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The Alesis **BRC™ Master Remote Control** puts the power of digital copy-and-paste editing in the hands of all ADAT® users. Take that great backing vocal on the first verse and fly it into verses two and three. Or, create the ultimate montage sax solo by copying small sections of many different takes with single-sample accuracy. The BRC gives you the advantages of a hard disc recording system with the security of a tangible tape-based storage medium.

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Select source with trk buttons

Offset Tape 02 from L04 to L08

L04 "Chorus 1" + 16-01:00

L08 "Chorus 2" + 48-01:00

Track delay: 170.0 ms

In the ADAT Digital Multitrack Recorder, digital audio not only sounds better, it becomes an essential creative tool, thanks to the patented Alesis technology that connects all ADATs in a system. The ADAT MultiChannel Optical Digital Interface™ on each ADAT transmits and receives eight channels of digital audio simultaneously using high-quality fiber-optic cables. The BRC can direct the "traffic" on this eight-channel interconnect, offering advantages not available on any other tape-based recording system.

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To be continued...

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Ed Golya and Danny McClelland, Avenue Edit

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Avenue Edit, Chicago

"We believe Scenaria is the best tool available for audio post. Our clients are always amazed by Scenaria's power and integration, all functions and project information reside in one system, making revisions quick and painless. And SoundNet networking lets us share resources between our two Scenaria systems."

Rick Wilson, The Post Group

The Post Group is a full service post-production facility with four room audio department. Their ScreenSound and Scenaria systems are used for a variety of projects from music videos and commercials to interactive video games.

Projects include: Paul McCartney World Tour video. Music videos for artists such as Prince, Hammer, Ice Cube and Tracy Chapman.

The Post Group, Hollywood

"The ergonomics of Scenaria attracted us to the system. We needed an automated system, but were limited in the amount of space available for its installation. Scenaria has solved both problems allowing recording, editing and mixing to be carried out on a compact, uncluttered work surface, and in the digital domain."

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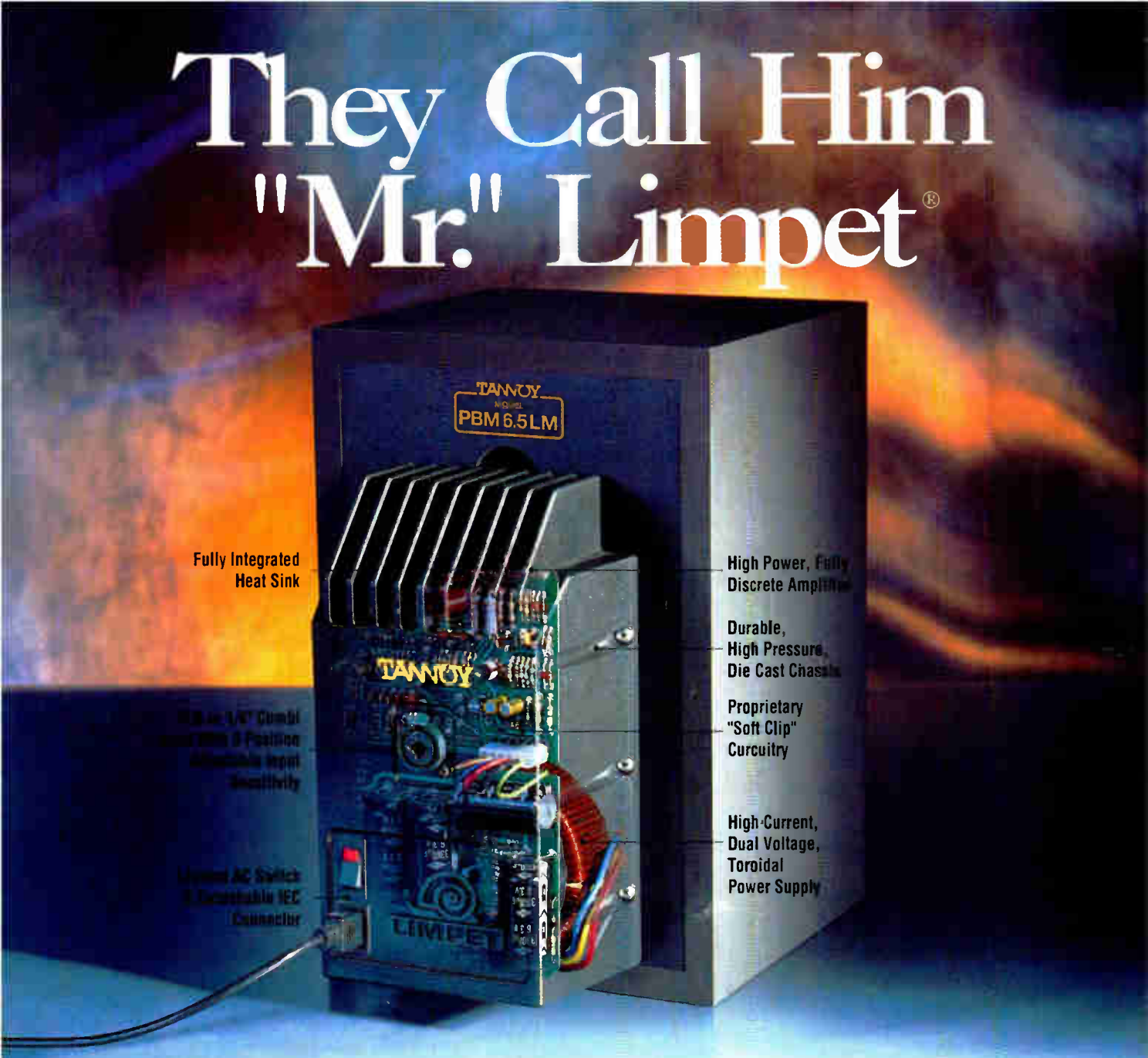

■ Every once in a while a product comes along which not only meets the ever increasing demands of the market, but one whose smooth commercial styling, ergonomics, durability and outstanding performance demands respect. Introducing MR. LIMPET. ■ The LIMPET is a unique, compact design that combines a very high current toroidal power supply, fully discrete amplification stages, and ultra wide (10 Hz to 80 kHz) bandwidth capabilities in a very affordable system. ■ Built using a one piece high pressure die-cast metal housing, the LIMPET is not only very rugged electrically and mechanically, its internal construction takes advantage of the industry's most advanced assembly techniques. ■ The LIMPET amplification system can be used with a wide range of TANNOY professional reference monitor systems, and provides the user with a number of improvements in both the performance of the loudspeaker system, and its flexibility. ■ Each single channel LIMPET system delivers an enhanced stereo image because the channels are fully separated - no power supply sagging due to inter-channel coupling, no crosstalk, no interference. Almost any kind of input level and connector can be used, since the LIMPET offers a balanced or unbalanced "combi" connector that can utilize either 1/4" or 3 pin jacks. ■ The ultra-low noise input section can accommodate either 0.775, 1.0, or 1.5 volt drive levels with no performance sacrifice. ■ The LIMPET's universal power supply, equipped with an industry standard IEC connector easily deals with almost any voltage, making the LIMPET a true global traveler. Finally, you can take your monitors wherever your work takes you, and not have to worry about cumbersome and troublesome adaptors, power converters, or strange electrical systems. ■ In addition, the unique and proprietary soft-clip circuitry and the significant reserves in the power supply ensure that no damage will occur to the drive units while providing the headroom needed for even the most demanding requirements. ■ The LIMPET is ideal for professional recording, broadcast/post production facilities, remote and live recording reinforcement applications, and finally gives the private/home recording studio truly reference quality performance unequaled at twice the price. ■ Instead of settling for the ordinary, get a LIMPET and get a real grip on your reference monitor performance.

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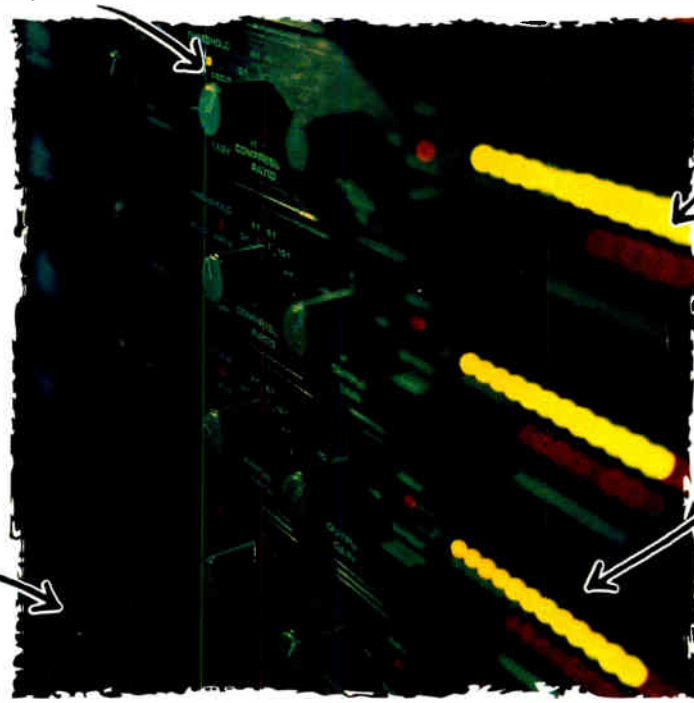

"Easily drove long lines over an acre of land."
Farm Aid, 1986

"A dent from where the thrashers knocked over the rack."
San Francisco, 1992

After 12 Good Years On The Road, We Thought It Was About Time For A Tune-Up.

When the original dbx 160X compressor/limiter was built some 12 years ago, it was built to last. After a slew of tours and out-of-town gigs, we've found that 99% of them are still on the road today. Which isn't bad. But then again, it isn't perfect. (Truth be told, that other 1% wreaked havoc on our egos.) Which is why we've designed the new and improved dbx 160A compressor/limiter. It operates simply and flawlessly to give you the legendary dbx sound by offering superb metering and a choice of hard knee or OverEasy™ compression. It also offers the best output stage for driving long lines. All this is just the right amount of tinkering and tuning to bring the dbx 160A up that extra notch. After all, you shouldn't be the only one on the road giving 100%.

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MIX®

PROFESSIONAL RECORDING • SOUND AND MUSIC PRODUCTION

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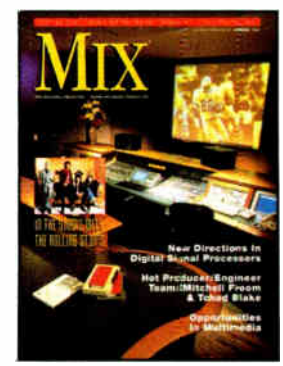
DEPARTMENTS

Cover: Cutters Inc., an all-digital post-production facility in Chicago, is the home of Sound One. The Surround-Sound room is centered around a 96-channel AMS Logic 2 console with a 24-channel AMS AudioFile Spectra. Acoustician Carl Yanchar helped design the suite, which features Foley pits, a voice-over/drum booth, random access video, Genelec monitors and complete digital integration with Cutters' other digital room, Sound Zero, as well as to other studios nationwide, via EDNet T1 fiber-optic lines. **Photo:** Kevin Anderson. **Inset Photo:** Mark Seliger.



STUDER: THE BEST INVESTMENT

IT'S DECISION TIME in a vast number of studios across the world. The question: what's the best multitrack platform to suit your needs today, and take you reliably into the future?

The choices are many – analog multitrack; digital multitrack; digital audio workstation. Each is a significant investment: one of the biggest you'll make. But what's the best choice to *protect* that investment?

The truth is, there's no simple answer. What we can say with certainty is that in many applications, there's simply no substitute for the capabilities of multitrack tape. Indeed, the solution emerging in many major facilities utilizes a combination of technologies: synchronizing multitrack analog and digital tape machines, while employing digital audio workstations for assembly and some aspects of editing. Our associate company Studer Editech makes one of the best tapeless systems around – the *Dyaxis*.

The fact is, tape works – artistically and financially. With 25 gigabytes of storage per reel of digital tape, it's the most cost-effective medium for multitrack music production, and it's easy to work with. Tape doesn't require time-consuming transfers or backup. In addition, multitrack tape systems are not dependent on the unrelated needs of other industries.

Tape is not going to become obsolete next year, and neither is your tape machine – analog or digital.

Good reasons, then, to come to Studer. We've been making tape machines from the very beginning, and whether you need analog or digital multitrack – or both – we have the highest return solution.

Studer. Hear Today – Here Tomorrow.

IN YOUR STUDIO'S FUTURE.

THE STUDER D827 MCH 24/48-track DASH recorder sets new standards in digital audio recording – just as its partner, the A827, represents the new standard by which analog multitracks are measured.

The Studer D827 MCH offers full 24/48-track capability – with field upgradability from 24 to 48-track. Its 18-bit converter technology ensures the very highest sound quality – in line with the Studer tradition. With proprietary noise shaping techniques to ensure that the subtle nuances of your recordings make it on to CD.

And the Studer D827 MCH offers something more: optional Studer-format 24-bit recording – without losing compatibility with existing DASH machines.

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And if you thought a modern multitrack recorder was just too expensive, think again. Due to the 827 series' excellent residual value, leasing companies are willing to offer extended leases with low monthly payments.

So why wait until tomorrow for your multitrack solution, when the answer's already here, today?

There's never been a better time to choose Studer for your studio's future.

Contact your nearest sales office for detailed information on the complete range of superlative 827-series multitrack tape machines.

Studer quality, reliability and support. The ultimate in sound quality – and the ultimate return on your investment.

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FROM THE EDITOR

One Strike and You're Out!

People often speak of win/win situations, those rare occasions where all parties benefit from a transaction. Unfortunately, this has hardly been the case with the great baseball strike of 1994. The players lose, the owners lose, and the fans lose. But closer to home, there are hundreds of audio professionals—broadcast personnel, sound reinforcement engineers, repair techs, rental companies—affected by the dispute. Not a pretty picture.

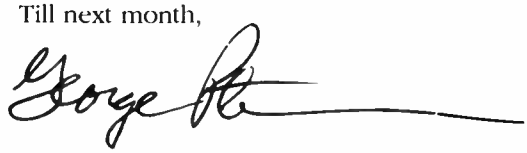
At the time of this writing, even the prospect of a World Series seems clouded. But aside from catching a Triple-A game or two, many fans quenched their thirst for big league action by tuning in to *Baseball*. Created by Ken Burns (director of *The Civil War*), this 18-hour series is expected to be the most-watched documentary event in television history. In this issue, *Mix* associate editor Tom Kenny speaks to soundtrack producer John Colby about the creation of the *Baseball* CD. Colby spent countless hours compiling material from dozens of sources covering the history of baseball, ranging from the 1911 wax cylinder recording of "Take Me Out to the Ballgame" to the pristine 48-track digital recording of Natalie Cole doing Duke Ellington's "Did You See Jackie Robinson Hit the Ball?"

For another slant on restoring vintage recordings, we take the Cedar DC 1 Declicker, CR 1 Decrackler and Esoteric Audio's Ramses 78 player out for test drives on a reissue project of early jazz and pop recordings: wax cylinders in a digital age.

But technology aside, the restoration of any historical audio poses serious moral and ethical questions. How does one walk that dangerous boundary between restoration and re-creation? Is equalization okay? If so, how much? How about a touch of reverb or some spatial processing? We've all heard far too many of the awful "rechanneled for stereo" releases, so where does one draw the line? Food for thought.

Also this month, our resident skeptic Stephen St.Croix begins an in-depth, three-part investigation of low-cost CD recorder technology. Will the CD-R masters and CD-ROM archives we cut today be playable five years from now? One year from now? The technology's here today, but how well does it work and how safe is it? Obviously, these are important issues to consider.

Till next month,



George Petersen,
Editor

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And right out of the box it's ready to use as a 32-part multitimbral musical instrument or a full-fledged studio production tool. With its diversity of sounds and infinite sonic possibilities, unsurpassed fidelity and sound manipulation capabilities, the S-760 will open up new worlds of sound, even if you already have a full rack of synths.

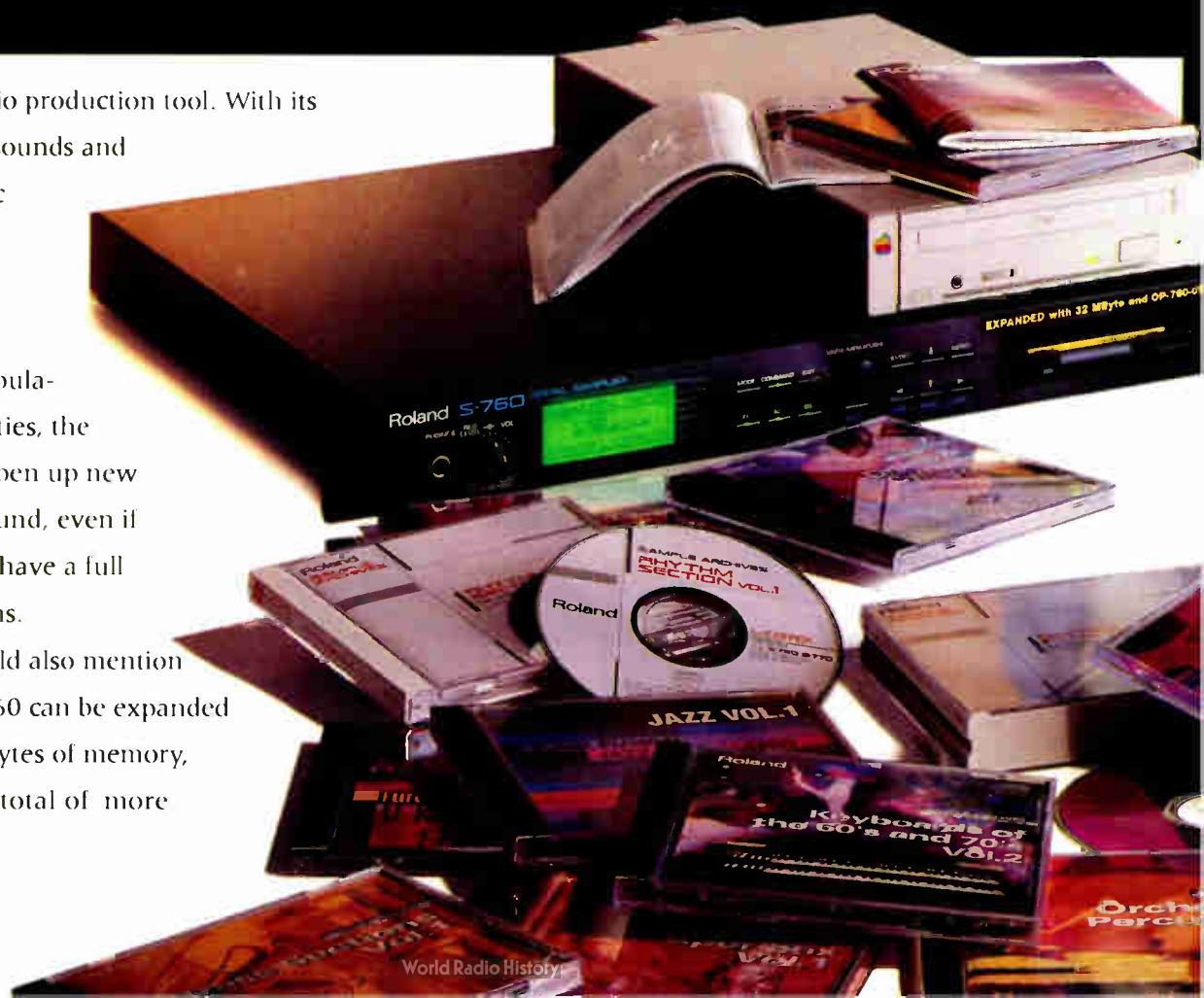
We should also mention that the S-760 can be expanded to 32 megabytes of memory, providing a total of more than three minutes of stereo sampling time at full bandwidth.

And the built-in SCSI interface lets you plug in virtually any storage device, including CD-ROM drives, hard disks and removable optical disk drives.

Edit your sounds with monitor and mouse.

Our large high-res LCD makes it easy on the eyes when you're editing without an external monitor. And with the optional OP-760-01 Board,

If you don't think you're quite ready for a sampler, think again.

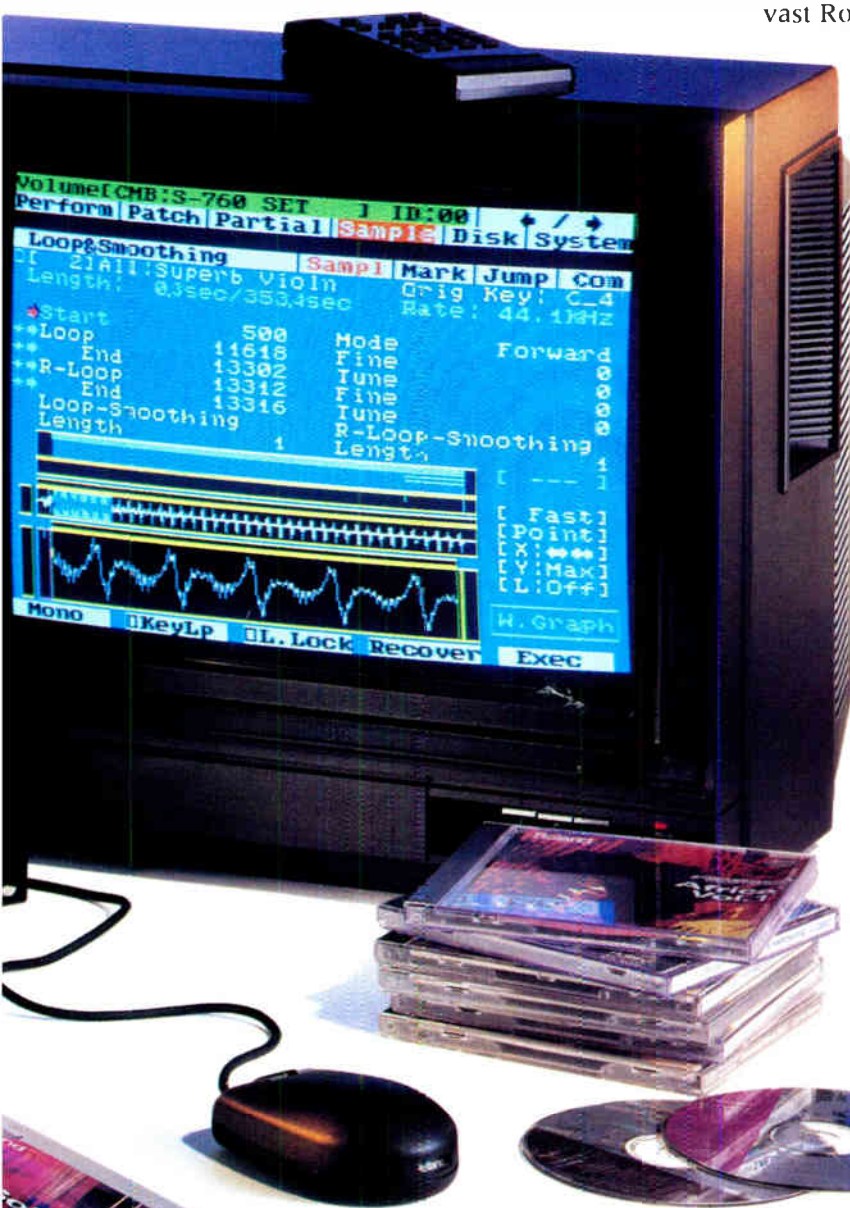


you can connect the S-760 to either a dedicated monitor or your ordinary color TV, and use a mouse for point, click and drag editing. View and access all editing operations such as loop, time stretch and cut/splice functions in an intuitive, easy-to-use graphic environment without having to use an external computer with dedicated software.

The Option Board expands the S-760 with lots of advanced functions like S-video, RGB and composite video output plus digital I/O, transforming the S-760 into the ultimate high-end sampler.

All the sound in the world at your fingertips.

The S-760 gives you immediate access to the vast Roland 700 Series CD-ROM library, the fastest-growing sound library in the world. And it comes with a 600 Mbyte CD ROM Preview Disk that'll get you started right away. Its standard SCSI port accepts up to seven SCSI devices, letting you play thousands upon thousands of meticulously recorded CD-ROM samples from around the world. Like Roland's Sample Archives, Project Series, Composer Series and numerous third party sources. The S-760 can even load data from the S-550 as well as convert programs from Akai® S-1000/1100 data.



Five bucks says you're ready for a sampler. Put down this magazine, pick up your phone and call (800) 386-7575. Ask for our $5 *Sample Archives Demo Disk II* audio CD and our new CD-ROM catalog of Roland and 3rd party sounds. Better yet, put down this magazine and get to your nearest Roland dealer for a real-time demo of the S-760 Digital Sampler. Then you'll know what we've known all along. You're ready.

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CURRENT

OSHA CITES A&M STUDIOS

In response to a complaint against A&M Recording Studios in Los Angeles, an inspector from the California Occupational Safety and Health Administration paid a visit to the studio on July 20 and issued several minor citations. The violations were unrelated to sound, but three more serious citations (which were reduced to minor) were issued for procedural issues around employee hearing protection.

Cal OSHA representative Rick Rice said the studio was cited for not having a hearing conservation program for employees, not ensuring that employees use proper hearing protection, and not providing training in hearing conservation. These were initially cited as serious violations, but—as state policy provides for—on discussion with the employer, the severity was reduced. Rice said that A&M Studios has been extremely cooperative and has already begun measures to abate the problems.

According to studio chief and A&M Studios vice president Shelly Yakus, the Cal OSHA inspector had a second engineer wear a sound-level meter for four hours in a session but discovered only brief moments of sound levels in excess of OSHA standards.

Yakus said that in response to the procedural violations, OSHA "talked about giving baseline hearing tests to employees and discussed having some of the people who work in control rooms, such as second engineers, wear custom earplugs when the levels get too high. We like what they have to say. They've been very reasonable in their requests, and if employees are subject to excessive sound, they have the right to know. We're going to do our best to inform them and to comply with the regulations."

Rice stressed that clients renting studio time and independent contractors are not subject to OSHA regulations in this regard, only employees of the business—clients can monitor as loudly as they like. He said "this was the first time that Cal OSHA enforced noise exposure regulations in a recording studio environment. Hearing regulations were developed for manufacturing and construction operations, but they would apply [to recording studios]." He referred interested California studio owners to the relevant material, contained in the California Code of Regulations Title 8, section 5095-5100, "Control of Noise Exposure."

NEWS FLASH!
RECORD PLANT BUYS EFX SYSTEMS

As we went to press, Record Plant announced its purchase of audio post facility EFX Systems, Burbank. More news next month.

TODD-AO ACQUIRES SKYWALKER SOUTH

Todd-AO/Glen Glenn Sound of Hollywood has signed a letter of intent to purchase the assets of Skywalker Sound South in Santa Monica. The deal, which is in due diligence as of press time and is expected to be completed October 31, involves the equipment and lease for the Lantana facility, as well as the building and equipment for the former Lion's Gate, known as the Bundy facility.

Apparently, Todd-AO had been looking to purchase or build a facility on the West Side for the past two to three years to accommodate the growing number of producers and production companies that have moved to Venice, Santa Monica and Malibu. "There had been rumors for some time that they were interested in selling," says Chris Jenkins, president of Todd-AO. "We approached them about four months ago, and it seemed to happen pretty quickly. I think the Lucas organization was motivated to find a buyer who wouldn't take a year to work the deal through."

"Todd-AO is certainly a venerable corporation, one with a great history and one with a great love

—CONTINUED ON PAGE 16

TEC Awards Announce Presenters

There will be an all-star turnout at the Tenth Annual Technical Excellence & Creativity Awards, to be held Friday, November 11, at the Westin St. Francis in San Francisco. Awards presenters scheduled at press time include famed country music artist Ray Benson, engineer Ed Cherney, legendary R&B keyboardist Booker T. Jones, producer George Martin, musician/producer Alan Parsons, San Francisco's own Boz Scaggs, producer/musician Don Was, and Allen Sides, owner/engineer of Ocean Way Recording, a three-time consecutive winner of the TEC Award for Recording Studio.

The TEC Awards will begin with a reception at 6 p.m., followed by dinner and the awards ceremony. Tickets are selling fast. This year, a limited number of ceremony-only (dinner not included) tickets are available. For more information, call Karen Dunn at (510) 939-6149.

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To find out more about audio solutions from a company that's totally committed to the present and future of audio post-production, phone **1-800-949-AVID.**

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That's what Tony Brown wrote to us after being set loose in Masterfonics with Vince Gill and the AT&T DISQ™ Digital Mixer Core to mix "When Love Finds You."

"Our artists love it. I love it. The improvement in sound is dramatic."

Tony Brown, President/MCA Nashville

What double-threat producer/record company exec wouldn't be impressed? After all, most of the world's digital multitrack tape machines are hooked up to analog mixing consoles. So the pristine digital presentation is compromised at the final step of the production process. But not when the mixing system gives the creative freedom to move instantly from analog to digital at the touch of a button.

Created by AT&T and Bell Labs, the DISQ Digital Mixer Core works in concert with the analog board in your studio. Using the faders and knobs of the control panel you're already comfortable with.

There's no learning curve. Just connect the system to your Neve-VR or SSL-E/G analog board and you'll be mixing digital in no time. Or select a new, fully integrated digital mixing console featuring the automation technology of Harrison by GLW. The result: Sound that is richer, warmer and truer than anything you've ever heard.

Systems are already up and running in LA, Miami, Nashville, New York and Tokyo. And releases mixed on the DISQ system are in the stores. We suggest you take a listen.

Want full details? Call 1 800-553-8805.

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INDUSTRY NOTES

Lynn Martin has been promoted to director of sales and marketing for the **Harman dbx group** (Sandy, UT), consisting of Allen & Heath, Audio Logic and dbx. Other group sales appointments include **Michael Charles** to sales coordinator and **Darrin Ward** to sales support; **Dale Curtis** was named senior engineer at dbx ...New reps for **Bullfrog Inc.** (South Bend, IN) include **Robert Louis & Associates** in Ohio, Pennsylvania and West Virginia; **Peter E. Schmitt Co.** in NYC and New Jersey; **Creative Services** in New York state; **ProMusica** in New England; **Sound Sales** in Delaware, Maryland and Virginia; **Sound Marketing** in Indiana, Kentucky, Illinois and Wisconsin; **SGE Inc.** in Michigan; and **GMS Sales** in North and South Dakota, Iowa, Kansas, Minnesota, Missouri and Nebraska...**Ann Morfogen** was named vice president, communications at **Sony Corporation of America** (New York)...**John Casey** is the new marketing manager for all of **Denon Electronics'** (Parsippany, NJ) product lines...**National Semiconductor Corp.** (Santa Clara, CA) named **Dan Parks** as the strategic marketing manager of the company's newly formed audio product line...**IVL Technologies** (Victoria, BC), DOD Electronics' partner in the DigiTech Vocalist, Whammy Pedal and DHP series, appointed **Tom Lang** as product specialist...**Roland Corp.** (Los Angeles) made three new appointments to its pro audio division: **Tom Stephenson** was promoted to national sales manager, **Laura Tyson** joined the company as Northeastern regional manager and **Grendal Hanks** is the new Western regional manager...Electroacoustics expert **Christopher J. Strick** joined San Francisco-based **Charles M. Salter Associates** as principal consultant... **Starin Marketing Inc.** is the new **Electro-Voice** (Buchanan, MI) rep firm in Indiana, northern Illinois and eastern Wisconsin...**Professional Audio Systems** (P.A.S.) recently moved to a larger facility that will allow them to double current production levels to keep up with demand. The new address is 2270 Cosmos Ct., Carlsbad, CA 92009. Phone (619) 431-9924, fax (619) 431-9496...**Laurie Stewart** and **Jeffrey Cary** joined the marketing communications department at Rochester, NY-based **Applied Research and Technology** (A.R.T.), and **Nancy Kimbel** was promoted to the sales force in media placement...Hollywood, CA-based **Lightworks** hired **John DeMezzo** as Eastern regional manager (out of the New York office) and assigned **Chris Genereaux** to developing special markets...**Dennis Paoletti** of San Francisco's Paoletti Associates Inc. is the new president of the **National Council of Acoustical Consultants**...**Online Marketing** (Wadsworth, OH) appointed **Douglas A. Shields** as sales representative...**Jay Price** recently joined the audio division at Kipp Visual Systems of Baltimore...**Producers Tape Service** (Troy, MI) hired **Al Crouse** as sales manager and **Michelle Wolfe** as customer service assistant, and **Mike Skibinski** joined the account executive staff...Pro audio service and sales company **Into-it Audio** recently opened in Nashville under chief of operations and founder **Brandi Radtke**; call (615) 254-4900...Boston-based **Global Access Telecommunications Service** hired **Ray Sensney** as vice president, business development, **Dennis Werner** as operations coordinator and **Susan Gince** as syndication coordinator...**Lex Computer and Management Corp.** (Keene, NH) granted a worldwide license to **Matsushita Electric Industrial Co.** for the technology covered under its Montage patents for nonlinear editing systems...**Avid Technology** (Tewksbury, MA) recently inaugurated its North American Partners Program, a new sales channel program designed to broaden the reach of the company's products. Call (508) 640-6789...**BTS** (Simi Valley, CA) appointed **Steve Russell** as customer service manager and **Barry Rubin** as marketing manager for computer video systems. ■

—FROM PAGE 12, CURRENT

of post-production, as we have," says Kiki Morris, general manager of Skywalker Sound. "It makes good sense for us to feel comfortable with turning over the facility to someone who has the same high regard for quality that Skywalker does.

"We're going to be concentrating on developing our digital technology and production up north," she adds. "We're very involved with the digital tielines—we pioneered that and we continue to develop it. And as we continue to develop it and our clients become more and more accustomed to it, we have found that it's not necessary to be just in Los Angeles."

The layout at Todd-AO West will remain pretty much as it was before, according to Jenkins. First-call re-recording mixer Mike Minkler and his partner, Bob Beemer, have signed an exclusive agreement to occupy Stage 1 for feature films. Another first-rate feature mixer is on tap for Studio 2, but negotiations were still pending at press time. Studios 3, 4, 5 and 6 will continue as before.

"We really don't anticipate making any major changes as far as personnel," Jenkins says. "We want to bring in a sense of stability and predictability for the employees there. We plan to go in and operate it as the high-quality facility it is. It's a terrific fit for us, and it's a terrific environment there at Lantana Center."

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In case you didn't notice the double-page ad in last month's *Mix*, check out page 32 of this issue—there may be a free studio in your future. That's because *Mix* and our sister publication, *Electronic Musician*, have teamed up with Alesis Studio Electronics to give away a complete "Dream Studio," consisting of more than $34,000 worth of Alesis equipment. The studio includes mixer, monitors, outboard gear and three ADAT modular digital multitracks. ■

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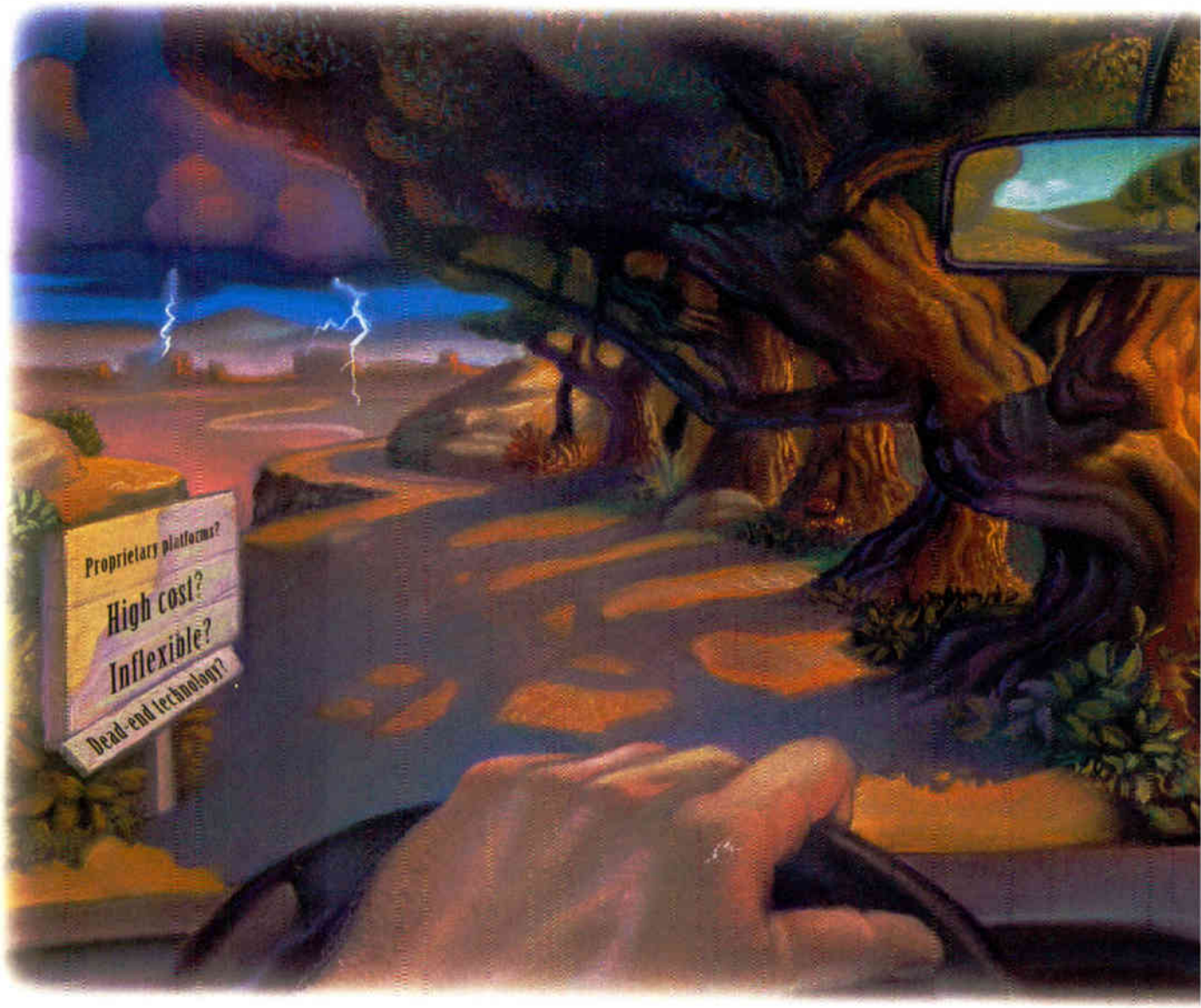

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TIMELINE

Workstations that work.

by Stephen St.Croix

To C or Not To D, That R The Question

1) CD-R WILL NEVER HAPPEN

Read this section to yourself in that famous whining Andy Rooney voice, and picture him at his desk absently fiddling with a dozen partially written CD-Rs.

Have you ever wondered why recordable CD technology has been around for all these years, yet *we* still don't have it? I mean, I can understand that it would be ridiculously expensive for the first year or two, and it certainly was—starting at over 35 thousand, then 15, then ten, 7.5, yeah, yeah, yeah. I've been waiting, you've been waiting. We have been waiting together. The years have been passing.

Then one day I picked up a magazine and there it was: three kilobucks. Wooh! This is more like it. In June, JVC Information Products announced that their CD-R system would have a retail price of $3,000. This was pretty interesting. For $3k, the average computer/audio dweeb could do some serious computer data archiving and even make some personal music CDs for that long drive to the beach. Seventy-four-minute CD-R media is currently down to around 13 bucks on the street. Thirteen bucks! When's the last time you could buy something on the street for 13 bucks that would last over an hour?

So I thought it might be time to try one of these things and let you know if they are any fun, or maybe even useful. As our own Paul Potyen has done some pretty extensive testing of these machines, and past (and coming) *Mix* issues contain the results of his efforts, I refer you to those for techy details. I just want to testify: to try the least expensive one and let you know how it went. Seems simple enough, doesn't it?

Well, I spent weeks trying to deal with JVC Information Products. Unfortunately, I not only couldn't get an evaluation unit; ultimately, I couldn't even get them to return my calls! I have had dealings with other divi-

ILLUSTRATION ANDREW SHACHAT

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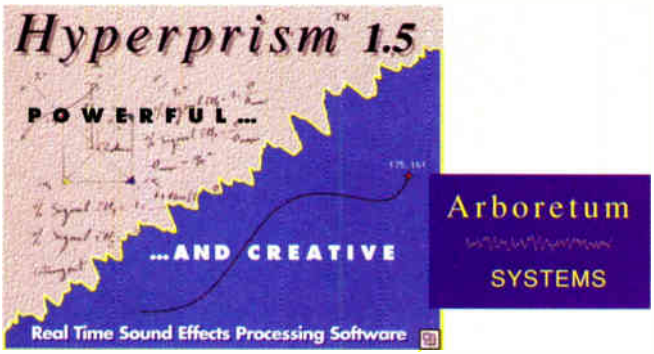

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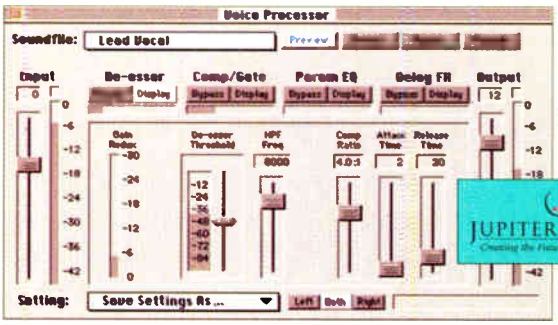

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sions of JVC and found them to be impressively helpful and cooperative; in fact, downright friendly and helpful. But not JVC Information Products. Maybe they just don't care what audio people think of their products.

2) WHAT NOW, GREEN KAO?

I finally gave up and moved on. I lined up other machines with no problem, and I am currently kicking out a couple CD-Rs a day with one that I found for only $2,500 retail! So there. I will tell you all about it in the next installment, when my tests are done.

Meanwhile, I decided to back up a little and interview people with CD-R experience—reviewers, users, manufacturers, mastering houses and software publishers—to see what is going on in the high-end. What I learned was pretty interesting. Success and myths all relate to the various combinations of hardware, software and media. Generally, the big freestanding pro systems are reliable in the hands of those who have paid their dues and spent the time to learn the idiosyncracies and media preferences of each machine.

Mastering facility B might swear by (and does, in fact) one brand of media for mastering from and writing to, citing a litany of reasons why all other brands gave them trouble. Facility M, on the other hand, might have exactly the same attitude and similar complaint list for the media they don't use, only their choice of the most reliable media might be the exact one that facility B said has never worked reliably since the dawn of arsenic-based dye. Research finally revealed that this is all based on successes and failures with the very early Yamaha, Sony and Marantz mechanisms, with various media. Early Yamahas, for example, didn't work well with the very light-dyed media like MTC, and since the people who owned these machines obviously needed totally reliable CD-R burning, they searched until they found media that was consistent. Even today, most are hesitant to change. The testing and learning involved in evaluating this media is exhausting, as I now know; so I can see why they might be hesitant to re-examine the question, but I offer a bit of advice: Today's media ranges from questionable to very impressive, and the best or worst ones might not be the same brands that were good or bad a few years ago. If you can make the time, have a new look.

> Today's media ranges from questionable to very impressive, and the best or worst ones might not be the same brands that were good or bad a few years ago.

3) AND THE REST OF US?

Unfortunately, the little low-cost SCSI CD-R market is kind of a mess. These systems can be made to work with well-designed software (and

—CONTINUED ON PAGE 190

by Bob Safir

THE AUDIO FOR MULTIMEDIA MESSAGE

DEVELOPING WORKING GROUPS

At last April's Computer Game Developers Conference, held at the Westin Hotel in Santa Clara, Calif., 1,600 people assembled to address a hundred issues facing the interactive gaming community. At that same conference, a small but substantial group of 70 people gathered to take a closer look at the audio issues facing the multimedia industry. As a result of that informal get-together, the kickoff meeting of The Association of Interactive Audio and Music Professionals convened two months later at the same site.

The original game conference hosted, among other things, an Audio Community Forum led by Tom Rettig from Bröderbund's sound department. At this meeting, a hot list of topics involving audio for multimedia emerged, chief among them the idea of having a common API (Programming Interface) for uploading sounds into the RAM area of an audio device. This capability would enable game manufacturers to have custom instruments or sound effects loaded into their programs.

A dozen other issues began to emerge out of this discussion. How about the ability to call up a digital audio file from MIDI? What about the general state of General MIDI? Cross-platform compatibility? Authoring tools? And, by the way, what's the story on composers' royalties (or lack of them) in the interactive entertainment arena? Who's taking care of *that* problem?

If there were a lack of time to solve the API question, it was certainly a stretch to address the dozens of related issues. It was out of this need that a proposal for an association of interactive audio professionals was born. Business cards were collected at the Computer Game Developers Conference from those interested in pursuing the multimedia audio issues. What followed was a groundswell of interest from many parties. The phones at InterOctave, the temporary headquarters of this newly emerging group, were ringing with inquiries from not just the U.S. but from Japan as well.

> If the mission is to "facilitate the advancement of music and audio in interactive media," then there's a lot of work that needs to be done.

The attendees of the June 20 kickoff meeting represented a cross-section of the industry that had never really assembled together before in one room: Apple, Bröderbund, Creative Labs, Media Vision, Microsoft, Crystal Semiconductor, AMD, Electronic Arts, E-mu, Sega, LucasArts, Kurzweil, Phonica, IBM, Digidesign and many others, including com-

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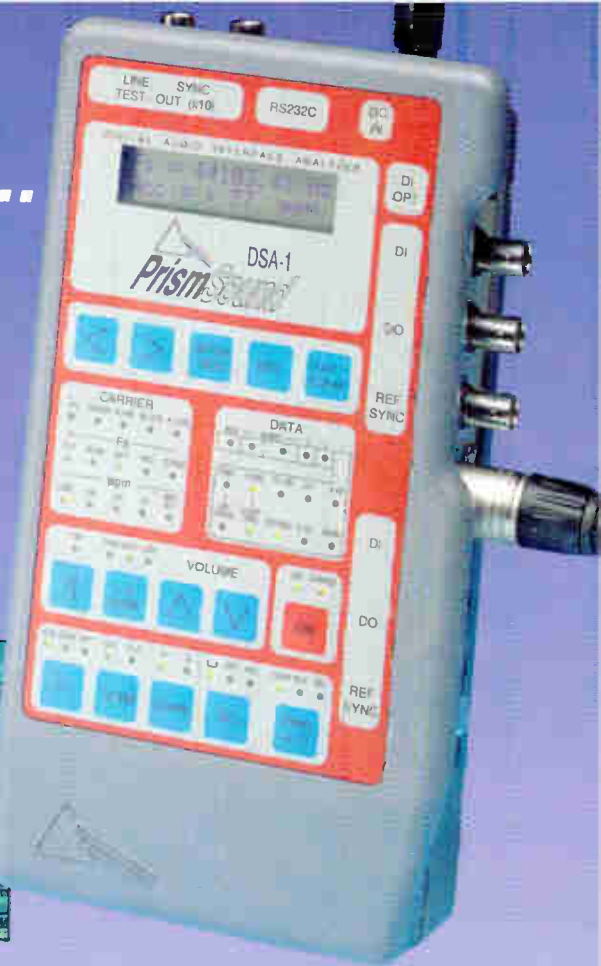

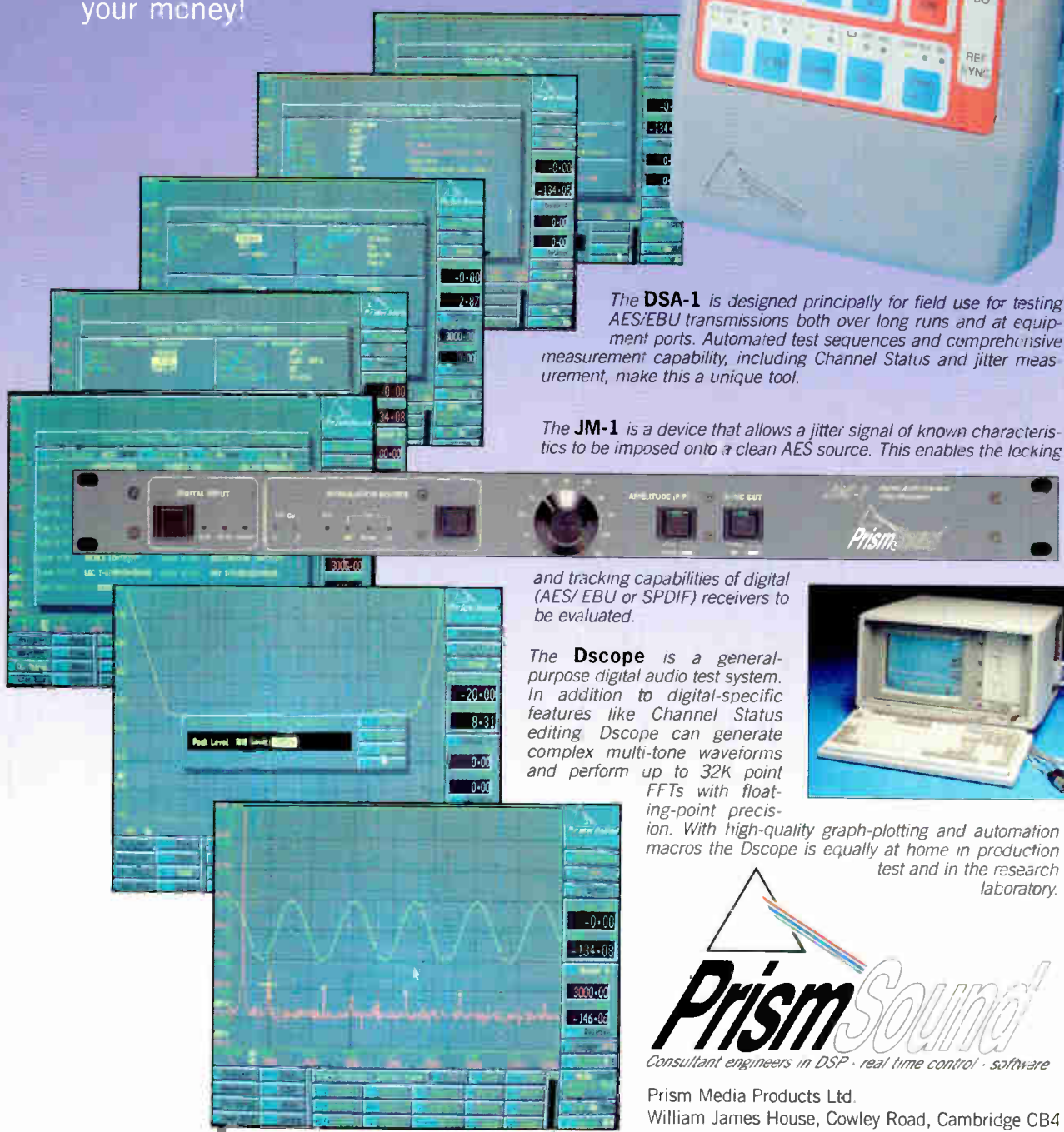

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posers such as The Fat Man, Rob Wallace, Don Griffin and this writer. Here was a terrific representation of "the audio portion of your program." The representatives from each of the main "food groups"—software, hardware and content providers—each had a specific focus on audio and music. Perhaps that's why it wasn't too surprising that in addition to interest in the subject matter, there was a lot of enthusiasm, energy and will-

IAIAC Workgroup Categories

Uploadable sounds/modification commands/generic synth spec
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- Sound Effects (triggered)
- Dialog (triggered)
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Standard imaging (3-D) parameters
GM compatibility
Digital mixing of audio
Synchronization
Compression/Decompression
MIDI calling waveforms
OS API deficiencies
Authoring Tools
Technology impact on end-user
Nonlinear scoring

From the above list, three actual working groups were formed based on attendees' interest in solving real-world problems:
1. Uploadable Sounds
2. General MIDI Compatibility Issues
3. Mixing/Compression/Sync/3-D (Post Processing)

power to deal with the thorny issues that lie ahead. The event was sponsored by Crystal Semiconductor, which makes (among other things) the audio chips for the synthesizers, sound cards and computers.

The mission statement for AIAMP was put this way: "To facilitate the advancement of music and audio in interactive media through the coordination of content, software and hardware professionals toward the development of recommended practices and specifications." This mission will require a focused energy and cooperation.

The goal at the meeting was to

identify the issues (and working groups to deal with them) and create an organization that can accomplish these lofty goals. Even the name AIAMP was temporary—the organizers of the event knew that there was an administrative cost that came with any organization, particularly nonprofit, volunteer-based ones. So it was up to the group to help determine its own destiny by identifying existing organizations that could serve as an umbrella organization for AIAMP to "live in."

Some of the organizations that were considered candidates for affiliation were the MMA (MIDI Manufacturers Association) the CGDA (Computer Game Developers Association) the IMA (Interactive Multimedia Association), the AES (Audio Engineering Society), VESA (DOS only), the SPA (Software Publishers Association), and the MDG (Multimedia Development Group).

Among the presenters at the event were Ernest Adams of the Computer Game Developers Association (a newly formed trade association of the Computer Game Developers Conference) and Tom White, president of the MMA. Both demonstrated why it would be beneficial for AIAMP to work in concert with their organizations. After subsequently reviewing the pros and cons of each proposal, the steering committee of AIAMP decided to split off the technical issues from the business and legal ones. The result is that AIAMP will become the Interactive Audio SIG (Special Interest Group) of the MMA. The business and legal issues will go with either the CGDA or perhaps an as-yet unidentified group. Tom Rettig and I were elected to serve as co-chairmen of the new MMA SIG.

Do I hear you asking what business the MMA has in working with a host of issues that go beyond the scope of MIDI? I thought so. As it turns out, the MMA, under Tom White's direction, has been pushing to encompass a wider vision for the future, one that would deal with multimedia hardware. As we all know by now, dealing with hardware means dealing with software as well. And while we're at it, we've learned that it's best to get input

—CONTINUED ON PAGE 190

Contact Information

The following e-mail addresses are available for obtaining additional information about IAIAC:
Interactive Audio SIG of the MMA
Bob Safir
interoctav@aol.com

To add yourself to the organization's database and receive information on an ongoing basis:
Rob Wallace
71042.1410@compuserve.com

Uploadable sounds workgroup:
Tom White, MMA (Chairman)
mma@pan.com

General MIDI authentication workgroup:
George Sanger (Chairman)
fatlabs@pan.com

Mixing/Compression/Sync/3D (Post Processing) workgroup:
Dale Gulick, AMD (Chairman)
dale.gulick@amd.com

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1. To enter the *Mix*/*Electronic Musician* Alesis Dream Studio Sweepstakes, print your name, address and phone number on the attached Subscription/Entry form or a facsimile thereof and mail it to the *Mix*/*Electronic Musician* Alesis Dream Studio Sweepstakes, P.O. Box 8845, Emeryville, CA 94662-0845. Enter as often as you wish, but all entries must be postmarked separately. **All entries must be received by October 15, 1994.**

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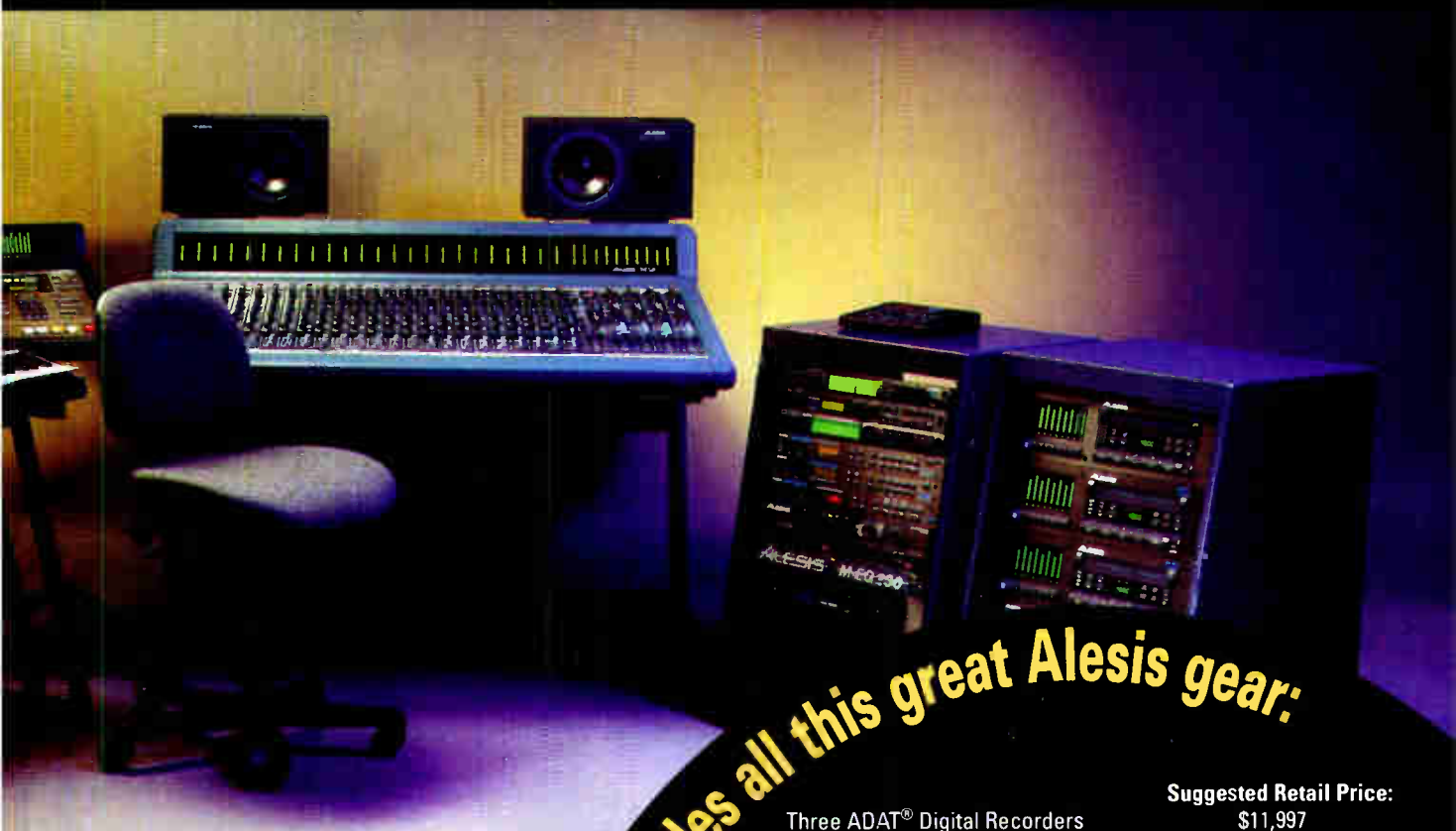

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All Entries Must Be Received by October 15, 1994!

by Mr. Bonzai

MR. BONZAI

Tchad Blake (left) and Mitchell Froom

MITCHELL FROOM & TCHAD BLAKE

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What could be better than hearing an artist totally at home with his heart, expressing her deepest feelings, exploring the personalities of passion and pain? Mitchell Froom and Tchad Blake are a production/engineering team that has captured these deeper levels of artistry on tape. There is a presence in their work that is outstanding and astounding.

Froom is the "producer," and Blake is the "engineer" in the usual sense, but these guys are too busy to be bothered by titles. Artists they've worked with include Los Lobos, Elvis Costello, Richard Thompson, Crowded House, Tim Finn, Jimmy Scott and Suzanne Vega. Lately, they've been splitting up to cover the territory in different ways, with Blake producing the Wild Colonials and New York's Soul Coughing. And here's the latest twist: Blake is producing Froom's upcoming solo album, which will feature guest appearances by an assortment of old friends.

Froom and Blake also happen to be two of the Latin Playboys, with Los Lobos' David Hidalgo and Louie Perez. The Playboys' album conjures up an image of Captain Beefheart stumbling into a saloon in Old Mexico and jammin' with the spicy beat, the traffic jam jazz, the celebration of many moods.

Join us now up at Cafe Bonzai in the Hollywood Hills for cheese and cucumber wrapped in smoked salmon, tofu with generous dabs of fresh ground garlic, boiled *edamame* (soybeans in the pod) and green tea...

Froom: This salmon is delicious—really nice.

Bonzai: What a pleasure it is to be here with you Latin Playboys. Is the album meeting your commercial expectations?

Froom: We didn't have any, so it's definitely meeting them.

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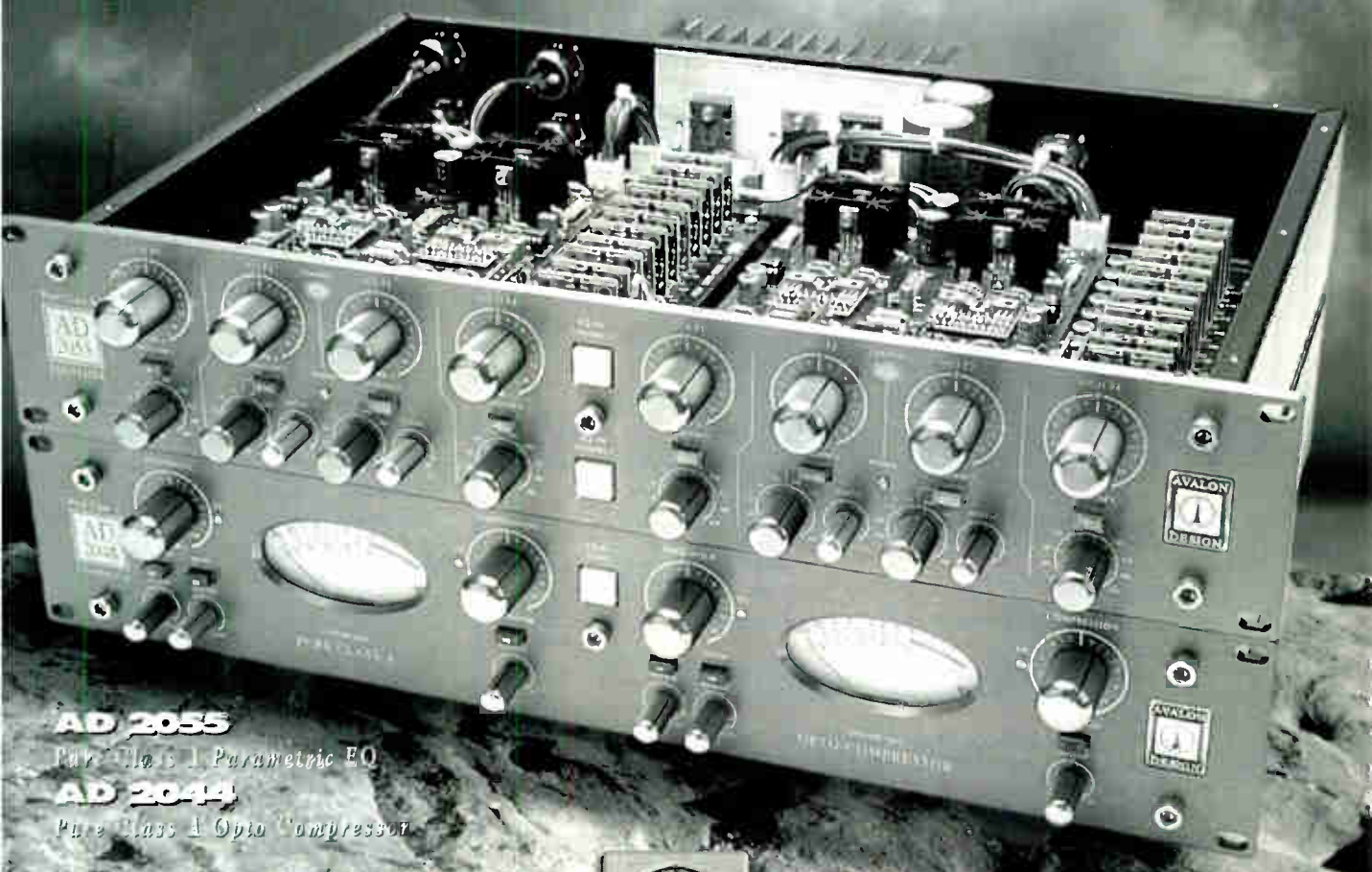

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when you can alter the sound to fit the track you're working on. If you pick one variation, it's not necessarily going to work that well on many things, whereas with the Novachord you can really fine-tune the sound to what you want.

Bonzai: Does the recording process slow down when you're working with these unfamiliar instruments?

Blake: No, it's actually faster, because they already have a sound that has so much character. I don't need to do much to them. At the most, I might have to clean up a little noise or a hum I might have to get rid of without affecting the sound, but that's it.

Froom: If somebody doesn't know what they want and they have a sampler with 4,000 sounds, you can spend forever and you just get lost. If you have a real instrument and an idea that the tonality can work in the track, then in a half-hour you can figure out how to play it and adjust the sound.

Blake: The main thing for us is to find the sound quickly and get it down and not make the process lugubrious.

Froom: We don't get caught up in the political implications of the instrument, either, like the sound of a tambourine and its large social, cultural and historical meaning.

Bonzai: What about microphones—do you have a little arsenal?

Blake: No, that's another thing I don't get hung up on very much. I use whatever is available.

Froom: We have one microphone that we often use for vocals—a Telefunken 251. I bought it because we started doing more traveling, and you can't find that mic in some countries.

Bonzai: Do you have a special preamp?

Blake: I've got a Little Labs mic pre, built by Johnathan Little at A&M. Incredible mic pre. But that's really it, for the vocals. Everything else is whatever the studio has—anything is usable, as long as it works. I don't get hung up on the sound of a piece of gear—I like it when things come up sounding in unexpected ways.

Bonzai: What about tracking analog vs. digital?

Blake: I like analog, and not necessarily because of the sound. Digital sounds fine to me in many applications. The main reason we use analog is that it is faster—we can edit immediately and inexpensively. We don't need another machine, other reels of tape or locking up. We never lock up machines—the most we do is 24 tracks.

Bonzai: So you just chop the tape?

Blake: For an edit, we just cut it and put it together. If we don't like it, we put it back. I love cutting tape. We don't go to a studio and say that we have to get things sounding a certain way. It just doesn't come into the picture. You put the band in the room, you bring it up on the console, you hear it back off the tape. Even if the tape changes the sound a little bit, I don't say, "Hey, the machine's aligned wrong." I like the things that happen in the process.

Bonzai: What has been your biggest commercial success?

> "Right now seems to be a particularly great time for people like us who tend to avoid the more generic type projects and concentrate on things that are more fun for us."
>
> —*Mitchell Froom*

Froom: The biggest one was a bit of a joke and wasn't really very good. We only spent a couple of days on it—"La Bamba," the Los Lobos single. That was Number One on a bunch of charts all over the world in '87 and '88.

Bonzai: Was that the beginning of your relationship with Los Lobos?

Froom: No, before that I had played organ on a remix of "Will the Wolf Survive," the single, and that's how we met.

Bonzai: Shall we pick an artist and talk about the pre-production, the tracking, the mixing? Los Lobos?

Froom: Well, for the *Kiko* record there was no pre-production involved. They had done some writing, but as far as I was concerned, we just started up and did the record very quickly. A group like the American Music Club would be the extreme opposite—I spent five or six weeks rehearsing them before we went into the studio. It just depends on what's needed and what kind of record they want to make. There are no specific guidelines.

Bonzai: How did Elvis Costello's *Brutal Youth* come together?

Froom: I had been talking to him about the sort of record he wanted to make, and the big discussion was about who would be the musicians on the record. He had worked with drummer Pete Thomas over the years and wanted an aggressive record, so Pete was the guy to play drums. Elvis had worked on some tapes before Tchad and I were involved, and he was in touch with [keyboardist] Steve Nieve, so he was a natural. The big discussion was really in the casting of the band, and Elvis had the idea of working with Nick Lowe. I had worked with Bruce Thomas on Suzanne Vega's album, and he seemed to be the best choice for bass. We went into rehearsal, one week with Nick and one week with Bruce, and just went into the studio with a pretty live setup.

Bonzai: How many weeks of tracking?

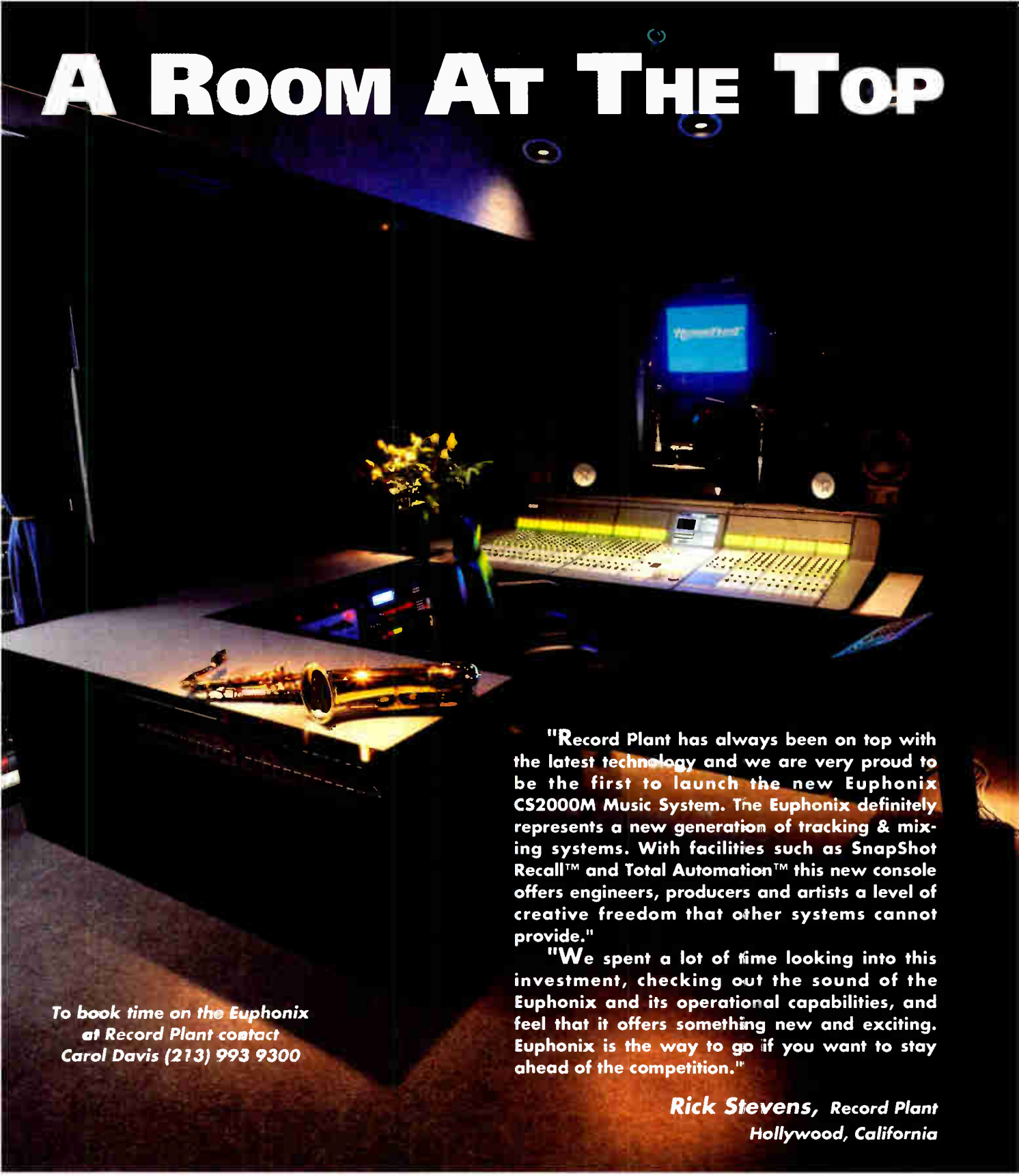
Froom: We don't really do what you call tracking. We just start working, and oftentimes that's the end of the story. You get the sound of the record on the day you're working.

Blake: We usually complete the song that day, including vocals, overdubs.

Froom: We take it as far as we can, and sometimes we'll go back to it later. Often it's finished, but you may want a little more perspective, or if the singer isn't in good voice that day, we may go back. It seems that the most successful recording is done at the moment. If you have somebody sing on a track, and the engineer is working that sound into the track and everything works together, it's going to be much easier for the person to sing it that moment. Much better than if you do overdubs without considering what the vocal may be. It can be difficult to have someone sing over some foreign sounds, conflicting frequencies and all that. In general, right at the moment, people are really into it, they're not paranoid, they are relaxed. If they've sung the song three or four times through the course of the day, they are right there with it. And the same goes for overdubs. People are into the real feeling of a track, and not coming back to it later, try-

—CONTINUED ON PAGE 208

A Room At The Top



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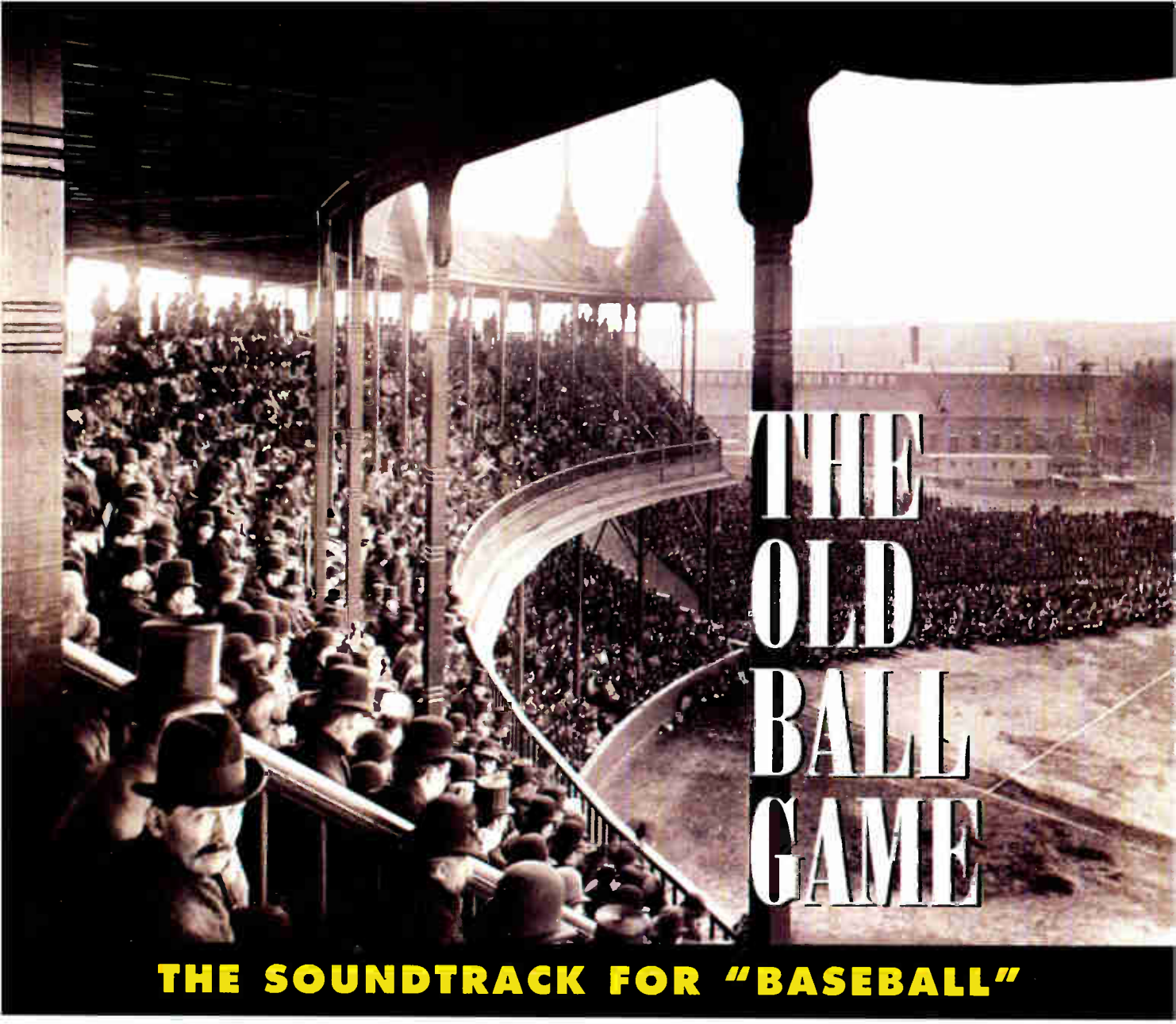

THE OLD BALL GAME

THE SOUNDTRACK FOR "BASEBALL"

BY TOM KENNY

"I once heard Ken Burns say that he likes to think of himself as a historian of human emotion. He's trying to dive in deep into how people felt through what they saw and what they wrote. That's his approach to history—he wants to tell the human story."

—ERIC EWERS, FLORENTINE FILMS

Documentary filmmaker Ken Burns has a gift for picking uniquely American stories and telling them from the perspective of individual Americans. As viewers think back to *The Civil War*, with the melody of "Lorena" lilting in the background, it's the soldiers' letters home that they remember. The story of Gettysburg, or Sherman's March, has been told hundreds of times in story and song. But the story of the footsoldier had not, at least not to a wide audience. And it's these personal stories—along with the musical selections—that pack the emotion. Burns did much the same thing for *The Brooklyn Bridge* (1982) and *The Statue of Liberty* (1986), both Academy Award nominees. And now he's put his touch on the history of baseball in an 18-hour PBS documentary—told in nine "innings" over nine September evenings—that promises to surpass *The Civil War* as the most-watched documentary of all time. Certainly, as an American sub-

A Film by Ken Burns

Above: Grand Pavilion, Boston South End Grounds, c.1890

ALL BASEBALL PHOTOS COURTESY OF THE NATIONAL BASEBALL LIBRARY AND ARCHIVE

ject, the history of baseball deserves epic treatment. The power of individual achievement within the context of the national pastime is as hot-dog-and-apple-pie as it gets. Along the way, in the course of his 125-year sociocultural study of America through baseball, Burns and his team at Florentine Films have managed to bring forth a history of recorded American music, albeit with a baseball slant. And it's out on CD.

"Ken's real brilliance is that, although he's not a musician, he has a great ear for melody and a great sensitivity for hearing and feeling genius where it exists—and especially how it matches up to his subject on an absolute emotional level," says John Colby, co-producer of the soundtrack album and a contributing composer for the film. "The tunes that he chooses to represent these films are ones that the public reacts to. These are beautiful old tunes—'Lorena,' 'Hurrah for the National Game'—tunes that strike an emotional chord. Ken has a great instinct for that. Because this film spans more than 125 years, its scope is about 20 times the length of his previous stories. So it became a broad stroke of American music, and the focal point is how it relates to baseball."

Colby has been working with Burns for more than a dozen years. The *Civil War* soundtrack won a Grammy in 1991 for Best Traditional Folk Album, and shows that Colby's been associated with—primarily sports programming—have won six Emmys. He has composed and/or produced more than 600 original TV themes and underscores, and from 1984-93 he was music director for ESPN, writing the infamous *Sportscenter* theme. He's written music for the past two Super Bowls, Wimbledon, the French Open and *NBC's NFL* and *NFL Today*. In his spare time, he has written underscores for the daytime soaps *One Life to Live* and *As the World Turns*, as well as *Lifestyles of the Rich and Famous*.

From the beginning, Colby says, the goal was to produce a soundtrack album that stands on its own, one that obviously reflects the film but does not just pull out the highlights—the idea being that if you don't see the film, the CD still stands as a document. Interestingly, the process of mixing the soundtrack album was in many ways the equivalent of mixing a film, sans picture.

"I looked at this project as having two types of elements," says Larry Gates, who mixed the disc at Newfound Music in New York, where he is co-owner and chief engineer. "One is songs, which were either completed as they came in from artists such as Dr. John, Carly Simon and Natalie Cole, or original piano or trumpet recordings, or from sources. The other segments were the montages, which are combinations of, in some cases, music, old blues recordings, ambiences, historical radio broadcasts, baseball hits, crowd noises, etc., all blended into an audio picture. We tried to put it in a visual context and create the audio equivalent of a believable scene."

The "scenes" on the CD begin with a Walt Whitman poem on the game of "Base," then it moves into the first recorded version of "Take Me Out to the Ball Game" (1911), followed by a piano-only version of "The Star Spangled Banner." The musical selections run from pre-World War I novelty tunes ("Gee It's a Wonderful Game"), to old-time

Hack Wilson, with grimace

Co-Produer John Colby holding an Edison Cylinder Player with engineer Larry Gates holding a cylinder and CD in front of the Spectral Synthesis workstation at Newfound Music

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blues ("Steal Away"), Roaring '20s ragtime ("Clubhouse Stomp"), big-band swing ("Pound Cake"), melancholy jazz ("Black and Tan," written by Duke Ellington for Jackie Robinson), '50s boogie ("Say Hey"), '70s pop (Carly Simon singing the original arrangement of "Take Me Out to the Ball Game") and even a contemporary interpretation of "The Star Spangled Banner" by Branford Marsalis and Bruce Hornsby, recorded during a break at *The Tonight Show*. "We didn't look at this thing as 31 separate cuts," Colby says, "but rather in blocks of time."

To maintain cohesiveness conceptually throughout the 60-minute disc, Colby and co. keep returning to the piano sound of Jacquelin Schwab—what Colby refers to as "the glue," recorded at Billy Shaw's Soundesign in Vermont. To maintain cohesiveness technically, they relied on balance and timing, accomplished within the Spectral Synthesis system.

"We took great pains in terms of balancing the ambience on this record that we would set the music into," Colby says. "Every segue on the record was examined regarding the transition—was it a comma, or was it a period? There were an immense number of sound effects and ambiences, with levels like you wouldn't believe. To balance these things out, to keep them together over this span, could only be done with the technology we had available, which was the Spectral system. We scrutinized every element, every second, and it was a battle to get everything to sit and feel that it belonged there."

"Timing was everything," adds Eric Ewers, associate producer on the CD and the group's liaison with Burns' Florentine Films. "One of the major things I've learned from Ken: This is an 18-hour film, and he knows every single frame, every single second. He can tell you why he made the decision that it should be

30 frames of black instead of 24 frames of black, and it makes a difference in how someone views it, hears it and sits with it. Whether it's a smooth transition or not. That's one of the things I wanted to bring to the table when we started working with the CD. I wanted to sit down with Larry [Gates] and say we need another second between these two cuts, which means he has to move everything from that point down. Plus we were tied into the Megamix, and he had to move that down. It was a painstaking process to get an extra second, or an extra half-second or less. But we had to have enough breathing space."

"Every segue will either feel correct or jumped or pregnant," Colby adds. "In other kinds of material it's not as crucial, but in this project, from the minute you hear sound at one end till it goes away at the other end, it had to fall in beatwise, musically."

All of the assembling and matrixing of sound elements—the layering, fade-ins, fade-outs, crossfades and the like—took place within the Spectral. "When some of the transitions involve lots of small sound bites—ambience bits, location sounds—they really needed to be matrixed together in the Spectral," Gates says, "and then the gross fade-up or fade-out could be done easily at the console. In terms of balancing levels from bite to bite, the Spectral was great. It gives you an instant ability to change the level of the sound bite, to split it into as many pieces as you want and affect the level or fade-in/out of each of those pieces, and it's all nondestructive.

"The Spectral also allows you to instantly duplicate elements, too, so if you're creating an ambience bed and you don't have enough time for an ambience, you can loop it quickly. All of this was done to 'put you in the scene.'"

The basic Spectral setup at Newfound Music consists of a 486/33MHz platform with a 17-inch monitor and "a real fast video card." It has eight analog ins/outs and a pair of switchable S/PDIF and AES/EBU ins and outs. It locks to an external word clock sync, and at the mix, it served as a master SMPTE time code source, driving the Megamix automation on the Amek Angela console. Audio was stored on a 1.2GB Hewlett-Packard drive. ("We're getting eight tracks off it in real time," Gates says, "although

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when there's a lot of crossfading and stuff going on, we're down to seven tracks.") Backup is to an HP 4mm dataDAT.

All of the sound elements, roughly 250 to 300 pieces for the mix—many on DAT, others from dbx ¼-inch—were loaded into the Spectral "pretty much flat, digital-to-digital transfer," Gates says. In the editing phase, the Spectral was used to build backgrounds and music beds, and to create transitions between "scenes." In the mixing phase, it functioned primarily as a multitrack and time code source, sometimes as a submixer.

"The Spectral has only eight outputs," Gates explains, "and yet on a given Spectral track, we would have eight or ten different kinds of elements, ranging from basic outdoor ambience effects to stick ball fields to baseball fields to city sounds to crowd sounds, to a bunch of guys playing in a parking lot, historical sounds. And they would all have to be treated with a different kind of ambience and a different kind of EQ. With eight outputs, it just wasn't enough, so what we did was we took the eight outs and multed them to sometimes as many as six console inputs and treated them as if they were different tracks. We have presets of all different kinds of ambience EQs, panning changes. So a particular track wasn't a limitation any more. We really had the equivalent of a 26- or maybe a 28-track mix happening—pretty much filled the console with inputs.

"Whenever we'd go back to a playground scene, for example," he continues, "we'd know that faders 18, 19 and 20 were the playground preset. You'd just open up those faders and put your elements on the corresponding tracks on the Spectral and pretty much be close."

To clean up and even out some of the "dirtier" but authentic recordings and sound elements, Gates made use of the studio's Lexicon PCM70 and original Prime Time, Yamaha REV5, Eventide SPX900 and a Berwin single-ended dynamic noise filter, which he was turned on to by his former boss and mentor Larry Rosen, of GRP Records.

"Of all the single-ended noise reduction units I've used, the Berwin has the least noticeable artifacts," says Gates. "It's pretty transparent, especially if you use it subtly, which I think is the key to using any of these devices. Basically, the unit is a dynamic noise filter that senses high-frequency content in the program material and shifts the frequency response. If the source material is a muted piano and there's not much frequency content above 4,000 cycles, the Berwin acts like a lowpass filter below 4,000 cycles. However, if a cymbal appears in the mix, it quickly opens up and passes through pretty much the full bandwidth of the cymbal. As with any of these devices, it's better and faster on less-complex program material."

In a film, especially in a mono production such as this, you can get away with period authenticity in the audio. A little mud and hiss here and there doesn't hurt so much because audio will always be the bastard son of picture. But "when it comes time to make the CD, authenticity is good up to a certain point, and then it's just dirty," Colby says. "In the earlier days, I was a big proponent of authenticity, even in its inexactness. But when you really scrutinize these things, it really comes out in the soundtrack. What's perfectly acceptable for the film is nowhere near acceptable for the soundtrack. It has to be pristine because every wart and pimple is exposed. And your thinking evolves. We did eight films with Ken before it became obligatory that a soundtrack would be released with them. And so it changes your recording philosophy, or it should."

At the time of this writing, there was no way to know whether the baseball strike of 1994 would continue through the playoffs or end quickly once federal arbitration began. Inning nine of the documentary, interestingly enough, examines such issues. Whether there is baseball in October or not, Ken Burns has tapped into a sense of nostalgia that is truly American—like a pipe organ during the seventh-inning stretch.

"It was an emotional trip, an emotional journey," Colby said before going off to Hawaii for a much-needed family vacation. "What I'm proudest about on the record, for all its technical accomplishments, is that it really represents, in and of itself, this picture. If you didn't see the film, you could sit through this and get a sense of the emotionality and this real broad sense of where music has gone and what it's come to." ■

Tom Kenny is a Mix *associate editor.*

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CUE MIXING

WHAT DO MUSICIANS AND ENGINEERS WANT?

Anyone who has recorded in a studio knows how crucial the proper headphone or monitor mix is to a good performance.

For someone cutting on the floor, an unbalanced or distorted mix can blow the vibe of a session. Inheriting a crappy set of phones will sometimes be enough to hang it up for the day.

Some players and singers want real hyped-sounding phones and mixes, and some couldn't care less. There are those who feel that phones work best at a relatively low level, while others seem intent on turning their brains to oatmeal with wide open volume.

Reading the dynamic of tastes and needs among different performers is only part of the job an engineer has to do when setting up the proper phone or monitor mix in the studio.

For this article, we've enlisted four engineer/producers with different takes on the world of studio cue mixing.

JOHN GUESS

John Guess is currently one of the hottest producers in Nashville, with recent projects for Suzy Bogguss, Michelle Wright and Linda Davis. Before moving to Nashville, Guess worked on Gold and Platinum pop projects by Rod Stewart, Donna Summer amd Kenny Loggins, as well as sessions as diverse as Captain Beefheart, Michael Omartian, Funkadelic, Luther Vandross, Frank Sinatra, Jeff Beck, Stevie Wonder and John Fogerty.

"With a headphone cue mix, I like to create as friendly an atmosphere as possible," Guess says. "That usually means getting a good stereo mix of everything, except for the vocal. I like the musicians to be able to control that. Most of the studios that I work at in Nashville have the individual 8-fader cue mixers made by Formula Sound, and that allows me to get a good stereo mix along with six monos for individual controls, or what we call 'more me's.'

"With that stereo mix, I have a good mix of the band. There will be an individual one for the vocal. In the stereo mix, I will add reverb, with nothing too long or swimmy. That usually consists of some EMT 250 on one of the sends, and I'll use a 480 on a small-hall setting with a pretty healthy predelay on another send. On the vocal, I just blend that with its own reverb, usually something like an SPX90, and feed it on its own fader.

"Before a session, I usually set up the phones with a pre-existing basic track tape that has similar instrumentation. That puts me that much further ahead in the game when the musicans walk in. That way I have a general set-

BY RICK CLARK

ting of everything, and I can tweak it from there.

"When I set it up, I will always leave the 'more me's' down on the faders out on the floor in the studio. I go around to each station and just bring up the stereo mix to where it is comfortable for me. I will then leave it up to the individual musicians to bring the 'more me' up to his or her personal taste.

"The only thing scary about that is, after a session, you can walk out and somebody will have the 'more me' turned all the way up and there will be nothing else on. You can usually discover that because that person will start having timing problems during the session. If all they are hearing is themselves, they will start getting out of the pocket. I can usually tell them to back it down a little bit if we have a problem.

"If you happen to be using a click track on one of the faders and someone has it up too loud, sometimes it will bleed and you can't get rid of it later. Acoustic guitarists are famous for this. You just have to be aware of it.

"For string bass sessions, it is a whole other matter. I prefer using single headphones, if they are available. That allows players to hear what is going on in the room a little better, and then they can just follow the conductor. It gives them enough to 'pitch' in the phones."

Most of the time, Guess works with "A" team session players, rather than bands that aren't well-versed in studio practices.

"When the 'A' players come in, there is usually very little discussion about the phone mix," he says. "If there is something that needs to be adjusted, they will usually voice that right away. Since they have their own faders

ILLUSTRATION BY CHARLIE POWELL

and panpots, they can position that mono signal anywhere in the field that they want.

"Every singer is different. Some adapt to phones easily and don't have any pitch problems. Others sing normally until they put phones on. Then they drift sharp or flat consistently. Each individual has to experiment to find out what works for them. They might need to pull one phone back a little bit to hear what is going on in the room.

"A number of years ago, I had a singer who was never satisfied with the cue system. He could never hear anything. One day he said, 'I want to hear more highs *in the lows*.' I said, 'I'm not sure how to go about doing that.' What I ended up doing was set up a stereo graphic equalizer in front of him, ran the cue mix through the graphic and said, 'Here, have at it!' After the session, I saw how he had set it, and it was pretty frightening. The level was even more frightening.

"My preference, even when I am mixing—just for comparison—is for the old-model Fostex T-20s. Not the newer ones. They don't have that real hype-y high end, and they are pretty smooth.

"Over the years, the consequences of excessive volume can be very alarming. I've found that some drummers will put on their small phones and then actually muffle outside sound with sound-deadening devices, just to cut down some of the level. That way they can hear the sounds more immediately, without having to turn it up as loud. Larrie London had his own little earphone system that he put in his ears and then put those gun mufflers, or sound mufflers, over his ears. If they are professional drummers, they often have their own setup."

TERRY BROWN

Terry Brown is best-known for his production work on ten Rush albums, among those the classic Platinum-selling prog-rock releases *Permanent Waves*, *Moving Pictures*, *Signals*, *Farewell to Kings* and *Hemispheres*. Brown scored a Number One hit with the first Cutting Crew record, "Died in Your Arms." He's also produced Blue Rodeo, Voivod and—among his more arcane production credits—the three Klaatu albums.

"Headphone mixes are such a personal thing," he says. "You can never really be sure that you are going to keep everybody happy. Volume is definitely something that has to be watched. It can be devastating listening to a screaming loud click in your phones for over eight hours. You can only work at such a loud volume for an hour or two. The fatigue is dramatic at high volume. I'll sometimes set a limit on it and say, 'This is it. You are not getting any more. You are going have to concentrate, or we are going to have to change the sound of the click.'

"Sometimes changing the sound of the click will fix it, like making it sound like a cow bell. Many drummers like to play with odd percussion things in the phones, so they can pick up on internal beats. I usually tailor those for the drum and find something the drummer is comfortable with.

"I find with the volume that you get off of drum kits, it is hard to give a drummer a really good drum headphone mix, especially in a very loud, ambient warehouse-type room. You are hearing so much from outside the headphones. That is especially true when you are playing to clicks and you're running in sync. The actual ambient volume of the drums is such that it is very difficult to create the right vibe inside the phones. It is really a case of mainly putting hi-hat, kick and snare in the phones. Most of the other sounds bleed into the phones. Neil Peart of Rush usually used a pair of AKG Parabolics. He would listen to them at a fairly loud volume, but he always knew his limits.

"I think the more sophisticated the player, the less of a problem playing with headphones becomes. They usually have a good handle on what they are playing and how they are playing vis-á-vis the time on the click. Moving in and out of time with a click is not a problem for them because they have such a good internal clock that they can move around the click and always find their way back. With less-experienced drummers, it can sometimes be a problem. In order to give them that little more security, the click gets louder and louder. Eventually, they are fighting to stay with the click.

"I use a pair of Sony Professional MDR-7506s. They have a wide frequency spectrum with a very solid bottom end. I find they are great for vocalists. I don't think I would use them for drums. By the time you get the bass drum to a point to where it

feels comfortable, they are usually bottoming out. You need a brasher type of headphone for drums, more like the gold AKG models.

"I do most of my work with three- or four-piece bands. Normally, I create my mixes at the console, using three, four or five submixes created at the console.

"The SSL has a convenient submix situation. If we are overdubbing, I'll send stereo mixes on anything that is being done as a sort of final cut. But in terms of doing tracks, mono mixes are usually more than adequate.

"The older Neves are a tough setup. The two-pot, four-button type of syndrome. It is hard to give a number of separate mixes on a standard old Neve. I'll usually steal the reverb send for headphone mixes in those kinds of cases. Sometimes I'll use the mix that I am listening to on monitors to do vocals.

"Since I often use players in the control room, the headphone mix is not a major concern. Sometimes a guitar player will want to use phones, so he can immerse himself in sound, rather than sitting in a room and being distracted by other sounds and people talking.

"It's hard to find a headphone mix that will satisfy a guitar player who desires to be in the room with a big rig feeding back and so on. In that case, I think the AKG Parabolics are the way to go. They are more than loud enough for what you need. Unless it is a specific situation where a guitar player needs to be in the studio with his amp, I prefer him in the control room so we can communicate quickly. That way we are [both] hearing all the nuances in the playing."

Brown likes the idea of cutting the bass player later, as an overdub. He feels that bass finds the pocket better when played to the control room monitors than when sitting in the room with the drummer and hearing drum bleed and drum signal conflicting with one another.

"If you are going to cut bass in the room with the drums," he says, "one way to achieve a better connection to what's being played is to sit on your amp. [But there] you have to consider the problem of bleed into the drums. Headphones for a bass player is a real tough call when he is in the room with the drummer. It's [only] a rough version of what you are really playing. You don't hear the fidelity of the bass. There is no headphone in the world that can compete with that. So it is much nicer to do it in an overdub situation."

JEFF POWELL

Working out of Ardent Recording in Memphis, Jeff Powell has recorded everything from classic rock bands such as Lynyrd Skynyrd and the Allman Brothers to cutting-edge projects like the latest Afghan Whigs and Primal Scream albums.

"When I'm doing a tracking session, I always make it a point to have a headphone box in the control room with me. When someone has a complaint about phones, I can put a pair of phones on, rather than just push the console sends and hear the sounds over the speakers."
— Jeff Powell

"At Ardent, we have an 8-channel submixer that our technical department designed," he says. "These submixers have a separate panning control and level control on each of these channels, as well as an overall volume control. They are on rolling stands with long cords, which makes them convenient to roll around anywhere in the studio. [So] each musician has the option to add to or take out or mix the components that are sent down these lines.

"I will usually set up a stereo mix with the drummer as we are getting drum sounds and send that down the first two channels. At the same time, I will take a direct multitrack out feed into the cue amp. Anything I do in the control room will not affect what they are hearing, and they have complete control over what they hear.

"I usually save back two modules—say 7 and 8—to set up an auxiliary stereo effects mix. In an instant, anyone who wants to hear effects—reverb, delay or anything like that—can have control over how much reverb or echo they want to hear on their voice or guitar. They can make it sound like they are in a bathroom or an airport hangar, or they can make it sound completely dry. I set all this up to where it is completely independent of what I do in the control room. That is my mode in tracking.

"Usually, the musicians are so happy to have the control over their own sounds that they don't ask for extra EQ, but I can provide extra if they want it.

"In overdub mode, I will usually switch things over, sending only a stereo mix down 1 and 2, and giving them what I call a 'more me' track.

"Sometimes you might run out of the eight tracks, but we cut the Allman Brothers live with two drummers, two guitar players, organ, bass, percussion and lead vocals, and it worked perfectly.

"We also have a Tascam 20-watt amplifier on top of each 8-channel mixer, with two rows of input holes that you can plug into. In fact, six headphones can run out of one box. The top inputs are connected to this 20-watt amplifier. It's great if you are doing a group vocal. I've never had anybody say they weren't loud enough—even the deafest people.

"When I'm doing a tracking session, I always make it a point to have a headphone box in the control room with me. When someone has a complaint about phones, I can put a pair of phones on, rather than just push the console sends and hear the sounds over the speakers.

"At Ardent, we use the Fostex T-20s. Sometimes drummers don't like them, especially if they move their head around a lot, because they can fly off their heads.

"Back in my days as an assistant, I saw engineers cop an attitude of 'Well, tough,' or make feeble attempts to fix things. When you put phones on, you can immediately tell if something is distorting. I've always believed that if a musician says there is something wrong with the phones or the mix, it's not because they are stupid; it is because there is something wrong that I can help them with. That is why I always have a

headphone box by me in the control room, so I can hear exactly what they are hearing. It usually takes about two seconds to know what is the matter."

CLIF NORREL

Clif Norrel's recording and/or mixing credits include R.E.M.'s *Automatic for the People*, John Hiatt's *Perfectly Good Guitar*, The Replacements' *All Shook Down*, and various albums by the Indigo Girls, Paul Kelly & The Messengers, Billy Idol, Widespread Panic and Tom Petty. As a producer/engineer, he has worked with Gin Blossoms, Jeff Buckley and Inspiral Carpets, among others.

About half of Norrel's projects make use of monitor wedges, as opposed to phones. Many of his projects are bands that need to re-create a gig atmosphere in order to capture the most natural performance.

"Often I will isolate the drummer, and he will be the only one with headphones on," Norell says. "I will have everyone else use floor wedges. I try to keep everything as live as possible, except for the drums. We can usually get away with not having to baffle off too many guitar amps. I just put close mics on the guitar amps and still have a live vocal and not worry about leakage too much."

Concerning wedges, Norrel basically doesn't have a preference. "We usually use whatever rentals are available, usually JBLs or EVs," he says. "We power them off the headphone amplifiers and use auxiliary sends for them.

"Sometimes the leakage with monitors gets a little critical. You have to have a good room to isolate the drums and a big enough room to put everybody else in. You really have to have two good decent-size rooms for that. It does work, and the bands seem to like it a lot more. It works well if you don't have a whole lot of mixes to give to them and they can stand closer to their amps. It also makes the guitars sound a little bit different when they have some direct feedback to their amp. When they are off in another room [from their amps], they are not going to get the kind of sustain and interplay with the amp that they need.

"With R.E.M., we generally used Sony MDR-V6 headphones for *Automatic for the People*, and they liked them quite a bit because they are a lot hype-ier: They have a lot more high end than most other phones. I tend to use those quite a bit, and I listen through those, sometimes, when I'm mixing as well—just to check the mix.

"I also like the Fostex T-20s. They seem to be able to get really loud, and a lot of bands like it real loud. They don't tend to blow up very often or clip out.

"Even though we used phones for tracking on R.E.M., we cut some of the guitar and keyboard overdubs in the control room. We just put an amp out in the studio.

"I recorded The Jayhawks' upcoming album, and they did lots of singing in the control room. A couple of times we actually had them holding their own mics—Shure SM-57s and -58s—and singing to the monitors with no headphones. They could go where they wanted. They loved that, and it seemed to work fine. As long as you don't have anything on tape that is really loud and that you are not going to use, the leakage is not a problem. I know a lot of people are probably afraid to do that. Or they say, 'You can't do that!' or 'You have to put the speakers out of phase.' You can do that,

but it sounds weird for the people who are singing or playing to the monitors. They can't hear as well. We usually just leave the speakers in phase and turn it up for them and mainly keep it from feeding back.

"When Amy and Emily of the Indigo Girls would sing together, we used floor monitors with a baffle between them, or we had them looking at each other with a fairly directional mic. I find it can help a singer's pitch because there is some kind of psychoacoustic pitch change that you get with headphones. I'm sure there is a technical explanation for it, but I think that it helps a lot of singers to sing with monitors."

Does Norrel look at the accidental monitor bleed as a sonic character enhancement to the production?

"I think that singing through a monitor makes the performance much better, which far outweighs any sonic change," he says. "You might get a cleaner recording by not having the wedges. Sometimes you can get a little leakage that the recording might have been better without, [but] I just think that it is not enough to be a problem.

"If you have two guitar players, it seems to work a lot better to put them on headphones with stereo cues, if you've got them. If all you've got is two mixes, it is better to give them one stereo cue with the players panned left and right, instead of giving them two mono cues. It keeps it from becoming a wall of mush in the phones. That way they can hear themselves playing. That is real important.

"I often work on old Neve consoles that don't have that many sends, and you've just got to make do on those. I don't usually work with the systems in some studios where you send a submix out and have the people do their own mixes. Generally, I do the mixes for them and go with what I generally think they need and change it when they need things changed.

"I think the headphone mix is as critical as getting good sounds on tape. It's important to give them something that will inspire them, like a big-sounding stereo mix, as opposed to something that is all cluttered. It deserves more attention than it gets. You should get it right before recording. If things aren't happening, it can seriously cause problems. When it is right, the artist's mind is freed up and you get a better performance.

"I usually record a lot of people at the same time, and I need to make sure that everyone is happy with their own mix. I will generally start out with the drummer on one mix, a vocalist on another and then everybody else on another mix. If someone still isn't happy with what they are getting, you can set up another mix for them.

"Sometimes a musician will ask you to turn things up until, all of a sudden, you are wondering, 'God, how can they listen to this?' So it is a good idea to go around and check their mix between takes and make sure that everything is working right. Don't just use the control room headphones and flip through their mixes, because their phones might be flapping out or doing something strange. You need to hear what they are hearing." ■

Rick Clark is a Memphis-based writer and musician.

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TCI's motion-control camera gantry system looms over one of the miniature sets for the "Theater of Time."

THIS ONE'S A LITTLE WEIRD, EVEN FOR LAS VEGAS. An immense pyramid, guarded by a Sphinx, rises majestically out of the former desert. It's not a mirage. The pyramid is the ancient Egyptian-themed Luxor Hotel, and although its facade is devoid of neon and glitter, there's no lack of glitz within its faux stone walls. The Luxor, along with Treasure Island and the MGM Grand (complete with amusement park), are the hallmarks of the new Las Vegas. Changing times have prompted the city to reinvent itself from a haven for mobsters, gamblers and desperados into a family-oriented vacation paradise.

Circus Circus Enterprises spent approximately $350 million to build the Luxor, an oasis of sensory overload that boasts a casino, a video game arcade, an indoor cityscape of restaurants and gift shops (surrounded by a miniature Nile River, complete with "tour" barges), and even a scaled-down Empire State Building terrorized by a King Kong doll.

by Michael Molenda

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But before you say, "only in Las Vegas," wait for the kicker: The hotel also includes three whiz-bang multimedia attractions that rival any of the thrills available at Disneyland or Universal Studios. "Secrets of the Luxor Pyramid" is a loosely scripted trilogy composed of an intense motion simulator ride ("In Search of the Obelisk"), a film/live-action talk show that incorporates 3-D projections ("Luxor Live"), and a high-resolution VistaVision film projected onto a 70-foot-high curved screen ("The Theater of Time").

The three attractions were developed by the Trumbull Company, headed by visionary film director and special effects wizard Douglas Trumbull, at a cost of approximately $50 million. Ultimately, more than 300 people worked 18 months to bring the project to life. During the final stages of the hotel's construction, a post-production sound crew headed by chief mixer Leslie Shatz (who worked on Francis Ford Coppola's *Dracula*) ventured to Las Vegas to attempt a fully digital, on-site mix of the "Secrets of the Luxor Pyramid" soundtrack. The adventure begins...

LOCATION BLUES

The frustrating happenstance of location shooting is a trial that mixers are usually spared. They get the tracks when everything is (hopefully) completed—the production sound, the Foley, the ADR—and work their magic in the controlled environment of the post-production studio. The Luxor gig was conceptualized as atypical, and that was *supposed* to be a big advantage. Mixing on-site would allow the audio engineers to tailor the film sound precisely to the acoustics of the theater. But there was one complication: The hotel was still being built when the crew arrived.

"We came in expecting to go right to work," says project engineer Alex Stahl, "and that wasn't going to happen. For one thing, there was no power. We started the project running off generators, and as you might expect, they went down quite a bit. In addition, everyone was working all at once and huge clouds of dust were everywhere. We got shut down three times because of toxic paint fumes. It was nuts. We had to wear hard hats, and arc welders and iron workers would be banging away in the theater while we were trying to mix. It was nearly impossible to get them to be quiet. It was like, 'hey, you do your job and I'll do mine.' There was no concept of what we were trying to do. We were considered as just another branch of tradespeople, just like the sheetrockers and carpenters.

"Finally, we went off-site for a while just to get some work done," Stahl continues. "We basically took over Oakdale [Post Audio Studios in Las Vegas]. We brought in everything and set up a miniature array of Yamaha NS-10Ms to emulate the theater sound system. It was great to be in a room that was air-conditioned, had stable power, and wasn't populated with burly iron workers who asked us what we were doing every few minutes."

Unfortunately, the dust and cacophony of the construction site wasn't the only problem facing the team. The components of the film sound were recorded onto different media—the music soundtrack and dialog were on analog masters, while sound effects were stored on DAT and hard disk (in a Studer Dyaxis II)—and had to be transferred to a common format for mixing. Trumbull chose Roland's DM-80 8-track hard disk recorders, which had worked very well on the "Back to the Future" attraction he designed for Universal Studios in

Hollywood.

Transferring tracks between formats, especially analog to digital, is typically a simple process. But the Luxor, in evoking the vibe and mystery of ancient Egypt, seemed jinxed by some cranky Pharaoh's curse. Nothing about the project was to be "simple."

"Douglas Trumbull went to Monterey to transfer the music tracks from composer Alan Silvestri's analog masters onto the DM-80," says audio postproduction coordinator/digital librarian Julie McDonald. "When the DM-80 arrived back on site, a tired engineer pressed the Initialize button and blew everything away. The first thing anybody did was erase the tape! We learned real quick that pressing one button on a hard disk recorder can mean goodbye: something we'd never even think of in the analog world."

Finally, things settled down to where the mixers could set up the on-site digital studio. Three Yamaha DMC100 digital consoles were locked together to construct the mix station in the Luxor's huge Future Theater. Multiple DM-80s were used as mixdown decks, data storage, and, ultimately, the attraction playback machines. The Studer Dyaxis II was used for sound effects editing and premixing, and signal processing was handled by the onboard effects in the DMC100, two Lexicon 300s and two Eventide H3000s.

With the digital studio more or less intact, there was even time for a little work-related mischief. "I decided to build most of the film's sound effects from noises around the construction site; ladders being dragged along metal floors, hammering, doors slamming and things like that," explains sound effects editor Benjy Bernhardt. "So we were walking around with portable DAT recorders collecting sounds with these shotgun mics that looked like machine guns. I think the workers got a little nervous when we pointed the 'guns' at them. And we pointed the 'guns' at them every chance we got!"

DATA MANAGEMENT

The fun ended, however, when the team realized that the task of managing digital data was expanding into a full-time job. Because this was the team's first experience with a completely digital production, no one had factored in the incredible amount of hard disk space needed, or the time required for scrupulous backups.

"Keeping track of digital data wasn't taken into account," McDonald admits. "Also, it turned out that we had a limited amount of external hard disk space, so in order to work on anything new—sound effects, dialog or music—we had to dump and store data. And even worse, each time we worked on a complete show, it necessitated a cycle of backing up data from, say, 'The Theater of Time' and restoring data from 'In Search of the Obelisk.' This meant a complete teardown and setup for each show every time something had to be fixed or redone."

The team opted to back up data to DAT, because there was some trepidation about the DM-80s working with magneto-optical drives. However, because the DM-80 has no facility for data compression, it can only save one project per DAT tape. McDonald ended up using more than 100 DAT tapes for data storage alone. [*Ed. Note: Version 2.0 allows for multiple projects to be backed up on a single DAT.*]

"Data management turned out to be a full-time job for me," she says.

"It often got really hairy when I'd have to calculate how much storage space we'd need to transfer analog tracks to the DM-80. I'd have to figure out how much hard disk space was required to store 20 minutes of music on eight tracks."

Intense deadline pressures added to the stress factor. During most of the music and dialog transfers, there was never enough time to make backups at the recording studio. Because of this, the trip from the studio to the Luxor became almost as perilous as driving the explosives convoy in the film, *The Wages of Fear*. When the DM-80 arrived on site, a DAT backup was done immediately, and the material was cataloged. But firing up the DM-80 always instilled the fear that some of the data just wouldn't be there. "The whole digital data thing became such a huge deal that we jokingly referred to ourselves as 'data managers' rather than mixers," Stahl says.

DIGITAL COLLABORATION

The data manager tag was especially appropriate, given the difficulty of taming various multitrack digital formats. Getting the digital "territories" to coexist nearly became a bigger, and more time-consuming problem than actually mixing the film. "Everyone has their own digital formats," Stahl explains. "We had Roland, Yamaha, AES/EBU, and the DAT machine, and initially, no one wanted to work together. We tried setting things up a number of ways, and we'd always get nine out of ten things working. No matter what we did, one device in the chain wouldn't lock up."

In the early stages of production, the team was constantly on the phone with consultants from Roland and Yamaha trying to solve or work around the sync problems. And the production wasn't being mixed in an ideal situation, either, since the "studio" was basically a construction site. The less-than-pristine environment often proved frustrating because video sync and time code were locked to 44/1000th of a second, where any bit of hum or jitter knocked the sync right off the map.

Losing sync also caused more than timing problems. Slightly out-of-sync digital signals were often subject to audio anomalies such as clicks and hums. Adding to the problem was the fact that the film lockup couldn't be confirmed until the theaters were completed and the special projectors installed. One of the films runs at 60 frames per second, and another at 48 fps, but the team was restricted to working with video clips running at 30 fps or less. Synching the soundtrack to picture turned out to be a game of trial and error.

"In my mind, the jury is still out regarding whether it's worth it to go completely digital," says the project's chief sound designer Leslie Shatz. "I think we spent a lot of time and trouble getting the digital gear to sync up, when using analog in some instances wouldn't have been such a bad thing. I've certainly mixed scores on analog that sounded just as clean and punchy as digital productions."

FINALLY, THE MIX

When the crew finally got down to it—the final mix, that is—in the immense Future Theater, the advantage of mixing on-site was indisputable. The soundtrack for "The Theater of Time" pounds through 13 house speakers, with a subwoofer array on the ceiling, and two speakers mold-

ed into each and every seat. The main audio program was split between six discrete tracks on the DM-80 playback deck: Left, right, center, left Dolby Surround, right Dolby Surround, and the subwoofer array. The remaining two tracks on the DM-80 were used to "rock" the seats. ("For the seat speakers, we selected effects based on how they *felt*, rather than how they sounded," Stahl reveals.)

"Although we had constructed this little community of high-tech digital workstations, we approached the mix in the traditional film method of using three mixers," Stahl explains. "I mixed the music soundtrack, Erich [Greenebaum, chief sound effects editor] mixed the sound effects, and Leslie [Shatz] mixed the dialog and was overall chief mixer.

"Conceivably, we could have attempted to automate the mixes for each of the three audio elements, and have one mixer assemble all the parts," he continues. "But with incredibly tight deadlines hanging over our heads, it seemed like a bad time to experiment with new methods. And considering the deadline pressure, I have to say that I really gained an appreciation for the DM-80; it made manipulating audio a breeze. Everything we had to do to match the final film, from cutting out bars to adding notes, was done quickly and easily with the DM-80."

Unfortunately, the first playback in the theater was far from awe-inspiring. The pristine digital resolution of the audio tracks was no match for an acoustically crippled auditorium. "It was awful," Stahl recalls. "There we were on site, with totally digital audio, and the sound was muddy and harsh at the same time. We had to have (acoustician) Chips Davis come out and treat the theater. He blasted tones through the system, found the offending resonances, and fixed them by installing some absorptive materials. But until then, it was rough going."

END OF RIDE

Excitement is the *raison d'etre* of these multimedia attractions that Trumbull coins "immersive entertainment," and the thrill factor is certainly intensified by the sonic environment. (When the villain in "The Theater of Time" film blows up the sun, the roar of the subwoofers almost knocks you across the auditorium.) Don't look for bulletproof plots, consistent speech intelligibility, or meaningful dialog; just strap yourself in and enjoy the ride.

"Mixing for these types of attractions can be fun, because you're pushing the envelope all the time," enthuses Stahl. "The sound is big, and the psychoacoustic effects are extremely aggressive. The fact that the audio was recorded digitally, and is being played back digitally, adds tremendous punch to the sound."

However, the sounds of a world tearing itself apart can be a bit much if you're trying to sleep. The Luxor isn't just an attraction, it's also a hotel. In some of the louder sections of "The Theater of Time," for example, the speaker arrays were putting out 130 dB at 30 Hz. "It was like an earthquake hit the hotel; the entire foundation would rumble," Stahl notes. "We had to upgrade the soundproofing of the theaters and reduce the volume and impact of the audio a bit to ensure that the hotel guests wouldn't be disturbed. But, in a way, the fact that the soundtrack burst out of the theater is a nice indication of how well we did our job." ■

Michael Molenda is editor of Electronic Musician *magazine.*

EVERYTHING YOU EXPECTED. AND MORE.

THE LEXICON PCM-80: THE NEXT GENERATION OF DIGITAL EFFECTS PROCESSING

At Lexicon, we've been making highly acclaimed digital effects processors for longer than anyone else: devices used in practically every studio in the world. Our systems offer pristine audio quality and unsurpassed control, making them the premier choice for musicians, engineers and producers alike.

Now, we've done it again. The PCM-80 is the next generation of effects processing. Based on our renowned PCM-70, it features the latest versions of several favorite effects from its predecessor. But there the similarity ends.

The PCM-80 is based on a new hardware platform featuring the very latest in proprietary digital signal processing. It's a true-stereo processor with balanced analog I/O as well as digital interfacing – you can even mix the two sets of inputs together. Its 24-bit digital bus ensures the finest resolution within the PCM-80's multiple-DSP architecture.

Onto this powerful platform, we built brand-new algorithms offering a virtually unlimited palette of sounds – some based on your favorite PCM-70 programs, plus many entirely new effects. There's an immense range of chorusing, panning and delay-based programs which can be combined with Lexicon's famous reverberation for startling, other-worldly sounds. There are even dynamic spatialization effects.

Perhaps the most impressive feature of the new PCM-80 is its unique Dynamic Patching™ matrix, which takes the PCM-80 into new sonic realms. Dynamic Patching provides incredibly powerful, synthesizer-like control over your effects. It maps data from external and internal controllers such as footswitches, envelope generators, MIDI controllers, tempo and LFO's – even the input signal itself – to any effect parameter. With up to 10 patches per effect, and an amazing eight steps per patch, the control possibilities become almost unlimited.

There's also a 'tempo' mode for every program which can drive almost any element of the PCM-80's effects. Delay lines, LFO's and Lexicon's unique Time Switches can all be quickly aligned to the tempo of your piece, with both rhythmic and absolute time values. You can source the tempo from MIDI, or generate MIDI clock from your own tap.

To round it all off, there's an industry-standard PCMCIA card slot for extra program memory – and for future algorithms – plus SIMM sockets for extending delay memory. The PCM-80 is designed to carry on Lexicon's tradition of creating products with staying power.

There's more to know about the PCM-80, which we can't tell you here. Experience it at your authorized Lexicon dealer. It's everything you expected – and more.

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by Paul Potyen

FINDING YOUR NICHE

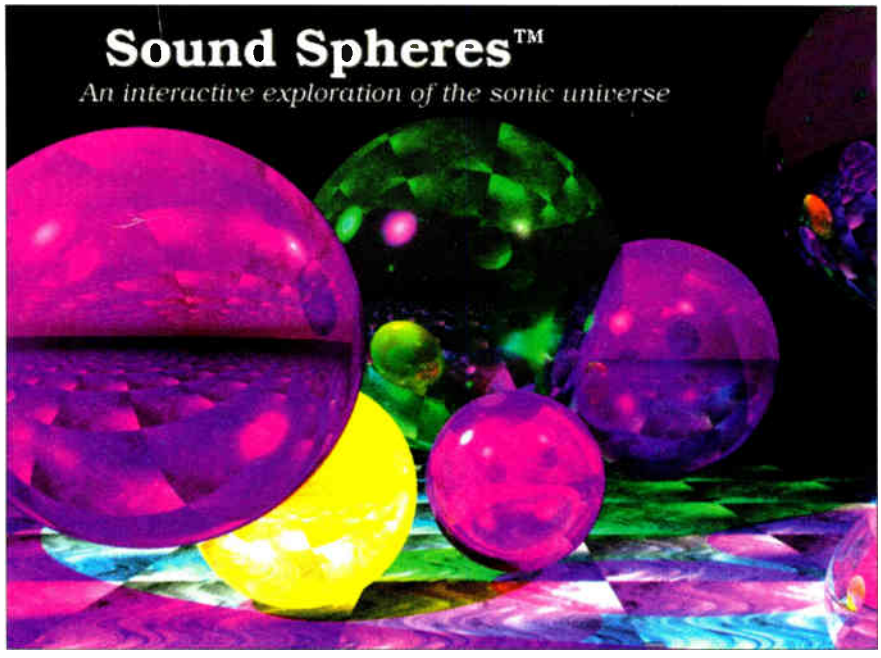
OPPORTUNITIES IN MULTIMEDIA

I'm not *quite* old enough to have experienced a real Gold Rush firsthand, but I think I see some parallels between those fabled "get rich quick" days of yore and today's multimedia feeding frenzy. It seems that everyone—from MIDI musicians to high-tech entrepreneurs to huge corporations—is being seduced by the siren song of multimedia.

Screen captures from LucasArt's CD-ROM game Rebel Assault and below, Sam & Max Hit the Road

While the possibilities of this new set of technologies seem to be limitless, there's been an endless sea of hype and an infinite number of strategies for creating and maintaining a successful multimedia business. Some talented people just buy the tools, jump in the creek and start panning for gold. Others spend huge dollars on marketing plans. Still others stand on the sidelines poised to jump at the right time.

But at the end of the day, who is going to the bank with precious metals, and who is going to the bank for a loan? Who is making money in this business, and how are they positioning themselves to be successful? In



Sound Spheres' opening graphic

THE ONLY AFFORDABLE 8•BUS CONSOLE THAT CAN GROW WITH YOUR NEEDS.

Parametric Hi-Mid EQ ½-oct. boost/cut

Parametric Hi-Mid EQ ½-oct. sweep range (500HZ-18kHz)

Parametric Hi-Mid EQ 2-oct. boost/cut

Parametric Hi-Mid EQ 2-oct. sweep range (500HZ-18kHz)

Parametric Hi-Mid EQ 3-oct. boost/cut

Parametric Hi Mid 3-oct. sweep range (500HZ-18kHz)

Parametric Hi Mid Sweep-O-Rama

Swept Lo-Mid EQ boost/cut (1K center)

Lo-Mid EQ sweep range (from 45Hz to 3kHz)

Hi shelving EQ boost/cut (12kHz)

Lo shelving EQ boost/cut (80Hz)

75Hz, 18dB/octave Lo Cut (Hi Pass) Filter

Interaction of Lo Cut Filter and Lo EQ boost

"The first of the four bands of the EQ section is hi-mid, offering a true parametric design ...useful in wideband adjustment for a more natural sound or in narrow-band for specific corrective adjustment. The upper-end frequency range...is particularly useful for adding punch to tracks or brightening up a hi-hat."
Mix February 1994

"I can only say that the 8•Bus sounds incredibly quiet. Crosstalk and signal-to-noise were certainly comparable to my Trident Model 65 console, which cost a ton more than the Mackie."
Electronic Musician February 1994

A surprisingly high percentage of 8•Bus warranty cards rave about how quiet our consoles are: "...quiet enough for hand disk digital recording." "...transparently quiet and musical..." "I am very happy with the low noise levels." "Phenomenally quiet!!!" "Less noise than the expensive board I used to have."

You get the idea. One of the most important reasons for these comments is Very Low Impedance Circuitry (VLZ).

VLZ wouldn't be necessary if we did all our recording in outer space or on the surface of Neptune where it's extremely cold. At absolute zero (–273 degrees F), circuit components are noise-free because the atoms that comprise them are completely at rest.

VLZ

However, when over three hundred degrees hotter (room temperature on Earth), all the atoms in circuit components are agitated and crash into each other. That causes little random voltage spikes which we hear as thermal noise. It's generated by all circuitry — even wire and circuit traces. Far more objectionable (and noticeable) than hum, thermal noise is what most consoles have too much of.

VLZ

The design around thermal noise by making internal impedance as low as practical at as many places as possible within the console. VLZ is achieved by scaling down resistor values by a factor of three or four — resulting in a corresponding reduction in thermal noise.

A prime example is our consoles' mix buses. Here, mix resistors are ¼ the value of those typically used in other mixers. Thermal noise is also ¼ as much. It's a big contributing factor to the 8•Bus' overall low noise level.

VLZ

Another advantage of VLZ is that low impedance circuitry, by its very nature, is more immune to crosstalk problems. By designing with low impedance, crosstalk throughout the console is inaudible.

Our approach isn't anything mysterious or proprietary. It's just straight-ahead, Mackie-style, over-engineering. However, VLZ doesn't come without cost. All circuitry has to be thoroughly buffered. Plus, the current consumption of the console goes up, requiring a larger power supply (which, of course, we provide in our usual excessive, over-engineered fashion – see below left). But when you compare the overall noise of our consoles to any of their competitors or imitators, you'll understand why Very Low Impedance circuit design puts the 8•Bus in the big leagues.

VLZ

You can never be too rich or have too many inputs. Since most of us don't qualify on either count, we've designed the 8•Bus Console Series so that you can add more inputs as your budget and job requirements grow.

Start with an initial outlay as small as $3995 (suggested retail for a 24•8). Add a meter bridge. When your spouse wants the card table back, add a matching epoxy-coated steel stand.

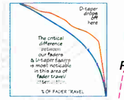
Now comes the nifty part. You can increase inputs in groups of 24 with our 24•E Expander. It has 24 complete channel strips with tape returns and connects to our 24•8 or 32•8 in minutes. Each 24•E comes with its own power supply; meter bridges and stands are also available. Because you can "daisy chain" up to seven 24•Es together (for a potential total of 200 channels and 400 inputs at mixdown), we think that our modular approach should hold the average gear head for at least a few years.

If you want a fader to reduce sound level in a smooth, predictable manner. To fool our ear into perceiving this, expensive mega-consoles use faders with a **logarithmic** taper. By contrast, other under-$10,000 consoles use "off-the-shelf" **D-taper** faders with a single extra resistive element screened onto the existing carbon (Fig. A at right). Bottom line: the sound level can drop precipitously when the fade gets around –20dB, making a smooth fader frustrating if not impossible.

For the Mackie 8•Bus, we commissioned a completely new 100mm fader that uses a complex network of additive resistive elements (Fig B.). They combine at various points along the faders' travel to achieve an absolutely accurate logarithmic taper (blue line on graph below). You get an even, predictable fade rate all the way to the bottom (where you get absolute attenuation — just like on big, expensive consoles).

Fig. A

Fig. B



Six Aux Sends, each with master level control & Solo buttons. Aux Sends 3 & 4/5 & 6 can be fed as stereo pairs to Phones 1 or 2.

Stereo Aux Returns. Returns 1 & 2 have a stereo Solo switch, stereo Level control, Pan control & Assign options to L/R Mix buses & odd-even submaster bus pairs. Returns 3 & 4 have a stereo Solo switch, stereo Level control & Assign option to the L/R Mix buses and/or Phones 1 & Phones 2 buses. Returns 5 & 6 are permanently assigned to the L/R Mix.

MIX-B/Monitor section. Acts as master gain control when building a separate broadcast, recording or monitor mix. MIX B To L/R Mix switch doubles inputs during mixdown.

Phones 1 & Phones 2. Independent controls let you build custom headphone mixes using any combination of Monitor, MIX-B, Aux 3 & 4, Aux 5 & 6, & External (a totally separate stereo input intended for click tracks, etc).

Monitor. Individual controls for Control Room & studio playback monitors. Select any combination of L/R Mix, MIX-B, 2-Tk & External. Mono switch sums L/R channels for checking mono mixes, and phase coherency.

Solo, with stereo level pot, lets you adjust the level of all soloed signals being fed to the monitor section.

Talkback. Converse via built-in microphone to any combination of Aux 1, Aux 2, Tape/Submasters (L/R Mix & the eight submasters) & Phones/Studio.

Meter Section. 12-segment Submaster LED ladders with –40 to +10dB range. 13-segment Main L/R meter with –40 to +22dB range. Entire section is covered with matte Lexan™.

8•Bus Assign Section. Pressing L Mix (odd-numbered buses) & R Mix (even-numbered) assigns bus to left or right Mix bus. Along with the Mono L & R switch, it assigns submaster buses to L/R mix.

Proprietary expansion port (32•8 & 24•8 only). Connects to 24•E Expander console. Each Expander has its own internal mix amplifier so the main console only "sees" one extra channel per 24•E Expander.

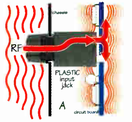
Main balanced outputs, +28dBu max output.

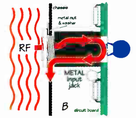
"Unlike some mid-priced mixers, the clean, quiet, smooth Mackie EQ let me get virtually every sound I wanted. In fact, the EQ was so comprehensive that I was able to get decent tones from poorly recorded tracks without using outboard graphic equalizers."
Electronic Musician February 1994

AUTOMATION FOR THE 8•BUS SERIES is coming soon. First to be released will be the OTTO-34 outboard automation module and UltraMix™ ultra-screaming-fast, Mac™ software. OTTO-34 connects via 8•Bus channel inserts (replaced with duplicate inserts on the OTTO-34's front panel). OTTO-34 provides smooth MIDI level & mute automation of channel inputs, AUX returns and main outputs for up to 32 channels.

ALL CONSOLE CONNECTORS ARE NOT EQUALLY QUIET. Every input and output on a mixer is a chance for RFI (radio frequency interference) to sneak into the console via external cables. RFI is generated by everything from computers and cellular phones to video equipment and local AM, FM, TV, CB and paging transmitters. On most mixers, RFI protection consists of grounding the input to an internal circuit trace. Unfortunately, this lets RFI use the circuit trace as a mini transmitting antenna (A). Everything inside the mixers that rectifies (diodes, ICs, etc.) turns into little crystal radio receivers and converts the RFI into audible, annoying hash (or actual faint radio reception).

Legendary producer/engineer Shep Pettibone with his 32•8 at NYC-based Mastermix Productions Ltd. Recent projects include tracking for Madonna. Partially at her request, he's since bought a matching MB•32 meterbridge.





Our 8•Bus consoles have metal ¼" jacks that make electrical contact with the metal chassis via a solid metal lock washer (B). Although RFI can get in a short way via plugs, it is immediately diverted with a shunting capacitor across the inputs. RFI is routed back through the metal jack and into the outer chassis where it is dissipated. 8•Bus mic inputs are shielded with ferrite beads that accomplish the same purpose.

Compare console power supplies

Only Mackie provides a 24-lb, ultra-low noise, triple-regulated, 220-watt power supply that can handle wide voltage variations & high ambient temperatures.

The MegaMondo 8•Bus Fantasy Combo

A 32•8 flanked by two 24•E Expanders and a Sidecar, for a total of 80 inputs during tracking and 160 inputs during mixdown. Suggested retail price for all you see here is (hold onto your Depend™s) $14,450. But look again. You couldn't touch this much console from any other manufacturer for under $50,000. And, you can start building this combo with a 32•8 for just $4995*.

"Frank Serafine, in the Foley Room at his Venice, California film and video sound complex. An innovative sound designer with film credits like Hunt for Red October, Poltergeist & Lawnmower Man, Frank has 8•Bus consoles in three of his production rooms: "It's the only under-$20,000 console we'd consider using for feature films and network TV sound."

SUDDEN IMPACT: Many other 8-bus mixers make three mechanical design mistakes that can lead to expensive repair bills (Fig. 1A). First, they use un-sealed potentiometers containing brittle phenolic as a base for the pot's resistive element. Next, they mount the potentiometers on vertical circuit boards. Finally, many consoles have pots whose bushings extend through holes in the chassis. It is a deadly combination when somebody decides to drop something on the console (Fig. 1B). Look at what happens when downward force is exerted on a knob whose bushings go through holes in the chassis: It transmits all the shear forces to the potentiometer and circuit board solder connection. If the phenolic inside the pot doesn't crack, the whole thing can get yanked off the vertical circuit board. If a number of controls get bashed from above (such as when a monitor topples onto the board), the repair bill can be hefty.

Fig. 1A

Fig. 1B

Our 8•Bus consoles head off all three design errors (Fig. 2A). Our knobs "ride" just thousandths of an inch from the metal surface of the console. When downward force arrives, it is transferred from knob to steel — instead of from knob to potentiometer. Next, we employ a co-molded potentiometer that doesn't use brittle phenolic at critical mechanical points. If the console really gets whacked, our rotary controls withstand far more abuse than regular pots. Our final design feature is our braced, horizontal circuit board and shock-absorbing structure (Fig. 2B). The board is thick fiberglass and is connected at regular points to the chassis by metal stand-offs that further absorb impact.

Fig. 2A

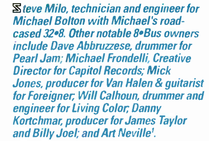
Fig. 2B

The Mackie 8•Bus SideCar ("$295 suggested retail") is a matching, floorstanding equipment console. It provides 11 rack spaces for power supplies, patch bays and outboard signal processors. The SideCar can be placed on either side of a stand-mounted 32•8, 24•8, 16•8 or 24•E.

Call 800/258-6883 for the name of your nearest Mackie 8•Bus dealer.

"When Steven Tyler (Aerosmith) and I sat down to design his home studio, we knew that our choice of a console was critical. We needed lots of inputs, routing flexibility, and most of all, great, clean sound. The Mackie 8•Bus with 24 inputs was the answer. It has 48 channels during mixdown, 24 mic pre's with phantom power and much more. When you're ready to shop for a mixing console (in any price range under $50,000), be sure to check out the Mackie 8•Bus."
MIDI March/April 1994

"With a retail price of $3995, the Mackie 24x8 offers a major price/performance breakthrough. I expect that the (24•8) will find a comfortable home in small home studios as well as broadcast and live applications."
Mix February 1994



Steve Milo, technician and engineer for Michael Bolton with Michael's road-cased 32•8. Other notable 8•Bus owners include Dave Abbruzzese, drummer for Pearl Jam; Michael Frondelli, Creative Director for Capitol Records; Mick Jones, producer for Van Halen & guitarist for Foreigner; Will Calhoun, drummer and engineer for Living Color; Danny Kortchmar, producer for James Taylor and Billy Joel; and Art Neville[1].

"Aside from the spectacular price/performance ratio, the board has some really excellent touches:
— ...meticulous attention to level matching makes the board very easy to manage levels with, even for the brain dead among us...it's very forgiving and very clear.
— Careful consideration to the range of recorders the board is likely to be hooked up with has led to excellent decisions regarding input and output levels, so it will plug anywhere with no fuss or muss...
— Robust construction. The unit came out of the box after multiple shippings and handlings, plugged in in 20 minutes and has worked perfectly since."
Recording (formerly Home & Studio Recording) April 1994

Submaster/Tape Outputs. ¼" TRS balanced (also wired for ¼" TS unbalanced) Tape Output Operating Level buttons switch the Submaster/Tape Output jacks to either +4dBu or –10dBV in groups of four "triple-bussed" outputs. Triple-bussing lets you feed a 24-track deck (or three 8-track digital decks) without having to constantly re-patch, by providing THREE outputs for each output bus.

Tape Returns. ¼" TRS balanced (also wired to accommodate ¼" TS unbalanced) Tape Return Operating Level buttons switch Tape Return jacks to +4dBu or –10dBV in groups of 8 channels.

[1]Mention in this ad denotes ownership and useage only and does not imply official endorsement by the individuals, groups, or production companies listed.

"PROFESSIONAL RECORDING CONSOLE QUALITY AND FEATURES AT AN AFFORDABLE PRICE."

In just a little over one year, the Mackie 8•Bus Series has re-defined the affordable recording/PA console.

Right now, at least a dozen major albums are being tracked on 8•Buses. Our boards are being built into the personal recording studios of such notables as Whitney Houston, Steven Tyler, Natalie Cole, Michael Bolton, k.d. lang and Boz Scaggs*, just to name a few (which can only lead to more albums being created with our mixers).

8•Bus consoles are in use at all four TV networks and in top name video post and film production houses. For example, dialog editing for The Untouchables and sound design for Baywatch are done on 8•Buses*.

We've given up counting the number of network commercials that have been mixed and/or scored on 8•Bus consoles. They include work for Pepsi Cola®, McDonalds®, Coca Cola®, Pizza Hut®, Kenner Toys®, Six Flags®, Skittles™ and Fox TV*!

24•8s and 32•8s are handling front-of-house sound for hundreds of clubs, churches, auditoriums and are constantly on the road with regional sound companies (•8•Buses are also currently being used for live recording on several major world tours.)

We've received extremely favorable reviews in Mix, Electronic Musician, Recording, Keyboard, EQ and MIDI magzines as well as in over a score of foreign audio journals.

If it seems like we're starting to border on outright bragging, we don't mean to. We're just trying to make an important point: Our 8•Bus consoles really work. When used in real-world applications by pros whose livelihoods depend on sonic quality and rock-solid reliability.

When Music & Sound Retailer Magazine polled America's top music retailers, they voted our 8•Bus console the most innovative product of 1994.

1994 Award Winner
Most Innovative Product of the Year
MACKIE DESIGNS 8•BUS MIXER

Mackie 16•8 16x8x2 Console, *1395*

Mackie 24•8 24x8x2 Console, *1995*

Mackie 34•8 32x8x2 Console, *2995*

24•E Expander adds 24 channel strips and tape outputs to the 24•8 & 32•8, *2995*. Up to seven 24•Es can be daisy-chained.

Writer/producer Billy Mosa' project studio in Los Angeles CA

We've created this mini-brochure because we want you to know why our 8•Bus Series consoles are on the road to becoming the de facto industry standard for affordable consoles. The reason that we've gone into such excruciating detail is because it's the details that set our consoles apart from our competitors.

It's not just that we offer true parametric equalization…it's the extreme bandwidth, wide sweep range and expensive circuitry (that insures musical-sounding EQ).

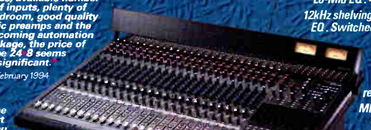
It's not just that we use the finest, double-sided, through-hole fiberglass circuit boards…it's that we combine them with a special knob shock-absorbing design and brass standoffs to virtually eliminate impact damage (during the January '94 Los Angeles earthquake, dozens of 8•Bus consoles survived direct impact damage from falling monitors that sent other mixers into the shop for major repairs).

It's not just that we provide two separate headphone sections…it's the remarkable combination of all sources you can use to build a custom mix (including Mix-B, Aux 3, 4, Aux 5/6 and even an external click track input).

It's hidden things like the design of our ¼" jacks that routes Radio Frequency interference away from internal circuit traces in ways plastic jacks can't. Semi-hidden things like our special custom

Channel strip jack section has:
Phantom Power (applied to channel strips in groups of eight)
Balanced Mic Inputs (the latest version of our highly-respected, discrete preamps)
Mic/Line Switch
Line In (bal./unbal. ¼" phone jack)
Direct Out (unbal. TS ¼" phone jack, post-EQ/post-fader/post-mute switch)
Channel Insert.
In addition, the 16•8 and 24•E have one 12V BNC lamp socket. The 24•8 and 32•8 have two.

With excellent sonic quality, frequency response, harmonic distortion and crosstalk specs, available number of inputs, plenty of headroom, good quality mic preamps and the upcoming automation package, the price of the 24•8 seems insignificant.
Mix February 1994



The first thing we noticed about the Mackie (24•8 console) is how great it sounds (extremely quiet) and how well it's laid out logically. Controls are just where you expect them to be. The options are plentiful.
MIDI March/April 1994

The Mackie 24•8 Recording/PA Console. Shown with optional MB•24 meter bridge (*695*) and The Stand (*295*)

"THE 8•BUS SEEMS TO INVITE YOU TO BE CREATIVE & EXPERIMENTAL."
Keyboard June 1994

100mm faders with true logarithmic taper. And obvious things like how logically our 16•8, 24•8 and 32•8 consoles are laid out for day-in, day-out professional use.

It all comes down to this: From Greg Mackie on down, most of us have been playing, recording and running PA for more years than we care to think about. Our 8•Bus Console Series wasn't designed by a marketing department or in response to a competitor's mixer.

We simply set out to create the ultra-affordable, big-studio-quality console we've always wanted to own. After you've read this brochure, we hope you want to own one, too.

*Suggested retail price. Slightly higher in Canada. Mention indicates confirmed useage or ownership only and does not intended to in any way imply specific endorsement by the individuals, corporations or production companies cited in this ad.

Aux Send Outputs (Aux 1 & 2 are balanced TRS outputs, designed so that ¼" unbalanced TS phone plugs can also be used without level loss. Aux 3-6 are unbalanced)
Submaster Inserts
Aux Returns (all unbal. stereo)
2-Tk Input
External Input.
MIX-B Output (¼" TS unbalanced)
Main Mix (¼" TS unbalanced, +4dBu nominal level)
Control Room Output
Main Inserts
Phones

Mic/line Channel Trim
Flip reverses tape & mic/line input, works with Mix-B (Monitor), making both tracking & mixdown easier.
Aux 1 & 2 with common Pre/Post switch.
Aux 3, 4, 5, 6. Shift connects level controls to either sends 3 & 4 or to sends 5 & 6. Source switch breaks Aux Sends 3-6 away from main channel strip input to tap from MIX-B/Monitor signal. Common Pre/Post switch.
Hi Mid EQ. ½ oct to 3-octave variable bandwidth, 500-18kHz sweep.
Lo-Mid EQ. 45Hz-3kHz fixed-Q sweep.
12kHz shelving Hi EQ & 80Hz shelving Lo EQ. Switched into MIX-B circuit when Split button is depressed.
Lo Cut filter. 18dB/octave low-cut (high-pass) filter with a -3dB point of 75Hz reduces room & PA rumble.
MIX B/Monitor Section with Level, Pan, EQ & Source capabilities. In the UP position, MIX-B Source works with the Flip switch to determine the input running to the MIX-B controls. MIX-B receives the selected signal from the Flip switch. In the Channel position, MIX-B's input provides a 2nd, independent stereo mix from the main channel signal.
MIX-B Split inserts Hi & Lo EQ into the MIX-B signal path.
+20dB Overload LED with diode matrix that monitors three critical signal chain points, reading the highest at any one time, tripling chances of detecting overload.
-20dB Signal Present LED tells at a glance what's on the channel.
Pan Control pans channel signal between the two sides of the L/R Mix buses, & between odd/even pairs of Buses 1-8 (depending on positions of the five assignment switches).
Solo/Channel Metering. Press Solo & the console's Main L/R LED meters display the ch.'s operating levels so you can accurately set input trim. Also assigns the output of the ch. to the stereo Solo buses, & disconnects all other sources from the Control Room monitor speakers (but doesn't interrupt the eight Submasters, MIX-B, L/R Mix, or Aux sends). Solo assignments are stereo so you hear the channel in full stereo perspective — even with the source panned hard left & effects return hard right.
Special 100mm logarithmic taper faders (see story on inside spread)

TEAR-OUT PRODUCT GUIDE

READ THE BOOK: CALL 800/258-6883

Our really detailed 24-page 8•Bus tabloid brochure includes common console hook-ups for tracking, mix down and PA applications and lots more arcane info. Call toll-free today.

SEE THE MOVIE: SEND US $9.95

We've produced an in-depth 8•Bus "video owner's manual" that covers every facet of our consoles.

"Our friend, The 8•Bus" includes demonstrations of all functions, step-by-step hook-up instructions for both studio and PA applications and special tips from the Mackie Technical Support team. Although extremely complete (and even occasionally serious), it's anything but boring. You'll learn the details of why pros overwhelmingly prefer the Mackie 8•Bus.

As a bonus co-feature, we'll include a copy of our award-winning, 28-minute feature "The First Mackie Home Studio Video: Clam Boots in Paradise," a merry madcap romp through LaLa land home studios of the stars with two genuine Mackoid employees (no mixers were harmed during the filming of this video). To get both, send a money order for $9.95 (U.S. currency) to:
Mackie Designs 8•Bus Video Offer,
20205 144th Ave NE, Woodinville, WA 98072. Allow two weeks for delivery (we pay shipping). Offer expires 6/1/95.

Sorry that we can't accept personal checks or bank cards or phone orders…but, being a manufacturer who sells our mixers only through retail dealers, we're just not set up for intensive mail order.

We apologize for the inconvenience but we think you'll find the videos worth your while.

16•8, 24•8, 32•8 Specifications

Noise. (Measured 20Hz to 20kHz bandwidth, Tape Returns selected, no EQ, Channel Pans alternating L/R, L/R. "Faders up" refers to Unity gain, 0dBu position.)

Main L/R Output Noise. Master fader down, –101dBu; master fader up/no ch.'s assigned, –95dBu; master fader up/24 chs. assigned, –90dBu; master fader up/24 chs. assigned, ch. faders up, –86dBu; +4dB operating level S/N ratio, –90dBu

Submaster Output Noise. Master fader down, –92dBu; master fader up/no ch.'s assigned, –90dBu; master fader up/24 chs. assigned, –90dBu; master fader up/24 chs. assigned, ch. faders up, –86dBu; +4dB operating level S/N ratio, 90dB

Total Harmonic Distortion. (1kHz @14dBu measured 20Hz–20kHz, mic input. Direct output, 0.003% typical; L/R Mix output, 0.0014% typical; Submaster output, 0.0015% typical

Crosstalk. (1kHz measured relative to 0dBu, measured 20Hz to 20kHz.) Line In to Adjacent Channel, –81dBu; L/R mix output w/channel down, –95dBu; submaster output w/channel down, –86dBu; L/R mix output w/channel muted, –95dBu; submaster output w/channel muted, –96dBu; L/R mix output w/channel un-assigned, –91dBu; submaster output w/channel un-assigned, –95dBu; L/R mix output w/adjacent channel assigned, –92dBu; submaster output w/adjacent channel assigned, –94dBu; L/R mix output pan pot attenuation, –87dBu; submaster output pan pot attenuation, –87dBu

Frequency Response. +0dB/-1dB, any input to any output 20Hz to 60kHz; +0dB/–3dB, any input to any output, 10Hz to 120kHz.

E.I.N. Mic input (150Ω termination, 20Hz–20kHz) –129.5dBm

C.M.R.R. Mic Input, max gain @1kHz, –83dBu; line input, minimum gain @1kHz, –45dBu; tape input, no gain @1kHz, –45dBu

Maximum Levels. Mic input, +14dBu; all other inputs, +22dBu; L/R Mix balanced output, +20dBu, all other outputs, +22dBu

Impedances. Microphone input, 1.5 kΩ; channel insert return, 2.5 kΩ; all other inputs, 10 kΩ or greater; all outputs, 120Ω

Equalization. Hi Mid, full parametric, ±15dB freq. sweep from 500Hz–18kHz, bandwidth (Q) variable from 1/12 octave to 3 octaves; Lo Mid, swept, 45Hz–3kHz ±15dB; Hi, shelving, 12kHz ±15dB; Lo, shelving 80Hz ±15dB; Lo Cut (HPF) 75Hz, 18dB/octave (Tchebechev)

NOTE: Specifications are subject to change without notice.

"Since the introduction of the CR-1604, Mackie mixers have been associated with excellent sound quality at a reasonable price. According to our audio tests, the 8-bus console won't be upsetting that tradition."
Keyboard June 1994

8•BUS SERIES DIMENSIONS

Consoles (H x W x D**), inches [cm]*

32•8: 6.0 x 45.8 x 28.8 [13.8 x 116.3 x 73.1]
24•8: 6.0 x 37.0 x 28.8 [13.8 x 94.0 x 73.1]
16•8: 6.0 x 29.2 x 28.8 [13.8 x 74.1 x 73.1]
24•E: 6.0 x 29.2 x 28.8 [13.8 x 74.1 x 73.1]

Meter Bridges (H x W x D), inches [cm]

MB•32: 5.7 x 45.8 x 2.6 [14.4 x 116.3 x 6.6]
MB•24: 5.7 x 37.0 x 2.6 [14.4 x 94.0 x 6.6]
MB•16: 5.7 x 29.2 x 2.6 [14.4 x 74.1 x 6.6]
MB•E: 5.7 x 29.2 x 2.6 [14.4 x 74.1 x 6.6]

Stands (H x W x D), inches [cm]

ST32•8: 29.5 x 45.8 x 28.8 [74.9 x 116.3 x 73.1]
ST24•8: 29.5 x 37.0 x 28.8 [74.9 x 94.0 x 73.1]
ST16•8/4•E: 29.5 x 29.2 x 28.8 [74.9 x 74.1 x 73.1]

Sidecar (H x W x D), inches [cm]

SC•8: 5.3 x 23.4 x 28.8 [13.4 x 59.4 x 73.1]

Power Supply (H x W x D), inches [cm]

PS21•8: 3.5 x 19.0 x 10.1 [8.9 x 48.3 x 25.6]

*Measured from highest point of main chassis.
**Add 5.5" [14 cm] for power connector clearance.

MACKIE.
MACKIE • DESIGNS • INCORPORATED

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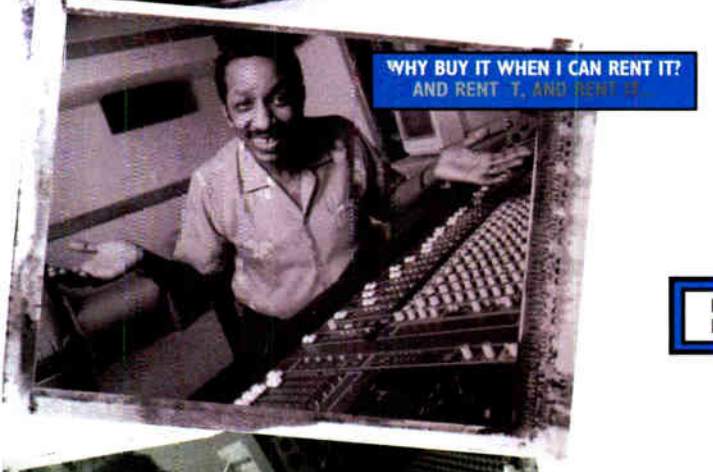

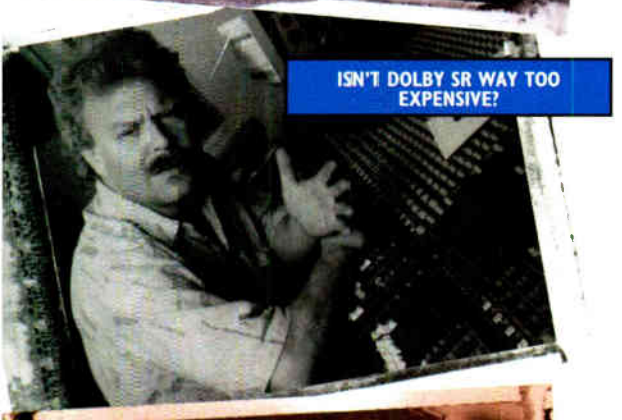

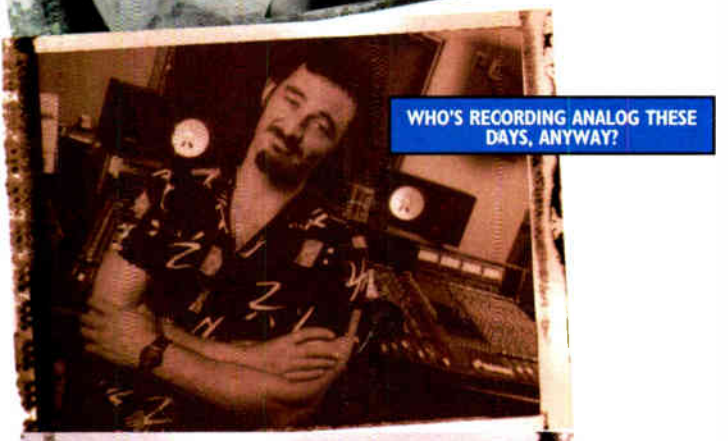

You've been waiting for the digital format wars to end and for professional technology to standardize. And waiting. And waiting.

Meanwhile, thousands of artists, producers and studios worldwide are choosing Dolby SR for the soundest of reasons.

Dolby SR can improve the quality of your recordings *now*, reducing tape noise and extending your dynamic range

SO, WHAT'S *your* EXCUSE?

by as much as 24 dB, no matter what your tape speed or formulation. It extends the life of your analog recorder while your sound retains its warmth and character.

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VideoGig brings high performance, random access and portability to the digital production environment.

Take your show on the road with the VideoGig™ family of removable 3.5-inch hard disk drives from MountainGate. It's the safest, easiest way to transport digital audio and video from here to there – and back again. ● With capacities of 1.7, 2.1 and 4.1 GB, there's plenty of room for everything from MIDI files to your latest mondo video. It's rock-solid storage, too, because VideoGig hard drives are fully enclosed in shock-resistant, sealed cartridges that keep them free from pollutants and protected against impacts that can damage media-only removables. ● You also get all the performance of today's most advanced storage devices with access times as fast as 8 ms and transfer rates of up to 10 MB/sec. ● And VideoGig is a real trooper, ranking first in reliability with a MTBF rated at 800,000 hours, backed by a two-year warranty that comes with an exclusive, same-day replacement guarantee. ● Compatible with most major computing platforms, you can use VideoGig for digital audio and video editing – including off-line, non-linear video and film editing. And you can keep on using it further down the line since today's docking stations are designed to work with tomorrow's even bigger and better VideoGig cartridges. ● So call MountainGate at 1-800-556-0222 today for the name of your nearest dealer or for more information about VideoGig hard drives. ● They're the removable storage products to use when you know the show must go on.

PERFORMANCE

CAPACITY

PORTABILITY

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MountainGate VideoGig
A Lockheed Company

order to get a better look at some of multimedia's niches, nooks and crannies, this month we talked to five different companies that specialize in particular aspects of multimedia production.

RAINER GEMBALCZYK,
Digital Playground; San Mateo, Calif.

David Joslyn and Rainer Gembalczyk founded Digital Playground to serve the interactive needs of high-tech corporate clients after working together at Music Annex in Menlo Park, Calif. "Today we have three people on staff," says Gembalczyk, "but we often draw on outside people such as graphic designers for our projects. David brought the corporate clients, whereas my clients were from the more traditional music side."

The company's niche has evolved from the owners' experience in the audio industry. Gembalczyk recorded music projects, as well as industrial work, cassette premastering and CD premastering using digital workstations. He says, "Over my eight years [at the Music Annex], I saw that one of their strengths was their ability to service a broad market. I carried that strategy over into my current business. Here a client doesn't need to go anywhere else to have additional work done on a project. Even if I can't do it here, at least I know people who can do that for me."

Gembalczyk and Joslyn are looking closely at the potential of the corporate market. "A lot of these corporations are now moving over to CD-ROM after having used tape-based audio and video materials, and we're in a position to help provide them with solutions to their needs." One of their clients is Personal Training Systems, a company that started out producing cassette tutorial programs for computer applications such as WordPerfect. Now they offer the same kind of programs on CD-ROM, which brings the advantages of random access and video support, all on the same computer screen as the application you are running. "We have been producing the audio for these programs," says Gembalczyk, "and then integrating it with the graphic elements onto a CD-ROM format.

"We're also doing an interactive sales presentation for Applied Materials—a company that makes the machinery to make computer chips—for an upcoming computer conference. It's designed for playback on a Macintosh directly from a hard drive. Those kinds of projects can be expensive to produce, and corporations are a perfect target market, because they have the budgets."

While the bulk of Digital Playground's work is corporate-oriented multimedia projects, about a third of the work is traditional audio recording and CD-mastering services. Digidesign's MasterListCD is used along with a Pinnacle Micro CD Recorder to create one-off masters for replication.

"We see ourselves as providing an extension of our traditional services," Gembalczyk says. "I don't see a mul-

The Digital Media Triangle

One way to find your place in this world of integrated digital media is by the kind of application, market and content that you're comfortable working in or that you aspire to work in. Beyond that, one way to visualize your career place in integrated media is to picture a triangle whose points represent creative, technology and business.

You can find yourself somewhere within that triangle based on what mixture you have of those three attributes. Then you can add depth to that triangle by representing the different component media: graphics, video, communications, programming, marketing. All those different strata represent the universe of multimedia talent.

You might find yourself more than one point, or within a finite space, in that dimension. To be a producer, you need to be able to drill down right through the central core: You must be able to understand creative, technical and business issues in each of the different media.

—Jeff Burger

timedia revolution here: it's really an *evolution*. The hardware and software is finally coming down to a point where small, owner-funded companies like ours can afford it. You can truly incorporate these other areas that have always been part of artistic expression. I think in the future we'll see more and more integration of different media in people's projects. I expect that we're going to help people put down their ideas into CD-ROM or some kind of online format to the consumer. And when fiber optics and other methods for fast data transfer become available to more modest facilities, we'll probably be working with subcontractors in remote locations.

"I think there are parallels in this industry to that of the music industry: there were a few years where an independent could put [an audio CD] out there and people would buy it in sufficient quantity to break even. Eventually, this market will become so saturated that only the very outstanding products will survive, unless they are supported by the huge marketing efforts that only large companies can afford."

GAYLYNN FIRTH,
Computer Curriculum Corporation; Santa Clara, Calif.

One of the first companies to venture into computer-aided instruction, Computer Curriculum Corporation is a fast-growing unit of publishing giant Simon & Schuster. In one of those corporate food-chain scenarios, Simon & Schuster was purchased by Paramount in 1990, and then just a few months ago Viacom purchased Paramount.

Multimedia products at CCC focus primarily on children's educational tools. The multimedia department is responsible for interactive design, graphics, animation and video. A separate department provides audio support. Ted Brooks, one of six audio producers on the staff, explains that the audio department spends about half its time recording voice-overs; the remaining time is devoted to music composing (although that task is often contracted out), mixing, digitizing and audio file management.

Gaylynn Firth was brought in as director of multimedia at CCC last December. Before that, she was the executive producer of Apple Computer's Apple Television department. She says, "Our products are both networkable and non-networkable, for Mac and PC, on either CD-ROM or laserdisc. The audience is predominantly K-to-12, although we do have a small adult-education emphasis."

The company has been publishing electronic books for many years and decided to get into multimedia about three years ago. Once the enabling interactive technology emerged from the R&D labs, Firth says, "it was a no-brainer. It enhances an individual's ability to learn to be able to not only hear about it, but see it."

The company develops a diverse set of products based on guidelines from state departments of education. The sales force approaches school districts directly, and the products are on state listings for curriculum approval. "It's very different from the 'edutainment market,'" Firth says. "The multimedia department works collaboratively with curriculum, the project manager, the authors, the developers, the sales and marketing people. We're involved in math, language arts, science, environmental issues."

Firth feels it is her mission to carry the torch of education into the future. "As the information highway becomes a reality, we'll need someone who is keeping the foundation of education in their heart. I don't want to see everything become edutainment. The field of interactive education has the potential of being very exciting. That's why I'm here."

JEFF BURGER,
Creative Technologies; Sedona, Ariz.

Jeff Burger is the ideal candidate to be a multimedia producer. Author of *Desktop Multimedia Bible* and *Multimedia for Decisionmakers: A Business Primer*, as well as hundreds of magazine articles, he is also an accomplished graphic artist with several national magazine covers to his credit. He's acquired considerable video production skills, is a music composer and performer, and a computer programmer.

"Multimedia was originally defined by technology," says Burger. "But it's really about content. And it's now evolving into various vertical markets, just as traditional communication and publishing media have. It's really a convergence of industries that fuel their content back out into

a set of other industries.

"Recently, the paradigm has shifted away from one guy sitting in front of a computer to more of a 'movie studio production' paradigm, where you have a team of experts in their own areas who come together for a given project," he continues. "That's the model I now use to fulfill client projects in the real world. While you may be able to do all these things, it's another thing to trust your instincts at picking somebody for their talent and then let their personality come out in the project.

"The smaller the scale of a project, the more I tend to want to do the whole thing. For larger projects, I focus on being the one who conceives the ideas that will join everything together, mandate a style and work with the client. I might do a basic graphic design of some of the key elements, then delegate an animator to make those elements move or create additional elements. As a composer, I might come up with specific frameworks—if not ideas and melodies—and delegate them to someone else. Designing the nature and flow of the interaction is part of my responsibility as a producer. Real-world deadlines force you to divest yourself of ego; Steven Spielberg does not make a movie alone. He is who he is because of the choices he's made."

Burger's clients come to him mostly via word-of-mouth. "I made a conscious decision to be a producer, not a service bureau," he says. "I wanted to feel good about the creative aspect of whatever project I worked on. A lot of my clients have been companies within the industry, like RasterOps and Passport Designs. We've also had other clients, such as BT North America and Clorox.

"You have to be prepared to have a dog-and-pony show ready to go. Be ready to call on a client and show off your stuff. At this point, for the handful of client projects I'm doing, it means putting something on a videotape and on a PowerBook. It's not worth the hassle of dragging a big computer around. A lot of it has to do with how you approach the client, too—making it clear that you're a professional and you know what you're talking about. I have a list of 20 questions that I ask every client at the beginning of a project. By my asking these questions, my clients feel that I've obviously got a

handle on this. And that's what people want: a feeling that you can work with them and make this happen.

"Here in Sedona, Ariz., I find myself grooming apprentices for contract work. I also have tons of subcontractor contacts, and I'm not afraid of doing business long-distance with a subcontractor any more than I am of doing business long-distance with a client. This method seems to work, unless you intend to set up the trappings required for having a place of business.

"I expect the business will dramatically change as the information highway takes shape. Right now, multimedia is an island in terms of delivery and development platforms. As we all get jacked into this matrix and begin to shuffle this data around, it will take a more ubiquitous form, such as telephones and televisions. At that point, we'll be able to take this information as a mainstream way of communication.

"Multimedia is not about technology; it is about communication. People will no longer be seduced by the technology. You can have the greatest recording facility in the world, but if you don't have any talent as an artist or an engineer, what difference does it make?"

HOWARD LIEBERMAN,
ESCAtech, Half Moon Bay, Calif.

According to company founder Howard Lieberman, ESCAtech's role in multimedia is to evangelize the importance of sound. "We do that by supporting manufacturers who develop hardware capable of delivering a sonic experience to multimedia users," he says. "We provide the software that demonstrates the full potential of that hardware. Computer manufacturers have still not paid adequate attention to sound. We'd like to help lead the crusade to increase the emotional relevancy of multimedia by optimizing the use of sound.

"The company is primarily oriented toward the computer and computer peripheral industry, such as speaker companies, sound card companies and DSP companies," Lieberman adds. "Computer companies have been flirting with sound for ten years: NeXT came out with a built-in DSP chip and stereo speaker system, and they didn't have any software that showed off their hardware. Others have been fearful to follow, in part because of the failure of NeXT."

Lieberman has never been short on vision. "In 1985, I was doing research at Bose Corporation. As the least nerdy of the research guys, I was assigned to figure out what to do with the loudspeaker technology. I concluded that the two markets that acoustics would go to next were computers and electronic musical instruments. In 1985, Bose Corporation didn't think multimedia mattered much. Today, they have a multimedia product line, and there are 30 to 50 loudspeaker companies pursuing multimedia, none of whom have created software that shows off their hardware. That's part of the niche we're filling."

As is the case with many start-ups, ESCAtech's clients were also former employers of the founders. Apple Computer recruited Lieberman away from Bose, and ESCAtech's first contracts were done for Apple, helping them show off their sound hardware at Mac World Expo last January. "We're also talking to Bose," says Lieberman. "Start-ups generally take advantage of personal relationships to get their businesses going. Since our company is OEM-oriented, we know people at most of the major computer companies. Those are the relationships that we're pursuing, because we understand the needs of manufacturers—not just the artistic community."

But ESCAtech is interested in doing more than meeting the needs of OEM clients. Lieberman explains: "The company is currently comprised of about ten individuals who have both technical and artistic chops. We want to produce a full series of titles over the next few years. Our company includes published writers, composers, performing musicians and programmers.

"Our first title, *Sound Spheres*, has already won an Invision award. It's our attempt to perform information—to deliver emotionally engaging information about the importance of sound in the multimedia marketplace. The visuals and the sound are all created here; it's just that we've targeted it to deliver a specific message rather than make it an abstract work of art. We originally thought that this product would help people buy sound cards, computers and speakers. But we found that there is interest from the retail distribution channels, as well, because it has a strong educational value and it's emotionally engaging enough to be appreciated by consumers.

"We are really a communication company that takes advantage of the fact that the majority of the information is transmitted the way I'm speaking to you right now: using sound. No blackboard, no notebook, just words."

Lieberman expects that ESCAtech will evolve toward a post-advertising agency electronic communication company. "However," he adds, "there will be another division that pursues the publishing side of the business with original titles. We'll continue to focus on the business orientation, but we're not going to count on creating a hit title to keep ourselves alive. Out of the 2,000 multimedia companies in California, I expect that 80 percent to 90 percent will not be here in three to five years."

MARY BIHR *and* MICHAEL LAND,
LucasArts Entertainment Company, San Rafael, Calif.

In 1989, LucasArts Entertainment Company was founded as an interactive component of LucasFilm Ltd., encompassing both film-related services and games. Subsequently, all of the film-related aspects were transferred to either LucasFilm Ltd. or Lucas Digital. Today, the company is involved in the creation, production sales and marketing of interactive entertainment games, including those for IBM PC and Macintosh CD-ROM, as well as set-top platforms such as Nintendo and Sega.

The company currently employs about 125 people, and about 75% of them are involved in some aspect of content. Games are generally developed in-house, although outside developers are also used. Typically, an in-house project leader has a creative vision for a project. It is implemented by a team that includes producers, sound people, artists, animators and others.

Sound department manager Michael Land heads up a team of three people. However, the audio takes up more than the equivalent percentage of the budget, "and certainly more than three percent of the time," he remarks. "The nature of the production for other aspects such as art is more time-intensive. A typical

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production cycle on a game is one to one-and-a-half years. The audio group usually comes in on the last three or four months to create the sound effects and the music score. Typically, there's not more than two projects on the front burner at any given time."

Says LucasArts marketing director Mary Bihr, "Ten years ago George Lucas realized the importance of technology in our industry. He had a vision for how the technology of interactive entertainment would influence that of film production. Today, we're seeing the low end of the film industry dovetail with our industry. An example of that is *Rebel Assault*, which used both original video footage with footage from *Star Wars*. We see the use of film and video as a means to an end: to create great suspension of disbelief and great game play."

Repurposed video on *Rebel Assault* was less than 10% of the 500 MB of content—about 40 to 60 hours. The audio was culled almost entirely from original tapes from *Star Wars*. According to Land, Skywalker Sound delivered the original London Symphony score, along with a bunch of sound effects on DAT. "Then we did our own music edit and layered on the sound effects in concert with the graphics elements of the game."

But Land adds that in other games, the sound team created a complete original score, as well as all the sound effects. One of the more unique aspects of this group is a proprietary sound technology called I-Muse, developed specifically for interactive games. It allows for the music to respond to the player's choices, so the mood, pacing and tempo are influenced by the player's decisions.

LucasArts expects to continue its successful ways as an interactive entertainment developer over the next few years. Bihr comments, "We expect to provide deeper and richer content as the technology improves. More complex production tools will be developed that involve drawing the player more into the game. We also expect a proliferation of platforms and technology that will enable faster games to be played from a set-top box." ■

Mix associate editor Paul Potyen is also a '49er fan.

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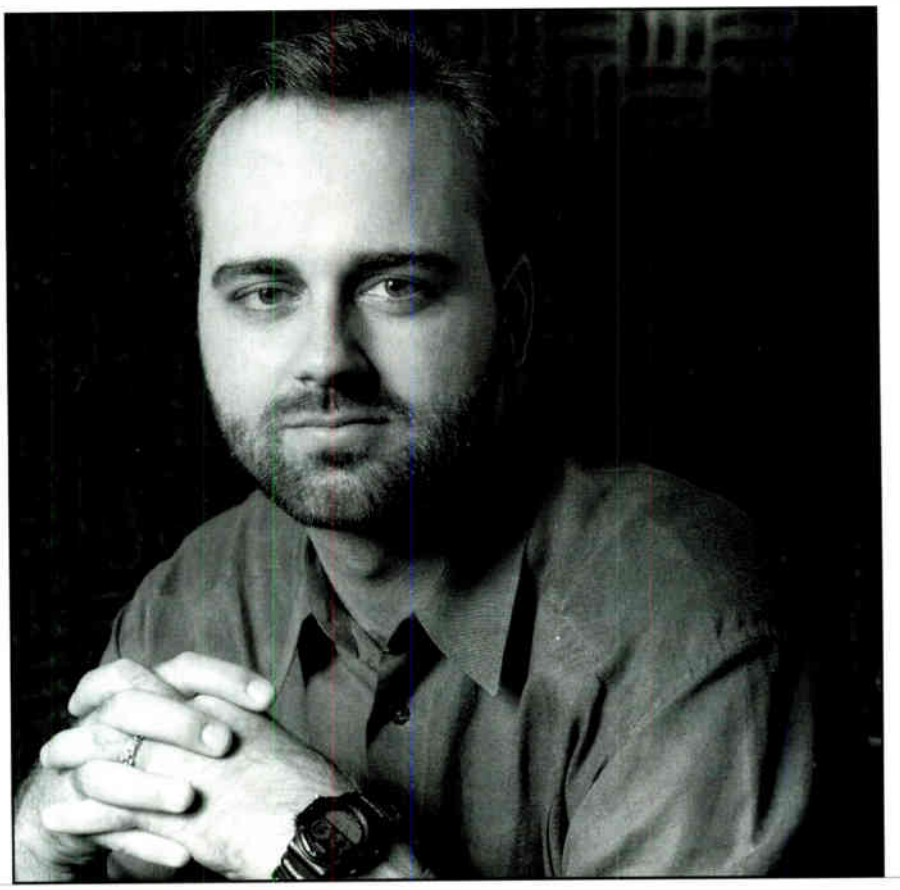
by Philip De Lancie

MULTIMEDIA TOOLS

DIGIDESIGN'S MICHAEL ROCKWELL TALKS ABOUT THE NEW MULTIMEDIA GROUP

It is no secret that audio has not generally been a top priority in multimedia so far, either among those who create the titles or those who develop the production tools. So perhaps it is no surprise that multimedia has been less than top-priority for audio tool developers. Although it is possible to cobble together a set of tools that will get the job done, squeezing the best possible quality out of multimedia sound is anything but an elegant and painless process. Even the widely used audio tools from Digidesign, a leading force in desktop production, have not been specifically designed to address the unique challenges and problems confronting the audio-for-multimedia professional.

Fortunately, as the multimedia market grows, so do the incentives and rewards for tailoring tools to its needs. At Digidesign, increased attention to multimedia products has been formalized with the creation of a new multimedia group. The group is headed by Michael Rockwell, who says that the growing importance of multimedia makes it imperative for



Michael Rockwell

Digidesign to "start now to identify areas where tools are necessary and to create the best tools for those tasks."

Rockwell comes to Digidesign with a varied audio background, including engineering for film and records and owning his own production studio for multimedia, film and television. He also brings with him programming experience acquired by creating tools to handle his specific production needs. One such tool, Region Munger, was commercially marketed by Rockwell through his own company before he joined Digidesign in May. His work on Region Munger has provided the foundation for the first of Digidesign's multimedia-specific tools.

Rockwell says his first goal in his new role is to "make it easier for people to do the things they do over and over every day." In the following interview, he talks about what he sees as the unique aspects of audio in the multimedia context, and how his goal will translate into actual products from Digidesign's new group.

What are some of the challenges of doing audio for multimedia that distinguish it from audio production for other applications?

There are both technical issues and creative issues. On a record, you have a linear medium that people play from beginning to end. They don't take your song and say, "I'm going to play the last verse and then the first verse and then the last chorus and then the tag." But in creating music for multimedia, you have to think of things as little atomic units that can live by themselves and also transition from one section to another. It is a very different way of thinking than doing a normal composition, and it is a real challenge. This modular music is a new art form.

Also, right now there are no really good tools for doing nonlinear composition—that is, for trying stuff out with your little atomic units. It is sort of tedious right now. Some of the tools are very good for creating linear chunks. But as far as trying a given scene out against all the other scenes in a complex maze of interaction, there is no way to do that using the tools that are currently available. So people have to make multiple versions and try them out to see if they transition smoothly. It is not a trivial job to make something that transitions smoothly from anywhere to anywhere.

On a record, you have a linear medium...In creating music for multimedia, you have to think of things as little atomic units that can live by themselves and also transition from one section to another. It is a very different way of thinking than doing a normal composition, and it is a real challenge. This modular music is a new art form.

Most of the technical issues relate to the bandwidth you have to work with. With multimedia, you are always constrained by your final delivery resolution, which is often 8 bits at a 22kHz sample rate, or even 11kHz. That is largely due to the fact that many multimedia projects are done for CD-ROM. The transfer rate from CD-ROM is only 150 kiloBytes/second for a single-speed drive. A double-speed transfers at 300 kB/second, which actually reliably gives you about 200 kB. If you use 16-bit/44.1kHz audio, it takes 166 kB/second, which means you have no bandwidth left for your visuals. So you have to really reduce the audio bandwidth, which is one of the issues that everyone is grappling with.

Given the smaller bandwidth, you have to think about dynamic range. You can't do stuff with lots of dynamics, because when it gets transferred to 8-bit, most of the low-level stuff will just turn to garbagy noise. So you have to think of more of a steady state in the audio.

You also have to think about the sounds you use. Everything sounds different when you do a sample-rate or bit-resolution conversion, so you have to take that into account when you do your mixing. It is a big challenge to make your stuff sound good on whatever platform you are delivering it on.

Another challenge is that every delivery has its own file format for audio. On the Mac, it is QuickTime, SND or AIFF. On the PC it is mainly .WAV. Sega, Nintendo, and other machines each have their own. You create in one format, and then you have to create all these delivery files.

To what extent do you think these various challenges are reflective of audio being a low priority in the eyes of those who develop both the production tools and the titles themselves?

It is a classic problem that people initially perceive the visual as more important. For the longest time, nobody cared about the audio in film, and that was the way it was in video production as well. But what happened was—and George Lucas really had a large part in this—that they showed that the visuals looked better, and the experience for the user or audience is much greater if the audio is extremely high-quality. The THX sound systems in the theaters really raised the awareness of this. And now, improving the audio is seen as one of the cheapest ways to make a film better.

I think that the multimedia community will eventually come around to this, but the technical issues have really precluded that so far. They would like to do better-quality audio, but there is really no easy way to do it, and they have to sacrifice a lot in terms of the amount of content to provide higher-quality audio. I think that is going to change. As compression and decompression algorithms get better and CPUs get faster, you should be able to squeeze better-quality audio into the same amount of space. But in the short term, the audio for multimedia doesn't sound much better than AM radio.

That is potentially frustrating for the audio professional—who is used to making things sound as good as possible—to know that their work will be

substantially degraded when it is heard by the consumer.
That was the case before with analog records and cassettes, until CDs made things better. You have to treat it as a creative challenge. You are trying to make the best possible product within the limitations that you have. And there are definitely techniques involved to make the audio sound substantially better than if you just throw it together.

Let's look at some of those techniques that can be employed using existing tools.
The first thing is that you always do your production at the highest quality you can. So you want to use good microphones and do your audio at true 16-bit/44.1kHz quality all the way through, and then take it down to your delivery platform at the last stage.

For one thing, somewhere down the road the players will be faster, and there may be quad-density CD-ROMs that have four times the storage, so you could actually do full Red Book audio at the same time as your video. So you are going to want to have your source material at high resolution so that you can make a new version—a reissue—that is high-quality.

Beyond that basic rule, everybody has their own creative solutions to trying to get the best quality, and people guard their secrets very closely. Right now, there are a number of products that do the conversion from 16-bit/44.1kHz production files down to the delivery format. There are two operations that have to be performed: sample-rate conversion and bit-resolution conversion.

As far as sample-rate conversion, programs like Sound Designer, SoundHack and Alchemy will all do that. SoundHack (a shareware program) does a very nice job converting to rates below 22 kHz, but it takes longer. For the user of these programs, there aren't a lot of options to worry about. You just say, "This is my input sample rate, and this is my output rate. Do it."

There are, however, different approaches to be considered by the developers of the conversion programs. A lot of it has to do with what quality FIR filter is used, because the first thing you have to do in the conversion is to filter out all the frequencies above the Nyquist frequency of the

destination sample rate, so that you can do interpolation without aliasing. The filter largely determines what frequencies end up in the final converted sound, which is why some converters sound duller than others. Doing a really high-quality, steep FIR filter is definitely a challenge.

Because there are slight differences in playback sample rates on different computers, what we are calling "22k audio" isn't always exactly 22.05 kHz, which would be half of 44.1. What are some of the complications that arise from this?

The files will play at a slightly different speed. It is a very small change, but if you are synchronizing to something, you are in trouble. Most multimedia programs have synchonized visuals, so you really have to get it as precise as you can. You could do your sample rate conversion before you do your synchronization, but usually the audio production happens after the visuals are done and timed out.

What about the bit-resolution part of the conversion?

There are basically three techniques for doing it. One is truncating, which means that you just take the upper eight bits of a 16-bit signal. The problem is that you get quantitization errors, which end up being perceived as distortion. It makes an unpleasant grunge on the audio.

The next method is rounding, in which you take the upper eight bits, but you look at the lower eight bits to see whether the last bit of the eight you are taking should be rounded up or down. That definitely improves the signal-to-noise by about 3 dB, so you get the full 48 dB possible with eight bits.

The other option is dithering, which means adding a controlled amount of noise to the signal. Where dithering can work is to make a constant lower-level background, like a music bed, sound better. Dithering adds noise to the boundary condition at the very lowest part of the signal, which helps to smooth out the quantitization errors. It makes the perceived quality of the audio much higher.

The drawback of dithering is that it makes the signal sound noisy. When you have eight bits and you put in a single bit of dither, that brings your signal-to-noise down to 42 dB, and the noise is very noticeable. There are noise-shaping techniques to try to reduce the perceived noise by concentrating the dither signal into the high and low frequencies where our hearing is less sensitive. The problem is that when you get down to low sample rates, such as 11 kHz, the highest frequency you can get is 5 kHz, and we are very sensitive to 5 kHz. So noise shaping at low sample rates is much less effective.

What is happening in terms of data compression that might eventually help address some of these limitations in delivery quality?

ADPCM (adaptive delta pulse code modulation) is one of the best ways to solve the resolution problem. The new version of QuickTime (2.0) has 4:1 ADPCM built in, and the new version of Windows (Chicago) will support ADPCM as well. Data compression gives you back more than eight bits of apparent resolution. What it requires, though, is processor time to decompress during playback. The overhead of that is too high for most developers. They don't want to dedicate more than ten percent of the CPU to deal with audio, and current ADPCM can take much more than that, depending on the playback machine. Most developers assume a pretty slow CPU in the target platform—a 486 SX25 on the PC side and a 25MHz 030 on the Mac side. That makes it even more of a challenge to decompress the audio. Also, right now there is no consistent compression scheme across multiple platforms.

Let's move on from technical issues to look at the productivity issues involved in audio for multimedia.

Multimedia production is very human-resource-intensive, because the tools are not there. The whole production process usually involves a huge amount of human effort to get it done. That is part of what is keeping production back and why we haven't seen more titles, because production takes so long.

We talked about all the different factors involved in making it sound good. Right now, whatever steps you use to get the best-quality signal, they tend to be done individually in separate programs, so the developer has to use five or ten different products to actually do the job. Or even within one program, processes are done as separate functions. So you have to perform each function, one at a time, and you often have to perform it on thousands of files, because the typical CD-ROM may have 3,000 individually callable lines of dialog.

Multimedia production is very human-resource-intensive, because the tools are not there. The whole production process usually involves a huge amount of human effort to get it done. That is part of what is keeping production back and why we haven't seen more titles, because production takes so long.

Even with QuickKeys and other automation techniques, someone has to sit there and manually do to thousands of files things that computers should be able to do by themselves. It is usually just repetitive types of actions, but you can't just give the work to cheap labor with no experience in audio, because you have to have some expertise to make sure you don't screw it up. And there is no good, reliable way to automate it right now.

How does the multimedia group at Digidesign intend to address this problem?

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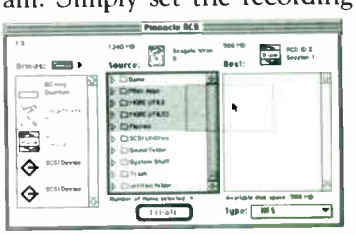

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types of DSP functions. Those seem to be the things that people do a lot, and they usually keep the same settings across a set of multiple files. Also, if you have one long file full of sentences or sound effects, you will be able to break it up into separate files using threshold-based automated region creation.

Basically, you create a document that you add a set of audio files to. Then you create a batch of processes, which will have a graphical interface with a signal path onto which you can drag processes from a list and arrange them in different orders. It will support Sound Designer plug-ins such as Q10, MDT and L1. Then you will have the sample-rate converter, and a bit-value converter that will give you the option of truncating, rounding or simple dithering. And then it will provide a way to auto-name the output files.

You can assign a batch to any number of files in a group, or regions within a single file, and create multiple batches to perform different settings or processes on different files. You will also be able to assign multiple batches to the same source file, so you could, for instance, process once for a PC destination file and then again for Mac. It will also do a "pre-flight" check to make sure you aren't going to run into any problems during processing. And it will keep a log so that if you do have problems, you will be able to see which files were sucessfully processed and which were skipped.

What will you be able to listen to when setting up your processing parameters?

The program will be able to take a little chunk of audio, run through all the selected processes in a given batch and preview it for you. But you won't be able to adjust the settings while you are in this batch-previewing mode. The preview will be through Sound Manager, so you can preview either out of your Digidesign hardware or your internal Mac speaker.

What will you need in order to use the program?

The conversion of sample rates, bit resolution and file formats, as well as the automated threshhold-based editing, will all work without any DSP hardware. But to use the Sound Designer II plug-ins for EQ, compression and other DSP processes, you will need one of Digidesign's DSP cards.

If you are not running any plug-ins, the goal is to make the program run in the background. The batch will run slower, but you will be able to do other stuff with your machine. Also, the program will be a native PowerPC application from its first release, which will be in December.

What lies beyond this first program for the multimedia group?

Our charter is to bring the tools to market that can solve the problems of audio for multimedia. We are looking very seriously at compression/decompression algorithms. And we are examining what it would take to modify our current audio-editing applications to make them more friendly for multimedia work. ■

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

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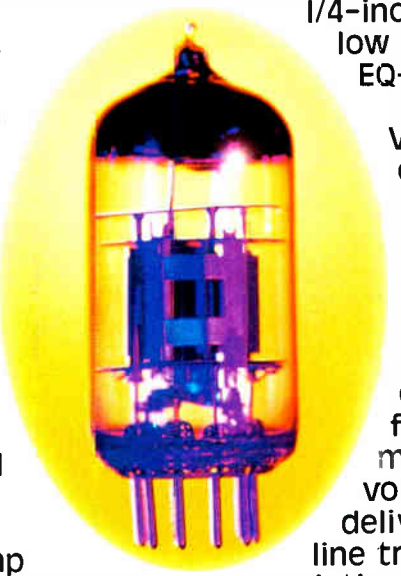

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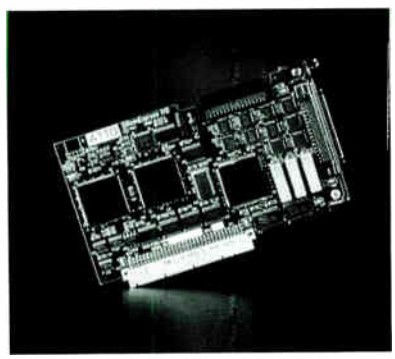

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The 1994 Edition of The U.S. Consumer Electronics Industry In Review: *Entertainment and Education—Yesterday, Today and Tomorrow* offers an analysis of growth trends in the consumer electronics industry, including subjects such as HDTV and Radio Broadcast Data System (RBDS), as well as multimedia and cellular products, personal digital assistants and a wide variety of other technologies and products. The 110-page booklet is available from the EIA/CEG's Communications Department, 2001 Pennsylvania Ave. NW; Washington, D.C. 20006. The information is also available on EIA Online via CompuServe.

by Dan Daley

THE AGENT GAME'S NEW TWIST

PROJECT STUDIOS

A couple of years ago I did a story on a then-nascent trend of representation for producers and upper-level engineers. That was followed awhile later by a piece on agents for a broader range of engineers. Logical person that I am, it occurred to me that project studio owners, who are many of these new engineers in the first place, might be picking up representation, too.

Sure enough, they are. And if there is an axis around which this newest trend revolves, it's the same one that project studios themselves spin about: money.

The equipment used in today's project studios is the result of changes in economics as they were played out in R&D labs. It's the same logic of why a color television that used to cost $1,000 now costs $200 and CD players that kicked off at $750 in 1982 now can be had for less than a hundred bucks.

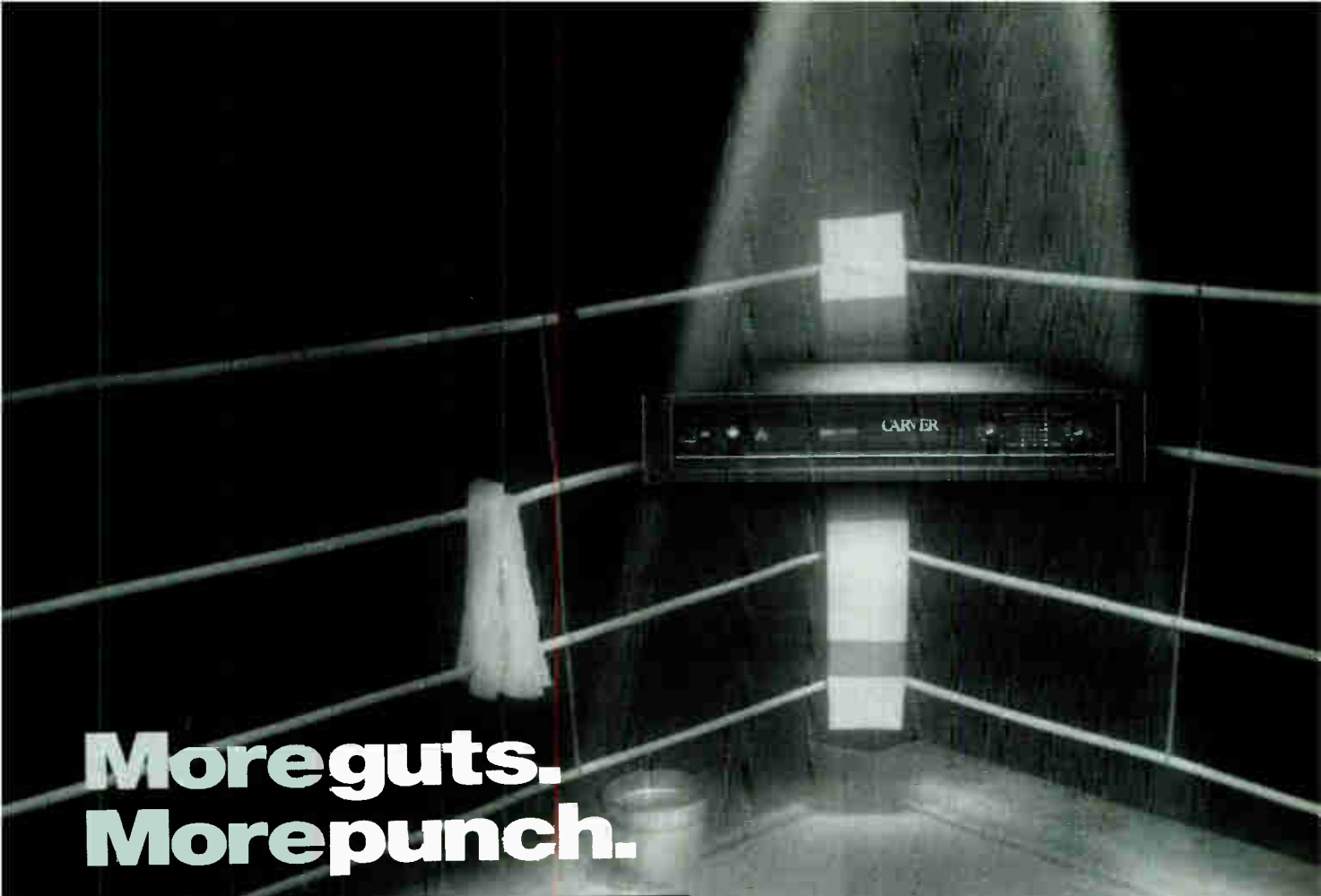
Those very economic issues are key to understanding the project studio phenomenon. In the new type of relationship that project studios bring to the business of production and engineering, money is once again the delineating line between camps and philosophies that otherwise have few boundaries, and even fewer rules.

Producers and engineers with personal studios who try to compete with world-class commercial studios for big-budget projects often have a hard time. Record companies, which are actually paying more for name producers and engineers than ever before, are wary of producers finding ways to get any more money out of them.

"It's always puzzled me why the record companies have such a problem with it," says one representative of several major producers and mixers. "They won't buy artists [recording] equipment with advances, but they'll spend a lot to rent it. The sentiment seems to be, 'We're already paying the producer a lot of money; we just don't want to spend any more on this project.'"

In the new type of relationship that project studios bring to the business of production and engineering, money is once again the delineating line between camps and philosophies that otherwise have few boundaries.

Sandy Roberton, president of World's End, a major management company, notes that producers' personal studios often hinder as much as they help a negotiation. "Sometimes it helps get more work," he says. "But also sometimes you have



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to be careful in how it's presented, because if a record company knows a producer has his own studio, they tend to be more aware of how much money is spent on overdubs. Sometimes that works against you."

On the other hand, Roberton notes, the producer has to understand that bringing a personal studio to the table entails its own level of commitment: "Do you really want a band in your house for four to six weeks?" he asks rhetorically. Ultimately, he observes, "Most home studios are only adequate for overdubbing. I have only one client—Rich Mouser—who can record live drums in his home and make them sound great. I personally think that most home studios should be used as a tool to bring the budget down; it's always difficult to charge commercial rates for a home studio."

Jack Leitenberg, who manages Don Was for Kuschick/Passick Management in New York, says the artist tends to make the decision more often than not. Bonnie Raitt, Kris Kristofferson and Waylon Jennings have availed themselves of Was' California personal studio for portions of their joint projects. "It's a convenience for them, and there is a cost-savings factor for some artists," Leitenberg says. "But Don is now at the level where we don't need to deal with the studio as part of the package if it's not appropriate for the project. The same goes for Peter Wolf, who we also manage and who also has a personal studio."

It's at the middle and lower echelons that the project studio becomes more of a piece on the board. Steven Scharf's Manhattan-based company represents a number of alternative-music producers, including Mark Berry (Voi Vod, Love Chain), Miles Wilkenson (Guy Clark, who qualifies as alternative country these days), Bryan Martin (That Petrol Emotion, Cotton Mather) and Tom Dube (Morphine, Modern Farmer). Dube has an ADAT-based home studio and has produced several of his records there. Others have been taken into traditional commercial settings. "It's all based on the budget," says Scharf. "The smaller labels with smaller budgets find his having his own studio more appealing. The larger labels may have different expectations. But even the budgets aren't always the only

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factor—a lot of my clients don't have their own studios, but things are such today that you can cut deals with regular studios all over the place."

Scharf sometimes negotiates the studio rate as well as the fee for his client; other times, it's either a separate negotiation or is handled between the producer and the client. With lower-budget projects, sometimes the entire budget is handed over to the producer to cover both the production fee and the studio costs.

Dance and urban contemporary producers often find that their equipment, which helped make them who they are, is part and parcel of their sounds. "The home studio has enabled a lot of writers to get their starts as producers," explains Jane Brinton, president of New Jersey-based This Beats Working Inc. Brinton manages remixers such as Junior Vasquez (Lisa Lisa, Cyndi Lauper) and Tony Shimkin (co-writer and programmer with Madonna). "It's a totally different ballgame now—both the producer and his or her studio are negotiable. It makes sense considering that years ago, if you wanted a remix, you sent the producer a tape and he added to what had been recorded. Now you send out time code and a vocal. So I always present the producer's studio as an option to the client. It depends upon the artist where the production winds up."

Brinton negotiates the rates for both producers and their studios, sometimes as a package. But even then, the individual costs are broken out for the artist and the label. "And sometimes they can negotiate directly with the producer," she says.

Tony Drootin manages five producer/engineers from his office in Teaneck, N.J., as well as managing Manhattan's Unique Recording studios. One of his charges, Kevin Deane, works from an ADAT-based home studio. Because the bulk of his production work is predicated on his composing, the tracks he produces are often completed before an artist is connected with them. Drootin says that studio time charges in such instances are limited to the time spent actually with an artist doing vocals on songs. In the budget-intensive world of R&B, rap, U/C and hip hop, in which producers often do only one or two songs on a recording, project-by-project negotiations that include the personal studio work best.

There are no hard and fast rules when it comes to adding personal studios into the budget and fee equation. Most managers are getting between 10% and 20%, although that usually applies to the producer's fee. The percentage on the studio varies according to each individual, some taking the same percentage as on the fee, others taking nothing at all with the attitude that the manager builds the producer's career, the producer builds the studio.

That there can be such a wide range of codes is indicative of yet another new trench on the battlefield of professional audio. But it will mature, and standards will develop and be applied. Multiple standards are in the nature of the project studio beast, and it's no different for managers of project studio-based producers/engineers. ■

Dan Daley spends most of his time bouncing between New York and Nashville.

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R E D
RANGE

by Adam Beyda

DON FLEMING

INDIE SPIRIT MOVES THE MAJORS

Back in the halcyon days of '80s recording, the moniker "alternative" mostly referred to music on independent labels. But in the wake of Nirvana, alternative went mainstream, becoming just another department at the majors. So what else is new? The hydra-headed corporate beast-machine will implacably package and sell whatever it can lay its insidious metallic pinchers on until such time as it collapses in flames. (Okay, I'm getting a little carried away here.) Corporations are forever trying to convince you of the truth and authenticity of their product, but because feeling and spirit resist simulation and cooptation, a work of art speaks for itself, regardless of what the company tries to tell you about it. As always, you have to look beyond the categories applied and the claims made to distinguish the truer substance or nature of the object or person.

At first glance, New York-based musician/producer Don Fleming looks like a commodity ready-made for the new alterna-corporate order: He has hipster credentials extraordinaire, playing and recording in the '80s D.C. and New York underground scenes, keeping company with the likes of Kramer and Sonic Youth. And over the past few years, he's unleashed serious production chops on a string of indie bands gone major—including Teenage Fanclub, the Screaming Trees and The Posies—to great effect.

Yet though he can play the majors' game, Fleming is not a contrived, soulless poser, fleecing green (day) kids and shaking down the alternative market for all it's worth. He's actually a pretty easy-going, level-headed, extremely busy guy who, at any given time, has his hand in a number of pies. He fronts his own combos, the current incarnation being Gumball, a hard-rockin' quartet with a new release, *Revolution on Ice*, out on Columbia. In a supporting role, he's played guitar and sung for a load of bands over the years, including Dinosaur Jr. and Half Japanese, and he recently played in the soundtrack band for the movie *Backbeat*.

Not enough? Well, all this playing is only part of the story, but it's intimately related to the other big plot element, his production work. Fleming says that for him, "the production thing grew out of being a musician who liked to play with a lot of different people. I've always had a main band, but at the same time I've always worked in as many projects as I could because I just really enjoy the feedback you get from playing

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with other people."

Given this background and attitude, it's no surprise that, far from being a label guy or mere technician, Fleming is a particularly personable, band-ocentric producer. "To me, a lot of producing is working with the band," he says "and making sure everyone is in the right frame of mind. I don't want them waiting on me while I'm sticking up 40 different microphones trying to get a sound. I want them to be just chomping at the bit, ready to record.

JOHN FALLS

Gumball is, left to right, Don Fleming, Eric Vermillion, Malcolm Riviera and Jay Spiegel

"One of my jobs in the studio," he adds, "is to isolate the band from everybody. I like getting bands out of the town they live in and away from their label and management. It's a more private time. People can't help but want to throw in their two cents' worth, but I just feel it's so easy to screw it up by worrying the band."

Fleming approaches producing from a musician's standpoint and likes to ensure that the band retains as much creative control as possible. As a rule, he doesn't participate in the songwriting with the bands he produces. His style is to add his perspective, tailoring his methods to the requirements of a given band and situation.

"I don't want to have it like *this* is my sound," he explains. "You hear this drum and you know that's a Don Fleming drum sound. I'm not into that. I'm into going to different studios, getting the players to do what they sound like and just being able to capture that. That to me is more of a challenge than just having a certain way I do it with every band."

Which is not to imply that he doesn't have his biases: He's very suspicious of the paint-by-numbers aspect of multitrack recording, and true to his underground roots (when he would knock out a single for one of his bands in an afternoon), his recording aesthetic is very live ("all you can do when you go in the studio is start playing and turn on the damn tape machine—that's pretty much the recording process") and decidely analog.

In fact, you might say that this cat is crazy into analog.

One of his favorite studios is New York's Sear Sound, well-known for its stock of vintage tube gear (Fleming's a big fan of harmonic distortion). On digital and computers in the studio, he opines, "I think there's enough people fighting it now that the analog thing has made quite a rebound in studios. A lot of people appreciate it. But it's good to continue reminding people, because there are tons of people who wouldn't have any clue that there's any difference and would just think, 'Oh well, this new digital board must be the best.'"

He reveres older methods of recording and old sounds, but he also likes pushing the limits of sound and enjoys distortion and loud guitars. "More and more when I'm doing guitar stuff," he says, "I like to avoid going through effects boxes, unless I'm using them very specifically for an effect, because I find that they really limit the frequency of the pickup that you're using. I just prefer that a hot P-90 goes straight into an amp and that you crank the amp and get that distortion and everything from the amp. The straighter you go to tape without going through anything, the better off you are."

On the new Gumball LP, which Fleming co-produced with John Agnello, he employed some particularly unusual guitar-miking techniques: "When you listen to the Hendrix song 'The Wind Cries Mary,'" he says, "you can hear the snares in the drums vibrating next to the guitar in the parts when the drums aren't playing. Well, I love that sound. On [the new Gumball], we did a couple of guitar solos where we just set up a mic on a snare and that was the mic that was picking up the amp, so it was

getting like heavy-duty snares."

Kind of eccentric, but there's a large audience for the unusual and human, not to say sloppy, aspects of music. In all his productions, Fleming tries to leave room for the unexpected: "Even if I've got something that's all worked out, I'm always trying to get in some time to fill up some tape with some very spontaneous stuff, whether it's covers that the band barely knows or just making stuff up. I generally find that a couple of good things come out of that. It's something you've got to be careful about; you don't want to be too rehearsed."

Not that his approach isn't rigorous or doesn't involve a lot of preparation if he feels it's necessary; it's just that in his production, his band- and people-oriented approach meshes cleanly with his preferred recording methods. For example, when it comes to drums, he says, "I'm really after getting a good drum sound on the first go 'round. I have to assess how much a drummer is going to be able to knock it out for me. I prefer not to edit and definitely not to use a click track—it's to the point where everyone's gotten used to hearing a drum machine at a metronome beat, and to have songs that speed up and slow down seems odd. But I want the drum tracks to sound really strong, so I'm definitely checking out the drummer a lot in pre-production."

In general, he has to be quite selective about prospective bands, because working on Gumball doesn't leave him a lot of time to produce. He chooses artists whose influence he wants to be exposed to; he learns a lot from working with bands and going into different studios, and he brings this knowledge to his own band and to other subsequent projects. He relishes his multiple roles and is glad to get out on the road with his band. "You get burnt on being in the studio," he says. "Most engineers and producers seem to be in that world where one job turns into the next job. You can go on for months and never see the sun. Too many people are limited by 'This is what you do,' and that's it. There are great engineers who are also great musicians. It's because the industry is so fixed by lawyers and the labels that people are restricted from doing as much as they probably would."

Despite recognizing the limitations of working with major labels, though, Fleming agrees that the majors' increased interest in alterative music is a good thing, that in general it's good that a (sometimes) more challenging kind of music is penetrating the commercial milieu. But he thinks that a lot of indie bands end up getting screwed. They're often clueless about the business and recording aspects of their careers and can suffer either from neglect or, more often, manipulation at the hands of the labels. His advice to young bands: "I still think the best thing for a new band is just go in a studio, record by yourself, press it on vinyl by yourself and sell it. Then, after you've done that, you'll know so much more about dealing with anybody."

The increased interest of the majors in things alternative has presented an opening for an infusion of raucous underground sensibility into projects that formerly would have been more by-the-numbers. When Fleming was offered the chance to produce some cuts on the new Alice Cooper LP last year, he was initially wary of

a possible aesthetic conflict between himself and Alice's slickster L.A. band. But he was pleased to find that they embraced his approach. They flipped when he brought in a stack of old guitar amps—"Alice was like 'Yeah, this was how we used to do it, and it worked fine.'"

When asked about how he adjusts to working on larger-budget projects, Fleming is philosophical, focusing more on the similarities than the differences. Besides, he says, "I tend to find whatever the budget is and however much time you give yourself to do it, you finish it. It's weird that way. If you have seven days to make a record, then you just do it, and it gets done. And if you give yourself four months, then you take four months."

Although, he adds, "Records shouldn't take more than a month at the longest if it's 24 tracks—longer and it's bogging down." Fleming's pleased when he mentions that the songs for *Backbeat* (with producer Don Was) were recorded in three days and says that for him, "It's good to keep on the cheap tip; it keeps me more realistic about the way I want to record."

He laments the way inexperienced bands who hold out for a huge advance tend to spend every penny on recording the LP and wind up with nothing to take home. It's just another pitfall of the big-business end of making music, the sort of problem that a producer like Fleming helps bands negotiate.

The business end of music may not be his chief interest, but it's an arena in which Fleming can handle himself. "I have a kind of Spinal Tap attitude," he says, "I laugh at it a lot. It's so stupid, you have to laugh. On the other hand, I do feel like there are too many musicians who ignore it all and end up getting completely destroyed because of it. Never get paid a dime. It happens all the time, and I just feel like if you're in it at all you kind of...I mean, I *do* get a certain amount of flak for being an indie-type person but knowing too much about the biz, but I feel like screw it, that's the only reason I'm still here. I still have fun making records. I don't know why, but whatever it is I gotta keep on doing it." ■

Adam Beyda is a Mix *assistant editor.*

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New Directions In Digital Signal Processing

BY GEORGE PETERSEN

TWENTY-THREE YEARS AGO, AT THE 1971 AES CONVENTION, A STRUGGLING YOUNG COMPANY BY THE NAME OF LEXICON UNVEILED THE INDUSTRY'S FIRST COMMERCIAL DIGITAL AUDIO PRODUCT, THE DELTA-T 101. WHILE THIS SIMPLE, LIMITED-BANDWIDTH, SINGLE-CHANNEL DELAY LINE IS CONSIDERED CRUDE BY TODAY'S STANDARDS, IT LAUNCHED A REVOLUTION IN DIGITAL SIGNAL PROCESSING THAT CONTINUES TO THIS DAY.

As with most high-technology items, such as VCRs, pocket calculators and personal computers, today's digital signal processors are better than ever, providing more power, flexibility, bandwidth, dynamic range and options at prices that have either declined or held constant against inflation. Meanwhile, software-based processors have changed the shape and nature of how we relate to and use digital signal processing. So where is digital signal processing headed? To find out, let's look at a number of cutting-edge models available today.

During the 1980s, manufacturers began shipping upgrades for their products with additional sounds on EPROM chips. The result was that users became less concerned about obsolescence, as a simple chip swap could mean a whole new life for your digital box.

Updates for the Lexicon 480L Digital Effects System, for example, include Software Version 4.0, which adds 100 new sounds (and 40 voice effects), Prime Time III, frequency distortion effects, MIDI sys ex control, ten ambience presets for film/video post, all the Program Pack cartridge sounds and the acclaimed PONS (Psychoacoustic Noise Shaping) technology. Also available is the "Classic Cart," a RAM cartridge with most of the sounds from the Model 224 digital reverb, so you don't have to worry about losing favorite effects when you upgrade to the new hardware.

Since the early days of software-controlled digital processors, third-party suppliers such as First Order Effects, which in 1986 started marketing ROMs with new effects programs for Eventide's SP-2016, have been getting into the act. This form of symbiosis continues, and among the most successful co-ventures is a new breed of plug-in software modules for use with Digidesign's Sound Tools, Pro Tools and Audiomedia II platforms.

One of the first third-party, Digidesign-compatible plug-ins was Waves Q10 (distributed by usWaves,

TC Electronic's M5000 offers updates via a BBS or floppy disk.

Digidesign Pro Tools with TDM

PHOTO: CHUCK O'REAR/WESTLIGHT

Knoxville, Tenn.), a stereo 10-band parametric equalizer-on-disk that, when installed with Sound Designer II, appears as a pull-down option page in the DSP menu. This $399 program offers full adjustment of gain, center frequency and bandwidth (Q) and includes onscreen displays of EQ curves. Other Waves plug-ins for Sound Designer II include the L1 Ultramaximizer,™ a brick-wall limiter for peak control with minimum audible effects in the digital domain; and Increased Digital Resolution (IDR™), a noise-shaping/dithering system for reducing high-bit-resolution files (20- or 16-bit) to low 8-/12-bit multimedia or 16-bit CD release formats.

New from Waves is WaveShell, a digital audio application that transforms a Digidesign disk-based recording system into a real-time signal processor using any Waves plug-in. Suited for DAT-to-DAT mastering or sweetening, WaveShell essentially uses the Digidesign hardware as a through-put processing device and is expected to be shipping by AES this fall.

Hyperprism from Arboretum Systems (San Francisco) is another Sound Designer II plug-in that has the ability to manipulate disk-based SDII or AIFF files, or it can act as a real-time processor on pass-through signals. Effects include pitch and envelope shifting, filters, flanging, chorus, delays, ring modulators, Doppler effects, vibrato, tremolo and spatial processing. A unique feature of Hyperprism is "mouse gesturing," allowing mouse movements to be translated to DSP changes. Additionally, curves drawn on the computer screen can modulate any two parameters—say, time stretch along the X axis and pitch shifting along the Y axis—for new control possibilities. Version 1.5 includes MIDI control for mapping and editing parameters via external controllers and/or storing processing changes on a sequencer. And the company plans to release a TDM™-compatible plug-in at this fall's AES show in San Francisco.

Another SDII plug-in is Multiband Dynamics Tool (MDT) from Jupiter Systems (Applegate, Calif.). Released earlier this year (and reviewed in last month's *Mix*), MDT allows the user to choose from a variety of compressors, limiters, downward expanders/gates, companders with tube-style action, de-essers and multiband, frequency-based dynamics controllers. Custom processors can be created by entering parameter values or drawing dynamics curves-on-screen. The company's latest plug-in is the Jupiter Voice Processor (JVP), which provides a de-esser, compressor with downward expanding gate, parametric EQ and multitap delay. TDM versions of MDT and JVP will be available this fall.

Speaking of TDM, Digidesign is now shipping the TDM Bus.™ The basics of Trans-system Digital Matrix technology were covered in detail in the October 1993 *Mix*, but for the uninitiated, the TDM Bus is an open-architecture, 24-bit digital audio bus that integrates Digidesign's Pro Tools system with additional patching, routing, I/O, mixing and DSP flexibility. The TDM system consists of a piggyback board that attaches to the Pro Tools card, a "DSP Farm" with a powerful effects engine for processing and mixing, ribbon cable for busing signals and data among the hardware cards, and a software application for Pro Tools-to-peripherals communications.

The first third-party TDM peripheral, Lexicon's NuVerb card fits into a single NuBus slot on a Macintosh and can be configured for use with Digidesign's Pro Tools or Sound Tools II. As its name suggests, NuVerb adds reverb and effects processing to the Macintosh workstation environment and can be used in conjunction with a Digi system or configured with AES/EBU digital I/O for stand-alone operation. Additionally, NuVerb effects can be dynamically automated to external SMPTE time code sources.

A variation on the card-slot approach to DSP is the M5000 Audio Mainframe from TC Electronic. Housed in a "traditional" two-rack-space enclosure, the M5000 uses a modular design that is expandable to four channels of analog I/O or up to eight channels using AES/EBU or S/PDIF digital ports. Programs include reverb, delay and pitch-shift

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effects. Standard interfaces include MIDI, PCM-CIA card slot and 3.5-inch floppy. All operating system and preset software upgrades are burned into ROM via disk and may be downloaded from a 24-hour bulletin board.

The M5000 V.1.13 operating system enhancement (available free to users) adds two new early reflection algorithms. But more interesting, perhaps, is the fact that the upgrade also includes a demo version of TC's new MD2 Multiband Digital Mastering Dynamics package, offering post-production and mastering engineers full control of dynamics, with up to three bands of frequency-dependent limiting/compression—entirely within the digital domain. The best part? The demo version is offered on a try-before-you-buy basis: After a short trial period, users can make MD2 a permanent option to their M5000s by entering a special code from TC.

Sometimes 16 bits just aren't enough. Introduced last year, Yamaha's SPX990 is a multi-effects processor with 20-bit A/D and D/A conversion. A slot accepts optional RAM cards, while balanced XLR and TRS phone connectors provide input and output. A newer 20-bit entry is Yamaha's D5000 digital delay/sampler, a 2-channel unit that boasts delay (or sampling) times of 5.2 seconds (10.4 seconds in mono), with the ability to display delay times in seconds, distance, musical tempo or SMPTE frames. And its 20-bit operation equates to a dynamic range of 104 dB, an impressive 10dB increase over most 16-bit units.

Once found only on big-ticket digital processors, digital I/O capability is now included in an increasing number of outboard devices. The Alesis QuadraVerb II features true stereo processing, and the $799 unit has both analog and fiber-optic I/O; the latter are compatible with ADAT-format digital recorders and the Alesis QuadraSynth, which has an optical digital output.

Another hot trend seems to be "Swiss Army Knife-type" multipurpose devices in single-rackspace boxes, providing processing of stereo input signals with various combinations of analog or digital I/O. Valley Audio's Model 730 Dynamap is a digital I/O processor offering stereo compression, keyable expansion/gating, a look-ahead limiting/sibilance control with multiple threshold/multiple segment ratio processing, and 100 factory settings and 400 user preset slots. All common sample rates are supported, with the ability to lock to externally varispeeded digital sources.

Along similar lines, Symetrix has taken its programmable Model 601 digital voice processor (a combination of a mono mic preamp, A/D converter and digital processing) to the next step with the Model 602, a unit with stereo line-level inputs and outputs. Also housed in a single-rackspace chassis, the 602 features a compressor/limiter, expander/gate, de-esser, single-ended noise reduction, automatic gain control, parametric EQ and digital delay with chorus and flanging. Inputs and outputs are balanced analog and digital (AES/EBU or S/PDIF), and 128 RAM and 128 ROM presets are standard.

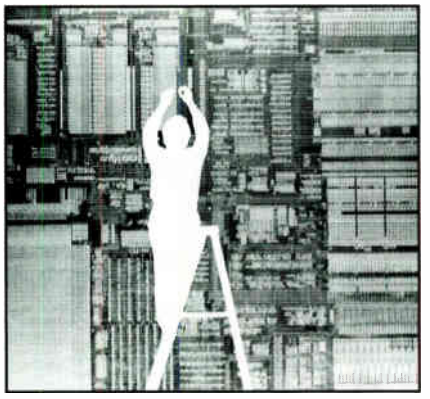

PHOTO: CHUCK O'REAR/WESTLIGHT

However, new approaches to DSP are not limited to recording and broadcast applications. The talk of last year's AES show was Peavey's MediaMation system, designed specifically for the sound contracting/fixed-installation market. MediaMation is based on a rack-mount PC with plug-in DSP hardware cards and an external box that contains the input/output connectors. Each card can be configured to handle typical sound system chores such as mixing, parametric EQ, compression, crossovers and signal delay. Using Windows-based control software, a user merely draws an onscreen block diagram specifying the order and number of necessary sound system devices (including the audio connections between components). The DSP cards and software do the rest, creating the required configuration.

Lone Wolf's MediaLink networking technology provides another glimpse of the shape of sound systems to come, with an integrated protocol extending beyond the remote control and monitoring of audio gear. Digital control of analog circuits isn't really new; however, once the new, higher-speed chips become available next year, MediaLink will include the ability to handle digital audio over the same network as the control signals. Lone Wolf has a growing list of manufacturers on its licensee roster, and the company's Visual Network Operating System (VNOS) software can simultaneously be accessed by PC and Macintosh platforms on the same network.

But whether used in sound reinforcement, broadcast or recording applications, one of the most far-reaching developments in signal processing actually stems from console technology, as digital consoles continue to be loaded with enormous amounts of onboard DSP. For example, Yamaha's under-$2,000 ProMix 01 (profiled in the July 1994 *Mix*) includes two internal digital multi-effects units, programmable 3-band digital EQ, three stereo compressor/limiter/gates, moving faders and dynamic real-time automation of all console functions (via MIDI) with 50-scene instantaneous recall.

As digital consoles (and workstations and outboard devices, for that matter) continue to evolve, why not use that available DSP clout for on-demand signal processing that could be a reverb/equalizer one instant and then become flanged echoes/Doppler shift a frame later? By their nature, computers are faceless, generic devices whose character and functionality is solely based on the software that's controlling them. And if software (and the occasional hardware card or two) is the driving force that can turn a computer from a CAD program, spreadsheet or word processor into a sequencer, workstation, or Video Toaster, then why not extend the list of transformations to include LA-2As, Pultecs and those wonderful acoustic reverb chambers at Capitol Records? Drop in a floppy disk and get whatever you want. DSP-wise, it seems like we're in for some interesting times ahead. Keep your seat belt fastened. ■

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

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Combining the functions of bass preamp and direct box in a compact enclosure is the SansAmp Bass Driver, from Tech 21, New York City. The unit's tube emulation circuitry can be switched in or out, allowing it to function as a sound-shaping or transparent active direct box. Three outputs (XLR and ¼-inch affected, ¼-inch unaffected) are standard as is three-way powering (48VDC phantom, battery or external adapter) and controls for level, blend, treble, bass, drive, and presence. Retail is $225.

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BARBETTA DIVA-4 OMNIFIELD MONITORS
From Barbetta Electronics (Moorpark, CA) comes the Diva-4, a studio monitor featuring 200-watt internal biamplification with active crossovers, 8-inch woofer and polymer dome tweeter. Frequency response is said to be 34 to 23k Hz (-0.25 dB). Retail is $3,895/pair. Barbetta has also announced the Diva-2, a compact 12x14.5x11-inch model with 140 watts of biamplification and a titanium tweeter.

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MONSTER STUDIO PRO 1000 CABLES
Monster Cable, of South San Francisco, CA, offers the Studio Pro 1000 line of speaker, instrument and microphone cables. These are designed for critical interconnection applications and feature Time Correct™ windings for phase coherency. In addition to the analog cables, Monster also offers Studio Pro AES/EBU digital transfer cables, with silver-plated OFC conductors.

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GEM SOUND LIGHT/AC STRIP
Gem Sound of Bronx, NY, offers the GL-99, a 19-inch unit with two dimmable, pull-out lights, and eight rear AC outlets controllable from a front panel switch. Retail is $99.

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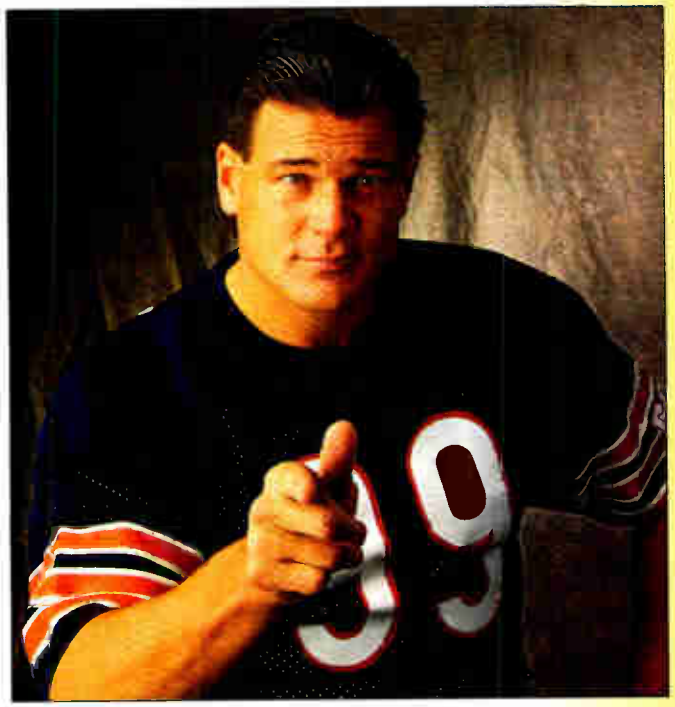

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by George Petersen

ADVENTURES IN SONIC RESTORATION

WITH THE CEDAR CR 1 AND DC 1

My studio handles an exceedingly wide range of sessions. One week it's a pop album mix, the next week has scoring sessions, followed by a couple days of cutting dialog for radio documentaries. You name it, we've done it all. However, a rather interesting project came along recently, and I just couldn't resist taking on a CD reissue series of early jazz and pop 78 rpm discs recorded from 1909 to 1949.

The studio has a number of restoration tools available, such as notch filter sets, parametric and program (solid-state and tube types) equalizers, compressors, expanders, gates, a Burwen dynamic noise filter, a multichannel disk-based editing system, sample rate converters (hardware and software-based), various analog and digital tape-recording formats and a shiny box of single-edged razor blades sitting next to the 2-track. However, a number of interesting new devices for audio restoration have recently come to market, and the 78 reissue project seemed the perfect opportunity to check these out.

Founded in 1988 in Cambridge, England, Cedar (Computer Enhanced Digital Audio Restoration) Audio Ltd. began by building PC-based systems for cleaning up sound stored on tape, vinyl and film. The latest version of the Cedar 2 Production System can be customized to meet user needs with a variety of real-time DSP modules, including scratch and click removal, crackle/buzz removal, distortion reduction, broadband noise reduction, digital EQ, phase/time correction and sample rate conversion. Additionally, Cedar's Stereo Compilation Editor provides up to eight tracks of workstation editing for CD premastering (with optional PQ subcode encoder), music/broadcast production or audio post with referencing to all SMPTE time code formats.

Above: Cedar DC 1 De-Clicker; at left, Cedar CR 1 De-Crackler.

Cedar also has developed a series of stand-alone 2-channel devices for audio restoration applications. Housed in a two-rackspace chassis, the devices feature 16-/24-bit digital I/O, 40-bit internal processing and battery-backed RAM for storage of setups and user parameters. All operations happen entirely in the digital domain, although the rack units also include balanced and unbalanced analog I/O (with 16- and 18-bit, 64-times oversampling delta-sigma bit-

OBVIOUSLY, THESE GUYS ARE SERIOUS ABOUT AUDIO.

—D&R ORION REVIEW, MIX MAGAZINE

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stream converters) for applications where interfacing with existing analog systems is required. All of the units operate in near real time, with a slight processing delay in the 100ms to 200ms range.

The first product in this series is the Cedar DC 1 De-Clicker ($16,500), a digital system featuring a unique "four-pass" process to remove clicks and scratches without removing transients in the program material. Input signals pass through the DC 1 unaffected, and the processing is only applied when a click or scratch occurs. Once a click is detected, that section is removed and replaced with a high-order interpolation of what should have been there, based on the waveform before and after the click. The microprocessor within the DC 1 is capable of 50 million floating-point calculations per second for removing up to 5,000 scratches per second.

Making its U.S. debut at AES New York a year ago, the CR 1 De-Crackler ($19,500) uses the same "split and recombine" process as the Cedar-2 PC-based system, whereby the elements of a recording that contain crackle, buzz or distortion are separated from the unaffected segment of the input signal; after processing the degraded section, both segments of the signal are recombined into a crackle-free output.

As we were going to press, we received information about Cedar's new AZ 1 Azimuth Corrector ($14,875), a device that detects and corrects the phase problems and time delays between the left and right channels of a stereo signal. As with the other Cedar rack modules, the AZ 1 operates in real time, to restore high-frequency response, stereo imaging and mono-compatibility.

DC 1 AND CR 1 OPERATIONS

The identical front panels of the CR 1 and DC 1 are so deceptively simple in appearance that one might underestimate the complexity, power and control of these devices. However, this clever user interface simplifies operations while allowing user access to any operational or setup feature in a few keystrokes. Controls consist of a few softkeys, level controls, four mode/page-select buttons, a rotary dial for changing settings, stereo input and output meters and a large, backlit LCD readout that displays parameters and settings. The operations of both units can be learned in less than ten minutes.

Setup is equally straightforward—just make the required analog (-10dB unbalanced RCA or +4dB balanced XLR) or digital (AES/EBU or S/PDIF coaxial) connections, and you're on your way. The analog and digital outputs are always active, so coming in digital and leaving as analog (or vice versa) is no problem.

Inputs and outputs can be monitored using the ten-step LED ladder meters, but I found these to be of almost no help at all. The "ballistics" are too slow, and the bottom of the scale is only -23 dB, which doesn't provide much of an idea of what's happening to signals below that threshold. So before you can react to a hot input, it's already lit the red peak LED. Digital signals are unforgiving when overload conditions occur, and an upgraded metering system would be a welcome addition, even if it were only a resettable peak hold function that could let you

know if clipping occurred during a transfer. This metering aspect is obviously not a problem when making transfers into the Cedar boxes in the digital domain, and when routing analog signals into the system, I used a Symetrix SX205 outboard meter, which has switchable ballistics, a wide-ranging scale and adjustable hold times. Ahhh...much better.

There's a massive amount of circuitry packed into these two-rack-space enclosures, requiring an internal (rear) cooling fan. In a quiet control room, the fan noise may be audible, but it's certainly no problem and is barely noticeable, especially when the units are mounted in a rack. Unfortunately, the cooling air vents are located *under* the chassis, and if the units are stacked atop one another (either on a tabletop or in a rack), the cooling vents would be blocked, which could spell trouble down the road. There is no mention of this in the documentation, but I recommend leaving an empty rack-space below each unit to allow sufficient airflow.

Cedar has provided remote-control ports (both RS-232 and MIDI) on the rear panels of the CR 1 and DC 1. As of this writing, I have not heard of any companies writing third-party editor programs for controlling the units, although this may change as more Cedar systems are delivered. On the horizon is a SMPTE time code control option, although this was not implemented in the units I tested.

THE PROJECT

I began my restoration project by manually cleaning the records and auditioning cuts to find the best versions in cases where several discs were available. I didn't use modern phono preamps, as these incorporate the RIAA equalization curve, which doesn't match prewar 78s. The phono outputs from the Ramses turntable (see sidebar) were routed into two channels of an outboard mic preamp, which provided flat response and ample gain for boosting the cartridge output to the +4dB line level on a Fostex D-10 DAT recorder.

Each disk was matched to its original playback speed, accomplished by cross-referencing the date of the recording and comparing the performance to concert pitch using a Kurzweil piano module in the control room. I wish somebody would make a reference 78 disc with calibration and 0dB-level test tones recorded at 71.29, 76.59, 78.26 and 80 rpm.

At this stage, I could have routed the preamp directly through the DC 1 and CR 1 units and into the D-10 in the digital domain, but I wanted to have an unprocessed archive tape of the 78s, and each disc required slightly—some more than slightly!—different settings on the DC 1 and CR 1. So rather than playing each disc five or six times to find the optimum Cedar settings, I could transfer the archive tapes through the DC 1 and CR 1 in the digital domain at a later date, and tweak at my leisure.

Everything was recorded on two channels, using a stereo cartridge. Although the first experimental stereo records were made in 1932, none of the discs in this particular project was originally recorded in stereo. However, even on this mono project, Cedar's stereo processing capability came in handy. By recording both sides of the record groove as discrete channels, I could later choose the better-sounding of the two. About 80% of the time, one channel is audibly better than the other. In some cases, this would change over the course of a single disc, and once the

—FROM PAGE 108, SONIC RESTORATION

The CR 1 provides two crackle algorithms to choose from: Crackle 1 is for well-defined crackle, and Crackle 2 is intended for duller or grungy-sounding crackle. The operational threshold (defining when the processing kicks in) is based on a 0 to 40 scale, although typical threshold settings are in the 4 to 5 range. I would have preferred a scale where the typical settings fell somewhere in the middle of the range, thus providing a wider latitude of adjustment. On most of the material I was restoring, the threshold settings ranged from 2 to 6, and I sometimes wanted a median setting, such as 3.5, when 3 seemed too low and 4 may have been too high. Perhaps Cedar could remedy this in a future software update.

It didn't take long for me to appreciate the real-time aspect of the CR 1 and DC 1. Questionable material (due to poor condition) could be auditioned immediately to determine its usability, rather than pouring it into a disk-based system, waiting for processing and then finding it to be unusable. This real-time advantage of the Cedar is an obvious plus in broadcasting situations, or in circumstances where materials are Cedar-processed before being transferred into a computer editing system. Even if you're pouring a project into a system such as the Sonic Solutions NoNoise workstation, which has substantial restoration capabilities, pre-processing through the DC 1 and CR 1 can save time by handling much of the clean-up chores before the next stage begins. Of course, it's possible to remove scratches on most disk-based editors via cut-and-paste editing or waveform-redraw techniques, but there's no contest when comparing manual editing to Cedar's ability to remove hundreds or thousands of scratches per second.

One thing to keep in mind about using the DC 1 and CR 1 is that these boxes can handle about 80% of the restoration chores on vintage records. This left me with the relatively simple job of adding a comparatively gentle touch of mastering EQ, which consisted of a narrow-band notch filter at 6.8 kHz (to eliminate some residual crackling) and some wideband program shaping with a tube equalizer, for overall tonal contouring. I chose to use analog EQs for this stage, because I prefer their sound, and the tube unit added a nice warming touch. This, of course, meant leaving the digital domain, but on scratched, beat-up recordings that were up to 100 years old, another digital conversion wasn't a factor. The Cedar DACs were excellent in handling the digital-to-analog transition, and while audio purists may abhor the concept of equalization, a bit of mastering EQ really solidified the project, especially in compensating for the differences between acoustic and electric recordings.

OTHER APPLICATIONS

In addition to 78 rpm record restoration, the Cedar units are equally useful on cylinders and other formats, including LPs, 45s and 16 rpm transcription records.

Results on film soundtracks were mixed. The system was ineffective on older, *variable-density* optical tracks, as clicks and pops on such tracks aren't really transient enough for the Cedar to recognize without interfering with the program material. The DC 1 and CR 1 worked much better on *variable-area* opticals (which have been in general use since the mid-1940s), where the shape of the click and pop waveforms tends to be sharper and more pointed, and thus easier to detect. In sum, the effect on soundtracks was less pronounced than on records but still a noticeable improvement.

On one occasion, I used the DC 1 to clean up a digital tape clone that had several mysterious clicks. These can spring up when making a digital clone using ordinary microphone cables or hi-fi phono cords that aren't designed for the extended bandwidth requirements of digital transfers, which extend well into the megahertz range. The DC 1 handled the digital file perfectly and removed the clicks without affecting the rest of the tracks.

Overall, Cedar's DC 1 and CR 1 provide an impressive amount of flexibility in an easy-to-use system. The attention to audio throughout is obvious, from the whisper-clean reproduction to the lack of artifacts or harshness in the output signal. To be sure, these are not inexpensive, but they are well-crafted, powerful tools for the serious audio restorer or archivist.

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by Mel Lambert

YAMAHA DMC1000

DIGITAL MIXING CONSOLE

The Yamaha DMC1000 digital mixing console can accommodate a wide variety of digital input and output formats, which makes it an extremely flexible console for mastering suites and other facilities that need to handle a mixture of AES/EBU, SDIF-2, ProDigi (PD), Yamaha and consumer S/PDIF-format signals. Factor in a total of 22 available digital inputs routing to multiple output groups and a master stereo output, and you begin to appreciate the DMC1000's I/O flexibility. Now add motorized servo-controlled channel faders, fully parametric EQ on every channel source, plus two built-in signal processors (the functional equivalent of a pair of SPX1000 reverb and delay units), and you begin to appreciate the amount of mixing power. And, yes, several units can be cascaded together to provide multi-channel mixing, with full MIDI-based automation plus standard 9-pin transport control of video and audio transports.

The DMC1000 is remarkably compact, allowing it to be placed in the center of a monitoring sweet spot. Overall dimensions are just 30x36x16 (WxDxH) inches and weight is less than 110 pounds—easy enough for portable applications.

The only fly in the ointment is the unit's cost. At $35,000, the DMC1000 is rather pricey. However, with a recent major system software upgrade, plus the fact that a growing number of facilities are now using DMC1000s to provide direct digital integration with systems such as the Avid Audio Vision and SSL ScreenSound workstations, the cost-effectiveness becomes more readily apparent. Built-in ESAM (Edit Suite Audio Mixer) control enables the unit to follow crossfade information for compatible video editors and switchers. For these and related applications, the DMC1000 represents an extremely powerful, user-friendly option.

SYSTEM ARCHITECTURE

The DMC1000 offers a mixture of fixed and assignable front-panel controls. Laid out in a "traditional" channel-strip format, the left-hand section features eight input channels, plus a ninth "module" that normally controls returns from the built-in stereo effects units. On the right are the conventional stereo master control and monitoring functions; in the center, a bank of assignable EQ knobs, plus automation controls and cursor buttons for a built-in VDU that's located on the right-hand side of the meter bridge, below a time code display.

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units, except for the LR master, which offers an enhanced resolution of 32 segments. Finally, on the extreme left, the meter bridge houses a 3.5-inch floppy drive that can be used for both storing/reloading automation data or loading new system software, plus a RAM card that can be used to store 64 static "snapshots" of every front-panel parameter setting.

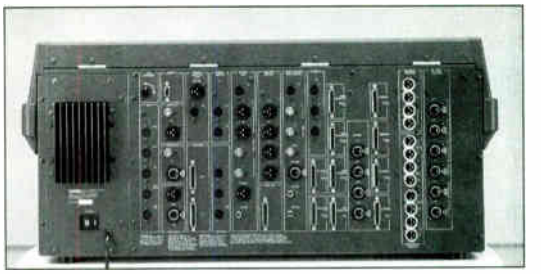
Each channel strip features two independent channel paths. The lower bank normally connects to digital inputs 1 thru 8, while the upper bank receives digital returns from a companion multitrack—just like a normal in-line analog board. However, all I/O assignments are fully software assignable, allowing the DMC1000 to function as an 8-into-8 mixer for tracking and overdubs, let's say, and then be reconfigured to a 22-into-8-into-2 format for remix. For those of you keeping track of such things—pardon the pun—the 22 available inputs comprise the eight "line" inputs, eight "group bus/tape-machine returns," and three stereo effects returns. Flexibility personified.

All primary inputs are digital-only; the user is expected to supply outboard A-to-D converters, as necessary. Most sources, of course, will be digital—playback from a DASH- or PD-format multitrack, for example, or synchronized ADAT/DA-88s, or maybe a multichannel workstation. A digital pad with up to 96 dB of attenuation is provided on each input source for level matching.

Output routing is controlled via a bank of ten buttons above each upper and lower channel strip—eight buses, plus direct routing to the LR master and monitor buses. Between the upper and lower banks are a set of aux-send controls, including pre/post switches and assignment to the mono Aux 1 and 2 or stereo Aux 3 buses. A fader-swap function allows the lower, long-throw channel fader to be flipped with the rotary control for access to levels in the upper input section.

The recently released Version 3.0 system software, available to existing users on a 3.5-inch floppy, adds a number of new operational features, the most useful of which is the ability to freely assign any input to any output. Not only does this new feature allow any channel path to access any group or stereo output, but it means that subgroups can be created and then routed directly to the LR master, with EQ on every bus.

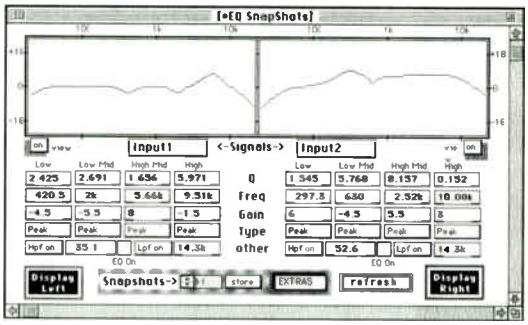
The DMC1000 can be mastered in the time it takes to read the preceding paragraphs. Of course, none of the rotary controls has end stops; instead, an array of LEDs around the edge of each knob displays the current setting derived from the unit's onboard automation system. Every control and switch setting is entirely software-controlled and can be stored and recalled from memory as necessary. All events are tagged to time code, either the unit's internal TC generator or from an external source if you are mixing to



DMC1000 rear-panel view

picture, for example.

With such a profusion of choices regarding I/O format selection and output routing, setting up the DMC1000 could seem daunting. The rear panel features XLR connectors for AES/EBU-format signals; 8-pin DINs for Yamaha format; and 25-pin D-Subs for ProDigi and SDIF-2 formats. Additional D-Subs provide access to the channel direct outputs, channel insert and returns, plus cascade between multiple consoles. Also provided are various ports for word clock and MIDI In, Out and Thru.



EQ SnapShot screen

In most applications, however, the majority of I/O system alternatives will not be used, although it's great to have them available for the all-too-frequent appearances of a recorder or digital processor with bizarre I/O configuration. It's a safe bet that the DMC1000 will offer a suitable port! (And if the requirements are particularly perverse, an external Yamaha IFU5A/IFU5B patch bay or FMC Series format converter should handle the problem.)

OPERATIONAL FUNCTIONS

All I/O selections and digital formats are made from the front panel using the unit's built-in 8-line x 40-character LCD panel. Master Word Clock, for example, can be selected between internal and any of the rear-panel ports; if the source is absent or unreliable, the setting simply signals that you might need to reconsider your selection! Settings for the DMC1000's pair of built-in SPX1000 effects processors are also accessed and modified using the LCD readout. Parameters can be selected easily using a set of function keys and cursor controls located in the central fader area and adjusted using a companion jog wheel. Although the menu structure is a bit confusing on first run-through, it soon makes sense, and accessing the appropriate function is easy.

Assigning the central EQ control section simply involves pressing a button on the appropriate channel section or touching the channel fader. The 12 EQ controls enable new settings to be assigned to the channel path. Each of the four parametric sections offers ±18dB cut/boost in 0.5dB steps, at a center frequency that can be swept continuously from 20 Hz to 20 kHz. Bandwidth is adjustable from 0.1 to 8.16. The upper and lower EQ bands can also be set to peak or shelf (several roll-off profiles are provided). Highpass and lowpass filters are also available. As would be expected, channels can be linked together for stereo operation, and the EQ profile can be called up on the LCD panel for visual display or offered as numerical values, if that's your preference.

I found the EQ to be extremely pleasant during evaluations with a wide variety of musical selections. The results of extreme EQ cut/boost are totally usable, without the group delay and intermodulation distortions you often encounter with analog designs. Settings can be adjusted easily and stored/recalled at the press of a button. Pans can also be adjusted from a central rotary control or via individual left-right nudge buttons provided on each channel strip. Either way, selecting and adjusting EQ and pan settings is a snap.

The use of a single aux-level control per input section is a little confusing at first but soon becomes part of the DMC1000's standard operating procedure. A bank of three assignment buttons allows the user to select which send—mono Aux 1 and 2 or stereo Aux 3—is being controlled, with pre/post-fader selections and on/off. Standard routing is provided from Aux 1 and 2 to the pair of built-in SPX1000 processors. These assignments can be changed within the system's I/O setup page should you want to use the buses for routing channel sends to an external processor.

Effects returns from the SPX1000 and outboard effects can be routed to stereo inputs A, B or C, with levels controlled from a single fader located to the right of the eight input channel faders. Although it would be

nice to have instant access to three simultaneous effects-return faders, the use of selection buttons is not too troublesome.

For connection to external analog processors, the DMC1000 features 20-bit digital-to-analog converters on each of the four aux outputs (two mono, one stereo), plus 18-bit A-to-Ds on the six aux inputs (three stereo pairs). All analog I/Os are via standard XLR connectors.

Each channel also has up to 370 milliseconds of available delay, which can be used, for example, to time-align close and distant microphones around an orchestra, to pull them back into phase coincidence.

The DMC1000 has a great deal going for it. It's simple and straightforward in operation, and all functions are within easy reach.

Delay times can be displayed in absolute time, samples or distance—very handy if you or a second engineer measured the distances between a central mic cluster and spot mics, for example.

Even more useful: If during mixdown all channels are set initially to the center value of, let's say, 185 ms, then any input can be advanced or retarded relative to any other source. Now MIDI triggering delays, for example, can be corrected easily by sliding all other sources relative to the keyboard output. And in Cascade mode, the system delay is necessary to compensate for the small but finite amount of time (10 samples) it takes for a signal to pass through a companion DMC1000 from input to output.

Any or all channel faders can be assigned to one of two groups. Now, the assigned channel faders automatically adjust themselves to follow the group master fader, which can be any fader within the preselected group. Also, channel sections can be linked together. Now, adjusting an EQ control on the grouped sections will be duplicated on all grouped inputs—a great feature if you need to

apply the same highpass roll-off to remove annoying air-conditioning rumble from several mic sources.

SNAPSHOT/DYNAMIC AUTOMATION

As might be expected, every front-panel setting can be memorized to floppy or RAM card as a series of snapshots. A group of snapshots can then be recalled under user control or via external MIDI program changes. In addition, all fader, EQ and gain settings can be memorized against time code in one of the DMC1000's four internal RAM-based registers, then off-loaded to disk. A set of on-screen prompts and system functions provided by the LCD panel allow reasonably complex editing of automation sections, so a final mix-down can be assembled in a series of steps and then joined together. A set of buttons control Record, Play and Auto modes for gathering and replaying automation data.

While it would be possible to handle complex automated mixes using the DMC1000's built-in system software and screen displays, the unit is somewhat hampered in both storage capacity and editing sophistication, which is where the Macintosh-based Project Manager software comes into its own. Under external MIDI control, all system parameters can be scanned, stored and reloaded into the console. A virtually limitless number of automated mixes and system snapshots can be stored on the Mac controller's hard disk, then off-loaded as necessary for archiving. Written in MAX by Zack Settel and Terry Holton from Yamaha R&D in London, England, Project Manager V.3.0 offers a great deal of computational power under simple MIDI control. In addition, MIDI Time Code and MIDI Machine Control can be integrated within the software to provide enhanced system integration for keyboard-based facilities.

THE BOTTOM LINE

The majority of digital consoles, because of their complexity, still cost several times more than their analog equivalents. But, given the additional functionality of an assignable, all-digital design—not to mention the elimination of noise and additional distortion—the DMC1000 has a great deal going for it. It's simple and straightforward in operation, and all functions are within easy reach of the operator. I was particularly impressed with the unit's excellent parametric EQ and built-in signal processing, together with the 22-input configuration available during remix.

As with all assignable designs, there is the inevitable trade-off between single controls per function and a centralized bank of controls. The DMC1000 offers a sensible combination of dedicated functions—a single long-throw fader or rotary control for the majority of input sources—and assignments for less frequently used functions, including pan and reverb. The built-in snapshot and dynamic automation is easy to master and can be augmented, if necessary, with an external MIDI-based sequencer or recorder.

All in all, the DMC1000 Digital Mixing Console would make a valuable addition to any mastering, location recording or mix-to-picture facility. The future is digital. ■

Former editor of Recording Engineer-Producer *magazine Mel Lambert currently heads up Media&Marketing, a consulting service for pro audio firms and facilities.*

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by Mel Lambert

OTARI CONCEPT I

DIGITALLY CONTROLLED CONSOLE

It's an unfortunate fact of life that an all-digital console is going to cost megabucks. (Except if your name is Yamaha, of course, but that's an entirely different story.) The majority of commercial facilities, project studios and post houses are looking at analog designs that cost between $50,000 and $100,000. For that kind of money, you can set a decent room rate or amortize the costs over a series of in-house projects. If within this price range the affordable technology is analog, what else might we look for to make life a little easier in the studio, or to simplify the resetting of a recording or production console?

The Otari Concept I represents a unique solution to the cross-pollination of analog and digital console design. In a nutshell, Otari has taken a great-sounding analog console and added computer-controlled switching of every function, plus dynamic automation of faders and mutes, via a familiar VCA-based automation package. In this way, the user can not only memorize mix data against a time code track, but also store to hard disk favorite I/O topologies for tracking, overdub and mixdown sessions and, at the press of a single key, rearrange every building block within the Concept I.

MAINFRAME SIZES

Concept I is available in three mainframe sizes, capable of holding 32, 40 or 48 channel modules, plus a master module and patch bay. Because each channel module comprises two separate signal paths, the number of available inputs is twice the mainframe capacity. In this way, a 24-channel system can handle remixes from a pair of interlocked multitracks, for example, or be used to provide multiple bus outputs for post applications. Also available are stereo input channel modules, a stereo group output module and a dynamics package; more on these later. Prices range from $54,500 for a 32-input mainframe fitted with 24 I/O modules, patch bay and VCA-based automation, to $108,000 for a fully loaded 48-input mainframe with moving-fader automation.

Key to the mixer's operation is the central CCS (Concept Control Systems) Master Module, which houses monitor-select switches, a QWERTY keyboard and cursor keys for the companion VDU displays, Otari's Disk-Mix VCA/moving-fader automation control keys, and an assignable bank of switches for channel functions. From here, you can select various meter-display modes; track output

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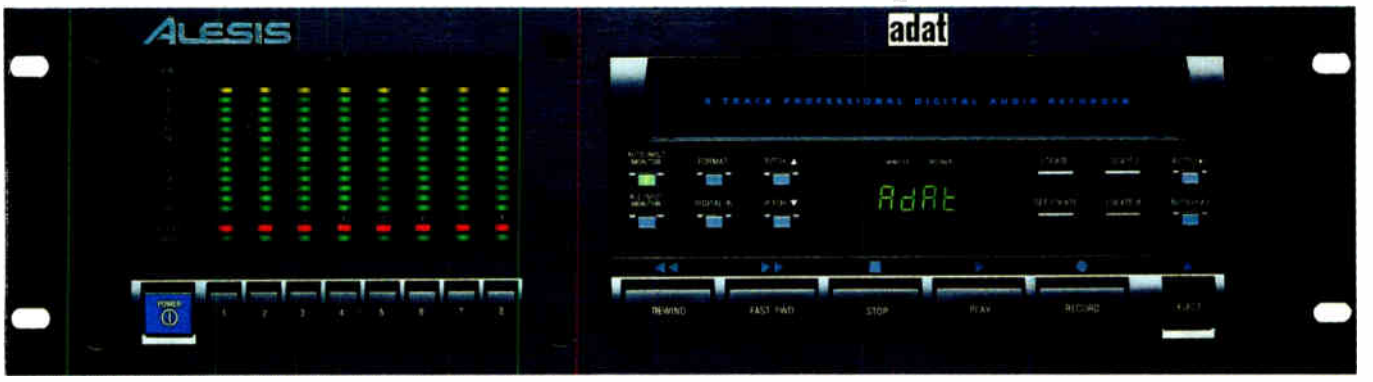

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assignments; insert point routing to the companion patch bay; stereo bus assignments; plus other switchable routing functions. All of these controls can be assigned on a channel-by-channel basis or globally for sections of the console.

DiskMix automation provides dynamic automation of all fader and mute settings and comes in two basic flavors. The familiar VCA-based system includes freely assignable subgrouping on any fader, with masters assignable to any channel fader, plus full read, write and update modes. Alternatively, the conventional DC-based fader can be replaced with servo-driven units; the resultant moving-fader version now provides visual display of relative mix levels, as well as internal level control.

Why does the moving-fader system still retain the use of VCAs, rather than replacing the entire element with a motor-driven audio fader? Simply to save bucks. By opting for a digitally controlled fader through which no audio passes—the VCA gain element still handles level adjustment—a much cheaper set of components can be used to drive the fader up and down during playback and to extract relative fader moves during write and update modes. In fact, selecting moving-fader automation only adds about $500 per input channel to the cost of a VCA-based system; updates are available for existing customers.

SYSTEM SETUP

To set up a system, simply call up a designated channel using the Select button and adjust the required control on the CCS Master Module. A companion PC scans these software-definable momentary keys and activates the appropriate computer-controlled switch element to route, for example, the output from a selected channel to Track Assign 1/2. All system setups, labeling of mixes, housekeeping functions, I/O assignments and fader levels are displayed on a companion black-and-white monitor (color is optional).

Entire console settings can be stored as snapshots and recalled from hard disk. In addition, a series of default settings—favorite tracking layouts, for example—can be assigned to programmable keys and mapped to individual or multiple channels. Programmable assignment switches offer a great deal of flexibility in a wide variety of applications.

Each channel strip is divided into two separate signal paths—labeled Channel Path and Mix Path—with independent 4-band EQ and a highpass filter in each section. Both paths function identically, aside from mic/line selection and trim, mic pad and phantom power switches on the upper Channel Path. As a starting point, you might route mic signals to the Channel Section; equalize, level-adjust and select track outputs with odd/even panning; and then use the Mix Path section to create a separate stereo balance from the bus outputs/tape-machine returns. Alternatively, to possibly mimic the way a traditional in-line board is laid out, you could use the lower section for balancing the mic/line-level signals from the studio while the upper section handles control-room monitoring.

The equalizer section operates smoothly and can be adjusted quickly and easily. The two outer bands

are shelving types, selectable to either 8/16 kHz or 60/120 Hz, while the remaining bands are fully sweepable from 75 Hz to 3 kHz for the low-mid and 800 Hz to 16 kHz for the high-mids. Cut/boost is ±15 dB. In addition, the two mid-bands can be set to narrow (Q=0.2 octaves) or wide (Q=0.55) bandwidth. The highpass filter operates at 40 Hz, with a slope of 18 dB/octave.

The equalizer comprises two custom-designed circuits. The other shelving bands are modeled after passive designs, yielding gentle, musical shelving at the two selectable frequencies. Mid-bands are state-variable designs, allowing more drastic frequency modification, with full sweep at two bandwidths. The 40Hz highpass filter allows subsonic "mud" to be removed without affecting the signal's musical integrity. When the EQ is switched out of the circuit, it is no longer driven, eliminating any low-level crosstalk that can result in "smear" with standard designs.

PROGRAMMABLE INPUT SELECTION

From the central Master Module, the input to the Channel and Mix Paths can be selected between Mic/Line (Channel) and Group/Tape (Mix); EQ inserted/removed; VCA bypassed or left in circuit (fader level is set to unity gain for the former); and section turned on and off. An input-reverse button simply swaps the control elements from Channel to Mix, and vice versa. In turn, output from the two signal paths can be assigned to either the stereo mix bus (allowing all channels, with EQ, to be made available during remix); routed directly to its corresponding track output; or cross-routed to any of the 24 available track output buses. Each channel module also features a pair of programmable "soft" switches.

Control room monitoring can be selected from the traditional sources (console two-mix, aux sends, tape-machine returns, etc.) and routed to a choice of main or close-field monitors. It is also possible to send direct mixes independently to either destination—very useful during drop-ins or while listening to separate cue sends.

Solo is very comprehensive, with selection of Mono AFL, Mono PFL or Stereo-in-Place; muted signals also

—CONTINUED ON PAGE 193

by George Petersen

TECH 21 SANSAMP PSA-1

Once upon a time, there was an engineer/guitarist named Andrew Barta, who was dissatisfied with the crop of amplifier emulators available at the time. He must have been *real* dissatisfied, because he decided to do something about it. In 1989, he debuted his first product, the SansAmp "Classic," a tiny device in a stomp-box chassis that simulated the sounds of dozens of popular guitar amp rigs. Amazingly, it worked. In fact, it was very good: The sounds were *tres* cool, but manipulating a row of tiny DIP switches to change sounds required the dexterity of a microsurgeon and didn't exactly win points with the grab-slam-give-it-to-me-now set. You see, guitar players want KNOBS—lots of 'em—and preferably KNOBS that go up to "11."

Undaunted, Barta went back to his laboratory, located in a remote part of New York City, and worked on a solution. The next SansAmp product (the name comes from the French word "sans," which means "without") addressed those user concerns by putting eight real KNOBS on the improved version. Housed in a single-rackspace chassis, it for some reason was called "SansAmp Rackmount." The unit was a major improvement over the pedal version, but creating and storing presets required photocopying blank template sheets from the manual and filling in the settings. It worked, but it wasn't quite as slick as recalling presets stored in memory.

Enter the PSA-1 (Programmable SansAmp), the latest version of the SansAmp Rackmount, providing 49 tube amp presets and allowing storage of 49 more for instant access. Other enhancements include program changes via MIDI and the ability to on/off load additional presets using any MIDI storage device, such as sequencers or the Alesis DataDisk.

The PSA-1 retains all the sound, flavor and familiar-looking KNOBS of its predecessor; however, what appear as simple, rotary analog controls on the front panel are actually linked to 256-step digital potentiometers. The sounds are 100% analog, merely under digital control. Also on the front panel is a ¼-inch input jack (conveniently normaled to the rear-panel input), program up/down keys, a large, bright two-digit program num-

ber display and KNOBS for preamp level, master gain, low/high EQ, Buzz, Punch, Crunch and Drive. A switch for saving new programs is inset (to avoid accidental erasures) and can be depressed with a guitar pick, pen tip or fingernail. The back panel includes MIDI in/out, footswitch jack, ¼-inch and balanced XLR outputs (-10/0dB switchable), ¼-inch effects loop send/return jacks and a (-10/0dB switchable) input which is normaled to the front-panel input. The power supply is internal (hooray!), so you won't have to worry about wall warts.

The PSA-1 has two sets of "stereo" outputs, which may lead some users to think that the unit operates in stereo. Not true! Let me explain. The only time that the outputs operate in stereo is when the SansAmp is connected to a *stereo* effects processor (meaning mono input/stereo output) and you're using the SansAmp outputs as a stereo router. If you're cutting tracks directly to tape and plan to add processing when you mix, don't waste a second tape track recording the PSA-1's "stereo" output. Just connect your recorder to either the left or right output and everything will be fine.

Programming and saving presets is a simple matter of turning the knobs until you get the sound you like and using a couple of keystrokes to save the settings. Unlike earlier SansAmp models, the PSA-1 lacks a bypass switch, a real drag. With this in mind, the unit has permanently assigned presets number 00 and 50 as bypasses, so you could scroll to one of those to A/B your settings. It's not as fast as a real bypass switch, but, the Petersen Procedure™ greatly improves upon the original:

To tweak a factory preset, start by copying that setting to presets 98 *and* 99. Do your edits on number 99, save it, and use the program-up button to hear bypass (=00) or hit the program-down key to compare your new sound to the original factory preset, which you copied to program =98. Once you have the setting you want, simply copy it to another program number, leaving the 98/99 settings for editing functions.

There are a couple of other ways to change presets, such as mapping program numbers to a MIDI foot controller. As an alternative, the PSA-1 allows setting up a footswitch-activated "loop" to scroll through a user-defined set of programs.

One of the PSA-1's drawbacks is the reality that two-character LED displays do not provide the optimal user interface, especially if you're planning to go beyond the basic operations of recalling programs and saving new presets. Procedures such as building loops of presets, selecting MIDI channels, and handling MIDI maps, data dumps and defining program change commands all require involved permutations of entering various two-digit codes, waiting for the display to begin blinking and then pushing a couple more buttons to complete the operation. Try to perform one of these without the manual and you're sunk. Fortunately, these routines are less important in the studio than for live gigs. If you need a Marshall or Fender Twin sound during a 3:00 a.m. session and the manual's nowhere to be found, just click through the (nonvolatile) factory presets and find what you need. *No problemo.*

Speaking of sounds, this thing rocks. Slams. Wails. Screams. Turn it on, plug it in, and 15 seconds later you're into some *serious* guitar sounds, whether it be simulations of Marshalls, Fenders, Mesa Boogies, Vox AC30s, classic fuzz boxes (Big Muffs, Fuzz Faces), a slew of bass amps or anything in between. I also used the PSA-1 as a direct box on harmonica tracks and had excellent results using either a vintage Shure Green Bullet or the Conneaut Audio Devices HM50VC, a reissue of the classic Astatic crystal mic. I didn't even need to break out my little Magnatone or Danelectro amps for the gig.

On another session, I was mixing a rock tune and the miked Leslie on the B3 part just wasn't happening. It sounded a little too "nice," when what I really needed was a mournful howl, *a la* Winwood's organ on "Gimme Some Lovin'." So I tried the PSA-1, connected to the send/return on the tape return of the B3 track. A quick tweak of the KNOBS, and I had what I needed. I'm hooked.

Whether it's blues, metal, jazz, country, R&B, funk, reggae or mystic new age, the SansAmp PSA-1 has something for everyone. At $795, this sure beats lugging dozens of heads and stacks of heavy cabinets around. Yeah.

Tech 21 Inc., 1600 Broadway, New York, NY 10019; (212) 315-1116. ■

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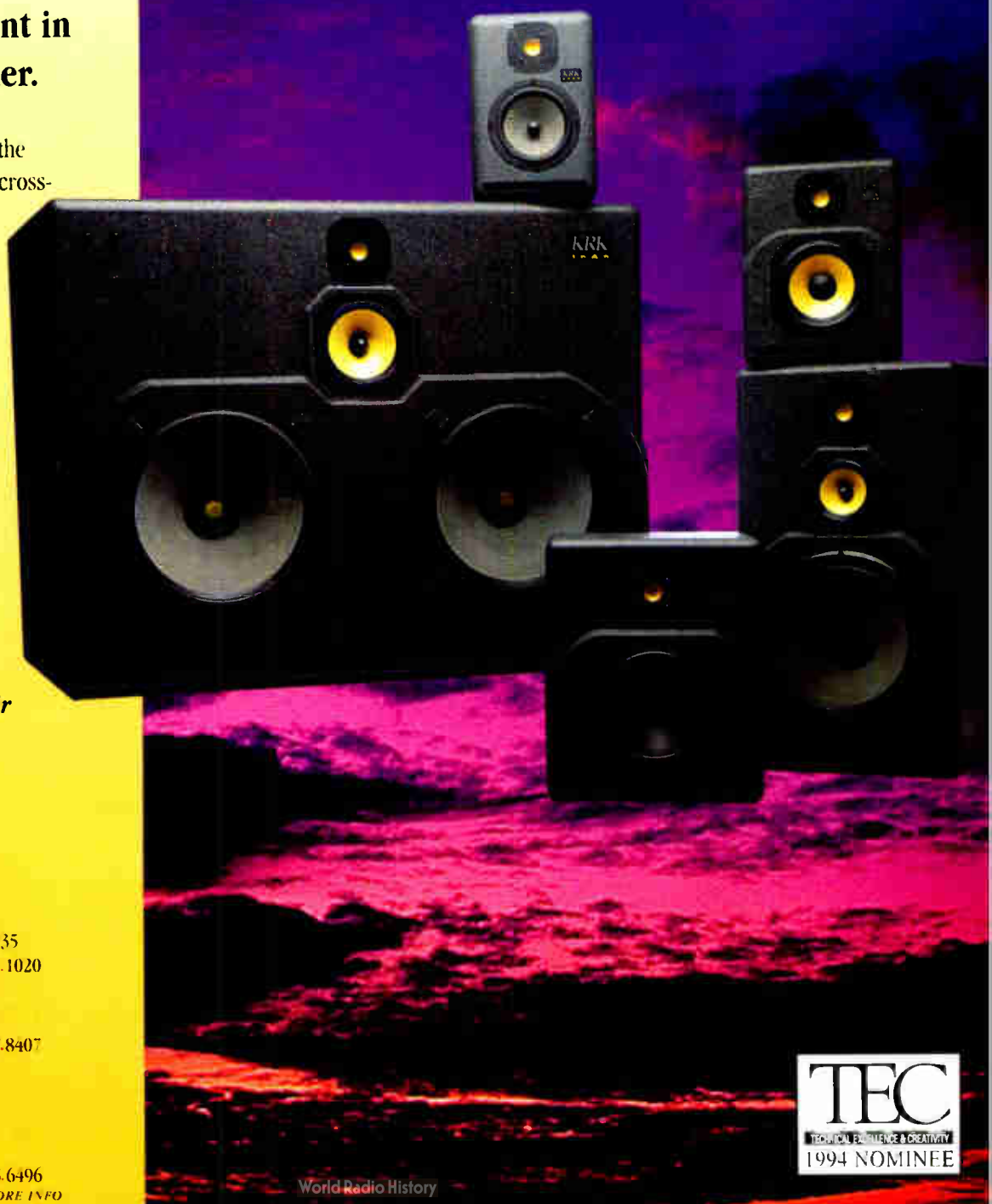

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POST·SCRIPT

SOUND FOR FILM

"I'm Still Here," Part Two: Sound Editing

by Larry Blake

This is part two of a four-part column dealing with a common thread in all aspects of film sound—production sound, sound editing, re-recording, and theater service personnel create more work for themselves when it would be best to keep everything simple, and in the process screw things up. "I'm still here" is my catch phrase for the way we do this to let the director and the audience know that they are "still there." I feel comfortable in dissing the world of sound editing because I'm an editor, just as I am a member of the re-recording community, which I'll take pot shots at next month.

Sound editing for motion pictures has really blossomed in the years since *Star Wars* took the world by storm in May 1977, creating the Third Coming of Film Sound (the first having been in 1927 for *The Jazz Singer* and the second in 1953 with the advent of stereo films).

BSW (Before *Star Wars*), sound editors were not afforded anywhere near the status or credit of their re-recording mixer brethren, in spite of the fact that they share 50-50 in the post-production process. Of course, this is not to say that good sound editing wasn't done before 1977 or that producers and directors didn't have their favorite sound editors.

But since sound designer Ben Burtt appeared on the scene with his sonic creations named Chewbacca and R2-D2, awareness of what sound editors do has increased dramatically, not only in the minds of filmmakers but also for the movie-going

—CONTINUED ON PAGE 130

FACILITY SPOTLIGHT

SR Audio & Cinemedia Productions

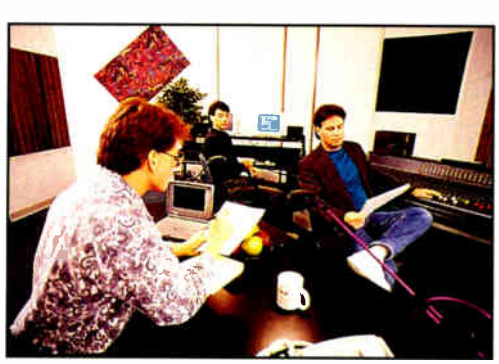
Des Moines, Iowa, will never be confused with Nashville, Chicago or San Jose, not in terms of music recording, audio post or multimedia production. But major labels have begun to show an interest in regional bands, and production companies have been able to attract national advertising spots. And something is happening in this Midwestern town of a quarter-million people that has led the local media to dub it "Silicorn Valley."

That something is Compact Disc-Interactive. Seventeen years ago West Des Moines-based Microware Corporation developed OS-9, a multitasking operating system that became CD-RTOS, the CD-I operating system eventually licensed by Sony and Philips in 1987. OptImage emerged as a spinoff, and a group of software engineers from the companies formed their own multimedia producers collective. Suddenly, people from both coasts were calling programmers in Des Moines to debug their CD-I projects.

Granted, CD-ROM, not CD-I, is the hot multimedia format today. But from an audio perspective, it

—CONTINUED ON PAGE 131

SR Audio owner Michael Lawyer at the Soundcraft with engineers Sean McMahon (producer's desk) and Dave Albert (DMP-7). Right: a full shot of the control room.



PHOTOS: DAVID PENNY

Dubbing "The Lion King" for Foreign Release

THE SCANDINAVIAN CONNECTION AT SUN STUDIO, COPENHAGEN

by Mel Lambert

You really have to hand it to Walt Disney Pictures. For more than half a century, the studio has known how to present animated features that grab the attention of film-going audiences around the world. That its latest production—Disney's 32nd full-length animated feature—is setting box-office records around the world should come as little surprise. Yet *The Lion King* is unique in a number of ways, not the least being that, to date, the film has been dubbed into 26 languages. The organization responsible for overseeing the redubbing and final distribution of the foreign-language versions is Disney's Buena Vista International division.

"On occasion, we have mixed a few foreign-release versions of our films here at our Burbank headquarters," explains Corky Ohara, director of Buena Vista International's foreign post-production. "But normally we mix at overseas studios, where Disney staff can liaise directly with local voice-over talent to produce different-language versions. Although all voice castings and film mixes receive final approval in Burbank, there's an increasing amount of autonomy in the process. We like to draw on the talents of our overseas people, working closely with foreign dubbing and mixing facilities such as Sun Studios in Copenhagen."

The Lion King was released in the U.S. during the last week in June and simultaneously in eight foreign languages. The French-Canadian remixes were handled in Paris; Hebrew and Zulu versions at Delta Studios, Shepperton, England; Cantonese and Mandarin at Media House in Hong Kong; plus Portuguese, Korean and Latin Spanish at The Disney Studios, Burbank. Obviously, such a schedule presented a logistical nightmare.

For the additional foreign-language versions, scheduled for release later this year, Disney will again use local production centers where there is sufficient creative talent available for voice casting, and to handle the subsequent remix to picture. For Scandinavian-language releases, Sun Studio was selected to handle recording of the Danish-language dialog and chorus recordings (recall that the film contains several major production numbers that needed to be re-recorded into local languages), as well as remixes for Denmark, Norway, Iceland, Sweden and Finland.

Headquartered in Copenhagen, Sun Studio also handles an increasing amount of dialog, Foley and music recording, plus Scandinavian-language remixes for Paramount, Warner Bros., Hanna-Barbera, Turner Network Television and other companies. The facility recently installed a fully loaded Solid State Logic OmniMix Multi-Format Production System and a ScreenSound Digital Audio Editing Suite.

"The entire [dubbing] process takes around six months from voice casting through to the final mix," explains Didi Adawi, local coordinator for Disney's Scandinavian versions. Voice casting alone takes around six weeks. "We have access to a pool of local actors, and Sun Studio is an ideal facility for gathering together and then mixing the [various SR·D and stereo optical] film soundtracks."

According to Fred Taieb, Buena Vista's creative director for its Paris-based European operations, "We need to cast voices that will be faithful to the original domestic version of *The Lion King* but which will be relevant to the local culture."

All castings for dialog and vocal recordings are first referred to Disney's Burbank headquarters, which, says Taieb "is looking for a good vocal match [to the original characters], but one that offers a local interpretation of the character. The key to the process, we have found, is to secure a good read [of the replacement lines] from a good actor. In that way, we have a new voice that is reacting to the on-screen action. The result, for local audiences, is far more realistic than if we simply replaced the lines."

VOICE-TEST RECORDINGS VIA ISDN

To speed up the approval process, voice-test recordings were routinely sent from Copenhagen to Burbank via ISDN (Integrated Services Digital Network) dial-up lines, using data-

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—FROM PAGE 128, SOUND FOR FILM

public. Members of the Great Unwashed that I meet in New Orleans know what Foley is! A lot of this has to do with the almost-viral proliferation of television programs and networks like *Entertainment Tonight* and E! TV, with their insatiable appetite for peeking behind the kimonos of us filmmakers. (Of course, the more tangible and easily photographed world of visual effects has achieved even greater renown, and even has its own great magazine, *Cinefex*.)

Getting back to the point, I believe supervising sound editors are now being accorded, and rightly so, equal weight with the re-recording mixers. Sound editors are sometimes brought in on pre-production to anticipate problems and to begin gathering material that will eventually need to show up at the dub. (In the UK, this early start is the rule rather than the exception.)

One potential problem comes from editors not paying enough attention to the production track and whatever else will be playing at the dub. If there is a big music cue going on, you can be pretty sure that the background ambiences are going to take it in the shorts. Another mistake is to not pay attention to what is really happening in the scene: I once cut more than two dozen background tracks in a huge industrial plant, only to be informed at the dub by the producer that all that banging and clanking was not appropriate for an *abandoned* industrial plant. A simple question would have saved me a lot of time and embarassment, and the producer a bit of money.

It is very intoxicating to look at a film for the first time and imagine how we can propel the drama with creative sound editing. This includes not only the obvious backgrounds and hard effects, but also such overlooked areas as dialog edits (searching for better alternate readings that the picture editor may have missed) and group walla (which, if properly executed, can spice up the more nondescript BGs).

The dark side of the process comes when editors prepare too many alternates, slowing down and complicating the mix needlessly. Group walla can be used to ridiculous extremes. But let me hasten to add that a sure-fire way to piss off a director is to not have a complete buffet table of ADR printed takes at the dub. Beware!

Another culprit in the "I'm still here" sweepstakes is Foley, which perhaps more than any other aspect of sound editing runs the gamut from the ridiculous to the sublime. As I see it, Foley serves three main functions: to reinforce the production track, to create unique design sound effects and to ensure that a completely filled music and effects track is available for foreigns. This is all well and good, but it doesn't account for some (admittedly complicated) films having three-month Foley schedules, resulting in more than 70 Foley tracks. Similarly, I don't understand simple talking-head films taking six weeks of Foley.

Some of this can be attributed to old-fashioned CYA; it's just that the act of covering everything often seems like old-fashioned padding. Once you get past the principal characters, only so many footstep tracks and movement tracks will

"read" before everything turns into mush. And if Guinness had a listing of the Most Foley Units Per Reel, I would bet my cat that any scene busy enough to be listed also has wall-to-wall music.

It's not that I'm jealous of my colleagues who get to spend this much time and money on Foley (the medium-budget independent feature films that I work on average from two to three weeks); I just think that needlessly long schedules are ultimately wasteful and hurt all of us.

I should be quick to interject that with the average Hollywood movie costing $25 million, I don't think that post-production is grabbing any larger percentage of the pie than it used to. All departments across the board are pushing the state of their arts in an attempt to keep ahead of the Joneses.

Please send along your comments directly to me at PO Box 24609, New Orleans LA 70184, fax (504) 488-5139. ■

Larry Blake is a sound editor/re-recording mixer who lives in New Orleans for reasons too numerous to mention, although purchasing a big nice old house for $150,000 would be a good start.

—FROM PAGE 128, SR AUDIO

doesn't really matter. "I tell people that I don't care what the platform standard is going to be," says Michael Lawyer, owner/manager of Des Moines' SR Audio & Cinemedia Productions, which works on CD-I projects two to three days a week. "Whether it's CD-I, 3DO or CD-ROM, it doesn't matter—you still have to create audio for it. As long as I can keep up-to-speed on the techniques and technologies, the format doesn't matter. People are going to always have to pay for audio. Audio is a part of multimedia."

CD-I projects at SR Audio have varied from training "films" for Pioneer Hybrid International (seed corn) to a prototype of the "album of the future," with Todd Rundgren and Panacea Entertainment, including menus (accessible while full-motion video is running) for liner notes, album credits, karaoke-style lyrics, videos and interviews.

To survive in a market like Des Moines, however, an audio facility

must offer diversified services. SR Audio has won numerous Telly Awards for original music and audio post on corporate projects (Purina Mills, John Deere), as well as one for the audio post on the independent feature film from Echo International, *Alone in the Dark*. The company also handles radio spots, but its bread-and-butter recently has been corporate video projects for clients ranging from the California Board of Tourism to Delta Airlines to Bell Atlantic. Typically, the job arrives via a local production company that makes use of local audio services—a variation on the audio-follows-video theme.

The workhorse in audio post at SR Audio (besides engineers Lawyer and Dave Albert) is the 8-channel Pro Tools 2.5 workstation that resides in the main room alongside the automated Soundcraft 600 with MAGI automation and three Yamaha DMP7 digital mixers. The 28x28 control room also houses an MCI/Sony analog 24-track and three 8-track Alesis ADATs. Full SMPTE lock to Beta SP or U-matic video is available from the main room or the MIDI pre-production room. All the sound modules from the MIDI room tie into the main room.

Often clients will ask for MIDI pre-production on original music for spots, then move into the 30x30-foot studio to augment the MIDI tracks with live musicians. In fact, the main studio is one of SR Audio's biggest draws. "It's extremely live—all hardwood parquet floors and hard walls," Lawyer says. "Because we're the only facility in Iowa with a room like this, the response from musician clients and regional bands coming in has been great. We hired an engineer named Sean McMahon who had worked in San Francisco, Smith/Lee in St. Louis, and at Al Jolson Jr.'s place in Nashville, and he's been doing all the music production. It's been great for this area, because very few of the people around here who claim to be producers have actually produced in a wide range of styles."

Like so many Midwestern facilities, SR Audio works split shifts, doing ad and commercial work during the day and music at night. The company was founded back in 1982 (15 miles to the south in Indianola; the SR in the name is for South River, an Indianola location) as the pre-production studio for A&M recording artists Head East. In a converted farmhouse, they had an MCI 1-inch 8-track and a Neotek console. Lawyer's background, however, was in video at a television station, and soon the company branched into radio and TV spots.

By the end of the '80s, Lawyer had outgrown the farmhouse, and with the emergence of digital 8-tracks, he saw the opportunity to bump up to 24-track recording. He also wanted to move to Des Moines. After the floods of '93 hit the Midwest, he took advantage of the timing and moved to the west side of Des Moines, into a db Engineering-designed 3,500 square-foot space in an industrial park. Lawyer describes the look as modern '90s, "more like a video post house."

The Des Moines location has not been a limitation for Lawyer so far. He says that he's seen just enough national work to whet his appetite. The only big drawback, he says, is that the market just won't support the purchase of an SSL or Neve console. "We're upgrading our equipment constantly, and we're looking toward getting something a little more world-class in terms of a console over the next six months, but you just can't charge the rates to justify a half-a-million-dollar console, and I wish we could. We've been exploring ways to bring in an SSL or a Neve or one of the new generation of digital consoles. And I expect to be shopping at AES." ■

—FROM PAGE 129, SUN STUDIOS & THE LION KING
compression transceivers. "In this way," explains Kirtsen Saabye, creative dubbing manager for the Disney Character Voice division, "we can send off a recording at the end of the day here in Copenhagen and then receive comments via fax by the next morning."

"The ISDN link saved us great deal of time," recalls Ohara. "Normally, we would need to Fed-Ex a DAT tape from Copenhagen for approval. Now the transfer process can be handled in minutes rather that days."

Once the new voices had been approved, ADR recordings were made at various locations throughout Scandinavia. For convenience, the dialog takes were recorded to Akai DD-1000 MO-based systems. Exabyte, MO disk or time code DATs are then used to transfer final takes back to Sun Studios.

After the replacement dialog and music tracks have been edited to picture on Sun Studio's Screen-Sound, they are immediately available via SoundNet to the companion OmniMix system. Sun Studio engineers Brian and Benni Christiansen (sons of the facility's owner, Svend Christiansen) handled the various mixing duties. "It took around four days to mix each [foreign-language] version," offers Brian "Witoft" Christiansen. "Because of OmniMix's built-in reverb and delay programs, we can accurately match the perspectives and ambiences of the original release and add processing to the dialog tracks."

PREPARATION OF FOREIGN-RELEASE M&E STEMS

Sun Studio received a variety of original tracks from Burbank. "We were fortunate that Terry [Porter, *Lion King* chief re-recording mixer] was able to handle preparation of the foreign-release M&E [music and effects] stems for Sun Studio," says Ohara. Porter supervised the dubbing of various mag elements, which were then transferred to a master 24-track DASH tape. Copies of this digital master were then made for the various foreign-language dubbing centers around the world.

"The DASH master," Porter recalls, "contained the domestic Dolby Stereo 2-channel Lt-Rt in both Dolby SR and A-Type formats; a 6-track domestic SR'D master [L, R, C, Left-Surround, Right-Surround and Subwoofer]; a 4+2 M&E containing a 4-track LCRS mix, a track of optional material, plus a solo English-language dialog track for sync reference; and a 6-track SR'D M&E. We originally dubbed *The Lion King* in 6-track SR'D. The special 4+2 M&E was made by running the SR'D subwoofer channel through a dbx 'boom box' and then dubbed into the 4-track LCRS M&E. I also combined the split surrounds into a single surround for the LCRS M&E."

This way, the remix engineers at Sun Studio could compare dialog sounds with and without processing

and check sync timings of all material transferred to the OmniMix hard drives before the mix. The provision of both 6- and 4-track M&E mixes simplified the dubbing of Dolby Stereo or SR'D versions.

In addition to the carefully prepared multitrack M&E stems, Porter also supplied a list of reverb settings that he had used on voices and sound effects, including Lexicon 480XLs, Eventide H3000s, Quantec XL and other processors. These could then be duplicated at Sun Studio on the same type of reverb units used during the original mix at Disney's Stage D in Burbank. "We also duplicated the same kind of reverb sounds on OmniMix's built-in Spatial Processing," recalls mix engineer Brian Christiansen. "OmniMix gives me 24 digital inputs from hard disk, plus 24 channels of reverb and ambience programs, plus 24 channels of delay. The OmniMix console was laid out with 16 tracks of dialog, eight tracks of overdubbed choir—four girls and four boys—plus the 6-track M&E from Burbank. I made use of the HSM [Hierarchical Sub Mix] Bus to combine tracks and processing to produce various mixes and submix stems."

Within the HSM Bus, Christiansen prepared multiple LCRS-2 (left, center, right, surround-left and -right) mixes of the original M&E tracks from Disney, with the new dialog and music elements. OmniMix provides up to 68 discrete mixes that can then be summed to form master discrete outputs, or inputs to Dolby Stereo and SR'D matrix-encoding systems. Because all system parameters were dynamically automated against time code, once the level adjustments, assignments and processing had been developed for the Danish versions of *The Lion King*—the first one prepared at Sun Studio—mixing the other-language versions simply involved laying up the new dialog and music tracks in sync and fine-tuning level and ambience adjustments.

"That ability saved a lot of time on the foreign dubs," says Ohara. "Once the first mix was completed, the automated mixes could be recalled for the Swedish dubs, including the digital ambience and reverb programs [from OmniMix]. For example, in some of the cave scenes, we could retain the same stereo reverbs from scene to scene, as well as the left-right POV changes across picture edits. All [the mix engineer] needed to do was replace the dialog lines and watch for any timing differences across edits.

"And we can easily archive each language mix to Exabyte, then use the data for any subsequent remixes." Six-channel premixes of music tracks recorded at Sun Studio were also transferred to digital 8-track for approval and archiving purposes.

Next year, Disney plans to release two new animated features: *Pocahontas* and *The Hunchback of Notre Dame*. Already there is talk of domestic and foreign-release mixes being handled in an even more coordinated way, possibly using similar re-recording systems, so that mix data from the domestic version might be available for foreign-language versions. Watch this space for further details. ■

Former editor of Recording Engineer-Producer *magazine Mel Lambert currently heads up Media&Marketing, a consulting service for pro audio firms and facilities.*

New Products For Film/Video Sound

KRK SHIELDED MONITORS
KRK Monitoring Systems (dist. by Group One Ltd., Farmingdale, NY), now offers optional video shielding on its most popular close-field monitors. The magnet assemblies on the new models 6000BS and 7000BS are covered by a Mu-metal cover that isolates the magnetic flux, eliminating picture distortion on nearby computer or video displays. The 6000BS combines a 6-inch polyglass woofer and 1-inch Kevlar dome tweeter to produce up to 106 dB from a 75-watt input. The larger 7000BS has a 7-inch woofer and 1-inch tweeter and handles up to 150 watts for a maximum level of 110 dB.
Circle #190 on Reader Service Card

SONY CDP-CX151 CD CHANGER
New from the consumer hi-fi division of Sony (Park Ridge, NJ) is the CDP-CX151, a 100-disc CD changer priced at $999. The compact unit uses a carousel design and features a wireless remote, rotary wheel track-access control, S/PDIF consumer optical (Toslink) digital output and a Custom File™ memory function that commits disc changes to memory for later recall.

FIRSTCOM MUSIQUICK
First Com Broadcast Services (Dallas) debuts MusiQuick software and Clipz CD-ROM, an integrated package that allows production music users to audition more than 8,000 production music tracks (the entire collection of the First Com, Music House and Chappell libraries) from a Macintosh or Windows-compatible PC. The software uses keywords and subcategory searches to find and audition a suitable music track. Once the music is selected, users can tap into a 24-hour/7-day-a-week online network and download the digital audio file of the selected track(s) directly into their computer's hard drive. The CD-ROM and software combination retails for $495; usage fees for any music selections are additional.
Circle #191 on Reader Service Card

DNF UNIVERSAL VTR CONTROLLER
DNF Industries (West Hollywood, CA) announces the ST200 Universal VTR Controller, a compact desktop device that provides autolocator-style functions to any RS-422 equipped VTR. Features include two selectable cue points, search to cue, pre-roll, a jog wheel and the usual REC/PLAY/STOP/RWD/FFD transport controls.
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by Mark Frink

SOUNDCHECK

The United Center, a work in progress

CHICAGO'S UNITED CENTER
by Rod James

Chicago's new United Center, referred to locally as "The House That Michael Built" in deference to Michael Jordan, recently opened its doors to ravenous Bulls basketball and Blackhawk hockey fans. Ironically, Jordan retired a season before the West Side facility was complete. With a seating capacity in excess of 20,000, the huge new arena dwarfs Chicago Stadium, its predecessor located across the street.

The old stadium could accommodate more than 18,000 fans, but it was constructed in the days before luxury suites and other modern amenities. With its relatively intimate scope, it was famous for being one of the loudest venues anywhere.

Jack Wrightson of Wrightson, Johnson, Haddon & Williams (WJHW), Dallas, provided acoustical consultation at the facility. He noted that retaining the loudness that the fans expect in the new building proved a major challenge. "Chicago stadium has about half of the interior volume of the new United Center, but we wanted to maintain its incredible crowd energy," he said.

United Center audio system designer Ron Baker, senior associate for WJHW, explained that reflector panels have been installed from the ceiling all the way around the arena, at the rear of the seating areas. The panels deflect noise back to the seats, helping to keep the room as live as possible.

The Crown IQ System-controlled main audio system was installed by Interstate Electronics, a Chicago-area contractor, and includes 38 CJ563 Industrial Virtual Array Modules from Eastern Acoustic Works (EAW) and eight EAW AS300i VA Installation Systems. The three-way, full-range CJ563 systems are arrayed in ten clusters hung with ATM Flyware from a catwalk 100 feet above the main floor.

Custom-engineered for sports arenas, stadiums and other large public spaces, the CJ563 has been installed at several next-generation facilities, including Hong Kong Stadium. The trapezoidal enclosure is designed with a slanted top and bottom for vertical arrays. The enclosure holds two 15-inch woofers in a vented enclosure, a pair of 10-inch mid-range cones loaded with Kenton Forsythe's compound flare and displacement plug, and a 2-inch compression driver on a fiberglass horn. Frequency response is 45 Hz to 19 kHz (+3 dB), and peak output is 140 dB SPL.

—CONTINUED ON PAGE 144

CSN at The Gorge

Situated on a bluff that offers the audience a panoramic view of the Columbia River, The Gorge at George, Wash., two hours east of Seattle, is one of the more scenic outdoor venues in the country, even rivaling Colorado's Red Rocks. Behind the stage, the hill drops steeply to the river, hundreds of feet below. After the sun sets across the river, the twilight sky provides a natural "eye," giving a stunning visual background.

Anyone who has been to the Gorge will be pleasantly surprised upon return. In operation for seven years, the venue has undergone major renovations, including a new roof, for the '94 season. Speakers can be hung rather than stacked for the first time, greatly improving the sound quality. The four-post, UPS roof is stabilized to the 32-foot-wide sound bays, whose I-beam head-blocks can fly a load of over a ton per bay. The 40-foot-tall "Super Scaff" bays are built in four 8-foot sections, each with the typical 7-foot 9-inches of clear width.

Show power was previously supplied by generator. There is now three-phase power available as an 800 and two 400 amp services. Other renovations include new FOH mix and spot platforms, new catering and production buildings backstage, and, most importantly, the upper section of the audience seating has been regraded and sodded, improving sight-lines and increasing capacity. "I think we could now comfortably fit about 25,000, but they have limited it to 18,500 for the five largest shows because it impacts the local community," MCA production manager Ted DeFilippis explains. "They've limited us to 20 shows, with the rest being capped at 13,500 or 15,000." The sold-out CSN show set an attendance record for the venue in its new configuration. [*Mix* covered CSN at the facility—then known as the Champs De Brionnes—in February 1991.] Overnighters are encouraged and accommodated with shower facilities. Many fans came in RVs, campers or brought their tents to take advantage of the aftershow buzz and the Yes concert the following day.

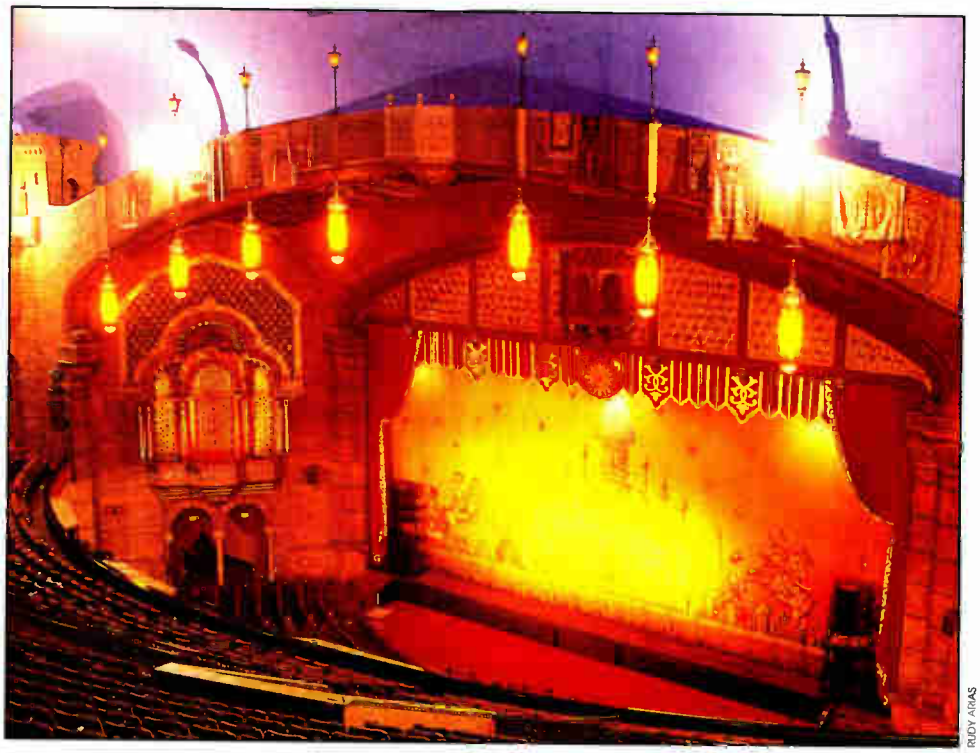
Above: CSN mixer Chris "Hoover" Rankin and Sound Image's Robbie Mailman

We caught Crosby, Stills &

—CONTINUED ON PAGE 139

THEATER PROFILE:

Atlanta's Fox Theatre



RUDY ARIAS

The Fox Theatre, located on Peachtree Street in Atlanta, had its in-house sound system redesigned this past summer. The new system was used recently for a theatrical production of *The King and I* and the gala movie premiere of *City Slickers II*. The new system, installed by chief audio engineer Jess McCurry, replaces the last major installation, which was state-of-the-art in 1985.

Touring "road-dogs" of the past two decades will remember the theater's distinctive architecture. Commissioned by the Shriners in the Roaring '20s, the flamboyant Egyptian revival design was inspired by the discovery in 1922 of King Tut's tomb, and the 4,500-seat venue was completed just two months after the stock market crash of '29.

Fox Theatrical opened the theater under a 21-year lease and went bankrupt three years later. The building has gone through periods of financial boom and bust and was threatened with demolition after closing in 1974. A major "Save the Fox" campaign was successful, and it reopened as a rock venue with Linda Ronstadt's October '75 performance. When Lynyrd Skynyrd recorded a live album, *One More From the Road*, there a year later, The Fox had already started to establish itself as one of the grand American soft-seaters of live sound. The new system caps a massive restoration campaign, which has gone on for the past 18 years.

Designed by Dr. Eugene Patronis, the new system is powered by 14 Crown Macro-Tech MA-1200s located in an equipment room under the stage. The three-way speaker system consists of OAP Audio Pro-Ax speakers with PX-3 system controllers. On each side of the stage are three PX-1060 enclosures, which are 10-inch horn-loaded midrange devices. A

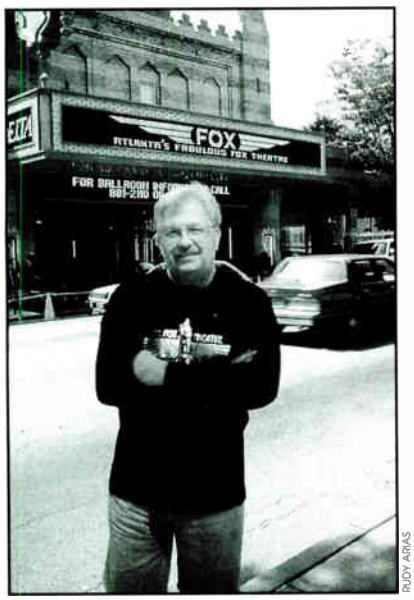
World Cup Sound

KEITH CLARK

The star-studded World Cup opening ceremonies at Chicago's Soldier Field featured performances by Diana Ross, Richard Marx, Jon Secada, Daryl Hall and a speech by President Clinton (not to mention a free Placido Domingo concert in Grant Park after the opening game). On Stage Audio of Elk Grove Village, Ill., provided a unique, distributed audio system for the ceremonies featuring 40 Electro-Voice DeltaMax DML-1152 controlled loudspeakers and several EV MT-2A concert systems. The DML-1152s, on custom platforms, were able to be removed within five minutes to allow for a timely start to the opening game. Klark-Teknik DN360 EQs, Shure microphones and a Yamaha PM-4000 console were also employed.

coaxially mounted 2-inch compression driver mates to a 60°x40° degree CD horn, with the backside of the horn acting as the compression plug for the ten. Underneath these on each side are two PX-15 dual woofers.

There are also two Meyer USW-1 subwoofers on each side of the front of the stage, powered by two Crown Com-Tech CT-800 amps. As is typical in this



RUDY ARIAS

Jess McCurry

type of venue, almost half the audience sits in the balcony. Across the top of the proscenium arch are five PX-1090 speakers, three as a center cluster and one each left and right, delayed with a Klark-Teknik DN 716. The system has been equalized with KT DN 300s and has dbx 160s for system limiters—all located in the amp room.

The Yamaha PM-4000 console has dbx 160 and 166 compressors and JBL 5547A graphic EQs available as inserts. The Crown IQ System, installed on a 486 computer located at the mix position and running software Version 1.1, provides convenient control and monitoring of the remotely located amplifiers. "We no longer have to be running back and forth to the amplifier racks or have someone positioned there on headset to determine what's happening," says McCurry, "and this is the single biggest advantage for us." ■

—FROM PAGE 137, CSN AT THE GORGE

Nash at the Gorge as their 25th-anniversary tour wound its way toward the Woodstock Festival in Saugerties, N.Y., several weeks later. Chris "Hoover" Rankin, who has been with the CSN acoustic show for several years, is mixing the electric band for the first time, using two Yamaha PM-3000 consoles. The first console, used for vocals and guitars, has 30 inserts and eight effects; the second, which had both drum sets, the percussion and the keyboards on it, has 19 inserts and four effects. The first console has five Yamaha REV5s, with the first four dedicated each to one vocal mic and the fifth as a dedicated guitar reverb. An Eventide H-3000 Harmonizer was used for Stephen Stills' guitar sound, and there were two Yamaha SPX-990s for additional instrument reverbs. A Roland SDE-3000 was also on hand, "just in case," says Hoover. "There are a couple of places during the show where we use a

little delay; nothing fancy."

Crosby and Nash sang into the new Audix OM-5, while Stills used a Shure SM58. "When we were doing the acoustic show, we used SM87s, which worked really well for that. We tried 58s for this tour because we're back to an electric band, and we were getting too much stage sound in the condensers," Hoover explains. "Robbie [Mailman, Sound Image's crew chief] suggested switching to the OM-5." Listening to the show, there was a sharp contrast between the quality of the vocals. "The clarity on the Audix microphones is perfect," says Rance Caldwell, CSN's veteran monitor engineer. "I had all SM58s out there, and I didn't change a thing other than the mic, and they sound a lot fuller and more present, plus I love the improvement in feedback rejection." In addition to Stills using a regular 58, he also insisted on his old Northwest double-12 floor monitors, even though they're loaded with the same components as the Sound Image wedges used on the tour. "I guess that's something like taking your own pillow and sleeping bag on the tour bus," Caldwell says.

Caldwell performed the monitor chores on two Ramsas with the assistance of Sound Image's John Shimke, using Klark-Teknik DN 360 equalizers and Yamaha SPX-90II reverbs. In addition to the double-12 wedges, there were three Radio Station transmitters with Aphex Dominators providing in-the-ear monitoring. Crosby, whose voice is sounding better than ever, had a stereo headphone mix. "They don't have to sing as hard to stay on pitch, because they've got their vocals right in their head," Caldwell comments. "In the past, with the band behind them and especially in conjunction with the P.A., the guys were singing too hard. We do three days on and one day off, and by the third show their voices would get blown out. With the headphone monitors and these new mics, they can hear each other, they're singing better and their voices are great after three shows."

Another advantage of the ear monitors is the ability of the engineer to talk with the artist. "If I need to, I can just have a chat with them in their ears," Caldwell adds. "Crosby also has a footswitch that takes his mic out of the split, and it goes into another channel on the monitor console that's dialed into his mix only, so we can actually have a private conversation."

Stills and Nash were each getting a mono mix in only one ear, and Caldwell balances certain things between the wedges and the ear monitor. "Stills likes to hear his electric in his left ear and puts an ear monitor in his right," says Caldwell. "Nash likes to be able to sort of walk in and out of his mix, and he wears his in the left ear, since Steven is on his left."

The floor monitors were powered with QSC 3800 and 3350 amplifiers and the Symetrix 524E crossovers. Crosby and Nash had one wedge each, while Stills had

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a stereo wedge mix. "In general, I put the vocals in their headphones and use the wedges for guitars plus a little bit of 'feel'—kick, snare, hi-hat, that kind of thing," Caldwell explains. "With the in-ear monitors, I don't have to get a 130dB vocal out of a wedge and then put everything else in it. It makes my job a lot easier." There were two wedges on each of the two drum risers and on the keyboard riser, with a single-15 wedge for percussion.

Out at the front of house, the vocals all have Aphex Expressors inserted. "I really like the control they give me and the way they sound," Hoover says. "I wouldn't mind an entire rack of Aphex products for this show." All the direct boxes were Countryman Type 85. Twelve channels of BSS DPR-404 were available for the acoustic portion of the show. "They give me a lot of channels of high-quality compression in a few rackspaces, and the de-esser is important when they go back and forth between picking and strumming," he explains. "When they start strumming heavy, the guitars can sound thin without a little de-essing."

All the electric guitar amps were miked with Shure SM57s. Inserted on the channels for Stills' two stereo electric rigs were two dbx 166 compressor/gates. Crosby, Nash and backup electric guitarist Ethan Johns played through Fender Vibro King amps, and dbx 903s were inserted at the console. Alexis Skoleski's SWR 8x8 bass cabinet was miked with a Sennheiser MD-421 and compressed with a 160x. Mike Finnegan, who has been with Crosby for 11 years, played a B-3/Leslie combo, miked with two 57s on the highs and a 421 on the lows, as well as a Yamaha KX-88 MIDI'd to a rack of TF-1 modules that looked older than the Leslie. Jodi Cortez played a seven-piece kit upstage-left, miked with a Shure SM91 on the kick, 57s on snare top and bottom, Ramsa S-5s on the rack toms and 421s on the floor toms. The multitalented Johns doubled on a similarly miked second kit upstage-right, when he wasn't playing guitar or percussion. dbx 160x compressors were inserted on the kick drums, and Klark-Teknik DN-514 quad gates were used on the toms and on the snare under channels.

The five-way, JBL-loaded Sound Image mains were powered with QSC EX 4000 amplifiers on the 18s, 15s and 12s and EX 1600 amps on the horns and tweeters. The drive rack had a Yamaha D-2040 processor used as a four-way crossover, with built-in custom parametric "massaging" of each bandpass. Hoover used the system without any EQ on the KT DN 360. The subs, driven from the matrix, were designed for use with the Bag End ELF system. The 18s are in specially designed, sealed enclosures, and the system has response below 20 Hz.

The amp racks are the same ones that went out with Jimmy Buffett last year and have the QSControl system installed, with a FiberHub in each amp rack and a Bridge for computer hookup at both the first amp rack and at the FOH drive rack. The array typically flies in a three-wide, four-deep array. Running the software on a Macintosh Quadra 605, Sound Image's Mailman has custom software control panels for attenuating the volume of individual amp channels to adjust the individual components of the speakers, by row, in the array. Another software control panel allows him to solo up individual amp channels in the array. "I have also copied the mute control from each amplifier panel to create an entire mute diagram of the left and right array," Mailman explains. "After I turn on the amps at the start of the day, I can then mute and then unmute each channel from the front-of-house to check my components, which I would normally do onstage by turning amps up and down manually. I also have a picture of all my output meters, grouped by component." ■

Mark Frink is Mix's sound reinforcement editor.

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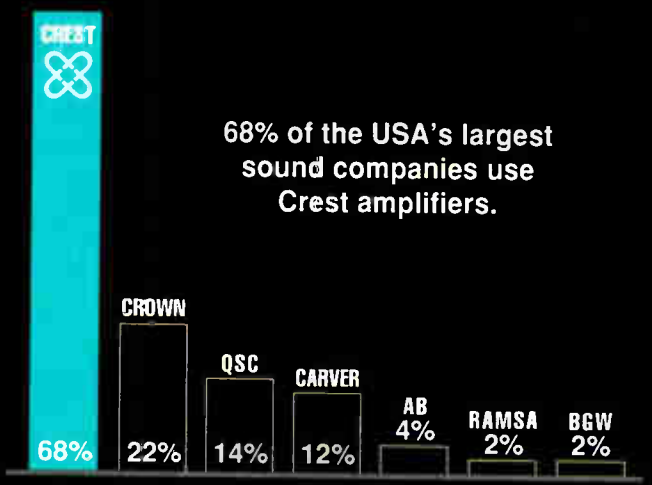

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—FROM PAGE 136, UNITED CENTER

Within each cluster of three or four CJ563s, the woofers form a line array on the left, with the high-frequency horns in the middle and the dual 10-inch midrange sections on the right. The 60°x40° coverage pattern is maintained well into the mid-bass region due to the large mouth sizes of the mid- and high-frequency horns.

The top row of each cluster projects to the farthest seating areas, while the bottom row provides some "back fire" to cover front row seats around the floor. Additional floor coverage in "basketball configuration" is provided by eight EAW AS300i loudspeakers with vented 15-inch woofers, horn-loaded 6.5-inch carbon-fiber midrange cones, and 1-inch compression driver/horn combinations. As in the CJ563, the drivers are oriented horizontally within the enclosure.

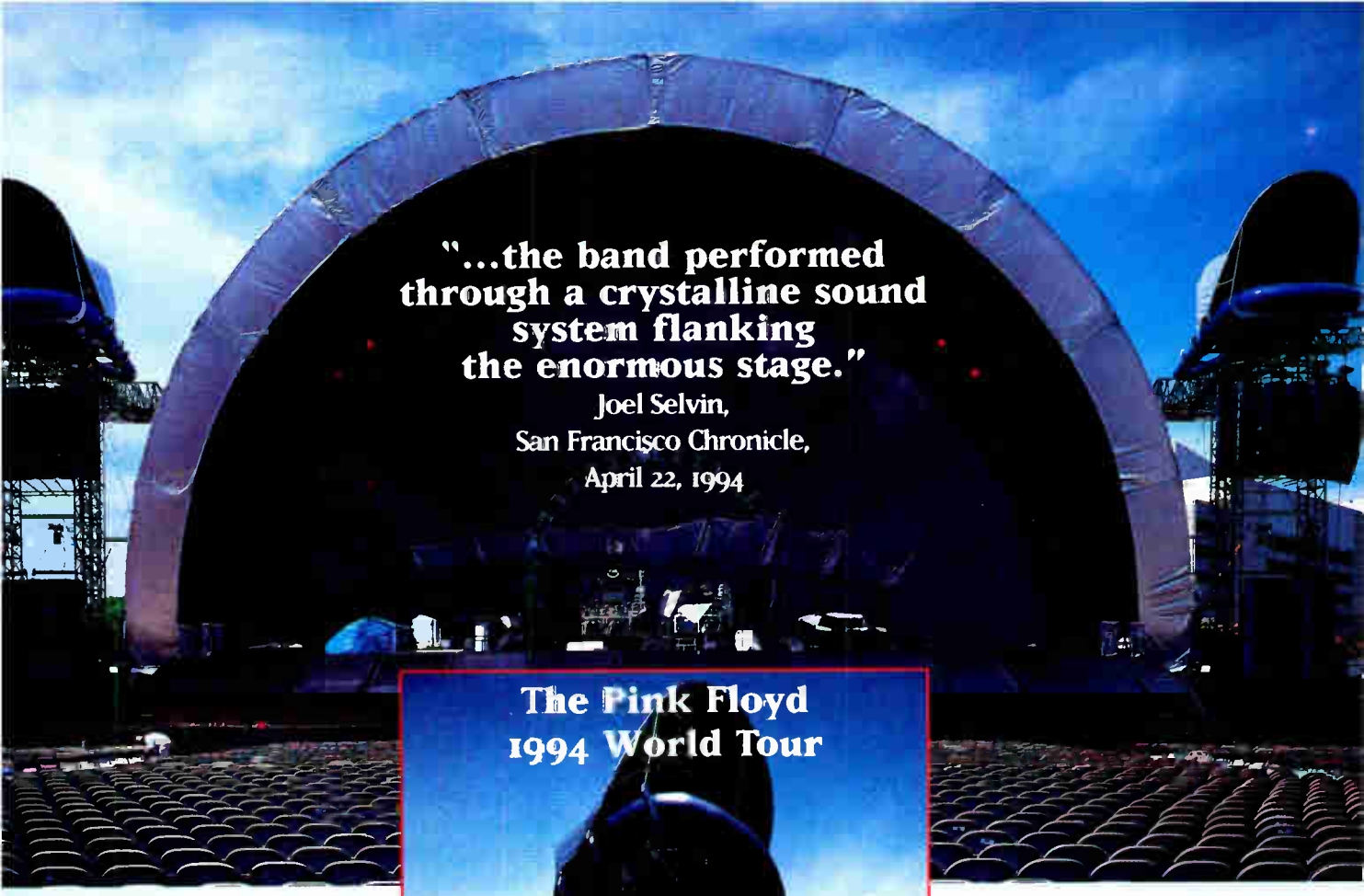
The system is capable of delivering smooth levels of 105 dB, which is especially important now that rock and pop music have become part of most sporting events during time-outs, halftime or period breaks. The EAW speaker systems are driven by Crown Com-Tech amplifiers: A Com-Tech CT-1600 channel drives the low-frequency section of each CJ563, while a CT-800 channel drives each dual midrange section, and a CT-400 channel powers each high-frequency driver. The amplifiers are rack-mounted in a catwalk above the playing surface.

Baker took advantage of some of the most recent developments in the Crown IQ System line. New software and hardware, linked to the main system amplifiers via IQ-P.I.P. modules on the back of each unit have been blended with IQ-compatible gear.

"Our primary goal for the IQ System was to simplify control of the main system," Baker explained. "For example, it is used to create 20 zones within the ten main clusters. Each zone covers a different seating section in the upper or lower portion of the arena. If that section has not been sold for some reason, the operator mutes the amplifiers driving that section of the cluster. This reduces excess energy in the room and aids intelligibility."

A Crestron touch panel has been linked to the IQ System, allowing quick and convenient system configuration, monitoring and muting in a clear graphic format. While touch panels have been used with the IQ System in the past, Baker and Crown devised a different, more efficient approach.

IQ Drones have been inserted between the touch panel and the IQ bus, serving as an interpreter between the two. The Drone can be used in lieu of an IQ interface and delivers much faster performance, according to the company. It allows interfacing between the IQ System and third-party control systems, as



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Cleveland Plain Dealer,
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Photos: On May 8, 1994, Pink Floyd played to a sold-out audience of nearly 50,000 at Vanderbilt Stadium, Nashville, TN. With Britannia Row & Turbosound, there wasn't a bad seat in the house.

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Chick Corea & the Elektric Band II with their PA 1800s

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well as interface of external stimulus devices such as switches and pots.

Programmed with a special version of IQ Turbo software, Drones have an individual control block as well as special container objects in the graphics mode. Object Oriented Protocol (OOP) allows configuration and use of objects to be easily changed.

High-speed IQ Turbo software further simplifies control system setup and operation—it brings online the ability to create any desired graphic display interface for system control. The user can literally create any object on the computer screen that corresponds to the device being controlled.

A 486 Toshiba laptop PC with color screen runs the IQ software and resides with the touch panel in the mix position, located on the luxury-suite level. The laptop computer takes up little space and can be moved around easily, as needed.

The mix position also contains a variety of source devices, including a cart machine, cassette deck and CD player. The stadium also employs a Digidesign Sound Tools music playback system providing rapid access to a large amount of music.

One of the most beloved features of old Chicago Stadium was a booming pipe organ, installed when the venue opened in the 1920s. The massive relic has been replaced by an electronic keyboard patched to the main system.

A 24-channel DDA Q Series console for the main system was selected for a variety of reasons. "It is a cost-effective, not overly complex unit that provides all of the control features necessary for sports arena applications," said Baker. "The console also includes individual input meters on each channel,

allowing the operator to easily locate all active channels at a glance."

A fair amount of capability is also built into the main system's equalization. Three Brooke-Siren SCS-926 Varicurve parametric equalizers offer pre-crossover EQ, while more than 20 Rane 3-band parametric EQs allow for further adjustment after the signal exits the White DSP5000 crossovers.

Several patch panels with local receptacles are located on the floor level, each outfitted with six microphone lines, intercom access and two jacks for foldback monitors. A multipin jack accommodates a snake running to the courtside announcer's table. An AKG D3900 microphone was chosen for voice-over.

An extensive paging and emergency evacuation system is made up of more than 2,000 ceiling speakers powered by Crown Com-Tech amplifiers running 70-volt lines. Each concourse also has its own level-sensing microphone with a Symetrix 571 SPL computer to track crowd noise.

The United Center's large-scale club offers a host of capabilities, including local playback, patching of local mics and a remote feed from the main systems. The more than 200 luxury suites stretching around the arena offer tenants a choice of four program sources. ■

Rod James lives somewhere in the Midwest under an assumed name, working behind the scenes on Michael Jordan's return.

NEWS FLASHES

Whether I cover a tour or an installation, I keep running into the issue of computer-controlled amplifiers. ProShow's Dave Stevens and I

will evaluate some of the issues involved with the available technologies and touring applications for an article next month...Mark your calendars twice. On Sunday, November 13, from 9 a.m. to noon, there will be a workshop at the 97th AES Convention in San Francisco on the topic of "Touring with Computer Controlled Sound Systems," exploring the interface between personal computers and touring systems. The workshop will address questions of functionality, availability and future development. It offers the opportunity for discussions with a panel of working engineers who have been on the road with these technologies, setting them up on a daily basis. This event should be particularly helpful for manufacturers just getting involved with the issues surrounding computer control...Then, December 1-4, the AES is holding a conference at the Aristocrat Hotel in Dallas on computer-controlled sound systems, with dozens of papers being presented covering systems for public spaces, recording studios, entertainment and special-purpose venues. This is the first international conference dedicated to these issues, with emphasis on both applications and engineering. It will be of interest to sound system operators, design consultants and installation contractors. The conference will offer parallel sessions covering both product design and real-world solutions. Registration is through the New York AES headquarters at (212) 661-8528...In lieu of our regular "Club of the Month," we're covering the Fox Theatre in Atlanta. However, we have an obituary for the Chestnut Cabaret in Philadelphia, which closed its doors on the first day of summer after 13 years. A classic breaking-ground for many new artists of the last decade, the 650-capacity club was a victim of constantly over- or undersold shows and a marginal sound system, requiring production to be brought in for many acts on a severely strained budget. I had my Ryder graffitied there after a Marshall Crenshaw show. Lighting director Brenda Siegelman and manager Chuck Summers said, "The demise was sudden and without warning. We loved the place and wanted a chance to say goodbye and thank you to everyone." Owner Steve Mountain will focus on running Cornerstone Management. The club is survived by the Troc, the TLA, Khyber Pass, Dobbs and all those riverfront clubs...After a quarter-century of service, the Grateful Dead's live engineer, Dan Healy, has been replaced by John Cutler, the band's studio engineer and FOH engineer for the Jerry Garcia Band. As usual, the Dead were out on tour this summer playing stadiums and sheds with Ultra Sound of San Rafael, CA... This summer's award for most outrageous technical overkill goes to Michael Bolton for use of a video prompter as a set list on his tour. ■

SOUND REINFORCEMENT NEW PRODUCTS

COMMUNITY CSX-S2 SPEAKERS

New from Community (Chester, PA) is the CSX-S2 line of speakers with 11 models ranging from compact two-way to full-range systems with subwoofers. Designed for the club/musician market, the speakers feature ferrofluid-cooled woofers and black-carpeted enclosures with recessed handles. Each component is equipped with Community's PowerSense™ circuitry, which monitors the operating power levels and provides a positive indication of overload conditions.

Circle #212 on Reader Service Card

YORKVILLE ELITE EX-601

Yorkville Sound of Niagara Falls, NY, debuts the EX-601, the newest addition in the Elite line. The speaker can be used as a full-range, stand-alone unit, or with Yorkville's P-601EX processor, in combination with the Elite SW-1000 or SW-800 subwoofers. The trapezoidal, arrayable system has a maximum SPL of 129 dB and handles 600 watts. Construction is ¾-inch poplar plywood, and ATM Fly-Ware™ rigging hardware is optional.

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BULLFROG PR1510

Designed for main P.A. applications, the PR1510 from Bullfrog (South Bend, IN) is a three-way trapezoidal system combining a double-ported 15-inch woofer, 10-inch midwoofer (in a separate enclosure section) and a 1.5-inch titanium compression driver on a 90x50-degree CD horn. The cabinet is made of non-resonant MDF and includes carpet covering and mounts for optional casters. The PR1510 is said to handle 1,000 watts with a sensitivity of 102 dB (1W/1m), and a double-15, same footprint subwoofer is available.

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ALLEN & HEATH GL4

Allen & Heath, of Salt Lake City, UT, announces the GL4, a fixed or touring sound console featuring a routing system that allows the board to be used as a front-of-house or monitor console. Available in configurations ranging up to 56 inputs, the GL4 includes 4-band sweepable EQ, continuously variable highpass filters and ten aux sends on ten dedicated controls. A 40-input model retails at $12,995.

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ARX SIXGATE UPDATE

ARX (U.S. offices are in Petaluma, CA) has enhanced its popular SixGate, which provides six independent noise gates in a single-rackspace package. The unit now includes ultra-low-noise/low-distortion circuitry and electronically balanced outputs, in addition to individual release, depth threshold and bypass controls on each channel.

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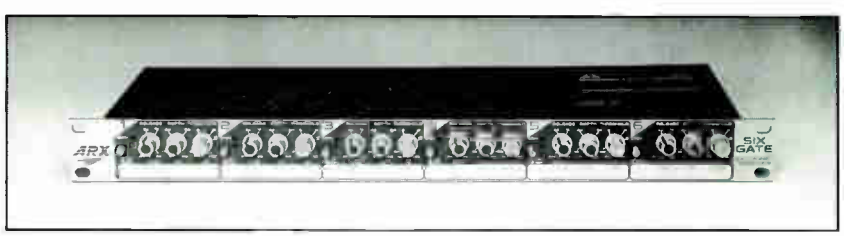

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BY BLAIR JACKSON

RECORDING NOTES

PHOTO: MARK SELIGER

The Rolling Stones (l to r): Charlie Watts, Mick Jagger, Ronnie Wood and Keith Richards. Below, their engineer on Voodoo Lounge, Don Smith.

Looking Inside The Stones' Voodoo Lounge

by Blair Jackson

Whether or not you think the Rolling Stones are, or ever were, "The World's Greatest Rock 'n' Roll Band" (as they've been frequently tagged since the late '60s), you have to admit they are indisputably masters of a certain nervy ouevre. Charlie Watts may well be the best straight-ahead rock drummer ever; Keith Richards continues to amaze with his uncanny knack for coming up with those instantly memorable, always slightly off-kilter riffs loaded with rogueish character and ciggy-dangling-from-his-lips attitude; and whether in concert or on record, Mick Jagger never fails to transcend his occasionally cartoonish persona through a mix of energy, sheer talent and conviction. Frankly, I think it's amazing that 32 years down the line these guys can get together once every few years and even become the Rolling Stones again, with relatively little diminution of their skills or their essential spirit.

PHOTO: MICHELLE SCHWARTZ

If their batting average is not as consistent as it once was—has there ever been a run of albums by any band to match *Beggar's Banquet* ('68), *Let It Bleed* ('69), *Sticky Fingers* ('71) and *Exile on Main Street* ('72)?—at least the Stones can still be counted on to come up with a killer album every two or three times out, records that proudly carry their (ig)noble tradition forward for another couple of years. Their latest, *Voodoo Lounge*, is being hailed almost unanimously as their best since the group's Golden Age (or at the very least, since their last indisputed great LP, 1978's *Some Girls*), and I'd have to agree. (I will not, however, join the revisionists who are now knocking *Steel Wheels*, their previous album; I felt it was strong, too.)

Part of what I like so much about *Voodoo Lounge* is that it really sounds like the Rolling Stones together in a room just playing to their heart's content. It's casual without being sloppy—the aural equivalent of a snifter of fine cognac at 3 a.m. after a night of hard partying. There's a crackle in every drum beat, the guitars spill out of the amplifiers and playfully tumble all over each other, and Jagger throws himself into every sexual and sexist scenario with his usual mixture of cool aplomb and snickering braggadocio.

One almost instinctively hesitates to heap more praise on the already overhyped producer Don Was, but the fact of the matter is he has once again shown that he is nearly without peer when it comes to recognizing good, passionate

—CONTINUED ON PAGE 155

D'Cuckoo:
MAKING IT ON THEIR OWN TERMS

by Blair Jackson

In this age of do-it-yourself music projects, few bands have taken the aesthetic as far as the San Francisco Bay Area-based phenoms known as D'Cuckoo. The all-women, mainly percussion ensemble not only built their own electronic instruments—marimba-like units dubbed "turtles," which trigger voluminous samples of every sort—they constructed their own studio and then engineered and produced their latest album, *Umoja*, for the fledgling indie company RGB Records.

For live performances, the band carries its own lighting and video systems, the latter dominated by a sophisticated computer graphics setup. Then there is RIGBy, the group's digital face puppet, who appears on screens between songs at most gigs for real-time banter with the band or audience, and their popular MIDIBall, a four-foot plastic ball laced with assorted wireless MIDI triggers—as it bounces through the crowd, different samples are set off or some visual effect appears on a screen. This is a band with its feet firmly planted in the Age of Multimedia, with ever-increasing technical and financial demands constantly straining the group's limits.

PHOTO: EGON DUBOIS

L to R: Jennifer Hruska, Candice Pacheco and Tina "Bean" Blaine

Musically, the group plays an amalgam of styles, ranging from highly melodic Zimbabwean pop music to beat-heavy techno-funk. There's a hip hop influence here, some obvious Middle Eastern and Southeast Asian roots over there, taiko drumming choreography on this number, and even a version of the

—CONTINUED ON PAGE 158

Bewitched by Luna

by Camran Afsari

"We didn't want to ask Lou Reed to play on our new record [*Bewitched*] because we thought that would be a bit much," says Luna bassist Justin Harwood, recognizing full well that the band has often (and rightly) been compared to Reed's seminal ensemble, the Velvet Underground. "But [the Velvets'] Sterling Morrison was an unsung hero to us—he's a great guitar player, and he was delighted to record with us. We flew him to up New York, put him up in a hotel and gave him lots of money. He brought an old Fender Jaguar, a Vox amp and a TC Electronic footpedal chorus with a parametric EQ. He was nervous, but he just sat on a chair and started playing along to 'Friendly Advice.' It was amazing standing there listening to him play; all of a sudden, the song became very special to us, because it had this Velvet Underground element to it."

PHOTO: MICHAEL LAVINE

Luna is (l to r) Justin Harwood, Dean Wareham, Stanley Demeski and Sean Eden (not pictured). Above: Victor Van Vugt, Luna's engineer and co-producer.

As it turns out, Lou Reed himself is a big fan of Luna (which also includes singer and lead guitarist Dean Wareham, guitarist Sean Eden and ex-Feelies drummer Stanley Demeski) and even offered the group the opening slot on the Velvets' 1993 summer reunion tour of Europe. When he first got the call about the tour, Wareham thought it was a joke; the pairing was too perfect. But Luna ended up traveling with their heroes (Reed, Morrison, John Cale, Moe Tucker) for about a month and became particularly friendly

—CONTINUED ON PAGE 153

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—FROM PAGE 152, THE ROLLING STONES
performances and offering intriguing arrangement ideas. There is a naturalness to the sound on this record that stems from the band's obvious comfort with both their producer and the material. There's nothing labored, forced or mannered about it: This is a band on a roll having a good ol' time.

It was Jagger who initially suggested hiring Was to work with him and Richards, but they all agreed that the sound model they would use for the record was Keith's excellent first solo album, *Talk Is Cheap*, which was engineered by Don Smith (who had been seriously considered to work on *Steel Wheels*, too). Smith and Was had already worked together on a couple of projects, including Iggy Pop and Roy Orbison (with k.d. lang), so they had an established rapport. With the team in place, Mick and Keith flew to Eddy Grant's studio on the isle of Barbados for a concentrated writing session (much as they did with *Steel Wheels*). Together, they worked up more than 50 songs (or at least 50 grooves). Then they convened for rehearsals with Charlie Watts, Ron Wood and new Stones bassist Darryl Jones (Bill Wyman called it quits, you'll recall, and was replaced by the Miles Davis alumnus after a widely publicized search) at Ron Wood's rural estate outside of Dublin before tracking began in earnest at Windmill Lane Studios in that city.

Although Smith worked on three Richards records over eight years, he is the first to admit that getting the call to do a Rolling Stones album "was obviously incredibly exciting. Fortunately, I was so busy I didn't have a lot of time to think about it. It wasn't until we all got in the same room together and they started playing and you hear that sound that Don and I kind of looked at each other and said, 'Aaaugh! Holy shit! It's the Rolling Stones!'" he says with a laugh.

"I mean, I carry their records to other sessions I do," he continues. "I'll use *Beggar's Banquet* or *Sticky Fingers* or *Exile on Main Street* to get sounds; those are standards I sometimes use. So it was a real thrill to be in there with them and for them to be sounding so good. When we went over to Ronnie's house, and they played us a bunch of the songs, I knew right away this was going to be a great record. They were all really excited about it, and that got us even more excited."

Smith says that Was played a pivitol role in shaping the sessions by taking so much interest in the material and helping Mick and Keith find and polish the pearls among the huge batch of new songs. "Don did everything from helping to keep the peace to making very specific arrangement suggestions," Smith says. "Mick and Keith are really into jamming; that's one of the ways they come up with songs—they'll have these eight- and ten-minute jams and grooves, and Don would go in there and try to figure out more concise song structures for them. But there was no hard and fast way they worked together. It seems as though every song had its own approach."

"It was funny—when I was mixing the record, I might find an old Stones song that was in the vein of what I was mixing, so I'd listen to refer to it. But I got caught one day by Mick: 'Hey, what're you listening to *Beggar's Banquet* for?' Usually I'm using a Stones song to mix somebody *else's* song." —*Don Smith*

If there was a governing principle guiding the sessions, it was, at least initially, to record as live as possible in Windmill's big room, even with Mick in the thick of things laying down his vocals (some of which were never improved upon). "We weren't trying anything fancy," Smith says. "With Charlie, I think we started out with just three simple mics on his kit and a couple of [Telefunken 251] overheads. With Keith, we'd put a 57 and maybe a 451 on his old 1957 Fender Twin, and then we'd also mic another amp, too—anything from a Champ to an old Bandmaster, an Ampeg V-4 or even this tiny Marshall we'd used on his second record that has like 10 watts and you turn the knobs up all the way and it makes this wild sound. Use 20:1 compression on it and it gets pretty weird! Keith likes that kind of stuff, and actually it's a lot of his sound—these funky old distorted amps.

"Depending on the song we used a lot of natural distortion on Darryl's bass, too. Typically, we'd use a DI plus an SVT, or maybe a B-15. On some of the rockers, we'd turn up the SVT to distort but then keep the DI clean, so you'd get an interesting combination."

One of the album's real revelations is Ron Wood's steel guitar and lap steel playing. For album after album, his parts have been difficult to discern in the mix, but on *Voodoo Lounge* his languid slide and steel textures dominate several songs. Comments Smith: "There are five guys in this band, and Don and I wanted to hear them all whenever we could. Ronnie did come up with a lot of really imaginative parts this time around, and the stuff he was doing really seemed to fit in well with the mood of things." Miking on Wood was generally straightforward, with minimal processing as needed. The album's other (perhaps) unexpected star is veteran keyboard ace Chuck Leavell, whose lines enliven every song on which they appear. The Stones could not have found a more sympathetic replacement for their late, lamented mate Ian Stewart.

Like *Sticky Fingers*, this is an album filled with little touches that insinuate themselves into your brain: the fiddle part on "The Worst," Flaco Jimenez's rich accordion on "Sweethearts Together," the peppery Stax horn blasts on "Brand New Car," Leavell's "Lady Jane"-ish harpsichord on "New Faces." "Plus, of course, there's a lot of stuff going on in the tracks that people will only hear when they listen to it more closely," Smith says. "Like an acoustic guitar line or something. Keith will say, 'I don't want to hear the acoustic guitar, but I want to feel it.' So you pull it back on the track until you don't really *hear* it, but you sense it. The Stones have always done things like

that on their records. It's one of the reasons you can listen to them over and over again. They sound simple, but there's actually a lot going on."

The greatest departure on the album, both in terms of the way the band sounds and how the song was recorded, came on "Moon Is Up," a slinky swamp rocker that would sound right at home on side four (a.k.a. "the weird side") of *Exile on Main Street*. By that point in the sessions, Was and Smith had already begun experimenting with Charlie Watts' drums by occasionally putting them in the bottom of a square cement stairwell at Windmill Lane ("We'd throw a few cables over the railings and yell, 'Whenever you're ready, Charlie!'" Smith says), but for this track they went even further: First they tried having Watts beating on some tape boxes, but that wasn't quite right, so they settled on a trash can on its side in the stairwell—"It was perfect!" Smith crows. Add to that an acoustic guitar put through a Leslie, a surreal wah-wah pedal-steel line by Wood, Chuck Leavell on harmonium and Jagger singing through both a regular mic and a distorted bullet (harmonica) mic, and you've got one of the strangest Stones tracks in many a year.

"I think in some ways, that song turned the album around," Smith says. "We'd been going fairly straight-ahead, and then we did that and it was like, 'Oh, we can experiment!' After that, we started doing more weird stuff and also taking a little more time getting sounds. The way they usually like to work is to come in and just start playing, so you usually don't have the luxury of spending a lot of time getting sounds. But with 'Moon Is Up' we definitely took the time."

The most "produced" (in the traditional sense) track on the album is probably "Out of Tears," a classic Stones ballad that skillfully juxtaposes a lush string arrangement by David Campbell, a wicked slide guitar part by Wood and layered keyboards by Leavell and Heartbreaker Ben Tench. "I think the most effects I used on any song was on 'Out of Tears,'" Smith comments. "On that one I decided to cop some of the feeling of 'Imagine' by John Lennon. I was trying to make it sound a little more in the living room, or a little more personal, and I ended up putting some slap-back on all the drums, and then on the whole track, and it gave it that John Lennon-Phil Spector kind of sound. What it also did was make it sound a lot less grand, which was the way to go with that song."

Was, Smith and the Stones tracked 33 songs over the course of six weeks of recording at Windmill Lane, a schedule Smith says "wasn't too bad, really. There were a few long days, but we still took weekends off. I've been through harder sessions." When it came time for Smith to mix the tapes, "We talked a lot about the sound of Keith's first solo record," he says. "We'd mixed it on this custom-made Neve console—there were only three of them built, and they were all built for George Martin: two were in Air London and one was Air Monserrat. Well, one of Air London's went to Atlantic in New York way back, and that's what we mixed Keith's first solo album on. The one from Air Monserrat went to A&M in Hollywood, so we decided to mix there. It's a great room, it has all the services we need, all the outboard gear you could possibly want, even the cost was good. It's one of the best-sounding boards in the world."

In the end, Smith mixed 17 of the 33 songs recorded, and 15 made it onto the album (the other two will undoubtedly turn up as B-sides). Typically, Smith would work up several different versions of each song for Jagger, Richards and Was to approve. "We might have the vocals up on one version and more in the back on another; or more prominent bass," Smith says. Jagger, he notes, was often quite specific about what he wanted to hear: "He might occasionally want a snare drum up a bit, or more bass, or he'd think a guitar part was maybe panned too much, so bring that in a bit. He knows what he's doing.

"It was funny—when I was mixing the record, I might find an old Stones song that was in the vein of what I was mixing, so I'd listen to refer to it," Smith continues. "But I got caught one day by Mick: 'Hey, what're you listening to *Beggar's Banquet* for?' Usually I'm using a Stones song to mix somebody *else's* song. I use the Stones to keep from getting too slick on anything: I'll put on *Exile on Main Street* or *Beggar's Banquet*—okay, here's what rock 'n' roll is supposed to be about!"

At the same time Bob Ludwig was mastering *Voodoo Lounge*, Smith was beginning work on another project with the Stones—remastering some of the group's albums from the early '70s. "I remember I went in with Mick one day, and he said, 'Check this out, it's a new mastering on *Exile on Main Street*. I said, 'I know that record!'" Smith relates with a chuckle. "So he put it on and it was like, '*Nope*, that isn't any good. It was way too hi-fi, way too bright. So over a period of time, I went out and found all the best early pressings I could find of *Exile* and all those records they were re-doing. I knew Bob Ludwig was going to have a tough job to do because we were going to digital, of course, and none of the original equipment this music was done on is still in existence.

"Mick, Keith, Don and I sat down one night and listened to a really good pressing of *Exile on Main Street*—the whole thing, all four sides. They hadn't listened to it like that in 20 years, and it was just a mindblower. Mick and Keith were teling stories about every song—that really made my year. I said to them, 'When you made the record, *this* is what you approved at the time. I think it should sound like this on CD.' Well, it took a long time to get today's technology to capture how exciting and energetic that old record was. I don't know what Bob Ludwig did exactly. He'd send us tests and we'd say, 'Nope, not quite,' and he'd tweak something and try it again. And finally he did it. Those records sound as good as they're ever going to. There's a level of detail in them that's pretty amazing, but it's not too clean."

At the close of his Stones recording and remastering marathon, Smith rewarded himself with a nice vacation; then it was back to work—this summer he produced The Rembrandts' new album, and he is planning to go into the studio with John Hiatt in the fall. In a career that has always been on an upward swing, Smith has worked with some of the most interesting bands in the business. But he is the first to admit that recording the Rolling Stones was a high-water mark. "I never dreamed I'd ever even meet these guys, let alone make a record with them," Smith says. "My thing was that I didn't want any slickness. I wanted it to be the basic raw Stones that

everybody loves and that I love. I know Don wanted the same thing. What we discussed is, we just didn't want to screw it up; that was our biggest concern. I wanted it to feel like the old thing but not sound dated. I wanted the feel and the rawness of the old records, but it had to have a little high-end and '90s energy to compete on the radio with everybody else. And I think we got that. It's a cool record." ■

—FROM PAGE 153, D'CUCKOO

Stones' "Ruby Tuesday" thrown into the (melting) pot. Many would call them World Beat for lack of a better term, but even that broad term sells their eclecticism short. Their far-reaching roots in different world-music traditions are part of what makes them unique, but it may also prove to be the stumbling block they will have to overcome to move from a band with a buzz surrounding it to a nationally (or internationally) popular act. Is the mainstream ready for an Anglo-Swahili-Rai-Shona-rock fusion?

For a band that plays very few traditional gigs—the complexity of their live operation makes playing the club circuit financially unfeasible, and they're not well-known enough to play theaters—D'Cuckoo certainly have benefitted from an avalanche of good Industry word-of-mouth and press coverage. They've taken their highly entertaining and energetic show to the Gavin (radio) Convention, NARM, SIGGRAPH and private corporate parties galore, and along the way made friends in high places who've helped propel the band forward financially or aided in stretching their artistic vision.

For instance, much of the gear the band used to record *Umoja* (the Swahili word for "unity") was loaned or donated by corporations. "We've been around for a while, and people like what we're doing and want to help us out," says Candice Pacheco, who co-founded the group back in 1986 (with Tina "Bean" Blaine and Patti Clemens, who has since left the group) and serves as the band's principal composer, singer and instrumental soloist. "I don't think these manufacturers are expecting great returns from it necessarily. They say, 'Look, use these and if you like them, use them and tell people you like them.' So we do that, and we also do things like play shows for companies in exchange for equipment." The bottom of the back cover of Umoja is littered with the corporate logos of companies: AKG, Bryston, dbx, Emu, Kurzweil, Lexicon, Mackie, Meyer Sound, OSC, Silicon Graphics, Spatializer and Zoom. These women do sincerely sing the praises of one and all, too.

And it's not like they're hitting up Solid State Logic for a G Series console with Ultimation. No, in keeping with their DIY approach, D'Cuckoo have set their sights considerably lower. The band's spacious studio digs in an aging Emeryville (between Oakland and Berkeley) warehouse could charitably be called "funky." The huge main recording room, with its 25-foot ceiling, doubles as a rehearsal space and is dominated by the bandmembers' "turtles" and some of their live sound equipment. The control room next door is also airy and high-ceilinged. With only a minimal nod to acoustic principles and no thought whatsoever to aesthetics, the room is not about to challenge nearby Fantasy Studios, but it has served them well, "and you should have seen where we did our last album," Pacheco says. "This is like heaven compared to how we've worked before. Before, we used a Yamaha monitor board with no faders that was literally in a garage. This is not a perfect room by any means, but it's worked out well so far."

Although the control room is centered around one of the new 8-bus Mackie consoles, the album was cut using three Mackie 1604s (with MixerMixer), an Alesis ADAT recorder, Meyer HD-1 monitors, and a small but more than adequate complement of outboard gear, most notably the Lexicon 300 (V3). Actually, since so much of the band's music is MIDI-based, the particulars of the studio were less important than they might be to other groups. Even so, Pacheco says, "We were always having to work around all this construction going on in the area; not to mention the trains that go by all day and night. We'd come in to record our vocals at two in the morning, and even then there'd be some 60-cycle hum we'd have to go track down a few blocks away where somebody was working."

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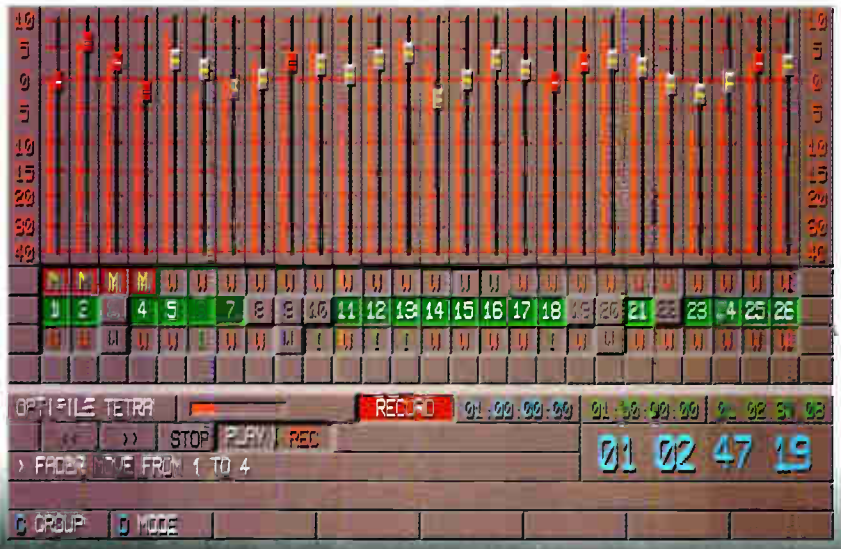

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According to Jennifer Hruska, who joined the band about a year and a half ago after a long tenure doing sound design and sampling for Kurzweil (with whom she retains an affiliation), "We really pushed the edge on this production because we had the [Mac] ci, no fast cash [accelerator] card or anything like that, and off of that we were running DECK II beta software, SampleCell—which Candice uses extensively—the sequencing program and many, many virtual tracks. All that was running on the Macintosh and, of course, we were SMPTE'd up to the ADAT and running seven tracks there, plus sending MIDI program changes out to effects. It was pretty loaded down. It probably took us a little longer because of all the MIDI and this technology that's not even quite there yet, but it was fun pushing the envelope.

"There was a lot to juggle on the recording end," she continues. "We had sequencer tracks, MIDI info and then we'd overdub any mic tracks—percussion, guitar, bass—and then we'd track vocals. Since we only had seven tracks of ADAT, we'd track things onto ADAT, then dump it down to DECK, then track more things to ADAT and also track onto DECK, and then sync all that stuff up." Although Hruska says the ADAT format worked well for this project, "since then I've A-B'd it with the [Tascam] DA-88, and I prefer that—it's much more present and transparent."

It's difficult to peg exactly how long it took to bring *Umoja* to life. Putting the studio together and getting the equipment needed to record the album took nearly a year. Pacheco spent several months "getting sound sources together," she says. "Composing is a breeze for me; the real work is getting the right sounds. Everything is so sample-based it becomes like getting a palette together."

Mixing and overdubbing took another three months. Says Hruska, "One of our biggest challenges was trying to maintain a lot of separation in the mixes because the tunes themselves are very dense and we don't have the greatest listening environment here. So you do that through EQ, and we had the Spatializer, which helped a lot. It's subtle, but we did mixes without the Spatializer and some with it, and you could definitely hear the difference. We would do things like take six vocal tracks and just run a couple of them through Spatialization and then let the others bypass it, and then mix the two together. By doing that we got a really full vocal sound, but it wasn't *too* much. We tried it the other way and it sounded very strange."

She adds, "We were able to automate everything except our vocal tracks. Because the bass and guitar parts were sitting in DECK, we were able to automate that. You can automate all your synths, of course. And you can automate all your effects changes in MIDI. But the vocal tracks were all over the place," she laughs. "It really took two of us and sometimes three of us just to mix those seven tracks."

But the end result is often quite stunning. The tight vocal blend is stirring and anthemic in places, angelic in others, and the music as a whole has a lot of the drive of a D'Cuckoo performance. *Umoja* ends up being a sampler of most of the styles this band tackles; in live performances, their African roots tend to dominate more.

"My introduction to this kind of music was in Africa," says Bean. "People would take banana tree

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Ah, decisions, decisions. You want to buy a new multitrack recorder, and you want to go digital so that you'll get the best possible sound quality. And you'd like to buy a hard disk recorder, rather than tape, so you can get random access editing power. And finally, it's got to be something you can really afford. But there's a problem.... don't all hard disk systems require expensive add-in hardware and software, to already expensive computers? Not anymore!

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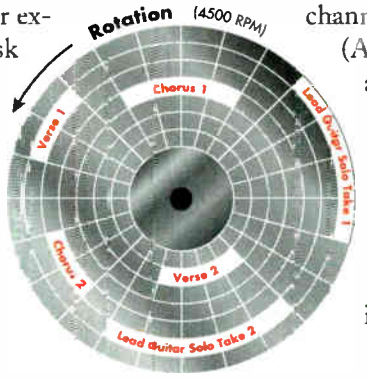

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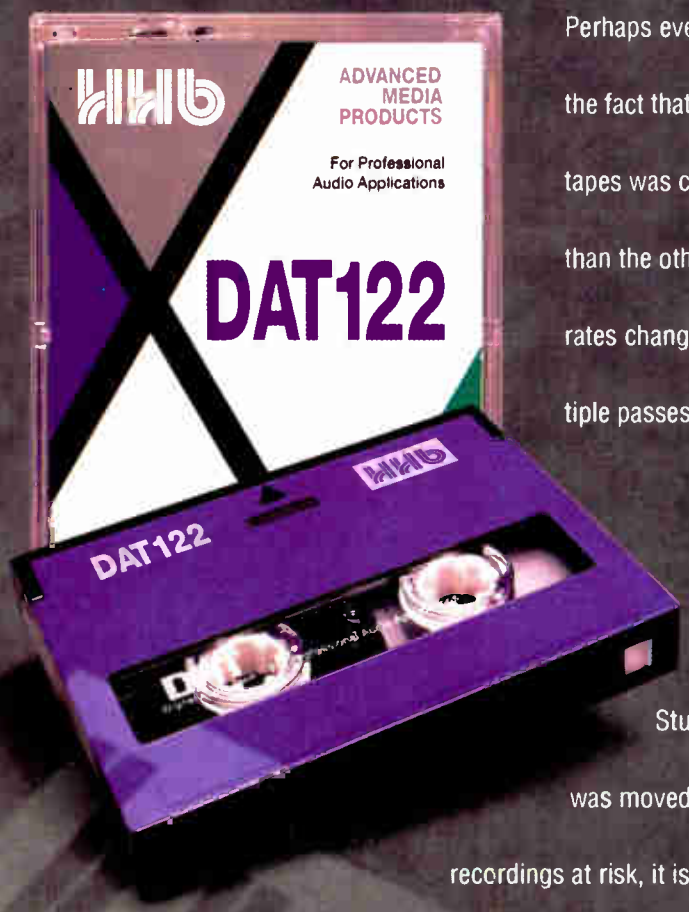

In the critical area of block errors, the tapes fell into two distinct categories of performance. Three exhibited similarly low error rates with the others presenting error levels considerably higher. HHB DAT Tape was one of the leading three.

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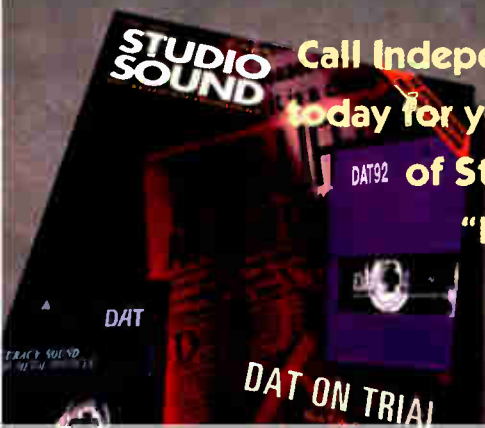

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trunks and take slabs of wood that weren't even tuned and hold them in place with little pieces of wire, and then eight or ten people would stand around and bang on it, and it would sound amazing. If we tried to do that here, I don't think there would be much of a market for it. But I like to think our music still has some of that spirit. It's music that makes you feel good."

"As a composer, I just keep trying to do new things," Pacheco says. "There's no master plan behind what I do; I just do whatever inspires me at the moment. This [*Umoja*] is just what came out this time. What comes out next time will probably be very different. I have no idea whether any of this is 'commercial.' That's so subjective. I suppose if we want to be commercial, we should start writing a few grunge tunes.

For now, the members of D'Cuckoo seem content with the unrothodox road they're taking. "Most bands that sign with major labels go nowhere," Pacheco says. "They end up on a shelf or massively in debt. They can't go to another label because the other label doesn't want to buy them out. So a lot of bands just get stuck; their careers get halted. That's really the worst."

"We're looking for alternative roads," Hruska adds. "Basically, we're trying to get power back to the artists because the industry has taken so much of their power away. That major label game—trying for that hit album—is such a ridiculous fantasy. So we have to be creative. But we're looking at it as a long road, and we're in it for the long haul." ■

—*FROM PAGE 153, LUNA*

with Morrison. The Velvets' volatile reunion ended up being short-lived (it did produce a fine album, *Live MCMXCIII*), but Luna has thrived in the year since, carrying on the VU tradition at the same time they move beyond it.

The New York heritage of the band goes back to 1977 when, at the age of 12, Wareham moved to Manhattan from his native New Zealand. (Harwood also hails from a suburban strip of New Zealand's north island.) In addition to the Velvet Underground, bands such as Television, The Feelies, Dream Syndicate and Joy Division made a strong impression on Wareham during his

high school years in New York. In 1987, after graduating with a sociology degree from Harvard, Wareham took to pouring moody Tom Verlaine guitar swirls into his first band—the obviously Velvets-inspired Galaxie 500. That group broke up in 1990, but Luna retains most of the same musical influences, without G-500's gloominess. Luna's songs still sometimes veer off into some bizarre thematic terrain, but the approach is poppier than the former band's.

Wareham and Harwood do most of the songwriting, composing at their respective home studios using 4-tracks and drum machines. But, says Harwood, "it's pointless to spend a lot of time making a perfect drum pattern when you've got Stanley [Luna's drummer]. He'll play along differently when he first hears it anyway."

Australia-born Victor Van Vugt was Luna's choice to engineer and co-produce *Bewitched*. Now living in London, Van Vugt was commissioned because of his engineering work on *The Good Son*, a fine record by another Australian, Nick Cave (& the Bad the Seeds). Harwood says, "We had lunch with a few people, but Victor was the nicest and happiest, the youngest and the only one who didn't say, 'Of course, there's only *one* way to do this.' "

The 30-year-old Van Vugt has shown little interest in mothering sounds out of the bands with whom he works, which is just fine for an outfit like Luna, where, for example, Wareham has developed a distinct tonality over the years. "I think the next hardest thing to learning how to play guitar is learning how to coax a decent sound out of an amplifier," Wareham notes. "The amp is as big a part of the sound as the guitar."

For his part, Van Vugt says he is surprised at how few musicians concentrate on their *source* sound (instrument), instead hoping that the engineer might be able to doctor it into some form they've imagined. He says, "On drums, so many times I've been asked by some guy who has a tiny little snare drum that he wants that 'Born in the USA' snare sound! Sorry, I can't do that. I'd be better off triggering a sample. If you have a good guitar, through a good amplifier, and a properly tuned kit, then you're halfway there."

All tracking for *Bewitched* was completed at Right Track Studios in Manhattan on a Studer 800 24-track and an SSL E Series console with G Series inputs. The basics were recorded live for seven of the ten songs. Then the overdubs, vocals and mixing were done at RPM Studios in New York on a '70s Neve 8068 console and another Studer A800.

Demeski used Pearl and Premier drum kits, interchanging between sticks, brushes and Blasticks. The snare mics were an SM57 (top) and a Beyer 201 (bottom), 421s on the toms and a U47 for the bass drum. Eden's guitar rig included a Les Paul, a Jazz Master and a Jaguar. Wareham played a Gibson J100 acoustic, a Gibson 335 for the rhythm tracks and a Les Paul for leads. Harwood's bass is a '63 Fender Jazz through a Mesa Boogie 400 and a 4x10 cabinet. The amps shared by the guitarists included a Vox AC30, a Matchless, a THD Bassman, Fender super reverb and a Fender Deluxe. The guitar amps were close-miked with an RCA77 ribbon, with a U87 at a distance. The acoustic guitar was close-miked with an omnidirectional B&K 404 augmented by a U87 overhead, both piped through a UREI LA3 "just lightly touching," according to Van Vugt.

An AKG C24 stereo mic in front of the drums and a spaced pair of U87s off to the side were used as an ambient mic matrix. A submix of these four signals was sent through a pair of UREI 1176s. Van Vugt comments, "We got that thick drum sound with the C24, while the U87 gave a much thinner and airy sound. On the quieter songs with brushes, we moved the room mics back several feet to get a much lighter ambience."

At RPM, the guitar and vocal overdubs were recorded using the same ambient mic array. Wareham's sleepy, boyish croon was captured with a Neumann TLM 170, then sent to a Fairchild 670 compressor. Before going to tape, the mix was fed through an EMT gold plate reverb and some more Fairchild compression. The songs were saved to DAT and to a Studer A80 ½-inch, 2-track; mastering engineer Bob Ludwig decided to use the analog media as master.

The next stop for *Bewitched* was Elektra Records' offices, where it was accepted without modifications and released in the late spring of 1994. The album has sold fairly well since then, and a supporting tour has spread the word. ■

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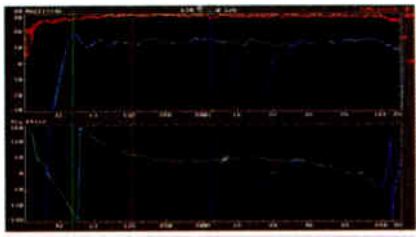
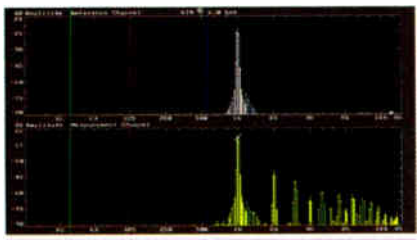


Speaker response vs. same speaker with polarity reversal.
Top: Amplitude response. Bottom: Phase response

Harmonic distortion

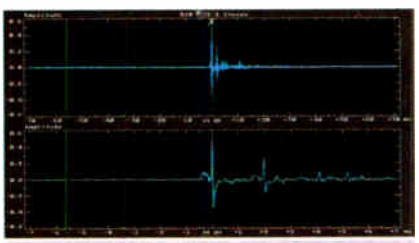
adds unwanted spectral coloration to your audio signal, and once introduced, is almost impossible to remove. Whether caused by component degradation or by gain structure mismanagement, SIM can detect and measure distortion in any system component, allowing an operator to quickly focus on and minimize the sources of distortion in the system.



Harmonic distortion in a loudspeaker:
Top: Input spectrum 1 kHz tone
Bottom: Output spectrum 1 kHz tone with distortion

Measuring delay times

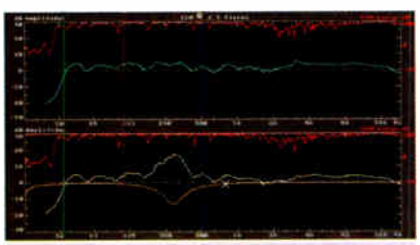
is impossible with most audio analyzers. More often than not, delay times end up being set through trial and error, and a whole lot of running around. SIM can measure the time offset between speakers and give you the delay times you need ***within ±.02ms***. Moreover, the whole process typically takes less than 5 seconds.



Delay finder function:
Showing a non-synchronous arrival from two speakers.
Bottom shows 10 times magnification of top.

System Equalization

can be a painstaking, and often frustrating, process. With SIM however, you can view the peaks and dips in your speaker system's response from 8 Hz to 22 kHz with ***1/24th octave resolution***. By measuring and displaying the response of the speaker system and the equalizer simultaneously, SIM can quickly and accurately get you to your desired system response.



Complementary Equalization
Top: Resulting system response. Bottom: unequalized speaker response (white) and EQ response (orange).

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by Barbara Schultz

SIMON GARBER

Left: Technical director Tim Lewis setting up a speaker. Below: Chief engineer Simon Garber and assistant Marc L'esperance at CBC Studio 1, choir recording.

SYMPHONY OF SOUND AND LIGHT

A CAPITAL IDEA IN OTTAWA

by Simon Garber

Imagine yourself on Parliament Hill in Canada's capital, Ottawa. It's summer. The air is dark and soft, the sky bright with stars. And there is music—the cold, clear music of the wilderness, evocative of Canada's beginnings. This is "Reflections of Canada," a sound and light show that translates the history of the country into lights, voices and music. It took more than 300 people over two years to develop this project. My role was that of chief audio engineer.

Every evening at six o'clock, from Victoria Day in May to Labor Day weekend in September, operators begin placing the eight Meyer UPA-1s in a semicircle, on 8-foot poles about 60 feet apart, along with two Meyer 2x18 subwoofers. By 7:30 p.m., the bleachers are in place. By 8:00 p.m., all systems are tested and traffic is rerouted away from the streets adjacent to Parliament Hill. At 9:00 p.m. it's showtime. Two shows a night—one in English and one in French—for a total of 180 shows, will entertain anywhere from 120,000 to 150,000 people during the season. As in past years, half the audience is expected to come from outside the Capital region, and more than one

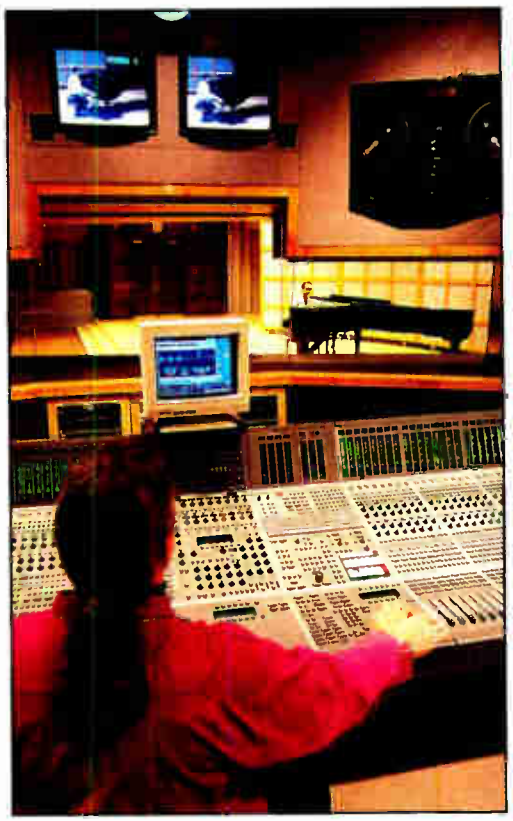
—CONTINUED ON PAGE 168

Glenn Gould Studio

The Canadian Broadcasting Centre, Toronto

In fall of 1992, the Canadian Broadcasting Corporation began settling into its new headquarters, which take up 14 floors on a square block of downtown Toronto. One of the first rooms to see work at the new facility was the Glenn Gould Studio, named for Canada's premier concert pianist. Gould, a prodigy who began playing concert halls at the age of 13, recorded more than 50 albums during his career (available on Sony Classical). Glen McLaughlin, the studio's technical director, describes the facility's inspiration as "considered by some to be an eccentric. He wore a hat and coat and gloves even in summer, and he did most of his work through the nighttime hours." But Gould had a long, productive, multifaceted relationship with the CBC, beginning in 1950: he gave recitals and played with ensembles and symphony orchestras for live radio broadcasts, produced a series of documentaries during the '60s and '70s and served the network as a resident expert on musical history and theory until his untimely death at age 50 in 1982.

The facility named for Gould is used for many of the CBC's recordings and live performance broadcasts, and for commercial projects. The studio, which measures 60 feet by 90 feet with a 35-foot ceiling, is a contemporary version of European "shoebox" concert halls. Paul Mills, head of the CBC's Network Radio Production Centre, says, "The interior design of the hall echoes the architecture of the building which houses it. The 'super grid' on the walls is interrupted by angular and cylindrical shapes of different colors and textures. These design elements break up and diffuse reflected sound waves, resulting in a smooth and pleasing reverberation." The construction materials used for this studio are mostly wood (floor, stage, seats and decorative treatments) and plaster (walls and ceiling). According to Mills, "The absorptive and reflective properties of certain components have been adjusted to fine-tune the room. The result is a warm and resonant sound that rivals the world's best small concert halls."



MICHAEL PARTENIO

This room was completed soon after the CBC relocated, and the control room, adjacent to the studio at stage-left, was not far behind. But, according to McLaughlin, the network's pressing schedule and major commercial projects—including a portion of the soundtrack music for *Schindler's List* recorded by the Toronto Mendelssohn Choir—forced a hasty completion of the control setup. "There was not enough time to fully test all the parameters associated with the control room acoustics and complete the install of a completely digital control room of this caliber before once again being pressured back into service for a further successful year of activities," McLaughlin says. So this year, the facility's design engineers dedicated the entire month of August to reconstructing the main control room and two rear equipment rooms.

The control room redesign was handled by Terry Medwedyk of Group One Acoustics Inc. (Mississauga, Ontario). Medwedyk explains that his task was to "provide a more linear frequency response, uniform RT60 through the frequency bands, improve sonic imaging and detailing and enlarge the listening window in the area of the console." To achieve these goals, Medwedyk specified the lowering of two thirds of the control room ceiling and the insertion of a series of acoustic modules for diffusion and absorption. "The rear wall was perforated, where possible, to increase the acoustic depth up to five feet, and also exposed sufficient cavity space to control low-frequency damping," says Medwedyk. In addition, the rear wall contains a series of tunable modules, the monitor plenum facing was reinforced, and the speaker cabinets were refocused and isolated from the structure on 2-inch pads.

The redesigned control space is built around a brand-new Neve Capricorn console with 96-input capability. McLaughlin says that the studio staff has worked closely with Neve on the debugging process for this model and that they're extremely pleased with both the company's responsiveness and the console. Other equipment specific

—CONTINUED ON PAGE 195

—FROM PAGE 166, SYMPHONY OF SOUND

third from abroad (15% from the United States).

The audio playback system starts with a Tascam DA-88 digital 8-track recorder with an SY-88 time code card chased by a PC running Cakewalk, which in turn controls the synchronized lighting system via MIDI messages to a DMX controller. Audio is fed directly to UREI 535 octave-band equalizers, a 360 Systems AM16-B audio crosspoint switcher (for loudspeaker assignment), eight Bryston 4B power amplifiers pushing the UPA-1s and two QSC EX-1600s driving the subwoofers.

THE PRODUCTION

"Reflections of Canada" required a number of interrelated elements, woven together into a 43-minute seamless production. Like a symphony, film score composer J. Douglas Dodd's creation has three movements, each with a different theme and mood, each focusing on a different period of Canadian history. In colloquial terms, the *bed tracks* are the 61-piece Vancouver Symphony Orchestra; the *background vocals* are the Vancouver Men's Chorus, the Elektra Women's Choir and the Vancouver Children's Choir.

DAVID KELLY

Vancouver's White Line Mobile

Resting on top of this are about 20 actors portraying the voices of ordinary Canadians from Canada's past and present, telling their stories (penned by producer Lindsay Bourne) with dramatic intensity, from their diaries, letters and conversations. And to top it off, award-winning filmscore composer J. Douglas Dodd featured traditional instruments such as pipa and erhu (China), classical guitar, mandolin, electric guitar, violin, bagpipes and drum, spoons, sax, penny whistle, voice, native drum and a transparent touch of synthesizer.

Vancouver's Stellar Productions, along with the National Capital Commission, defined the scope of the project. Bourne's desire to keep every door open in this production encouraged the engineering team, including Charlie Knowles, assistant Marc L'Esperance and me, to examine new, appropriate technology—technology that didn't even exist when the budget was drawn up three years ago. The Alesis ADAT's ability to slip pieces in time, keep multiple performances, move to different studios and keep tape costs under control were mighty attractive. So ADAT tape became the medium of choice.

THE VOICES

The first step was to record the dialog tracks to DAT at Blue Wave's Studio C in Vancouver. Dodd's score is tied directly to the script and the delivery, so this was a natural first step. All dialog had to be recorded in both English and French, so the production team was almost as large as the acting pool. Language issues played an important part in the direction of

the entire production. The mix may have been a little simpler had the French and English deliveries been exactly the same length. However, differences in script and performance would still have required different music mixes for each language.

THE ORCHESTRA

Orchestras seem to be most comfortable at home, so we recorded in their living room—Vancouver's 2,800-seat Orpheum Theatre—with David Kelln's Vancouver-based White Line Mobile. We had very little rehearsal time and no time to experiment with mic choice or placement. Normally I might record an orchestra with six or eight mics, but the production required the ability to select specific instruments and pan them to any of the eight speakers. So we went with 40 mics; half of them were AKG C-451s, and the rest were an assortment of C-414s, Neumann U87s and KM84s, Sony C-38s and a 969 stereo, Sennheiser MD-441s and MD-421s, and an AKG C-426 stereo mic. All were mixed through a Soundcraft 6000 and an auxiliary Mackie 1604 to 21 ADAT tracks (3 machines), plus two tracks for an additional AKG C-426 stereo pickup and one for click. The Otari MTR-90 24-track that lives in the bus sat on standby.

The next step—head back to my home base, Goldrush Recording Company's (Vancouver) editing suite, to make clones. You can't overdo cloning. Every time you see "Error on Machine 3," you bless your little clones. Some masters that displayed a lot of errors spawned faultless clones.

Our next task was to create an edited sequence of the orchestral score onto four tracks of an ADAT in A/B roll fashion. The C-426 stereo tracks were sufficient for cueing purposes so a pre-mix was not necessary (yet). The score embodies an overture, 11 stories, a finale and the national anthem, "O Canada," each of which was recorded separately. All the elements are linked together with the "traditional instruments" or reverb. Therefore, everything overlaps in one way or another. Hindsight being 20/20, we later realized that this step would either determine the frozen time relationship between segments or cause somebody's nose to be buried in the Frame Master Plus Time Code Calculator (I heard they stopped making them—pity) to recalculate offsets later on down the road.

Next—make clones.

Up to this point, Dodd had been scoring and arranging with his home studio, which included an E-mu Proteus 2, Cakewalk for Windows sequencer and the dialog tracks. Now he could replace the synth orchestra-in-a-box with the real orchestra performances and lay them up on his old reliable 1-inch Scully 280 8-track.

THE CHOIRS

The choirs demanded a room large enough to accommodate more than 100 bodies (with a live, acoustic environment that would allow the singers to be comfortable) and controlled enough to minimize leakage of the studio playback of the orchestra tracks. The choirs all voted for CBC's (Vancouver) Studio 1. Who were we to argue?

We arrived with our ADATs. I chose to record the choirs with eight microphones—two B&K 4011s, four B&K 4006s, and a stereo Soundfield mic through John Hardy M-1 preamps patched directly to one ADAT. We monitored through CBC's soon-to-be-replaced Ward-Beck desk. First, the children's choir and soloists were recorded on one machine followed by the mixed chorus on another, while a third was playing back the orchestra lay-up tape. The children's choir was recorded at zero offset to the orchestra tape, which was at zero offset to the BRC (Big Remote Control—cool acronym). When it came time to record the mixed chorus, we wanted to be able to keep a take and do another. Also, the choirmaster, Willi Zwosdeski, elected to record the pieces out of sequence. So I decided to record them sequentially on the tape. This meant that each choir selection would have a different offset to the master machine. The plot thickens. The next day we were back at Goldrush making more clones.

THE TRADITIONAL INSTRUMENTS

It was easy to choose a studio to record the traditional instruments. Mushroom Studios (Vancouver) is a favorite tracking room in this neck of the woods. It's been my first choice for over 20 years; it's where I got flung into the pit as staff engineer in the early '70s. The main room will accommodate a 40-piece orchestra, and it complements acoustic instruments

well. Thirty Universal Audio tube preamps still heat the room, and there's an ample selection of vintage microphones. The custom Altec 604E/Mastering Lab monitor system has always been my point of reference.

We got smart and recorded the traditional instruments at zero offset to the master. Since each segment only used a couple of tracks, we were able to allow multiple takes painlessly. In order to preserve the ethnic integrity, some of the musicians, such as Qiu Xia (pronounced *chiu sha*) on pipa and Shirley Yuan on erhu, collaborated with Dodd for a story about the mass immigration of Chinese to build the railroad across Canada. They worked so well with the orchestra that we didn't want to lose a note. But alas, dialog always wins out. A native story was also arranged by one of the performers, Stephen Point. But this time, there was no orchestra—just voice and native drum. And no time reference. And the French read was 30 seconds shorter than the English (a rather unusual occurrence). From then on the shows would be different lengths, and all the offsets would differ between the French and the English shows.

Next—clone.

THE MIX

This brings us to the mix and our introduction to Rod Michaels, who quickly became known as Sir Build-a-Mix, master of the 56-channel SSL G Series console at Greenhouse Studios (formerly Vancouver Studios). A mixing theater may have been most appropriate for this project; however, a mixing theater with 56 channels of Total Recall automation didn't exist within our reach. Greenhouse's Studio B had just enough room to comfortably fit eight Yamaha NS-10Ms, a subwoofer, four engineers, four producers, ten ADATs and coffee.

We decided that the only logical way to approach the mix was sequentially. Each piece had a different complement of elements, each with its own offset. We started by submixing the orchestra to eight tracks, assigned to channels in such a way that the panning emulated the actual orchestra setup. To conserve channels, the mixes were laid up on A/B rolls and then remixed to a single ADAT. Keeping every door open, we gave Dodd one last chance to make minor adjustments to the pacing of the show—a second or two here or there, or maybe just a few frames. Time to get out the Frame Master...

The mixed chorus panning also imitated the chorus' performance environment. Then we added the traditional instruments, the kids, and the soloists Joelle Rabu and boy soprano Fraser Walters. Lindsay Bourne would say, "Can you make the flute start over there, fly over to there and then swirl around the block?" No problem, says techno-wizard Charlie Knowles, who had anticipated this request and built a "dual quad panner" with a couple of surplus rotary pot joysticks, some tin foil and a cardboard box.

Each story had to overlap the next in one way or another, so we had to have faders for anything that would carry over the transition. That meant building a "join mix" that had all the elements in each of the two segments required at the crossfade. This ultimately became the mix file for the subsequent story. Because the mix ADAT was locked to the others, we were able to do seamless punch-ins and -outs anywhere in the program.

The voices had been edited on a PC running Turtle Beach 56K-PC and its Gem-based software, Soundstage. We triggered the voice clips with SMPTE generated by the BRC and re-recorded the voices on yet another ADAT tape. By this time, the library had grown to a point where we had developed a system to catalog the tapes, as by now we had used nearly 100 tapes.

A WORD ABOUT CLONING

Cloning with ADAT doesn't always work the way the manual suggests. After following the step-by-step instructions many times and exercising language that we hadn't used since high school, we are of the firm belief that the ability of ADATs to clone is related to the position of the moon and stars and *the rock* (I'll explain the rock in a minute). The very last day of our mix sent us to *clone hell*—armed with seven machines, loads of sync cables and fiber-optic digital cables, we tried every possi-

Secrets of the Alesis ADAT

By pressing the Set Locate and other keys simultaneously, ADAT users can access functions and data that is not mentioned in the Alesis manual. Here are some useful combinations:

Push SET LOCATE and...

- **FORMAT to toggle the machine between the t160 and Std modes**
- **FAST FWD to display the ADAT's software version number**
- **SETUP to indicate the number of hours on the head drum**
- **PLAY to indicate the ADAT's Machine ID number**
- **RECORD to toggle between four possible crossfade times: fad1/fad2/fad3/fad4 (these correspond to 10.67, 21.33, 32 and 42.67 milliseconds)**

The following error messages were decoded for us by Alesis technical support. They were scrawled onto a piece of paper during conversation and may require some interpretation.

err0	ADAT doesn't see tape sensing switches
err1	Problem with tape position (unthreading)
err2	Capstan not engaged
err3	Capstan engaged
err4	Head is not spinning
err5	Head speed is too fast or too slow relative to tape speed.
err6	Can't read "data" section at head of tape
err7	Can't read audio section of tape (excessive error correction)
err8	Loss of sync during recording
err9	Non-functioning take-up reel

The BRC has a few anomalies of its own. A Reset feature could replace the rather brutal method of powering down to reset—a regular procedure with this technology. After all, it's just a dedicated computer.

ble combination of all seven machines, and only one set of two would clone. Even machines with the same software version wouldn't talk to each other!

FINE TUNING

The first time I heard the show "on the hill" in Ottawa, I was stunned. I phoned Doug Dodd in Vancouver on a cell phone during the first run of the show in the middle of an April blizzard and let his answering machine hear a bit. The image was a thousand times bigger than it could ever be imagined on eight NS-10s in a studio. Ninety-degree pans became 180 degrees. Sounds moved over your head, and the orchestra hugged you.

After a day of system calibration, EQ and level balancing, I determined that the biggest problem in the soundtrack was the subwoofer activity accompanying the voices that came from speakers other than the center pair. As our subwoofer source was controlled by the crosspoint switcher, we were able to assign subwoofer sources via MIDI events in Cakewalk. Problem solved. The tricky spot was an overlapping collage at the end that required about 30 MIDI messages in 20 seconds.

CHOICES

Originally, the show was to be 35 minutes plus pre-roll, so ADAT was a logical choice for playback. As the show grew beyond 40 minutes, we realized that we would either have to change the medium or find longer S-VHS tapes. We found numerous errors on T-180 tape immediately after formatting new tapes. A phone call to Alesis' 800 number didn't solve the problem. After experimenting with combinations of the Set Locate button and other buttons, we found that the undocumented combination of the Set Locate button with the Format button toggled the display between "Std1" and "t160."

After another attempt, we found that T-180 tapes formatted and recorded with the "t160" setting were stable. Also, the ADATs default to "Std1," so they had to be toggled each time a T-180 tape was used, as the transport ballistics appear to be affected by this setting. After experimenting with T-180 tape, we determined that they were not as robust as the T-120, so given the show's longer running time, we opted for the Tascam DA-88 for the playback machine. Tascam's integration of the time code functions was also a big plus. The scrub wheel was indispensable in determining the exact start and stop point of each voice in the collage.

How would I do it if I had it to do all over again? I would think twice about the current generation of Alesis ADAT machines. Although I'm pleased with the sound quality, I'm discouraged by inconsistencies in the performance of the machines, slow rewind, lack of documentation, limited time on reliable tape and clonability. The Fostex, by nature, shares some of these drawbacks, but integrated time code functions and other features make it a more attractive offering. Today, I'd probably bet on the Tascam DA-88, but tomorrow...who knows?

THE ROCK

And now, about *the rock*. Some time ago while recording the soundtrack for the feature film *Bowl of Bone*, the filmmaker gave Doug Dodd a rock. The rock, a tree-bark tool, had been

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given to her by a medicine woman, the subject of the film. The medicine woman had gotten it from her grandmother, who had gotten it from her grandmother, etc. Doug was told to keep the ancestral rock with him whenever he is working. So the rock lived on his computer all through the composition phase. More than once, when things started to go haywire in the studio, Doug placed the rock on the console and...presto! All systems began working properly. Evasive, intermittent noise in the audio system disappeared and ADATs would clone. How do you patent a device like that?

We began a daily ritual of stroking the rock. First thing in the morning and occasional strokes throughout the day. As my late grandmother would say, "a little ancestral guidance vouldn't hoit." Rock on. ■

Simon Garber has spent most of the past 24 years as a recording engineer and live sound mixer. He is also an audio consultant and computer hacker. He can be found trolling the Internet at sgarber@wimsey.com.

CANADIAN BITS AND PIECES

ALBERTA

Calgary's **The Beach Advanced Audio Productions** hosted Richard Samuels' sessions for his recently completed album, coincidentally called *The Beach*. Samuels has garnered two Top 20 Canadian hits from this record. Other recent work at the facility includes Shannon Gay's album *Humankind*, ADR for the Canadian Broadcasting Company's TV series *North of 60* and post-production for the ABC series *Lonesome Dove*. Other news from The Beach includes the addition of a second digital room for album work and post-production this year to accommodate an increasingly busy schedule. The new Studio B has 32-track capability and SMPTE/video interlock.

QUEBEC

Studio Place Royale (Montreal) produced the soundtrack for *Montreal Voila!*, a multimedia show projected on three screens that are superimposed on a translucent panoramic (35-foot) screen in Montreal's Olympic Stadium. The project was recorded on 24 tracks with Dolby SR; all subgroups were derived from Tascam DA-88s and DAT, and final mixes were done on the DA-88 and D2. For the final presentation, the main mix is played over theater speakers, but the dialog, in English and French, is heard through acoustically transparent headphones...**Studio Morin Heights** (Morin Heights) has been busy with a number of music projects: The facility saw Sony artist Keven Jordan, Gary U.S. Bonds with producer Yank Barry, and Mutt Lange mixing Michael Bolton's new single, "Ain't Got Nothin' If You Ain't Got Love," in January, March and May, respectively. In June, SMH had Neil Peart of Rush in producing and Paul Northfield mixing an album tribute to Buddy Rich...A number of the participants in the Montreal International Jazz Festival are being recorded and mixed at **Studio Tempo** (Montreal). The facility is also doing digit-

—CONTINUED ON PAGE 194

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USE READER SERVICE CARD FOR MORE INFO

by Philip De Lancie

TAPE & DISC NEWS

BLUE BOOK CD STANDARD FROM ODC

Optical Disc Corporation has published a proposal for a new CD standard. The ODC "Blue Book" provides technical specifications for a high-density CD (HDCD) format supporting distribution of high-quality digital video on a 12cm (standard CD-sized) disc. ODC says the proposed HDCD format, which uses ISO MPEG standard definitions to compress video and audio information, yields full-screen/full-motion video along with audio quality "comparable to that of a CD."

ODC's move comes as Video CD systems, based on the White Book standard originally developed for karaoke applications, are poised to begin competing with VHS and laserdisc for the lucrative home video delivery market. White Book CDs use standard pit densities and are thus able to store a maximum of 74 minutes of MPEG I compressed video, not enough to fit a feature film on one CD.

ODC's Blue Book would allow for a range of pit densities up to four-times standard, which the company says is the upper limit of what is feasible using today's playback technology. The specification supports up to 3.3 gigabytes of user data, making possible a full, 135-minute feature-length movie recorded on a single CD. Either MPEG I or MPEG II compression may be used for a data rate of up to 3.3 Mbit/second.

Blue Book players will use visible-light, red diode lasers and high-performance optics similar to those used in today's laserdisc players. The standard is also designed to be backward-compatible to allow HDCD players to play standard CDs.

"ODC's mastering technology has demonstrated the capability of mastering at densities of at least eight times standard CD density," says Richard Wilkinson, president of ODC (see Fig. 1). "However, blue playback lasers are required before such densities are feasible for a consumer product, and it is not clear how soon such technology can be commercialized and produced inexpensively enough to build into consumer players."

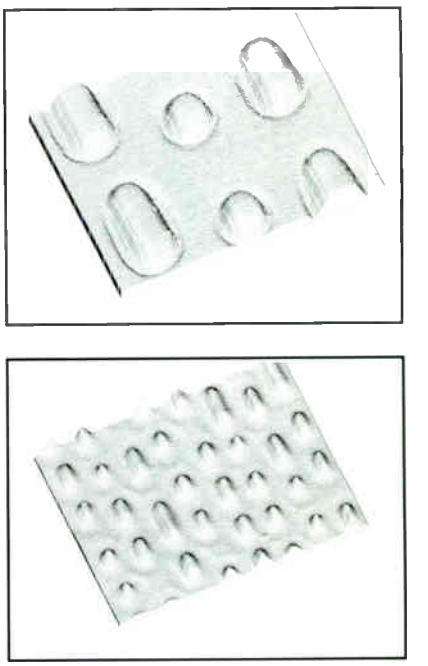

Figure 1: The topography of a typical standard pit-density CD (right) compared with an 8-times density CD

ODC has submitted a draft of the Blue Book proposal to the International Electrotechnical Commission (IEC) for adoption as an international standard. The move is likely to spur other companies who have been working on high-density CDs to weigh in with their own proposals or objections. Of the two main CD technology licensors, Sony has not made clear its position on the Blue Book. Philips is known to be reluctant to endorse higher-density CDs at this time, largely out of fear that talk of new CD-based video formats could undermine its efforts to market Video CD and the related CD-I FMV (full-motion video) format.

CD LICENSING SUBJECT OF ANTITRUST PROBE

The licensing practices of some CD technology patent holders have at-

tracted the attention of the U.S. Department of Justice, which has begun an investigation into possible violations of antitrust laws. According to the *Wall Street Journal*, the department has issued subpoenas to a dozen companies seeking information on their CD-related dealings with Sony and Philips, the main players in worldwide CD licensing. A related report in *Billboard* says the Justice Department confimed that an investigation is underway into "licensing practices in the optical disc area," but declined to give any further details while the probe is in progress.

SPLICES

Concept Design (Graham, NC) introduced the Marathon, which converts the Sony HSP 5000 Sprinter high-speed video duplicator into a continuous loop, eliminating the need for rewinding after each pass. Using handling techniques from the film-processing industry, the unit is claimed to run over 12,000 passes with "no perceivable quality degradation." Co-developed with Allied Film and Video of Detroit, Marathon is expandable to a capacity of 240 meters...**SKC America** opened a technical support office for its videotape business in Mt. Olive, NJ. The company also introduced new high-speed and real-time videotapes featuring magnetite coating, which is said to yield higher signal, less noise and better color saturation...**Saki Magnetics** (Calabasas, CA) launched a program to relap cassette or ¼-inch tape heads, including those for high-speed or in-cassette duplication, for $25. The service includes a free evaluation of any head or head assembly...**Emerald Technology** is establishing a new production facility in Lincoln, NE, to handle production of its new CD8000 CD-packaging machines...**AstralTech Americas** is doubling CD replication capacity at its recently opened plant in Boca Raton, FL. The addition of two more lines and a second printer will boost annual capacity to 25 million units...**Versadyne** (Campbell, CA) reports sales of Series 1000 high-speed duplication systems to Maturity Audio Video in Nairobi, Kenya, and Cargill Associates of Gardena, CA. ■

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"I have always admired the ergonomics and automation of SSL consoles. Now, having compared the sound quality of our new SL 8000 console at Air Lyndhurst with the older SSLs that were in use at our former studio at Oxford Circus, I find that the sound quality of the new console is marvellous.

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COAST TO

L.A. GRAPEVINE

by Maureen Droney

Appropriately situated at the intersection of Freedom Drive and Liberty Bell Road just off Mulholland Highway sits American Recording Inc. Established in 1958, and in its current location since 1984, American has kept a low profile. Although in the last few years they have received tons of phone calls and deliveries for both Ray Parker's AmeRayCan Studios and Rick Rubin's American Records, the staff at American Recording

—CONTINUED ON PAGE 182

American Recording's studio manager, Bill Cooper, at the Trident A-range 40-input console

PHOTO: MAUREEN DRONEY

NASHVILLE SKYLINE

by Dan Daley

Masterfonics is expanding its facility. In the wake of a personnel restructuring that saw director of recording Lisa Roy take over the position of general manager and several other positions consolidated, Masterfonics will build a new large tracking studio in the Carlo Building two doors away on Music Circle. The studio will be designed by Tom Hidley, who designed the original mastering room at Masterfonics, and the design will be a 201Iz type, according to Roy. Construction is slated to begin in September, with a completion date estimated by the beginning of next year. "It will make us the largest tracking room between here and Los Angeles," she said. No console or monitoring decisions have been announced yet.

Optifile has become the most implemented retrofit automation system in Nashville with the installation of an Optifile Tetra system on the D&R Orion console at 16th Avenue Sound, bringing the total number of systems in town to 14. The first Optifile system was installed on the Soundcraft 3200 at Recording Arts in 1991. According to Curt Smith of Sascom Marketing, which markets Optifile in North America, the Optifile's similarity of operation to SSL automation systems is one reason for so many retrofits in a single town. Smith also noted that Studio Supply is qualified to handle technical support for the system.

The first country music vid in surround was done at Scene Three. The Tracy Lawrence track, "Renegades, Rebels and Rogues," is set, like the last one, at the Charlotte Raceway and has a rather extended script whose ellipitical ending augurs for a sequel. Mixer Nick Palladino suggested the use of surround to Atlantic Records president Rick Blackburn and video director Marc Ball. "I think with all the surround decode capability on televisions now, that by Christmas this kind of thing's gonna be huge," said Palladino, who used the Dolby surround system for the mix.

Almo Irving Publishing will be expanding its small demo studio, according to studio tech Scott Gunter, exchanging a Fostex mixer for a Mackie 32-input console and adding iso booths and treatment specified by Vincent Van Haaff.

Audio Productions has installed a 3D2 digital transmission system, said studio president Jim Reyland, as part of his strategy to reach beyond Nashville for agency work. "It's radically altered the way we do business," he said. The studio also recently completed a 1,500-square-foot expansion, including an audio-for-video suite and

—CONTINUED ON PAGE 187

COAST

Steve Berlin (saxman with Los Lobos) was at Hollywood's Brooklyn Recording producing Buckwheat Zydeco's latest Island Records release,* Five Card Stud, *with engineer Bob Schaper. Pictured are Berlin (left) and Stanley "Buckwheat" Dural Jr.

SESSIONS & STUDIO NEWS

by Jeff Forlenza

NORTH CENTRAL

At Chicago's Pegasus Recording Studio, the engineering team of Gary Khan and Mary Mazurek have been busy on a variety of projects: Acoustic sextet Magellan completed a CD of 12 percussive and melodic songs, co-produced by Khan. The Beat Monkeys returned to Pegasus to track their third industrial dance project with producer James Phillips.. Capitol recording artists Everclear were at Smart Studios (Madison, WI) mixing an EP with Brian Anderson. Also at Smart, producer/engineer Doug Olson mixed an EP for Atlantic recording artists Dead Hot Workshop...

SOUTHERN CALIFORNIA

There's been plenty of studio activity at Scream Studios in Studio City: Snoop Doggy Dogg and Warren G were in doing rap vocals with producer/engineer Greg Geitzendauer; and producer Matt Wallace was in mixing Sheryl Crow, Matthew Sweet and Redd Kross for the Carpenters tribute album on A&M Records. *If I Were a Carpenter*...Virgin recording artists Simple Minds were at Hollywood's Westlake Audio tracking and mixing their latest with producer Keith Forsey and engineer Brian Reeves in Studio D; over in West-

—CONTINUED ON PAGE 184

NY METRO REPORT

by Dan Daley

New York has a huge and growing Hispanic population. The various cultures under that rubric have brought their music with them over the years, much of which is recorded in town. One of the characteristics of Latin American recording is how it parallels the regular shuttling that goes on between Nueva

—CONTINUED ON PAGE 185

Hot remixer David Morales remixed Janet Jackson's single "Throb" for Virgin Records at Platinum Island Recording in Manhattan. Morales worked with engineer Dave Sussman on the 64-input SSL 4000 console in Platinum's East Room.

PHOTO: JIM CARROLL

NORTH CENTRAL NEWS

by Jeff Forlenza

In Sioux Falls, South Dakota, Jaee Logan and David Jackson recently opened a multimillion-dollar facility and named it Half&Half Productions. Working with designer Mack Clark of MacTech associates, the facility was built from the ground up and features a Euphonix CS2000 console with SnapShot Recall automation, the largest Digidesign Pro Tools configuration available (with TDM bus), Tascam 48-track analog and Alesis ADAT recorders, and DynAudio Acoustic main and reference monitors. In addition, the studio has six Macintosh computers, a Yamaha C6F seven foot acoustic grand piano and a wide assortment of digital keyboard controllers.

Not only business partners, Logan and Jackson have been a songwriting/music production team since they were childhood friends in Oakland, Calif. Both of them have had successful careers in the music industry: Logan has written, arranged or produced hit songs for the likes of En Vogue, Bobby Brown, Pebbles and Hammer. Jackson has produced and/or worked with numerous R&B acts like Teddy Pendergrass and Frankie Beverly's Maze. When Logan heard his longtime friend was building a world-class studio, he packed up his studio in Oakland and sent it to South Dakota. "I trusted David to where I took my whole studio and put it in a semi-truck and put it in his hands," Jaee Logan says. So now, all of Logan's and Jackson's Gold and Platinum records hang on the walls of a new studio in Sioux Falls. But the question most-often asked is "Why South Dakota?"

"Half&Half Productions came out of a concept of creating a remote facility away from the hype of L.A. and New York, but providing the same services," David Jackson answers. "Recording artists will want to use our facility because of its state-of-the-art equipment and the remote location. They can be in a small town with all the accompaniments that they're used to and not be bothered."

Now that they're up and running, clients who have traveled to Half-&Half include Minneapolis-based rockers Inflatable Date, Bay Area hip hoppers DaKumpny (featuring Mac-Mone, former producer/member of Digital Underground), Minneapolis act Violet working with hot producer Bobby Z, and Oakland R&B artists B Angie B tracking for Hammer's Bust It Productions. The newest member of the Half&Half staff is Bill Summers, a multitalented percussionist and producer, who has worked with Quincy Jones, Herbie Hancock and Joe Zawinul.

PHOTO: MARK POLLARD

Owners Jaee Logan and David Jackson stand behind their Euphonix CS2000 console inside their plush new Half&Half Productions in Sioux Falls, South Dakota. Below: Blue Earth Recording (Harrisburg, Ill.) was designed by owner Richard Banks and features a 78-input AMEK Angela console.

In 1984, two University of Wisconsin film school graduates opened a small basement studio to record local punk bands in the Madison, Wisc., area. As their engineering knowledge grew, so did their gear list: from 4-track basement studio to, eventually, a 24-track world-class facility. Along the way, those two film school grads, Butch Vig and Steve Marker, have recorded some pretty influential records by groups like Nirvana, John Cale, Sonic Youth, Gumball and Smashing Pumpkins at their facility—Smart Studios. In 1991, the Russ Berger Design Group was hired to redesign a new Smart Studios with a tracking studio centered around a Trident 80C console and a mixdown studio based on a revamped Harrison 5632 board.

Studio A, the tracking room, has floor-to-ceiling glass for enhanced visual communication between engineer and musician and a 4-channel headphone system for better musician mixes. Studio B, the mixing room, has a console with an illustrious past: The vintage 56-input Harrison 5632 56-input board once resided in the Osmond Studios; since then, the console was completely redesigned to include 56 channels of Uptown Moving Fader automation. Smart multitracks include a 2-inch Sony APR 24-track in the A Room and a pair of Otari MX80 2-inch 24-tracks in the B Room. Other recorders at Smart include Panasonic DATs, and Studer and MCI 2-tracks. Of course, there are plenty of unusual microphones, preamps and outboard gear to satisfy the most esoteric taste. Due to strong demand for Vig's engineering chops, two more local engineers were enlisted at Smart Studios—Doug Olson and Brian Anderson.

In Lansing, Mich., Harvest Productions is a recording studio that's taking to the regional airwaves. Via "Live Harvest," a weekly, half-hour segment of the *Basement Show* program on Michigan State's student-run station, bands can track and transmit simultaneously from Harvest's facility. The station (WDBM 89-FM) and studio teamed up in an effort to get local musicians some recognition. Harvest engineer Jim Diamond explains, "Bands get to play for a wide variety of people. It gives the studio wide exposure, and I get to mix live on air."

Aside from live mixing/engineering duties, Diamond also auditions potential bands for the program, and a wide assortment of bands have played on the show so far. Diamond works from a Trident 70 Series console with a Tascam ATR-60 1-inch 16-track and a Pro Tools system for tracking. Also in the studio with the band and engineers is host and station manager, Ron St. John, who interviews the band during the segment.

But live broadcasting is only a

—CONTINUED ON PAGE 186

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—FROM PAGE 178, L.A. GRAPEVINE

have always politely corrected the callers and UPS. "Finally," says studio manager/engineer Bill Cooper, "we had to call Rick Rubin and ask him to do something. I mean we were getting boxes of their CDs shipped to us! It wouldn't have been right to just keep them!"

American's owner, Richard Podolar, is a musician and producer who has been in the business since he was a teenager. A session guitarist on numerous records, he also engineered the first Steppenwolf and Three Dog Night hits ("Born to Be Wild," "Magic Carpet Ride," "Joy to the World," "Mama Told Me Not to Come"), which led him to produce those bands and others. All of the albums Podolar recorded with Steppenwolf and Three Dog Night went Gold, and at one time, Podolar had seven simultaneously charting records. His first studio, also called American Recording, was established with his parents in 1958 in Hollywood.

The second incarnation of American was in Studio City in 1962, where it was one of the first recording studios in the San Fernando Valley. After moving to its final location in 1984, American became popular with outside clients, and Podolar took a step back from active producing to pursue other interests. Recently, he has begun producing again with several new groups he discovered locally—among them an all-star bluegrass project called Laurel Canyon Ramblers. At its Mulholland Highway location, American has played host to, among other artists, Huey Lewis & The News, Fleetwood Mac, Tom Petty, Heart, Mister Mister, Don Grusin and The Divinyls, along with numerous soundtracks. Of special note is the new Victoria Williams album. In an article about the Paul Fox-produced project, *Billboard* quoted Williams: "We recorded 16 tracks, and a lot of this material is first-take stuff. Some of it was composed in the studio during breaks in recording. And it's all live vocals."

That kind of live, comfortable feeling is what American strives for. "They used a lot of different instrumentation on that album, mostly acoustic instruments and no headphones," engineer/manager Cooper says of the Williams project. "We had to change setups every day, and often for every song—it was the kind of challenge we like here. Engineer Ed Thacker likes to experiment—one of the old '70s tricks he brought back was a beach umbrella over the drums to tighten up the sound! On one song, the band had to follow Victoria's foot tapping for timing. As there were a lot of musicians, and they all couldn't directly see her foot, we hooked up a video camera, trained it on her foot and gave them TV monitors. That was fun!"

Equipment at American includes a Trident A-range 40-input console; Otari MTR-90 and 3M-79 transformerless 24-tracks; a live echo chamber; a good selection of mics and Starbird stands (my favorite!) to hold them up; along with a full complement of signal processing including EMT 250, AMS reverb and delay, GML preamps and EQ, Lang EQs, lots of UREI LA-2As, and API. There are two iso booths, a Steinway grand piano, a full kitchen and easy parking for 20 cars.

Things have been bustling lately over at Audio Intervisual Design, now located on LaBrea in Hollywood. AID is the Los Angeles distributor for Sonic Solutions, TimeLine, Tascam, Sony Digital and Analog, Lexicon, and a host of other professional products. Owners Jeff Evans and Jim Pace are particularly excited these days about dB Technologies Model 3000, a digital optimizer and sample rate converter. Pace tells us that since the dB 3000 is so multifunctional (it does conversion, monitoring, measurement, debugging and correction for digital audio, among other things), one of AID's big challenges is explaining to potential buyers what all the applications are. They must be doing a pretty good job of it, as they've been selling quite a few units to the golden ears crowd, among them film mixer Shawn Murphy, DMP Records' Tom Jung and A&M's Dave Collins.

Co-owner Pace, who was a longtime tour sound mixer for Kenny Loggins, started AID ten years ago with Record Plant's Chris Stone when they recognized the need for a sales organization with an in-depth understanding of the new technologies. Jeff Evans, whose background includes a physics degree, motorcycle racing and stints at Sound Genesis, Dolby and Neve, soon came onboard, and in 1988 Evans joined with Pace to amicably buy Stone out. Now the two find themselves so busy that they have to book lunch dates with each other to get face-to-face and

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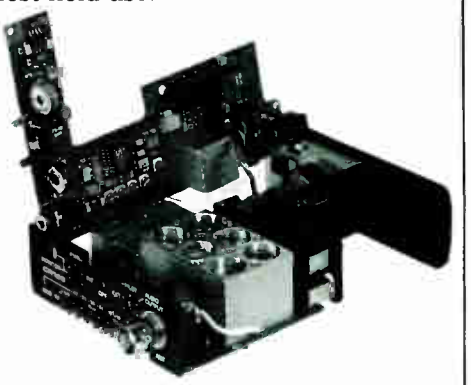

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catch up!

With their usual flair, the staff at Record Plant held a series of champagne breakfasts and cocktail receptions to introduce their newest studio suite, Euphonix I. The second-floor "penthouse" studio was designed by studio bau:ton and feels private and comfortable, with French windows and a small balcony overlooking Hollywood. The recording room leads to its own private lounge. The console is a 72-input Euphonix CS2000M, and speakers are Mastering Lab 10s with custom subwoofer, although various systems, including Yamaha NS10M, KRK, Tannoy and Auratone are available. Tape decks are Studer A800 MkIII, Ampex ATR 102-104, and Panasonic SV 3700 Pro-DAT. Sony 3348, Mitsubishi X880 and various other formats are available in-house for additional charge. House video sync is distributed to all studios at Record Plant, (including, of course, Euphonix I), and all other Record Plant amenities are available—from the extensive microphone collection to client service directors to the atrium Jacuzzi, billiards and coffee bar.

On the Euphonix tip, rumor has it that Skip Saylor (Los Angeles) Recording will be installing the first ever Euphonix CS2000M 4-104 in the "Back Room." That will be the largest (104-fader/208-input) music console yet made by Euphonix. At the same time, Skip will upgrade its SSL room with the addition of a Neve "bucket"—16 channels of classic Neve 1073s with faders, to make the front room 96-in.

Got L.A. news? Fax Maureen Droney at (310) 472-8223. ■

—FROM PAGE 179, SESSIONS AND STUDIO NEWS

lake's Studio C **Phil Ramone** was producing a big band album for **Barry Manilow** with engineer **Allan Abrahamson**...Hot R&B producer **Nick Martinelli** was working with cross-dressing disco diva **RuPaul** on his/her sophomore release for Tommy Boy Records. **Bruce Weeden** engineered the sessions at the 64-track **MNM Music Group Studio** in Santa Monica...

NORTHEAST

Brazilian jazz guitarist Toninho Horta was at Manhattan's **Quad Recording** doing overdubs and mixes on his latest album; engineer **Scott Hollingsworth** did overdubs, and engineer **Ray Bardani** did the mixes... Singer/songwriter **Marshall Crenshaw** and engineer **Will Schillinger** co-produced Crenshaw's live CD, *My Truck Is My Home*, at **Pilot Recording** Studios in New York City. The CD (on Razor and Tie Records) is a collection of new and old live performances mostly recorded by Schillinger dating back to 1980...The **Barrio Boys** were at **Kajem Studios** (Gladwyne, PA) cutting tracks for their latest SBK release. **Etienne** produced the slamming tracks with engineer **Joe Alexander**...Hard rock outfit **Exotic Pet** recorded their independently released debut CD at **Wild Sound Studios** in Asbury Park, N.J. *Bleed* was produced by **Mitch Wilson** and **John Kelsey**; **Joey DeMaio** engineered and mixed the Exotic Pet tracks...

SOUTHEAST

At Nashville's **Sound Emporium**, **Trisha Yearwood** was working on a Christmas album for MCA with pro-

ducer **Garth Fundis** and the engineering team of **Dave Sinko** and **Ken Hutton**. Also at Sound Emporium, **Ricky Skaggs** was tracking his latest Sony Music release with producer **Brian Ahern** and engineer **Alan Schulman**...Singer/songwriter **John Gorka** was at **Bias Recording** (Springfield, VA) working on his CD, *Out of the Valley*, for High Street Records. **John Jennings** produced and mixed Gorka's guitar/vocals sessions with the help of engineer **Bob Dawson**...At **Studio Center** in Miami, **The Puppies** recorded and mixed tracks for their latest Sony Music CD with producer **Calvin Mills** and engineer **Ray Seay**...

NORTHWEST

The **Loud Family** mixed their new Alias Records release, *The Tape of Only Linda*, at **Music Annex** in Menlo Park, CA, with producer/engineer **Mitch Easter**. The San Francisco-based band is led by **Scott Miller** (formerly with Game Theory) on lead vocals and rhythm guitar. Easter is noted for albums done with R.E.M...In between concert stops in the Bay Area, **Martin Gore**, of the group Depeche Mode, stopped in at San Francisco's **Different Fur Recording** to record several Leonard Cohen tunes. Gore produced the tracks for Mute Records with the help of engineer **Ron Rigler** and assistant **Adam Munoz**...

SOUTHWEST

The **Hit Shack Recording Studio** in Austin, TX, recently updated its control room with a new Mackie 32x8 board and a highly modified 3M M79 24-track recorder. Some of the first clients using the new equipment included producer **Malcolm Burn** working with **Charlie Sexton** on a new CD for MCA Records...New Orleans legend **Willie Foster** brought his powerful voice and harmonica to the **Fire Station** (San Marcos, TX) to track his latest Palindrome Records release with guitarist/producer **Bobby Mack**...

STUDIO NEWS

Philly's **Studio 4 Recording** and Ruffhouse Records recently moved to new digs. Due to the success of Ruffhouse Records (run by Studio 4 principals) the need for more room led partners Chris Schwartz, Joe Nicolo, Phil Nicolo and Dave Johnson to purchase an 18,000-square-foot/two-story building on Fayette Street in Conshohocken, a Philly suburb. The revamped Studio 4 will feature a huge A room and a new Euphonix room. New address for Ruffhouse Records/Studio 4 is 129 Fayette Street, Conshohocken, PA 19428; phone (610) 940-9533...Neal Schon (guitarist/songwriter for Santana, Journey and Bad English) re-opened his recording/rehearsal studio in Oakland, CA: **Gush Studios** is equipped with a Soundcraft TS 12 36-input console and 24-track 2-inch Otari decks. Noted acoustician Chips Davis worked with Schon on the redesign, which took eight months and included new AC and electrical systems for the 5,000-square-foot facility. Allen Craft, chief engineer at Gush, reports that sessions are underway including Schon's new project, Abraxas, with former members of Santana Gregg Rolie and Michael Shrieve.

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

—FROM PAGE 179, NY METRO

York and various Latin cities. There are almost two dozen flights a day from area airports to San Juan, Puerto Rico, alone. Many Latin artists will develop parts of their records in

small studios throughout Latin America, coming to New York for mixing and large room tracking, as well as to take advantage of the city's Latin musician base.

"What New York now has is one or two major regular recording studios that cater to Latin artists, and a handful of project studios," explains Jose Fernandez, a Latino engineer and a salesman at Manny's Music. "It's mostly from Puerto Rico and the Dominican Republic, doing salsa and merengue." Fernandez says that the sessions now integrate MIDI fairly extensively but that live percussion remains fundamental to Hispanic sessions. He adds that these sessions also tend to pay less than mainstream dates, an unfortunate but not unusual circumstance of ethnic recording sessions and one dictated by lower overall budgets.

Jorge Rosales, another Manny's employee and a former engineer and voice-over talent at the now-closed Latin Sound Recording studio, agrees about pay and notes that, despite increasing Hispanic populations, competition for Latin sessions remains high, with the choice sessions going to a very small cadre of engineers who shuttle between Latin America and New York, such as Jose Mendez and July Ruez.

Prices tend to dictate analog recording; however, digital is beginning to make an impact, mainly via MDMs, according to Fernandez. "A lot of project studios in the Caribbean are now starting to use the DA-88," he says. "Latin artists want to record digitally, and that's the way they can afford to." That's been a project studio phenomenon, both in the city and in Latin America, although Fernandez doesn't believe it will hurt the larger rooms doing Latin.

The largest of these commercial rooms is Variety Recording on West 42nd Street. According to studio manager Carlos Cervantes, 75% of the studio's work comes from Hispanic dates. The studio charges $85 per hour in its large SSL-equipped A room, and $65 per hour in the MCI console B room. "Rates have gone up a little in the last year or so," Cervantes says. "But we think the music scene will continue to grow as New York's Hispanic population grows. That's what's keeping us alive."

It's also becoming a bit more diverse. While Puerto Rican and Dominican sessions predominate, Cervantes notes recent sessions with Mexican producers and artists, something that used to be limited to the southern California area. Another large session recently involved recording various American Indian tribes. "There's also been some rap, too," Cervantes notes. "But Hispanic is the main thing. People who play a certain type of music want to be able to go where they feel comfortable, where people speak their language and understand how to record their music."

In terms of project studios, the leading one is recording artist/producer Juan Ruis Guerra's Quatro Quarenta (440) in Manhattan, where he records his own releases as well as those for artists on his Karen Records label. Of course there are others, too numerous to track or try to quantify. But it's safe to say that New York's Hispanic base remains one of its mainstays.

Till the NY fax gets fixed, please fax me for NY Metro Spews at (615) 646-0102.

—FROM PAGE 180, NORTH CENTRAL

small portion of Harvest's work. Founded in 1982 by owners Steve Curran and Mark Miller, the Harvest Productions creative team also includes custom music writer Julie Magsig, and most of their work is advertising jingles and audio-for-video. In fact, Harvest won a 1994 Regional Addy Award from the American Advertising Federation for original music produced for a marketing video for Steelcase Inc.

Smith/Lee Productions is the largest audio production studio in St. Louis. Lately Smith/Lee has had some international clientele. BBC British radio and NHK Japanese public TV were at the music production/recording facility working on different projects. The BBC project was a full radio production of St. Louis playwright Joan Lipkins' play *Small Domestic Acts*. The BBC sent its senior drama producer, Tony Coe, as well as British television producer Lizbeth Goodman to oversee the recordings done by Smith/Lee audio engineer Jamie Maguire. Smith/Lee also provided recording services for a Japanese program on the culture of the Mississippi River. The series produced by NHK, Japan's public broadcasting company, has a potential au-

dience of 15 million viewers. NHK sent senior executive producer Margaret Narumi, director Yo Kuroiwa and executive producer Yoshinori Sakimoto to record the soundtrack for the opening show of the six-part series. Smith/Lee engineer Steve Higdon recorded several blues classics as well as an a cappella version of "Old Man River" performed by Erma Whiteside and Blues Deluxe for the program.

With three control rooms, Smith/Lee's consoles include an MCI 600 Series and two AudioArts Wheatstone boards. Storage comes from a 2-inch 24-track MCI, Fostex DATs and assorted ½-inch machines. The big room (of five different recording spaces) is over 600 square feet, according to engineer Steve Higdon.

In Harrisburg, Ill., owner Richard Banks designed Blue Earth Recording with the help of architect Chuck Garrison and design consultant Hal Burnett. Banks went for a Chateau/resort/recording facility vibe for the two-room facility. Since Blue Earth opened in 1983, Banks has recorded a wide range of music—country, gospel, jazz, bluegrass and alternative—from his 78-input, British-built Amek Angela console with MegaMix custom software. Storage includes 24- and 16-track analog units. As far as resort accommodations, Blue Earth boasts a hot tub, a private lake, a large dining room and a gourmet kitchen. Blue Earth has two live performance rooms—the main A room is 20x28 feet, the B room is 15x22 feet—and the control room is a spacious 22x28 feet. Recent projects at Blue Earth include music tracking, like the latest release from nine-piece ska band, the Jungle Dogs, and corporate video presentations. ■

—FROM PAGE 178, NASHVILLE SKYLINE

a digital editing lounge.

Speaking of reaching beyond Nashville, Jon Bon Jovi was in Emerald in July tracking for his next release. Peter Collins produced. Kevin "Caveman" Shirley engineered.

A busy tracking room in town, The Castle Recording Studios has seen plenty of hot country artists in recently, including Brooks & Dunn, George Jones, Chris LeDoux and Billy Ray Cyrus.

Fax Nashville items to Dan Daley at (615) 646-0102. ■

▪ STUDIO SHOWCASE ▪

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STUDIO SHOWCASE

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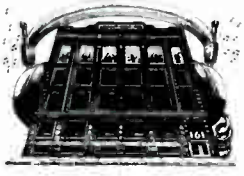

STREETERVILLE..

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Located in a pristine forest setting with sweeping views of the Rocky Mountains and Colorado plains, Akashic Recording Studio offers beautifully designed and exquisite-sounding rooms, sonically transparent signal path, and a Class A staff. Featuring a custom Jim Williams 64-input console, highly upgraded JH-24, and a MIDI'd 1895 Steinway grand, Akashic Recording Studio provides an unparalleled level of quality and inspiration for any music project.

—FROM PAGE 25, TO C OR NOT TO D

sometimes firmware and even hardware assistance), but it's still basically a mess. The available mechanisms, the drives themselves, range from okay to pretty close to useless. Several people warned me about the JVC drives, primarily because they only have 64 kilobytes of buffer. "So what?" you might ask; "I have a cousin with less than 32 kilobytes of I/O buffer and a friend with absolutely no memory at all, so what's the problem?" Well, let's say that you are using one of the available software packages designed specifically to record audio from a hard disk onto one of these CD-R drives. You are just sitting there watching (what else can you do for 80 minutes?) while your hard drive gets a bit warm and suddenly feels the uncontrollable desire to do a little thermal calibration. It thinks it is okay to do this, since it is only reading, not writing, and it won't really take all that long. Well, even a tiny t-cal will punch a hole in the outgoing datastream much longer than a piddly little 64k buffer can cover, so you lose. Another shiny little frisbee for Fido.

Not even consumer machines can cope with the burst of digital trash that can result from running out of buffer or from a laser turning off, so bursts of horrible noise appear. Neat, huh? So *maybe* JVC didn't want to send me a machine because that might happen, and anybody who knows me knows that I would tell you. Or maybe they didn't think I was cool enough. If, in fact, *that* was the real reason, they were right. I am not cool enough to try to use a CD-R system with only 64k of buffer. Who is? But there *is* a way...

I still couldn't believe the apparent apathy that the JVC people exhibited, considering the fact that CD-R is getting off to such a slow start, so I looked into that, too. It seems that all the laser guys—MO, phase-change, WORM and write-once (CD)—are not that interested in putting large amounts of time and effort into the modifications that the basic mechanism's hardware would need to work reliably in audio applications. Why should they? They already have a *much* larger market ready and waiting for their technologies in computer data archiving, and have had since the beginning. These applications do not require the large buffers and other assorted tweaks that we audio types need.

Even when they have a mechanism that they can sell into the audio market, the inside word is that they tend to feel the audio market is sort of a pain—very small and very touchy. Several of these large companies don't even have a real audio division for these drives—they leave it to their computer data outlets to handle. This certainly doesn't help matters any. We *are* growing, however, and very soon now these companies will recognize that.

4) OKAY, IT COULD HAPPEN

As this column was developing, so was the state of the art in both CD-R mechanisms and in hard drives. I came to discover that *several* new CD-R machines are on the horizon, and the very near horizon at that. One major company is rumored to be coming out with a four-times normal speed read *and write* CD-R mechanism that is—again, I stress *rumored*—targeted for a street price of just $1,500! I have already heard, however, that even if this happens, certain other technical decisions made on this mechanism may keep it from becoming the price-breaking audio dream machine. It is quite hard to predict, so forget you read it here; it could all be just another Communist lie, designed to undermine the growing CD-R drive manufacturing industry here in America... Oops, I mean here in Japan. A more solid prediction is that another company is about to come out with a double-speed read, double-speed write, 1 meg-buffered SCSI CD-R system, for—3 kilobucks! If they get it right, this could be a very, very nice toy. So I ordered one, and I plan to let you know what I find in my next column. Imagine, for $3,000, you and your Mac or DOS machine, a bit of third-party software and hardware (which I will also report on) can make CD masters, short-run demos, safeties or archive data.

And as for hard disks? The bottom line is that there is only one: the Micropolis 2217AV. Smart shopping will put one of these 5,400 rpm, 1.7 gig mini-monsters in the privacy of your own home for a bit over $1k! It's pretty quiet, SCSI-2, with half-a-meg of cache, and it does the shortest t-cals on Earth, *and knows when not to.* I think this is the drive that Squiggle uses (or is he Prince again now?), and it most certainly is the one that Hendrix would have used—it is the ugliest purple thing you have ever seen outside of a Pacer showroom. I think it's fuscia, but Micropolis says it's not. *This* is how you use a 64k CD-R burner.

Next time, I will also let you know about media: some surprising facts about life expectancy, how many hours of poorly performed Mexican hat dancing a CD-R can take and still play, and the question on all our minds—if you write on the label side with a magic marker, have you invented Write Only Memory? Are Mitsubishi Kasai blanks the best for observing total solar eclipses? Learn top-secret CD-R tech terms like "Mitsui Toatsu Chemicals," "MasterListCD," "Mitsubishi Kasai," "4X," "scratched," "toxic" and "toast."

CD-Results of my explorations next time in "Round Shiny Things—The Gold Hard Facts," same time, same channel. ■

Steve St.Croix is usually a happy, friendly guy, but not when gear doesn't work, or even show up.

—FROM PAGE 30, MULTIMEDIA MESSAGE

from the content originators—in this case, the composers and musicians—so that evolving technology is representative of their needs and wishes. Therefore, there seems to be a good fit between AIAMP's agenda and the goals of the MMA. Other benefits are also apparent: the MMA is already set up, can handle new inquiries, is recognized industrywide and has an e-mail system in place.

These benefits should not be underemphasized, for the work of the Interactive Audio SIG will follow a pattern that has been successful in the MMA. Working groups, devoted to specific issues and with highly targeted goals, will do the day-to-day business of solving technical problems. There will be representation across the board. Eventually, practices and specifications will be made that can be blessed by the MMA and disseminated to the industry. Those who wish to be involved in working groups need not join the MMA—membership in the MMA will only be required if one wishes to vote on

specific issues. Suddenly, the awesome task of moving toward recommended practices and standards doesn't seem impossible at all.

The identification of working groups proved to be the most unwieldy event of the day, due to an abundance of topics coupled with a tendency to try and solve all the world's problems in one fell swoop. For example, uploading sounds into RAM, the number one topic, is a big issue, with a lot of technical and political ramifications. There's no obstacle to doing this, as witnessed by Creative Labs' AWE board, which already has the feature built in. However, the proposal is to have a *universal* method of doing so rather than Creative's proprietary one. Hence, the politics.

At the same time, providing this API could open the door to a host of other features. Why load only samples if you could also load prerecorded music, loops, triggered sound effects and dialog? Should these issues be lumped together under one heading (downloadable sounds), or should each get its own category? There's an attraction to a blue-sky, let's-define-the-platform-of-the-future approach, but it quickly becomes complex and unmanageable. Tackling the larger, industrywide problems where everyone has a stake and a potential benefit seems to make the most sense. The smaller subcategories can also be addressed in parallel, but they don't require immediate solutions. With that in mind, the categories for working groups were defined. (See sidebar: "IAIAC Workgroup Categories.")

The General MIDI debate is one that should not come as a surprise to anyone who has been keeping up in this area. Although it is widely agreed that General MIDI is conceptually the "right thing," there are still major variations in timbre, levels and overall quality/expectations between one GM unit and the next. If General MIDI is to succeed or even survive in future interactive entertainment platforms, some serious work will have to be done to make General MIDI less "general." George Sanger (a.k.a. The Fat Man) has begun a process of minimizing GM discrepancies based on specific criteria for General MIDI playback. Now, with the Interactive Audio SIG of the MMA, it's quite possible that recognition, acceptance and adoption of this spec could happen much more quickly.

The third topic is a good example or microcosm of the very nature of the challenges that this group faces. Certainly, there is the problem of designing algorithms when you don't know what the target platform is. Designing DSP functions for a 56000 chip will be different than for a sound card or Sound Canvas. In each of these categories, no one is implementing features in a consistent, compatible (and don't forget user-friendly) way. And whereas a year or two years ago no one much cared how anyone implemented anything, there's a new phenomenon operating today—multimedia is very real. It's not just Apple or Microsoft's latest hype. It is no longer the "zero billion dollar industry" that has been the butt of many jokes. It has finally come of age. Hence, solving compatibility or cross-platform audio issues has much greater implications than it did before.

Perhaps when we look back it will be the general improvements in CD-ROM technology that helped multimedia turn a corner. Perhaps it will be remembered as the release of products such as *Myst* or *7th Guest* that made interactive entertainment come of age. Whatever the case, the ante has changed, the stakes are higher and the landscape is very different than it was even six months ago. If the mission is to "facilitate the advancement of music and audio in interactive media," then there's a lot of work that needs to be done.

One of the slides at the June 20 meeting of AIAMP said, "Music is the least expensive way to increase the perceived value, saleability, marketability and overall success of an interactive entertainment title." That's a message that people involved in audio for multimedia need to evangelize. If that message gets heard, it will be very good news for the people responsible for creating audio for multimedia in the first place. And if the efforts of the Interactive Audio SIG are successful, that's good news for everyone in the industy, including a most important player in the multimedia pie—the consumer. ■

Bob Safir is president of InterOctave, a San Jose/L.A.-based company specializing in original music and sound design for interactive multimedia. Safir was recently a multimedia product manager at Microsoft.

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—FROM PAGE 124, OTARI CONCEPT I

can be soloed. In addition, solos can be additive, interlocked or temporary, allowing a wide range of signals to be routed to the monitors as other signals pass to their required destination. Solo mode can be set independently for the Channel and Mix sections.

Also available from the central section is a bank of buttons that control assignment of pre/post-fader auxiliary outputs to the corresponding aux send bus. Ten aux sends are available, each with independent master level controls; auxes 1/2 and 5/6 are configured as stereo sends, while the remainder are mono. (In fact, aux 7/8 is paralleled to 9/10, which means that there are really only eight independent sends available, but let's not quibble.)

Because of the way the internal topology is laid out, it is not possible to simultaneously route the pre/post-fader signal from the Channel and Mix section to the same aux send. During mixdown, for example, you might need to derive a reverb send from inputs connected to various Channel and Mix sections and route them to a common processor. A possible work-around would be to use a separate mono/stereo aux send from each section and then sum them to Monitor Select A or B. Here, a variety of sources, including the independent aux sends, can be added in any combination. So, routing the output of Monitor B, for example, to your digital reverb unit provides access from both sections.

In much the same way, you can route the output from the Channel and Mix sections to the same multitrack bus—impossible using the central switch matrix—by using aux send 3/4. Since the output from this 2-channel bus is also available at the input to the Track Assign Matrix, you can directly access the required signal paths. In addition, routing channel outputs via aux send 3/4 to redundant track buses provides extra sends from each channel during tracking and remix.

All in all, once you understand how signals are selected via the various designated outputs from each section, and how they can be interconnected, running the Concept I is elementary.

SYSTEM STATUS DISPLAYS

A bank of handy signal indicators is located in the upper section of each channel module. The more familiar 24-segment LED meter, which normally displays either peak or VU levels to the corresponding group output bus, also can be switched to display the current track-bus assignment. In this way, you can easily scan the output LEDs to check that signals are being routed correctly, and that levels are within acceptable ranges. A separate bank of LEDs below the level/track-assign meters displays a variety of useful system-status information, including routing assignment for both the Channel and Mix sections.

The use of centrally controlled assignment can be a double-edged sword. While, on the one hand, you can store and recall every switch setting, interrogating and displaying the myriad signals flowing through the console's sections can be a nightmare. Traditional consoles show you that a channel is routed to bus #23 and #24, for example, by the position of the corresponding buttons. Concept I offers a good compromise:

a set of carefully selected displays that provide the essential data quickly and easily.

STEREO I/O FUNCTIONS

In addition to the traditional mono channel and master modules, Otari offers stereo versions for post-production, broadcast and similar operations. The stereo input module provides separate Main and Return paths. The Main signal path contains the stereo 4-band sweep EQ section, with extra width and balance controls. The Return section can be used for stereo effects units, with independent level and pan controls. Access also is provided from either Main or Effects to the ten aux sends.

Input to the stereo group module can be connected to either the corresponding track bus or an independent line-level source. The two internal signal paths are designated Main and Group; the former contains the module's 4-band stereo EQ. In this way, one can set up submixes and stems from track-assign buses, or mix-minus balances using the various aux sends.

The combination of mixed mono and stereo input modules, plus a collection of stereo group modules, allows Concept I to be laid out to simultaneously derive multitrack sends, submix stems, mix-minus balances, main multichannel mixes and so on. Although true surround-sound assignment and panning is not provided from each module, there are two possible work-arounds: either use four buses labeled Left, Center, Right and Surround, and then use paralleled channels to provide LCR and front-back panning; or use one of the aux sends for surround-sound assignment panning. In either case, the addition of moving-fader automation means that you can view the complex level moves needed to route and pan a signal between various output destinations.

The optional Dynamics Control package provides centralized control of compression, limiting and gating for either the Mix path or both Mix and Channel sections. Prices range from $7,700 for 24 channels of Mix path dynamics to $11,700 for 48 channels of simultaneous control. Gain adjustment is via the VCAs fitted in each signal path. A separate video display plus assignable controls lets you set up the dynamics envelope and attack and release times on either a channel-by-channel or global basis. Gain reduction can also be displayed on the corresponding channel level meter. Two or four processor paths can be linked to ensure correct stereo and surround-sound imaging.

It's hard to find a console that offers the power, speed and versatility of the Otari Concept I. It is very clearly laid out and, once you have come to terms with the central assignment controls—and one or two operational limitations—the console never gets in your way. Operation of the VCA and moving-fader automation is incredibly intuitive. You never have to slow down to label or store mixes; it all happens in the background. In fact, all you need to do is concentrate on what's coming through the control-room monitors. Concept I sounds great, especially the EQ section, and is highly recommended for the quality- and cost-conscious studio operator.

My sincere thanks to composer Robert Irving, for allowing me access to his 48-channel Concept I for these evaluation sessions, and for some great coffee! ■

—FROM PAGE 173, BITS & PIECES

al restoration projects on its Sonic System for Rhino Records and Justin Time Records...**Le Studio Mobile**'s recent projects have included sound for the TV broadcast of the Juno Awards in Toronto and the *Canada Day Special* in Ottawa, and TV specials for Carroll Baker and Jeff Healey. The facility is currently working on the production of a series of classical recordings of the Montreal Symphony Orchestra for the CBC. Le Studio Mobile features a Soundcraft 64-input console and a Studer 24-track recorder...

ONTARIO

David Greene of Toronto's **Magnetic Music** has become the founding member of the newly formed Toronto Chapter of SPARS. The chapter's inaugural meeting was held at the end of May at the Harris Institute for the Arts. Magnetic Music was the site for creation of music libraries for a number of television programs, including the animated series *Free Willy* based on the popular film, and *Tales From the Cryptkeeper*...**Reaction Studios** (Toronto), equipped with an SSL 4040G, a Studer A827 and Dolby SR, recently hosted Alert artist Kim Mitchell with Joe Hardy producing, James Stewart producing Glueleg, and the Breit Brothers with producer Steve Addabbo...**Group One Acoustics Inc.** (Toronto) recently completed redesign work for a number of Toronto facilities, including **Digital Music Productions** (redesign of control rooms A and B and new Studio B), **Wellesley Studio** (450-square-foot control room and two studios) and **Lonesome Pine** (new control room and studio suite)...At **Electronic Media Arts Corporation** (London), Rob Nation recently completed tracking and mixing an album for hard rockers Aces Wild with producer Peter Brennan. Other recent projects at EMAC were Joe Vaughan tracking and mixing BMG artist Glenn Bennett, and The Hitmen; and Joe Finlan engineering jazz sessions with Denise Pelley and producer Jack Richardson, and big band music from The Canadian Modernaires. EMAC recently added a digital audio editing/mixing and post-production suite centered around a Spectral Synthesis DAW...**McClear Pathe Recording and Post-Production** in Toronto, which celebrated the

grand opening of its Studio Four this summer (housing the facility's second Pro Tools system), hosted the recording of Rush's album *Counterparts*. (Rush was inducted to the Juno Hall of Fame this year.) Also at McClear Pathe, Jeff Wolpert engineered and co-produced two new recordings by a cappella group The Nylons...**Master's Workshop** of Toronto has been working on a number of alternate-language versions of the Imax/Omnimax feature *Africa: The Serengeti*, for which the facility provided audio post-production. Master's, recently nominated for a Golden Reel Award for an episode of the series *African Skies*, was also hired by Alliance Communications to create soundtracks for four Movies of the Week for CBS by the end of this year...**Pizazzudio Recording Studio** (Weston) recently hosted sessions for David Deacon's debut album, *Over the Line*, mixed by Andy and Ryan and Michael Jack, and mastering sessions for Bryan Way's *Kid From the Country*, produced by J.K. Gulley and engineered by Michael Jack at the Power Plant in Barrie, Ontario. Equipment used for the mastering work included Digidesign's MasterListCD and a Sony CD recorder...**Keen Music Voice and Sound Design** upgraded its facility with a second Fairlight running MFX 2. Another addition to Keen is engineer Terry Wedel, formerly of Mastertrack...The **BCB Technology Group Inc.** (Woodbridge) and **Sidus Systems Inc.** arrived at a marketing agreement for the design and sale of digital voice-recording and transcription systems. Sidus Systems is a manufacturer, systems integrator and distributor of computers, peripherals and network products. BCB Technology manufactures and distributes products in the computer telephony and voice-processing markets based on its proprietary technology...

BRITISH COLUMBIA

Warehouse Studios (Vancouver) plans to open an expanded facility in early 1995. Recently Warehouse, which features a 58-input Air Studios Neve console, an SSL 72-input G Series with Total Recall and KRK and Yamaha monitors, has been booked by clients such as The Cult, Nine Inch Nails, k.d. lang and Motley Crue... The owners of **Desolation Sound Studio** (Vancouver) pride themselves on their collection of vintage tube equipment. This facility's recent projects include work with Carl Anderson (of *Jesus Christ Superstar*), vocalist Devin Townsend and James' Guitarist Saul Davies...**Turtle Recording** had its mobile van out this summer with the CFMI (radio) Unplugged Concert Series, held at the Arts Club Backstage and produced and engineered by Larry Anschell. Artists featured in the series included Randy Bachman, Lowest of the Low, Ashley MacIsaac and The Watchmen...At **Mushroom Studios** (Vancouver), Nettwerk Records artists Ginger (formerly the Grapes of Wrath) were in recording their latest album with New York producer/engineer Jim Rondinelli and Blair Calibaba assisting. Troubadour Records' international children's artist Raffi was in with Michael Crebver and Rolf Hennemann, laying tracks for the next Raffi record, which was scheduled for fall release...A new addition to Vancouver's north shore is **Machine Works**. This facility, owned by Paul Dean (of Loverboy and Streetheart) features an SSL 4000 E Series console and a Studer 2-inch, 24-track tape machine. Machine Works hosted sessions for Marc LeFrance's debut independent release, *Out of Nowhere* on Delinquent Records (produced by Dean), as well as for Dean's own solo album, *Machine*, engineered by Ken Lomas, Dean and Joel VanDyke ...Vancouver also has a new record label, **Plum Records**, owned by songwriter/producer John Dexter (The Motels, The Tubes, Cheap Trick). The first acts signed by Plum include Rymes with Orange and Blf Naked. ■

—FROM PAGE 167, GLENN GOULD STUDIO

to this facility includes recorders from Studer and Sony, monitors from Bryston, Camber and Tannoy, an extensive collection of AKG, B&K, Countryman, Sennheiser and Shure mics and, in appropriate recognition of the GGS's namesake, two 9-foot Steinway grand pianos. And McLaughlin stresses that the studio's equipment capabilities don't stop there. As part of the CBC, Glenn Gould's staff has access to a virtually unlimited inventory.

Recent projects completed at the Glenn Gould Studio include live performances by the Oscar Peterson Trio and Bruce Cockburn, and Elvis Costello and the Brodsky Quartet recording music for the soundtrack of *Lost in the Stars*. ■

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MIX MARKETPLACE
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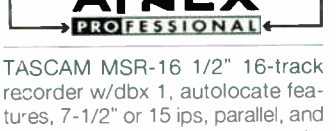

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—FROM PAGE 38, FROOM AND BLAKE

ing to remember. You tend to get the most done in the moment—if you stick with it.

Bonzai: Richard Thompson is an interesting character—how has that gone?

Froom: He's the first artist that we've worked with on four albums. My favorite thing is to work with someone over and over again. With Richard, his records have always been quick, and he's a lot of fun. In terms of things like pre-production, I'll get together with him for a day or two before the recording, and he plays me the songs. Those are the ones we do, and I rarely have any suggestions. He knows how to write a song, and it wouldn't make any sense to start talking about things like moving the bridge here and there. Once in a while, we'll make some changes, but he has a very strong take on what he's doing. The discussion is mostly about the musicians and the type of record he wants to end up with. Lately, he's been talking about doing two records: a '50s-ish pop album and an acoustic album.

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Blake: I think he had a hormonal disorder.

Froom: By the time they found a cure, he already had a career. He had a hit with Lionel Hampton in the '40s and has been going ever since. But it's the classic story of being screwed over by the music industry. Ray Charles really liked his work and made a record with him, with orchestral arrangements by Marty Paich. Jimmy thought he had finally made it, but he had a contract with some small label, and they wouldn't let him release it.

Blake: He's very small and skinny, and everyone thought he was on heroin, so he was often arrested and treated very badly.

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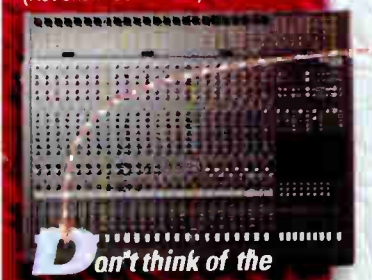

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And naturally the MicroSeries 1202 also has the better-than-compact-disc dynamic range, incredibly low noise specifications and sheer musicality that have won our larger mixers a place in major recording and broadcast facilities worldwide.

At $399, every audio professional should have a 1202 in their bag of tricks. For submixing, for extra high quality mic preamps, for impedance and level shifting.

Call toll-free for more information on the remarkable MS1202.

Microphone preamplifiers *so good that they are regularly used for direct-to-DAT audiophile classical recordings. In fact, many engineers prefer them to the mic pre's on ultra-expensive, big-studio consoles.*

Two ***auxiliary sends*** *per channel.*

Two-band equalization *at useful points: Low EQ at 80Hz (instead of the usual 100Hz), high EQ at 12kHz (instead of 10kHz).*

Trim controls*. Set these controls once per session and then forget about 'em thanks to the MS1202's forgiving, UnityPlus gain structure*

Four bal./unbal. mono ***line inputs.***

No hum-inducing, outlet-eating power supply "wall wart!" The MS1202 has a ***built-in power supply*** *and uses a standard IEC line cord.*

Two stereo ***effects returns.***

Four stereo or mono ***line inputs.***

RCA-type ***tape inputs & outputs.***

Balanced main outputs.

Solid steel chassis*...and a "footprint" of less than one square foot.*

Horizontal*, double-sided thru-holed plated* ***fiberglass circuit board*** *design, brass standoffs and special* ***shock-absorbing knob design*** *makes the MS1202 incredibly resistant to frontal impacts.*

Big console specifications: *–129dBm mic E.I.N., 90dB working signal-to-noise ratio, 116dB internal dynamic range (that's 26dB better than compact discs) and 300K bandwidth.*

For a very impressive, current example of just how good the MS1202's mic preamps sound, check out acoustic guitarist Edward Gerhard's CD, ***"Luna"****, on the Virtue label (VRD 1921). It was recorded direct to DAT via a* ***MicroSeries 1202*** *and a stereo pair of Neumann KM 140 microphones.*

Sealed rotary potentiometers *resist dust and liquid contamination.*

"This little mixer has the same electronics as Mackie's incredibly popular CR-1604. The MS1202 is billed as a ***'low noise, high headroom mic/line mixer,'*** *and certainly lives up to its word. The whole thing is laid out extremely logically, clearly and ergonomically. The gain has been structured to actually work in the real world."*
Recording (formerly Home & Studio Recording) Magazine

"We needed a quiet 4-channel preamp with lots of headroom. The MS1202 was as cheap as any preamp and sounds even better!"
R.N., Cincinnati, OH (recent MS1202 registration card)

Extremely powerful ***headphone amplifier*** *with independent volume control.*

Tape input to AUX 2 by pressing ***Tape In.***

Unique ***3-way metering*** *from two 12-LED displays. Normally, the LED ladders display* ***main left/right output****. When the Channel Metering button is pressed, the left LED ladder shows* ***mic preamp operating levels*** *(so you can correctly set the Trim pots), while the right LED ladder shows channel operating levels.*

*Suggested U.S. retail price.

MACKIE.

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You have a greater number of configurations from which to choose. With more systems containing large format compression drivers plus a dual 18-inch subwoofer system, SR Series II is sure to have the loudspeaker systems to fit your needs.

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Our newest horn technology, available in five models, yields outstanding pattern control (90° X 50°) and exhibits the lowest midband distortion we have ever achieved in large format systems. Equally important, the 2447J compression driver extends high frequency response well above 18 kHz, virtually eliminating the need for a separate tweeter.

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Many of the models incorporate recent breakthroughs in component design. The 2119H has been engineered for extra output power capability in dedicated midrange applications. Our 2417H small format compression driver incorporates the lightest diaphragm we have ever made, resulting in exceptional transient response, enhanced high frequency clarity and crisp, clear vocals.

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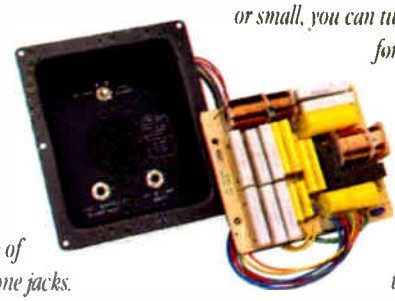
You now have the choice of Speak-On® connectors or phone jacks. Speak-On's permit the use of multi-conductor cable for quick and reliable set-ups. Or you can choose the simplicity and convenience of 1/4-inch phone jacks. The input terminal cup is made of heavy gauge steel to endure years of road use and abuse. A heavy-duty rotary switch makes selecting Passive or Bi-amp operational modes quick, easy and reliable. Crossover networks have been re-engineered to survive years of road work and offer outstanding acoustic performance. Highest quality close tolerance capacitors, high power resistors and low insertion-loss inductors assure the smoothest possible acoustic response. Regardless of your application, large or small, you can turn to SR Series II for the most reliable sound reinforcement solutions. For complete technical information via fax, call the FlashFax number below. Better yet, stop by your local JBL Professional dealer for a personal demonstration.



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