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U2 360°

Michael Romanowski Mastering, San Francisco

A PENTON MEDIA PUBLICATION

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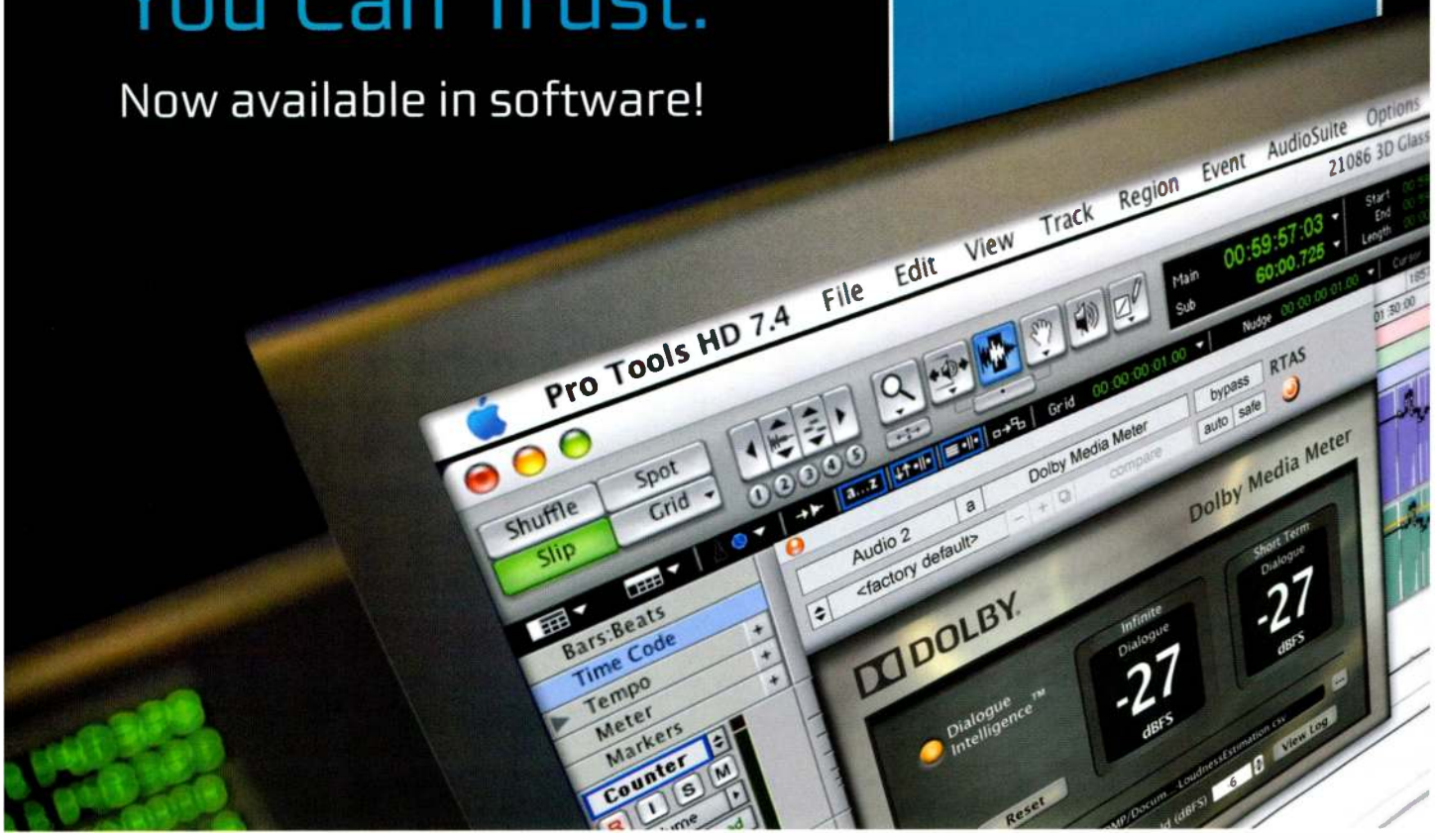

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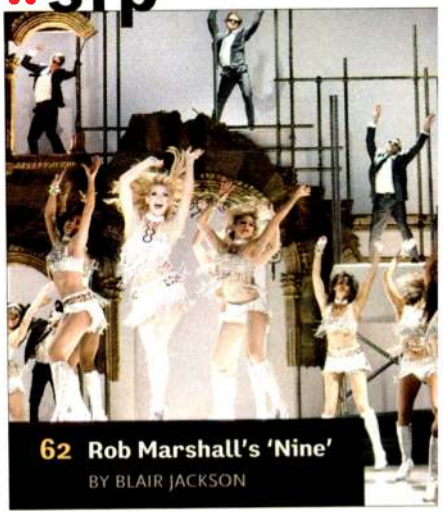

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on the cover

On the Cover: Michael Romanowski Mastering in San Francisco was hand-built by the owners and features the first installation of Focal's Grande Utopia EM monitoring system. Photo: Rick English. Inset: Steve Jennings.

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The Misunderstood Part of the Record Process

The Recording Academy's Producers & Engineers Wing put on yet another dynamite panel in October, its 26th with the Audio Engineering Society. Titled "Mixing With Attitude," it featured Tony Maserati, Chris Lord-Alge and Chuck Ainlay, moderated by Nile Rodgers—all engineers and producers at the top of their games. The conversation was lively, spirited, chock full of contrasting styles. However, all the participants agreed on the mission of any project: Serve the artist, serve the song.

Then the Q&A started, and after a funny interlude with the first question from Bob Clearmountain, another audience member stood up and asked what the panelists do to prevent a mastering engineer from screwing up their track. The engineers onstage looked genuinely puzzled, momentarily at a loss for words. "I've never experienced that," Ainlay piped in. "I have a great relationship with my mastering engineers, and I rely on them. They've always made my tracks sound better." The other two echoed the sentiment, and then it went to the next question. But the pause was slightly awkward.

The exchange reminded me about how misunderstood the mastering process remains. Labels and management seem to be forever pushing an escalating loudness war; manufacturers are developing plug-ins and trying to convince a generation that they can do it themselves; and there are still producers out there who think a mastering engineer is trying to "screw up their song." Stuck in the middle are the mixers and the mastering engineers themselves. And everyone's facing pressure on all fronts, in all formats, with decreased budgets thrown in to boot.

As we used to write back in the '80s, there is no "dark art" to mastering. These aren't "wizards" who toil away in some lab somewhere only to appear with a finished reference ready for pressing or radio play or MP3 delivery. These are engineers—artists really—who work in the most precise and detail-revealing listening environments imaginable, tweaked to their individual specs with a signal chain that works for them. These are dedicated pros who can reach for subtlety and then bang you over the head with screaming guitar. They know that a vocal carries the day. And they do care about the artist and the song.

The relationship a mixer has with a mastering engineer is truly collaborative. When you send a track off to mastering, you're not paying for the room or the audiophile equipment. You're paying for the years and years of knowledge, across all genres of music. You're paying for the artist's touch. Michael Romanowski, a San Francisco–based mastering engineer whose room is featured on this month's cover, says, "I appreciate that people are doing projects on their own, but the more people do their own records, the more they need a mastering engineer. They need that perspective."

So continue to record, edit and mix at the highest resolution, with the artist and the song as your guide. Then turn it over to an extra set of "golden ears." You'll be glad you did.

Tom Kenny
Editor

MIX

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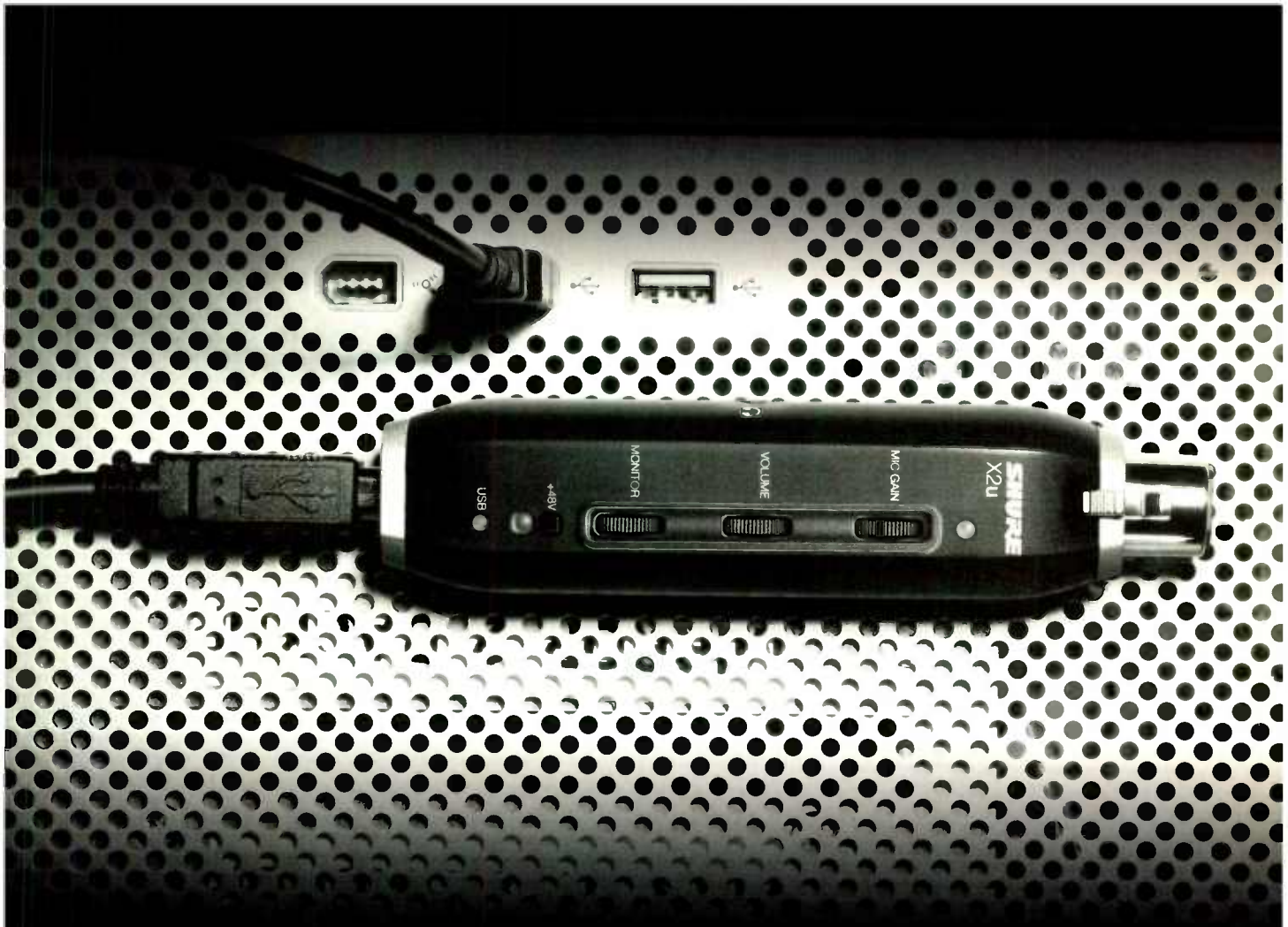

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By Tom Kenny

Michael Romanowski Mastering

There are a couple of legacies rippling through this month's *Mix* cover. The first involves the owner, mastering engineer Michael Romanowski, who came to the San Francisco Bay Area from Nashville a little more than 15 years ago and has since become heir apparent in a mastering-mentor line that began with the dean of Bay Area mastering, George Horn, followed by the equally legendary Paul Stubblebine and Phil Brown.

The other legacy involves the location. When Stubblebine—a longtime first-call engineer going back to CBS Records' The Automatt days, then Rocket Lab, then Paul Stubblebine Mastering—left his operation at Hyde Street in 2002, he assumed the lease at 1340 Mission, home of Coast Recorders. Leaving the Bill Putnam–designed space from the 1960s intact, Stubblebine and Romanowski set about building a couple of mastering rooms with the goal of creating a full-blown creative production hub.

"We built everything in these rooms ourselves," says Romanowski, referring to the fact that he and Brown actually strapped on tool belts. "We ripped everything out to the studs and implemented our own design. We knew the dimensions we wanted, the density of materials, the height; then we started building out the walls and ceiling. We built the lighting system, the bass traps, the ceiling. At various stages, we would have [acoustical consultant] Bob Hodas come in and shoot the room and we would modify accordingly."

Berkeley-based Hodas, who has tuned more than 1,000 rooms in his career, considered this job something of a pet project. He's been friends with Stubblebine since 1980, and it was he who introduced the team to the Focal Grande Utopia EM monitor system featured on this month's cover. "The front rooms didn't exist before," explains Hodas. "I came in at the beginning of the studio renovation to consult, first on concepts and room size, and then at various stages of development for wall construction, treatments and speaker placement. We used my SIM system and Paul's HD-1s, plus a sub to test for speaker placement and room response. This is a mastering room, so they didn't want it to be overly absorptive."

After diffusion was in place, bass traps built in the front corners and reverb time adjusted, six years later Hodas found himself with the team at the Rocky Mountain Audio Festival, an annual audiophile gathering. He had been familiar with the Focals and had seen the Grande Utopias in an early stage at the factory at France. In Denver, he asked Stubblebine and Romanowski, "Can you master on these?"

From left, the design/engineering team: Bob Hodas, Paul Stubblebine and Michael Romanowski

PHOTO: RICK ENGLISH

"I feel like this speaker was made for me," Hodas says. "It's a vertical array with an articulating spine, so you can line up the drivers to optimize time arrival at any listening distance. The tweeter goes out to 40k for the new HD audio, and it has an electromagnetic subwoofer that allows you to control the amount of current. With Q control, crossover and level adjustments, it's extremely flexible and efficient.

"I was just looking for something that was brutally honest," adds Romanowski, who uses Sonic Studio SoundBlade with Pacific Microsonics AD/DA converters and a host of analog gear, along with Pathos Adrenaline amps on the Focals. "In mastering, we need to hear what's going on, we need it to be predicatable and we need it to be as translatable as possible. I do have digital EQ and compression—both outboard and hardware— but I have no plug-ins. I'll use analog EQ for the broad strokes, the sculpting, and then I'll hone in with the precision with digital. I don't like sample rate conversion, going down or up. I guess I'm a little bit old-school."

A little more than two years ago, Romanowski assumed the lease from Stubblebine at 1340 Mission. Today, the building houses Romanowki Mastering, along with a second, identically framed mastering room run by John Greenham; Broken Radio—the former Coast studio now run by Matt Boudreau—is a partner in the building; Mike Winger, a songwriter and producer, has production offices upstairs; and Stubblebine still masters to vinyl on the Scully lathe and devotes much of his time to The Tape Project (with third partner Dan Schmalle), a subscriber-based series with 10 classic album releases a year on ¼-inch tape.

Vinyl? Tape? "Yes, a lot of people thought we were nuts, but we had been kicking the idea around for decades," Stubblebine says. "We had expertise in mastering, licensing, hardware and the format. It's a very small niche, but without overblowing the resurgence in vinyl, we discovered a market that will absorb an analog presentation. We decided to go back to master-tape presentation.

"As long as I've been working in San Francisco, there's been a lot of independent activity, always a willingness on the parts of labels and individuals to take a chance," Stubblebine adds. "You had Hi-Tone, Fantasy, Acoustic Disc and then a lot of individuals who go their own way. I've always related to that independent spirit within the independent community. There are a tremendous amount of tools available out there for creative people to make their own records. But the more that people do it themselves, the more they really need the final touch of professional mastering." III

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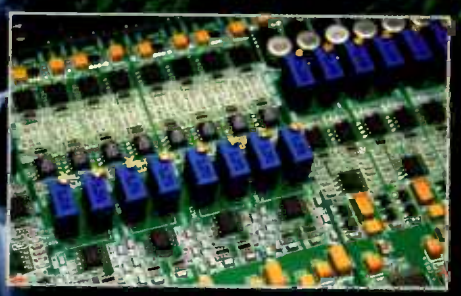

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CURRENT

compiled by Sarah Benzuly

THE NEW MSR STUDIOS

New York City's largest studios continue to be a healthy source of intrigue for Big Apple dwellers and beyond. The recent developments springing from the facility formerly known as Legacy Recording proved to be food for "Page Six"–style fodder, as Dave Amlen became the sole owner of the studio complex on 48th Street on October 16.

The acquisition came following the settlement of an ongoing dispute between Amlen and his former Legacy partners, Simon Andrews, Frank Filipetti and Ed Glickman. "It was a marriage and it broke up. Like any partnership, there were issues involving finances, the dispersion of funds, who was entitled to what and why," Amlen said. "We fought for a year and spent a lot. At the end of the day, we decided it was better to resolve this than keep fighting because the only people who were going to make money about it were the attorneys."

PHOTO: DAVID WEISS

From left: general manager Matt Carter, owner Dave Amlen and chief engineer Bradshaw Leigh, all of MSR Studios

Once he gained control of Legacy, Amlen merged it with his two-room production facility on 36th Street, Manhattan Sound Recording (MSR), to form one combined entity known as MSR Studios (www.msrstudiosny.com). According to Amlen, the addition of 48th Street's two tracking rooms and large-format mix room to MSR creates the largest full-service, dual location recording facility in New York City.

"I think this is a good thing for everyone," Amlen said, referring to the potential impact of this latest development on the city. "I want to cater to the clients and give them what they want, but it is a two-way street and we have to make sure we can afford to stay in business. It's a little give-and-take. For my part, I'm glad to put this chapter behind me, and I'm going to relish what's ahead for MSR Studios."

—*David Weiss*

API Turns 40

Front-of-house engineer Dave Natale (Rolling Stones, Fleetwood Mac, Tina Turner) mixes Landreth and Weir on an API 1608.

API celebrated its 40th anniversary at the 2009 AES convention with a party at the Roseland Ballroom in New York City's Theater District. Food, drinks, live entertainment and special guests were on hand, including Sonny Landreth and his band and former Grateful Dead member Bob Weir.

The company's origins In the late 1960s Saul Walker, who had an ongoing interest in radio and studio electronics from his college days, partnered with Lou Lindauer to establish Automated Processes Incorporated (API) on Long Island, N.Y. In 1969, the pair began designing and manufacturing their own components, starting with faders and amplifiers. Walker designed a proprietary op amp, the 2520, which became central to many of his designs, including the 512 mic pre, 550A EQ, 525 comp, 560 graphic EQ, 1604 console and more. He also developed the API 960, the first programmable, continuously variable, parametric EQ.

BlueArrow Hits The Mark

The Nashville Music Awards reception on the first evening of Next Big Nashville (October 7) named Landmark Digital Services, an audio recognition and broadcast-monitoring provider, as Innovator of the Year. The company's BlueArrow audio recognition technology was cited as a "leader in advancing music through technological innovation."

BlueArrow is a patented pattern-recognition algorithm capable of identifying recorded music from any audio source by matching a short sample against a massive database of audio "fingerprints" or signature files. The technology can identify recorded music within one to two seconds despite high noise, signal interference or compression.

Studio Unknown

We kick off a new online series written by and for mid-level studio owners. On a monthly basis, Studio Unknown (Baltimore) owner Kevin Hill and creative director Lisa Horan will be calling around the country and bringing their own expertise to the issues that matter most to a successful studio life. Let's face it, the middle has been hit hard in the economic downturn, but it's also the middle that is most likely to come roaring back. In this month's installment, they talk about mastering. Check it out at mixonline.com/studio_unknown.

Studio Unknown owner/engineer Kevin Hill and creative director Lisa Horan

Industry News


Johan Wadsten


Tony Van Veen

Kirk Imamura (Avatar Studios) and **Tony Van Veen** (Discmakers) join **SPARS**' board of directors. **Jed Allen** joins **Universal Audio** (Scotts Valley, CA) in the newly created position of director of international sales...**iZotope** (Cambridge, MA) news: **Hart Shafer**, director of production management, and end of distribution agreement with **M-Audio** whereby iZotope will handle its own distribution...**Johan Wadsten** takes on international product development for **Merging** Technologies' (Switzerland) Ovation...New business development manager at **Powersoft** (Florence, Italy) is **Thomas Mittelmann**...**Nigel Toates** is **TC Group**'s (Kitchener, Ontario) new Western regional sales manager for the MI retail segment...Distribution news: **MXL Microphones** (El Segundo, CA) names **TMP Pro Distribution** (Berlin, CT) to handle the company's V67 Series microphones...**Kurzweil** and **Fostex** (Agoura Hills, CA) team up with **American Music & Sound** (Agoura Hills, CA) for exclusive distribution; AM&S also adds **Phonic** (Taiwan) to its distribution network; **TransAudio Group** (Las Vegas) is **Tonelux Designs**' (Woodbridge, VA) exclusive worldwide distributor; and **ARX Systems** (Scottsdale, AZ) appoints **Sterling Do Brasil** (Rio de Janeiro).

seen & heard

"We need to address this; if we don't, we're going to end up with no available credits at all and no good way to track information for payment."

—Newly appointed P&E Wing Steering Committee co-chair Eric Schilling on the recording metadata project with BMS/Chace and the Library of Congress

Soundworks Live

Two years ago, San Francisco Bay Area–based director Michael Coleman started producing sound for film video profiles for *Mix* online, focusing on the individuals and sound teams who work on the film sound mixes. Now, Coleman has launched www.SoundWorksCollection.com with an Oscar Sound recognition focus. Every two weeks until Oscar night in March 2010, the Soundworks Collection site will release a new sound-for-film profile. You can follow the online series and watch such film profiles as *2012*, *Where the Wild Things Are*, *Terminator Salvation*, *The Princess and the Frog*, *Inglourious Basterds* and more.

Michael Coleman

onthemove

Tom Benson,
Powersoft VP/director of operations

Main Responsibilities: sales and marketing management.

Previous Lives:

- 2004-present, RF Pro VP/director of operations
- 1998-2004, Group One live audio division sales/marketing manager
- 1996-1998, Crest Audio Northeast region division manager
- 1986-1996, Metropolis Audio president
- Positions at Ramsa Division of Panasonic, Beyerdynamic, EUMIG, TDK Electronics

My favorite memory from working in this industry is...working the Pavarotti concert in New York's Central Park.

What I'm listening to: rock, classical/opera, blues, jazz, musical theater and singer/songwriter works.

When I'm not in the office, you can find me...on my sailboat in the warmer months, at Broadway shows and concerts, doing volunteer community service, attending events and board meetings at the LI Music Hall of Fame and on my bicycle.

Mix Master Directory Spotlight

This month's featured listing from the new online-only Mix Master Directory (directory.mixonline.com/mmd)

Colorado Sound Studios

Colorado Sound Studios is a multi-Gold and Platinum Award–winning recording facility providing top-quality recording services for local and national acts. Our studios feature a nice blend of vintage microphones, outboard gear and instruments.

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Terra Nova Mastering—First in Austin

For the past five years, Terra Nova Mastering (www.terranovamastering.com) has handled all of New West Records' *Austin City Limits* releases—a series of 5.1 surround DVDs and full-length CDs that showcase not only the best of *ACL*, but many of the best roots and rock 'n' roll performers anywhere. Chief engineer Jerry Tubb's first *ACL* project was a Lucinda Williams performance; other highlights have included Norah Jones, David Byrne, Neko Case and the Platinum-selling DVD of Johnny Cash's 1987 appearance on the program. And New West is just one of the thousands of clients that Tubb and his wife and partner, interior designer/artist Diane Tubb, have hosted during the 19 years since they opened Austin's first dedicated mastering facility.

"Jerry and I met in Midland,Texas," Diane Tubb says. "He was head of the commercial music department at Midland Junior College. We had been married about a year when he came back from one of the earliest South by Southwests, and said, 'You know, there's no mastering studio in Austin.'"

"So I had the bright idea to quit my job," Jerry Tubb says with a laugh. "And we picked up and moved to Austin."

The Tubbs' first studio was in a spare bedroom in their new home, but after a talented young singer/songwriter named Bob Schneider tracked mud through the house, "Diane said, 'Go find yourself a studio,'" Jerry Tubb says.

The Tubbs then rented an 800-square-foot space where Jerry Tubb could set up a Digidesign Sound Tools system, and Diane Tubb ran the business side. They launched a direct-mail campaign to Texas musicians, studios and engineers, and word spread that Austin had its own digital mastering studio. "I started working with Willie Nelson and Ray Benson and Jerry Jeff Walker," Jerry Tubb says. "We were off and running."

Terra Nova has moved/expanded twice more since then; it's now situated in a 3,000-square-foot industrial space that includes two 400-square-foot mastering rooms—one occupied by Jerry Tubb and the other by engineer Nick Landis, who works mainly in Pro Tools.

Jerry Tubb's studio centers around Sonic Studio's SoundBlade. His main monitors are Dunlavy SC-IVAs; in '04, when New West called, he added Paradigm center and surround speakers. And though he's used a digital platform since 1990, he relies on some key analog pieces: Sontec 432 mastering EQ, Millennia Media NSEQ2 with Fred Forssell mods and Manley VariMu compressor.

PHOTO: COOKE PHOTOGRAPHICS

For 19 years, Jerry and Diane Tubb have owned and operated Terra Nova; mastering credits include Eric Johnson, John Hiatt, Marcia Ball and 15 Willie Nelson albums.

The studios were designed by Jerry Tubb and Austin's Gilbert Designs. "I'd been working in small, dead rooms for too long," Jerry Tubb says, "so I wanted a big room with a tall ceiling and we left it pretty live. When we were finishing the acoustics of the room, we needed more treatment, so I asked Diane to do some paintings on big canvases. My walls here are covered with these far-out paintings of abstract guitars and violins. And I have to say, Diane is responsible for the success of our business. She is so good with people and always has a big smile and lots of charm; people just want to come see us and hang out."

—Barbara Schultz

project studio ACMastering

Mastering engineer Adrian Carr opened ACMastering in his Montreal home in 2008 after a long career in New York City.

For two decades, mastering engineer/musician/composer Adrian Carr was well-established in New York City. Educated at Juilliard and at Princeton University, Carr went on to run his own facility in Midtown Manhattan's Film Center Building from 1988 until 2005. There, he originally specialized in recording acoustic music (mainly classical and jazz) before rededicating his services to mastering in 1998 and amassing credits for a number of classical labels, as well as Motown, Capitol Nashville and EMI Latin.

In 2005, Carr took a break from the music industry and relocated to Montreal's South Shore. "I moved up here to be with my wife," Carr explains. "I love Montreal. There's lots of music happening here. Most of the funding for the arts comes from the government." Carr then began a new chapter in his own career by building a mastering room in his home, which he opened in 2008 as ACMastering (acmastering.com). "Today, everybody is trying to keep costs down," he says. "I didn't want to start again with a big overhead."

Carr built his room around Focal Twin6 Be monitors with Tannoy TS12

New Mastering Studios for Fuller, Airshow

Latin Grammy–nominated **Michael Fuller**, who's now in his 24th year operating **Fullersound Mastering**, and whose career included years as senior mastering engineer at Criteria Studios (now Hit Factory Criteria, Miami), has worked on releases for Rod Stewart, Andrés Cepeda, Daddy Yankee and more. In September, Fuller opened a new studio in Fort Lauderdale, Fla. (www.fullersound.com), designed by John Arthur of Arthur-Lambert. Fullersound is equipped with a Dangerous Music mastering console, Cube-Tec AC-5, Sonic Solutions and Pro Tools HD Version 7.4, plus Dynaudio M3 mains, Prism Sound converters and a variety of analog and digital processing.

PHOTO: LISETTE ARENCIBIA

Veteran engineer Michael Fuller's Fullersound went online September 1.

Charlie Pilzer cut the ribbon on his new **Airshow Mastering** studio (Takoma Park, Md.; www.airshowmastering.com) in November. As we wrote last December, the studio is also the new home of recording/mixing engineer Frank Marchand. Designed by Sam Berkow of SIA Acoustics, Pilzer's studio includes a Sonic Studio SoundBlade workstation, Maselec MTC-2 mastering console and Duntech 2001 monitors. Marchand uses a Digidesign ICON console and Pro Tools HD3 Accel.

—Barbara Schultz

PHOTO: MIKE MONSIEUR

The opening of Charlie Pilzer's new Airshow Mastering studio was announced in October at AES.

Track Sheet

We're seeing a lot more boutique vinyl releases, and among them is X's second album, *Wild Gift*. First released by Slash Records in 1981, this seminal punk album has been remastered from the original ¼-inch analog tapes for 180-gram vinyl. The project was overseen by the bandmembers and Porterhouse Records president Steve Kravac, and was done by **Brian "Big Bass" Gardner** at **Bernie Grundman Mastering** (Hollywood)...Vice Records artists **The Raveonettes** returned to **The Lodge** (Indianapolis) to master their fourth album, *In and Out of Control*. Engineers on the project were **Emily Lazar** and **Joe LaPorta**...In the Chris Pelonis–designed **Nettleingham Audio** (Vancouver, WA), **Kevin Nettleingham** mastered releases for **Brent Mills and the Beaverton Four Square Church** and **Ferocious Eagle**...Musician/producer **Randy Emata** worked with engineer **Stephen Marsh** at **Stephen Marsh Mastering** (Hollywood) to master a new album for Christian artist **Tim Cantwell**...Engineer **Kurt Lindvall**'s new studio, **Lindvall Mastering** (Jersey City, NJ) is now open. Visit www.lindvallmastering.com for info.

PHOTO: DAVID COGGIN

From left: Porterhouse Records president Steve Kravac, John Doe of X and mastering engineer Brian "Big Bass" Gardner

Send "Sessions" news to bschultz@mixonline.com.

by Matt Gallagher

subwoofers. "Speakers are half the equation and the room is the other half," he says of mastering. "I've got more bass response in my room because I want to hear the complete spectrum." Carr also had to fortify his new room with mastering equipment—from scratch. "When I left New York City in 2005, I sold *everything*," he says. "It was probably the best thing I could do because in just three years' time, the equipment has really changed. It's come a long way in terms of ease of use and quality." ACMastering offers a plethora of top-quality equipment; Carr's Website has a detailed equipment list. "I have two different chains—analog and digital—and I use both, depending on what I think is needed," Carr explains. He uses a dual-core Mac Pro running OS 10.5, with Sonic Solutions/Sonic Studio PreMaster CD software, Sonnox Elite Oxford plug-ins, Universal Audio UAD-2 Powered Plug-Ins, Logic Pro 8 and BIAS Peak Pro 6. His analog hardware includes an A Designs HM2EQ, Charter Oak SCL-1 and Great River MAQ-2NV. Digital hardware includes a Lavry Engineering LavryBlue LE 4496 AD/DA converter and Lucid GENx192 master clock.

"Most of my business [comes] via the Internet," Carr notes. "Clients can send files over the Internet, I can send them samples, they can hear what I'm doing, and they say, basically, 'Go ahead.' That's the way my business has been getting off the ground. I'm thankful for all of the clients that I have. I almost have a completely new client list. A lot of the record companies are not there. Everything has been redefined and my rates are very reasonable—I think about half of what I used to charge."

ACMastering's business philosophy is largely shaped by independent musician clients who are new to music production. "It used to be you could fix it in the mix; now that's gotten pushed to, 'Oh, we'll fix it in mastering.' I'm developing this thing I call 'heavy vinyl mastering,' using the combination of EQ, compression and stereo imaging in the signal to create more realism and warmth. I had to find a way to open up the mix. My mantra is, 'Sound your best.' If you want to get your music out there, sounding your best is such an important step to being successful and proud of what you do!"

L.A. Grapevine

by Bud Scoppa

For years, as I made the daily commute from Studio City to Hollywood through the Cahuenga Pass, I drove past the iconic mid-century building that housed Hanna-Barbera Studios. But *The Flintstones* and *Jetsons* are long gone; in their place are the engineers of Universal Mastering Studios West, one of three mastering studios in the States owned and operated by the Universal Music Group; the others are in Santa Monica and Manhattan.

UMSW took over the premises following construction of a seven-room state-of-the-art facility inside what was formerly a warehouse space. The turnkey project was designed and overseen by Hanson Hsu's Delta H Design Inc., employing the firm's trademarked ZR (which stands for zero reflection) Acoustics®, a sophisticated technology that eliminates the need for trapezoidal architecture while using everyday materials. Indeed, each of the seven spaces—two mastering rooms and five production rooms—is strictly rectangular, and four of the production rooms are no bigger than the walk-in closet of a Beverly Hills debutante.

The facility was installed within the existing building in a "doughnut hole" arrangement, with hallways separating and surrounding the exterior of the newly built structure from the interior walls of the surrounding building. It looks conventional, but it sounds incredible, even though the rooms have yet to be totally tweaked out in terms of gear and placement. You don't have to take my word for it—just ask the guys who work in these rooms.

PHOTO ISABELLE SHU

From left, in Universal Mastering West, Mastering B, are quality-control specialist Charles Cosin, UMG senior VP of Studio and Vault Operations Paul West and studio designer/acoustician Hanson Hsu

"I love the way the room sounds; it's totally transparent," says senior mastering engineer Erick Labsen, taking a quick break from a session in Mastering B. "The room is very revealing; I'm really happy with the way things sound in here, and then, when I take them out and listen to them on other systems, they sound great, as well. When Hanson showed me how it works, I thought, 'Why hasn't anyone thought of this before?' He's come up with something that's groundbreaking in room design. From a physics and math point of view, I think it's absolutely brilliant."

"When Hanson showed us how ZR works, our jaws dropped," says senior mastering/mixing engineer Pete Doell. "It really sounds like such an obvious thing in a way. But on another level, it's like from Mars. You can stand in the corner and the bass doesn't build up, and you can hear everything coming out of both speakers. It's a good thing not only for the mastering engineer, but for the client."

According to UMG's senior VP of Studio & Vault Operations, Paul West, Hsu's nontraditional proposal was attractive because it met the studio's "eclectic" needs. "The idea of building small rooms for production, mid-sized rooms for editing and some mastering and larger rooms with mixing and mastering capabilities—all being of the same acoustic signature and design—was the key for making that decision," West explains.

"I didn't believe it till I heard it," says quality-control specialist Charles Cosin, who works in P4, one of the compact production rooms. At Hsu's suggestion, I've brought three CDs from my current listening stack, and Cosin gives me his chair for a quick playback session. I start with "Come Together" from the remastered *Abbey Road*, then "1901" from Phoenix's *Wolfgang Amadeus Phoenix* and finally "Dear God" from Monsters of Folk's self-titled debut. None of them has ever sounded clearer, fuller or more enveloping to my ears. I turned to Hsu, and asked, "Can you do my family room?"

"Look at this playback system—it's simple and clean," Hsu says. "A Hafler amp, Dynaudio BM 15s with passive crossover and stock cables. And you're hearing it the short way in a rectangular room. You can clearly pick up minute details in the content, like being able to hear the difference between 96k/24-bit files and 44.1k/16-bit files."

We head next door to P3, the bigger production room, where senior engineer/R&D specialist Ed Abbott does his thing. When I play the same three tracks through monitors Abbott designed for Dynaudio, the sound becomes downright 3-D.

Hsu takes me to the conference room, where I sign a nondisclosure agreement and he unrolls the ZR Acoustics blueprints for the job, making me privy to his secret recipe, which I am not at liberty to disclose; otherwise, he'll have to kill me. All I can say is it's insanely clever and so simple in principle. Smart guy, that Hanson Hsu.

"Every time we do a new generation of ZR, it improves exponentially," Hsu points out. "And we're always discovering new things. For example, Pete Doell discovered while changing speaker cables that you get clear stereo imaging standing *behind* the speakers. I *think* I know why that happens, but I'm still working out the science on it."

On Friday, Abbott and the UMG engineers will bring their ears to B, where they'll demo a pair of Lipinski Sound L-707s matched with dual subwoofers, which Abbott believes will be the optimum monitor configuration for the room. At the moment, there's an Audire Otez amp driving a variety of demo speakers, such as Dynaudio C3s and BM 15s, B&W 808s and the currently hooked-up Tannoy 215s.

"The room is big enough that I doubt one sub will cut it," Abbott says of the need for two subwoofers. "Besides, the ZR math was worked out for stereo speakers, so trying to position one sub would be an exercise in compromise I'm not sure we'd be able to solve satisfactorily—although it might be worth the price of admission to watch Hanson melt down trying to figure it out."

Abbott goes back to work in P3 and Hsu heads off to a meeting with studio manager Nick Dofflemyer, leaving me in B for some solo playtime. I slip in *Abbey Road*, crank up the volume and blast the second half through the Tannoys. Wow. If they go with the Lipinskis, I'll be glad to take the Tannoys off their hands and put them in my ZR Acoustics family room. Hey, I can dream, can't I? III

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NASHVILLE Skyline

by Peter Cooper

Eric Conn's life shifted with the change of a head stack.

"I was a music major in college, but I didn't know anything about recording and I'd never even heard of mastering," says Conn, who runs Independent Mastering in Nashville with friend and fellow musician Don Cobb. "A friend was doing a project at Doug Sax's Mastering Lab [then in Hollywood], and I walked in there and Doug changed the head stack on a tape machine, and all of a sudden the sound changed. That moment was where I fell in love with mastering, and thought, 'Whoa, this is what I want to do.'"

Conn wound up working at Sax's Sheffield Lab Recording for three years, and then at Denny Purcell's Georgetown Masters for four years. Cobb was also a staff member at Georgetown, where he worked for 14 years under Purcell, perhaps the most celebrated and best-loved mastering engineer in Nashville history.

"I started as a recording and mix engineer," says Cobb, who worked in that capacity with James Taylor, Quincy Jones, Waylon Jennings and others. "In the studio, it's a great process, but mastering is a little more sane schedule. What's interesting to me is that someone comes in with a data drive or a reel-to-reel tape or whatever it is, full of different mixes, and you spend the day EQ'ing and editing, and at the end of the day you can have a complete album. You get the excitement of the project, and the next day you're on to something else."

PHOTO: PETER COOPER

Don Cobb (left) and Eric Conn of Nashville's Independent Mastering

Since opening Independent Mastering in 2001, Conn and Cobb have mastered music from Garth Brooks, Kenny Chesney, George Strait, Martina McBride, Earl Scruggs, Janis Ian and numerous others, yet they talk as enthusiastically about the recent Chris Pandolfi album as about any million-seller. Pandolfi, after all, is a particularly deft Nashville banjo man, and his *Looking Glass* album—well, it sounds good.

By background and inclination, Conn and Cobb are musicians who concern themselves with signal path rather than engineers who concern themselves with music. "We do a lot of educating here, about levels and retaining dynamic range versus being competitive in the marketplace," Conn says. "We have conversations regularly about where people want to fit in the marketplace. Does someone really need to be as loud as Nickelback? A lot of clients are saying, 'No, I don't need it that loud.' If all they want is for it to be loud, we can do that, but we show everyone the other options and show them what they're gaining or missing."

The board at Independent Mastering is a custom job that started in Conn's living room.

"We wanted simplicity and a good signal path," he says. "Everything in the signal path is discrete and a lot of it is unbalanced. It's just simple: Less is more. It's the same with the monitors. We went through six months of listening to different monitor boxes, and we couldn't find anything that sounded better than what we built, which basically has a couple of switches and an attenuator. You can put relays in and complicated switching and a lot of pretty lights, and you may wind up with something that looks good and sounds like crap."

Conn and Cobb operate on a "four ears is better than two" system, working through most projects together, though Conn tends to deal more with equalization while Cobb handles the bulk of the editing duties.

"The common denominator is the Sonic Solutions editing system we use," Cobb says. "We rely on that, daily, and it's a great system."

The studio monitors are based on Pioneer components, but they're custom jobs as well, with Bryston amplifiers on the low end and McIntoshes on top. "We used to have near-fields up, and we like these so much that we don't even use the near-fields anymore," Cobb says.

Independent Mastering is located in the same complex as Masterlink, the studio that was formerly Monument and that has housed sessions by Neil Young, Kris Kristofferson and many others. Every now and again, Cobb and Conn record something at Masterlink, always for fun and always live to 2-track.

"We like that because we're musicians," Conn says. "I think one thing that puts us at a good place in this game is that we know what acoustic instruments sound like, so there's a benchmark for fidelity and a benchmark for the way an acoustic instrument sounds in real life. We've got four different sets of line amps, and two are solid-state, and each one sounds different. Spending the time to know the gear is an important part in the process, and the goal is to make the instruments sound like instruments. Some people feel that they must impart their signature on a record, but we don't feel that way: The mix engineer and the artist have worked hard to achieve that level of integrity with the mix, and it's not our job to change it. We'd rather the artists create their signature, and we're just part of the process to make sure that comes through." ■

Peter Cooper can be reached at peter@petercoopermusic.com.

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NEW YORK Metro

by David Weiss

The lure of New York City is strong, but there are issues that can break Gotham's magnetic grip on the musically minded. Why master in the granite canyons of Midtown when you can do it equally well from the comforts of home?

That's what Carl and Adrianna Rowatti, owners of Trutone Mastering Labs (www.trutonemastering.com), pondered back in March of 2008, when Sony BMG Music made a tempting buyout offer for the lease on their Midtown Manhattan studios. Sony's high-caliber mastering department had been displaced when its 54th Street building closed in late 2007. Impressed by the Walters-Storyk Design Group–designed Trutone penthouse facility, Sony BMG realized it would be faster and easier to take over the Trutone studios than to build its own from scratch.

What did the couple do? Fast-forward to the bucolic surroundings of Trutone today, a 1,500-square-foot studio facility added to their 4,400-square-foot suburban Orangeburg, N.Y., home, and the decision sure looks like a no-brainer. They took the deal and virtually re-created Rowatti's New York City mastering suite—complete with a legendary Neumann VMS-70 lathe for cutting vinyl records—in the countryside.

PHOTOS: PHILIP JENSEN CARTER

The Rowattis replicated their (former) Manhattan penthouse studio and now work from home in Orangeburg, N.Y.

Trutone Mastering owners Carl and Adrianna Rowatti

The relocation of Trutone Mastering Labs is the latest evidence that world-class mastering can thrive in a home environment. By employing decoupled floors, a fully floating room design, IAC doors, diffusers, absorption and thorough sound insulation, WSDG's John Storyk ensured that the new Trutone studio would have minimal environmental impact not only in terms of the neighborhood, but also in relation to the rest of the Rowattis' house.

"Putting studios in homes is old news, but mastering facilities are still seen as mostly being in cities," Storyk notes. "The new location for Trutone is part of a totally welcome trend and consistent with the playing field becoming more democratic. I think we will continue to see more world-class mastering facilities in homes. When designing these residential-based facilities, the two major hurdles you typically face are providing sufficient isolation and proper ceiling height."

A top priority for Rowatti—whose credits include icons such as Bruce Springsteen, Bob Dylan, Whitney Houston, Pavarotti, The Killers and the Rolling Stones (as well as Yung Joc and Cassie)—was maintaining as much continuity as possible between his New York City suite, Studio I, and his rural haunt. The new room sports fewer cubic feet, but the dissimilarities end there.

"This studio is very similar in design and function to the room I had in Manhattan—it is laid out in the same way, and I wanted to maintain a similar flavor as far as color scheme and finishes," he notes. "I kept two short racks behind me with certain gear, including a brass-face Fairchild 670 [Serial #45]. Prior to relocating, I did pick and choose the gear between New York City Trutone's Studio I and Studio II; I had the option of selecting the cream of the crop."

While digital equipment plays a role at Trutone—a Weiss EQ1 MKII and BW-102 mainframe, and Sonic Studio HD DAW are all in the rotation—analog is definitely top dog here. Given Rowatti's expertise in vinyl mastering and renown for accuracy in the transfer, that penchant for analog should be no surprise. Sitting in the sweet spot behind the Neumann SP-77 mastering console and an awe-inspiring Neumann lathe with SAL-74B cutting rack and SX-74 cutter on the right, it's clear that vinyl is indeed spoken here.

"Most of the top studios process in analog and that's what we do," Rowatti confirms. "We have a wide array of gear, from contemporary to really sought-after vintage pieces. The Sontec MES 432C mastering EQ has op amps, and the line amps in the Neumann console were rebuilt with those same Sontec op amps to drive them. Additionally, we replaced the console's input transformers with an active front end. By replacing the console's transformers with this new input and output section, we got rid of some iron and gave the console some more oomph and definition, without compromising anything I need for cutting my records."

While the Sontec is his go-to EQ, Rowatti has no compunction about putting his Pultec EMH7 vacuum tube EQ into the signal path, either—a combination of the EQP-1A3, MEQ-5 and a high/lowpass filter on one chassis, Trutone's collection represents the only four of these units that were produced. "The Pultec is a passive equalizer, and the curves are created using coils and condensers. It's a very expensive way of doing it, but it has unique characteristics as a result. It's like a musical instrument."

Away from the unrelenting pace of the New York City metropolis, Trutone Mastering nonetheless remains right in its element. For Carl Rowatti, mastering appears to be a completely intuitive process, one that may require complex tools but a quite uncomplicated explanation. "As a mastering engineer, I feel privileged to be last in command as far as putting the finishing touches on a project before it's released," he says simply. "The goal is to adjust the program for maximum volume without perceivable loss of dynamics, maintain track-to-track continuity and equalize so that everything is heard barring a non-forgiving mix. As a result, the top is crisp, the vocals are clear and defined, and the bass is where it should be." III

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As Lines Blur Between Mixing And Mastering, Engineers Stay Focused on Quality

by Sarah Jones

These are tricky times for mastering engineers. While one could argue that mastering engineers are always "mixing," the line between mixing and mastering is blurring. Certainly, low-cost tools have lowered the bar of entry for artists and engineers, and demystified some of the processes involved; lower budgets have put a crunch on overall productions, squeezing projects especially at the end stages; and, quite simply, with the number of options available through DAW recording, decisions tend to get delayed.

It's important to distinguish the difference between making fine mix adjustments in the mastering room and finishing the mix during mastering. The latest trend to enter the mastering room—the provision of mix stems accompanying a ref—can put the mastering engineer between a rock and a hard place. When yours are the final ears on a project that a producer, engineer and artist have presumably labored over for months, how much can you be expected to do? How much do you want to do?

Mix Stems and the Mastering Engineer

Stems—the separated elements of a final mix—are increasingly showing up in mastering rooms, a trend welcomed by many engineers as an opportunity to fine-tune, not finish, the mix. "I would say it's not my preference to mix anything," says Bob Ludwig (Radiohead, Bruce Springsteen, Pearl Jam, Coldplay) of Gateway Mastering (Portland, Maine). "I get to work with some of the world's greatest mixers, and I would never want to step on anybody's toes, so it's best to have something that the artist has approved beforehand and the A&R person has approved, and everybody's happy. Just send me the final thing. But having said that, if the artist is not happy with the vocal levels, for instance—which is what most of it comes down to—then it's actually cheaper to have us, or the remixer, go back to the stems that the mixer might have created. Instead of having to hire the mix studio again and go back with a big expensive console, they can take the stems and correct the odd vocal word usually right in Pro Tools or some other workstation, or they can do a special vocal-up

GRAY AREA

Jennifer Munson of Taloowa Mastering: "I almost never deal with stems."

mix from the stems very easily.

"For years, great mixers like Bob Clearmountain would routinely do a master mix—a choice mix, he would call it; a vocal up a half dB, perhaps a vocal up 1 dB and, occasionally, a vocal down a half dB or something, and then do an instrumental mix, a TV mix and now very often an a cappella mix so that vocals can be mixed back," he continues. "At the same time, we just did a new Natalie Merchant record—a fantastic record. All of the lyrics are based on children's poetry that was written in the late 1880s and early 1900s. While most of it was mixed to half-inch, the producer made sure to have everything on stems as well."

New York mastering engineer James Cruz spent long stretches at Hit Factory and Sony before opening his own facility, Zeitgeist Sound Studios (Long Island City). He recently mastered projects by Beyoncé and Calle 13, and the latter earned five Latin Grammys in '09, including Album of the year. Cruz, who also works occasionally as a mixing engineer, enjoys the flexibility of working with stems, yet is careful to maintain a mastering perspective. "Sometimes I'll actually get an 8-channel file of everything so I can tweak the mix a bit here and there," he says. "Yes, I'm making slight mix decisions at that point, and there are other mastering tools that I can use to make slight mix decisions, like different styles of EQ to bring out the stereo image or tighten it a little bit more. The more freedom I have, the better the end result is going to be. I'm not saying that I would use all of those options, but it's good to have them."

He emphasizes that he would take the same mastering approach whether or not he was dealing with stems, "but as I'm mastering it and I'm listening to it, and thinking, 'It'd be great to hear that vocal out a little bit more or hear the vocal down a little bit more,' or, 'It'd be great if that kick drum would come out a little bit more,' I can't do it with EQ, because by bringing up the kick drum I'm also bringing up the string bass and everything just starts to get a little bit muddy. If I could just reach over to my Pro Tools and nudge the kick drum up a little bit, the kick drum is up a little bit without ruining the feel of the entire mix."

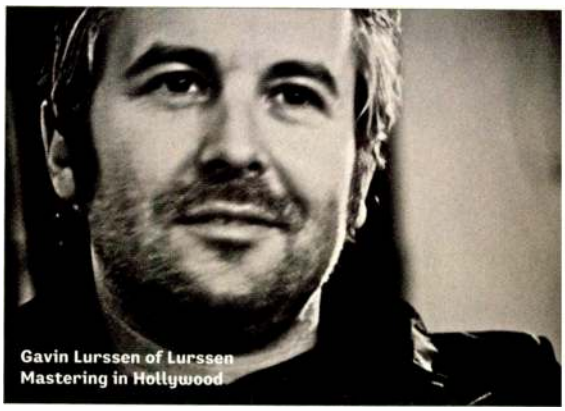
Andrew Mendelson, owner and chief mastering engineer of Georgetown Masters (Nashville), appreciates having access to mix elements, but notes that working with stems can sometimes change the vibe of a session. "It changes the workflow a little bit," says Mendelson, who has mastered artists such as Kenny Chesney, Ricky Skaggs, the Rolling Stones and White Stripes. "It seems like in audio production in general, people have a tendency to push things off to the next stage and there's certainly the risk of [waiting to figure out mix issues in mastering]."

Gavin Lurssen, of Lurssen Mastering in Hollywood, has mastered projects ranging from Spinal Tap to the Grammy-winning Robert Plant and Alison Krauss collaboration *Raising Sand*. He says the line is blurred to the point that several of his clients don't even want to hear their mixes until they've been mastered. "What some of them are doing is, if their budget can support it, they'll come see me to get an idea of what the finished product will sound like before mixing is done," he says. "They'll go back, they'll make adjustments with the end result in mind, because they want to know what it's going to sound like when I've mastered it."

Of course, mixing options in mastering are often defined by the media format. "Predominantly, we're getting files off the Internet and they're mixed down to 2-track; I almost never deal with stems. Instead, my husband has designed an MS processing system that allows us to alter vocal levels and other relative balance issues easily and quickly, even in a stereo track." says Jennifer Munson, who engineered at Gateway and Sony Classical and has mastered music from artists ranging from Isaac Stern to Busta Rhymes. She now divides her time between mastering at her own facility, Taloowa Mastering, and engineering the *On the Media* program for NPR. "Often [stems are] offered if they're talking to me directly at the start of a project. I'll listen to one track or something like that, give them feedback on what I'm hearing and then the rest of the album usually comes back just fine."

Summing choices also can influence mastering options. Mendelson says that when mixing on a console through a series of outboard gear, when stems are printed through that chain, the stems summing together through those 2-channel devices will not sound the same as sending each individual track through those devices and then summing behind them. "Sometimes pulling the stems together, the sum of all the elements doesn't actually create the master mix. So you're going to have to make a choice: Are the stems better to work with than the master mix, which was signed off on? Because before you even touch a knob, you've got an inherent change in the sound."

"Mastering engineers can get good summing buses to deal with stems," adds Lurssen, "but problems can arise when engineers bring in stems and want to go back and make minor mix adjustments. And then, because they want to adjust one balance in the mix, they might raise the guitar half



Gavin Lurssen of Lurssen Mastering in Hollywood

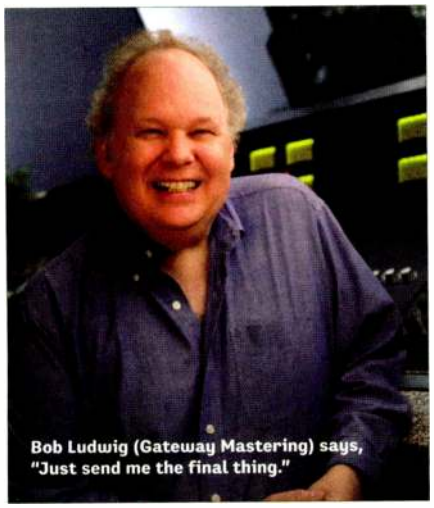

Andrew Mendelson (Georgetown Masters) has mastered recordings by Kenny Chesney, Ricky Skaggs, White Stripes and others.

a dB, but they end up going through a summing bus that will degrade the whole thing. That process can mean taking one step forward and four steps backward."

Different Goals, Different Mixes

As the loudness wars drag on, in an effort to satisfy A&R with a "competitive" mix while providing mastering engineers some dynamic breathing room, mixing engineers may resort to creating two distinct reference mixes—a heavily compressed version for the clients and a less-compressed version for mastering. The danger? Mastering engineers are working from a different point of reference from the client. Further complicating matters is the idea that CD mix references physically resemble a finished product, influencing client expectations, explains Lurssen.

"It used to be that you would get a lacquer vinyl reference or a DAT ref, even a cassette ref," Lurssen says. "But when CDs became affordable in the '90s, all the mix rooms started using CD refs." Increasingly, he says, artists, comparing their unmastered CD references to commercial CD releases, began to question why their music wasn't as loud. "Mixers would run everything through an L2 or a Finalizer and crank it up, and they would come into the mastering room and it would be pretty hot," Lurssen continues. "And the mastering community would say, 'Can you give me something that's not quite as hot?' And we would get something that was not quite as hot, but the bands would say, 'Hey, this isn't what I remember it sounding like.' Because the mastering engineer is working on something that the artist hasn't even heard. The artist needs not only to really hear the [actual] mix, but the artist needs to understand that if it hasn't gone through the process of mastering, it's not going to sound like a commercial CD."


Bob Ludwig (Gateway Mastering) says, "Just send me the final thing."

Lurssen feels the line between mixing and mastering is more blurred for the client than to the engineers along the chain. "You have to educate people from scratch; there's a responsibility that goes into audio processing," he says. "I usually get to know somebody before they come and see me, and I go through all this with them, which is time-consuming, and in this business time is money. They don't even realize that this is where the value of their mastering session starts."

Munson agrees that clients and artists often do not understand the mastering process—a problem that is sometimes perpetuated by attempts to make the clients happy with a mix before it has been mastered. She adds that there is a lot of weight on the mix engineer to be a buffer between artists and mastering, to keep mixes at a reasonable level. "Just having a mix engineer who's saying, 'This is how it's going to be, just turn it up, listen to it and know that the end result is going to improve dramatically after mastering if the mix is not crushed'—having someone who gets that process, who can convince their clients of this, I think that's the hard part."

"I'm a big proponent of starting with what's been approved, what everyone is liking so we're all on the same page," says Mendelson. "When [mix engineers] remove all those compressors when they send it to me, now I'm starting with a mix that's totally different than what's been approved. And I understand the intention was to give me more room to work, but it's really important if you're going to do that to also send what people have been approving, even if it's nothing more than a 16-bit/44.1k reference."

Knowing Enough to Be Dangerous

Just as merely owning Pro Tools doesn't make someone a recording engineer, having a mastering plug-in doesn't make someone a mastering engineer. "People put these plug-ins on stuff, it makes it louder and it makes it more compressed, and it makes levels a lot closer to being even, but it's not a substitute for a trained set of ears and all of these things we are doing," says Cruz. "[Mastering plug-ins are] just squashing the hell out of everybody's mix. They're taking all of this time to make this great-sounding mix and convey the emotions of the artist, then to just strap one of these things across the mix just squashes everything down, killing all of the life and all of the emotion in it."

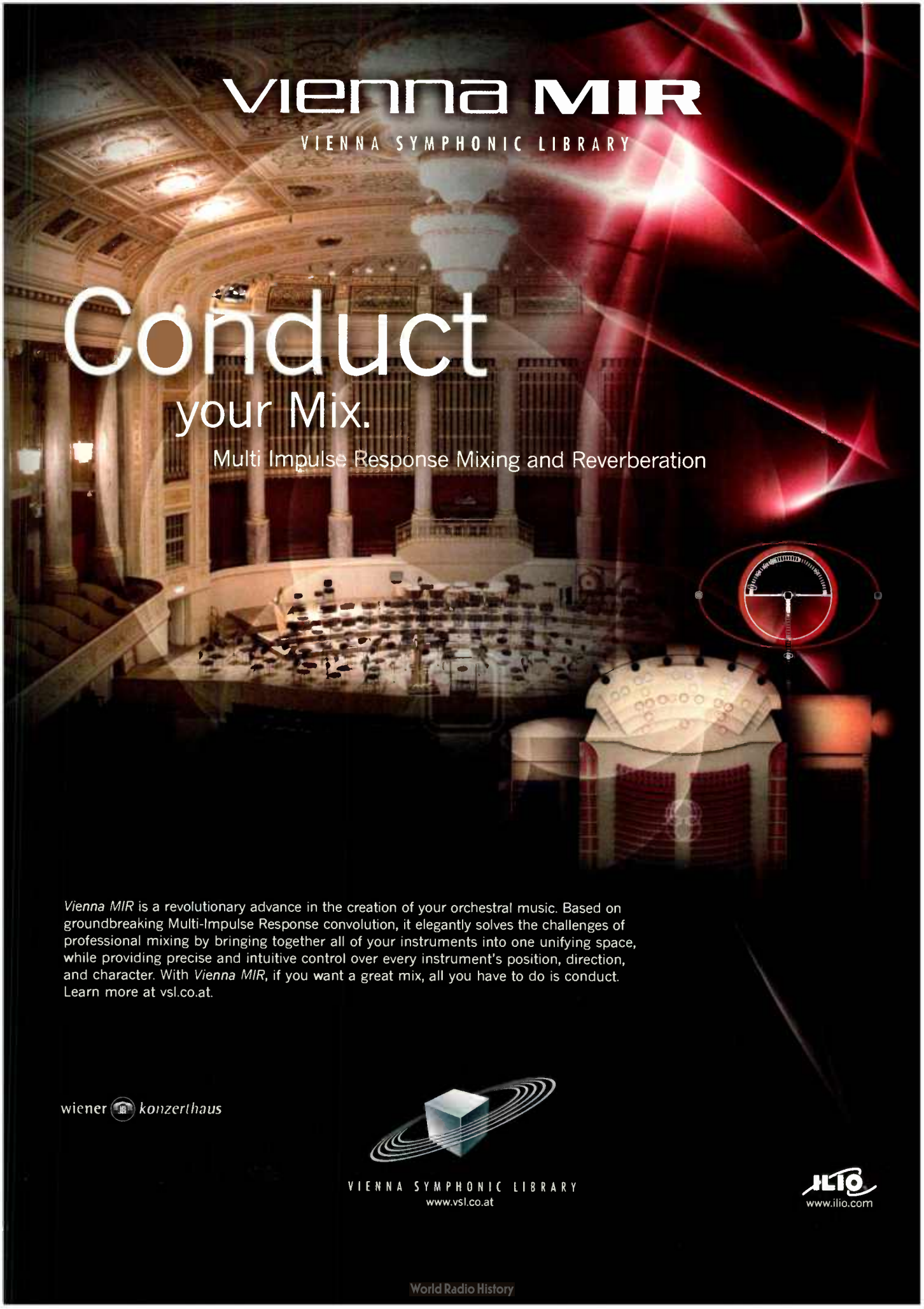
In addition, Mendelson notes that simply labeling tools "mastering EQ" and "mastering compressor" perpetuates the misconception that mastering is purely about processing, as opposed to the broader process of creating a high-quality master—and that philosophical change leads people to take things into their own hands who might otherwise not have done so.

"There's a lot more to mastering than the processing," he says. "That's one element. But I have a staff of four people who assist me doing all kinds of other work, in terms of production and quality control. It is like a bridge between the creative aspect and the distribution side of making a work of art—making a proper DDP image, Red Book-compatible CD or, in the case of surround sound or audio-for-video, ensuring optimum quality data compression where necessary, making sure ISRC and UPC codes are entered correctly, making sure that CD text is entered correctly, doing a final QC and making sure that nothing's amiss. It's a last stage to find any flaw before you go to make a whole lot of copies."


Zeitgeist Sound Studios' (New York) mastering engineer James Cruz also works as a mixing engineer.

Mastering engineers agree that although technical and economic factors may cause them to work differently, they remain true to their focus. "As far as my role changing, it's only in the sense that I can do things that maybe I once couldn't as my tools get better," says Mendelson. "But I still view my role as a mastering engineer as somebody who takes the finished mix and makes that final mix entity sound as good as it possibly can." ■

Sarah Jones is associate director of Women's Audio Mission, a San Francisco–based nonprofit dedicated to advancing women in the recording arts.



MODULE MANIA

500 Series Gear Is Hot, Hot, Hot!

By George Petersen

A year ago at AES, the show seemed inundated with software plug-ins of every sort. This time around, the AES floor was teeming with analog processors, and many of the new debuts were modules—and new housings—made in the increasingly popular API 500 Series format. A good part of this stems from API co-founder Saul Walker, whose brilliant design some four decades ago for the API 550A equalizer (based on his discrete 2550 op amps and ingenious Proportional Q circuit) led to a highly prized classic that remains in production today.

There are numerous reasons why so many new products appeared sporting 5.25x1.5-inch front panels and rear 15-pin edge card connectors. Certainly, the ability to pack up to 11 modules in a single rack or desktop-style "lunchbox" makes sense for traveling engineers or any users who want to pack a maximum amount of analog gear into a convenient, customizable package for use as a front end to DAWs or digital consoles. On the manufacturing side, creating a product with minimal metal work, few or no I/O connectors, and *sans* power supply is an attractive incentive. Let's face it: No one enjoys designing power supplies.

API Audio 550A equalizer module

After a little research, we uncovered more than 130 modules and housings in the 500 Series format, including preamps, equalizers, compressors, summing boxes, DIs and some that defy categorization. It's a huge selection by anyone's standards, and so far no one's built a digital processor in a 500 Series module, but give it time.

Parking the Cards

Unless you already have a console that supports 500 Series modules (such as API's Model 1608 or the Tree Audio 500), you'll need some sort of enclosure to provide I/O connections and supply the standard 130 mA to power each module. Enclosures vary from bare-bones, two-slot horizontal or vertical units to elaborate rack systems with onboard summing, mixing and monitoring (such as Radial Engineering's new Workhorse 5000) to small sidecar consoles, like the 8-channel Mark VIII console from Pete's Place Audio.

Once you've settled on a housing that meets your needs, the selection of modules should be fairly easy. However, there are a few products that vary enough from the original module spec to lead to a few caveats. Purple Audio's Moiyn 8x2 summing amp only functions when used in Purple's Sweet 10 rack. Radial Engineering's modules can be used in any 500-compatible application, but some offer additional features when used with the company's Workhorse 5000 rack, such as the tuner output function on the JDV-LB instrument preamp or the DI output jack on the PowerPre preamp. As an alternative, Speck's ASC-V EQ module has rear I/O and power connections so it can be used standalone in an enclosure.


Radial Engineering Workhorse 5000 offers direct and summing outs.

Some modules, such as Buzz Audio's Elixir preamp, exceed the 130mA current draw, which may limit the number of Elixirs in some systems, depending on the design of the enclosure's power supply. A few modules have sidestepped the power issue by making 3-inch, double-width modules that combine the output of two slots, thus doubling the allotted power available to the module. This approach doesn't work for all designs, such as VSI Audio's tube compressor/preamp, which requires either a separate source to supply the 300-volt plate voltage or installation in a VSI-made housing.

A few years ago, in an attempt to standardize conformity within the 500 Series module realm, API started the VPR Alliance. Administered by API, VPR is an approval process that verifies whether modules are fully compatible with its API Lunchbox and 500VPR rack units. A number of third-party manufacturers have paid to join VPR, although others have declined. Lack of a VPR stamp does not necessarily mean a product is unsatisfactory; but the fact that VPR exists at all indicates that users need to check manufacturer specs to make sure any module/enclosure under consideration is right for their needs.

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Outside the Box

While not necessarily compatible with 500 Series products, modular systems are available from other manufacturers. SSL offers its Mynx system, which houses the company's X-Rack modules. Tonelux offers an array of modules for its 16-slot VRACK and full-on console systems. Tube-Tech just announced a new two-slot housing to complement its RM-8 8-slot rack and tube-based mic pre/EQ/compressor modules. And at AES, SPL debuted its RackPack 500, a rack housing for four 500 Series modules *and* four of its proprietary modules—mic pre's, Transient Designer, equalizers, TwinTube saturator and compressor.

—Continued on page 28

PREAMPLIFIER MODULES

COMPANY; WEBSITE	MODEL	CHANNELS	DIRECT INPUT?	WIDTH	LIST PRICE	NOTES
A-Designs; www.adesignsaudio.com	P-1	1	yes	1	$895	Based on A-Designs' Pacifica preamp
A-Designs	EM-Silver	1	yes	1	$895	Custom-steel output transformer to complement ribbon mics
A-Designs	EM-Blue	1	yes	1	$895	Custom-nickel output transformer for extended HF
A-Designs	EM-Red	1	yes	1	$895	Custom input transformer and 50/50 output transformer for upfront mids
A-Designs	EM-Gold	1	yes	1	$895	Custom input transformer and steel output trans complements LF sources
Al.So Audio; www.alternatesoundings.fr	MDI2	2	yes	1	$555	Dual hi-Z instrument to line-level preamp (no mic inputs)
Al.So Audio	MP1	1	no	1	$555	Single-channel mic preamp
Al.So Audio	MP²	2	yes	1	$1,195	Mic/line preamp with Sowter transformers
AnaMod; www.realios.com	Realios 9031	1	yes	1	$899	Class-A discrete design based on Dick Swettenham/Helios preamp
API Audio; www.apiaudio.com	512c	1	yes	1	$760	Low-noise (-129 EIN) all-discrete design based on 1967 model 512
Atlas Pro Audio; www.atlasproaudio.com	Juggernaut 500	1	yes	1	$1,095	Has interchangeable input transformers and variable impedance loading
Audio Maintenance; www.audiomaintenance.com	5003D	1	no	1	$650	Has Carnhill I/O transformers, switchable input impedance
Avedis Audio; www.avedisaudio.com	MA5	1	no	1	$395	Carnhill input transformer; Jensen output transformer
Bizzar Audio; www.bizzaraudio.com	Mint Julep	1	no	1	$400	Transformerless design with NE5532 op amps
Bozo Electronics; www.bozoel.com	MPA3	1	no	1	$520	Has stepped gain switching, onboard highpass filter
Brent Averill; www.brentaverill.com	312A	1	yes	1	$760	Jensen I/O transformers, Avedis 1122 op amps
Burl Audio; www.burlaudio.com	B1D	1	yes	1	$899	Transformer input with steel output trans, lo-Z switch for ribbon mics
Burl Audio	B1	1	yes	1	$899	Transformer input with nickel output trans, lo-Z switch for ribbon mics
Buzz Audio; buzzaudio.com	Elixir	1	yes	1	$870	Transformer input, Lundahl LL1517 trans output, lo-Z switch for ribbon mics
Chameleon Labs; www.chameleonlabs.com	Model 7681	1	yes	1	$399	Designed to provide classic 1081 preamp sound
Chandler; www.chandlerlimited.com	Germanium 500	1	yes	1	$1,045	Identical circuitry to Chandler's rackmount Germanium preamp/DI
Classic Audio Products; www.classicapi.com	VP26	1	no	1	$590	Sold without discrete op amp; use your own or buy new for $60 to $65
Daking Audio; www.daking.com	MicPre 500	1	yes	1	TBA	Modular version of Daking Mic Pre IV
DAV Electronics; www.davelectronics.com	Broadhurst Gardens 501	1	yes	1	$360	10 to 150k Hz bandwidth
Eisen Audio; www.eisenaudio.com	EAC312V	1	yes	1	$525	Huge range of custom 500 Series preamps and D.I.Y. kits also offered
Electrodyne; www.petesplaceaudio.com	501	1	yes	1	$895	Discrete transistor circuit based on 1969 Electrodyne design
FiveFish Studios; www.fivefishstudios.com	X-12mk500	1	no	1	$395	Also available in $375 unassembled kit version
FiveFish Studios	X-72mk500	1	no	1	$490	Has Carnhill output transformer
FiveFish Studios	SC-1mk500	1	no	1	$325	Input transformer optional; also available in $299 unassembled kit
Forssell Technologies; www.forsselltech.com	SMP500	1	no	1	$795	Class-A J-FET front end
Grace Design; www.gracedesign.com	m501	1	yes	1	$625	Transformerless design, impedance switch for ribbon mics
Great River; www.greatriverelectronics.com	MP500NV	1	yes	2	$795	Designed to emulate 1073 sound, has Sowter transformer
Helios; www.helios-electronics.com	Type 69-500	1	no	1	$1,375	Based on Dick Swettenham design with 3-band EQ and HP filter
Inward Connections; www.vintageking.com	MPD 500	1	yes	1	$1,050	All-discrete design using SPA-690 op amp and transformer I/O
JLM Audio; www.jlmaudio.com	Dual 99v500	1	yes	1	$829	Two-stage gain path (99V discrete op amps) with variable impedance control
JLM Audio	NV500	1	yes	1	$829	Based on Neve 1073/1290 with variable impedance control
JLM Audio	TG500	1	yes	1	$829	Class-A FET design based on early Neve/EMI/BBC gear
JMK Audio; www.jmkaudio.com	JM-120	1	yes	1	$325	Instrument-only preamp with inputs tailored for guitar and bass
John Hardy Company; www.johnhardyco.com	Twin Servo 500	1	no	1	TBA	Input impedance switch, Jensen I/O transformers
Lachapell Audio; www.lachapellaudio.com	583e	1	yes	2	$2,025	Same as 583s, but has 3-band sweep EQ, usable with pre or separately
Lachapell Audio	583s	1	yes	2	$1,349	Tube/transformer-based input stage, transformerless output
LAZ Electronics; www.lazpro.com	MPA	1	yes	1	$811	Discrete dual-stage design with transformer I/O
Lipinski Sound; www.lipinskisound.com	L-609	1	yes	1	$995	Discrete design based on Lipinski Square, custom input transformer
Old School Audio; www.oldschoolaudio.com	MP1-C	1	yes	1	$499	Custom Crimson Audio input transformer
Old School Audio	MP1-L	1	yes	1	$543	Has Lundahl 1538XL input transformer
Old School Audio	MP1-L3	1	yes	1	$599	Has Lundahl LL7903 input transformer
Old School Audio	MP1-A	1	yes	1	$499	Transformer input and output
Purple Audio; www.purpleaudio.com	Pants	1	yes	1	$725	Differential circuit, xformer I/O, mic/line input switch, 100k/1M-ohm DI switch
Purple Audio	Biz Mk	1	yes	1	$725	Xformer I/O, mic/line input switch, 33k/100k-ohm DI switch
Radial Engineering; www.radialeng.com	JDV-LB	1	yes	1	$400	Class-A instrument-only preamp/DI, Drag Control load correction, tuner out*
Radial Engineering	PowerPre	1	yes*	1	$500	Discrete design, xformer out, three switchable preamp voices
Roll Music; www.rollmusic.com	Tubule RM55A7	1	no	1	$1,000	ECC832 tube, transformer-coupled preamp
Safe Sound Audio; www.safesoundaudio.co.uk	P0501	1	yes	1	$999	Has PeakRide compressor and limiter, 60kHz preamp bandwidth
Shadow Hills; www.shadowhillsindustries.com	Mono GAMA	1	yes	1	$980	GAMA (Golden Age Mic Amp) has three selctable output transformers
Shiny Box; www.shinybox.com	Si	1	no	1	$500	Transformerless design, selectable impedance loading
True Systems; www.true-systems.com	PT2-500	1	yes	1	$799	Wide 1.5 to 600k Hz bandwidth, DI section also has ¼-inch thru output
Vintage Design; www.vintagedesign.se	M582 mk2	1	yes	1	$795	Input transformer, switchable 300/1,200-ohm input inpedance
VSI Audio; www.vsiaudio.com	L-21	1	yes	1	$725	Nickel-steel transformer out, also offered as L-22 ($725) with steel transformer

*DI Out and Tuner Out only available when used in Radial Workhorse enclosure

EQUALIZER MODULES

COMPANY; WEBSITE	MODEL	CHANNELS	BANDS	TYPE	WIDTH	LIST PRICE	NOTES
A-Designs Audio; www.adesignsaudio.com	EM-PEQ	2	2	peak/shelving	1	$1,450	Erickson-Montessi version of Pultec EQP-1A
Alta Moda; www.altamodaaudio.com	AM-20	1	1	peak/shelving	1	$599	Fully parametric midrange bands
API Audio; www.apiaudio.com	550A	1	3	peak/shelving	1	$1,195	Discrete design, "Proportional Q" narrows Q at extreme settings
API Audio	550B	1	4	peak/shelving	1	$1,195	Discrete design, Proportional Q, based on original 1967 550 with extra band
API Audio	560	1	10	graphic	1	$895	All-discrete 10-band graphic, Proportional Q
API Audio	550A Saul Walker Ed.	1	3	peak/shelving	1	$2,195	Special-edition reissue of original API 550A
Avedis Audio; www.avedisaudio.com	E27	1	3	sweep/shelving	1	$1,100	Push-button shelving option for LF/HF bands
Buzz Audio; www.buzzaudio.com	Tonic	1	3	sweep/shelving	1	$1,060	Inductor-based EQ, selectable LP/HP filters, Lundahl output transformer
Chandler Limited; www.chandlerlimited.com	Little Devil EQ	1	4	sweep/shelving	1	$1,375	Switchable Q on mids, shelf LF/HF filters
Electrodyne; www.petesplaceaudio.com	511	1	2	peak/shelving	1	$1,050	Discrete design based on 1969 Electrodyne circuit
Great River; www.greatriverelectronics.com	Harrison 32EQ	1	4	peak/shelving	1	$1,010	Based on Harrison 32 Series, jumper selects feedback or non-feedback design
JDK Audio (formerly Arsenal Audio); www.jdkaudio.com	V14	1	4	peak/shelving	1	$695	Based on classic API model 562
JLM Audio; www.jlmaudio.com	PEQ500	1	2	peak/shelving	1	$912	Based on Pultec EQP-1A/EQP-1R, but with added frequencies
Laz Electronics; www.lazpro.com	EQA	1	3	peak/shelving	1	$976	Sweepable shelf LF and HF, semi-parmetric mid band with Q switch
Purple Audio; www.purpleaudio.com	TAV	1	10	graphic	1	$725	All-discrete, inductor-based graphic EQ
Purple Audio	ODD	1	4	peak/shelving	1	$725	Inductor-based EQ, switchable frequencies, HP/LP filters
Purple Audio	LilPEQR	1	2	shelving	1	$625	Program EQ with switchable LF/HF frequencies
S&M Pro Audio; www.sandmproaudio.com	EQSM1	1	4	peak/shelving	1	$575	Sweepable mid bands, shelf LF/HF, 50Hz highpass filter
Speck Electronics; www.speck.com	ASC-V	1	4	peak/shelving	1	$869	Parametric with LF/HF shelf switch, xformer and non-xformer outputs

DYNAMIC MODULES

COMPANY; WEBSITE	MODEL	CHANNELS	WIDTH	LIST PRICE	NOTES
Alta Moda Audio; www.altamodaaudio.com	AM-10	1	1	$699	FET compressor with soft-knee feedback topology
AnaMod; www.anamodaudio.com	AM660	1	1	$1,295	Modeled on Fairchild 660 variable-mu compressor
API Audio; www.apiaudio.com	527	1	1	$995	Based on API 225L discrete compressor, switchable "thrust" circuit
API Audio	525	1	1	$1,195	Discrete design, peak-detecting "feedback" compressor
Buzz Audio; www.buzzaudio.com	Potion	1	2	$1,260	FET compressor with transformer I/Os
Buzz Audio	Essence	1	2	$1,260	Optical compressor, Lundahl I/O trans., differential drive sidechain control
Chandler Limited; www.chandlerlimited.com	Little Devil	1	1	$1,155	FET compressor based on Germainum and 2264 compressors
Dramastic Audio; www.dramasticaudio.com	Obsidian 500	2	2	$2,495	Stereo bus compressor, xformer I/Os, optional dual-mono expander/sidechain/de-esser cards
Foote Control Systems; www.mercenary.com/fcs-p3500.html	P-3500	1	1	$750	Compressor with feed-forward/feedback switch
Foote Control Systems	P-3500S	1	2	$350	Expander module works with P-3500 for stereo operation
Inward Connections; www.vintageking.com	VC-500	1	1	$1,095	All-discrete VCA compressor with SPA 690 op amp and transformer output
Inward Connections	OPT-1A	1	1	$1,095	All-discrete opto limiter with transformer I/O
JMK Audio; www.jmkaudio.com	JM-115C	1	1	$545	One-knob, VCA-based compressor
Laz Electronic; www.lazpro.com	FSC	1	1	$238	D.I.Y. compressor kit based on Fred Forssell opto design
Lipinski Sound; www.lipinskisound.com	L-629	1	1	$1,195	Modeled on Fairchild 660, all-discrete audio path
Old School Audio; www.oldschoolaudio.com	OSA Compressor	1	1	$899	VCA-based compressor, discrete transformer output stage
Pendulum Audio; www.pendulumaudio.com	OCL-500	1	1	$1,295	Opto compressor, transformerless Class-A makeup stage
Pete's Place Audio; www.petesplaceaudio.com	BAC 500	1	1	$995	Brad Avenson FET design with discrete op amps and custom trans
Purple Audio; www.purpleaudio.com	Action	1	1	$725	FET compressor, transformer I/O
Radial Engineering; www.radialeng.com	Komit	1	1	$500	Auto-tracking feed-forward design, has key input
Shadow Hills; www.shadowhillsindustries.com	Dual Vandergraph	2	2	$2,250	All-discrete stereo compressor
Shadow Hills	Mono Optograph	1	2	$1,675	All-discrete mono optical compressor
Standard Audio; www.standard-audio.com	Level-Or	1	1	$485	JFET limiter/distortion processor based on Shure Level-Loc
VSI Audio; www.vsiaudio.com	L-23	1	1	$1,500	Tube mic/line preamp-opto compressor, requires external PS or use with VSI PSU-T300 housing

OTHER MODULES

COMPANY; WEBSITE	MODEL	WIDTH	LIST PRICE	NOTES
Ai.So; www.alternatesoundings.fr	M²B	1	$941	Modular master bus with 8 channels of summing
Empirical Labs; www.empiricallabs.com	Derr-Esser	1	$500	Combo de-esser/HF limiter/highpass filter/lowpass filter
JCF Audio; www.jcfaudio.com	Levr	1	$850	2-channel active summing module, optional Cinemag output transformer
Little Labs; www.littlelabs.com	VOG	1	$420	Analog bass resonance tool, sweepable to emphasize selected LF tones
Mooktronics; www.conwayrecording.com/mooktronics	PDI 500	1	$235	Passive DI box with Cinemag transformer, Jensen transformer optional
Purple Audio; www.purpleaudio.com	Moiyn	1	$725	8x2 mixer/summing amp (turns Purple Sweet 10 rack into 8x2 mixer)
Purple Audio	Cans	1	$500	Headphone amp/control room preamp w/swap, L/R mute and mono switches
Radial Engineering; www.radialeng.com	PHZ-LB	1	$350	Phase adjustment processor aligns any two input sources (mic and direct, etc.) in time
Radial Engineering	X-AMP-LB	1	$300	Line-level-to-guitar-level reamping device with two transformer outputs
Radial Engineering	EXTC	1	$300	Line-level-to-guitar-level loop for using EFX pedals with pro gear
Radial Engineering	JDX-LB	1	$300	Guitar amp-to-speaker direct box/preamp/amp cabinet emulator
XQP; www.xqp.com	531	1	$449	Optical de-esser based on Dane model 31

HOUSINGS

COMPANY; WEBSITE	MODEL	CAPACITY	TYPE	LIST PRICE	NOTES
A-Designs; www.adesignsaudio.com	500HR	2	horizontal	$335	Single rackspace chassis, internal power supply
API Audio; www.apiaudio.com	500-6B Lunchbox	6	vertical	$499	Desktop format with carry handle
API Audio	500VPR	10	vertical	$949	Rackmount version, internal power supply
Atlas Pro Audio; www.atlasproaudio.com	Revolver	2	vertical	$499	Desktop style, optional rack kits can combine 1 to 3 Revolvers
Avedis Audio; www.avedisaudio.com	R52	2	horizontal	$450	Single-rackspace unit with LEDs for phantom-power on/off
Big Rack Audio; www.bigrackaudio.com	Model 501	11	vertical	$449	Also avail. in $399 kit form, no power supply (requires API L200PS)
Brent Averill; www.brentaverill.com	6-Module	6	vertical	$550	Available in rack or desktop style with handle, Jensen transformer option
Brent Averill	11-Module Rack	11	vertical	$950	Rackmount, Jensen transformer option
Daking Audio; www.daking.com	500 Grand	6	vertical	$550	Desktop version for six modules
Daking Audio	500 Grand Rack	6	vertical	$550	Rackmount version for six modules
Daking Audio	500 Grand Rack	11	vertical	$950	Rackmount version for 11 modules
Empirical Labs; www.empiricallabs.com	EL500	2	horizontal	$500	Single-rackspace with XLR I/O and front panel hi-Z ¼-inch input
Old School Audio; www.oldschoolaudio.com	Track Pack	8	vertical	$599	Desktop version with handle, has vented passive cooling
Old School Audio	Power Rack	11	vertical	$699	Rackmount style with vented passive cooling
Pete's Place; www.petesplaceaudio.com	Mk VIII	16	vertical	$9,000	Console-style with fader/pan/mutes and empty module slots
Purple Audio; www.purpleaudio.com	Sweet 10 Rack	10	vertical	$800	Two XLR outs for each module, optional 8x2 mixer/summing module
Radial Engineering; www.radialeng.com	Workhorse 5000	8	vertical	$1,299	Direct and summing outs, onboard 8x2 mixer, monitoring section
SPL; www.spl-usa.com	RackPack 500	8*	vertical	$1,200	*Rack holds 4 500 Series modules and 4 SPL-format modules
VSI Audio; www.vsiaudio.com	PSU-T300	6	vertical	$900	Has stereo-link switches, channel inserts and 300V supply for LSI's L-23 tube comp

—Continued from page 26

More Options

Another option not mentioned so far is the D.I.Y. approach, and a number of manufacturers offer their gear in kit form, including Laz Electronic (compressors), Five Fish Studios (preamps) and Big Rack Audio (housings). And if you have an empty slot or two, several companies sell blank filler panels, although Big Rack Audio also offers panels custom-engraved with your studio logo. The charts that begin on page 26 survey the current state of the 500 Series world. The offerings are varied and plentiful, so you should have no problem configuring the ideal system for your productions. ■

George Petersen is Mix's executive editor.

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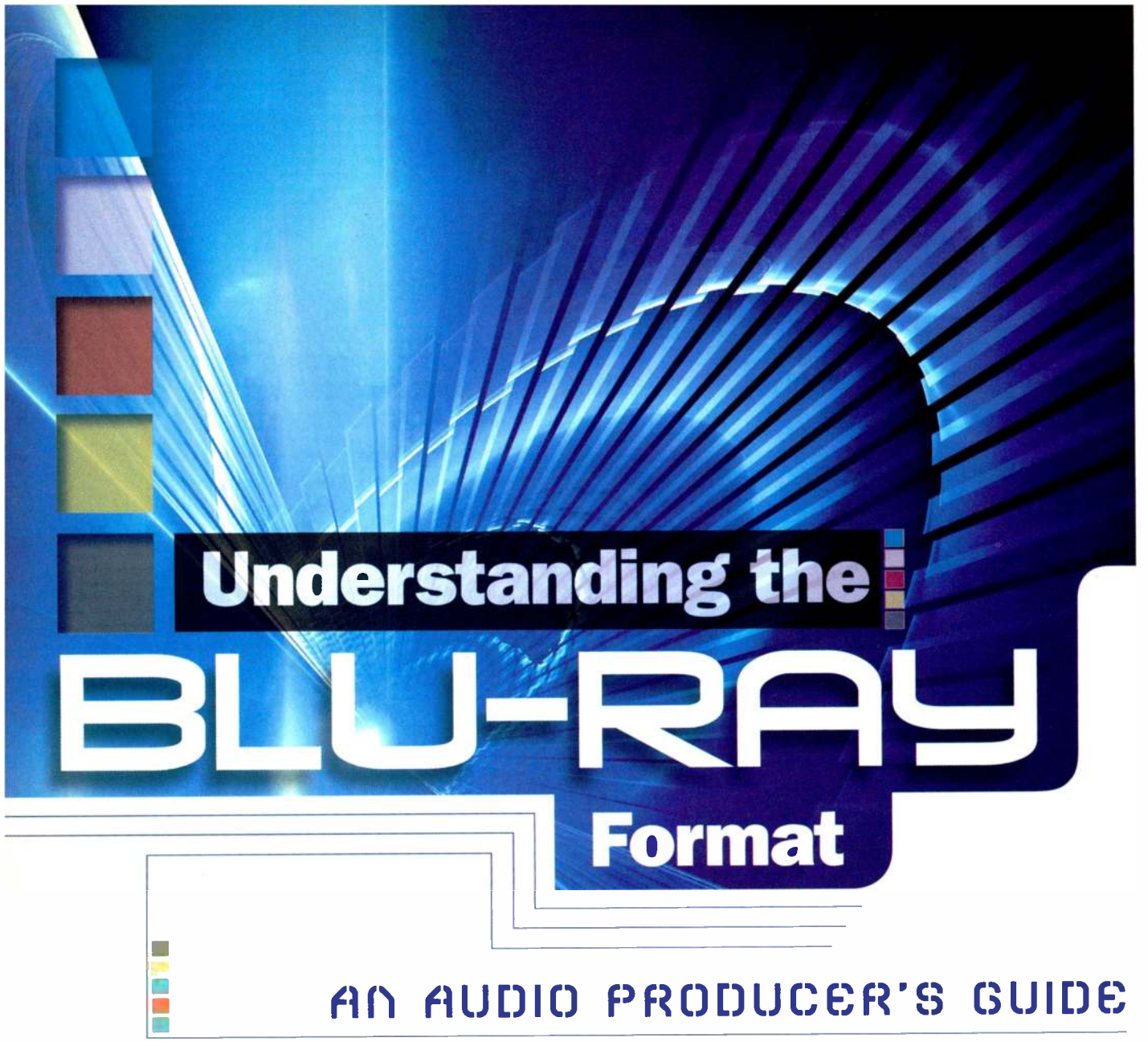

Understanding the BLU-RAY Format

AN AUDIO PRODUCER'S GUIDE

By Glen O'Hara

Creators of audio content for consumer video and audio platforms have always had to deal with a list of do's and don'ts. As formats evolved, the list got longer, as did the learning curve. Early CD authors were presented with digital zero, 16-bit/44.1kHz and stereo PCM. Then came DVD and DVD-A, which brought 5.1/6.1 channels, DTS, Dolby Digital, 96kHz sample rate and MLP lossless. And so it goes with Blu-ray, the latest format to change the game for content creators. With the increasing importance and consumer acceptance of this new medium, let's explore some of the possibilities and the limitations that the latest high-definition disc has to offer.

Outstanding Possibilities

Blu-ray's audio and video specs are fantastic. The disc supports up to 32 different bitstreams for primary *and* 32 bitstreams for secondary audio, plus up to 16 MB for tertiary audio clips used in menu and button sounds. Bitstreams support any number of channels (mono, stereo, 5.1, 7.1 and more) using PCM, Dolby and DTS formats. There is also support for 96- and 192kHz audio sample rates. (There is no support for 44.1 or 88.2.)

An impressive example of Blu-ray's capabilities is on the film *Harry Potter and the Order of the Phoenix*, with 14 (yes, 14) 5.1 channel bitstreams, 13 different languages and 27 subtitle streams. In this title, Warner Home Video chose to have two English 5.1 channel mixes, in both raw PCM and Dolby Digital legacy, along with 12 other languages including Spanish and Castilian (Español and Castellano), European and Canadian French, German, Italian, Dutch, Japanese, Danish, Swedish, Catalan and Flemish. Now that's some authoring!

On the video side, a dual-layer, 50GB Blu-ray can store up to nine hours of HD feature content (1,920x1,080 resolution) and up to

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WRITER/DIRECTOR
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23 hours of SD content (720x480). A Blu-ray disc's maximum sustainable data transfer rate is 48 Mb/sec, with the video part of that max limited to 40 Mb/sec. With variable bit rate encoding on both audio and video, audio could hit peak rates well above 8 Mb without affecting video quality at all.

However, before this stellar bit rate can be spun into the consumer's player, some questions should be answered. For instance: Should you give priority to the analog or digital outs? Should you send the original bitstream (only HDMI 1.3 or later) or a PCM stereo downmix to your HDMI output? Do you want any 96kHz sample-rate content down-sampled to 48 kHz for your digital out? These questions go on and on, and it's important that creators pay attention to these critical details—otherwise, consumers could end up with poor to downright annoying results.

For example, a stereo mix must be designated for LCRS (matrix or Dolby Pro Logic) decoding or straight through stereo intended for Left Front/Right Front playback. This is done via metadata flags known as Lt/Rt or Lo/Ro to indicate how audio playback should properly decode. Lt/Rt means "Left Total/Right Total" and is the indicator for surround sound (LCRS) decoding; Lo/Ro is the indicator for Left Only/Right Only decoding. Because industry authoring deals mostly with feature content, many hardware and software encoders, or the procedure within the authoring/compression departments, will default to Lt/Rt if not specified. In this case, our straight stereo mix's phantom center would cancel out of the Left and Right playback and instead be directed to the consumer's center channel and inadvertently decoded in LCRS surround mode. This actually occurred in a *Steely Dan* concert video DVD a few years ago. Now with Blu-ray's bevy of features, attention to this kind of detail is even more critical.

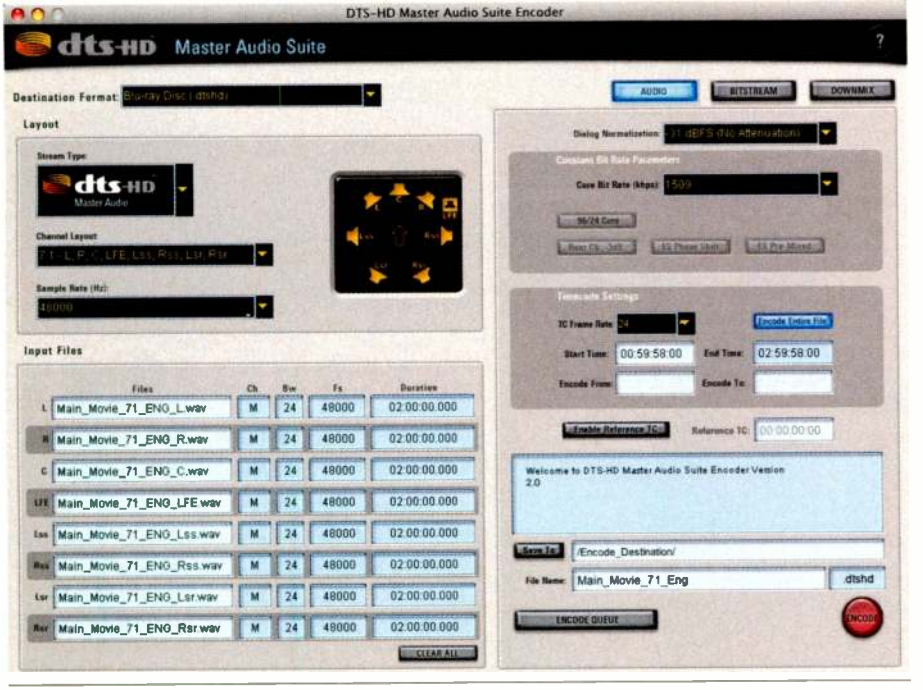
Dolby Media Meter analyzes the mix for overall levels.

What's on First, Who's on Second

Blu-ray's primary audio bitstreams are designated to the main soundtracks. This is really where the "sky's the limit." Currently, up to eight channels of any configuration (8.0, 7.1, 6.1, 5.1, 5.0, LCR, 2.0) down to mono are completely supported using PCM, Dolby or DTS formats. There are some channel limits with a 192kHz sample rate.

Secondary audio is designed primarily to accommodate director/actor commentary-type tracks, but it also offers some very cool options. DVD content creators had to make many tough decisions due to space and bandwidth limitations. Commentary tracks were usually encoded in stereo or Dolby Digital 2.0 instead of 5.1 to save space *and* were separate bitstreams. With Blu-ray, any number of commentary tracks can be encoded in Dolby Digital Plus or DTS Express in mono or stereo as secondary audio. (Due to limited bandwidth, PCM is not possible.) Not only is this secondary audio simply added to the primary audio mix (by user selection), it can be authored to do so on-the-fly, meaning through a pop-up menu while the feature is still playing. Blu-ray's specs require that the player be capable of mixing these sounds together, yet a secondary or tertiary track's sounds could be dropped, depending on player settings for co-ax or optical digital outputs. The big advantage here is commentary tracks no longer require another primary soundtrack as in DVD, allowing for more creative options with significantly less file size and bandwidth.

In addition to bringing this mono or stereo commentary track into the mix, what is called "AAF" metadata can be encoded into the secondary bitstream that allows fader moves of any and all channels in the primary mix. One can "ride faders" that reduce the primary audio level creatively around the commentary dialog and export that automation for inclusion in the secondary bitstream.



DTS Master Audio Suite uses straightforward entry screens.

When using this feature, the overall level of the primary audio can be adjusted +12 to -50 relative dB in 1dB increments, but any individual channel adjustment is limited to -28dB relative differential from the rest. Using metadata, the channels can be routed to any supported output in someone's home theater/player system setup (i.e., not necessarily center or L/R). I can't wait for someone to have the director talk over my shoulder in the surrounds. With Blu-ray, this is possible.

PCM With Reservations

Although Blu-ray supports PCM in any bit depth up to eight channels at 48kHz or 96kHz sample rates, or up to six channels at 192 kHz, there are two caveats about using PCM.

First, PCM requires at least double the file sizes as compared to using even the highest-quality, lossless features of both Dolby and DTS. Second, even if you have plenty of room on a 25- or 50GB disc, you lose many important features. The ability to set "dialnorm" (dialog normalization) and downmix options is only available when your content of any number of channels is "bundled" within a Dolby or DTS bitstream.

Not having the ability to set dialnorm significantly changes the game for both the consumer and the author. For instance, it may cause the end-users to alter their volume knob constantly due to the likelihood that different mixes from different sources can exhibit more drastic level differences than you might expect. At the production end, Blu-ray authors and their audio staff can simply adjust dialnorm settings as the audio content is encoded using any of the Dolby or DTS technologies. When using PCM, the authors would have to add what could be unfeasible workflow delay issues to kick the various audio mixes back to content-creation personnel to re-adjust audio levels for consistent playback from all the various content.

Also, when using PCM for multichannel tracks, one is at the mercy of the player manufacturer's default for downmixing. When either Dolby or DTS is used to encode multichannel mixes, metadata can be set by content creators through their compression (encoding) and authors as to exactly how *they* would like downmixes to be executed. This includes specifying how a 7.1 or 6.1 mix should be downmixed into 5.1, and how that resulting downmix should be presented when downmixed into stereo.

DVD vs. Blu-ray

The new Dolby and DTS extensions for Blu-ray

are quite impressive. Both offer lossless encoding formats up to 24-bit/192kHz via DTS Master Audio and Dolby TrueHD. Both offer extra (beyond 5.1) channels with very high-quality lossy formats: DTS-HD and Dolby Digital Plus.

In the past, legacy Dolby Digital, AC3 bitstreams were limited to 448 Kb/sec on DVD. Legacy Dolby Digital always had a maximum transfer (or data rate) of 640 Kb/sec, but this was not supported on DVD specifications. No such limit exists for Blu-ray. Using their (legacy) AC3/Dolby Digital 5.1 at 640 Kb/sec makes a huge difference over the 384Kb or even the 448Kb rates available on DVD. For a Blu-ray that needs many 5.1 bitstreams, they still take up comparably small space vs. the Dolby TrueHD. So if a content creator wanted multiple 5.1 mixes in various languages, both DTS and Dolby legacy formats could make a huge difference, allowing many 5.1 mixes to fit nicely on Blu-ray.

DTS' legacy format, Coherent Acoustics (at its full 1,509 Kb/sec), was and still is available for DVD, as well as the 768Kb/sec version; i.e., both DVD and Blu-ray. So keep in mind that a Legacy DTS at 768 Kb/sec or a Legacy Dolby Digital AC3 stream at 640 Kb/sec—both supporting up to 6.1 channels—could come in very handy for lots of alternate-language multichannel bitstreams (tracks). On DVD, most creators only had room for encoded 2-channel downmixes for alternate languages. DVD maximum was eight audio bitstreams.

Dolby or DTS?

Although Dolby and DTS are different in their approaches, both companies offer transparent delivery of original master recordings for Blu-ray. On DVDs, many "golden-eared" audio/recording engineers creating 5.1 mixes were amazed at the Coherent Acoustics algorithm employed by DTS, even at their (half) speed of 768 Kb/sec. I would always recommend the full 1,509 Kb/sec for client's music or concert video 5.1 content, where total space was not a problem. Now, with the high-resolution and lossless options for Blu-ray, the sonic differences are perhaps even less than subtle, or nonexistent.

This doesn't mean there aren't some differences. DTS has an interesting advantage for Blu-ray, in that the DTS bitstream was structured to always have DTS' legacy 5.1 48 kHz (known as "Core") embodied in its new formats, thus saving space. Dolby Digital's new TrueHD format uses the company's previous MLP (Meridian

Lossless Packing) technology from the DVD-A specification; then for Blu-ray compatibility, a simultaneous AC3 (legacy) encode is required and is additive to the final file size.

While DTS is marketing this point as an advantage, the reality is that a compatible Dolby TrueHD bitstream typically adds only about 10 to 15-percent more data. This would result in about 400 extra MB on a file for a 2.5-hour feature that is already 3 to 6 GB. This would only be significant if someone was right at the 25GB (single) or 50GB (dual-layer) limit and needed a digital "shoehorn" option without sacrificing the "lossless" feature.

On the Dolby side, the advantage is seen

DTS HD sounds best encoded at 1,509 Kb/sec.

in the Dolby Media Meter plug-in found in the company's offerings of encoding and editing tools. Using this awesome tool, you can analyze any existing mix for overall levels against industry-standard dialnorm, which is -27 dBFS. As I mentioned above, due to Blu-ray's much larger data capacity, content creators are including a lot of extra bonus material and dealing with different feature mixes, language overdubs, etc., all of which can have dramatically different overall levels. Dolby Media Meter can run faster than real-time analysis, whose result is a recommended dialnorm setting for that particular content. This application can run stand-alone or as an RTAS/AudioSuite plug-in in Pro Tools, among other platforms. It's also available for separate purchase from Dolby and can be invaluable for consistent levels over an entire Blu-ray disc's audio content.

Whatever format you use to author to Blu-ray, you can be sure that you'll have an abundance of great tools to access the deep feature set that Blu-ray discs offer. The bottom line is stellar picture and sound in numerous languages with lots of extra features and resources. What's not to like?

For more info on Blu-ray authoring, be sure to read *Mix*'s review of the Dolby Media Producer software suite at mixonline.com/gear/reviews/audio_dolby_media_producer_2. III

Glen O'Hara is an engineer and educator who has produced 5.1 music titles on DVD-A and DTS audio discs.

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PHOTO: AUTUMN DE WILDE

Norah Jones' album *The Fall* was tracked to analog. She says, "It's nice to go old-school and get a good performance. If there's a little character or mistake, fine."

By Chris J. Walker

Norah Jones

STEPPING OUTSIDE HER COMFORT ZONE

A virtual unknown before 2002, Norah Jones became one of the most successful artists of the new century when her debut release, *Come Away With Me*, sold 18 million copies and swept the 2003 Grammy Awards, winning in eight categories. Jones' inviting, gentle and sweet-sounding style drew from jazz, country and pop, all rolled into a distinctive sound that was unmistakably her own. She followed her initial triumph with two more popular discs: *Feels Like Home* (2004) was produced by the legendary Arif Mardin, while the 2006 album, *Not Too Late*, was a more homespun and personal project, made with her bassist boyfriend, Lee Alexander, in the confines of their Manhattan home studio.

Jones started her latest record, *The Fall*, more than a year ago, initially working with many familiar faces, but over time she realized, "I wanted to try something different and maybe use other musicians," she says. "I had been working with the same people, who I love, for the last six or seven years. I decided I wanted to find a producer who could help me get out of my comfort zone.

"So I started looking for producers and it became really hard," Jones

says with a laugh. "A lot of people that I liked were busy or weren't into doing it because the songs were already written and they would rather write together." Besides writing several songs alone, Jones had co-written with Ryan Adams, Jessie Harris, Will Sheff and Mike Martin. She continues, "Then I thought, 'Maybe I'll just hire an engineer who has a strong personality, who can be an engineer/producer.'"

Jones, producer/engineer Jacquire King and assistant engineer Brad Bivens at the Neve 8088 in Sunset Sound Studio 2

PHOTO: KEVIN KRUPITZER

During the process of investigating producer/engineers who had worked on albums she liked, she came across Jacquire King, who had worked on Tom Waits' *Mule Variations*, as well as CDs by Modest Mouse and the Kings of Leon, among others. The two met and, Jones says, "He just seemed really great—super-right-on, and like somebody I could work with easily, but wasn't going to be a puppet and would have his own opinions."

The Fall is a more rocking, guitar-oriented album that her previous releases, with Jones playing quite a bit of guitar herself this time. "It's just sort of an evolution, I guess," she says. "Ten years ago or so, when I started making music in New York, all I was listening to was older music, such as jazz, a little country and some blues. I didn't listen to much modern music, and these days I actually rarely listen to jazz, though I still love it dearly and it's what I kind of grew up on." Jones says her updated musical interests span Houston-based Aqua Velva, techno artist Santagold, Brazilian Jorge Ben Jor and even classic rocker Neil Young.

"We definitely had a lot of conversations about where she wanted to go," King comments from his Nashville studio. "We were looking at 18 or more tunes, and we had a big list of musicians that we wanted to try out. She wanted to play with musicians that were a little bit more rhythm-oriented and the section being a stronger element—forceful and kind of driving things.

"Then the next job was to pinpoint which sessions and groups of musicians we wanted to pair with songs. Some of them we placed in more than one group. So it was figuring that out with her and working to have a lot more guitar on this record. She does play a fair amount of keyboards—Wurlitzer especially and some piano, too."

Once Jones and King were in agreement about the songs and musicians, they tracked for two weeks at the Magic Shop in Manhattan. Studio A there has a 1,000-square-foot live room and a control room equipped with a Neve Series 80 custom wrap-around console, Studer analog recorders, Pro Tools and plenty of classic outboard gear. King had never worked there before, but Jones was well-acquainted with the facility: "I've worked there a lot, and you can get really good drum sounds there," she notes. "It's not the most well-decorated place, but it's got a vibe, fun and there's good delivery food." [Laughs]

King and his assistant for the past year-and-a-half, Brad Bivens, recorded the sessions to analog tape, and then transferred everything to Pro Tools for editing, overdubbing and mixing. "I think it's more pleasing to everyone and less about making records with your eyes," he says of working with a traditional console and tape. "There's more attention to what you're hearing; it just feels more real and final."

Jones concurs and takes it a step further: "Tape is easier, and it's not like, 'Oh, can we fix this tiny little thing that really doesn't matter, but since it's easy to fix I can fix it?' [Digital] is that kind of mentality. It's nice to go old-school and get a good performance. If there's a little character or mistake, fine."

Working at the Magic Shop and for a week at Sunset Sound in Hollywood (an API room), Bivens tracked Jones with drummers Joey Waronker (Beck, R.E.M.) and James Gadson (Bill Withers), keyboardist James Poyser (Erykah Badu, Al Green) and guitarists Marc Ribot (Tom Waits, Elvis Costello) and Smokey Hormel (Johnny Cash, Joe Strummer), among others.

Among the mics King and Bivens used on the sessions in both studios were a Neumann 47 on the bass amp, Telefunken Ela M 251 and Placid Audio Copperphone (Jones' personal microphones) on vocals, and Sennheiser 409 and Neumann 67 on the guitar amps; drum mics included a Coles 4038, Sennheiser 421 on the kick, Royer SF-7, Neumann 67s and Altec 633-A.

Bivens says of the main tracking sessions, "I had a great time and witnessed inspired playing from the musicians and Norah. She's quick, decisive and knows what she wants to hear, which makes it easy for engineers."

Much of the overdubbing took place at Jones' home studio. "Working at home can be good and bad," she says. "It's certainly fun, easy and comfortable. I can cook for the guys when they're doing something I'm not involved in, which I like to do. But it's also in your house," she chuckles.

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By George Petersen

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There was good chemistry between the players and Jones, and this allowed the group to experiment with arrangements throughout the sessions. King says, "It was really about the musicians learning the songs and then shaping them in the moment/performance. There are a few songs on the record that sound nothing like the demo. For instance, 'Light as a Feather' [co-written with Ryan Adams] felt more like country-rock/Americana than it does on the record. 'Chasing Pirates' had a slight shift, too, and the way it was to be presented was very important to Norah. We ended up combining a few different looks at it for the final. And 'Young Blood' she played for me on guitar when we first got together and didn't have any specific direction as a writing demo to where it is now."

Mixing was done at King's studio in Nashville, which includes a Quad Eight console, Neve 2254 compressor/limiters and a host of other new and vintage outboard pieces. Jones wasn't on hand for the mixing, which took some getting used to for her. "I'm very involved with the mixing usually, and this was very different for me. But the Internet [sending high-res files] made it somewhat painless. I would listen a few times on my stereo and through two different sets of headphones. Then I would send him my notes and we would go back and forth sometimes two, sometimes five times. I'm pretty in-tune with the way the balances are and very sensitive to brightness. I don't like it with drums and vocals."

"The producer part of me allows for a lot of input in the mixing process," King says. "But the mixer part of me has to be the dominant thing that doesn't care what's there as much as the producer would. I just try to take more of an objective look [mixing], and I think that's why I enjoy and want to have an ample amount of time to mix. I also see it as a real opportunity and privilege to be able to mix the records that I produce." He spent about three weeks mixing *The Fall*, and notes, "I typically don't mix more than a song a day and don't like to rush through it. I like to take a lot of breaks and get a lot of perspective."

Happy with the album, Jones looks up the road: "I've got a cool band put together and I'm real excited about that, and it's going to be fun touring. I would love to make a country record, but have never made a real record of that type. Also, I would like to make a real jazz record; I've never made one, really. Those things are on the back burner and I'm going wait till I run out of other ideas before I do those."

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Michael Jackson 'This Is It'

DETECTIVE WORK PAYS OFF IN NEW DOCUMENTARY

By Blair Jackson

It was the most anticipated set of shows in many years: Fifty sellout concerts at London's O2 Arena marking the triumphant return of one of music's most dynamic performers. A new studio album was in an early stage, and there were plans to shoot the last two O2 shows for a DVD. But as we all know, things didn't quite work out as intended. When Michael Jackson died unexpectedly on June 25, all of those big plans went up in smoke and were replaced with...different plans, the centerpiece of which is a music documentary called *Michael Jackson's This Is It*, compiled from tour rehearsals and contemporaneous interview footage. The film began a successful theatrical run in late October, and at press-time a DVD release of the film was expected in the near future. A companion two-CD set, also called *This Is It*, features the original studio versions of the songs in the film—in the order in which they appear in the movie—plus a poem by Jackson called "Earth Song" and one previously unreleased song, "This Is It," co-written a number of years ago by Jackson and Paul Anka, and featuring backup vocals by Jackson's brothers.

Putting together a feature-length documentary under the best conditions is a time-consuming and painstaking proposition, but in the case of *This Is It*, the filmmakers had to construct a movie largely out of elements that were not originally intended for release—on both the video and audio sides—and work at lightning speed to get it out in the fall. Even though the production was at the full-dress run-through stage at the Staples Center in L.A. when Jackson died, it had never been fully shot with multiple cameras and never completely recorded on multitrack, so when it was determined that a documentary would be made, the scramble was on to sort through untold hours of video and audio footage from multiple sources, from HD cam to simple handheld (video), and from multitrack Pro Tools to stereo camera audio.

It was a daunting task, and on the audio end, the initial cataloging of the audio elements and suggestions for the best audio sources to use in the film for a given song fell to tour audio supervisor Michael Prince and front-of-house mixer Bill Sheppell. Prince had worked for Jackson for nearly 15 years in a number of different audio capacities, from recording the superstar's musical ideas in hotel rooms, studios or other places when he was out on the road or in L.A. or at the Neverland Ranch, to engineering and mixing his studio recordings and live shows. Sheppell is a revered live mixer who has worked often with Korn and, more germane to the Jackson camp, ran FOH for Prince's 21-show run at the O2 in 2007.

"This film couldn't have happened if it wasn't for the fact that Bill Sheppell recorded some of the rehearsals," Michael Prince says. "We were very fortunate that Bill was recording rehearsals multitrack to work on perfecting the mix when the band wasn't there—to work on drum EQ, that sort of thing. He wasn't capturing every rehearsal, just some of them, and some of the ones he captured in 2-track on his Pro Tools LE system just so he'd have a record of it and could see how things were progressing. Plus, we had to make recordings for the lighting director and for the programmers who were synching the lasers so they could get the length of the songs and the timing and the tempos." In

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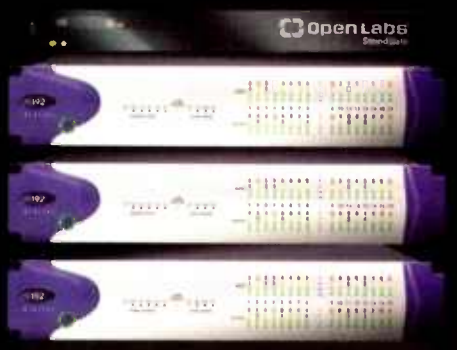

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some cases, too, the only audio rolling was from cameras that were capturing onstage or backstage action for what at the time was to be a tour "making of" segment for the eventual concert DVD.

"There was an amazing amount of detective work required to put these songs together," Prince continues. "Once the decision was made to make a movie, Bill Sheppell and I sat down in these little rooms at AEG [in L.A.] and started going through every hard drive of every day trying to figure out what days we had multitracks on, which days we had 2-tracks of, what songs we had in which format. We might only have the second half of 'Startin' Somethin'' this day, and we have the first half of it from this other day. We also had to decide which multitrack sounded best of the band and use that as our bed track, and then we'd sometimes bring in guitar solos if there were close-ups, or Michael's vocal from different days and try to make the best of what we had. Sometimes the visuals are so much better on this day, and we'd say, 'Well, we don't have a vocal from that day; we didn't record that.' So we'd take the vocal from a previous day and match the EQ and level so it would fit sonically. Fortunately, rhythmically, MJ tended to sing things pretty much the same every day."

The fruits of Prince and Sheppell's sleuthing, editing and mixing—with co-supervising music editors Scott Stambler and Ryan Rubin—were up to 64 tracks of material per song (some brought down from 90 by Sheppell), which were then delivered to Oscar-winning re-recording mixer Paul Massey who, with FX mixer Dave Giammarco, mixed the audio to picture in 5.1 on a Harrison MPC in Sony's Cary Grant Theatre.

The mixers, too, were challenged by disparities in the audio material. "It is what it is," Massey comments good-naturedly. "It's not all beautiful multitrack audio. But it's documentary, so one of the big mandates on this film was that there could be no ADR and no musical overdubs and such. Everything came from the rehearsals musically. There's one song, 'I Just Can't Stop Loving You,' which is this fantastic performance where Michael is singing with Judith Hill, one of the background singers. Well, there was no multitrack of it—we had a little bit of a 2-track front-of-house mix that Bill had done that was really just a guide, so he wasn't closely monitoring it, and the rest is kind of camera 2-track and whatever ambient mics there may have been to pick up various parts of different rehearsals. But it's still great because the performance is just awesome. In that situation, the performance—I hope—takes the audience away from the fact that it wasn't a multitrack recording."

Three members of the audio post crew (from left): re-recording mixer Paul Massey, tour audio supervisor Michael Prince and effects mixer David Giammarco

Then there are songs like "Human Nature," which starts out as 2-track camera audio but then moves to gloriously full multitrack as the picture changes from one rehearsal to another. "We've tried to even it all out with some EQ and compression," Massey comments of the format variations. "I think people will understand what we were working with and appreciate it for what it is. I'm really proud of the end result, and I'm happy to have been involved. It's a great tribute to Michael Jackson."

Michael Prince agrees, but is perhaps a bit more wistful—after all, he worked closely with Jackson for so many years. "I'm blown away by what we were able to achieve, from an audio standpoint, with this film, but I'm also still really sorry that people never got to see and hear those concerts. They were really going to be amazing." III

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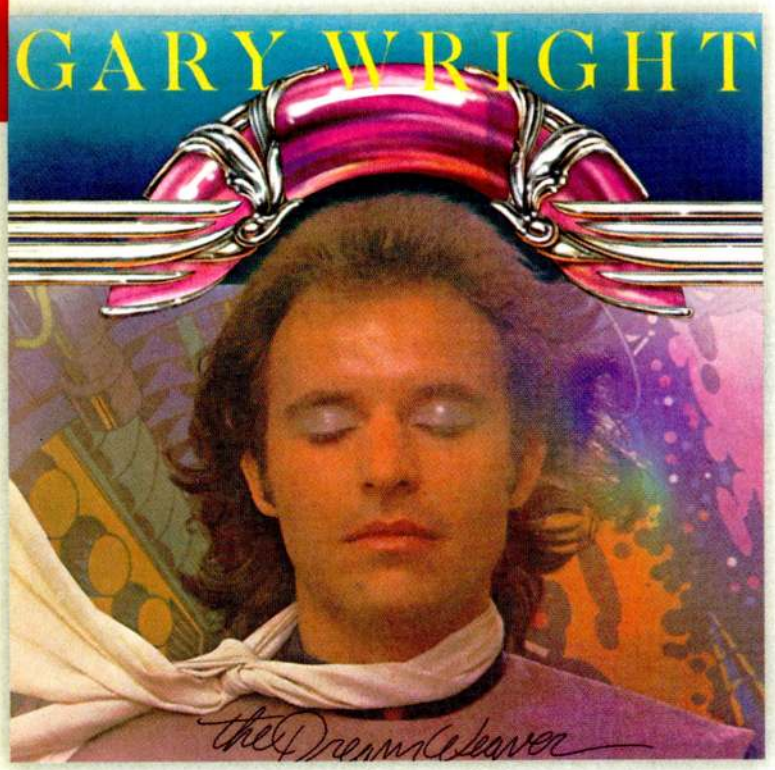

Gary Wright

"DREAM WEAVER"

By Matt Hurwitz

In April 2009, at a party inside Capitol Studios in Hollywood honoring his late friend George Harrison, Gary Wright found himself chatting at a table with Grammy-winning producer David Foster and legendary session drummer Jim Keltner. "Wow, it's the rhythm section for 'Dream Weaver,'" he recalls saying. "We all laughed."

Thirty-four years earlier, Wright was with the same pair at Armin Steiner's Sound Labs Studio in Hollywood, recording what would turn out to be one of the first—if not *the* first—all-electronic keyboard pop albums, *The Dream Weaver*, whose title track would become Wright's signature hit. The song rose to Number 2 in 1976, the album Number 7.

After spending several years in the late '60s as keyboardist (and lone American) with UK band Spooky Tooth, Wright went out on his own in 1970, appearing on Harrison's seminal *All Things Must Pass* LP and recording several solo albums for A&M Records. Wright briefly reformed Spooky Tooth with guitarist Mick Jones, but the band finally split up for good in 1974, after which Wright signed a deal with Warner Bros.

While Spooky Tooth had made its name in progressive rock, and his first two solo efforts, *Extraction* and *Footprint*, had been rock-oriented, Wright had always longed to produce an R&B disc. "I'd always had a really strong R&B influence in my life," he says. "Even though there is a similarity in blues and some R&B, guitar riff–wise, I had really always, in my heart, wanted to focus more on rhythm and blues."

Upon returning from England, Wright rented a house in his native New Jersey and began composing songs for what would become *The Dream Weaver*. All of the tracks were written on keyboards—with the exception of "Dream Weaver," which he wrote on guitar. So Wright—armed with an arsenal comprising a Minimoog, Hammond organ, Clavinet, Fender Rhodes and an ARP String Ensemble—began recording demos onto a Revox 2-track reel-to-reel deck. An Echoplex provided the delay so key to what would be the *Dream Weaver* sound.

Wright's connection to electronic instruments actually began in the final stages of Spooky Tooth, which is when he bought a Minimoog. "I was just starting to get into the technology," he says, "but since Spooky Tooth was more of a rock band, I couldn't get totally into it. I was just unbelievably fascinated by the Minimoog."

Being *sans* drummer, Wright used a Univox Rhythm Ace to keep the beat, and the device actually remained a part of the final recordings. "It's like a little percussion section," he explains. "Roger Linn used to come to a lot of my concerts and hear the Rhythm Ace. Shortly thereafter, he made the Linn Drum Machine," a key component of many a small studio for years to come.

After recording a half-dozen demos, the composer played the tapes to a Warner Bros. exec, who was as taken with the tracks as they were. "He said, 'You gonna do anything else?' I said, 'I don't think so. I don't think it needs guitar.' At that stage, I was kind of off guitars. I had played so much with guitar-heavy bands, I said, 'I'll just leave it as it is and do an all-keyboard album.'"

While playing on Peter Ivers' *Nirvana Cuba*, on which Wright's sister, Lorna, was singing backup, Wright met guitarist/producer Jay Lewis, who had more recently taken on engineering duties. "Gary came to the studio where we were recording, we hit it off and he asked me to do *Dream Weaver* with him," Lewis recalls. Though Lewis was not overly familiar with the types of electronic instruments Wright would be using, Wright notes, "It was new ground for him, too. He just looked at them from an acoustical perspective. And he had really good ears."

In the spring of 1975, Wright and Lewis booked a week at Sound Labs to do basic tracking. "There was a pile of hit records coming out of there and had been for years," Lewis notes. The studio had a large room for tracking, along with a smaller room for mixing and vocals/overdubs. "Everything there was really top notch—you walked in the door and you were ready to go."

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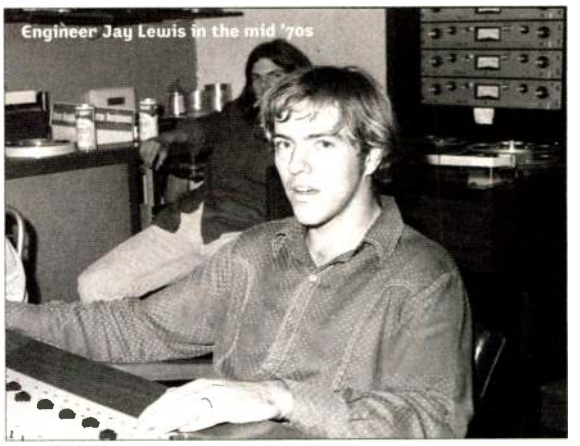
to get the best sound of out of them," Lewis says. The recording console was originally a Quad 8 desk, though Lewis notes, "By the time they were done with it, who knows what model it was!" Same goes for the 3M 16-track tape machine.

Wright intended to use his demo recordings as a roadmap for his studio musicians, who would be more used to playing with the standard guitar/bass/drums setup than playing to a Rhythm Ace. "I knew I had to get drummers who could play with rhythm machines," he says, "because I wanted to use the groove of the rhythm machines." On a recommendation from session guitarist Hugh McCracken, Wright turned to busy drummers Andy Newmark and Jim Keltner, the latter a veteran of Wright's previous solo records. (Newmark would play on the majority of the album; Keltner worked strictly on "Dream Weaver.")

For tracking, Wright was joined by a fresh-faced David Foster (before he became a producer), who played a variety of keyboards, most notably the signature Rhodes piano on "Dream Weaver." The team was rounded out by another keyboardist, Bobby Lyle, who played clavinet and Rhodes on several of the other tracks.


Engineer Jay Lewis in the mid '70s

Wright himself was actually the session bass player, using his Minimoog for the assignment and giving the album—and "Dream Weaver" in particular—a signature sound. "I did a lot of experimentation with it. And Jay really was good, too, in recording it." The Minimoog was played live through a bass amp, which was miked, while Lewis also took a direct signal from the keyboard, mixing the two together. "The miked bass gave us more of an ambient sound, gave it a little bit more depth," Wright notes. It also allowed the other players to feel the bass, as they would with an electric bass guitar, while tracking, as opposed to simply hearing it in their headphones.

"Later on," says Lewis, "people started to make patches that sounded big, like that. In those days, there weren't any. Of all the things Gary did on that album, his bass playing on that keyboard was really awesome." Though Wright played his bass live during tracking for the sake of the band performance, most of those parts were replaced during later overdubbing, using the method described above. "The parts he played weren't something that was predefined, for the most part—they were 'found' in the studio."

Tracking for the album went smoothly, over a week's time. When it came time to record the final track, the choice was down to two songs, and Wright had a difficult time deciding which to record. "I was in the studio with David Foster and Jim Keltner, and I played David the two songs, and said, 'Which of these two do you think I should do?' He looked me, and said, 'I would do 'Dream Weaver.'"

That choice resulted in a mega-hit for its composer, though the song didn't sound quite

the way we know it at first. "The original feel was more like The Band's 'The Weight,' with guitars, if you can imagine," Wright recalls. "So David suggested, 'Why don't you do it in a shuffle kind of thing?' So we changed it to have a swing, kind of shuffle feel," a rhythm that Keltner adapted to beautifully, as well.

Keltner and Newmark's drums, by the way, were miked in a fairly straightforward manner, which was Lewis' preference. "I was not—and I'm still not—a fan of a lot of microphones on drums," he explains. Lewis used a time-tested basic setup: Shure SM57 on the snare, an Electro-Voice RE20 on the kick and a Sennheiser 421 splitting the tom toms. For the floor toms, he preferred a favorite mic—a Beyer M500 ribbon, with its distinctive flat round head and large diaphragm—which he still carries around from job to job, just in case.

Once tracking was completed, Wright and Lewis spent several months adding overdubs at the now-defunct Stronghold Studios in the San Fernando Valley. Their efforts, however, were hampered by tremendous shedding issues from the then-new Ampex Grand Master 456 audio tape they'd used to record basic tracks. "Partway through overdubbing, we started hearing dropouts," Lewis recalls. "We looked, and we were losing the face of the tape—in chunks." They quickly returned to Sound Labs, where the tapes were cleaned by hand and then transferred back to Ampex 406, after which overdubbing continued at Stronghold, with Wright filling in gaps by re-recording any damaged parts.

Another correction to "Dream Weaver" was made during mixing. While it seems perfectly natural that the song's third verse contains no drums, it was actually the result of a "happy accident. There was a technical issue in that verse, but the rest of the take was fantastic," recalls Lewis. "So we made a decision to just take the drums out of that verse," filling in the gap with a stereo-panned "spaceship" sound that Lewis created from several pink-noise sources. "In those days, it was a hip thing to do," he says of the spaceship. "Today, I guess it wouldn't be so hip."

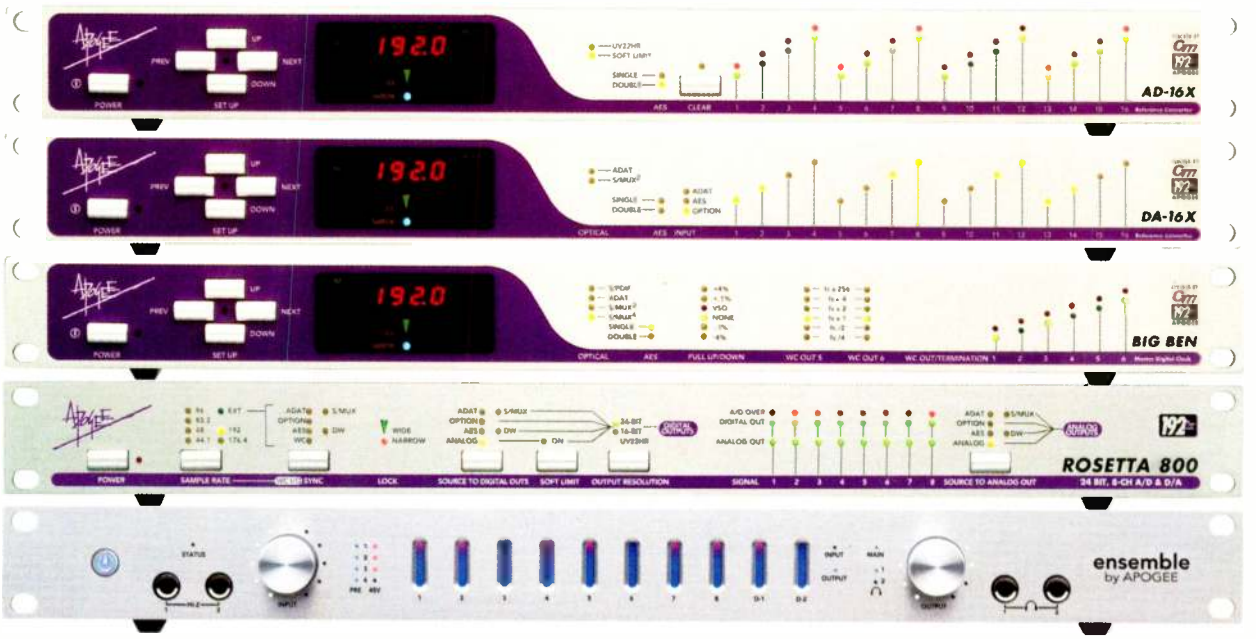
In overdubbing, Wright and Lewis added a few other sounds onto "Dream Weaver" that gave it its unique flavor. The shimmering, flanged sound of the high string part from the ARP String Ensemble was created by again splitting the signal, one into a direct input to the desk, where it was fed through a flanger, the other signal out to the studio to a fast-spinning Leslie speaker, which was miked in stereo. "That combination really gave it a whole different dimension," Lewis notes.

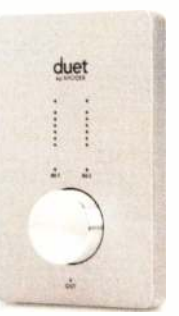
Adding to the spacey sound of the track was a whoosh of tinkling chimes, which Wright created on the Minimoog. "They had a little booklet with sounds, and one of them was called 'Tinkling Bells,'" he explains. "I just tweaked all the parameters and then put it through an Echoplex."

The most important overdubs, of course, were Wright's vocals, recorded through a Neumann U87, with slight compression and an EQ Lewis found that brought out the edge in the singer's voice. "He would put everything he had into every take," Lewis recalls. "The veins in his neck would stand out. With Gary, you don't have to manufacture anything, you're just taking it down." The engineer added a small amount of pre-delay during mixing, adding even greater depth to the soulful vocals.

While not intentional, Wright created the next step in pop recording, which would be heard echoing into the 1980s. "I didn't really have a goal, sound-wise; I just wanted to make a good album with good songs," he says. "All these sounds just fell into place." III

Amazing DNA





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Left: The 170-foot-tall steel structure and stage at University of Phoenix Stadium (Glendale, Ariz.). Right, from top: Bono, Adam Clayton, The Edge and Larry Mullins Jr.

By Kevin Becka

U2 360° Tour

SEEKING INTIMACY ON A GRAND SCALE

The U2 360° tour that recently ended its first leg in the U.S. has taken the stadium show to a new level. The sheer scope of the production is mind-boggling. It took two years to design and develop, travels on 180 trucks, employs more than 400 people—including 12 system engineer/techs—and uses an astounding amount of audio and video gear. The best thing about the show is the communication and contact between the band and the audience provided by the 170-foot-tall steel structure perched over the stage.

Originally inspired by the Theme Building at Los Angeles' LAX airport, the four-legged "spider" incorporates all of the lighting, some of the 12 manned cameras and spots, massive speaker arrays and a huge 360-degree vertically expandable LED video screen. And as ridiculous as it sounds, once the show starts, you forget it's there: Instead of being the elephant in the room, the structure focuses attention on the band and how they interact with the crowd, both near and far. The inner ring near-

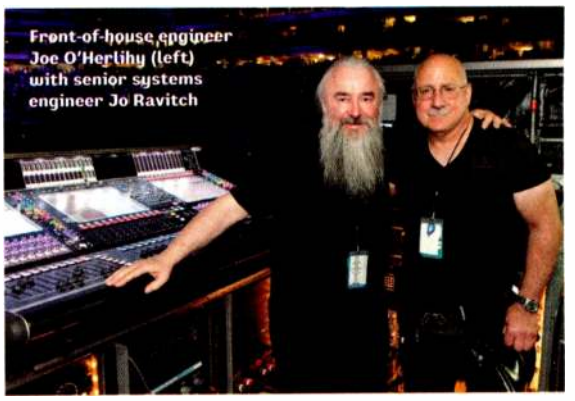
est the main stage gives more than 3,000 fans close proximity to the band, while the outer ring gives the band access to standing and seated concertgoers farther out. At different times during the show, The Edge, Bono, Adam Clayton and even drummer Larry Mullins Jr. use two moving bridges to perform between the areas and are followed by video and audio all the way.

Of course, you'd expect the audio system used for such a massive setup to be huge—and it doesn't disappoint. The setup comprises the latest in digital tech offered for live sound and, surprisingly, some tried-and-true analog gear. The tour's look and systems design was a collaboration between the band and audio director/front-of-house Joe O'Herlihy, show designer Willie Williams, production architect/designers Jeremy Lloyd and Mark Fisher, and Clair Global R&D and engineering teams.

The speakers used are all Clair and comprise FOH left/right hangs of 36 i5 and 36 i5B; 24 i5 and 24 i5B rear; 16 i5 and 16 i5B at house left; and 16 i5 and 16 i5B at house right. Main stage front-fills include 24 FF2 and 24 BT218 subs, while the "B" stage area carries 72 S4 subs. There are also two towers carrying 32 iDL delay cabinets. That's 336 separate enclosures, all powered by Lab.gruppen PLM 10000Q and PLM 14000s and Powersoft K10 amps that are positioned at each leg of the structure and are fed audio from the stage racks. All EQ and control is via Lake/Dolby I/O software Version 5.3, with most of the processing resident in the Lab.gruppen PLM 10000Q and PLM 14000 amplifiers; system tuning is via EAW Smaart software.

Consoles at FOH are redundant DiGiCo SD7s, each running identical shows. Jo Ravitch, senior systems engineer/Clair Global crew chief, says, "There are two main stage racks, one of them distributes AES to each leg and there's a backup system of analog feeds to each amp, as well. If we have an issue with anything in this setup, I walk over here and switch to analog and Joe [O'Herlihy] walks over to the other board and picks up the mix."

The front end for Bono and The Edge's vocals and some of the compression for the guitars called for some unusual gear choices. Ravitch says, "When the tour started, there wasn't very much [processing] available on the board so we're using outboard stuff." For Bono's vocals, O'Herlihy calls on the Manley Vox Box; The Edge's vocals take an Avalon 737. Compression for the guitars is on a Summit Audio DCL-200 comp/limiter, with the rest of the limiting provided by the SD7.


Front-of-house engineer Joe O'Herlihy (left) with senior systems engineer Jo Ravitch

The system was a game-changer for O'Herlihy, who has been with U2 for more than 25 years. "The approach to the mix in the context of the way the sound is distributed has been enlightening, to be perfectly honest," he says. "The size of the system has created an experience that is incredibly responsive. We now have something that's almost touch-sensitive. When you make a move, there's a large physical element of immediately hearing what you do."

Because of the staging's scope and design, the textbooks had to be thrown out and a system designed that would cover everyone. O'Herlihy says, "From the mix perspective, you have to get your head around the whole concept of having an inside column and an outside column, and how you distribute your gain structures accordingly."

The players' audio experience onstage was an essential element in the system design. "Any time you do things in 360 degrees, the apex of that circle is right where the drummer is," O'Herlihy continues. "It would normally be a difficult place to perform while being hammered with all that bass." This is where the use of the 72 Clair S4 cardioid subs around the outer ring comes in. "The cardioid movement works extraordinarily well in nullifying bass, so it's a clean, clean stage that is a good performance area," the FOH engineer adds.

O'Herlihy has seen an exponential evolution in tour sound technology. He had his digital education on the DiGiCo D5, which was innovative at the time. On the Vertigo tour, he had the benefit of the D5 being around for a few years before he took it out. He did not have that luxury with the SD7, but trusted that it was the only console that could get the job done. The SD7 was the only solution that let him put each and every individual channel where he wanted it without using external equipment that would have meant another link in the chain that could possibly fail. Still, the SD7 was a leap of faith and trust in DiGiCo. "We've had our glitches along the way with software updates, but like everything else, we're in virgin territory here and we felt that that the SD7 is what made this whole thing work."


In monitor world, from left: Niall Slevin, Alistair McMillan and Dave Skaff

Underneath It All

Monitor mixers Dave Skaff, Alistair McMillan and Niall Slevin make their home under the massive stage, which is also where offstage keyboardist Terry Lawless plays. Because all three mixers don't have a view of the stage, they watch what's going on via TV monitors at each station. And as the band is moving around so much, each station gets a four-camera split specially switched for their benefit, resulting in the band being visible at all times.

Skaff mixes for bassist Adam Clayton, drummer Larry Mullins and Lawless on a Digidesign D-Show Profile. The tour's redundancy mantra carries on below stage with Skaff mixing on one Profile with another right next to it ready to go. "With just a couple of switches hit at the same time, I'm fully up on the second rig," says Skaff, who worked for Digidesign on the VENUE console project from the beginning. In his mixes, he uses a variety of plug-ins from Waves, McDSP and the Phoenix plug-in from Crane Song, and also records every show to Pro Tools HD.

Using digital consoles has made it easier to provide specific mixes for each bandmember. The Edge has six guitar amps onstage and two under, while Clayton has five bass guitar feeds, and they rely on the team to provide the specific balances they need for each song. Skaff points out the advantage: "Without digital, it would be a madness of markers and 3x5 index cards. At soundcheck, Bono will do half a song, shout out

another song, do 12 bars of that song and shout out another. It would be impossible to get all that to come back without the digital consoles."

Mixers Slevin and McMillan provide audio for The Edge and Bono on two DiGiCo SD7s, each running dual engines fed via MADI. Each desk runs both mixes, the thought being that if one console quits, the engineer can jump to the second engine on the working console and continue to work until the downed desk can be revived. The stage racks and local racks used for processing are also duplicated and can be quickly switched if needed. McMillan is recording the show to Steinberg Cubase on two independent Apple G5s, which top out at 90 tracks, 20 of which are ambience. "I feed [Bono] quite a bit of ambience," says McMillan. "He enjoys hearing the audience reaction."

To help with latency, McMillan keeps Bono's vocal on an analog path by getting a split from the stage, which he sends through a Rupert Neve–designed Amek preamp and then into a channel on a Midas Verona analog console. The rest of the band and effects are sent to a second channel on the Verona, which all go directly to Bono. For the singer's reverb, he's using the Bricasti M7, McMillan's favorite new toy. "It's more like glue than a reverb," McMillan says. For Bono's delays, he uses a TC Electronic 2290 and a variety of verbs from Lexicon and Yamaha across the rest of the band.

McMillan, who has mixed monitors for Van Morrison, came primarily from a studio background, having worked extensively at Windmill Lane in Dublin. "These guys have made me raise the bar within myself," McMillan says. "After 20 years, you get set in your ways. Here, I had to start again and I love that."

For The Edge, Niall Slevin runs 40 inputs per engine into his SD7, sharing the same rack feeds with McMillan. He uses an AMS reverb and a Lexicon PCM 80 for his mixes but duplicates his rack effects with onboard equivalents in case of failure. He also has duplicate analog processors in his rack for McMillan's mixes should Alistair need to jump over to his console. Slevin feels the SD7 is a big sonic improvement over the SD5, but he is realistic about its abilities. "It still has a few reliability issues, but we're pushing it to the max, especially with the redundancy. Effectively, we're throwing it out the top floor and seeing if it will fly. At the moment, it's gliding, but it's getting there. No one has had these consoles and pushed it as much as we have. When we find things out, DiGiCo has been very good about fixing it. I can't imagine a situation at the moment in a rock 'n' roll theater or any other audio application that this couldn't deal with."

The band is using Future Sonics in-ear systems transmitted over newly upgraded Sennheiser G3 wireless systems, which the crew credits with adding more definition and top end. With this large of a setup, RF is a big challenge and the team has found themselves going back to old-school techniques of placement using line-of-sight and shorter cables. Skaff says, "The wilder it gets, the more we seem to go back to basics to make things happen."

A show of this scale being launched during tough times is easy to pick on. But it's hard to argue with its success both in record-breaking attendance and integration of new technology. At a time when album sales are not driving revenues, live performance has stepped into the spotlight and blazed a trail where other methods have failed. Did the band achieve "intimacy on a grand scale" as Bono proposed during the show? Only you can be the judge, but from my seat, it was dazzling. III

Kevin Becka is Mix's technical editor.

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SOUNDCHECK

Hear Music Through Subs

At the Rochester School for the Deaf (Rochester, N.Y.; rsdeaf.org), Bag End S18E-C subwoofers placed face-down on a vibrating floor help deaf and hard-of-hearing children "hear" music by letting them feel the vibration of the sound through the floor.

The Multisensory Sound Laboratory (MSSL) is a special product developed by Oval Window Audio to provide sensory feedback to special audiences, usually deaf and hard-of-hearing children, to let them appreciate sounds through vibration.

The speakers are positioned face-down against corners of the floor, which is constructed using interlocking panels floating on soft acoustic isolation blocks. The vibrating floor lets participants dance and move to the vibrations.

"We chose Bag End speakers for the 'driver' of the floor," says Norman Lederman, director of research and development for Oval Window Audio, "because we wanted a compact, sealed enclosure of solid construction that could generously reproduce sound down to 20 Hz and below. The black-carpet finish also complements the colors of the floor. In effect, the entire floor becomes one big subwoofer."

Teachers and students at the Rochester School for the Deaf

Left: the Bag End S18E-C sub. Above: the Circle Percussion Group SEN and HIBIKI perform at the school.

tour log

Touring in support of last year's release, *The Sound of Madness*, Florida-based Shinedown (Eric Bass, bass/piano/vocals; Brent Smith, vocals; Zach Myers, guitar; and Barry Kerch, drums) is working with front-of-house engineer Doug Nightwine, who reports that they are carrying little in the way of gear and relying on house support; monitor engineer for the tour is Chris Lightcap.

PHOTO: DAVID BERGMAN

FOH Doug Nightwine

How did you get involved with this tour?

I was mixing Puddle of Mudd, who is co-managed by the same company.

How much gear are you carrying?

Board groups. Yamaha PM5D in monitor world, Digidesign Profile at front of house.

What is your go-to piece of gear for this band?

I would have to say the Profile. It's a powerful mix system in such a small footprint.

Where can we find you when you're not on the road?

Still on the road. There are more December shows still being confirmed.

fix it

Luke Bryan Engineer Chris "Sully" Sullivan

We are not carrying a front-of-house console, so we are relying on a "desk du jour" supplied by the local sound company. Aviom's Pro64 is an extremely powerful tool for us because the system makes all inputs and outputs available throughout the entire system at all times. This means that I can run a Cat-5 cable from any A-Net box anywhere on the stage to a pair of 64160 output units that we place either next to the FOH stage box or right out front on the doghouse of the front-of-house desk. We have a pair of short XLR fan-out snakes to connect the Aviom 64160 outputs to the stage box or FOH console to deliver crystal-clear audio.

Royal Albert Hall Upgrades Elgar Room

On October 14, 2009, the Royal Albert Hall opened the doors to a new venue, the transformed Elgar Room—which once saw Dame Judi Dench and Sir Laurence Olivier perform—to the tune of £1 million.

The Elgar Room now incorporates built-in technical facilities and flexibility to match any event requirement—from late-night and intimate gigs to after-show parties, comedy nights, and cabaret and theater performances.

The original floor-to-ceiling windows were restored as the room's raised flooring was removed to create one large space, increasing its maximum capacity to 350 standing and to 110 when used as a restaurant.

A Meyer Sound UPJ speaker system is augmented with EM Acoustics monitors and subs, and QSC amps. Visiting engineers will find a stocked control rack that includes a Meyer Sound PSU, Tascam CD player, Shure receiver/transmitter/splitter/antenna, and gear from Biamp, Emo (distribution panel) and Ampetronic (loop amp). Shure mics are also on hand.

load in

Jay-Z's recently wrapped up tour used an AKG WMS4500 wireless mic system and C5900 vocal mic onstage, spec'd by production manager/front-of-house engineer Bryon Tate.

Yamaha Commercial Audio Systems has launched its "Rolling Showroom," a state-of-the-art 53-foot double-expanding trailer that will make stops at select national tradeshows, regional events and the company's training sessions...Touring engineer **Jason Choquette** spec'd the system for the touring musical ***The Producers*** with a DiGiCo SD8 at its core...The Midas Heritage 3000 celebrates 10 years in the business...**Delicate Productions** (Camarillo, CA) purchased a d&b monitor rig, which is currently out on **The Killers** world tour...**The Fillmore Charlotte**, a 20,000-square-foot venue, sports two Soundcraft Vi4s at FOH and monitor and a P.A. system comprising JBL, Crown and dbx components...**Square Brussels**, a new event space in the Belgian capital, recently purchased Studer Vista 5 and Vista 5 SR consoles as part of the SR system for its auditorium. Belgium-based company **Play** installed the consoles, which were purchased through Studer's Belgian representative HeynenNV.

road-worthy gear

CAD Audio VP Mics

New from CAD Audio's Astatic Commercial line are the 1600VP (hanging model) and 1700VP (56-inch carbon fiber boom model) condenser mics featuring remote control of polar pattern. The mics are designed for recording or live sound installations; directivity can be changed noiselessly in real-time, even on-the-fly during performances via a small VPC-1 remote box from up to 2,000 feet away using a single 2-conductor shielded cable. Up to six boxes can be mounted in a single rackspace. Specs include a response of 40 to 20k Hz.

www.cadaudio.com

Stewart Subcompact Power Amps

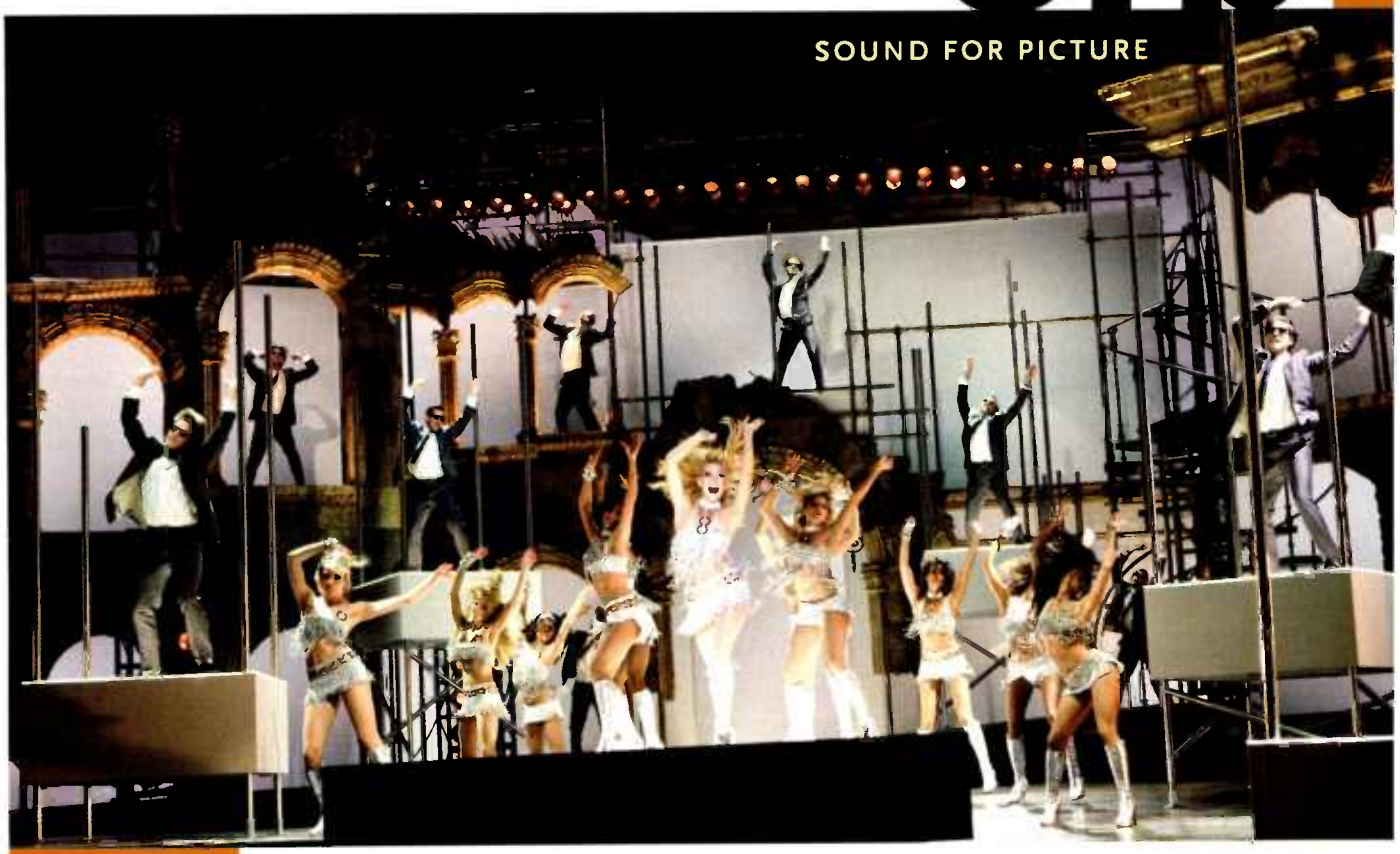
Weighing less than one pound, the AV25, CVA-25 and CVA-50 are ultra-compact amps designed to be located in places typically off limits to traditional-size units (including plenums). Optional mounts allow these to be pole-mounted, attached behind flat-panel displays, recessed in lecterns and countless other locations. The AV25 is a stereo, 35watts/channel (into 4-ohm) Class-D amp with a $259 MSRP. The mono CVA-25 (25-watt, $289) and CVA-50 (50-watt, $359) models are also Class-D, but are designed to drive 25/70-volt distributed systems. All are quarter-rack–sized with external inline power supplies.

www.stewartaudio.com

Blue enCORE Live Sound Mics

Known for its studio mics, Blue unveils its enCORE handheld live vocal mics with thick steel grilles and rugged cast zinc bodies. The $99.99 MSRP enCORE 100 is a dynamic model. The $149.99 enCORE 200 adds Blue's Active Dynamic circuitry and output transformer, combining the high-SPL handling of a dynamic with the low noise of a phantom-powered mic. The $199.99 enCore 300 has a hand-selected Blue Aria condenser capsule and preamp, with a reinforced chassis that controls airflow around the capsule for a natural, open sound, no matter how the artist holds the mic.

www.bluemic.com



By Blair Jackson

Rob Marshall's *Nine*

SONG AND DANCE IN AN AMBITIOUS MOVIE MUSICAL

With his multiple-Oscar-winning 2002 film *Chicago*, director/choreographer Rob Marshall showed beyond any doubt that he knows how to bring a stage musical to contemporary film audiences in strikingly creative ways. After a detour to Japan for the historical drama *Memoirs of a Geisha* (2005), Marshall went back to Broadway for inspiration, this time moving the 1982 hit *Nine* (a Tony winner for Best Musical) to the screen.

While perhaps not as immediately accessible to U.S. audiences as *Chicago*, *Nine* is actually a more interesting and compelling story. It's based on an Italian play that was itself adapted from Federico Fellini's classic semi-autobiographical 1963 film, *8½*, which is about a filmmaker confronting a creative block and examining his many relationships with women—including his wife, mistress, a whore and others. The incredible cast includes Daniel Day-Lewis as director Guido Contini; fellow Academy Award winners Penelope Cruz, Marion Cotillard, Nicole Kidman, Judi Dench and Sophia Loren in some of the principal female roles; and Stacy Ferguson (Fergie), Kate Hudson and others. All the actors did their own singing (and dancing), and the film includes three new Maury Yeston songs not included in the composer/lyricist's Broadway show.

Music director Paul Bogaev prepped the actors for their songs during the summer of 2008, tracking mostly at Angel Studios in Islington, London, during September 2008, before any film was shot. Executive music producer Matt Sullivan, who supervised the recording and worked with the actors, musicians and orchestrator Doug Besterman, says of Angel, "It's an old church where they've constructed three studios and we used Studio 1, which is a good-sized room with a lot of isolation. For film, when you're mixing in 5.1, it's really important to have as much isolation as possible." Studio 1 has a high-ceilinged main room and four iso rooms, all connected to a control room equipped with a Neve 88R console with surround panel and Meyer X-10 monitoring system. "Then, two of the songs were re-recorded at Abbey Road in the legendary Studio 2. We had two studios—2 and

3—tied in and a 55-piece orchestra," conducted by Bogaev. Both Sullivan and Besterman worked with Marshall on *Chicago*, and Sullivan also was a music supervisor on three other recent film musicals—*Rent*, *Hairspray* and *Dreamgirls*.

"We worked with the actors and the dancers and the director," Sullivan says. "Rob rehearses for a couple of months and we come in and shoot the rehearsals, and the orchestrator comes in and sits in a couple of rehearsals. Rob is really great at telling everyone exactly how he sees a musical number. If he wants a song to be dark and dramatic and it's Guido Contini's wife feeling she's alone and abandoned, he tells the orchestrator that, he tells the lighting people, and we're all on the same page of what the feel is. When we see her on an empty stage with a single spotlight and you hear a single cello line playing along with her, it all works together. Rob's approach to doing a musical on film is very much the same as doing a musical for stage. It's just that our opening night is shooting it—and opening night takes a few months." [Laughs]

Even though the actors are lip-synching to playback when the film is shot, they are still singing every time. The combination of tight close-ups and skimpy costumes on many women conspired to make earwigs an impractical solution to playing the music on set; plus, Sullivan notes, "The dancers want to hear the big, loud music. We had a theater audio consultant come in and rig the entire soundstage, which is really big." Most of the film was shot at Shepperton Studios near London, with additional work at Rome's massive Cinecitta complex and a little bit of exterior location work in Italy. Like the songs in *Chicago*, the ones in *Nine* make imaginative use of soundstages to create a sort of alternative stylized reality that is at once intimate and theatrical.

"It's the kind of film where dialog and music both have significant roles, and the lines are completely blurred in terms of where dialog and music begin and end," says sound editor Wylie Stateman, who co-supervised with Renee Tondelli, working both in Hollywood and at Pinewood Studios (Shepperton's sister studio) in London. "The songs all have very significant dramatic meaning, so the dialog has to lace in and out of the songs, and there has to be great continuity in the performances, as well as the sonic transitions.

"Rob is very conscious about blending the musical numbers in a seamless way," Stateman says. "He doesn't want the film to *stop* for a musical number; he wants the number to develop naturally from the emotion of the film. So as a scene is moving toward some emotional climax, the characters are *driven* to songs. And Rob, because he has such attention to rhythm and to timing, insisted that we carry seamlessly both the cutting patterns and the sound patterns—whether it's the cadence in somebody's voice or the cadence in their walk—to 'hand off' to the songs in a way that minimizes the audience's ability to foresee a song coming."

Co-supervisor Wylie Stateman roughing it on a soundstage

Stateman is a four-time Oscar nominee for sound or sound editing (including Marshall's *Memoirs of a Geisha*); Tondelli is a dialog and ADR specialist. "Renee is such an important part of the senior team leading the sound work on this film," Stateman comments, "because the dialog establishes a tremendous amount of the sonic integrity of the film, meaning acoustically it has to go seamlessly from spoken word into song and back out again, and that requires literally the micro-editing of the soundtrack. Sometimes things are blended syllable by syllable from production to ADR to music pre-record and then back again. She's done an amazing job on this." (The production sound mixer on the film was Jim Greenhorn, whose recent credits include such impressive productions as *The Reader* and *Notes on a Scandal*.)

"Foley was also very important in this film," he adds, "because it's often Foley that ties the dramatic lensed material with the staged material against playback. We built a floor on the ADR stage over at Todd-AO on Seward in Hollywood, and 12 dancers—some of whom had danced on *Nine* and some of whom knew Rob from *Chicago*—came in from around the world, and they danced these numbers wearing headphones and we made 5-channel recordings of their feet and of their movements. It's a really lovely contributing element, making the playback tracks sound at home in the film and real in the theater.

"It's not about covering everything; it's really about finding the dramatic punctuation, finding just the right moment for a bit of movement of something to help with the perception of reality and the perception that these numbers were sung and danced in that shot."

That particular Foley session was done in Hollywood "because it was more convenient for the dancers at that particular moment in time," Stateman says. "I did it with Renee and with Harry Cohen, who was also a very significant player—he's the sound effects designer. We've been together for almost 20 years; Renee and I for more than 10 years. We all worked with Rob on *Memoirs of a Geisha*." The film was mixed in Pinewood's enormous, refurbished Powell Theatre (the largest re-recording studio in the UK) on the room's Euphonix System 5. Mike Prestwood-Smith did the dialog; Rob Fernandez, from Sound One in New York, did music; and Pinewood's own Richard Pryke (an Oscar-winner for *Slumdog Millionaire*) handled effects.

When we spoke with Stateman and Sullivan in mid-October, work had just begun on the final mix and neither was expecting any major problems to crop up. "It's shaping up really, really well," Sullivan says. "I've spent a lot of time in the last month getting the 5.1 music stems big and fat and punchy. My engineer Frank Woolf—who did *Hairspray* with me and some of *Dreamgirls*—and I mixed the stems at Westlake Studios on Santa Monica Boulevard. Then we came here and did some work at SARM Studios [in London], which is Trevor Horn's place. We also did some fixes at Pinewood—some overdubs, some sweeteners."

Meanwhile, back at the mix, the post team was hard at work finishing this film that Stateman calls "a crazy, beautiful canvas." As a music man himself, and someone who famously works well with actors, Marshall is obviously very attuned to the importance and nuances of sound—it certainly says something about both his ears and his ability to hire a good sound team that both of his previous directorial efforts earned Academy Award nominations for sound (with *Chicago* earning trophies for Mike Minkler, Dominick Tavella and David Lee).

"Rob Marshall is totally the creative engine behind this film," Stateman concludes. "He's looking to create a film that's unbridled by *anything*, and his imagination is quite vast. This particular film offered him an opportunity to explore both a '60s style—which is really a tribute to Fellini—and today's technology, in terms of digital negative capture on film, finished with every electronic and digital advantage available. You can tell that Rob is still evolving as a filmmaker, learning every time he makes a film, and it's been really exciting to make this journey with him." **III**

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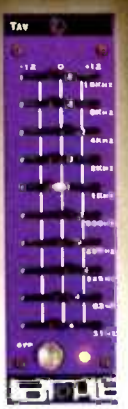

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wunder audio

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Offering twice the amp power of the VS3208, Quested's (www.quested.com) new V3110 ($9,000/pair) monitor is powered by a 700-watt, Class-D amplifier for the 10-inch woofer and 150W per driver of Class-A/B amplification for the 3-inch mid and 1.13-inch HF. The V3110 offers independent EQ/trim for the HF, mid and LF, allowing for setup in a variety of environments and positions, and its 24dB/octave crossover slopes promise greater drive unit efficiency. Other features include a rotatable MF/HF section for horizontal or vertical placement, combo XLR/TRS inputs and 120dB max SPL.

Hardware Doppelganger

elysia **mpressor Dynamics Plug-In**

brainworx (brainworx-music.de) and elysia (www.elysia.com) have collaborated on the mpressor ($440) software dynamics processor plug-in, which closely emulates elysia's mpressor hardware unit. The software offers all of the hardware unit's functions, including its unique Auto-Fast feature, promising perfect attack. Anti-Log for non-logarithmic release curves and Negative Ratios for compression effects. The mpressor plug-in is available in RTAS, VST, Audio Units and TDM formats, and a free 14-day trial version is available for download.

Beefy Mid/Near-Fields

Guzauski/Swist **Monitors**

From the minds of Grammy Award–winning engineer Mick Guzauski and designer Larry Swist (www.guzauski-swist.com), the Guzauski/Swist near-fields ($12,000; available for purchase directly from the manufacturer) feature a 12-inch, low-resonance, long-excursion driver in a sealed cabinet; a 3-inch Dome ATC midrange; and a 1-inch Morel soft-dome tweeter (the same used by Dynaudio). The system is powered by 1,500 watts of Class-D amplification included in a separate rack. The acoustically decoupled midrange/tweeter enclosure is hung from the woofer cabinet and isolated down to 6 Hz using a military-grade isolation system. Users can align the system either vertically or horizontally.

Hearing the Almighty

Little Labs **VOG**

The new VOG (Voice of God, $420) processor from Little Labs (www.littlelabs.com) comes in a 500 Series module format and lets users add a proximity effect without the source being close to the mic. VOG features a sweeping sharp peak resonance from 20 to 300 Hz while everything below the peak is rolled off at a steep -24dB/octave. This gives the ability to focus on the low end while eliminating mush and unnecessary woofer excursion.

Little, Yellow, Different

Avant Electronics **Active MixCubes**

Newly redesigned from the ground up, the Active MixCubes ($459/pair, $259 each) from Avant (www.avantelectronics.com) incorporate a Class-A/B amplifier rated at 60W RMS. Other features include a rear-mounted, detented gain knob; a pin-1 audio ground lift; illuminated on/off switch; combo TRS/XLR input jack; and an aluminum heat sink. A pair weighs 14 pounds, 4 ounces, and comes with a five-year limited warranty to the original owner.

Big Bam Boom

Sonic Reality **EpiK DrumS Ken Scott Series**

EpiK DrumS (www.epikdrums.com, $749), the latest virtual instrument drum kit plug-in from Sonic Reality, features five of the world's best drummers recorded by legendary producer/engineer Ken Scott. For this VI, Scott re-created the drum sounds he recorded with David Bowie, Supertramp, Mahavishnu Orchestra, Dixie Dregs, Missing Persons, Elton John and The Beatles using the same gear, instruments and original drummers—Billy Cobham, Terry Bozzio, Woody Woodmansey, Bob Siebenberg and Rod Morgenstein. The collection offers more than 80 GB of 24-bit samples, including 2,000 grooves featuring discrete user control over the mixes, or mixes by Ken Scott himself.

Seeing Red

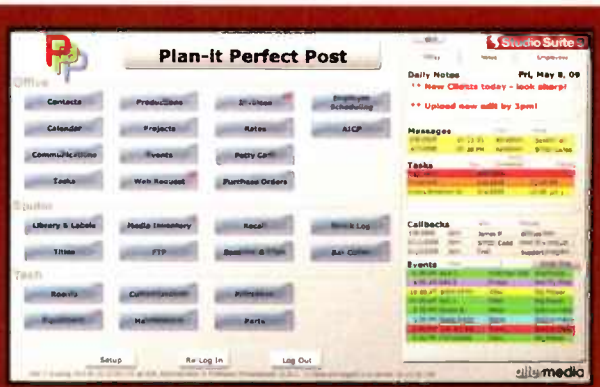
Focusrite **Scarlett Plug-In Suite**

The latest software release from Focusrite (www.focusrite.com), the Scarlett ($99) plug-in suite harkens back to the company's Red Range hardware. This collection of compression, gating, EQ and reverb plug-ins offers a library of presets and classic Focusrite features, controls and GUIs, including detailed porthole-style VU meters. The plug-in's EQ uses the same 6-band EQ approach as Focusrite's Red 2 and ISA EQs, while its compressor can operate in stereo and dual-mono and features a sidechain input. Scarlett is dual-platform (Mac/PC) and works under VST, Audio Units and RTAS (Pro Tools) hosts.

Organizational Issues?

AlterMedia **Studio Suite 9 Studio Management Software**

The latest incarnation of AlterMedia's Studio Suite (www.studio-suite.net) offers a range of new modules for organizing contacts, rates/scheduling, maintenance/inventory and more.



Other features include iPhone access, a new "quick-find" feature, e-mail management, dynamic categorization and increased reporting options with easier data export to Excel. The software comes in three versions priced from $499 to $1,799, and requires FileMaker Pro 9 to operate.

By George Petersen

ADAM Audio S3X-H Studio Monitors

Mid-Field, Three-Way Design With Hefty Amps, X-ART Tweeter

I've been intrigued by ADAM speakers since encountering them at AES Munich a decade ago. I was struck by company co-founder Klaus Heinz' ART (Accelerating Ribbon Technology) folded-ribbon tweeter based on Dr. Oskar Heil's 1972 Air Motion Transformer. Rather than the 1:1 ratio motion of a conventional piston-type HF unit (such as a cone or dome), the folded tweeter has a much larger surface area and creates air motion by squeezing the surrounding air in a 4:1 velocity ratio.

Ten years later, ADAM continues to refine its ART approach, resulting in the new X-ART (eXtended-ART) tweeter. Used in the new SX Series monitors, the X-ART driver exhibits greater efficiency, an additional 3dB power handling and HF response out to 50 kHz. The SX Series range from small two-way near-fields (S1X and S2X) to three-way mid-fields (S3X and S4X). The latter models are offered in vertical and horizontal versions, such as the S3X-H tested here.

More That's New

Unlike ADAM's mirror-imaged S3A and P33A monitors, which use dual woofers—with one voiced as a subwoofer and the other handling upper mid-bass and mids—the SX3-H is a more "conventional" three-way with two 7-inch woofers operating in the same frequency range, crossed over to a 4.5-inch Hexacone midrange at 350 Hz and the X-ART driver kicking in at 2.8 kHz. Also, the SX3-H's *non*-mirror-imaged design simplifies using these in surround.

But the big changes are on the inside. The P33A had three 100-watt amplifiers; the SX3H packs three ICE 250W (350W peak) PWM amps to drive each woofer and the mid driver. A 50W (100W peak) Class-A/B analog amp that's flat out to 300 kHz powers HF. Despite this horsepower, the SX3-H is a compact 21x11x13 inches (WxHxD) and each monitor weighs in at 43 pounds.

Note: The SX3-H woofers are spec'd as 7-inch and the mid as 4.5, yet the actual diameter of the cones—the moving part, not the basket frame—are 6 inches and 3.5 inches, respectively.

The twin-front ported, black-matte enclosure is gently radiused along the front baffle and sides. On the back panel are amp-cooling vents, an AC power switch and XLR analog input; 24-bit/192kHz digital inputs are optional.

Controls are front-mounted for easy, fast room tweaking.

In the Studio

All necessary controls for SX3-H operation are on the front panel. The AC standby switch let me leave the rear AC switch "on" all the time, then put the speakers in standby to avoid power-on "thumps" and use an AC strip rather than have to reach behind the SX3-Hs to turn them off. The standby is also useful for muting one side or the other while checking L/R elements in your mix.

Six front panel controls for tweaking setups include input sensitivity (fine and coarse), LF and HF. On the LF side, there's a 0 to +6dB bass boost control at 80 Hz (which I never needed) and a ±4dB shelf filter at 150 Hz. HF offers a gentle ±4dB shelf above 6 kHz and tweeter level that's ±2 dB in 0.5dB steps. All the controls are detented—a nice touch, but with no pointers or indicators on the knobs, you can't tell from a glance whether the bass shelf is set at +0.5 or -4 dB.

Although the SX3-Hs are intended as mid-fields, I first tried using them in a near-field configuration with the monitors placed about five feet away in a 10x12-foot video edit suite. The results were pretty much disastrous. The room was far too small and the substantial LF from the SX3-Hs overwhelmed the space. In situations like this, ADAM's two-way, single woofer SX2 would be a better choice.

Using the SX3-Hs in a medium-sized control room (15x18-foot with 10-foot ceiling) was a completely different experience. This particular room is fairly absorptive, and a slight HF gain (about 1.5 dB) was all the correction required. Here, the bottom end was tight and full, with no boominess whatsoever, and the mids were in perfect balance, whether in playbacks at 80 dB or 108 dB. The top end was natural, detailed and sweet, and with the X-ART tweeters I felt confident adding any air-band EQ to a track.

The monitors were on stands in the mid-field pocket (about six to seven feet back). At this distance, the top end was open, with the SX3-Hs creating the effect of a coherent, almost single-point source. The imaging was razor-sharp, creating a well-defined center and a nice sense of front-to-back soundstage.

With 800-plus watts of onboard amplification, the system is capable of SPLs exceeding 126 dB, offering plenty of headroom, which adds to the SX3-H's superb transient response. Despite all that punch, any amp noise was almost undetectable and the SX3-Hs provided long sessions without listening fatigue. And besides simply sounding right, mixes made on the SX3-Hs translated effortlessly to other systems.

At $6,800 pair, the ADAM Audio SX3-Hs are clearly not for everyone. However, anyone seeking an uncompromised solution to studio monitoring should put these on the short list of products to consider. III

PRODUCT SUMMARY

COMPANY: ADAM Audio
PRODUCT: SX3-H
WEBSITE: www.adam-audio.com
PRICE: $6,800 pair

PROS: Clean, flat response; great translatability. Superb transient response.

CONS: LF may overwhelm small rooms. Pricey.

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By Barry Rudolph

Shure KSM313, KSM353 Ribbon Mics

Versatile, Sturdy Transducers Excel Over a Range of Applications

With its acquisition of Crowley and Tripp Microphones, Shure enters the ribbon mic arena with the KSM313 (Crowley and Tripp's Naked Eye) and the KSM353 (El Diablo). They are made in the U.S. in the same way, with Shure continuing support for all original Crowley and Tripp mics.

Both of these mics use Roswellite™ ribbon material, a super-elastic conductive and magnetic composite with shape memory and low mass. Invented by Bob Crowley and Hugh Tripp, Roswellite—unlike conventional aluminum ribbons—is stronger, yet instantly responds accurately to high frequencies and returns to shape after being physically deformed by windblasts, plosives, phantom-power jolts and high-SPL sources.

The KSM313 Revealed

The KSM313 has what is called a dual-voice design because the two sides of the figure-8 polar pattern are exploited to offer two distinctly different frequency responses and sound. The front (logo) side has the classic thick and creamy ribbon sound, while the backside is significantly brighter—almost like the rising high-frequency curve of a good vocal condenser mic.

The KSM313 has a steel body that's painted black, and its red mesh screening covers the machined sound-entry ports. It feels hefty, and a threaded nut attaches it to a "monocle" swivel bracket that allows for any microphone orientation. The 313 uses direct point-to-point wiring, gold ribbon connections and a high-efficiency, custom-wound transformer. It comes in a foam-lined mahogany "cigar box" case that's expertly built using finger joinery and fancy hardware.

The KSM353 Design

The KSM353 is a "no expense spared" microphone crafted for pristine audio in studio and concert hall applications. Like the 313, it's also handmade but comes in a tall wooden box that looks like it should hold a delicate astronomical instrument or a nuclear fuel rod.

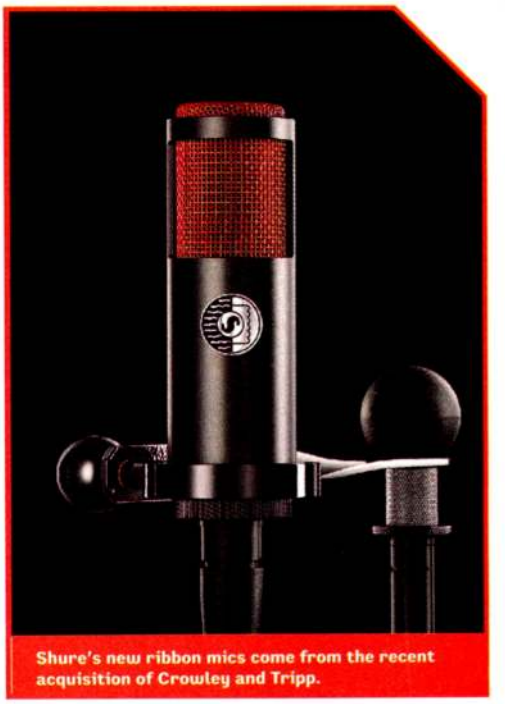
The mic has a highly polished, machined stainless-steel tube containing the double-shielded transformer and ribbon motor rigidly joined together for minimal magnetic and RF interference, lowest noise and highest output. Both sides of the 353 are symmetrical in frequency response to minimize off-axis coloration.

PRODUCT SUMMARY

COMPANY NAME: Shure Microphones
PRODUCT: KSM353, KSM313
WEBSITE: www.shure.com
PRICE: KSM353, $3,320; KSM313, $1,560

PROS: Great sound, virtually indestructible Roswellite ribbons.

CONS: Insufficient shock-mount for the KSM353.



Shure's new ribbon mics come from the recent acquisition of Crowley and Tripp.

Rockin' Ribbons

In the studio, I recorded both electric guitar and vocals using these mics. I used a GML 8302 mic preamp, AEA's RPQ preamp or the studio's API console pre's, and found that both mics produced more level than old vintage ribbon mics or a Royer R-121. As with all of the ribbon mics I tried for this review, I found that mic placement and source distance were very critical to the sound. When close-miking, moving a few inches up, down, back and forth yielded huge sonic changes.

In separate tests, I placed both the KSM313 and KSM353 close to one speaker of a Marshall Hendrix reissue cabinet. I used an Orange Tiny Terror Top set to 15 watts and did tests with both the guitar player and re-amped direct guitar recordings coming from 24-bit/96kHz Pro Tools HD sessions. I found the KSM313's logo side to sound full and round, reminiscent of the RCA 44 ribbon with the RCA sounding slightly "honky" in the midrange. The backside sounded very close to the front of AEA's R84 ribbon—more extended high frequencies, yet it retained most of the fat low end. I liked the option of turning the 313 around for a different sound, but if you carefully aim the mic at the speaker's center, you'll always get enough highs if you require. By way of comparison, a good-sounding Royer R-121 was slightly "scooped out" in the midrange relative to all these mics.

Compared to the 313, the 353 sounded bigger in the low end and exhibited smoother high frequencies on both vocals and guitars. For voice-overs, it has a good neutral sound without special emphasis on any particular frequency area, such as the Coles 4038 with its brontosaurus bottom end. For vocals, the 353 has a near-condenser sound but is smoother in the high frequencies and never seemed to overload, making it a good choice for sibilant or shrill-sounding singers. The only downside was that I could not trust the included shock-mount to keep the KSM353 from nearly sliding out and hitting the floor—this mount seems all wrong for a mic of this caliber and price point. (Shure acknowledges this and promises a better mount soon.)

Mics You Can Count On

The KSM313 and KSM353 are rugged, worry-free ribbon mics that you don't have to baby. Their warm and clean sound make them great all-around sonic alternatives to a studio's or live stage's workhorse condensers and dynamics. ■

Barry Rudolph is a Los Angeles–based recording engineer. Visit him at www.barryrudolph.com.

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By Bobby Frasier

M-Audio Studiophile CX8 Monitors

Two-Way Powered Reference Models for the Home Setup

M-Audio has been offering entry-level studio speakers for 20 years, and in the distant past the products were hit or miss. But after the company's acquisition by Avid, there was some obvious retooling of the monitor line. I tested the DSM2 in the October 2008 issue of *Mix* and was quite impressed. I use the now-discontinued Studiopro 3 monitors on occasion as they fit the bill perfectly in terms of travel, size and price-point restraints. Listing at $499 each, the Studiophile CX8 monitors sit squarely in the middle of the current M-Audio line. These are large speakers, delivering a commanding presence on the bridge of a personal studio space.

Components Are Us

The 8-inch woofer is a woven Kevlar design, providing rigidity with less mass than some conventional paper-coned speakers. This yields a punchy low end, with a fast response time and more accurate bass. A 2-inch rear port is tuned to bring the low-end response down to 38 Hz. An 80-watt Class-A/B amp powers the low end, with 40W going to the HF driver. The HF transducer is a 1-inch silk-dome tweeter mounted in a recessed, circular waveguide. The guide increases the sweet spot for improved imaging at varying mix positions. This tweeter has a frequency response out to 30 kHz, providing good clarity in the upper-harmonic range. The crossover point for the two drivers is 2.7 kHz.

The CX8 rear panel's XLR, RCA and ¼-inch TRS inputs should cover just about any output source in a project studio.

A three-position (0/-2/-4dB) Acoustic Space switch cuts at 200 Hz, compensating for the speaker placements against a wall or in a corner. The HF trim switch cuts or boosts 3 kHz by ±2 dB, giving you the ability to compensate for a slightly live or dead room. With the MF boost switch in the On position, a 2dB boost peaking at 2 kHz with a 1kHz bandwidth is kicked in, amplifying that critical midrange area between 1.5 and 2.5 kHz. Rounding out the rear panel controls is the LF cut-off switch. This is essentially a highpass filter with settings of 80 Hz or 60 Hz, both with a 12dB/octave filter. If you're using a subwoofer, setting this switch in as close as possible to the lowpass cut-off frequency of your sub will help eliminate any unnecessary exaggeration of the bass response.

The cabinet is designed to be internally rigid, giving off less resonance, which can color your mix. This has been with 1-inch MDF baffles on the front and rear of the cabinet. Rounded edges complete the modern look and help eliminate acoustical corner turbulence, furthering the design criteria of accuracy and transferability.

PRODUCT SUMMARY

COMPANY: M-Audio
PRODUCT: Studiophile CX8
WEB: www.m-audio.com
PRICE: $499 each

PROS: Big, impressive footprint. Transient on/off protection. Punchy low end. Affordable.

CONS: Detail, clarity and accuracy less than competing/similar price-range models.

The CX8's woofer is powered by an 80-watt Class-A/B amp with a 40W amp for the HF driver.

Power to the People

These are large speakers. At 17x11x13 inches (HxWxD), they seem quite tall and deep, but not necessarily too wide. They fit nicely on a console bridge or desk, provided you have enough rear space. The elongated, football-shaped blue power light on the front is unique and subdued. Lately, I've noticed a lot of blue LEDs that are overbearing when mixing in low-light situations. I found that a lengthy break-in period was required to really get these speakers to sing.

I had just reviewed the JBL LSR 2328Ps and was shocked at the level of detail in a speaker at their price point ($435 each), so the CX8s had a lot to live up to.

In almost every instance of playback, the CX8s had the largest variation of reproduction in the critical midrange, particularly in the upper frequencies. Snare drums are brighter (compared to the LSR 2328Ps), vocals have an increase in amplitude in the 1.6kHz and 3.2kHz harmonic range, with closed hi-hats sounding constrained without the associated harmonics. Electric guitars were more forward in the mix—not quite nasty, but a definite change in the midrange response. Noting the detail of reverbs and recording space, I can't help but think the JBLs, at a slightly lower price point, would be the obvious choice if one were considering a new speaker system in this price range.

Listening to original Pro Tools files, I observed the same things. Both electric and acoustic guitars were forward, vocals seemed constrained and lacking harmonics. Kick drums had plenty of punch and sounded very natural. Listening to original 2-track recordings from a Zoom H2 and H4n were actually a bit more pleasing on the CX8s due to the elevated response in the bass range.

Are They X-ellent?

Speakers are, without a doubt, getting better in the $1k price range. The selection of a speaker system is a truly personal choice, and a passionate one, so choose wisely. Give several systems in your price range a listen (make sure they're warmed up) with audio references you are familiar with. The CX8s may be the sound you are looking for, but for my money the JBL LSR 2328Ps, at a lower price, provide more accuracy and transferability in this price range. This is one man's opinion; you be the judge. III

Bobby Frasier is an audio engineer and consultant who has worked for SSL, Panasonic and Alesis.

Symphony Users are Talking...

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By Eddie Ciletti

More Electronics Basics

Useful LED and Relay Tricks

This month, "Tech's Files" will stray from the conventional audio signal path and venture into some über-basic examples of analog control and display circuitry. All of us are familiar with LEDs as visual indicators. As I tell students in the classes I teach, Electronics 101 defines a diode as a device that allows current to flow in only one direction, which can enable rectification, commonly used to convert an alternating current into direct current. In the 1920s, diodes were found to emit light in certain applications. Years later, experiments with diodes made of exotic materials (such as silicon germanium and gallium arsenide phosphide) spawned commercial LEDs in various colors.

A single LED can translate amplitude variations into a corresponding brightness range—not very precise, but definitely operator-intuitive. An audio signal can drive an LED to moderate brightness, and by exploiting its ability to rectify an incoming signal, two LEDs in parallel with the signal path can create a simple fuzz box. If the design goal is to make the LED bright enough to get attention, then a transistor (or op amp) must be inserted between the LED and the audio signal to act as a buffer/driver.

Figure 1 shows a simple buffer/driver option. Swapping out the LED for a load resistor (on the collector) yields the more familiar single-stage voltage amplifier. Like a transistor, an LED is a semiconductor that has polarity and must be oriented accordingly. Notice that the LED "arrow" is pointing in the same direction as the NPN transistor's emitter. This particular circuit is being used to indicate the threshold and degree of processing for a simple optical limiter.

Regardless of whatever "load" (a resistor, LED or relay coil, as shown in Fig. 2) is being used, the resulting headroom, LED brightness or reliable relay latching can easily be optimized if the user tweaks the bias resistor on the emitter and the voltage divider (the two resistors connected to the base).

Either/Or and Other Options

Before diving into relay-driving circuits, let's review what switches do. Switches fall into many categories based on the number of circuits (poles) and the number of connections or positions. An old-fashioned power switch—toggle, rocker or push-and-latch type—is often single-pole/single-throw (SPST) or double-pole/single-throw (DPST). All of these types have a maximum of three positions (center OFF) and two "throws"; just think of Dr. Frankenstein "throwing" that giant switch lever.

Whereas a single "throw" allows a single option—on or off, connect or disconnect, make or break—a two-throw switch allows an either/or option. Polarity-reverse switches are more likely to be double-pole/double-throw (DPDT). Toggle switches can typically have one to four poles, beyond which the physical size becomes unwieldy.

Rotary switches can have multiple poles and position/throws, and options like break-before-make (non-shorting) and "shorting" for jobs like input select or EQ boost/cut, respectively. Often, rotary switches (and pots) are customized (more costly), and sometimes they need to conserve front panel real estate or have remote-control capability, the latter being our focus.

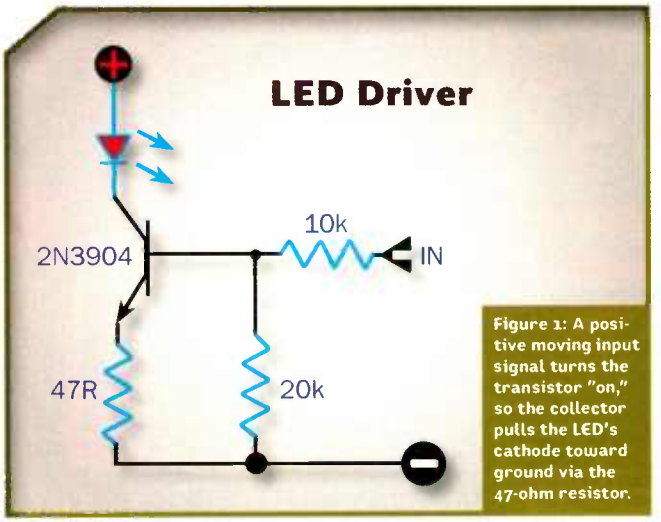

Figure 1: A positive moving input signal turns the transistor "on," so the collector pulls the LED's cathode toward ground via the 47-ohm resistor.

Modern "soft" power switches—classified as "momentary" SPST—are at the front of more complex control circuitry that allows almost no current to pass when the mechanical switch is closed (conducting). Here, all the heavy work is done by "remote control," using either electronic (FET) switching or relays. A relay is a switch mechanism with a magnetically conductive pole piece that can be opened or closed when a current is passed through a coil that, in turn, generates a magnetic field. (The coil is described as "energized.")

A relay can be a single- or double-throw switch, with one, two or four poles being very typical. A single-pole/single-throw switch could control multiple relays; a single-pole/multiple position switch could select *one* relay from a group of several. There's a relay flavor to suit any in a large variety of applications.

The coil in this telecommunications-grade relay draws about 11 mA, power consumption being critical if the relay is electronically controlled by a microprocessor or other integrated circuit. Conversely, switch mechanisms for high-voltage/high-current applications require greater distances between switch contacts (to prevent arcing) and higher tension to keep the contacts closed (and low-contact resistance); therefore, greater current is flowing in the relay coil to create a more substantive magnetic field. Here again, a transistor buffer driver can do the heavy lifting.

The coil driver detailed in Fig. 2 was used in a custom 5.1-channel mute box. Rather than drive all relays from a single switch, I isolated each relay from the master switch with a transistor, allowing future options such as individual mutes or linking to the existing monitor controller.

Look at Dem Lites!

While a single LED does a decent job of indicating level changes, a bar graph display can expand the resolution to provide as much precision as necessary. In this application, a simple Class-A DI/mic preamp, I wanted four LEDs to indicate signal presence at four levels starting at instrument level (-20 dBu),

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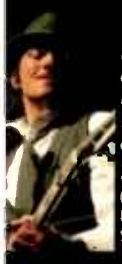
~ **Jim Messina**
(Loggins & Messina, Poco, Buffalo Springfield)



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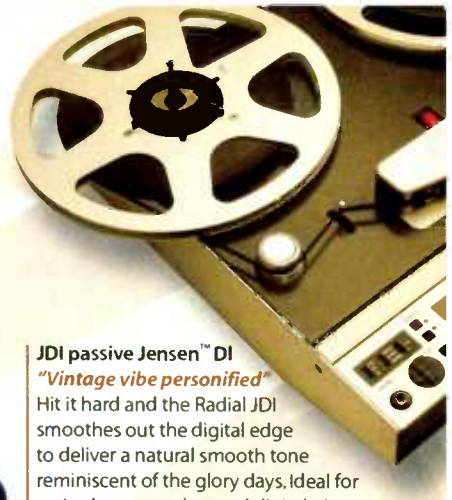
~ **Justin Meldal-Johnsen**
(NiN, Beck, Garbage, Tori Amos, Black Eyed Peas, Macy Gray)

"It is nice to find great sounding industrial grade equipment still being made today!"

~ **Daniel Lanois**
(U2, Robbie Robertson, Bob Dylan, Peter Gabriel)



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nominal (+4 dBu), followed by the highest clean level (+15 dBu) before going into soft clipping (+20 dBu). In class, a comparator was chosen to teach my students one of the ways to get the job done, the alternatives being a dedicated LED meter driver chip and the more challenging micro-controller, with the latter requiring programming skills.

The circuit is fairly simple if you look at one comparator at a time (see Fig. 3). The LM-339 is a 14-pin IC with four comparators, enough to drive four LEDs. A comparator is like an op amp configured for a differential (balanced) input signal, but instead of looking for balanced audio, one input sees the AC (audio) signal while the other sees one step in a DC voltage divider/ladder. When the audio signal crosses the DC threshold, the comparator output swings in the direction that turns the LED on.

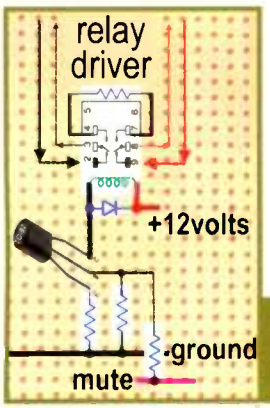

Figure 2: Positive DC turns this transistor "on," so the collector pulls the relay coil cathode toward ground via the emitter resistor.

In addition to the comparator is a PNP transistor current source. Note that the 2N3906 emitter arrow is opposite that of the 2N3904 in Fig. 1. Its job is to keep LED brightness constant, no matter how many LEDs are on. Similar to an op amp running on a single-voltage supply, the comparator is given a reference DC voltage via the trim pot. Once the ladder is optimized for each LED, the trim pot serves as an overall calibration control. In the classes I teach, each student calculates the steps in the voltage ladder, in both directions; each DC step roughly corresponds with the RMS voltages associated with the dBu levels.

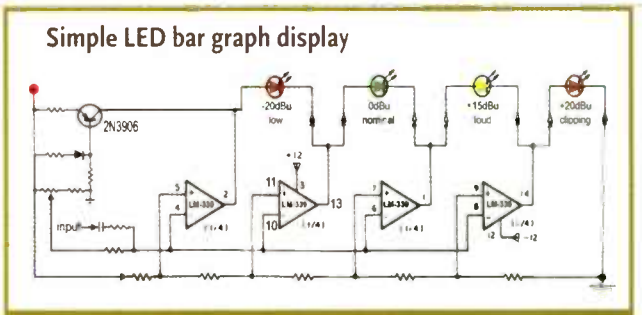

Figure 3: A quad comparator drives this simple LED ladder. Three series resistors across the bottom set the threshold for each LED.

Familiarity with schematics often expedites the design process. You'll find lots of help from manufacturers' data sheets and application notes at their respective Websites, as well as through parts dealers such as Digi-Key, Allied and Mouser. A Web search for a 2N3904 or an LM339 should put a manufacturer's page at or near the top—look for National, Fairchild or ON semiconductor. Just beware the unscrupulous Website that asks you to pay for data sheets! III

For more fun with Eddie Ciletti, visit www.tangible-technology.com.

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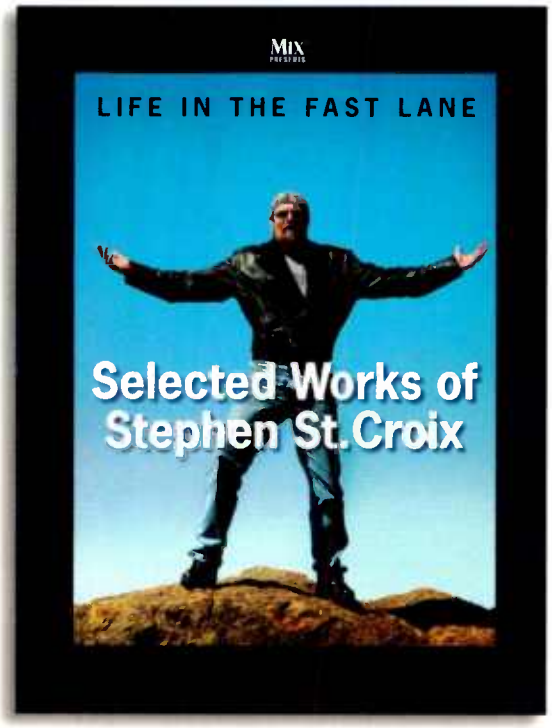

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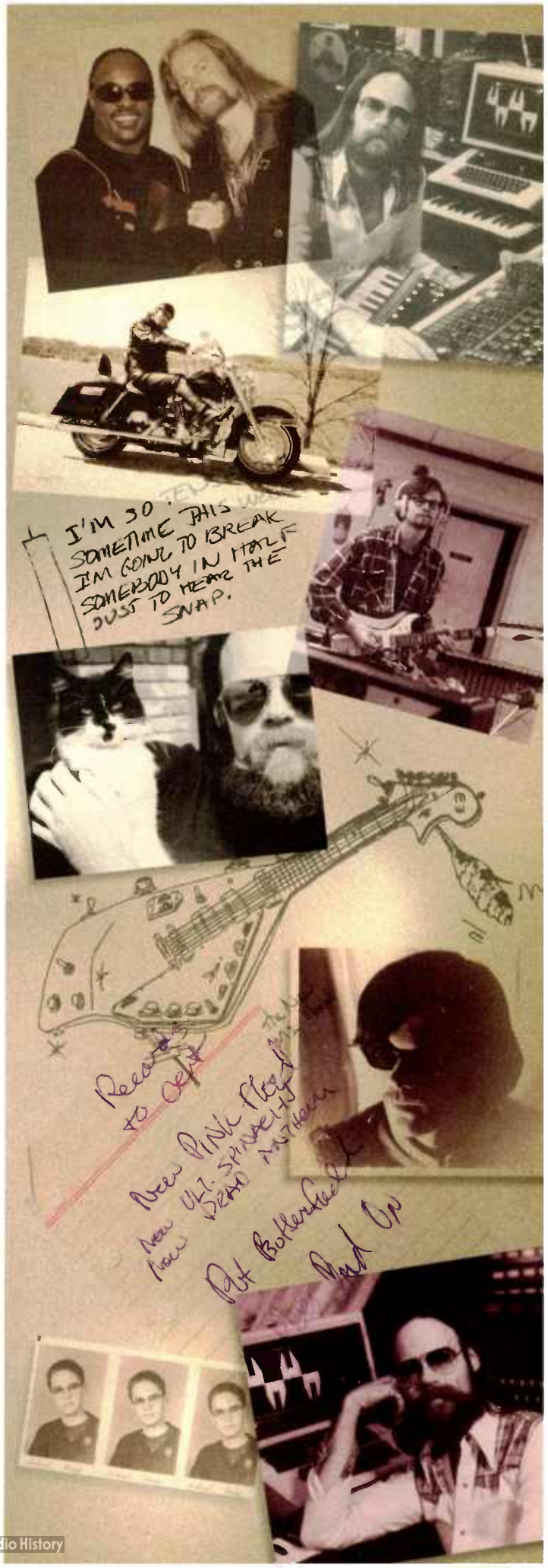

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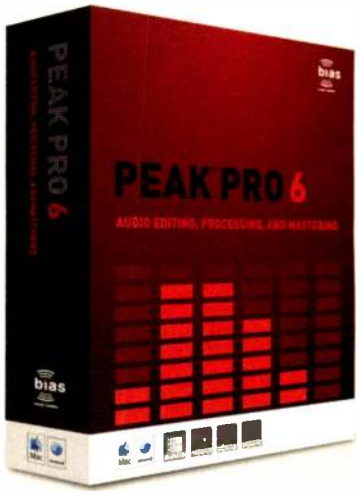

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Q&A

By Blair Jackson

Paul Blakemore

The multifaceted mastering engineer for audiophile label Telarc, now part of Concord Music Group, describes his process and setup.

How did your background in conventional recording prepare you for mastering?

In myriad ways. I've done just about everything you can possibly do in professional audio in the past 34 years, and if you understand all of the processes that are involved in making a recording, that's infinitely helpful in mastering. Actually, a lot of people who are mixers and recording engineers don't make very good mastering engineers because they can't embrace somebody else's methods or point of view about making a recording. In mastering, you have to expose yourself to so many different kinds of music and recording styles and embrace what's in front of you.

You work in Cleveland in what was once the main studio of Telarc Records, which is now part of CMG. Tell me about what you have in your room.

I have ATC 150s for my main monitors and other smaller ATC speakers to fill in for the surround setup, though we haven't been doing much surround work recently. For PCM work, I'm a huge fan of Magix's Sequoia [DAW]. It's an amazing program you can make behave like Pro Tools or SADiE or Sonic Solutions; you can make it be whatever you want.

That all lives in a machine room, and you can access all of the computers and have keyboard/video/mouse control over them with this Raritan KVM switcher. This particular one is 16-by-4, so you can put 16 computers on it and have four user stations. And just by doing a couple of keystrokes, you get a menu of all the computers that are hooked up, and by selecting one, it transfers the keyboard video and mouse to that computer. It makes for an extremely flexible setup. There's also a Z-Systems [Digital] Detangler for all of the AES routing that is remote-controllable with another CPU. So it's a pretty powerful post-production facility in a fairly small space. I was co-designer and supervised construction.

For DSD playback, I have both Meitner and DAD A-to-Ds and D-to-As. The DAD AX24 also does PCM. I usually monitor PCM through a Prism DA2, and when I'm doing analog sample rate conversions—which I prefer to any of the digital downsampling things I've heard—I use a DCS 955 DAC, which is a really beautiful-sounding DAC they don't make any more, and I have a Lavry AD122. I also have a custom 44.1 PCM A-to-D converter called Tandem 20 that has been a key component of the Telarc sound since the early 1990s. It was built by Ken Hamann. Thomas Stockham, who invented the Soundstream digital recording system, also contributed to the design. It has been used on virtually every Telarc CD release since the early '90s, as well as on the PCM layer of many of Telarc's hybrid SACD releases. For each project, I do multiple test recordings with different combinations of D-to-A and A-to-D converters and—this might sound a little arcane—different kinds of interconnect wire.

There are a couple of plug-ins I'm fond of that anyone who does this sort of work should investigate. Cube-Tec makes a digital equalizer called the VPI analogEQ that is really great-sounding. And the other is their very simple-to-use but highly effective dynamic range plug-in called the Loudness Maximizer.

Can you talk about the difference between mastering classical and non-classical projects?

Within classical there are two different kinds of releases. There are the audio purist releases where you do very little, if any, tinkering with the dynamic range of the music—where the idea is to preserve the dynamic contrasts that are in the musical performance, bearing in mind that hearing it coming out of loudspeakers is not the same as hearing it in a concert hall, so there are going to be some minor adjustments needed—but largely maintaining a dynamic range almost as wide as the actual performance, which can be 50-plus dB. Then there's another kind of classical release that's targeted to a sort of "entertainment classical" audience—like what you might put on at a dinner party or listen to in your car or something. Those require some dynamic range control, though nothing as aggressive as what you'd find on an R&B record, for example. For those kinds of releases, I usually target something in about a 20dB dynamic range.

Also, in classical mastering, most of the dynamic range control is done essentially by fader-riding—not necessarily an actual fader with your finger on it, but the equivalent result, and when you do that you're probably going to end up with some peak problems. For the really straight classical stuff, often there are no devices used for peak control. Occasionally I will use a good peak limiter, but more often you actually use an editing approach to controlling peaks because they're often really short in duration—a few milliseconds—so doing a chop and reducing the volume of a peak manually can be very effective. If you just take care of those two, three, four peaks with manual peak editing, you can raise the average volume of the whole thing without messing with the music's internal dynamics. ■

Blair Jackson is Mix's senior editor.

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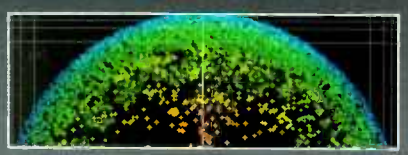

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