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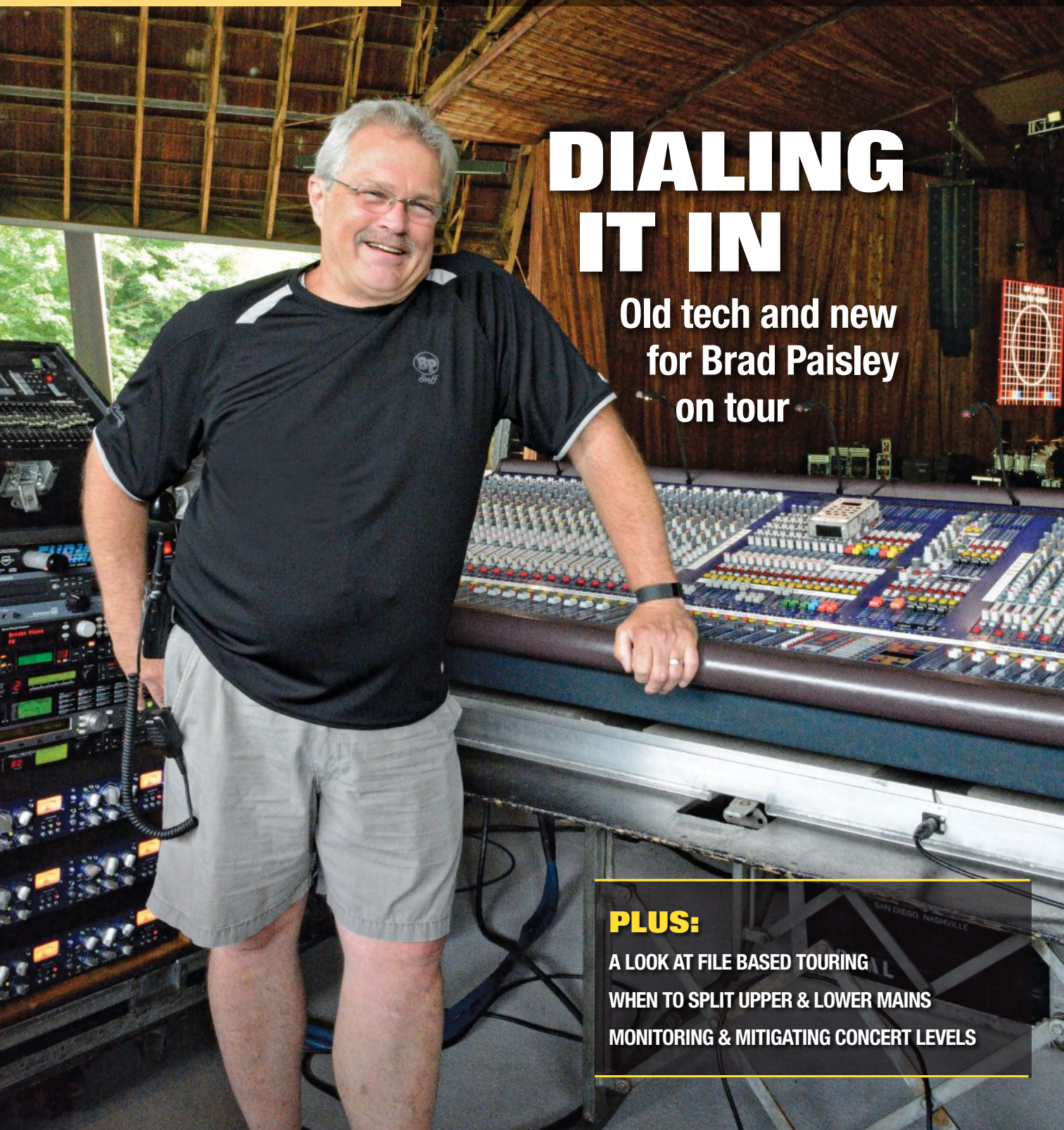

DIALING IT IN

Old tech and new for Brad Paisley on tour

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FEATURES

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From the Editor's Desk…

One of the topics that's going to be discussed more and more in professional audio, particularly in the U.S., is noise abatement and level control. In fact, many of you are probably already encountering it.

Greg DeTogne checks in this issue with a look at the very interesting work being done in this regard by Sidney Wilson and Erevu Group in the Bay Area. The approach is quite encompassing, comprised of numerous facets. Suffice to say that Sidney and his team have been working hard at developing accurate data gathering tools and solutions that could well have a wider impact in the world of sound reinforcement.

Greg also contributes a report on the current tour by country star Brad Paisley, focusing on the blend of older and newer technologies being deployed by the sound crew. Speaking of tech, Kevin Young provides us with a profile of Bryan Bell, who's done quite a few notable things in his decades-long career as an audio innovator, living on the sometimes "bleeding edge."

Elsewhere in the issue, Mark Frink supplies a very informative look at the advantages of file based touring, also discussing how it impacts other issues that are key to mix engineers. Bob McCarthy offers a detailed analysis of splitting upper and lower loudspeaker mains, most commonly utilized when facing balcony situations.

Craig Leerman continues his fun Microfiles series in looking at a classic RCA microphone design from long ago. In another piece, he provides valuable insight on the care and feeding of consoles.

And as always, there's much more. Enjoy the issue...

Keith Clark

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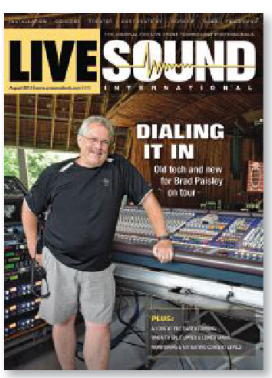

ON THE COVER: Front of house engineer Kevin Freeman at the Midas Heritage 2000 console he's using on the current Brad Paisley tour. *(Photo by Keith Clark)*

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Perhaps most notable is the addition of the Dan Dugan Automatic Mic Mixer for the CL Series. Already included in the QL Series, gain distribution for up to 16 speech microphone channels is automatically optimized in real time, achieving smooth, natural level control. What could be smarter than that?

For a complete list of features and to download the software free-of-charge, visit www.yamahaca.com.

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Yamaha MonitorMix

An app to enhance the capabilities of the company's new TF Series digital mixing consoles. It offers individual wireless aux mixing from up to 10 iPhone, iPad or iPod touch devices simultaneously, giving performers control over the aux buses assigned to them without having to master complex parameters. Personal group settings can also be created for easier adjustment, i.e., the ability to set all levels on just one fader. MonitorMix is available as a free download at the App Store. **www.yamahaproaudio.com**

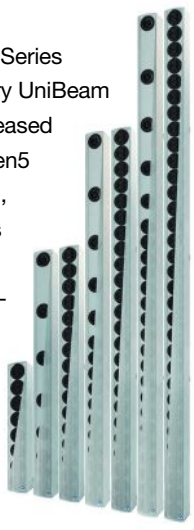
Martin Audio DX0.5

A loudspeaker management system for the company's recently released CDD Series of installation loudspeakers. The 2 x 6 processor optimizes both passive and powered loudspeakers. Each input and output is loaded with digital processing, including EQ, crossover, delay and limiting. The unit utilizes 24-bit AKM AD/DA converters with 120 dB dynamic range. It also offers 24 memory locations, with users able to recall pre-set files via the front panel, or using the free software application and front panel USB, to define and store their own settings. In addition, Martin Audio has announced the availability of EASE data for the six CDD Series models, which can be downloaded from the Loudspeaker Measurement Data page on the company website. **www.martin-audio.com**

Allen & Heath Qu-You

A personal monitor mixing app for Qu Series consoles and mixers that provides remote control of mixes. Up to seven devices running Qu-You plus an iPad running Qu-Pad can be used at the same time. The app provides selection of specific monitor mixes, assignment of source control, views of channel numbers, names and meters, assignment of up for four groups of sources to level trim wheels, and more. Users can also create a "Me" group for control of their own channels. In addition, there's control of the mix master level, mute, master PEQ, graphic EQ and compressor, as well as control of mix send levels and pan. Qu-You can be downloaded from the company website. **www.allen-heath.com**

Renkus-Heinz Iconyx Gen5



Introduced in both Iconyx and IC Live Install Series products, Gen5 incorporates new, proprietary UniBeam Technology for more uniform coverage, increased output, and faster setup and deployment. Gen5 also offers new configurations for installation, including new Master and Slave modules, as well as the new IC16-8-RN hybrid column, designed to extend length and LF beam control while using a single 8-channel amplifier.

In addition, Gen5 is compatible with new RHAON II System Designer software, which has been redesigned from the ground up using highly structured modular code for greater stability and expandability. **www.renkus-heinz.com**

CAD Audio CADLive

Vocal and instrument microphones joining the company's CADLive Series, all supercardoid, dynamic designs with neodymium elements. The D89 is designed for miking electric guitar amps and cabinets, drums, brass and strings, while the D90 is for vocals, including high SPL situations. It comes with a durable case. The D38 and D32 are also designed for vocals, with the latter outfitted with an on/off switch. Both are available in three packs with case and mic clips. **www.cadaudio.com**

← Bose Professional F1 Model 812

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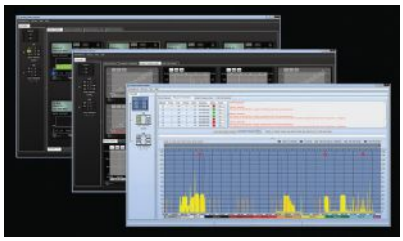
Lake Controller v6.4 →

A software program from Lab.gruppen with enhanced preset and EQ handling via new Recallable EQ Overlays that allow users to store and recall individual EQ overlays to modules and groups in a Lake Controller. Any given loudspeaker preset can consist of a single base preset that can then be augmented by EQ Overlay additions, fostering fast modification of a preset to compensate for the number of boxes in an array or for variations such as throw distance. It also allows system engineers to carry their favorite EQ to an onsite system without any risk of damaging the original file. Included in the Installer is Lake LoadLibrary 3.6, which offers new FIR presets for some of the most common loudspeakers in the industry. Version 6.4 also incorporates comprehensive implementation of Lab.gruppen's RPM (Rational Power Management), including the AutoRPM feature introduced in v6.3.1 earlier this year. **www.labgruppen.com**



← Lectrosonics Wireless Designer Software v1.1

The latest version of the software package providing an overall view of Lectrosonics wireless systems, including all receiver mainframes that are connected. Originally designed to work with the DSW (encrypted) system, v1.1 is now back-ported to allow use with existing Venue receivers, also offering a detailed spectrum scan view and frequency coordination page for improved ease of use. A summary of each channel is displayed with real time indications for levels and settings on each installed module. With multiple receivers, the main display window can be scaled and zoomed for the desired viewing, and several color themes are provided. The software also includes a spectrum scanner and coordination package. Receivers can be tuned across the available bands (via the modules) and presented in a graphic display. The data from the scan can then be incorporated into the frequency calculations for accurate channel coordination. Three user-selectable viewing modes include daylight, indoor, and dark conditions. **www.lectrosonics.com**

Radial Engineering Space Heater →

An 8-channel tube summing mixer with high voltage tube overdrive that's equipped with individual drive and output for each channel. A 3-position HEAT switch enables users to switch from 35, 70 or 140 volts to dial in a touch of distortion or go "over the top" with full saturation. Each channel can be used individually, or all eight channels can be mixed to a stereo bus. A built-in headphone amp is available for monitoring and trouble shooting. Connections to and from the Space Heater are supported with both balanced 1/4-inch TRS and 25-pin D-subs, along with XLRs at the master output. A notable live application is with in-ear monitors, where the Space Heater can be set to act like a natural limiter by clipping transients, which in turn will make IEMs sound more natural. **www.radialeng.com**

Sebastien Poux and Sidney Wilson going over data at the Delicate Productions Bay Area facility.

CODE OF PRACTICE

Spearheading an effort to monitor and mitigate concert noise levels.

by Gregory A. DeTogne

SIDNEY WILSON'S worldview takes in the concept that one man's music is another's noise, and then transcends any conventional meanings the phrase may imply. For him and the Erevu Group, a San Francisco, CA-based firm he founded that's dedicated to the task of offering creative solutions to noise problems arising at outdoor music venues, harmony is a matter of striking a delicate balance between the needs of fans, artists, promoters, and communities at large.

In practical terms, there are three primary areas Erevu focuses upon as part of its problem solving core services: Real-time noise monitoring, sound system specification, and compliance reporting. Relying upon an increasingly proprietary analysis platform utilizing hardware and software culled from the pro audio and sound and vibration industries, the company provides guidelines for optimizing venue coverage while simultaneously minimizing the impact on local residents.

Among these guidelines – which are commonly presented to clients in a formal "Code of Practice" document – are detailed recommendations for deploying sound systems, recommended maximum audio levels, loudspeaker types, trim heights, system focus points, and subwoofer configurations.

GETTING STARTED

The Erevu Group came together in a collision of destiny and providence. Wilson, who also serves as operations manager for Hi-Tech Audio in Hayward, CA, was called in to help Jason Alt and George Edwards of nearby Delicate Productions with troublesome noise issues they faced with a Northern California client that owned a winery and hosted outdoor musical events. With an undercurrent of complaining neighbors and litigation swirling around him, Wilson dove into the project without really knowing how deep the water was, and with no real map of how to proceed.

"I only had logic to guide me," Wilson says of the experience, "so we began by looking at the existing ordinances and made our first measurements based on those ordinances. What we found was that the client was in compliance. As a result the litigation went in an entirely different direction, and we wound up measuring for every event, and helping them design an acoustical shell. Overall it turned into about four and a half years of work, and we created our first Code of Practice document. Over that time we got better and better at doing these measurements, and realized the market potential for our specialized services."

Ultimately, the winery's noise-related problems were solved thanks to Wilson's work and Delicate Productions' willingness to let him experiment with the process until the desired results were achieved and all parties involved were satisfied. Future revenues generated by the events were saved, and Erevu's techniques were greatly refined.

As the company continued to evolve, a new generation of clients enlisted its skills. Among this group were the California Roots Music & Art Festival and last year's First City Festival, both of which were held at the Monterey

Wilson with some of his measurement gear prior to an event.

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County Fairgrounds. A site that can easily be classified as one where if anything can go wrong it probably will in terms of acoustical issues, the fairgrounds are bordered by residential areas, the Monterey Pines Golf Course, Monterey Regional Airport, and a mix of commercial strips, churches, and schools. Add to this the vagaries of being next the ocean and the related microclimate changes it spawns, and one can better appreciate the hotbed of conflicting community issues that Wilson regularly faces underscoring the importance of having a predictable source.

"One of the things we discovered over the years was that despite whatever noise ordinance is in place in a city or county, a venue can be in total compliance and still be considered a nuisance," he explains. "One neighbor will say the level is fine and then another will be spitting mad and saying they can't take it. Against this backdrop, it didn't take us long to determine that a big part of what should determine our best practices is discovering exactly what is disturbing people. Are they complaining about high frequencies, or the low-end? These are major questions you need to answer in order to solve the problem."

According to Wilson, to a large degree the process of determining exactly what the neighbors are complaining about revolves around whether measurements are being made using A- or C-weighting. Unlike when using A-weighting, audio data measured and viewed with C-weighting allows engineers to see precisely what their relative levels are across the entire frequency spectrum, thereby making individually offending or excessive levels readily apparent. This, in turn, makes self-correction quick and accurate: Rather than taking the whole bottom-end down if low frequencies are a problem, engineers can simply see that the kick drum is really the issue and fix it. The end result is mixes get significantly better.

COMPLETE CORRELATION

This year's BottleRock Festival in Napa, CA (Summer's Leading Edge, July 2015 LSI) represented the third time out for an Erevu system at the popular Wine Country event. Front of house engineer Sebastien Poux, who oversaw activities for Delicate Productions at the Miner Family Winery Stage, concurs with Wilson's preference for C-weighting.

"Over the years, we've always been walking on eggshells around the low frequencies at these shows," Poux says. "They would be the ones that always put us ultimately into the red. What was great about the Erevu system this year was that I could see everything.

"If I heard too much bass, I didn't have to mute all of the bass frequencies," he continues. "I simply modified those where the problems showed themselves. This really helped me when I was dealing with guest engineers too. I didn't have to tell them to change their mix in order to be compliant with the local noise regulations. I could just show them where things were a little hot and needed to come down a notch. With C-weighting you get all the frequency content for the signals you're measuring. When you have those kinds of numbers in front

Screenshots of the Leq and other information measured over time at multiple stages at BottleRock 2015. While the Miner Family Winery Stage faced south toward the Napa River, two of the other main stages faced residential and commercial areas. Both showed significant improvement with regard to noise mitigation, despite Erevu moving its measurement locations outside the grounds 1,000 feet closer to both stages.

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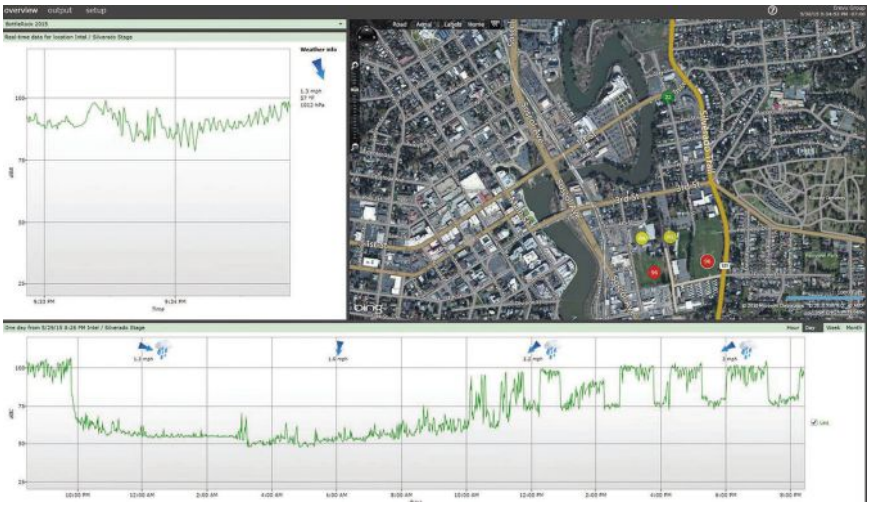

Another screenshot showing measurement and weather data at BottleRock 2015, joined by a Google map showing the site's boundaries.

of you, it unleashes your creativity to a much larger extent. What you hear and what you see on your monitor screen correlate completely."

No engineer likes to be tapped on the shoulder while mixing and be told to turn it down. Taking that into consideration, one of the real strengths of an Erevu system is the ability it provides for engineers to self-regulate themselves. At BottleRock, if there was a problem, they could assess the situation in real-time and correct it almost immediately.

BIRD'S-EYE VIEW

At the hub of the BottleRock noise monitoring system was Erevu's command center/production office, manned this time out by Louis Adamo of Hi-Tech Audio. Seated before multiple monitors, Adamo had a bird's-eye view of measured data streamed in real-time from all remote locations both internal and external to the festival.

Inside, monitoring stations were setup at each stage. Outside, monitoring stations were placed in strategic areas within the community. From his post, Adamo could view everything happening from at that moment to over the course of a day or the entire weekend at any station. Beyond the Leq and other acoustical information, weather data was available as well for air temperature, barometric pressure, wind speeds, humidity, precipitation, and all other relevant factors.

Complementing this already broad picture was an overlay of Google maps revealing the locations of the stages and monitoring stations. With all data stored to the cloud, Erevu had no problem providing its client with a legally-defensible document at the end of the event that would stand up in court should a question of compliance come up.

Lab-style measurement mics were chosen for the remote measuring stations, all of which were equipped with a LAN connection to facilitate the transmission of information via TCP/IP to the production office, as well as to the cloud-based data archive. Twenty-one-inch monitors were placed at each of the festival's house mix positions. Erevu's recommended trim heights and loudspeaker/sub placement strategy, combined with the Miner Family Winery Stage's VUE Audiotechnik line arrays, allowed Poux to drive the sound cohesively across his intended area of coverage and keep it there.

"The VUE rig was a very clean sounding PA," Poux reports. "We had a nice, well-rounded sound. Adding the Erevu monitor to my mix position out front let me keep constant tabs on my levels, and provided a constant visual confirmation of what I heard in front of me and all around at every level. I was also constantly monitoring every other stage location, looking at the Leq in other spots, the weather…it's all useful and brings a whole new dimension to how I think about my job.

"Hearing what's going on around you – especially in a festival situation with multiple stages all going at once – is one thing, being able to see it too, that's another. With sound bombarding you from 360 degrees around, sometimes it's hard to tell just by listening what's going on. Now all I have to do is look at my screen and I can see that the guy over there is hitting 105 and that's what I'm hearing. If something has to be done or said to someone, this system gives me a straight-up answer."

A NEW NORM

In the not-so-distant past (and even within the present for some), Wilson notes, the idea of noise monitoring and compliance to community standards was something many engineers didn't know anything about, or simply didn't care to know about.

"That's rapidly changing in this country," he says with the same passion that has fueled Erevu's conviction to mediating the situation. "In Europe there's a well-entrenched concern for monitoring our industry's performance, and going beyond simple compliance with local sound level ordinances to insure that everyone in the community can coexist in harmony.

"It will soon be the norm here, and we're happy to supply the tools that will make it all happen." ■

GREGORY A. DETOGNE *is a writer and editor who has served the pro audio industry for the past 32 years.*

EDC, New York

Rock in Rio, Las Vegas

BottleRock, Napa Valley

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FILE BASED TOURING

What's in your mic box?

by Mark Frink

DIGITAL CONSOLES have produced many benefits and changes to touring live sound workflow. Instant reset-ability, automated scene changes and multi-band festivals on a single mixer, just to name a few. Perhaps the biggest is that it's no longer necessary to bring the console itself from on tour, instead the console's show file just needs to be loaded onto a similar desk.

While the move from analog to digital also drastically reduced console size and weight on a per channel basis, a digital console's file, made of a small collection of ones and zeros, takes no space at all when it's email across the country or around the world. A digital console's file is only a few hundred kilobytes, about the same as the digital file for the input list and stage plot PDF document used to describe the show.

Early on, mix engineers understood that for analog consoles, getting microphone pre-amp gains, high-pass filters and EQ settings for individual channels correctly reset was one key to getting multiple bands on and off a festival stage, leading to various methods of "charting" a console. Today, digital consoles are extremely precise, producing accurate settings for not just gain and filters, but for every adjustable parameter in the desk.

A prime directive of file-based touring (FBT) engineers is using the exact same make and model of mics every night, so that precise, predictable results are produced by the console and the same mix can be provided at its outputs, aside from output EQ that must be customized for the daily combination of loudspeakers and room acoustics.

A digital console reproduces a matrix of precise gain and EQ settings from inputs to outputs with precision in tenths or even hundredths of a dB. FBT engineers that headline an appearance often have ample time after they load their files onto the console *du jour*, to adjust for any microphone substitutions from the previous show, as well as to optimize their speaker system.

THROW AND GO

However, when FBT engineers appear at festivals, they may have little or no time to hear what each input sounds like, often just a quick "throw-and-go" line check to hear if every input is connected. Using consistent mics and DIs allows engineers to enter into the festival process with confidence, knowing each channel has the correct gain and EQ because the same makes and models are being used without substitution.

For FBT engineers who bring only a console file to a festival, correctly fulfilling their input list requirements from local inventory is the key to success, so they can mix from the first song while adjusting system EQ, instead of beginning their show tweaking input gains to rebalance their desk and checking channel EQ.

The combined response of speaker systems and venues varies from one show to the next and FBT engineers must rely on the PA being adjusted to a consistent standard so their mix translates correctly. The same is true for monitor engineers using local wedges. In-ear monitor engineers enjoy a huge benefit from their performers playing inside a similar 'room' at every show. Since IEMs travel with their performers, simply using the same wireless or hardwired systems produces consistent results, with the effects of the changing acoustics of different venues reduced by the 25 dB of isolation provided by custom molds.

If the same make and model of mics and DIs are used in every day, the results for IEM performers are surprisingly consistent, other than extreme venue acoustics and slap back that get into open stage microphones. For wedge-based performers and front of house engineers, daily changes in acoustics are a bigger problem and consistent input list inventory is even more important, allowing engineers to quickly focus on the sound of the venue.

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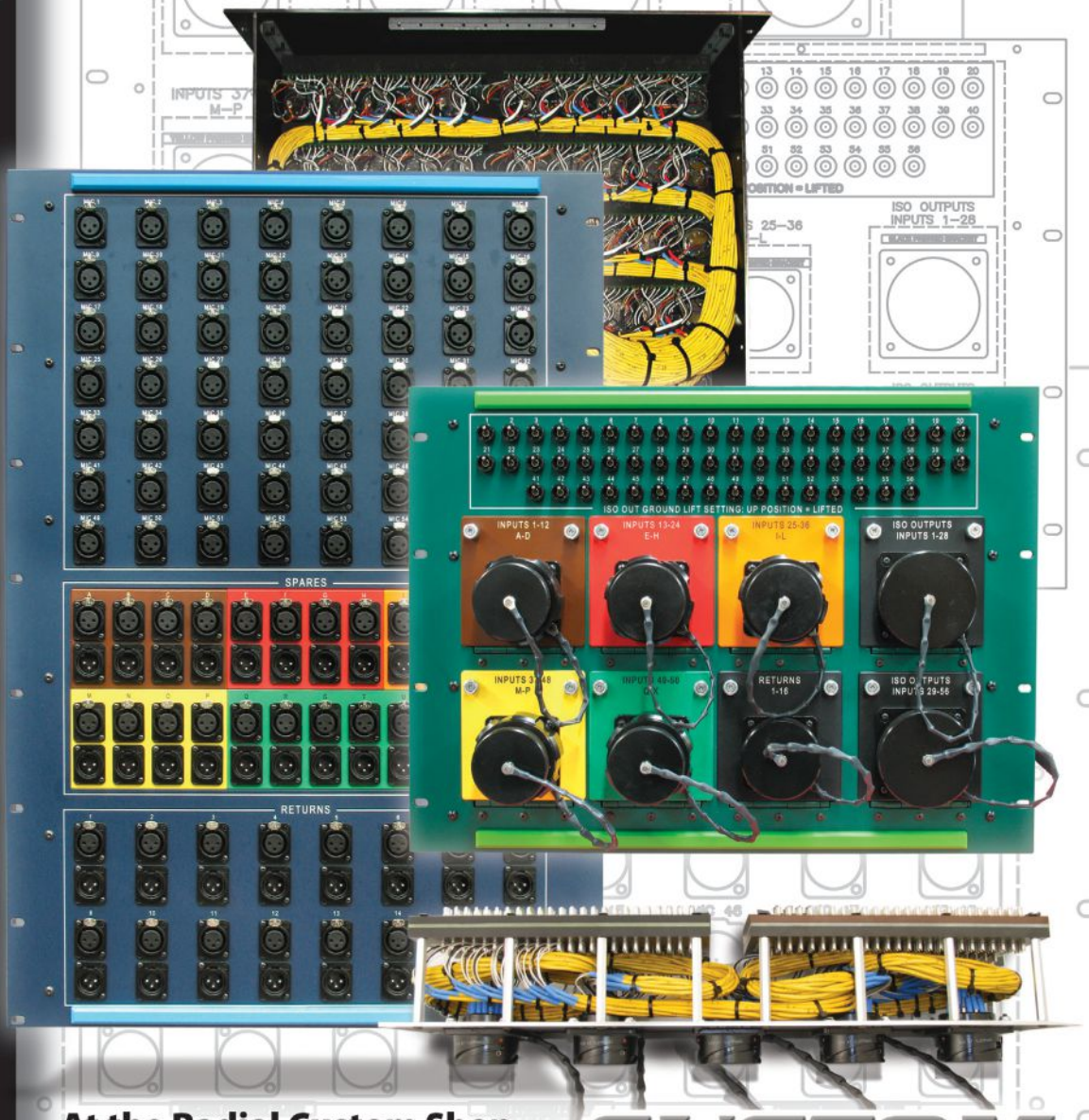

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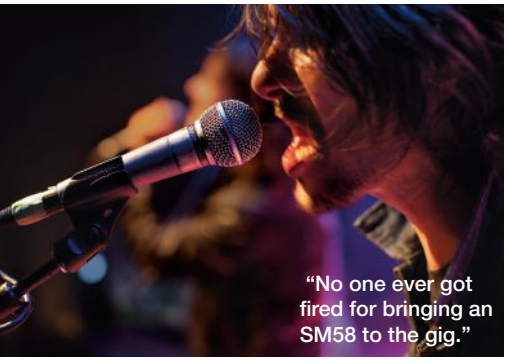
REGULAR ROUND MIC

The FBT engineer's microphone choices dictate the ability of local suppliers to duplicate them from one show to the next. Some microphones are almost universally available. Shure's venerable and ubiquitous SM58 can be found in every professional microphone locker or workbox, hence the expression "No one ever got fired for bringing an SM58 to the gig."



"No one ever got fired for bringing an SM58 to the gig."

Popular vocal mics that are also found in house inventory include the AKG C535, Audix OM7, beyerdynamic M-88, Neumann KMS 105, and Shure's own BETA 87. While there are other modern vocal mics to choose from, it takes time for newer products to proliferate into house and local vendor stock.

Engineers who choose vocal mics that are less common in local inventory are forced to bring them along if they want consistency. However, an extra benefit of carrying vocal mics is it can guarantee each performer hygienically puts their mouth on the same mic every night, which is important for singers whose ability to perform daily requires them to be healthy enough to sing.

The discussion could easily turn towards personal feelings about the SM58. However, their cost is low and their use so widespread that it's easy to expect venues or their vendors can supply them universally. SM58s work predictably on stages with moderate SPL and where IEM use precludes wedges and side-fills from being pointed at singers. Wedge-based monitoring benefits from the tighter polar patterns of hyper- or supercardioid vocal mics on louder stages.

FBT engineers quickly learn that substituting a Shure BETA 58 for an SM58 results in a 4 dB increase in signal into the console, along with an increase in proximity effect from the mic's higher directivity, requiring a corresponding reduction in gain and higher high-pass filters. Other vocal mic manufacturers carefully provide similar or lower sensitivity to promote substitution.

Another issue is choosing between standard, widely available inventory that can be supplied at every gig or widening the mic options to include less commonly available makes and models. It's simply not practical for many FBT engineers to carry a full complement of mics and DIs.

A blended approach, where one or more special vocal or instrument mics are carried for "money" channels, while the rest of the inputs are covered by standard choices, allows the engineer a bit more freedom and is commonly used. This can reduce carried mics to just a lead vocal and a kick drum or couple piano mics, depending on the artist.

No matter how carefully an artist's itinerary is planned, there will always be special performances where it's only practical for every microphone to be supplied by a local audio vendor due to logistics, whether it's a TV show or a one-off in Dubai. An input list that's supplied entirely locally has the additional benefit of allowing the artist's engineer to simply walk away from the stage afterwards.

DIRECT BOXES

Different makes of active direct boxes can vary in gain as well as providing subtle variances in coloration. Prove it to yourself by taking four different models and playing the same instrument or test source in each.

Direct boxes are often not interchangeable for file-based touring and just like microphones, there are two basic types: active DIs that use phantom power and passive DIs that are simply a transformer in a box. In fact, making your own passive DI is relatively easy and back in the day, building your own (as well as XLRs, snakes and stage-boxes) was a rite of passage.

Today we buy manufactured direct boxes and whether it's a Radial JDI or Whirlwind JT, the Jensen JT-DB transformer inside produces the same signal, allowing identical gain (and tone) settings on your console. Most agree that DIs with less expensive transformers also sound similar, but a $10 transformer won't sound as good as one costing 10 times as much: you get what you pay for.

Knowing where to best use active and passive DIs is important and for FBT engineers, they're not interchangeable. The direct box "rule of thumb" is to deploy a passive DI with an active sound source – whether it's an electronic keyboard, iPod or a guitar with a battery inside – and an active DI with instruments that have passive pickups. Replacing a passive DI with an active DI usually requires a significant change in input channel gain.

Passive DIs for active sources can reduce the number of inputs where changing direct boxes affects tone and gain setting to just those with passive pickups, such as upright basses, mandolins and acoustic guitars that don't have batteries inside. This is one reason Countryman DIs earned their place on riders for three decades: specifying them guaranteed consistency, even on analog consoles, and active DIs also produce better low end, especially passive electric basses with single-coil pickups.

Countryman's iconic Type 85 active DI, named for the

FBT engineers shouldn't leave home without one of these; in this case, a LaCie Rugged Key USB stick.

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year it was designed, exhibits a polarity that's opposite from modern DIs, because Carl Countryman designed it to the AES standard of that time, pin 3 hot. Substituting a modern active DI for a Type 85 results a signal of the opposite polarity, so FBT engineers shouldn't substitute a different active DI (including Countryman's newer Type 10) for a Type 85 without flipping its polarity.

The Countryman Type 85 active direct box exhibits a polarity that's opposite of modern DIs.

CHOOSING STANDARDS

Whether it's inventory from a club, casino, theater or church, several mic models have become standards over the years, promoting their continued use, despite the appearance of newer, better sounding products. The litany of standard house models is well known and led by Shure. The company's SM58, SM57 and SM81 have been on the list for decades, joined by the next generation BETA 52, BETA 91 and BETA 98. The BETA 58 and BETA 57 are nearly as ubiquitous, but face stiff competition from other modern mics with tight patterns.

Other microphone brands have succeeded in widespread house inventory with specific, classic models. The Sennheiser MD 421, beyerdynamic M-88 and AKG C451 and C414 have been tech rider standards for decades, as has the Countryman's Type 85 direct box, with Radial's J48 and JDI entering with the next generation. These are so popular that it's unusual to find house inventory that doesn't include all of them.

Every engineer hopes to consistently use the same sound system, but the rigors of modern touring require that an artist's success will send them long distances where bringing more than a few instruments is just not practical. FBT engineers take this into account when they decide what they fit into their carry-on or in the back of the van. ■

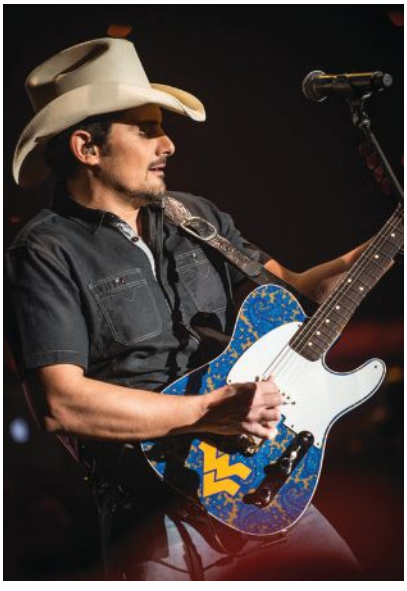
Monitor engineer MARK FRINK *is on the road with Dr. John, FOH FBT engineer Andy Loy, and TM Blake Nichols.*

Dialing It In

PHOTOS COURTESY OF BEN ENOS

Blending technologies old and new on Brad Paisley's Crushin' It tour.

by Gregory A. DeTogne



PHOTOS COURTESY OF BEN ENOS

Breaking its silence, Kevin Freeman's radio crackles to life with someone asking, "What's your 20?" Calmly keying the talk button, he responds facetiously, "I'm in the production orifice, you need some help?" The voice on the other end asks a couple of questions, Freeman responds with a couple of "uh-huhs," and then quiet returns to the spartan room.

"So like I was saying," Freeman drawls, returning to matters at hand during a load-in break at the Blossom Music Center in Cuyahoga Falls, OH, "this is one of those venues that's a bit of a challenge, especially when you roll in with nine truckloads of gear and try to shoehorn it all in. The upstage wall is 42 feet wide and 24 feet high, so we have to add more space to the front of the stage and move everything downstage in order to hang the video walls and lighting rig.

"PA-wise we can only hang about nine boxes per side in the mains, and the rest we have to groundstack," he continues. "That's why we come in a day early just for setup – it's a lot easier on everyone's nerves that way."

Freeman has been on the road with Brad Paisley for the past 16-plus years. As in the past, this time out for the country star's Crushin' It World Tour he's serving as both front of house engineer and the show's production manager. "With regards to the latter," he explains, "that means I sit down here in this office and let the guys

from Sound Image do all the work, then take credit for everything tomorrow when the show turns out great."

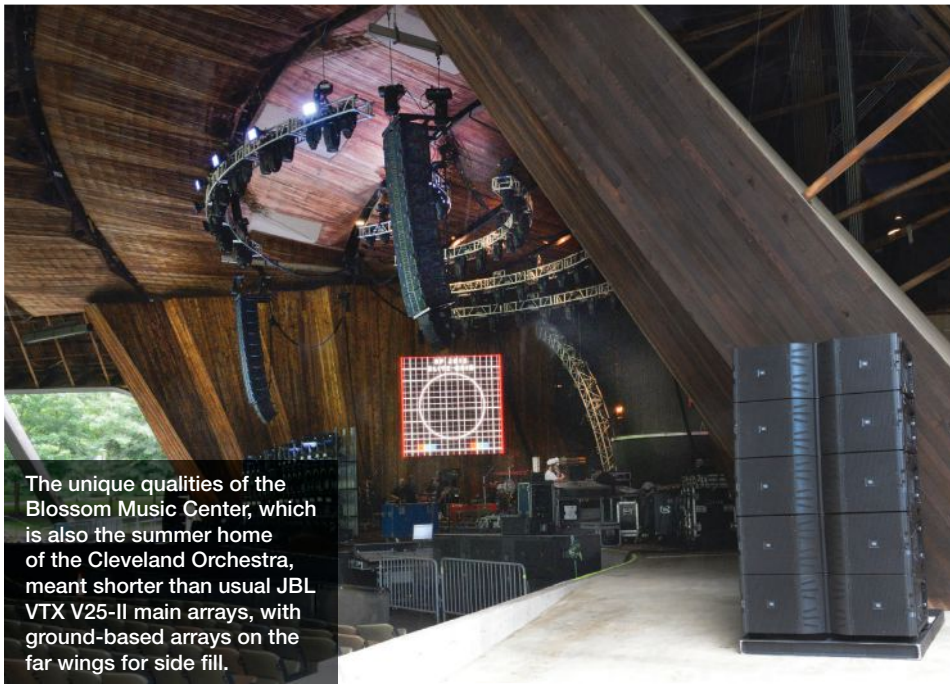
Musically Traditional

Launching in May in Camden, NJ with 34 more shows to go until an end date on October 3rd in West Palm Beach, Crushin' It rolls with a PA supplied by Sound Image Nashville, and a seasoned crew that besides Freeman includes monitor engineer Mark Gould, systems tech Bill Chase, audio crew chief Greg Hancock, and monitor tech/Pro Tools guru Kyle Herbert. Musically traditional in many respects with five voices onstage in addition to acres of guitar, bass, pedal steel, keyboards, and driving drums, the tour's schedule is a further nod to standard country practice, hitting it hard for three dates in a row, going home, then coming out and doing it all again.

Technically, Crushin' It represents a blend of old and new. "I'll never speak badly of any digital console, but they're not for me," Freeman says, clearly demarcating which side of the old/new fence he straddles. "I took the Midas Heritage 2000 I'm using out of the crate brand new about 14 years ago, and it's been mine ever since. Shadoan (Sound Image owner Dave Shadoan) really wanted me to get the 3K so he could send it out for either monitors or the house when I wasn't using it, but I told him I wanted the 2000. I didn't want to reach over the 19 knobs I didn't need every day to get to the five I did.

"I just wanted something simple that worked and sounded good every day. This is a real console, not a computer. Signal goes through copper and components, and if it works for me what's the point in changing? This is a country band. Guys with guitars. Keyboards, bass, fiddle. Brad plays loud. I wasn't looking to do anything complicated because it's just not necessary."

At most of the venues on the tour, the crew is busy flying 12- to 14-box arrays of three-way JBL VTX V25-II enclosures per side used for the house mains. Nine more of the same boxes generally go up for the aux hangs flanking the left-and-right mains to cover the far reaches of the house. Sixteen dual-18 VTX S28 subwoofers join the club to extend the low frequency content, and while arrayable, these boxes remain earthbound unless there is absolutely no space on the ground at specific venues, with the Shoreline Amphitheatre in Mountain View, CA being one example.



The unique qualities of the Blossom Music Center, which is also the summer home of the Cleveland Orchestra, meant shorter than usual JBL VTX V25-II main arrays, with ground-based arrays on the far wings for side fill.

Like Freeman's Midas Heritage 2000, the VTX rig takes a beating and keeps on going day after day. "I don't run into driver problems or rigging issues," systems tech Bill Chase reports. "It just keeps going up, comes back down, and goes back up again. We updated to the V25-II waveguides, and along with new presets, gained a significant amount of headroom and a ton of added HF capabilities, to the point actually that now I have to re-think the zoning of the entire PA. It takes less boost for longer throws now, and we can run all the way up to 17K without ever looking back."

With power coming from 41 4,500-watt Crown Audio I-Tech 12000HD amplifiers, processing for the arrays is provided from both the internal circuitry found within the amps and a Dolby Lake Controller. HiQnet Performance Manager software brings a template of control to the amps, and works hand-in-hand EQ-wise with JBL Line Array Calculator II to set delays for the subs, gain, and other parameters. With the Dolby Lake and a tablet or a smart phone, changes can be made across the board, even on the way to catering.

Not Missing A Thing

"The way Kevin mixes," Chase notes, "you never feel like you miss any instrument at any given time. You hear everything each song has to offer. With his console package and this PA, it's a dynamic show. We have moments in the 90s, and others that are over 105 dB. It's pretty impressive what JBL has been able to do with FIR filtering and the alignment of the VTX boxes.

"The phase measurement of this PA is pretty much dead flat from the low 100s on up," he adds. "Low-end head-

In addition to production management on this tour, Kevin Freeman provides the house mix on his trusty Midas Heritage 2000 analog console.

Monitor engineer Mark Gould with his Avid D-Show, and immediately behind him are the tour's Shure UHF-R wireless receivers topped by the Madell RF spectrum analyzer that he uses for frequency coordination.

room is as impressive as that found in the high-end. We have a kettle drum that will get you to jump right out of your seat if you're not ready for it. Overall we have a fabulous mix of old school and new."

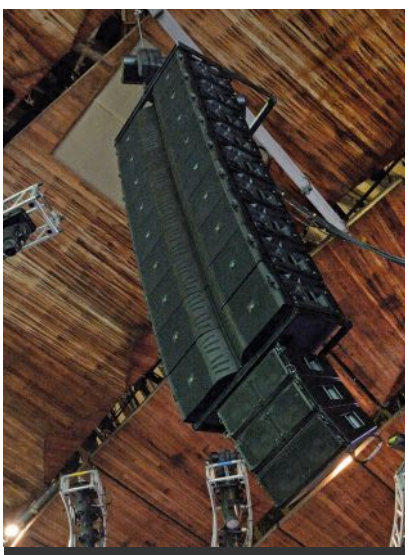
Freeman maintains an eclectic collection of outboard gear, including dbx Blue Series compressors, a Bricasti M7 reverb he uses on vocals, a Yamaha SPX2000 he appreciates for drums based on it ability to produce great "trashy" sounding reverb, an M2000 from TC Electronic kept at hand for instrument wash, and an SPX990 that he uses a couple of times each show for special effects including his "big drum reverb." An Eventide Eclipse multi-effects processor adds further complement to the collection, and sees use on backing vocals.

In his hands, compression is used very sparingly. "At this stage of my career I'm starting to look at my rack and tell myself I don't even need any of that stuff," he admits. "I could do the whole show without it."

Making Everything Fit

With 12 years under his belt touring with Paisley, monitor engineer Mark Gould says the thing this band wants most is consistency. "There are certain things they aren't going to conquer, and they all know it," he explains. "Brad is a guitar player, and he keeps his amps right onstage. They're loud, so a certain aspect of everyone's job is learning to make everything else fit around them."

From behind his Avid D-Show console, Gould rides herd over 48 inputs, plus a number of click tracks and talkbacks. Everyone is on ears, but there are still side fills at stage left and right, as well as a couple of wedges stashed discretely for the drummer and keyboardist.



A closer look at one of the VTX V25-II arrays flying at the Blossom Music Center.

Three click tracks are played: One on a loop from the effects generator on the computer, another for video, and a third from the drummer. The video click allows the band to sync-up with video images as needed. Subtle in nature, the loop click signals effects or spare instrument tracks. If the band needs to follow the drummer, he'll send the required click.

"People visit us and totally freak out when they find out we have to manage three click tracks," Gould notes. "But it's all kind of random. Yeah, there are three clicks. But it's not that hard – treat it like an input and call it a day."

Paisley's preference for earbuds strays from the use of custom-molded products, and the rest of the band's taste follows suit, with Westone dual-driver generics being the choice of everyone. "They love 'em," Gould shares. "Those earpieces have a little bit of a bell tone-shaped curve, which is right where guitar players want to be anyway, so the devices are very natural sounding. What Brad cares about a lot is guitar. The last thing he wants are shimmering

highs and punchy lows. You don't hear life that way, and the band doesn't want it any differently in their ears."

Methodical Approach

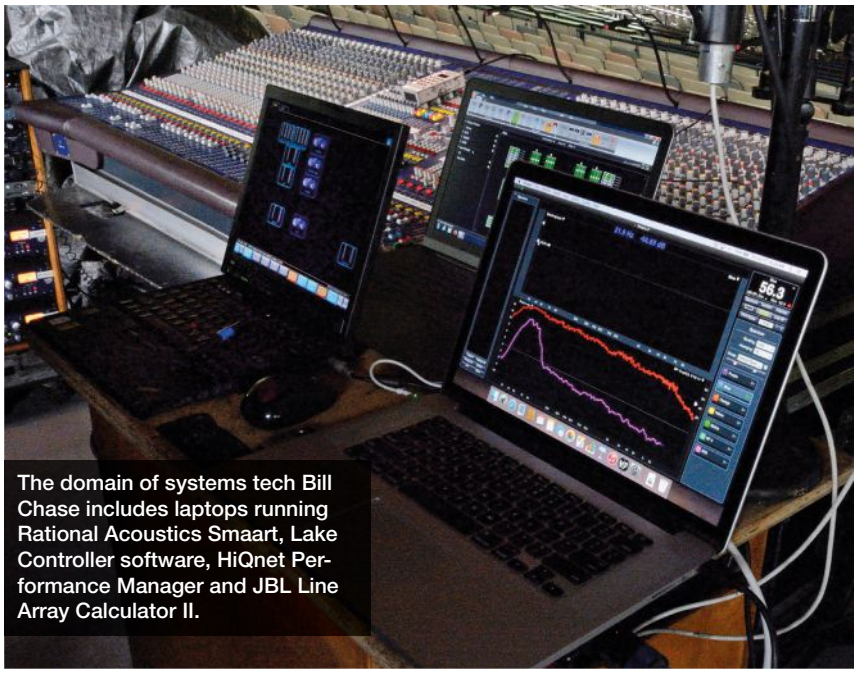
Even with "ears," the nature of this band and the number of amps onstage make stage volume loud. Wireless channels total 24, with Shure UHF-R pulling the load on instruments and vocals. Gould is the de facto wireless coordinator, with a Madell RF spectrum analyzer his instrument of choice to dial everything in.

"First I sweep the environment," he says, explaining his tuning techniques. "If I see a number of TV stations, I know I'll have to start turning things on and moving them around next. I'll fire up one thing, look where it pops up on the analyzer, and just keep working my way down the line. I can see harmonics on the scope too, so I'll move my frequencies accordingly to steer clear of trouble spots. If I get really lucky, I'll move one transmitter frequency and a whole bunch of harmonics will disappear, fixing the problems entirely.

"Everyone seems to be moving to computer-based coordination, but I can see things in real-time this way, and it really takes no time at all for me to do RF. Another thing that's important is every time I turn a unit on and fix it, I leave it on. If you turn things off as you go, you won't see all the harmonics and problems will have a way of popping up."

Paisley's star-position, downstage center vocal mic is a Shure BETA 58A, an offering that suits his powerful, low/mid-centric voice. BETA 58As follow suit at all other vocal positions except for at Paisley's stage left and right risers, out on the thrust, and at a FOH stage, where Shure KSM9s are found.

Drums are captured with a BETA 91 at kick, SM57s on snare, Sennheiser e604s on toms, and Audix SCX1 condensers on high-hat and overheads. SM57s stand-in once again for Paisley's guitar cabinets, while Sennheiser MD 421s capture the sound of the steel guitar.



The domain of systems tech Bill Chase includes laptops running Rational Acoustics Smaart, Lake Controller software, HiQnet Performance Manager and JBL Line Array Calculator II.

Experiencing Something

Gould uses Waves V9 plug-ins with his D-Show console, specifically the SSL console package that provides him with built-in compression on the channel strip. Echoing Freeman, he says, "I use very little compression. I'm like a 3:1 guy on everything, just enough to round-off the edges. I'm not trying to create sounds, just manage them."

A rack of Crown I-Tech 12000HD amplifiers. The tour carries more than 40 to drive all loudspeakers in the full rig.

The tour thus far has been met with success at every stop, and included a night in Nashville opening for the Rolling Stones, a show that found Paisley joining the legendary rockers onstage performing "Dead Flowers."

As he departs the production office at the Blossom Music Center, Freeman pauses to offer a final thought. "I like to make it big. Not so much loud, but big. I came into this job with the same attitude – big means you feel it, and that's why you go to a concert in the first place. I obtain this bigness with subs, a lot of drums, bass guitar, and of course Brad is pretty adamant about having his guitar right in your face. We're not making a record every night either.

"My goal is to send the audience home with the feeling that they experienced something rather than just sat back and listened." ■

GREGORY A. DETOGNE *is a writer and editor who has served the pro audio industry for more than 32 years.*

TECH TOPIC

Balcony Battles

When to split upper and lower main loudspeakers?

by Bob McCarthy

PREVIOUSLY, I addressed the impact of breaking and tapering a line of loudspeakers (*Breaking The Line, June 2015 LSI*). Now let's turn our attention to balconies.

Everybody seems to love breaking main loudspeakers horizontally into left and right, but breaking them vertically into upper and lower? Not so much. We can be repeat offenders when it comes to multi-main horizontal breaks, such as a parade route or racetracks. Multi-mains can go vertical as well, although it's unlikely that we'll expand beyond two elements.

Vertical expansion is also driven by room shape, in this case a very specific room shape: the balcony. Let's look into the trade-offs involved in battling the balcony.

We're talking about left/right (L/R) mains. There's no such thing as a lower center (that's where the band is). Center mains solve balcony coverage with L/R side fills near the deck and lots of delays. The question for the left main is when to surrender to uncoupling. We all want the band to stay together, but sometimes the members need to go their separate ways (**Figure 1**).

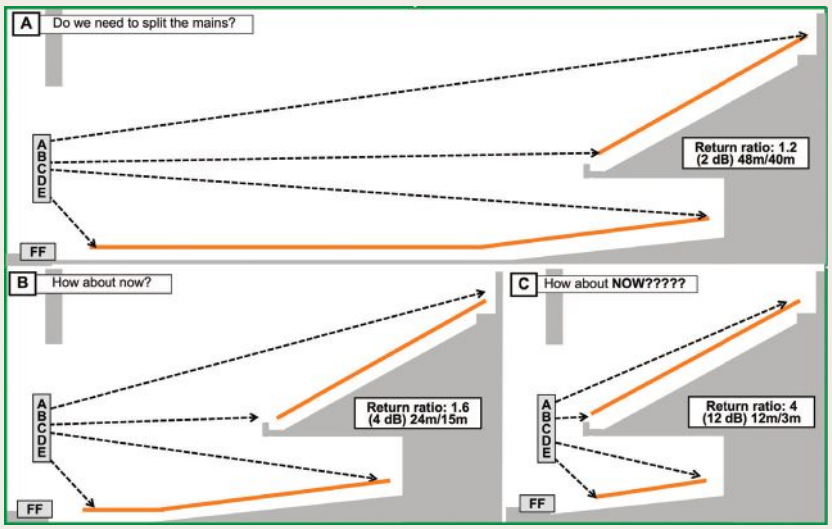


Figure 1 – Example applications that question whether or not we need to split the mains into upper and lower sections. The same main loudspeaker height and balcony shape appears in all three examples.

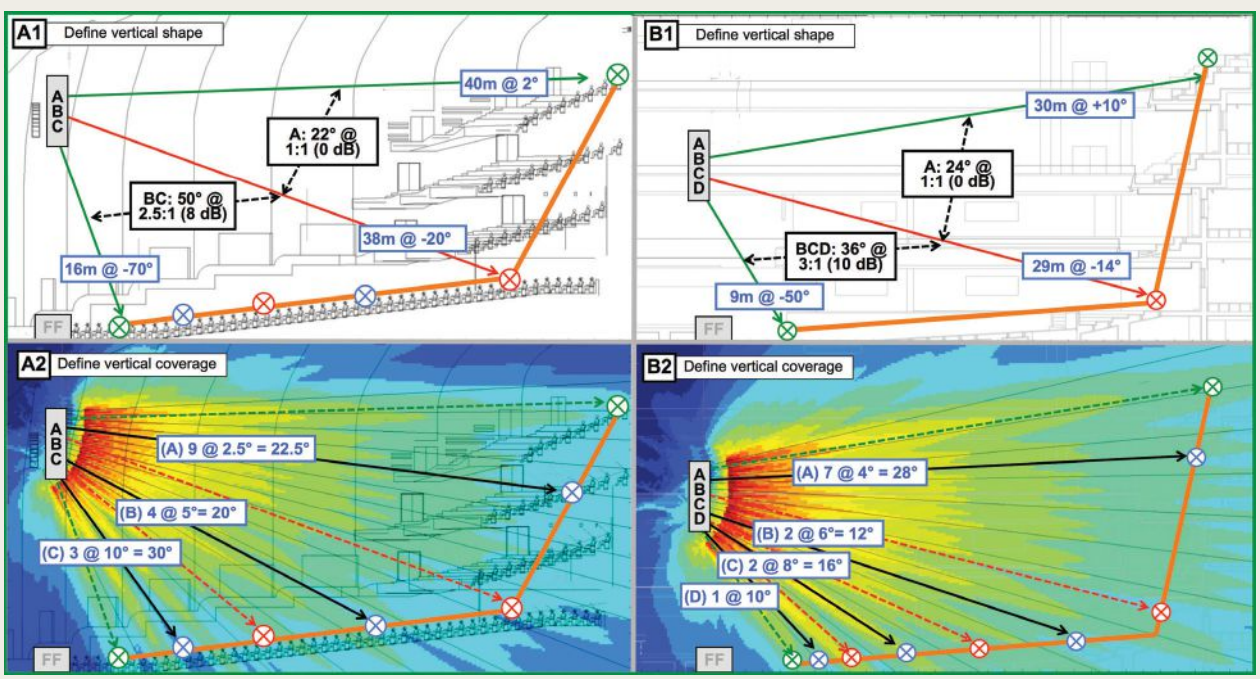


Figure 2 – Example applications with double sloped vertical shapes. Multiple shallow balconies present a nearly symmetric (1:1) range ratio while the floor is highly asymmetric (>2:1). Coverage can be divided between the two slopes.

SINGLE & DOUBLE SLOPES

The typical listener plane is a slope rising with distance. We solve this shape with the asymmetric coupled point source. The simplest listener plane is a constant slope, a consistent rise over distance. We commonly encounter more complexity, with a steeper slope in the rear than front. The coupled point source can adapt to this shape by complementary asymmetry, even with very substantial differences in rate of rise.

Balconies add a second listener plane, which is where the trouble starts. We are now double-sloped, a shape that calls out for uncoupling. There are two primary strategies: treat the shape as a single complex slope (and stay coupled) or treat them as distinct slopes and solve them separately (uncoupled).

We can keep the main array coupled by plowing a line of best fit through the balcony details. The downsides are level variance (balcony front will be louder) and ripple variance (balcony front reflection). The upside is the extended frequency range of the coupling zone, the result of keeping all sources close. A deep balcony increases the level variance. A tall, reflective balcony front increases the ripple. That's what we're up against.

How deep is too deep? How do we know when the front will give us trouble? We'll be able to wrap our heads around balcony acoustics once we see how acoustics wraps itself around balconies.

The double slope has four coverage target milestones: VTOP1 (vertical top), VBOT1 (vertical bottom), VTOP2 and VBOT2. Each has a unique angle and range relative to the mains, and each pair has a unique angular spread and range ratio relative to each other. It's the inner pair's relationship (VBOT1-VTOP2) that has the twist. Let's plug in some numbers and see the results (**Figure 2**).

We start with a matched pair, two identical slopes, stacked directly on top of each other. Each has a 20-degree spread and 2:1 range ratio. Our loudspeaker is in the middle so it covers from VTOP1 (+20 degrees) to VBOT2 (-20 degrees), with a 2:1 range ratio (6 dB). In between are VBOT1 (+0 degrees) to VTOP2 (-0 degrees), which also have a 2:1 range ratio.

We can solve a 6 dB range ratio spread over a 40-degree angular spread by aiming an 80-degree loudspeaker at the uppermost seat. How do we solve a 6 dB change that happens in a 0-degree spread? OK, it can't be 0 degrees because the balcony has to be thick enough to hold people, but it can be very, very small.

RETURN RATIO

"Listen up, main! Stick together. Here's our mission: Go deep then gradually come closer for 20 degrees and then instantly go deep again and repeat." If you're not convinced yet that this is mission impossible, then add range ratio until you surrender. A wider balcony front gives us more angle to work with, but with friends like this, who needs enemies?

Let's make a single modification to the previous shape and do the exercise again. Slide the upper floor backwards so its front aligns with the lower floor's rear. What's different? VBOT1 and VTOP2 are still both at 0 degrees, but they now

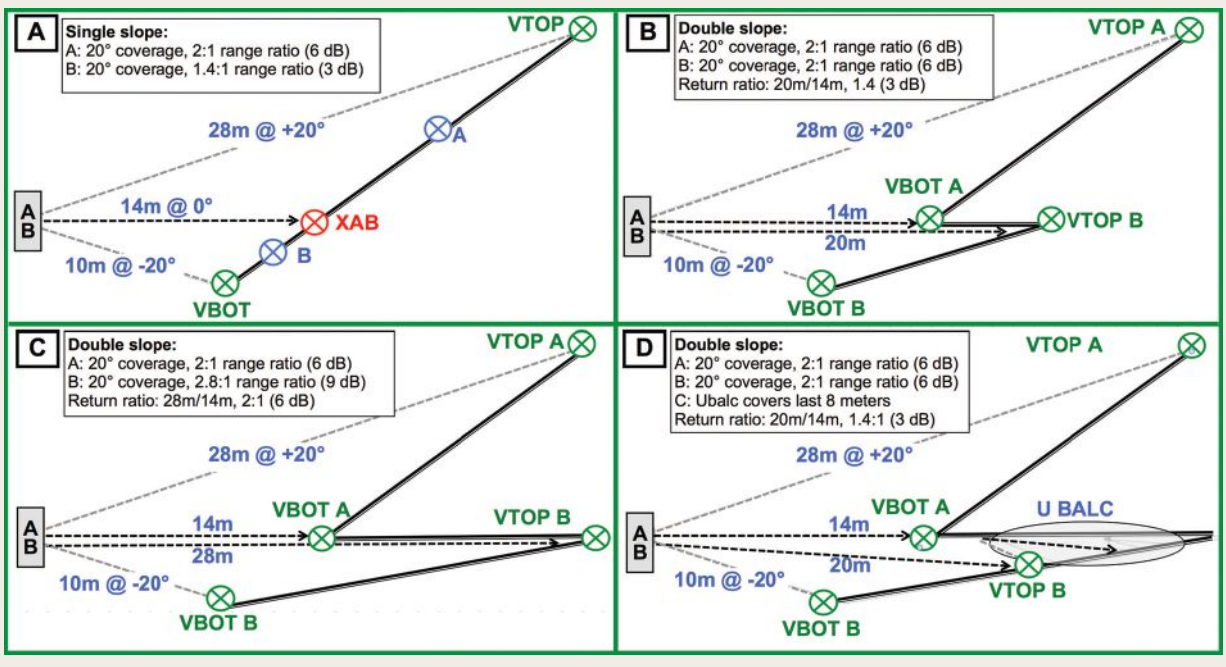


Figure 3 – Upper/lower decision examples. In all cases there is 20 degrees of coverage required above and below the speaker location. (A) Single main can cover the continuous slope. (B) The 3 dB return ratio does not splitting. (C) The 6 dB return ratio indicates splitting is best. (D) Underbalcony loudspeakers reduce the return ratio to 3 dB (no splitting required).

have a 1:1 range ratio. There's no longer a zig-zag in the middle. We would surely cover this with a single main. It's also not a balcony any more but it reveals the mechanism, the return ratio, the primary indicator for splitting the array.

Every inch we slide the upper floor forward increases the discontinuity between VBOT1 and VTOP2. Such sharp turns in coverage require angular isolation and we don't have it. Return ratio (in dB) quantifies the level difference the balcony forces us to overcome. We can saw a line of best fit through a shallow balcony with a small return ratio and keep the array together. Return ratios of 6 dB or more cannot be smoothed over (**Figure 3**).

SECONDARY OPTIONS FOR UPPER/LOWER MAINS

There are still options short of breaking up. We can outsource coverage to others, specifically the underbalcony area, which can be covered by delays. The area covered by the delay is taken off the custody requirements of the main. VTOP2 moves closer, reducing the range ratio and opening up angle, a double bonus. We may be able to tough it out as a single main if the delays can bring the return ratio in bounds.

The height of the mains also plays a role. We've looked at them in the middle. Going upward reduces the angular spread between VBOT1 and VTOP2 (as if it wasn't small enough already). Going higher leads to occultation (the blocking of the sight line to the loudspeaker) underneath, which reduces return ratio by coverage reduction.

Delays, however, have moved from optional to mandatory. Occultation seriously downgrades the underbalcony area and should not be considered fair trade for return ratio gains. Moving the mains under the balcony line ensure sightlines to the back and opens up the angular spread (the mains can see the underbalcony ceiling now).

Return ratio shows no improvement and balcony coverage will become more challenging. The upper level slope is flattening (from the mains POV). The upper level needs more severe coverage shaping due to reduced angle and rising range ratio. Such severe asymmetry is difficult with a single slope. Asking the mains to do that upstairs and on the floor is a very tall order, especially if it's a tall balcony.

There's one more height-related consideration: the coverage pattern bending often termed "smiles and frowns." This is relevant to high and low orientation to balcony fronts (and our attempts to avoid them). Only a vertically centered main can be precisely steered to overcome a high return

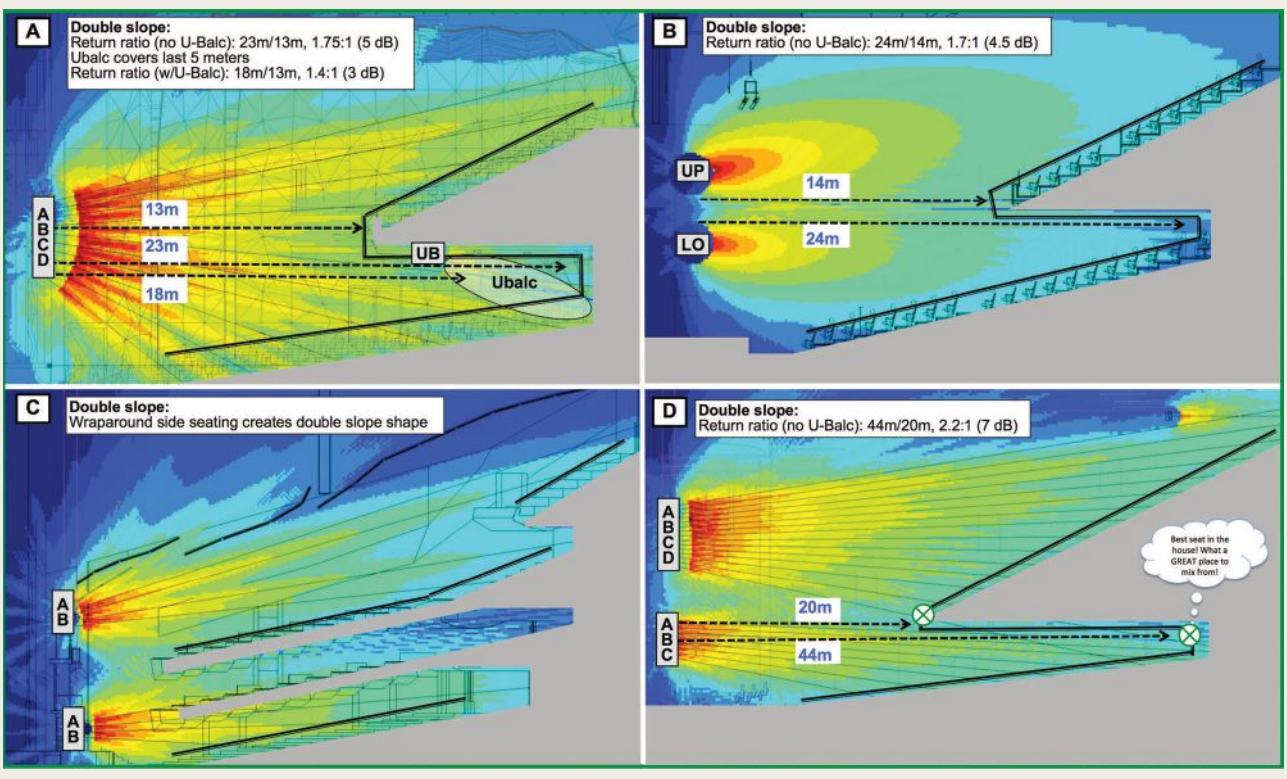


Figure 4 – Upper/lower main design examples. (A) U-Balc reduces the return ratio enough to use a single main. (B-D) Upper lower mains are used.

ratio. Upper or lower positions cause the coverage transition to appear at different heights across the room.

Here's the consolation for this exercise. All is not lost when we raise the white flag and divide the array into upper and lower sections. Instead of trying to make one array do something it hates to do (double sloping), we get two arrays being what they love to be: asymmetric coupled point sources drawing a single slope. The ripple variance in the low end might be a very small price for this payoff.

The design process is basically a two-layer cake. Upper and lower are separately analyzed and comparably power scaled. In some cases it's possible to move the upper main deeper into the house (since it starts at the balcony). This is free money in terms of power and signal/noise ratio, as long as the image is not compromised.

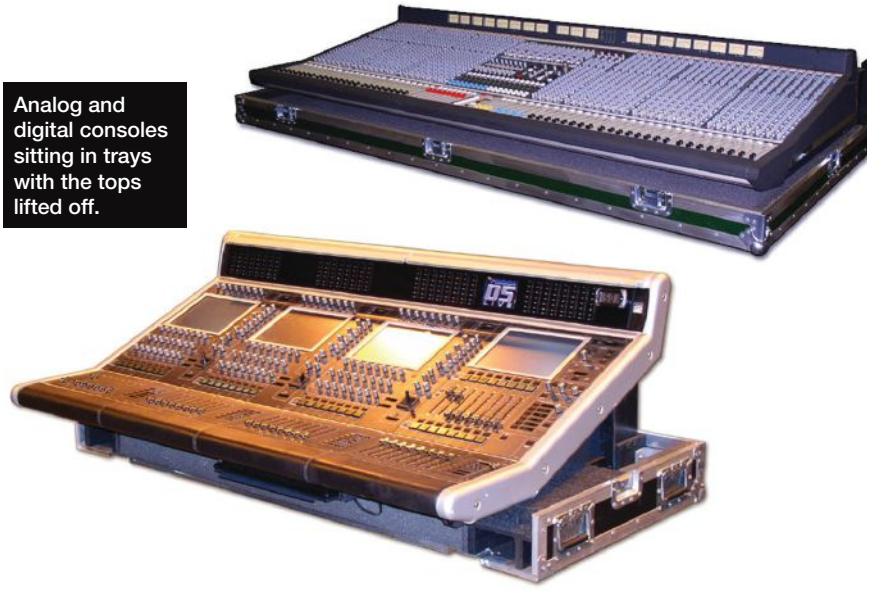
BALCONY FRONTS

There's an old expression to sum up the sound engineer's perspective on this: The only good balcony front is a dead balcony front. "Balcophobia" is a serious malady in the sound community. Designers go to great lengths to avoid what acousticians go to great lengths to install: lively balcony fronts. We've all been burned by this, so it's worth a few paragraphs to put things in proper perspective. Some balconies are poisonous but others are harmless, but many of us run from both kinds.

Bad balconies are tall, lively, featureless (single angle, not diffuse). Glass and steel (bad). They also have lousy angles with respect to our loudspeakers, sending sound back on stage or onto paying patrons. Even worse (the worst) is the flat, curved balcony in a fan shaped room with the stage as it's focal point. Been there, done that.

Good balconies are short, dead, diffuse, filled with lighting gear, multi-angled and inclined to send our sound harmlessly into the open air such as the ceiling. Size up the live surfaces of your local balcony. It's harmless below 500 Hz if it's less than 0.5 meters tall. The key is to not to hurt the design over avoiding something that won't hurt you (**Figure 4**). ■

BOB MCCARTHY *has been designing and tuning sound systems for over 30 years. His book* Sound Systems: Design and Optimization *is available at Focal Press (www.focalpress.com). He lives in NYC and is the director of system optimization for Meyer Sound.*



Analog and digital consoles sitting in trays with the tops lifted off.

MISSION CRITICAL

Mixing console protection and maintenance approaches.

by Craig Leerman

AT THE HEART OF virtually every PA system is a console. It might be a small analog mixer with only a few inputs and a limited number of mix buses, or it might be a big digital desk with hundreds of inputs and dozens of mix buses, but no matter the size of the console, it needs to be in proper working condition for the next gig. A big part of this means storing and transporting consoles safely as well as performing maintenance to keep them in top shape.

Because of their critical mission, every console should have a case that it lives in to protect it when transported and stored. Cases come in many styles, including soft-sided bags, molded or formed plastic, wood, metal, and laminate-covered wood-sided cases that use metal edging and corners that are commonly referred to as ATA or "flight" cases.

ATA stands for the Air Transport Association of America, and more specifically, the organization's Specification 300 which covers reusable transit and storage containers. The specification sets guidelines and testing standards that place a case into one of three category certifications. A Category I rating means it can survive 100 airline shipments, a Category II rating refers to 10 airline shipments, and a Category III rating means a single airline shipment. It's always best to check with the manufacturer to find out what level of protection a specific case really offers.

Many rugged plastic cases and even well-built shipping crates can pass ATA certification, but the type most of us refer to as flight cases are metal-edged laminated panel models. They're available with wall thicknesses from 1/4-inch to 3/4-inch. The wood panels are laminated with ABS, fiberglass or even metal to make them very strong and resistant to impact. Extruded metal edging is riveted to the panels, and metal corners are used to reinforce the case and give added protection.

Some of the more common styles of console cases include:

Gig Bags. Normally used with very small mixers, they offer basic protection but little else. They might be O.K. for gigging musicians who move around their own gear locally, but consoles are better protected with hard-sided cases.

Lift-Out. These cases are mostly used for small consoles, up to about 32 inputs in size. They can be made from molded or formed plastic, or can be of the flight case style, with the inside padded for added protection. In use, the mixer is removed from the case.

Lift-Off With Tray. The most common style of cases for medium- to large-sized consoles. In use, the case is placed at the location where the console will be used, the lid is removed, and the console stays in the "tray" or bottom of the case while in use. It's common for larger lift-off cases to have wheels attached to the back of the lid so that they can be rolled in an upright position. Caution should be exercised when rolling them because they can be top-heavy.

Doghouse. They're similar to tray cases, but there's an enclosed area behind the mixer that houses and hides the cabling. In use, the doghouse lid also serves as a handy shelf, holding items like intercom packs and signal lights as well as small monitor "cue" loudspeakers. When used with large analog mixers, it's common to keep a snake fan – equipped with a multi-pin disconnect – hooked up

A slant-top design to mount the mixer at an angle, with an equipment rack beneath.

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to the console inside the doghouse. This way, during set-up only a single connection needs to be made to the snake, saving time as well as wear and tear on the individual channel connectors.

Slant-Top. These are used with mixers that have rack-mount ears. The mixer is bolted into the bottom half of the case and the lid of the case is simply removed for use. A variation called the "pop up" case offers rack rails that adjust to different angles, allowing the user to select the most comfortable operating position. This style allows for a more compact case because the mixer can be stowed in a lowered position.

Slant-Top Rack. The console can be mounted in operating position at the top of the rack, along with additional rack spaces below for processors and other gear. This style allows the gear in the rack to remain hooked up and connected to the mixer. Many of the larger slant top racks have wheels, and some also have large rack lids that can be used as tables to increase the work surface area.

Roll-Top. Not really a "road " case, but houses of worship and higher end installs place the console on a table that has a rolling top that can be opened and closed. Some of these units are stationary, but quite a few are on wheels and allow for the console to be placed in different areas of the room or even a different room. Some of these units also offer racks below the mixer for processing or amplifiers.

PREVENTING PROBLEMS

Note that if a console is used in any enclosed unit, be it a case or a desk, make sure there's enough airflow and that any ventilation holes are not blocked. Heat can damage electronics, and many units have heat sensors built in that will turn them off if temperatures get too hot. Not exactly what we want to happen during a gig.

CREDIT: POWER CASE (WWW.POWERCASE.GR)

Padding in the case is important, providing added protection.

No matter the style or type of case, make sure it fits and supports the console during transport and use. And speaking of transport, take care to secure the case in the truck, especially if it's got wheels. I strap mine to a truck wall.

Cases require preventative maintenance (PM) just like any other piece of gear. They should be inspected regularly for damage or other problems. Be sure to repair or replace defective parts, or the case might not be able to supply the proper level of protection. Lubricate parts like castors, hasps and hinges with manufacturer- recommended product at regular intervals to keep them working well.

Let's move along to PM with consoles. At my shop, we go over our front-line consoles a minimum of four times a year. Boards that mostly sit on the shelf are still checked once or twice annually.

A factor to take into account is the environmental conditions the console has been exposed to. A mixer that's been used at outdoor events that are both hot and dusty – a regular occurrence at my base of operations in Las Vegas – gets more PM scheduled than one used on indoors at corporate events in air conditioned ballrooms.

Logic dictates that newer consoles can get by with less attention than older ones, but only to a point. A good way for new equipment to age before it's time is to ignore PM, and that not only jeopardizes performance at shows but overall return on investment.

CARE & FEEDING

I begin console PM by giving the surface a good cleaning. Dust and dirt can be removed with a vacuum and a dry cloth. You can also use compressed air in a "duster" can or from a compressor to blow away dust. Make sure if using a compressor that it's of the oil-free variety so it's not spraying a light film of oil on the console.

It's important to ensure that doghouses have enough room for cabling. They can also serve as a handy shelf when closed.

CREDIT: POWER CASE (WWW.POWERCASE.GR)

Take care to follow manufacturer recommendations on cleaning console display screens because some chemicals (even mild glass cleaners) may damage the screen surface. Check all ventilation holes and vacuum out the dust. Clean or replace any air filters per manufacturer instructions.

Trays can also be modified to accommodate additional gear like outboard talkback mic interface and headphone jack.

CREDIT: POWER CASE (WWW.POWERCASE.GR)

Board and gaff tape residue can be removed with a cleaner like Simple Green. If that doesn't work, step up to a citrus-based solution like Goo Gone. Be

sure to read the directions and warnings on the labels of cleaning fluids. While cleaning, give the console an overall evaluation, looking for damage. Also make sure any onboard option cards are installed correctly, and if no cards are used, check that the covers are still securely in place.

Next, check all the connectors to see if they're loose or broken. A small soft-bristled brush and a vacuum work wonders for getting dirt and dust out of connectors. Electronic connectors can be cleaned with a contact cleaner like CAIG DeoxIT. Fiber optic connectors should only be cleaned with items made specifically for fiber, such as products from Sticklers, TechSpray and Chemtronics.

Examine the power cord for damage, and don't overlook external power supplies. Clean out all ventilation ports and check the filters and connectors on external power supplies. Also check any power supply cables.

Faders on analog consoles can be addressed by blowing clean air into the fader slots. Move each fader to one end and blow air into the slot, aiming away from the fader handle so that dust can escape through the slot. Then move the handle to the opposite end and blow air aiming the opposite way.

Get all dust and dirt out before using a contact cleaner or lubricant, or else the chemicals might mix with the dust and gunk and turn into a sticky mess. At my shop, we use DeoxIT fader spray, working the fader back and forth a few times to get all surfaces wet with the cleaner. Also, let the faders dry before plugging in the console. With digital consoles, clean the faders per manufacturer instructions.

Once satisfied that the console and connectors are clean and in working order, plug in the console and turn it on. Check the firmware and software versions and visit the manufacturer's website to see if there are any updates available for both the console and ancillary gear like computers and tablets.

Finally, connect the console to a system and provide input via a microphone and/or playback device. Test the onboard connectors as well as the surface knobs and faders. Go through functions and make sure they work and pass audio cleanly.

Console reliability is a must in our business, and a little investment in PM helps ensure smooth gigs with no surprises. ■

Senior contributing editor CRAIG LEERMAN is the owner of Tech Works, a production company based in Las Vegas.

IN PROFILE: AUDIO INNOVATOR BRYAN BELL

A life on the leading edge of technology.

by Kevin Young

Bryan Bell (left) with Neil and Pegi Young.

BRYAN BELL has worn many hats over the course of his career: long-time front of house engineer and technician for Herbie Hancock, MIDI system designer for artists such as INXS and Neil Young, system designer for venues such as the Berkeley Greek Theatre, and an innovator in audio and MI technology whose work was ahead of its time.

Bell describes his career path as accidental – a product of a series of choices and circumstances he could never have foreseen. But it was his twin passions for music and science (and, in one case, fast cars) that led to creating instrument/audio technology for some of the most respected artists in jazz and rock 'n' roll.

Born in New Orleans, Bell attended elementary school in Albuquerque, NM, where his father worked as a professor, composer, conductor and director at the Center for the Arts. At his father's insistence, music came first and, as a child, he studied classical piano and conducting and was exposed to recording and technical theatre.

"My father's choir did live two-track recordings in local venues and we'd edit them on high-end, professional audio equipment at home," he says, adding that he acted as assistant engineer on his first record at age 11. He also apprenticed with the choir's engineer, noting "That's how I learned basic live sound, but I also learned about lighting at the Center for the Arts and at La Petite Theatre in New Orleans."

Bell conducted his first choral group in fifth grade and sang, played piano, B3 and guitar in various bands in his teens. "But poorly," he laughs. His preference for performing originals over covers kept him out of many bands, "but that was OK. I didn't need to be on stage because I liked engineering so much."

At age 15, he built his first sound system and continued to build systems and mix local bands during summers in New Orleans and while finishing high school and during his studies at Oregon's Portland State University.

REALITY CHECK

Bell's interests extended beyond audio, however. In 1969, dissatisfied with the response time of traditional theatre dimmers, he invented a lighting system for a New Orleans nightclub comprised of micro switches mounted underneath a section of cut down acoustic piano keys so the lights could be changed in time with the music. Later that year, he built an electric car with a mentor.

"He (the mentor) was a commercial real estate guy and old-school 'hacker' with the wherewithal and disposable income to build whatever he was interested in," Bell explains. "He got mad at the oil companies, so we went to the junkyard and bought a steamship starter motor, a tractor transmission and a junked Ford Anglia. We filled it with lead acid missile batteries weighing 90 pounds for each two volts. Technically it was a hybrid because we had a backup rototiller gas engine and generator to recharge the batteries if they ran out."

He also owned race cars briefly while in college, but his ultimate goal was to be a nuclear physicist; a dream inspired by the fact that Albuquerque was home to various military installations, including the Naval Weapons Center for Nuclear Weapons, and where he was literally the only kid in the neighborhood whose father had a civilian job.

After becoming a Sri Chinmoy disciple in his late teens, Bell met John McLaughlin, who asked him to mix the Mahavishnu Orchestra. "Through Sri

Chinmoy I was trying to learn humility," he says. "Unfortunately, I failed at that, but I got a career out of it. At 19, I was married to another disciple, but wasn't going to college, making music or racing cars, and John asked me: 'What are you really doing with your life?'

"I told him that I had this ivory tower notion of solving cold fusion and running New York on a gallon of seawater, but he said, 'Look, there are no good jobs in nuclear physics: you can build weapons of mass destruction or power plants, which, if they leak, become weapons of mass destruction. Or you can teach college kids to build power plants and weapons. So why don't you come invent cool stuff for me and do my sound?'"

Touring with McLaughlin ended Bell's marriage, but it allowed him to further explore his passion for invention (Leo Hoarty, Bob Easton and Bell developed McLaughlin's first guitar synthesizer) and to deepen his knowledge of mixing live in a very challenging environment.

"Mahavishnu played a lot of unison lines," he says. "The guitar, violin and keyboard players worked very hard to sound like each other so you didn't always know who was playing what. The music was so complicated, the main thing was getting a good rhythm section balance and letting the band control the dynamic."

Working with McLaughlin and, later, with Herbie Hancock, provided ample opportunity to innovate, but dampened any musical aspirations Bell still had. At that young age, he explains, he considered himself a highly skilled pianist, guitarist and composer. But while engineering Mahavishnu, he decided his guitar chops weren't in the same league as McLaughlin's, and after working for Hancock, ditto his piano playing, and after working with Wayne Shorter, ditto again for his composition skills.

Instead, he focused on engineering and listening and found himself, with Hancock, in a situation where his technical skills complimented his employer's musical prowess. "I met Herbie in 1975 when Mahavishnu opened for The Headhunters," he recalls. "I'd just finished sound check and was told Mr. Hancock wanted to see me in his dressing room. I went downstairs, but he was chanting, so I loitered for a little while, then finally interrupted him and said, excuse me, Mr. Hancock, you sent for me? He replied, 'who are you?' I said I'm John's sound engineer, Bryan. And he said, 'that's the best sound I've ever heard. If you ever need a job call me first.' Then he went back to chanting."

Bell in his home office in the early 1980s with his mini-comupter and early Apple computers running his first online music system, Synth-Bank.

PERFECT MATCHES

After finishing up with McLaughlin, and then between jobs, Bell dropped in on Hancock unannounced. "I knocked on his door at 9 am and said, hi, it's Bryan, John McLaughlin's sound engineer. You told me if I needed a job to call you first. But I got a blank stare – no recognition whatsoever. He just said, 'I don't remember.'"

That would have been the end of it but for the fact that Hancock owned a Ford Cobra and Bell loved cars. "I'd given up racing to mix and here's one of the coolest cars in the world, so I asked for a ride," he says. "Herbie said it wasn't running, but I asked him if he had any tools. The fuel line had cracked at the connector, so I cut an inch off, slid it back on and the car started right up. Then he goes, 'It's coming back to me now. You can mix your ass off and you don't mind fixing my car. Why don't you stay for a couple of weeks?'" A couple of weeks became eight years, more than 20 of Hancock's albums and numerous music technology firsts.

Hancock's long-time recording engineer/producer, Fred Catero, who'd recorded everything from symphonies to Barbara Streisand, Frank Sinatra, Bob Dylan, Chicago, Blood Sweat Tears, Santana and Janis Joplin, became an important mentor to Bell. "Whenever we were in the studio, Fred was there. He taught me analog recording and I shared computer technology with him."

With Hancock, Bell worked as a sound engineer and keyboard technician, as well as production manager, stage manager and truck driver when necessary. "It was a brutal workload," he states, but a gig in which he thrived, both professionally and personally, after doing something he swore he'd never do

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again – got married.

"We met in 1977 at Herbie's home," Bell says, "but I was 24, a rock 'n' roll divorcee and I thought, not a chance. Not again. Herbie's band actually had a pool going on how long we'd last. It ranged from six weeks to 18 months. We've been married 38 years now and have three children and a granddaughter, so I won the pool. My wife (Margarita) is very traditional but highly independent. She wanted kids and I wanted to rock 'n' roll, so I basically outsourced the children to her." It was a match that allowed him to have his own family but continue to tour and innovate.

During that time Bell built one of the first wireless headset microphones, added a disk drive to a synthesizer and built an automated patch bay – both firsts – and, in 1979, he and others created an integrated, multivendor interface (an analog version of MIDI) to integrate Hancock's various keyboards. They later expanded on that system to include a mixing console, tape machine, video deck and multiple keyboards, with an Apple II as the user interface and a 16-bit master computer running a custom built operating system, designed by Bell, to speed up processing.

The concept was to use different manufacturers' gear in an open architecture – a precursor to the networked business model MIDI later helped foster. "Where multiple companies are invested in the outcome and therefore amplify the whole business," he adds.

HUGE INSPIRATION

In part, the concept was inspired by a 1976 visit to Xerox Park where Bell and Hancock were introduced to a prototype for a personal computer, well before the Macintosh. "We had to sign a non-disclosure agreement and couldn't talk about what we'd seen for years, but Dr. Alan Kay, who showed us the computer, was a huge inspiration to me. He said: 'The easiest way to predict the future is to invent it' and that was my philosophy about technology and system design. The easiest way to have a reliable sound system and great sounding bands was to build a reliable system and great sounding band gear."

Bell and Herbie Hancock in "the stone knives and bear skin rugs era" of keyboard and audio technology.

Bell refers to the mid-70s/early-80s as "the stone knives and bear skin rugs era" of keyboard and audio technology. "We built our own amplifiers. Early wireless technology was cutting edge, but not stable. We used a British Kelsey console for monitors. I built my own direct boxes and front-loaded speaker system to maximize bass response. I replaced every piece of The Headhunters' sound and band gear except the instruments. We used military grade connectors on multi-cables, shock-mounted every microphone and cut low frequencies by putting 12-inch speakers downstage so the bass player could hear the band without any 40 to 80 cycle stuff on stage at all, and had super clean sounds because everything was properly isolated."

The challenge with VSOP, Hancock's acoustic band, was different. "It was about translating their acoustic sound in a way that worked for up to 100,000 people," he explains. But his philosophy of mixing was the same regardless of the artist, he maintains: "My job was to get a balance and be invisible, to be a servant of the music and provide the technology to establish an emotional connection between the musicians and audience."

In doing so, one gig stands out above the others: Joni Mitchell performing "Mingus" at the Greek Theatre in the late 1970s. "I'd designed and tuned the PA there and had it perfectly dialed in," he says. "I actually met people 30 years later who'd seen that show and said it was the best they'd ever been to, and when someone remembers when you had a really good day, it's very cool."

Other artists he worked for over time include the Hawaiian band Kalapana as well as Carlos Santana, who offered him a job if he ever left Hancock. He eventually did and worked for Santana as manager of his sound company as well as a live mixer, electronics tech. His next big gig was Neil Young in 1985. It was the first time Bell didn't mix and do something else, working instead as a MIDI/computer tech and playing in the band on a few songs.

THE COMING WORLD

Bell's work at the Greek and a variety of other venues was an offshoot of his founding Bryan Bell Productions in the mid-70s – a company that would ultimately become Synth-Bank, the first online database system for music, in 1984, and resulted in his spending far less time on the road. Initially Synth-Bank was intended as a backup provider for keyboard sounds, tour accounting files and other data, as well as a library providing sounds created by A-list artists to other musicians and an online community in the early days of the Internet.

"That business model didn't work," he says, "but it led to doing MIDI designs for acts like INXS and con-

sulting for Michael Jackson, The Rolling Stones, Yes, ELP and others. I still made records, but there was so much demand for the designs that I couldn't tour and mix house. I'd design a system, train a crew, send them out and then design the next."

Bell has continued to consult for various artists, in addition to serving as outsourced chief technology officer for Domain Chandon and working on The Tonight Show from 1992 to 1994 as band engineer and sound designer when Jay Leno took over. Eventually, however, he decided to get out of the music business and learn more about the "coming world of technology."

Consequently, from 1994 to 2000 Bell served as Strategic Technologist for The Frank Russell Company (currently Russell Investments) and continued his work with Russell Family Enterprises as outsourced CTO from 2000 to 2013. "The Russells were very supportive of me keeping my passion for music alive in side projects and community service," he adds.

Bell has since returned to music and now, at 62, maintains contact with many of the artists he mixed, including Hancock, Santana and Young while also continuing to engineer and produce records, his first and most lasting passion. "A lot of what I made was built because we didn't have the tools I wanted to make records," he concludes. "But my main motivation for innovating, inventing, or whatever, was to serve artists.

"With VSOP, I used to pray before every show to just not screw it up – to not let the sound system get between the band and the audience. That's challenging with an acoustic piano in a 60,000-seat stadium, but it's the most amazing thing when you get it right." ■

Based in Toronto, KEVIN YOUNG *is a freelance music and tech writer, professional musician and composer.*

(Left) DJ Vourteque plying his trade at the Hangar, with a d&b Y12 main array flown to his right. (Above) A perspective of the Jubilee stage at this year's Electric Forest Festival. (Below) A nighttime view of the Observatory stage, where stage-based reinforcement was supplied by compact d&b V8 arrays.

Making BIG SOUND IN THE WOODS

Multi-stage sound reinforcement at the Electric Forest Festival.

by Live Sound Staff

The small Michigan town of Rothbury has a population of 500 – except for a week every July when it swells to more than 45,000 as the site of the Electric Forest Festival. The four-day event focuses on jam band and electronic genres, and co-produced by Insomniac Events and Madison House, this year it saw tickets sell out in less than 24 hours.

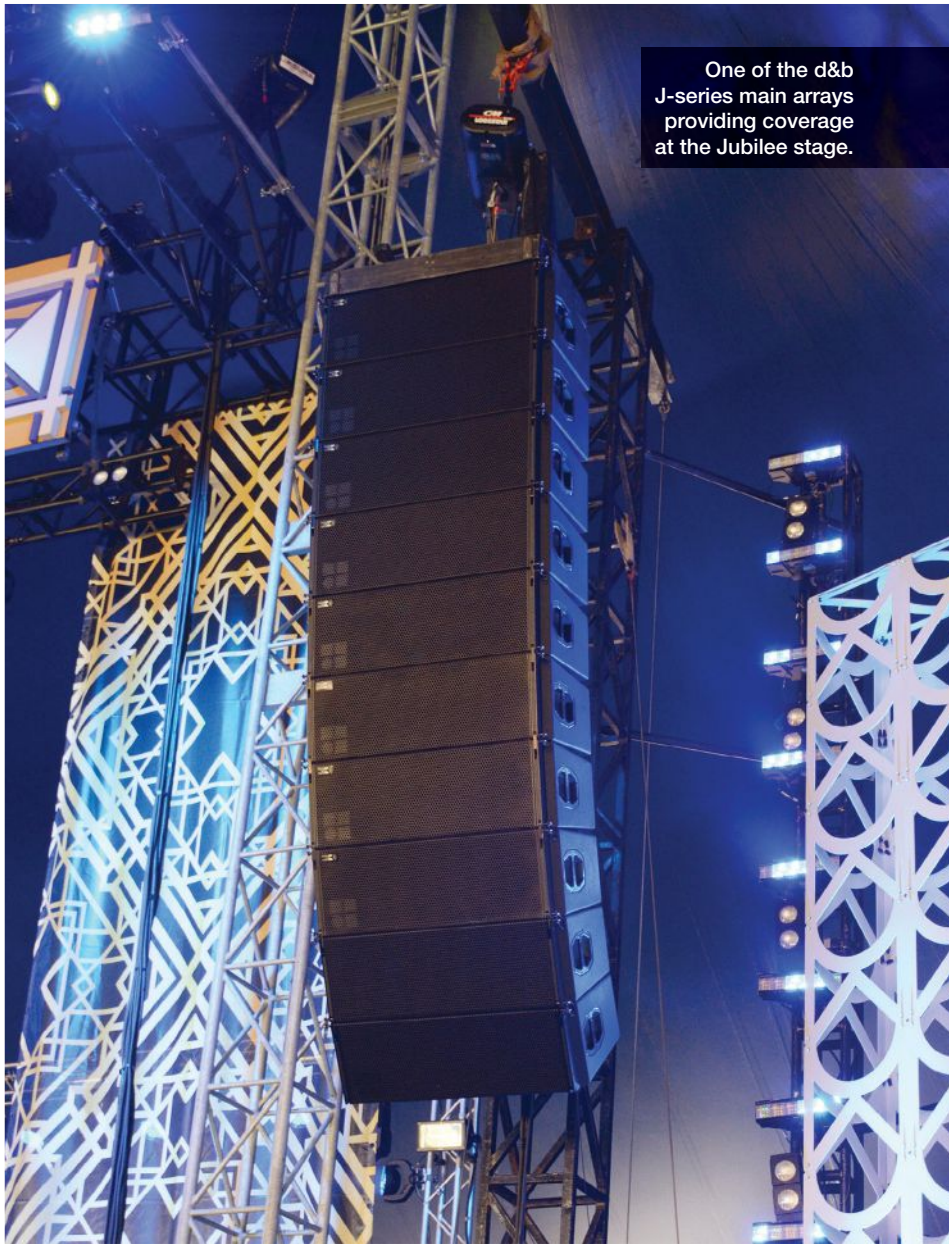
The music is pretty much non-stop at Electric Forest with seven stages hosting live performances, joined by interactive art, workshops, and educational seminars. Sound and lighting company Burst of Detroit served the event for the fifth straight year, providing sound reinforcement at four stages while also rolling out its new

d&b audiotechnik inventory.

"Every year this festival grows incrementally, matched by the attendees' expectations for quality audio," notes Burst owner Scott Ciungan. "As a result, it was a great opportunity to show what our new d&b PA is capable of."

Ciungan reached out to long-time d&b user Eighth Day Sound (Highland Heights, OH) to supplement its inventory as well as to provide technical support. "We wanted to provide the same high level of sonic quality at every stage for fans and performers no matter where they were located, so we worked to standardize on d&b throughout," he adds. "Eighth Day was great in helping us accomplish this."

Eighth Day also served the Ranch arena stage at the festival, while Thunder Audio (Detroit and Nashville) handled the Tripolee and Sherwood Court stages. The festival incorporates the natural beauty of the surroundings – more than 40 acres are utilized to create Electric Forest at the Double JJ Resort– into carefully crafted, creatively themed environments with live performance stages. It's an experience that's been termed "an escape for the ages" (IMF Mag) and a "fairytale-like adult playground" (VICE Thump), but at its heart, the music is the driving force.



One of the d&b J-series main arrays providing coverage at the Jubilee stage.

Hit The Ground Running

The Jubilee stage is easy to spot due to the bright, pink tent that covers it and the audience area, and performances by woman-on-violin Lindsey Stirling, Phutureprimitive (DJ/Producer Rain), Dopapod, and Galactic with Macy Gray drew more than 10,000. Pat Fisher of Burst served as the front of house engineer at the stage, in addition to helping Ciungan coordinate the scheduling, personnel and set-up at the other stages.

"We completed d&b training a few weeks prior to the festival to make sure we hit the ground running," Fisher explains. "The ArrayCalc and R1 remote control software was extremely useful when doing our prep work. We had the site measurements for each stage, plugged them in, and designed a system specifically for each venue. The result was terrific – it was amazing how well it worked." *(For more about ArrayCalc, see Designer Notebook beginning on page 48 of this issue.)*

The Julilee stage was served by flown left-right line arrays each consisting of eight d&b J8 enclosures, with dual J12s hung below to further nearfield coverage. Both the J8 and J12 are three-way designs – due to differing dipolar arrangements of the LF drivers, the J8 provides 80 degrees of horizontal dispersion while the J12 offers 120 degrees in the horizontal realm.

The low end was bolstered with 14 d&b J-SUB subwoofers ground stacked two high across the front of the stage, book-ended by four J-INFRA subwoofers that were also stacked two high. Eight Y10P two-way loudspeakers placed along the lip of the stage handled front fill.

"This system is the most user-friendly PA I've ever used," Fisher says. "It sounds phenomenal and everything worked exactly as it was supposed to. We turned it on, did a little tuning and

tweaking, and it worked flawlessly for four days, even on heavy bass loads. Those subs are a force of nature."

Loudspeakers were driven by five d&b D80 touring racks each loaded with three D80 amplifiers as well providing power distribution, connector interfaces and a 32 A CEE mains power connector. The four-channel amplifiers contain pre-set configurations for all d&b loudspeakers in addition to offering a linear mode. Signal delay capability allows user-definable settings to be applied independently to each channel, and the same applies to the two 16-band equalizers providing optional parametric, asymmetric, shelving or notch filtering.

"These amplifiers are extremely robust," Fisher notes. "With as much SPL that was being produced you would think they might hit their limit, but they are workhorses for sure."

Adjusting To Needs

Fisher performed his mixes on an Avid VENUE D-Show digital console at front-of-house supplemented with a Venue Rack and Stage Rack. A rack-mounted Lake LM 44 processor was on hand to mix matrix and system EQ between the D-Show and the loudspeaker system. Monitor engineer Justin Wilcox of Burst utilized another D-Show console along with the Venue Rack and Stage Rack.

Wilcox also rode herd over a stable of Shure UHF-R wireless microphone systems available for all performers, and Burst also made sure an commensurate wired mic package was on hand and available.

Given the variety of musicians that graced the Jubilee stage, the monitor system was both robust and versatile. Up to 18 d&b M2 bi-amped monitor wedges could be placed on stage, with two stacks of three d&b V12 enclosures on top of two V-SUBs delivering in fill. Three more touring racks, each with three D8-amplifiers, powered these loudspeakers.

"Between remix artists, individual musicians, and larger bands, we had a variety of monitor needs to fulfill," Wilcox says. "The key was building in enough flexibility to adjust to their needs quickly. The end result proved excellent."

Big House

The Hangar, a live performance venue across from the Jubilee stage, has a form factor that it's name clearly implies. It's a huge rectangular pole barn with a stage at one end, a large wooden bar at the other, and vendors located in "store fronts" along each side. Hosting Jerk Church, Vourteque, JPOD, the Preservation Hall Jazz Band and others, it's reverberant nature had to be accounted for in the sound design.

The main system again comprised left-right arrays, this time each with d&b Y12 enclosures flown from hoists at the far sides of the stage. Two d&b B2 subwoofers were stacked beneath each array, with two more B2s centered under the stage. All loudspeakers were powered by three D80 touring racks, with the Avid VENUE Profile house console positioned stage left to keep it out of the crowd.

On stage, a dozen L-Acoustics Hiq15 stage wedges, driven by four LA8 amplifier controllers, handled all monitor requirements. Six were placed along

Josh Sobeck of Burst mixing both monitors and mains on a Midas M32 console at stage left of the Observatory stage.

the lip of the stage, while the remaining six could be positioned as needed for an assortment of DJs that also performed in the venue. A Yamaha PM5D was on hand for mixing monitors, providing plenty of extra channels to accommodate performers' in-ear monitoring systems.

What It's About

A region of the site called Sherwood Forest hosted the Observatory and Forest stages. The area was comprised of approximately 14 acres of pine trees resplendent with colorful swinging hammocks, flamboyant artwork and eclectic performing artists – along with cool lighting effects when the sun went down.

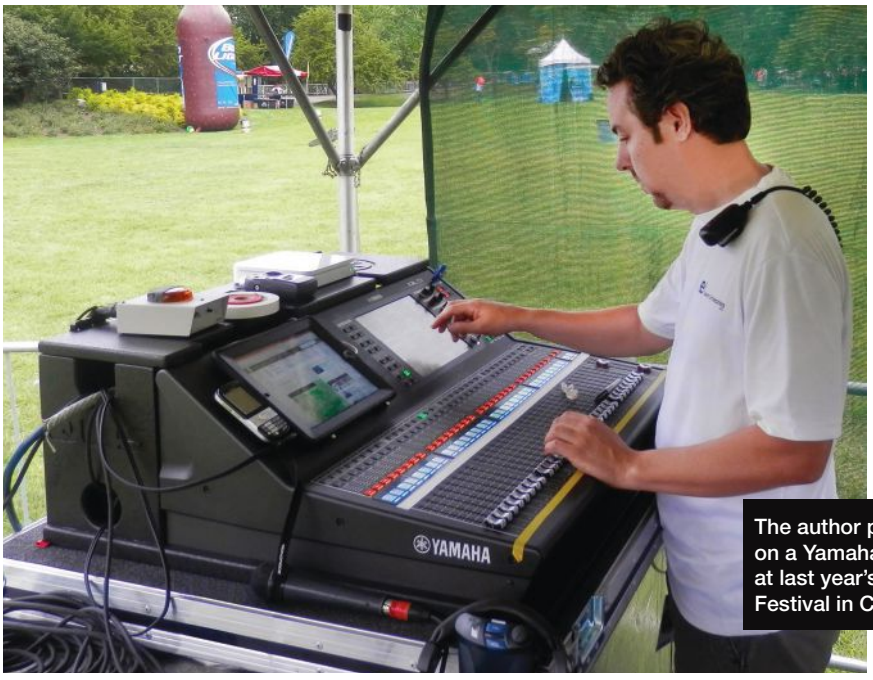
Scott Ciungan (right) and Pat Fisher of Burst at the Avid D-Show console at the Jubilee stage.

Both stages offered similar terraced viewing areas, make-shift dance floors, and plenty of room to sit back and enjoy the music. Hosting similar types of performances, Burst equipped both stages with the virtually identical main systems.

Compact, stage-based left-right arrays each consisting of three V8 array enclosures flanked the sides the stage, with six V-SUBs evenly distributed on the ground in front. Audio power was generated by six D80 amplifiers. Front of house was again at stage left to keep it out of the way, with a Midas M32 console available for both house and monitor mixing. Twelve Adamson Systems M212 wedges powered by eight Lab.gruppen PLM10000Q amplifiers could be placed as requested by each artist.

"The systems at all four stages worked without a hitch, just as we planned it," Ciungan concludes. "The entire time we're at Electric Forest, it's go-go-go, but even though it's nonstop, the end result is always worth it – especially this year with the enhanced performance of our new d&b stable of gear.

"I think our role with the festival continues to expand because our commitment to audio quality matches that of the promoter, and that's what it's all about in this business." ■



The author plying his trade on a Yamaha QL5 console at last year's Buckle-Up Festival in Cincinnati.

FLYING SOLO

Key issues in handling house and monitor sound simultaneously.

by Nicholas Radina

ARE YOU A LONE RANGER of the audio world? I've been one for 20 years, working as an independent practitioner of live sound.

Lone Rangers face the common scenario of ever-increasing responsibilities from advancing the load in and out, to pinning the stage, handling musicians and tour managers, corporate clients and eager brides. All with no A2 or enough hands or help – just a steady schedule of shows ranging from music to corporate events to weddings to comedy shows, plus that children's theater show thrown into the mix at the last moment (of course).

We strive to make the nearly impossible possible, all while flying solo as the promoter, client and entertainers put the squeeze on our time and patience. The aim of this column is to share what I've learned over the past two decades in hopes of helping fellow Lone Rangers better deal with the challenges that lay before us day after day. And while these challenges are unfortunately quite common, they also present a wonderful opportunity to learn some powerful fundamentals.

Future topics will range from gear and maintenance to troubleshooting and organization, as well as advancing shows, client relations, work flow strategies, wireless challenges and of course, mixing tips and tricks. But first let's start with some workflow strategies for mixing monitors (wedges and in-ear monitors) from front of house, in addition to stage techniques to maximize monitoring success.

STOP THE HACKING: OUTPUT EQ

Imagine this common scene: a singer is playing acoustic guitar through a direct box (DI) and a wedge, providing foldback for both her voice and guitar. The acoustic guitar is feeding back in the wedge and/or just plain sounds bad. You start hacking away at the mix graph, yet now her vocal in the wedge sounds horrible. The problem is that you're trying to solve one problem while making another worse.

Look to the output EQ as the tool for making the wedge sound natural, not the input. This also serves as a quick test to know if something is wrong with the monitor, crossover or amplifier. Once comfortable, you now have a reference – when something doesn't sound right, you know it's the source.

MIXING FOR TWO BOSSES

A sole mix engineer is responsible for providing a mix to two important groups: the audience and the performers. The audience is hearing the house mix through the main PA. The performers hear the monitor mix through wedges and possibly IEMs, both of which are completely different from the PA.

When confronted with a single channel strip for the singer's main vocal and another for her guitar, how do you manage making both sound good through two or three completely different loudspeakers? Split. Think of yourself as a hybrid engineer. In the traditional live audio world, both house and monitor engineers have a split of all inputs. But as a Lone Ranger, you're not that fortunate; it's all you.

But why can't there be the same flexibility and separation? There can be, by splitting inputs to separate channels on the console, one for the house mix and the other for the monitor mix. Be sure to un-assign the "monitor channels" from the stereo bus. The monitor sends will come from the "monitor channels" and not the house channels. The parametric nature of channel EQ and its accompanying high-pass filter are potent tools for monitor mixing.

This approach provides independent control over each input for each type of output/loudspeaker. It can be done at the desk or at the snake head using simple

XLR "Y" cables or a proper isolated splitter such as a Radial Engineering ProMS2 or Whirlwind IMP splitter. (Both are available in 1 x 2 and 1 x 3 configurations). Another useful tool for this purpose is the Klark Teknik Square ONE, a unit providing a 8-in x 24-out split.

If the number of open channels is tight, prioritize the most important and challenging inputs, such as vocals and acoustic instruments. In the digital world, physical splits may not be required, yet be aware that when "soft" splitting channels on a digital desk, sharing the head amp may be necessary. The use of physical splits provides the benefit of independent head amp control.

I tend to set up the monitor channels as post fader because they provide the benefit of the channel EQ and the fader, which makes it much easier to give everyone more or less of a single input by simply using the fader. A trick with analog consoles is to take off the fader cap or exchange different colored caps for easy identification. If digital, label the monitor channels in lower case and/or a different color.

CUE ME

The cue wedge is essential to a monitor engineer, supplying a true reference of what the musicians are hearing through their monitors. This is especially useful when doing double-duty on house and monitor mixes. Try to borrow (from the stage) a wedge with the same drive quotient (crossover, amplification, etc.) as the monitors on stage and place it next to the console.

A classic Y-Split XLR cable splitter.

Whirlwind IMP and Radial Engineering ProMS2 isolated splitters.

If mixing IEM, invest in decent buds (preferably molds), but I've found that the foamy Shure tips work well. In addition, a wired IEM pack such as a Shure P4HW or a wireless unit is a smart thing to have and use. In soloing the output for the mix, you hear the actual mix(another word for mix) as the musician hears it on stage, not just the description from the musician.

FLIP IT

The polarity button, often incorrectly referred to as the "phase button," simply flips the input polarity 180 degrees. This is especially useful in eliminating low end feedback from acoustic guitars and other instruments.

In addition, when mixing ears, flipping the polarity on a singer's vocal and other inputs can yield incredible results without needing to pull out an excessive amount of EQ. Don't be afraid to hit that button.

WEDGE & MIC PLACEMENT

This one is a biggie, a bedrock fundamental that I teach others constantly. A mic and a wedge are always a compromise, and there's always a limit to how loud a wedge can be. Feedback happens when the mic is picking up the output of itself in the monitor. Therefore it's very important to know the pick-up patterns of the mics on stage. So if you're at a gig and not sure, look it up!

For example, a standard (Shure) SM58 has a cardioid pattern, so it's null (rejection zone) is in the rear. A Shure BETA 58, meanwhile, has a supercardioid pattern so the null is to the sides. The essential take-away is to make sure the null faces the wedge or wedges so the mic(s) avoid sound you don't want to pick up. A wonderful explanation of this is presented by Dave Rat on a video available on ProSoundWeb. Another great resource is an article on PSW by Mark Frink entitled "Monitor Mixing Tips & Tools Of The Trade For A Successful Show."

STAYING IN CONTROL

As a Lone Ranger, it's important to be creative and able to adapt on the fly – while adhering to essential fundamentals of audio. There's no other way to success. Give these techniques outlined here a try, and let me know your experiences and questions. Next time I'll address advancing and handling multiple performances on the same bill with maximum efficiency. Good luck out there! ■

NICHOLAS RADINA *is an audio engineer and musician based in Cincinnati. In addition to keeping up with a busy freelance schedule, he's currently touring as the monitor engineer with the band O.A.R. and smacking cowbells with Salsa bands. He invites your input via his website at NicholasRadina.com.*

The author's RCA Aeropressure MI-6207-G microphone with burnt umber finish.

DIRECTIONAL VARIANCE

The RCA Aeropressure MI-6207-G microphone.

by Craig Leerman

TWO OF THE COOLEST microphones in my collection are from the RCA MI-6207-G Aeropressure Series. What makes them unique is a "Paracoustic baffle," a parabolic shaped piece of metal used to help convert them from omnidirectional to more directional. Complete units are rare because the baffles were easily damaged or lost. I'm lucky to have found two: an almost mint condition example in the common burnt umber (RCA brown) finish, and a very clean specimen in the rare black and chrome color scheme.

While RCA is out of business now, it did make some of the most iconic-looking mics of all time and some of the best-sounding units of their era. I don't have a lot of RCA mics, primarily because many of them are for recording and broadcast while I work in live sound. At least that's what I tell everyone.

The truth is that the classic models like the iconic Velocity Ribbon Model 77 pill-shaped mic (manufactured from the mid-1940s until the early 60s) and Velocity Ribbon Model 74 (made from the mid-30s through the 50s) and Model 44 (early 30s to 1946) are much in demand by both users and collectors, meaning they're both rare and pricey.

RCA AEROPRESSURE MI-6207-G SPECS

Transducer: Dynamic, non-metallic molded diaphragm
Polar Pattern: Semi-directional with baffle, omnidirectional without
Frequency Response: 80 Hz – 18 kHz
Sensitivity: -56 dB
Nominal Impedance: 250 ohms
Size: 5 x 2.1 inches without baffle, baffle is 4 inches in diameter
Net Weight: 2.25 pounds
Retail Price In 1950: $25.50

BRIEF HISTORY

During World War I, radio communication was deemed vital to the war effort by the U.S. government, so it took charge of the industry. And after the war, the government wanted control of the airwaves, forming a corporation that would have a monopoly on radio equipment and transmission. It worked with General Electric (GE), which then bought the American Marconi wireless company, and these firms, along with the Pan-American Telegraph Company (controlled by the U.S. Navy), became a publicly traded company known as the Radio Corporation of America on October 17, 1919.

The incorporation stipulated that the majority of the stock be held by U.S. citizens, but GE held controlling interest in RCA, along with Westinghouse. RCA also bought up radio stations, and in 1926 formed the National Broadcasting Company (NBC). GE and Westinghouse stepped away from ownership of RCA in 1930, and the three companies became competitors.

In 1941, RCA Laboratories was formed in Princeton, NJ, and over the years produced innovations such as color television, the electron microscope, and liquid crystal displays (LCDs). For the next 30 years the company focused on electronics, but eventually diversified to a broad range of interests, including ownership of Hertz Car Rental and Banquet Foods. Plagued by financial problems that began in the 70s, RCA was acquired by GE in 1986, which then set about breaking it up.

EARLY DYNAMIC

Of course, RCA was also an innovator when it came to microphone technology. Manufactured between 1945 and 1951, Aeropressure Series mics were marketed for low-cost PA applications and for "talk back" in broadcast or recording studios. RCA called them (and the Type 88 Series) "pressure" microphones. Today the term is "dynamic." A catalog description from 1950 informs us that "the sound pressure actuates a thin but rugged molded diaphragm to which an annular coil is attached, with the coil in an air gap of a magnetic structure."

A magazine ad terms Aeropressure mics "semi-directional," with the catalog stating that the sound is "non-directional" below 1000 cycles and increasingly directional above those frequencies. It adds that "the directional pattern can be sharpened or broadened depending upon the position of the supplied Paracoustic baffle. With the concave side toward the front, the pattern is narrowed, and with the convex side toward the front, it is broadened."

Of course, for a solid omnidirectional pattern, you could simply leave the baffle off the mic. And in fact, a knurled bolt was supplied with the baffle that allowed users to easily attach or remove it without needing a tool. My Aeropressure mics don't have their original knurled bolts and are equipped with standard slotted screws that need a screwdriver.

EVOLUTIONARY STEP

Both of my models work well but sound a little thin compared to today's offerings. Frequency response is stated at 80 Hz – 8 kHz, which is rather limited but functional since these mics were targeted primarily for use with the human voice.

"G" models shipped with a short length of cable terminated to an XLR. "B" models came with a 15-foot cable and plug, and "E" models had an attached 30-foot un-terminated cable.

My burnt umber mic is a G model, while the model designation for the black and chrome unit can't be determined because the cable's been repaired and a modern XLR installed.

Stand-mounting is accommodated with a 1/8-inch pipe thread socket on the rear of the body that accepts a swivel fitting. The other end of the fitting accepts a 1/8-inch pipe or bolt, along with a variety of adapters to convert the 1/8 thread to 5/8-27 standard mic stand thread as well as the 1/2 pipe that was more commonly used for stands in that era.

Without the baffle it's an omnidirectional mic.

Another catalog of the period notes that the company sent out questionnaires to customers that confirmed "for its simplicity in procurement and availability, standard 1/2-inch pipe size was infinitely more popular than any other pipe size." While my Aeropressure models aren't worth thousands of dollars, they're priceless to me because they show a step in the evolution of directional microphones – and they look pretty cool as well. ■

CRAIG LEERMAN *is senior contributing editor for* Live Sound International *and is an avid collector of vintage microphones. Read about more about his mics on ProSoundWeb by searching "Microfiles."*

d&b AUDIOTECHNIK ARRAYPROCESSING

Detailing new functionality to further optimize line array performance.

by Frank Bothe

APRIL 2015 MARKED the introduction of the d&b audiotechnik ArrayCalc simulation software V8, incorporating ArrayProcessing. This function optimizes the spatial (level) and spectral (frequency response) of existing d&b line arrays across an entire audience listening area defined by the vertical coverage and splay settings of the array.

This latest update also applies a common target frequency response to each line array, ensuring sonic consistency regardless of series type, column length and splay settings. ArrayCalc V8 is available to download from the company website (www.dbaudio.com).

LINE ARRAYS

Modern line array technology was introduced during the early 1990s. This shift in loudspeaker design proved to be a better solution for covering large audience areas, with better sonic results than large conventional point source setups. The main advantages of line arrays are:

- More coherent (and therefore more efficient with a higher output)
- Higher directivity (and therefore longer throw)
- Greater scalability (and therefore better implementation)

The basic system approach for line arrays has not changed since initial development; however, all individual components such as loudspeakers, amplifiers, signal processing, rigging systems and prediction software have continuously been refined. ArrayProcessing is a new optimization technology that builds on all these achievements, but adds another level of sound quality and user friendliness.

HOLISTIC BEHAVIOR

ArrayProcessing is an additional feature within the d&b ArrayCalc simulation software combined with the latest generation of d&b amplifiers. The advanced digital signal processing within the D80 and D20 mobile amplifiers as well as the 10D and 30D install amplifiers enhances the performance of J-Series, V-Series and Y-Series line arrays.

ArrayProcessing calculates and designs the holistic behavior of a line array creating individual sets of FIR and IIR filters for every single cabinet of the array, each of which are driven by a dedicated amplifier channel. These filters shape the sound generated by the array to precisely match a user defined level distribution and obtain a uniform frequency response over a given audience geometry.

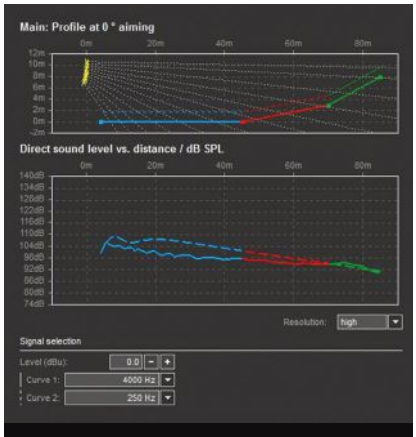


Figure 1: Typical level drop over distance for high-mid (solid) versus low-mid (dotted).

Physically, ArrayProcessing employs a conventional line array setup that is properly designed and positioned correctly, providing the required vertical dispersion and sufficient acoustic output to cover the audience area. It adds 5.9 milliseconds of latency, in addition to the 0.3 msec of the amplifiers, arriving at a total of only 6.2 msec.

MOTIVATION & BENEFITS

Typically, a line array configuration for a given situation is planned in a way that optimizes the level distribution over distance in the high-mid frequency range (2 kHz to 4 kHz). This requires a specific vertical aiming for the individual cabinets that is defined by the splay angles between them.

However, the array dispersion at lower frequencies (100 Hz to 1 kHz, depending on the array length) is a direct result of the total array curvature created by the splay settings (and not the individual aiming of a cabinet). This often creates a different level over distance distribution compared to the

high-mid range.

The result is an uneven spatial balance and spectral response from the front to the back of a venue – a rich and (too) warm sound close to the array, which may become thin and almost aggressive in remote areas. The effect is well known and has often been a cause for criticism against line array technology.

Another example is the difference in spectral response when covering steep seating areas with a strongly curved array, as it is often used in out fill and 270-degree applications for tiers or balconies. In the highest seats it sounds very thin, in the seats around

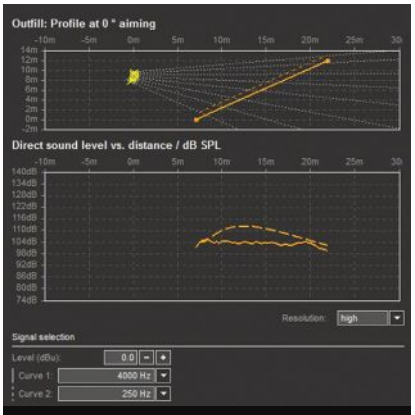


Figure 2: Typical level drop over distance of a strongly curved array for high-mid (solid) versus low-mid (dotted).

the middle there is a strong midrange beam, which disappears again when approaching the stage. In these situations it can often be perceived that the lower midrange dispersion does not follow the array shape.

ArrayProcessing can eliminate these issues by providing a consistent frequency response throughout all listening positions. The optimization means each area within a listening area has the same spectral consistency, so the sound at the front of house position applies to each member of the audience. The mix is valid for everyone.

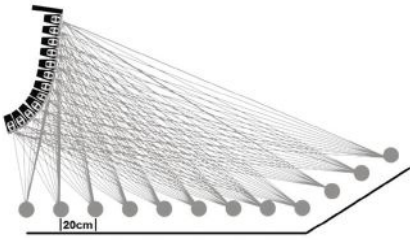


Figure 3: Calculating the contribution of each individual source of the array to each listening position.

COMPENSATING ABSORPTION EFFECTS

ArrayProcessing includes air absorption effects in its calculations and provides a precise and seamless correction for all relevant cabinets. This not only provides a more consistent sound balance over distance, in many applications where the system has sufficient headroom, its throw can be extended and the need for delay systems greatly reduced.

FLEXIBILITY

The level distribution in the audience area can be modified and tailored to reduce the level towards the front of the audience area and modify the level drop over distance over the audience area. Different settings for the array can be compared at a mouse click.

INTELLIGIBILITY

In many applications, achieving a more accurate directivity control causes less stimulus to the reverberant field and leads to improved intelligibility.

HEALTH & SAFETY

Using ArrayProcessing, the level increase towards the front of the venue can be adjusted. Reducing it may help avoiding harmful sound pressure at the front while keeping the desired level for the rest of the audience.

HOW IT WORKS

ArrayCalc calculates the level distribution at different frequencies for combinations of up to 14 different pairs of line array columns or point source loudspeakers distributed across the defined space, plus subwoofers in various flown and ground stacked configurations (left/right or subwoofer array). In addition to the ArrayProcessing option for line arrays, it provides analysis and the time alignment of all sources of the system and finally creates an intuitive workspace for d&b R1 Remote control software to configure and control the amplifiers.

When ArrayProcessing is enabled, target points are distributed along the listening area profile with a 20 centimeter spacing (along the intersection of the array profile with all matching listening planes). The program calculates the contribution of each individual source of the array to each listening position using a high spectral resolution of 24 frequencies per octave, making a total of 240 individual frequencies per target point over the entire ten octave audio band.

The resulting data is stored in a matrix and serves as a basis for all further calculations. The algorithm also considers and corrects refraction effects produced by neighboring cabinets.

The ArrayProcessing optimization routine will then create a unified/standardized frequency response at all of these points. This target frequency response is exactly the reference response that is initially defined when tuning and voicing the controller set-

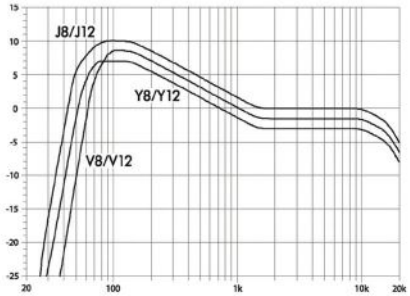


Figure 4: Target frequency responses for J-Series, V-Series and Y-Series "top" loudspeakers.

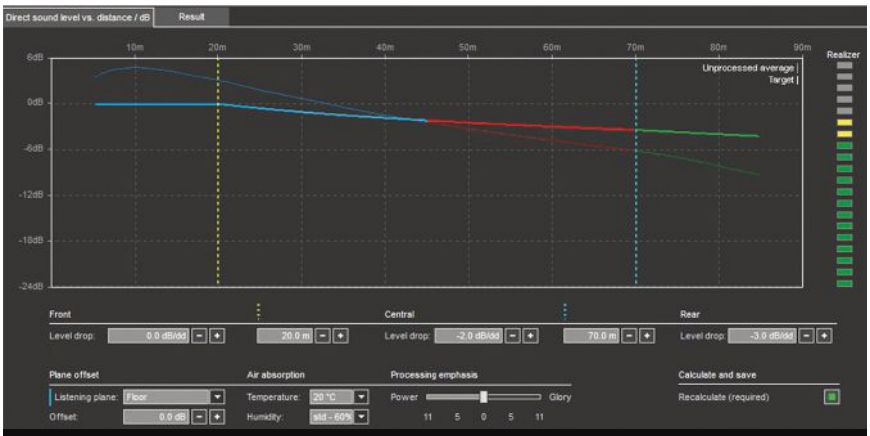


Figure 5: ArrayProcessing level drop over distance plot. Target (solid) and unprocessed (dotted) curve. Each listening plane is shown in a different color.

ups for the line arrays in conventional (unprocessed) setups. This response is identical for all systems above approximately 140 Hz, below that frequency each system has its own individual low-frequency extension, depending on the specific cabinet design.

The target response created by the ArrayProcessing algorithm is independent of array length, splay settings and system type. Any optimized line array will provide the same sonic characteristics, regardless of Series. Any combination using multiple columns of optimized line arrays (rear fills, out fills, delays) does not require individual tuning and maintains this uniform sonic footprint.

Additional adjustments to the system response, like master equalization for example, is valid for all line arrays in the system. As all loudspeaker columns have the same response, these adjustments will be identical for the entire system for all listening areas.

USER PARAMETERS

The user can specify a desired level distribution along the listening profile. This is done in a simple way by specifying the level drop (in dB per doubling of distance) for up to three different sections of the listening area profile (front/central/rear). Additionally, a level offset can be applied to specific listening planes.

Further, there is another powerful parameter: the Power/Glory fader, which defines the processing emphasis. Special focus on either maximum SPL and system headroom (Power) or on a best match of the target level distribution and frequency responses (Glory) can be selected. The centre position usually provides a good balance between those parameters.

Up to 10 different combinations of user parameter settings can be prepared and stored in the ArrayProcessing slots of the amplifiers. These can be selected using the R1 Remote control software V2. Switching between different slots is performed close to real time.

KEEPING IT "ORGANIC"

Individual FIR filtering for each line array element can easily destroy the sonic integrity of a system. The secret lies in useful constraints to the algorithm and all resulting transfer functions. Algorithm results for each frequency need to relate to the neighboring frequencies to ensure a continuous filter response. System efficiency, headroom and time correlation must be preserved.

DIFFERENT STRATEGIES

For the lower frequency range, where all sources contribute to most listening positions, processing basically only modifies the time alignment, but keeps equal level for all sources. For higher frequencies, where the individual sources cover only a small part of the listening area, the algorithm gradually shifts towards individual magnitude equalization of the transfer functions.

The transition between these ranges is continuous, always considering coherence relations between all elements of an array, providing the recognized d&b sonic footprint.

The processing is matched to compensate for the air absorption under the actual atmospheric conditions and geometric relations.

After processing, ArrayCalc displays the optimized results for the frequency

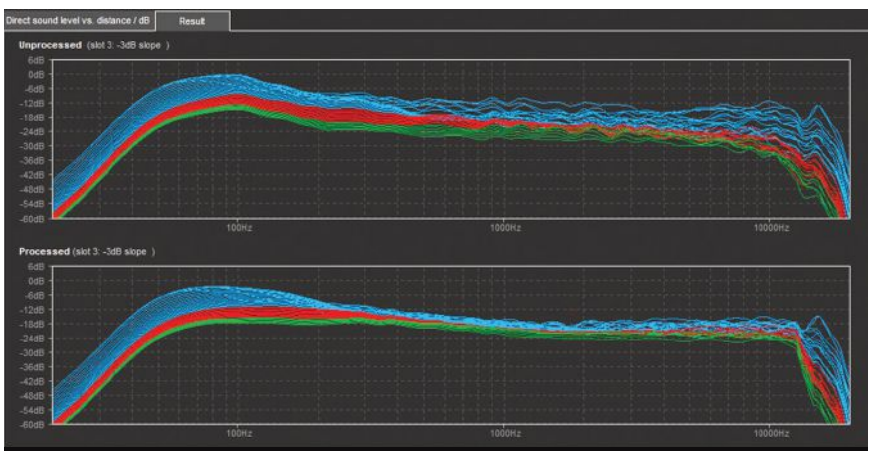


Figure 6: An example of unprocessed (top) and processed (bottom) frequency responses over distance.

response and level distribution for each configuration (slot). The listening experience is as striking as the plots suggest.

CALCULATION SPEED

For mobile applications, the speed of the calculation is an essential aspect. The user should always be able to immediately react on changing requirements (atmospheric conditions, audience attendance, level adjustments at the front or back). The typical calculation time for a 20-deep array covering an audience profile of 100 meters is in the range of one minute on a standard laptop computer.

SUMMARY

The directivity control of d&b line array systems is well behaved in the horizontal plane, achieved by an exacting approach to the alignment of the internal elements to smoothly and effectively cover the operational bandwidth. With the inclusion of ArrayProcessing, the ArrayCalc simulation software is able to achieve a vertical directivity of line arrays exactly matching the individual requirement of the venue.

The established approach to defining the mechanical array setup is combined with the ability to generate different processing settings for each loudspeaker using FIR and IIR filters. These settings are then installed into the individual amplifiers driving each array.

For consistent array performance, a fixed target frequency response is employed within ArrayProcessing. This achieves spectral continuity across multiple line arrays in projects, even when the setups differ mechanically, or include arrays from different series (J-Series, V-Series and Y-Series). This consistent spectral performance delivers the same sound balance throughout the entire listening environment, significantly reducing the time required to fine tune the resulting systems.

The ArrayProcessing approach can adjust the level drop over distance for distinct areas within the vertical coverage angle of the array. Similarly, it is also compensates for differing high frequency atmospheric absorption effects over distance.

ArrayProcessing is very quick in deployment. Different system coverage configurations for a venue can be prepared and selected at a mouse click. Integrating our latest technology, it adds a new dimension to d&b loudspeakers systems utilized worldwide. ■

FRANK BOTHE *heads up research and development for d&b audiotechnik.*

(LEFT) A perspective of the Coach House, with a portion of one of the new Renkus-Heinz IC2 clusters visible at top/left.

(BELOW) Two of the four new IC2 clusters that provide main and out fill coverage.

SOLVING A CHALLENGING ROOM

Steerable sound at The Coach House.

by Live Sound Staff

FOR MORE THAN 30 YEARS, The Coach House Concert Theatre in San Juan Capistrano, CA has hosted a roster of regional and international artists, and recently, the 480-seat hall received a sonic upgrade.

Brian English of locally based ESP Management explains that the room has always been acoustically difficult, with a low ceiling and a stage placed asymmetrically so there's a larger seating area at house left than at house right. Further, the areas near the bar are underneath an even lower ceiling due to upstairs VIP booths, and the house mix position is up in the balcony.

English collaborated with Coach House management and Ralph Heinz (senior VP of R&D at Renkus-Heinz) to design a new system based on digitally steerable IC2 (IC Squared) loudspeakers from Renkus-Heinz. "A lot of acts specify a line array, and the Coach House team wanted to be able to meet that need," English notes. "But because the ceiling is so low, you can't really do a conventional line array."

The system, installed by English and DJE Sound and Lighting (Lake Forest, CA), incorporates four clusters, each with two IC2 loudspeakers mounted close to the ceiling to avoid sightline issues. "We were able to focus each array exactly where we wanted them to go," English says. "You can have up to four steerable beams out of each enclosure, so we were able to take one tight beam and shoot it right through the windows of the VIP area without it splashing all over the wall. We also focused a beam at the face of the engineer upstairs, so for the first time in 30 years, you can hear the PA from the mix position."

The main left/right clusters at the downstage corners fire straight out, while the secondary left/right clusters are 10 feet upstage, toed out at a 45-degree angle and focused as out fills. Six IC212S-R subwoofers are positioned under center stage to enhance the low end, with two aux-driven IC118S-R powered subs under the stage at the outside corners extending response below 30 Hz.

The stage is outfitted with plenty of Renkus-Heinz RH123 powered loudspeakers to serve as monitors.

The stage got a sonic makeover as well with 10 Renkus-Heinz RH123 powered, three-way loudspeakers. With a dual-angle (30 or 45 degrees) cabinete, they serve as high-output yet unobtrusive floor monitors.

Both English and venue owner Gary Folgner are happy with the results. "I'm impressed with how well we're able to cover the entire place," English says. "I can't name another system that would have done what the Renkus-Heinz system does. In addition, the footprint is perfect; it didn't interfere with the sightlines, which occur at several angles. And because of its powerful output, we were able to hit SPL levels that they've never heard in that room before."

In fact, the client's only complaint is that the system can be too loud. "Fortunately," laughs English, "that's easily fixed with a fader." ■

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An Adamson E Series array delivering to the masses at the Oasis Stage at Milwaukee Summerfest.

CLASSIC ENHANCEMENTS

Optimizing sonic quality for opera, EDM, festivals and more.

by Live Sound Staff

REINFORCING AN OASIS IN MILWAUKEE

At the annual Summerfest in Milwaukee along the lakefront of Lake Michigan in Wisconsin, Clearwing Productions (Milwaukee, Phoenix) delivered an Adamson Systems E-Series rig for the Miller Lite Oasis Stage, which hosted artists such as Bastille, Public Enemy, Kip Moore, Sammy Hagar and Smash Mouth.

The 52,000-square-foot Oasis coverage area accommodates up to 9,500, with Adamson application engineer Brian Fraser designing the main system utilizing Adamson Blueprint software. He specified left-right arrays made up of six E15 and three E12 line array enclosures flown from truss above the stage wings.

Front fill was provided by four new S10 enclosures positioned along the lip of the stage while eight more S10s handled out fill duties. The system was completed with 16 E219 subwoofers to enhance the low end, ground stacked in front of the stage.

"Mixing on an Adamson E Series rig for the first time, I was blown away," states Ben "Snake" Schmitt, front of house engineer for Kip Moore. "The coverage was second to none and maintained a consistent sonic quality from the first row to the last. Punchy, transparent, responsive, and clear, these boxes are fun to mix through. I'm already looking forward to the next time I'm able to mix on an Adamson rig."

AN UNEXPECTED MIX EXPERIENCE IN MONTREAL

The recent 36th Montreal Jazz Festival, which presented more than 600 concerts in 10 days, was supported by official sound provider Solotech (Montreal), which deployed more than 25 Yamaha digital consoles. Models included CL and QL Series as well as PM5D, M7CL and more.

Pierre Perreault served as the front of house engineer (joined by guest engineers) at the 1,500-seat Theatre Maisonneuve, utilizing a CL5 along with two Rio3224-D stage boxes. Along the way he had the unexpected pleasure of mixing Dee Dee Bridgewater with Irvin Mayfield and the New Orleans Jazz Orchestra due to several complications

Pierre Perreault with the Yamaha CL5 console he mixed with at the Montreal Jazz Festival.

that had arisen.

"Doing a show you don't know anything about, with no sound check for the main artist and 20 additional musicians on stage, you need to have a console that is easy to mix on so you can react quickly," Perreault notes. "The CL5 was the perfect console for making my life easier that night while sounding great at the same time."

He cites the console's familiar user interface, Premium Rack effects, and custom faders layers as big plusses, along with in-person support from Yamaha. "More and more venues in Québec are upgrading their M7CLs to CL5s," he adds, "which for me is a really big plus because I'm able to import my M7CL shows into the CL5. It saves a lot of time while also gaining access to the new tools."

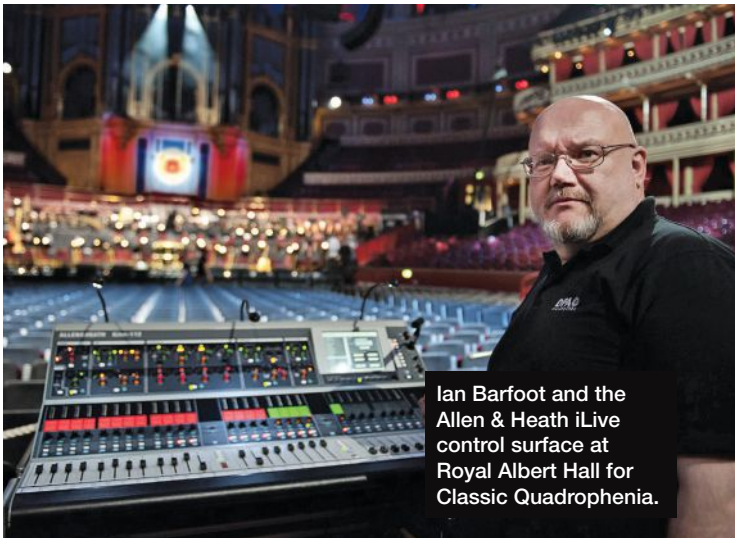
COUNTRY FEST KICKOFF ON THE CAROLINA SHORE

The inaugural Carolina Country Music Festival kicked off in Myrtle Beach in June, attracting more than 60,000 festival-goers with headliners such as Lady Antebellum, Eric Church, Big & Rich, and Hunter Hayes. Winston-Salem, NC-based Special Event Services provided sound for the fest, which took place right on the beach, choosing to deploy L-Acoustics K1 and K2 line arrays.

The ever-changing ocean winds posed a challenge for the sound team, as did the festival setup, which consisted of two face-to-face stages. The main stage was outfitted with eight K1 and six K2 per side, joined by 18 SB28 subwoofers and six Kara front fills. Four ARCSII and four additional SB28s per side handled side fill. The opposing B stage carried eight K2 per side with eight SB28 for bass.

The main stage was staffed by systems engineers John Kaylor and Jason Farah, backed up by Eric Roa, A2, Matt Naylor, monitors, and Michael Tate, patch. The B stage was handled by systems and front of house engineer Michael Brammer, supported by Ricky Touchette, monitors, and Ross Touchette, patch.

Cole Swindell shadowed by an L-Acoustics array at the Carolina Country Music Festival in Myrtle Beach.



Ian Barfoot and the Allen & Heath iLive control surface at Royal Albert Hall for Classic Quadrophenia.

At the last minute, organizers added a VIP pre-show performance by Sam Hunt. With the main stage not yet complete, the party, which drew 25,000, was hosted on the B-stage. "The eight K2 per side handled it flawlessly," Brammer says. "Everyone was complimentary of the system. The general feeling was that the sound was warm and smooth, and several artists were amazed at the amount of horsepower as well as the fact that the K2s were producing so much low end that there was almost no need for subs."

MANAGING CLASSIC QUADROPHENIA IN LONDON

An Allen & Heath iLive digital mixing system was employed to manage front of house for a recent production of Pete Townshend's Classic Quadrophenia at Royal Albert Hall in London that featured the Royal Philharmonic Orchestra, the London Oriana Choir, and guest singers Billy Idol, Phil Daniels, and Alfie Boe.

"The brief was to emulate the Quadrophenia studio album, and provide clean, open sound, so I knew I had to choose iLive because it fits the bill exactly – it has a very open, clean sound, great audio processing, is super flexible, networkable, and is customizable so I can make it work for me, rather than the other way around," explains front of house engineer Ian Barfoot. "With an 80-strong orchestra, 90-strong choir and various guest celebrity singers, there was a lot going on, so iLive is just what I needed."

The systems for the production were supplied by Capital Sound (London), with the iLive quotient comprised of two modular iDR10 MixRacks installed on stage and linked using

the proprietary ACE protocol, with an iLive-112 control surface at FOH interfaced with the racks via fiber optics and Cat-5 working in tandem. The system managed 128 inputs, approximately 12 outputs, and 16 DCAs, and it also provided orchestral stems to the monitor board, left and right to the main venue system, and recording feeds to the mobile broadcast trucks.

Barfoot used a laptop running the iLive Editor app as an extra meter bridge so that the system technician could monitor the first 50 microphones, mainly for the string section. He also deployed an iPad with the app as a remote control during rehearsals.

KEEPING THINGS CONTAINED IN ANGLESEY

The Gottwood Electronic and Music Festival, an intimate boutique event set in a Welsh forest on the isle of Anglesey, has been running since 2010, presenting a DJ line-up of rising stars and established veterans. The site offers outstanding natural beauty, and the location is key to the festival's success. But it comes with issues.

"The ambient sound levels are exceptionally low, and for the surrounding houses, off-site sound has been a continuous battle," explains Tom Elkington of festival promoter Future Noise. In response, this year the noise issues were banished with help from Martin Audio MLA Compact, which was able to contain off-site perimeter sound while also boosting SPL in the primary coverage areas.

Dual MLA Compact arrays groundstacked at one of the six stages at the Gottwood Electronic and Music Festival.

Production company VME (Knutsford, Cheshire) outfitted all six outdoor stages with MLA Compact – four enclosures per side, joined by two MLX subs – in a ground-stack configuration. "While the majority of our MLA deployments are typically to ensure even coverage across large areas for audiences of 10,000-plus, Gottwood presented new challenges to us as we needed to ensure that leakage was kept to a minimum," notes VME general manager Ben Hyman.

The detailed work of the sound design team combined with the technology proved a winning combination, with off-site levels measured at 44 to 45 dB with all systems on the site playing to the prescribed level. "Having worked with MLA for two years, I was confident that we could re-invent the audio systems across the site, and utilize the controllability that MLA's DISPLAY 2 software gives us to achieve even higher onsite levels while at the same time maintaining the lowest off-site levels," Hyman concludes.

A vocalist in "Electra" in Sweden outfitted with a Countryman H6 Headset microphone.

OPERA IN THE GREAT OUTDOORS OF SWEDEN

For outdoor performances of the one-act opera "Electra" earlier this year at a former military command center in Umeå, Sweden, sound designer Les Wern choose Countryman H6 Headset microphones for all 13 vocalists. The five principal performers were also outfitted with Countryman B6 omnidirectional lavalier mics as backups.

The venue, which accommodated audiences of up to 2,000, presented a daunting environment for the production crew and performers. "Wind was a constant challenge," Wern notes. "We've used the Countryman H6 for operatic vocalists in the past, so we knew we could have the right gain version of the mics that would best cope with the performers' very loud voices. The sound quality of the H6 is also very good, so it was easy to convince the artists that these mics were the best choice."

Moisture, both in the environment and utilized in the production, was also a constant concern. "Here too, the H6 – with its water resistant design – was an excellent choice. Throughout the weeks of rehearsals and all five performances, we didn't have a single failure. The microphones performed above and beyond expectations."

All of the mics were used in conjunction with Sennheiser wireless systems incorporating SK2000 transmitters and EM 2050 receivers. ■

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Lewitt DTP Beat Kit Pro 7

Evaluating a set of microphones for drum applications. ***by Craig Leerman***

LEWITT MICROPHONES have only been around since 2010, but in a short amount of time they've had an impact, utilized for work with David Crosby, Faith Evans and Brian Culbertson, among others. My buddy Rick Camp also uses them with Jennifer Lopez both live and in the studio. I decided to check them out, with the company sending me the Beat Kit Pro 7, a collection of seven mics for drums (and other applications).

The foundation of the kit is the dual-element DTP 640 REX kick mic that has both a large (1.25-inch) diaphragm dynamic element and condenser element (.88-inch) that the user can access independently or together. Both elements offer a cardioid pattern. The mic includes a built-in swivel stand mount with 5-pin XLR, with a short (about 5 feet) breakout cable splitting the signal from a 5-pin female connector to a pair of standard 3-pin XLRs.

The DTP 640 REX offers three different enhanced frequency response (EFR) settings: a flat response, a curve designed to enhance kick sound applied to the dynamic mic only, and a curve for recording applications. The recording curve affects both elements and focuses on frequencies from 70 Hz to 150 Hz with the condenser element and 3 kHz to 5 kHz with the dynamic. When combined, the two elements produce a "more full" kick sound. A 3-position pre-attenuation level switch offers settings of 0 dB, -10 dB, and -20 dB. With the switch in the 0 dB setting, the mic can handle 150 dB max SPL. The entire unit measures 6.2 inches long, 2.8 inches in diameter and weighs 27.3 ounces.

The Lewitt Beat Kit Pro 7 microphone package.

A trio of DTP 340 TT dynamics, primarily for toms and snare, offer a supercardioid pattern, a sensitivity rating of -57 dB, and a frequency response of 40 Hz to 16 kHz. They're only 3.7 inches long and weigh in at 5.8 ounces.

For overheads and cymbals, there's a pair of LCT 340 small-diaphragm condensers with interchangeable omnidirectional and cardioid capsules. (Users also have the option of purchasing the cardioid capsules only.) These mics have a 4-position attenuation switch with settings of -6 dB, -12 dB, -18 dB, and off, as well as a 4-position high-pass filter with positions for 12 dB at 40 Hz, 6 dB at 150 Hz, 6 dB at 300 Hz, and off. The switches are recessed and if desired, their settings can be illuminated. Stated frequency response of the LCT 340 is 20 Hz to 20 kHz and the sensitivity rating is -41 dBV for the cardioid capsule. Length is 6.3 inches, diameter is .94 inches, and weight is 7 ounces.

Last but certainly not least is a single MTP 440 DM cardioid dynamic mic. Frequency range is stated as 60 Hz to 16 kHz, with a sensitivity rating of -52 dBV. It's 6.2 inches long, 1.5 inches in diameter, and weighs 9.9 ounces.

PROTECTION & CONVENIENCE

The kit shipped to me arrived in a hard-shell, metal-edged case that is well padded with foam. The case is also now ATA-grade. There's a lift-out foam tray with compartments that house the mics, windscreens and optional capsules for the condensers, as well as the kick drum splitter cable. The bottom of the case has another foam section with cut-outs for the mic clips and drum clamps.

Five of the clips surround the mics and have an adjustable knob that can be tightened to prevent slippage. The other clip is for a standard vocal mic. All have heavy rubber tops and hard plastic bottoms with metal threaded inserts. They're quite rugged. Lewitt also includes adapters so the clips will work with 5/8-27 and 3/8-16 threads. Nice touch!

In addition, four drum clips are included for mounting directly on drum rims. They're made from a tough plas-

tic and allow position adjustment. They should work well with all standard drum set rims except wooden ones.

INITIAL IMPRESSIONS

With everything unwrapped it was time to head over to the bench. The first mic I picked up was the DTP 640 REX – big and solid with a built-in stand mount. I really like the choice between dynamic and condenser elements and the ability to blend them together. Between the EFR settings and the two elements, I was able to dial in fantastic kick sounds.

Next up were the DTP 340 TTs. At under 4 inches long, they fit anywhere on a drum kit or percussion setup. Listening on headphones, I tried them on a variety of different toms, congas, bongos, in addition to a djembe. Nice tone, and the build is so solid that I'd have no worries about an errant drum stick strike (or hundreds).

Moving along to the LCT 340 condensers, Lewitt provided both cardioid and omnidirectional capsules to check out. The cardioid capsules add about 3/8 of an inch to the length, but other than a difference in pattern, the mics sound nearly identical. I tried a few placements, with the mics on the ride cymbal and hi-hat, as well as overheads and on a few percussion instruments.

At left, the LCT 340 condenser available with omnidirectional and cardioid capsules (or just cardioid). At right, inside the dual-element capsule design of the DTP 640 REX.

The Beat Kit Pro 7 is supplied in a multi-level, durable case.

I also recorded with them in an X/Y configuration and with the omni capsule positioned as more of a room mic. With the filter and attenuation settings, I could dial the mic into any job. It has an extremely low self-noise level of 15 dB and makes a great recording mic. I thought the dual element kick mic would be my favorite but these condensers changed my mind.

Finally, the single MTP 440 DM sounded very clean, excelling on both instrument and voices. The tough windscreen can take stick hits and still look like new.

IN THE REAL WORLD

We first used the mics on a kit for a live music video shoot at the shop. It proved very easy to dial in great kick sound with the dual-element DTP 640 REX, and snare and toms were excellent with the DTP 340 TT dynamics. The package was completed with the MTP 440 on hi-hat and the LCT 340 condensers as overheads. The director was really impressed with how well the kit – especially the toms – was captured.

Next, we were working with a drummer at a local show with a mic endorsement from a different company, but he consented to letting us place the DTP 640 REX inside his kick where it couldn't be seen. During sound check we compared his kick mic with ours, and it wasn't even close. Unanimous decision, Lewitt.

This was followed by work with a jazz trio at a corporate reception. The drummer had an 18-inch kick with no hole in the front head, so we tried the DTP 640 REX on both the batter and resonant sides of the drum, settling on a placement near the pedal on the batter side. Using the condenser element only, a full sound was attained.

In addition, we put the MTP 440 on the snare to catch the brush work, and placed the LCT 340s as overheads to capture the rest of the kit and cymbals. We also tried a DTP 340 TT on the bass player's tiny tube amp to add a bit of character along with the DI coming right off his electric 5-string. It sounded so good that I turned off the DI and just fed the mic into the PA.

The Lewitt Beat Kit Pro 7 excelled at everything we tried. If you're looking for a first-rate drum package, this one is tough to beat. And if you're not in the market for an entire package, check out the individual mics. You won't be disappointed.

Note: Lewitt microphones are available in the U.S. from American Music And Sound (www.americanmusicandsound.com).

U.S. MSRP: $1,999.99; price of kit with cardioid capsules only for the LCT 340 mics: $1,599.99 ■

Senior contributing editor CRAIG LEERMAN *is the owner of Tech Works, a production company based in Las Vegas.*

Compact Line Arrays

Light in footprint, heavy in utility. ***by Live Sound Staff***

COMPACT LINE ARRAYS are those we've defined as having low-frequency drivers measuring 8 inches or smaller. Array modules in this genre offer a relatively small footprint in terms of size, weight and cost, yet they are capable of delivering significant output. They're conveniently portable due to the size/weight factor, and are suitable for a range of fixed installations as well.

Compact arrays present a scalable solution – a single unit will provide main coverage to a relatively small space, and the addition of more loudspeakers easily expands coverage capabilities. For dynamic full-range music presentation, arrays are usually accompanied by at least one subwoofer, many of them designed to fit seamlessly within a flown array structure.

Many manufacturers also engineer line array modules of various sizes to work together. Most commonly, we see compact modules at the bottom of larger arrays to supply front fill reinforcement at concerts, festivals and other large-scale events, and they can also be placed on the stage lip to provide low-profile front and near fill. Another application is side fill in tandem with larger main arrays.

Flexibility with rigging continues to evolve, providing added array structure options. Compact line arrays also present an increasingly popular approach of groundstacking as mains capable of satisfying the requirements of smaller applications without the need for rigging infrastructure.

The majority of compact line arrays are available with dedicated amplification and sophisticated DSP packages, either onboard or separately rack-mounted. Others are designed to work with a range of amplification and processing devices, and some companies offer a choice of either approach. Most recently, a number of models are now equipped with proprietary and/or Dante networking capability.

An ever-expanding selection of line array tools can only serve to enhance the craft. The challenge is knowing what's available and being able to quickly differentiate them, at least from a specification standpoint. And that's the point of Real World Gear – enjoy this look at a wide range of options from around the industry.

Adamson Systems SpekTrix
www.adamsonsystems.com

Configuration: 3-way
LF: 1 x 8-inch Kevlar neodymium cone driver
MF: 1 x 8-inch Kevlar neodymium cone driver
HF: 1 x 1.4-inch compression driver
Frequency Response: 100 Hz - 18 kHz
Dispersion: 120 (h) x 5 (v) degrees
Rigging Angles: Adjustable at 6 positions of splay
Power: LF & MF (each): 250 watts AES, 1000 watts peak; HF: 110 watts AES, 440 watts peak
Weight: 62 pounds
Size: 8.6 (h) x 27.9 (w) x 18.9 (d) inches

EAW KF720
www.eaw.com

Configuration: 3-way
LF: 2 x 6-inch sealed cone drivers
MF: 2x 6-inch sealed cone drivers
HF: 6 x 1-inch dome tweeters (both MF and HF feed horn-loaded with CSA Aperture)
Frequency Response: 75 Hz - 21 kHz
Dispersion: 110 (h) x 12 (v) degrees
Rigging Angles: Adjustable -- 0, 3, 6, 9 and 12 degrees
Power: Biamplified; LF - 450 watts, MF/HF - 250 watts (both ratings 16 ohms)
Weight: 43.6 pounds
Size: 9.4 (h) x 24 (w) x 14.3 (d) inches

Martin Audio MLA Mini
www.martin-audio.com

Configuration: 2-way (cellular drive)
LF: 2 x 6.5-inch neodymium cone drivers
HF: 3 x 1.4-inch neodymium compression drivers on constant-directivity waveguide
Frequency Response: 76 Hz - 18 kHz
Dispersion: 100 (h at - 6 dB) x 10 (v) degrees
Crossover: 1.2 kHz (proprietary FIR filtering)
Rigging Angles: Vertical coverage can be fine-tuned electronically
Power: Self-powered (class D, 9 channels), multi-channel DSP
Weight: 30.4 pounds
Size: 8.3 (h) x 19.7 (w) x 14.8 (d) inches

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With its unobtrusive cabinet design, compact dimensions, high power and exemplary directivity performance, the T10 loudspeaker is a flexible solution for speech and music reproduction in small to medium size applications, including theaters, churches, clubs and much more.

A unique setup combining a rotatable waveguide with horn and an acoustic lens enables the T10 to adapt from line to point source mode simply by rotating the horn through apertures at the cabinet sides. As a vertical line source the T10 provides 90-degree horizontal dispersion maintained down to approximately 600 Hz, while the integrated lens in the front grill widens the HF dispersion in line array mode to 105 degrees. When the loudspeaker is used upright as a point source, the lens curves the wavefront of the line source, providing a 90 x 35-degree dispersion pattern.

Differing only in rigging hardware, Ti10L and Ti10P are installation variants of the T10, providing permanent line and point source solutions, respectively. All installation models can be painted or protected to suit their surroundings, with special color and weather-resistant options.

TECHNOLOGY FOCUS An innovative electroacoustic design enables the T10 to be transformed from a line array module to a high-directivity point source loudspeaker without tools or removing the front grill.

COMPANION PRODUCT

The T-SUB is an actively driven bass-reflex subwoofer with a long-excursion 15-inch driver and the same integrated rigging hardware as the T10. It can be utilized in various configurations to increase the LF headroom and extend the bandwidth of a T10 column down to 47 Hz. The installation specific Ti-SUB differs only in cabinet construction and mounting hardware.

KEY SPECS

Configuration: 2-way
LF: 2 x 6.5-inch cones neodymium cone drivers
HF: 1 x 1.4-inch-exit compression driver on rotatable waveguide
Frequency Response: 68 Hz - 18 kHz
Dispersion: 105 (h) x 15 (v) degrees or 90 x 35 degrees single point
Crossover: Internal passive
Rigging Angles: 0 to 15 degrees in 1-degree increments
Power: d&b amplification (D6, D12, D20, D80, 10D, 30D)
Weight: 24 pounds
Size: 7.7 (h) x 18.5 (w) x 11.8 (d) inches

Meyer Sound M'elodie

www.meyersound.com

Configuration: 3-way
LF/MF: 2 x 8-inch cones (neodymium)
HF: 1 x 1.2-inch-exit driver with REM (neodymium)
Frequency Response: 76 Hz - 16 kHz (± 4 dB)
Dispersion: 100 (h) x 11 (v) degrees
Crossover: 320 Hz and 1.1 kHz
Rigging Angles: 0 to 11 degrees, 1-degree increments
Power: Self-powered, 1,275 watts tri-amped; DSP
Weight: 62 pounds
Size: 9.2 (h) x 28.5 (w) x 12.8 (d) inches

Renkus-Heinz IC²

www.renkus-heinz.com

Configuration: 2-way
LF: 4 x 8-inch neodymium cone drivers
HF: 4 x 1-inch compression drivers
Frequency Response: 60 Hz - 20 kHz
Dispersion: 120 or 90 (h) degrees; adjustable vertical from 10 to 80 degrees per beam
Rigging Angles: Digitally steerable; adjustable from -30 to +30 degrees
Power: Self-powered (class D, 8 channels), multi-channel DSP
Weight: 75 pounds
Size: 18.5 (h) x 28.5 (w) x 11.5 (d) inches

D.A.S. Audio AERO 8A

www.dasaudio.com

Configuration: 2-way
LF: 1 x D.A.S. 8MN 8-inch neodymium cone driver
HF: 1 x D.A.S. M-60N 1.75-inch neodymium driver
Frequency Response: 95 Hz - 20 kHz
Dispersion: 90 degrees nominal
Rigging Angles: Adjustable in 1-degree increments from 0 - 10 degrees
Power: Self-powered; LF - 250 watts, HF - 100 watts; DSP
Weight: 39.6 pounds
Size: 9.6 (h) x 20.7 (w) x 14 (d) inches

L-Acoustics Kiva

www.l-acoustics.com

The Kiva-SB15m combines an ultra-compact WST enclosure and a complementary subwoofer. It delivers remarkable acoustic properties in an unobtrusive and lightweight package and is suited to various long-throw install and rental applications. Utilizing the WST line source technology, Kiva offers clarity, precision and a unique sensation of proximity for an incomparable listening experience.

Kiva delivers a smooth and controlled horizontal directivity pattern with a homogeneous tonal balance, a feature particularly valuable since most of a given audience is located off-axis. With its variable curvature, a Kiva line source allows matching any audience geometry.

In stand-alone configuration, Kiva is suited to distributed applications, as a main or complementary system in an ultra-compact size and low weight package. The LF resources are fully scalable by adjusting the number of SB15m subwoofers for FOH applications requiring extended bandwidth and LF impact.

TECHNOLOGY FOCUS Wavefront Sculpture Technology (DOSC waveguide) morphs the spherical wavefront of the HF driver into a cylindrical, isophasic wave. Coplanar symmetry provides a coherent wavefront over the entire horizontal coverage at all frequencies. This behaves as if the sound was radiated by a single, continuous and articulated ribbon. Array Morphing EQ adjusts the tonal balance of the system to reach a reference curve or ensure consistency of the system sonic signature with multiple arrays of differing size.

TOURS & INSTALLS

Skirball Center, CA ▮ Universal Studios – King Kong attraction, CA ▮ Getty Villa – Barbara & Lawrence Fleischman Theatre, CA ▮ LDS Conference Center, UT ▮ Williamette Christian Church, OR ▮ Deer Park PAC, TX ▮ Grace Evangelical Church, TN ▮ Eagan High School, MN ▮ Raleigh First Assembly Church, NC ▮ Richard & Karen Carpenter PAC, CA ▮ Covenant Church Life Center, TX

KEY SPECS

Configuration: 2-way
LF: 2 x 6.5-inch neodymium cone drivers
HF: 1 x 1.5-inch compression driver
Frequency Response: 80 Hz - 20 kHz
Dispersion: 100 x 15 degrees maximum inter-element angle
Rigging Angles: 0 to 15 degrees, 1-degree increments from 0 to 5 degrees, and 2.5-degree increments beyond 5 degrees
Power: L-Acoustics LA4/LA8 amplified controller with L-DRIVE circuit
Weight: 28.7 pounds
Size: 6.9 (h) x 20.5 (w) x 14.1 (d) inches

QSC WideLine-8 WL3082

www.qsc.com

Configuration: 3-way
LF/MF: Dual 8-inch neodymium cone drivers
HF: 1.4-inch-exit neodymium compression driver
Frequency Response: 68 Hz - 18 kHz
Dispersion: 140 x 10 degrees
Rigging Angles: Adjustable in 1-degree increments from 0 - 10 degrees
Power: Tri-amped; LF - 250 watts, MF - 250 watts, HF - 85 watts
Weight: 38 pounds
Size: 9 (h) x 20 (w) x 15 (d) inches

WorxAudio Technologies TrueLine V5

www.worxaudio.com

Configuration: 2-way
LF: 2 x 5-inch cones (neodymium)
HF: 1 x 1-inch-exit driver (neodymium), coupled to a stabilized proprietary Flat-Wave Former
Frequency Response: 52 Hz – 20 kHz (-10 dB)
Dispersion: 120 (h) x 10 (v) degrees
Crossover: 90 Hz
Rigging Angles: Adjustable in 1-degree increments
Power: WorxAudio amplification recommended; LF - 1,000 watts, HF - 300 watts, both peak
Weight: 30 pounds
Size: 7.2 (h) x 18 (w) x 13.4 (d) inches

RCF TTL31A-II

http://rcf-usa.com

Configuration: 2-way
LF: 1 x 8-inch neodymium cone drivers, horn-loaded
HF: 3 x 1-inch neodymium compression drivers in horn-array configuration
Frequency Response: 60 Hz - 20 kHz
Dispersion: 100 (h) x 15 (v) degrees
Rigging Angles: Adjustable, 0 to 15 degrees
Power: Self-powered, 750 watts total; DSP
Weight: 49.5 pounds
Size: 11.8 (h) x 21.2 (w) x 18.2 (d) inches

NEXO GEO M620

www.yamahaca.com

The GEO M620 is a full-range unit for stand-alone, curved array or line array applications. Extremely compact in size at 7.4 x 14.6 x 10.2 inches (h x w x d), each M620 module punches well above its weight of less than 22 pounds.

Using a NEXO-designed, long-excursion, high-efficiency 6.5-inch LF driver and a 1-inch throat driver on a BEA/FEA optimized HR Wavesource, the M620 delivers a frequency response of 80 Hz to 19 kHz (±3 dB), with nominal peak SPL of 127 dB. HF dispersion is 80 or 120 degrees horizontal, with 20-degree vertical coverage, 0- to 20-degree splay when arrayed.

Using NEXO's HRW patented waveguide for optimum HF coupling between elements, the M620 performs in a variety of configurations, facilitated by a fully integrated 3-point rigging system. The M620 is joined by the M6B low-frequency module with the same dimensions.

TECHNOLOGY FOCUS A Directivity Phase Device (DPD) on each cone driver extends the upper frequency limit for file-source coupling between adjacent loudspeakers. As a result, the 6.5-inch cones coherently couple as if there were twice as many 3.25-inch cones mounted at half the physical distance.

COMPANION PRODUCT The GEO M6B low- and mid-frequency partner module shares the same physical footprint as the M620, allowing the cabinets to be arrayed together in the same column. It incorporates a flare-shaped port tube to increase LF efficiency and linearity at high power, providing a usable range of 70 Hz to 1 kHz (- 6 dB).

KEY SPECS

Configuration: 2-way
LF/MF: 1 x 6.5-inch cone
HF: 1 x 1-inch-throat driver on optimized HR Wavesource
Frequency Response: 80 Hz - 19 kHz
Dispersion: 80 or 120 (h) x 20 (v) degrees
Rigging: Proprietary NEXOSkeleton rigging system; can also be groundstacked or pole-mounted on subs
Power: NEXO NXAMP amplifier/controller recommended (1 unit can drive up to 12 cabinets)
Weight: 21.4 pounds
Size: 7.4 (h) x 14.6 (w) x 10.2 (d) inches

Outline MINI-COM.P.A.S.S. iMODE

www.outlinearray.com

Configuration: 2-way
LF: Quad 5-inch, Double Parabolic Reflective Wave Guide loaded
HF: Dual 1.75-inch, Double Parabolic Reflective Wave Guide loaded
Frequency Response: 100 Hz - 20 kHz
Dispersion: Asymmetrical horizontal directivity - steps of 15 degrees can be set between 60 to 150 degrees manually; vertical depends on array height and curvature
Rigging Angles: 0 to 7.5 degrees, .5-degree increments
Power: Self-powered, 2 x 500 watts; DSP
Weight: 52.9 pounds
Size: 13.8 (h) x 21.7 (w) x 16.4 (d) inches

FBT Mitus 206LA

www.fbt.it

Configuration: 2-way
LF: 2 x 6.5-inch neodymium cone drivers
HF: 1 x 1.4-inch neodymium compression driver on a waveguide
Frequency Response: 68 Hz - 20 kHz
Dispersion: 100 (h) x 10 (v) degrees
Rigging Angles: Adjustable in 2-degree increments from 0 to 10 degrees
Power: Self-powered (class D), LF - 600 watts, HF - 300 watts; DSP
Weight: 30.8 pounds
Size: 7.5 (h) x 22.6 (w) x 15 (d) inches

Clair Brothers i208

www.clairbrothers.com

Configuration: 3-way
LF: 1 x 8-inch cone driver
LMF: 1 x 8-inch cone driver
HF: 1 x 1.4-inch compression driver
Frequency Response: 60 Hz - 20 kHz
Dispersion: 120 (h) x 10 (v) degrees
Rigging Angles: Adjustable at 0, 2.5, 5, 7.5 or 10-degree increments
Power: LF & LMF (each): 400 watts program, 800 watts peak; HF: 220 watts program, 440 watts peak
Weight: 62 pounds
Size: 9.2 (h) x 28.9 (w) x 23.9 (d) inches

VUE Audiotechnik al-4

www.vueaudio.com

The al-Class al-4 line array opens up a whole new world of possibilities by utilizing advanced technologies to achieve unparalleled performance by an ultra-compact and extremely scalable package. The al-4 element utilizes an M-T-M configuration for symmetrical horizontal consistency with two 4-inch Kevlar cone neodymium woofers flanking a precision-engineered, 1-inch-exit neodymium compression driver featuring a Truextent beryllium diaphragm.

The al-4 is paired with system optimized V4 Systems Engines, which provide amplification, DSP, systemVUE control, and now, Dante compatibility. Each al-4 "block" includes eight al-4 acoustic elements and a single V4, scalable by adding or removing elements or combining multiple blocks.

The al-4 system brings pristine sound quality and performance to a varied range of applications. Matt Kornick, systems tech for Sound Image who worked with the al-4 on the Jason Mraz Tour 2015 that's pictured above, states, "Both ET (FOH engineer) and I were very impressed with the power and clarity in such a travel friendly package."

TECHNOLOGY FOCUS Truextent beryllium diaphragm technology allows the compression driver to deliver dramatic improvements in HF extension and response linearity. The companion V4 Systems Engine is a rack-mount amp and processor that delivers power for up to 8 acoustic elements as well as 64-bit digital processing, SystemVUE networking, and compatibility with VUEPoint beam steering.

OF NOTE Optional flying, ground stack and pole-mount accessories are available. The al-4 functions more like full-scale line array systems, with the vertical coverage limited only by the number of elements in the array rather than by the physical limitations of the cabinet design. This flexibility allows al-4 rental inventory to serve a variety of uses.

KEY SPECIFICATIONS

Configuration: 2-way
LF: 2 x 4-inch Kevlar neodymium cone drivers
HF: 1 x 1-inch beryllium diaphragm compression driver
Frequency Response: 90 Hz - 20 kHz (+/- 2.5 dB)
Dispersion: 90 (h) x 10 (v) degrees
Rigging Angles: 0, 1, 2.5, 3.5, 5, 6 and 7.5 degrees between array elements
Power: V4 Systems Engine (power, DSP, networking)
Weight: 19 pounds
Size: 10.3 (h) x 19.9 (w) x 5.5 (d) inches

K-array KH15

www.k-array.com

Configuration: 2-way (cellular drive)
LF: 2 x 6.5-inch neodymium cone drivers
HF: 3 x 1.4-inch neodymium compression drivers on constant-directivity waveguide
Frequency Response: 76 Hz - 18 kHz
Dispersion: 100 (h at - 6 dB) x 10 (v) degrees
Crossover: 1.2 kHz (proprietary FIR filtering)
Rigging Angles: Vertical coverage can be fine-tuned electronically
Power: Self-powered (class D, 9 channels), multi-channel DSP
Weight: 30.4 pounds
Size: 8.3 (h) x 19.7 (w) x 14.8 (d) inches

Electro-Voice XLD281

www.electrovoice.com

Configuration: 3-way
LF: 1 x 8-inch neodymium cone (EV DVN2080)
MF: 1 x 8-inch neodymium cone (EV DVN2080)
HF: 2 x 2-inch voice coil neodymium drivers (EV ND2S-8)
Frequency Response: 60 Hz - 20 kHz
Dispersion: 120 x 10 degrees (90 degrees horizontal available – XLD291)
Rigging Angles: 1-degree increments
Power: Biamp and triamp modes (200/200/80 watts)
Weight: 48 pounds
Size: 9.9 (h) x 28.6 (w) x 14.5 (d) inches

Alcons Audio LR7

www.alconsaudio.com

Configuration: 2-way
LF: 1 x 6.5-inch neodymium cone
HF: 1 x RBN401 4-inch pro-ribbon driver on a proprietary "Morpher" lens
Frequency Response: 74 Hz - 20 kHz
Dispersion: 120 or 90 (h) x 15 (v) degrees
Rigging Angles: 0 to 15 degrees in 1-degree steps
Power: Alcons amplifier/controller recommended
Weight: 17.6 pounds
Size: 6.9 (h) x 14.1 (w) x 10.7 (d) inches

Turbosound Flashline TFS-550H

www.turbosound.com

The Flashline TFS-550H is a compact yet powerful 3-way, bi-amped line array designed for a wide range of medium-scale touring and installed applications. Each module utilizes dual high-excursion 6.5-inch neodymium cone drivers with compression loading, along with a high-efficiency 4-inch neodymium Polyhorn MF driver and a proprietary 1-inch neodymium HF compression driver on a Dendritic horn.

The cabinet is symmetrically loaded to create coplanar symmetry with smooth and consistent horizontal and vertical coverage, the cylindrical domain equivalent of a coaxial arrangement for individual spherical sources. In addition, the precise positioning of the neodymium drive units saves space within the enclosure and enables a very compact footprint.

Recommended amplification is provided in the form of advanced, powerful 10000DP 4-channel amplifiers incorporating both Lake processing and Dante networking.

TECHNOLOGY FOCUS Utilizing Turbosound technologies deployed in the larger Flashline and Flex Array systems, the HF Dendritic waveguide has multiple hornlets with identical path lengths for a flat constant-phase wavefront with a horizontal dispersion pattern of 110 degrees. When coupled to the horn, the waveguide shapes the spherical wave of the compression driver into the cylindrical wavefront – a key component of line source array behavior.

OF NOTE The touring flybar provides multiple pick-up points located along a central spine, and allows arrays of mid/high enclosures, bass cabinets, or a combination of both types to be flown in a visually unobtrusive array. A further range of rigging hardware is available for pole mounting, ground stacking and truss mounting.

KEY SPECS

Configuration: 3-way
LF: 2 x 6.5-inch neodymium cone drivers
MF: 1 x 4-inch neodymium cone driver
HF: 1 x 1-inch compression driver
Frequency Response: 80 Hz - 20 kHz
Dispersion: 110 (h) x 8 (v) degrees
Rigging Angles: 0 to 12 degrees in 1-degree increments
Power: 10000DP amplification recommended (DSP, networking); LF: 400 watts peak, MF/HF: 240 watts peak
Weight: 29.5 pounds
Size: 7.6 (h) x 21.7 (w) x 15.6 (d) inches

dB Technologies DVA M2P

http://dbtechnologies.com

Configuration: 2-way
LF: 2 x 6.5-inch neodymium cone drivers
HF: 2 x 1-inch neodymium compression drivers
Frequency Response: 68 Hz - 20 kHz
Dispersion: 90 (h) x 15 (v) degrees
Rigging Angles: Adjustable, angles include 0, - 1.5, - 3, - 4.5, - 6, - 8, - 10, - 12.5, and - 15 degrees
Power: 150 watts RMS, 300 watts peak
Weight: 15.7 pounds
Size: 7.5 (h) x 18.1 (w) x 13.6 (d) inches

Soundbridge XYON 7108XY

www.soundbridge.com

Configuration: 2-way
LF: 1 x 8-inch cone driver with QUAD-One focusing
HF: 1 x EXO-LD co-ax driver with proprietary Q-Drive WaveShaper
Frequency response: 80 Hz - 22 kHz
Dispersion: 80 or 120 (h) x 10 (v) degrees
Rigging Angles: Adjustable in 0 to 12 degrees in 1-degree increments
Power: LF - 200 watts AES, 800 watts peak; HF - 250 watts AES, 1,000 watts peak
Weight: 65 pounds
Size: 8.7 (h) x 26.7 (w) x 20.2 (d) inches

Alto Professional TOURMAX SXA28P

www.altoproaudio.com

Configuration: 2-way
LF: 2 x 8-inch cone drivers
HF: 2 x 1.4-inch neodymium compression drivers
Frequency Response: 77 Hz - 18 kHz
Dispersion: 100 x 7.5 degrees
Rigging Angles: Adjustable at -20, 0, +20 degrees
Power: 800 watts program, 400 watts continuous
Weight: 48.1 pounds
Size: 10.7 (h) x 24.4 (w) x 16.7 (d) inches

JBL VERTEC VT4887ADP-DA

www.jblpro.com

The VT4887ADP-DA is a compact, powered 3-way line array designed to deliver high-quality reinforcement of music and speech in concert audio, corporate A/V, and theatrical presentations of all types for both portable users and performance venues.

VT4887ADP-DA elements incorporate advanced technology components, including JBL Differential Drive, dual voice coil drivers with neodymium magnet structures, and Direct Cooled cone transducers for low weight and high output. New 2268H-1 8-inch LF drivers further enhance performance and extend LF response.

Onboard JBL DrivePack technology, now with new V5 DSP, delivers superior audio quality. Further, robust high-efficiency Class-I power is matched to the components, joined by comprehensive onboard BSS Omnidrive HD DSP functionality that provides precision band-pass filters, limiting, pre-equalization filters and automatic self-test functions.

TECHNOLOGY FOCUS LevelMax multi-state limiters provide electrical, mechanical and thermal protection; the modular bay that's fitted with the DPDA digital audio input module also accepts dbx module (non-networked, analog) or optional Crown networked modules; control of all key parameters can be attained via Harman HiQnet System Architect software.

OF NOTE New V5 DSP technology delivers superior horizontal coverage and refines tonal balance through the use of sophisticated multi-stage limiting and phase linearization.

KEY SPECIFICATIONS

Configuration: 3-way
LF: 2 x 8-inch Differential Drive neodymium cone drivers
MF: 4 x 4-inch neodymium cone drivers
HF: 2 x 1-inch neodymium compression drivers
Frequency Response: 55 Hz - 22 kHz
Dispersion: 100 degrees horizontal
Rigging Angles: Selectable splay increments between 0 to 15
Power: Self-powered (DSP/networking) Total power is 1100 watts continues, 2200 watts peak
Weight: 87.5 pounds
Size: 11 (h) x 31 (w) x 22.1 (d) inches

Biema CAVA

www.biema.us

Configuration: 2-way
LF: 2 x 8-in cone drivers
HF: 2 x 1-inch compression drivers
Frequency Response: 100 Hz - 18 kHz
Dispersion: 90 (h) x 8 (v) degrees
Rigging Angles: 0 to 8 degrees, adjustable in 1-degree increments
Power: Self-powered (class H), 600 watts; DSP
Weight: 96 pounds
Size: 10.4 (h) x 31 (w) x 24.8 (d) inches

OmniSistem Beta 3 – R6a

http://omnisistem.com

Configuration: 3-way
LF: 2 x 6.5-inch cone drivers
MF: 1 x 6.5-inch cone driver
HF: 1 x ribbon driver
Frequency Response: 40 Hz to 20 kHz
Dispersion: 90 (h) x 10 (v) degrees
Rigging Angles: Adjustable in 1-degree increments
Power: Self-powered (DSP)
Weight: 38.5 pounds
Size: 8.3 (h) x 29 (w) x 16.5 (d) inches

SLS Audio LS8800

www.slsaudio.com

Configuration: 2-way
LF: 2 x 8-inch cone drivers
HF: 1 x PRD1000 ribbon driver
Frequency Response: 72 Hz to 20 kHz
Dispersion: 110-degree horizontal
Rigging Angles: 1 to 10 degrees
Power: Biamp; LF - 500 watts; HF - 60 watts
Weight: 60 pounds
Size: 9.6 (h) x 28.3 (w) x 13 (d) inches

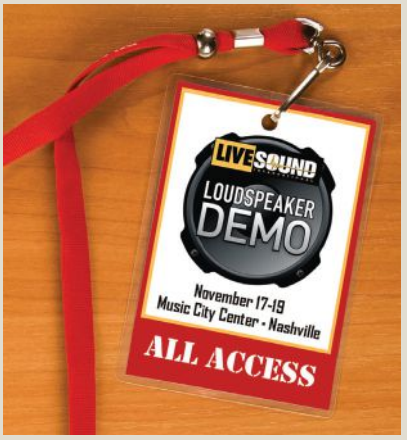
LSI Loudspeaker Demo Coming To Nashville

The next Live Sound International Loudspeaker Demo is slated for November 17-19 in Nashville at the Music City Center. All pro audio and church sound personnel are invited to attend this free event.

Dedicated demo sessions focusing on portable loudspeaker systems will be presented for the first time, joining the popular compact system sessions. An additional demo session has been added on the evening of November 17 beginning at 6 pm, created for audio professionals who may not be able to attend the daytime sessions.

The event presents a unique controlled environment offering side-by-side listening opportunities to evaluate top loudspeaker systems from more than a dozen manufacturers. The list includes:

- Alcons Audio
- Bose Professional
- Cerwin-Vega
- Danley Sound Labs
- EAW
- Electro-Voice
- L-Acoustics
- Martin Audio
- RCF USA
- Renkus-Heinz
- Tannoy
- Turbosound
- VUE Audiotechnik
- WorxAudio/PreSonus



Online registration, available via ProSoundWeb, is simple. Mark your calendars now to make sure you don't miss this one-of-a-kind event.

PEOPLE

LOUD Technologies has named **Larry Pendergrass** as its senior vice president of engineering of the Music Gear Group, which includes **Mackie**. Based at company headquarters in Woodinville, WA, he brings more than 30 years of experience in the tech industry, holding positions at companies such as Hewlett-Packard and Tektronix, among others.

Most recently, Pendergrass served as an executive management consultant, focused on strategy development, project portfolio management, engineering operations, M&A, and executive leadership development. His expertise includes work in electronics, optics, acoustics, and magnetics.

Brice Helman has joined **Professional Wireless Systems (PWS)** as a senior application engineer, where he is responsible for project-specific design and development, including software development, design services, drawing packages, mock-ups and high-fidelity prototypes.

Helman will also support and enhance the company's existing software products and in-house software tools, including its Intermodulation Analysis Software System (IAS). Most recently he worked for Funa International, where he served as design engineer, AutoCAD draftsman and programmer in designing, engineering and installing advanced fiber networks, DSP systems, show control, and low-voltage systems for entertainment venues worldwide.

Hans-Peter Nüdling has been named to the senior management team at **d&b audiotechnik**, serving as chief sales officer. He's responsible for global sales and services, bringing more than 25 years of sales, business development, electronics and technology experience to the position. Most recently, Nüdling was CEO of two technology businesses in electronics and medical applications

"Based on Hans-Peter's international experience, excellent sales capabilities and technology expertise, I'm confident that he will significantly contribute to our global growth strategy," says **Amnon Harman**, CEO of d&b."He will play an important role in expanding our business in new market segments, both in live entertainment as well as in the installation business."

Shure director of global credit services **Jay Snyder** has been named the Robert M. Healy Credit Executive of the Year by the National Association of Credit Management (NACM). Snyder is an active member of the association and currently sits on its National Board of Directors.

At Shure, Snyder has achieved all-time metrics in credit by forming effective relationships across the company's three business units and with customers, while leading business process improvement teams that work toward achieving strategic goals. Snyder was nominated for the award by Shure senior vice president and chief financial officer **Jim Ahlborn**, another NACM member.

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COMPANIES

The **Roland Professional A/V Division** has named **HWPco** as its new rep firm in Tennessee, Alabama, Georgia and the Carolinas. Headquartered outside of Atlanta, HWPco is an award-winning firm experienced in serving resellers, systems integrators, contractors, architects, engineers, designers and consultants in the southeastern U.S.

HWPco principals **Trey Gunter** and **Marcus Myers** note that they're excited to be representing Roland's pro AV line at a time when new products like the M-5000 digital console and V-1200HD switcher are hitting the market. (The HWPco team is pictured above.)

Allen & Heath has named **Richard Dean Associates** as its new rep firm for the New England region as well as **Samuel K. Macdonald** (known as **SKMac**) as its new rep firm for the Mid-Atlantic states.

Both companies enjoy a long heritage serving the pro AV marketplace. SKMac was founded in 1926, while **Richard Bazirgan** and **Dean Goodwin** established Richard Dean Associates in 1975. Members of the Richard Dean Associates team are pictured above at the recent InfoComm 2015 show in Orlando.

Australia-based **RØDE Microphones** has acquired **Aphex**, noted for its range of audio signal processing equipment that incorporates various proprietary technologies, including the Aural Exciter. RØDE founder and managing director **Peter Freedman** announced the acquisition of the U.S.-based company, and he's pictured here (left) with David Wiener, chairman and CEO of DWV Entertainment, the previous owner of Aphex.

"Growing up in professional audio as I did, I've always had incredible respect for Aphex," Freedman states. "They've always been the best in the business at enhancing the recorded audio experience, and that is as true today as it was when the company was founded 40 years ago." ■

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THE POINT OF NO RETURN

Pulling back the reins to attain the desired result.

by M. Erik Matlock

THERE ARE TIMES with a live mix when we outsmart ourselves. Too many knobs turned. Too many buttons pushed. The EQ looks like a crazy BMX track. Preamps and faders are well outside of the ideal range.

Sometimes the best thing to do is zero it all out and start over.

Several years ago, I had the honor of mixing a one-night show for a band that I absolutely love. Most of my gigs were as a hired gun, working for whoever showed up. This was different.

The show was at a venue with a great house system, a really solid setup. I was brought in to mix front of house and monitors for the headliner from the same console.

For whatever reason, the band was late, which left the opening act plenty of time for sound check. The crew had set up their board in front of me, joined by an abundance of outboard gear. As soon as they started playing, it was obvious that the guy at the console was struggling to dial in the mix.

After a while, I wandered down to help him with a few things and we got it better, mostly by pushing a lot of bypass buttons and adjusting more appropriate EQ frequencies. After 10 minutes or so, he seemed OK and I went back to my world.

Once my band finally showed up, we only had a few minutes for sound check. No problem. I knew the system, these guys were pros, it went fine.

When the opening act kicked off the show, their engineer returned to frantically adjusting his mix and processors. Eventually he settled down a bit but was still too jumpy to the end.

During my set, he stood next to me and observed for quite some time, finally asking rather desperately why my mix sounded considerably better. What magic toy did I posses in my rack that he didn't? What form of sorcery was I using that he'd not yet acquired?

Nothing. Just a decent console, a few compressors and gates, one channel of reverb and one channel of delay. Two rack spaces of processors total. Plenty for an old school rock mix, stripped down with minimal EQ. The band was amazing, and the mix just fell into place. It was a spectacular night.

As delicately as possible, I mentioned that he seemed too dependent on the toys at the expense of listening to and appropriately crafting his mix. I asked (gently) if perhaps he was too concerned about the technology while losing touch with the sound – not to mention the accumulation of unnecessary, and possibly conflicting, issues from a serious tangle of patch cables and processors.

He'd reached the point of no return, which in my observation seems to happen more often to folks who mix the same group on the same system every week. There's a tendency to keep building and adding to make things "different" and "better" – and it can lead to a confusing mess. Hired guns, on the other hand, don't usually face this problem, mixing different bands with sometimes different gear every gig. They have to zero it out after every show. It's not an option.

Once, early in my career while working in a studio, I got chewed out over one aux knob that didn't make it back to absolute zero: "What if that aux brought in something we couldn't fix? What if you cost us a client?" That was basically how the chewing out went.

I didn't like the attack, but I understood the logic. We have to be in control of the mix. We don't want random weirdness to interfere with the sound. We can't become hoarders of frequencies and processors or the result is a sonic cesspool of unnecessary garbage.

The moral of the story? If you just can't seem to get the mix where you want it, don't be afraid to start over. Not five minutes before show time, but the next sound check or rehearsal. And keep firmly in mind that simple and clean is pretty amazing.

Just don't be the last person to notice when you've reached the point of no return. ■

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