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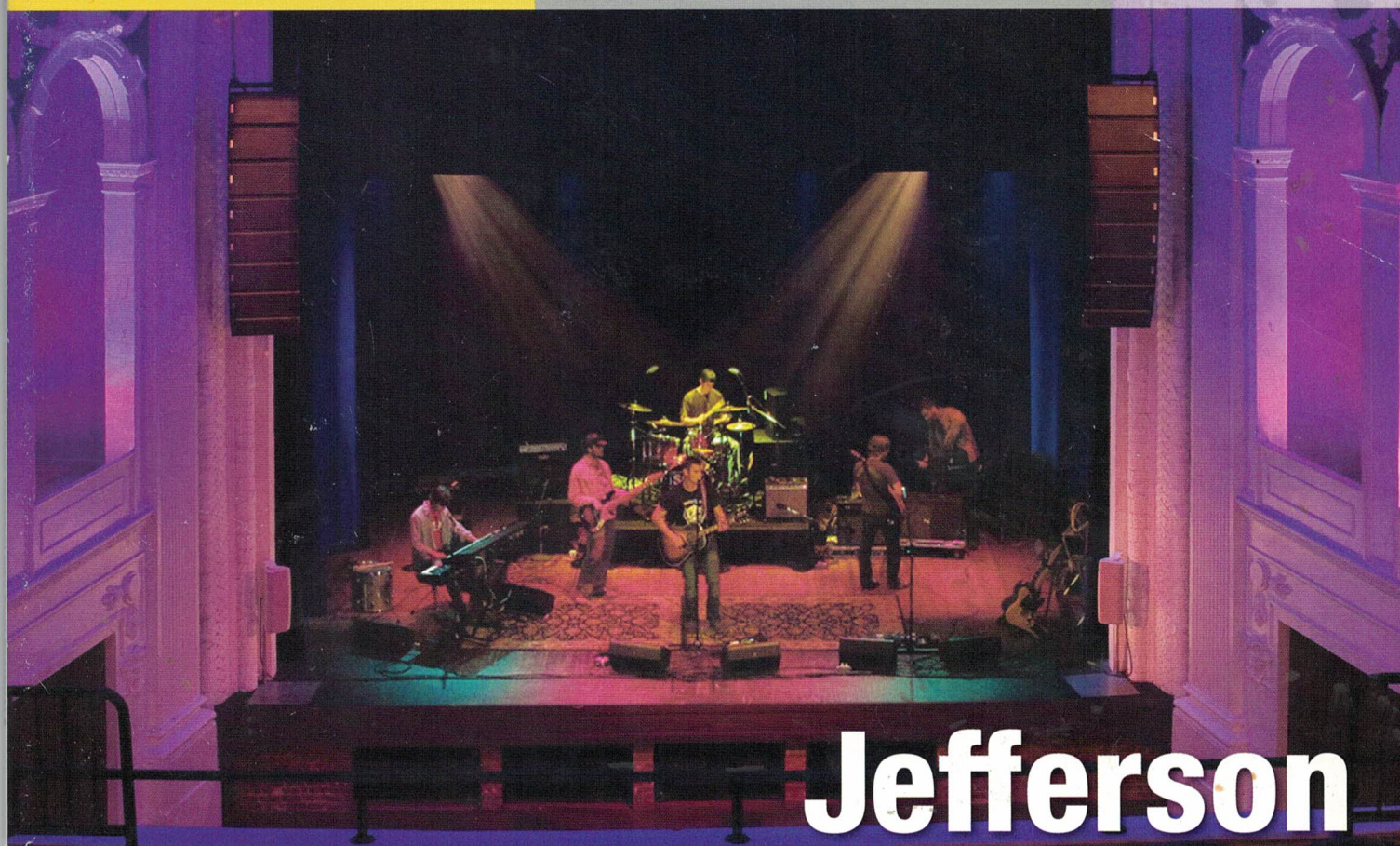

Jefferson Theater

A sound design tailored for touring professionals

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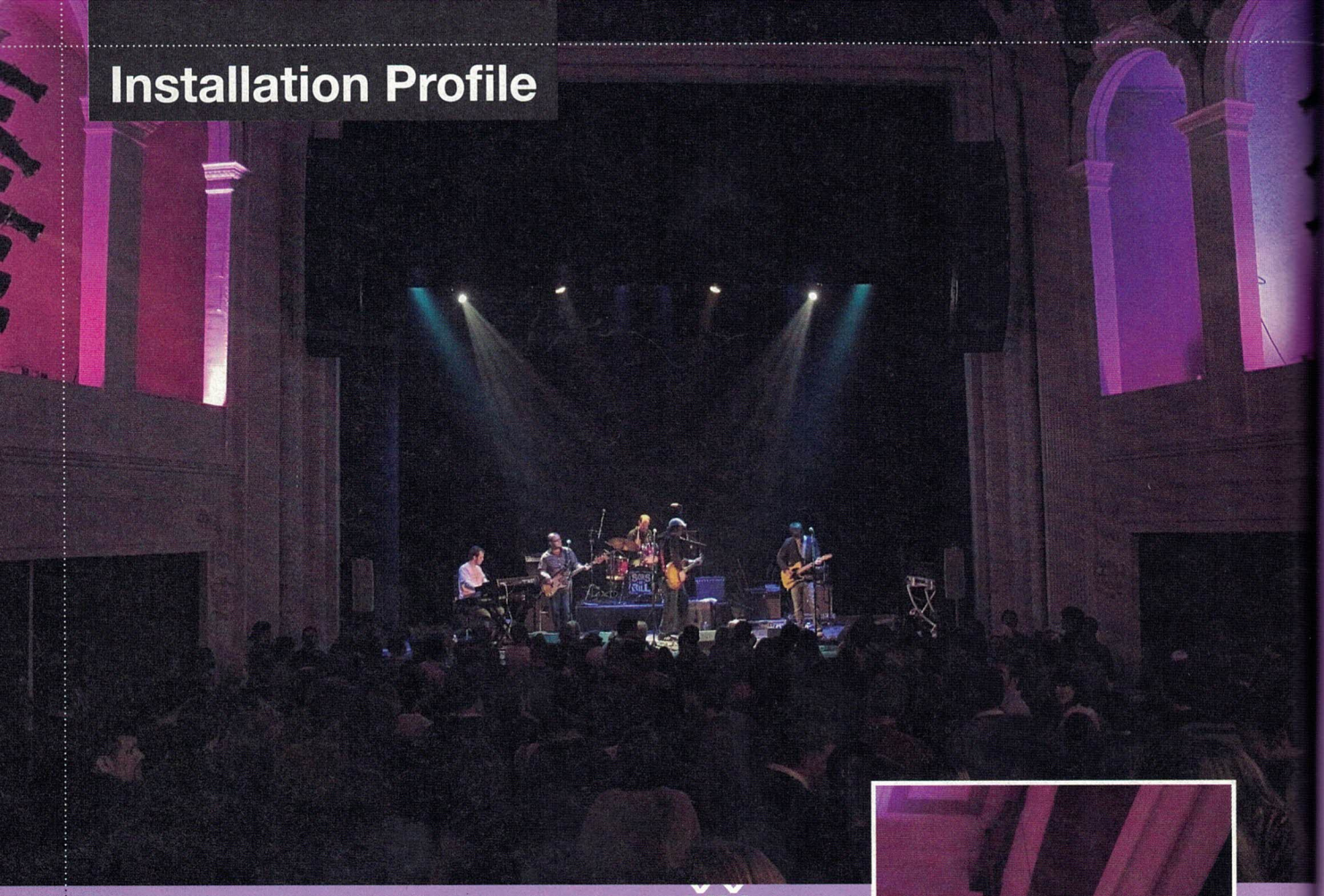


Jefferson Theater

A sound design tailored for touring professionals and musicians alike. *by Keith Clark*

The Jefferson Theater has been around for almost 100 years, and it's a safe bet that it's never sounded better thanks to a new sound design and reinforcement system to serve a steady stream of live performances by national and regional rock/pop artists.

The new incarnation of a venue that began as a host to vaudeville acts and silent movies in 1912 in downtown Charlottesville, VA is the brainchild of Coran Capshaw, who as the founder of Red Light Management manages Dave Matthews Band, Tim McGraw, Trey Anastasio, and many others.

The rejuvenated Jefferson Theater, several years in the making, is now another gem in the crown of the Charlottesville Downtown Mall, a European-style open-air city center with a host of other first-rate music venues, including the Pavilion outdoor amphitheater, the Paramount renovated classic theater, and the Southern, a 200-seat venue offering an intimate concert setting.

One of the NEXO GEO Tangent Arrays flying at the Jefferson Theater.

All of these venues have more in common than their location, incorporating sound reinforcement systems and other production elements designed and installed by Stage Sound. The Roanoke,

The underbalcony region served by heavy acoustic treatment and compact QSC loudspeakers providing tiers of delay.

VA-based pro audio company, headed by Reid Henion, also provides a host of other services such as turnkey lighting and video system packages.

Stage Sound enjoys a 20-years-plus history of collaboration on a variety of projects with Capshaw, and that was furthered with the Jefferson Theater. It was a process that took nearly five years from start to completion.

"In 2005, Coran asked me to have a look at this old rundown theater with him," Henion notes. "We sat in the seats, stood on the stage, and brainstormed what might be possible in such a space. Stage Sound was the first contractor involved. Since then, the project has seen several different teams of architects, a few consultants, and a lot of contractors.

"As with many projects, this one evolved from lots of people's differing visions for the primary uses of the space," he continues. "At one point, the theater was to be both an opera house in the summer and a bar/music venue in the winter."

That broader vision eventually became more finely focused on hosting top national and regional acts year round, with overall project management under the direction of Red Light Management Project Manager Kirby Hutto.

"This wasn't a situation where you could go in and put up a bunch of draping like you might do in a typical rock 'n' roll room."

In addition to new sound and lighting systems, the building also underwent significant renovations, including restoration of original architecture wherever possible, structural and electrical upgrades to accommodate the new systems infrastructure, new central air and heating systems, and much more.

Starting With Quiet

The performance room of the Jefferson Theater, with a total audience capacity of 800-plus, is a "tall box." A proscenium stage fronts a large main floor listening space (standing only, no seating) that measures about 50 feet wide. The floor eventually gives way to two raked, asymmetrical balconies at the back of the room. The high ceiling has some domed characteristics, and parallel wall spaces and hard reflective surfaces abound.

Further, a lot of the surfaces adjacent to the planned location of the house loudspeaker arrays at the sides of the stage proscenium are angled such that they would destroy intelligibility, particularly with respect to coverage for the first balcony. This region was a particular priority, where it was envisioned that a lot of the "audiophiles" would position themselves to sit in the raked theater seating.

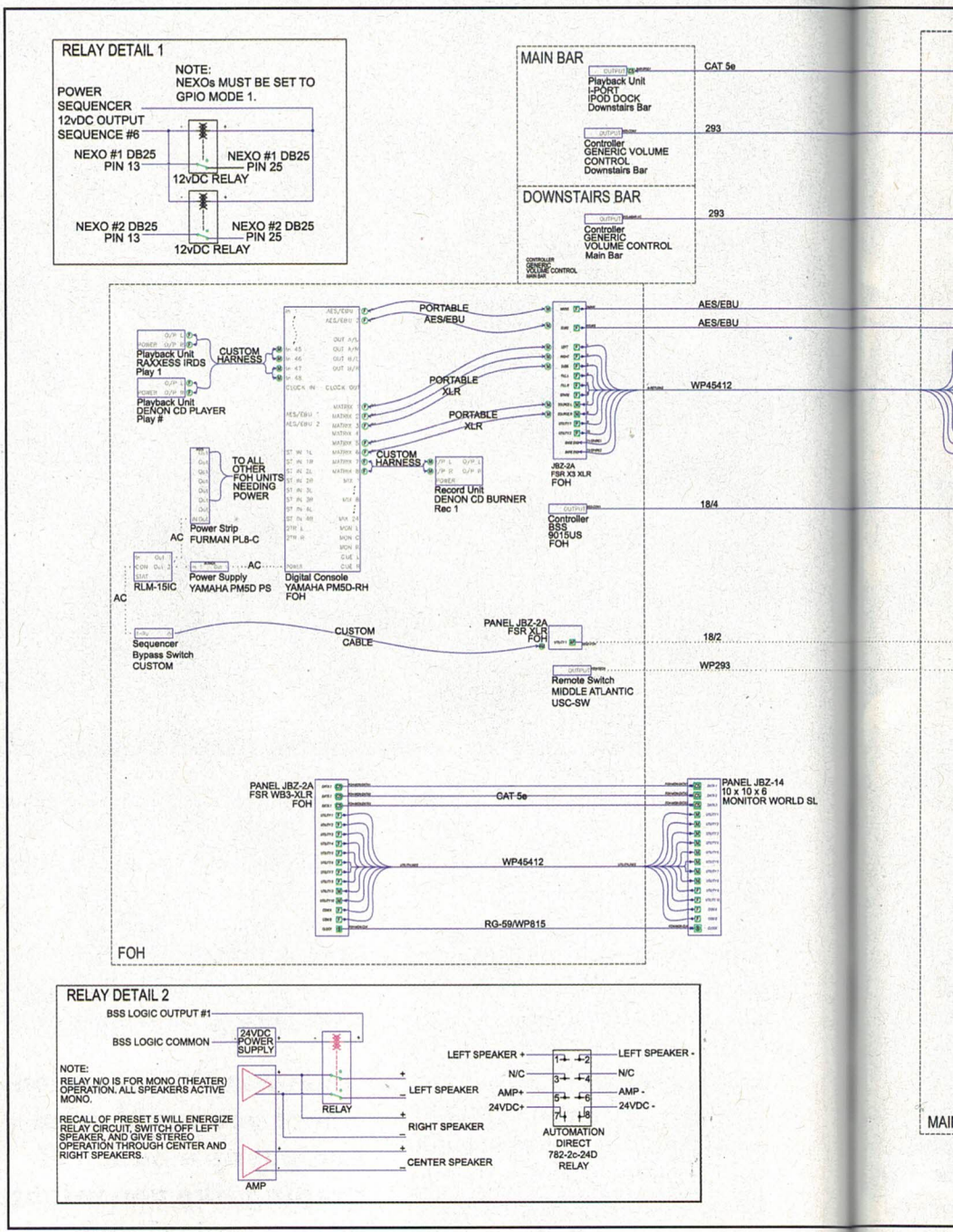
"The room was very live, acoustically, to say the least," Henion says. "We saw

a lot of problems with reflected energy, particularly in introducing a concert-scale sound reinforcement system to the space."

Given the simple charge by Capshaw to make the room "sound great," the first step of the sound design was thorough acoustic analysis, where problem areas could be diagnosed and remedies prescribed. Complicating this process was a mandate not to interfere with the room's architectural aesthetic. Acoustical panels that melded into their surroundings were deployed on certain hard wall surfaces, combined with Sonospray and SonoKrete spray-applied acoustic treatment that is indistinguishable from plaster. Heavy soft goods were also used to "line" the stage house to "tighten up" the sound at the source.

Another issue was the large face of the first balcony, which had the potential to "slap back" energy to the stage and the main floor listening area to a significant degree. Initially the plan was to dampen this surface with acoustic panels, but aesthetic concerns won out and the decision was made to repair and refurbish the original ornate plaster work, so reducing the impact of unwanted reflections would need to be addressed in the system design. Further, certain areas, in particular the space spanning back under the first balcony, were "de-coupled" from the rest of the room and needed special attention if they were to sound and feel like they were in the same acoustic space.

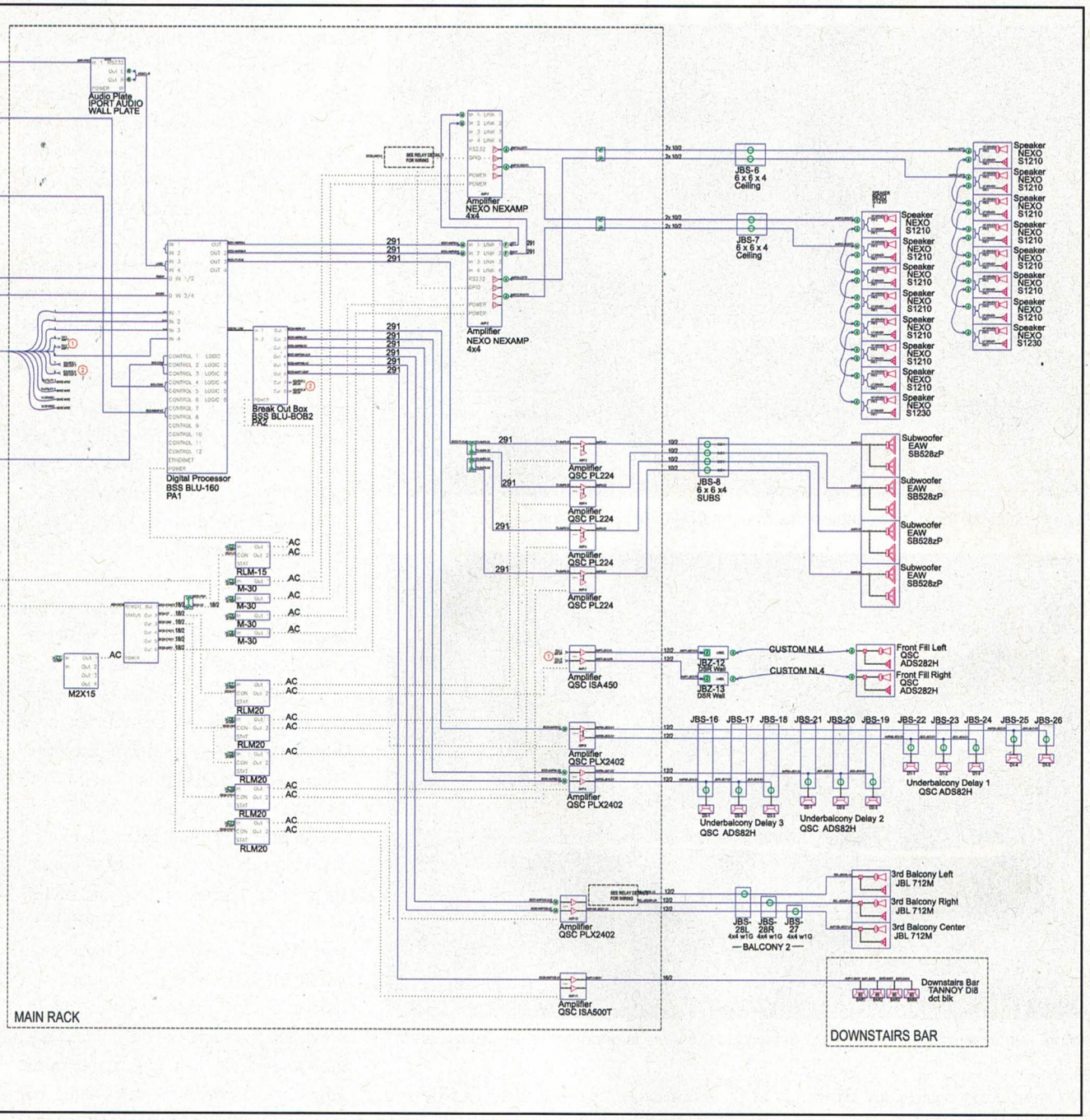
"This wasn't a situation where you could go in and put up a bunch of draping like you might do in a typical rock 'n' roll room," Henion adds. "It required very specific solutions. We started with the goal of making the room very quiet, or at least as quiet as the budget would allow, and then set about delivering the reinforcement they wanted, where they wanted it."



Meeting Expectations

Stage Sound then set out a straightforward list of criteria for a sound system following completion of the acoustic game plan. Topping the list was choosing components that are rider friendly. In addition, all gear had to possess a strong reputation for reliability as well as being easy to keep working optimally.

At the same time, the house and monitor systems needed to simply interface with other gear that bands might be traveling with. Also, because it isn't always easy to hire and retain top-notch house techs, and the skill levels of traveling techs can be all over the map, both the house and monitor systems needed to be simple enough to be operated competently by less-than-expert individuals.



At the outset of the project, the Stage Sound house loudspeaker system design focused on point-source loudspeakers in clusters of three, flown at left and right. Even though line arrays are the modern expectation, there were not any mid-size models on the market at that time providing narrow enough horizontal dispersion to meet the need of keeping as much energy as possible off the walls.

During this period, however, NEXO debuted the compact (26 inches wide) GEO S Tangent Array Series, and its 80-degree horizontal dispersion pattern fit the bill quite well. Utilizing modeling to help with the predictive process, Stage Sound formulated flown main left and right arrays both made up of six GEO S1210 modules, with each array also incorporating a GEO S1230 specialized down fill module at the bottom.

"We wanted to use a line array system for rider acceptability, but the room is quite narrow and tall, and has two balconies - not the usual best case for a line array," Henion says. "This required a hybrid system using tangent arrays along with tiered delays for several zones. We never could have done this well with a conventional line array. The NEXO

How the venue looks from behind the Yamaha PM5D-RH house console.

More reinforcement from compact delay loudspeakers is supplied to the lounge area.

Tangent Array technology allowed us to tailor the HF coverage differently from the MF coverage (to direct some HF off the balcony face) and use high-density fill speakers in selected zones, to achieve a high degree of uniformity throughout the listening area."

He also cites the relatively high "Q" factor of these loudspeakers, which produces a uniform and fairly steep roll-off right outside of the coverage pattern - again, helping to keep energy from exciting the walls. "The design of the hyperbolic waveguide on these boxes behaves in the best sense like a large-format horn, but without all the negatives" he notes, adding that the low-profile aesthetic of the arrays proved yet another plus.

Every Other Box

The arrays are driven with a NEXAMP integrated power amplifier and DSP package. They're biamplified, again in deference to rider friendly considerations, but Henion notes that he could have gone passive with much the same result. "I liked this line array and electronics package so much that we've also added one to our rental division, and it runs in passive mode to rave reviews from most who use it," he adds. "But these days, virtually everyone who's touring asks for a 3- or 4-way system, regardless of whether it's needed or actually does a better job."

Just two NEXAMP units are required to handle all 14 array boxes, and they do so very comfortably. "These are just monster amplifiers, delivering 16,000 watts - honest watts - at 2 ohms, and they'll do 1 ohm all day as well," Henion explains.

The reason for even using two units as opposed to one on this project is largely a matter of precautionary backup, as in the old adage, "the show must go on." Each amplifier drives every other box of both left and right arrays, so if one of the units goes down, the other continues to drive half the system, both left and right, mids and highs.

"While it wouldn't sound too hot, it would get the job done until a replacement could be swapped in, and no one would be asking for a ticket refund," he says. "One of the great developments in amplifiers is that it now takes far fewer units to drive a large-scale system, but the downside is if there's a failure, it can take out a lot of the system. In this system, one amp can easily drive the entire thing, but as a responsible system provider, I wanted to be sure it was backed up."

Additional near fill is supplied by more AD S-282 loudspeakers, one per side on the stage and positioned on portable stands fabricated by Stage Sound to allow them to be moved around to suit the needs of each act.

"We thought about mounting these permanently, but frankly that's just too limiting," Henion notes. "We wanted

that 'one perfect spot' for them, but what's perfect for one band is not so perfect for the next 100. With the stands, everyone gets to choose their favorite spot." These are fed programming from a matrix on the house Yamaha PM5D-RH digital console.

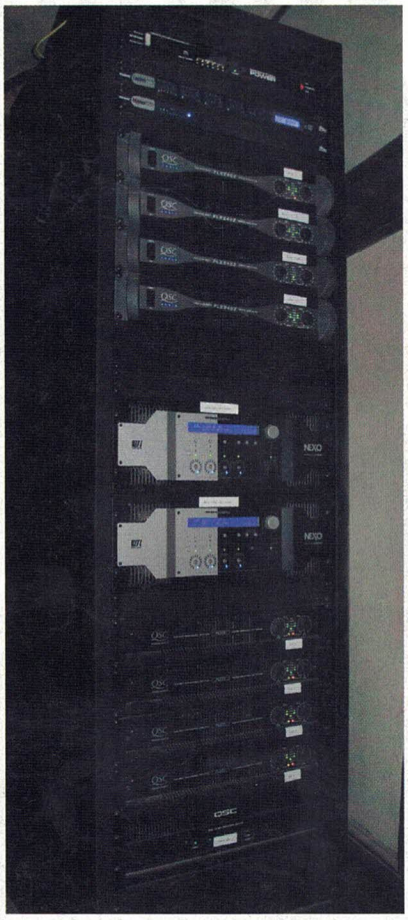
Bolstering the low-end are four EAW SB528z direct-radiating dual-18 subwoofers housed in chambers located equidistantly beneath the front of the stage, powered by four bridged QSC PowerLight PL224 amplifiers. The size of the chambers, was quite limited due to existing infrastructure that couldn't be moved, necessitating subs capable of providing commensurate performance from a compact package.

Combating Non-Linearity

The ample area extending under the first balcony, home to the main bar and plenty of space for patrons, was another primary focus of the design.

"What we've seen in the past with spaces of this nature, and what proved out here, is that these regions can suffer from a tremendous amount of mid-frequency buildup – really, more than anyone with ears should be able to tolerate," Henion says. "You can see it in any modeling program you choose to use – there's a lot of non-linearity going on, particularly in the 300 to 800 Hz range. Further, this zone opens to the front of the room through a narrow aperture which does not allow the main arrays to cover the space optimally at frequencies above 1,200 Hz or so"

The solution: First, optimize the splay of the main arrays for coverage above and below the two problem areas, those being the main balcony face and the opening into the under-balcony problem zone, steering as much HF away from those as possible. Next, incorporate as much treatment as possible into the problem zone to "sock it down," trying to neutralize the intrinsic sonic signature of the space.



House system amplification and processing, including the dual powerhouse NEXAMP units in the center.

SonoKrete was used to treat the entire ceiling in this zone, and the architect also worked some decorative heavy drape into the design. Treating the ceiling this completely allowed Stage Sound to use a high-density array of quality loudspeakers on three tiers of delay (11 QSC AD S82-H compact 2-way models mounted horizontally) to provide direct coverage, without the typical ceiling reflections that often plague surface-mounted solutions.

"This approach not only serves this zone well, but it also smoothes out the entire room so that coverage to the main floor and first balcony is absolutely beautiful," Henion states. "A nice thing about the NEXO arrays is that they allow adjustment of the splay over quite a range and still stay musical.

"The midrange still carries through that underbalcony area to some extent – there's just not an absolute way to control it," he continues, "but by steering the high end away and replacing it with that of the delays, it sounds really great. Even better than we hoped."

In addition to the NEXO-specific DSP in the NEXAMPS, overall house system processing is supplied by a BSS Soundweb London BLU-160 DSP and a companion BSS BLU-BOB2 (break-out box) system expander. It also facilitates eight modes of system operation, both in analog and digital, with one of the modes being a handy way for the bartender to provide background music from a bar-mounted iPod via a simple rotary switch located at the house mix position. This also allows the house engineer to take control and fade or start the house music when appropriate.

Analog & Digital

A Yamaha PM5D-RH running at 96K, anchors the house mix position, not only a favorite of Henion's but also meeting the criteria for rider-friendliness in spades. "The PM5D-RH is the best-selling tour-grade console in the world for many very good reasons," he notes. "Even if it's not someone's absolute number one choice, it's certain to be in the top two or three. We wanted to do as many shows as possible without having to swap out consoles, and that's definitely been the case."

Still, accommodations were made for both analog and digital consoles, with AES/EBU inputs as well as analog inputs available at the mix position. The system can be configured with just one switch between aux

driven subs analog, full range with the subs fed off the DSP, either analog or digital - any permutation. Plenty of onboard effects on the PM5D also mean that outboard units aren't needed, but again, they can be patched into the system by any visiting engineer if desired.

The upper balcony region, largely used for VIP and meeting purposes, is served by a discrete system that can be controlled at the house console. Levels can be adjusted for specific requests, and the system can be shut off when the area is not in use. Two ceiling-mounted JBL SRX712 loudspeakers provide coverage, with power from a QSC PLX2402 amplifier.

The stage monitoring system is large and impressive, capable of meeting the production expectations of most artists. The system is headed by a Midas Sienna analog console, a widely accepted board in its own right that also serves to head off concerns about digital latency issues expressed to Henion by select monitor engineers.

A significant portion of the monitoring gear, as well as some of the house fill components, were brought over from another one of Capshaw's venues. It's still choice equipment by any standard, with Electro-Voice Ti-1152 biamplified (QSC power) loudspeakers for stage side fill joined by Katz Audio dual-18 subwoofers.

Seven JBL SRX712 M biamped stage monitors are driven by Lab. gruppen amplifiers, with an 8-channel C10:8X driving the highs and two 4-channel C48:4 for the woofers. There are also dual JBL MP412S subwoofers for drummers.

Two Ashly Audio 4.24C 4x8 digital processors were specified for the wedges, with a BSS Minidrive for the drum monitors and an EV 3-way processor for the side fills. A host of Ashly 31-band graphic EQs, PreSonus gates, and other effects are also available.

A Wonderful Place

Henion and crew were also responsible for the electrical design for all things related to lighting, sound, stage, and video. They called for a new isolated ground system going to one "technical power" load center. This feeds an assortment of receptacles recessed into the stage and distributed throughout the facility. The load center also feeds two 100-amp, 3-phase disconnects on stage left. One is typically used for the stage monitor package and the other is available so visiting acts bringing in their own gear can plug in quickly and conveniently.

And, as noted earlier, Stage Sound specified and installed the lighting package as well as planned the infrastructure for increased video capabilities to be added at a later date. Every bit of their work on the project is backed by immaculate and highly detailed documentation.

All of the time, care, and attention to detail reaped immediate benefit, when on opening night Capshaw simply told Henion, "It sounds *good*! Thank you!" Meeting the top priority of delivering a top-quality system to a satisfied client, Henion notes that visiting technical crews and artists have expressed their approval as well, with the vast majority using what's in place rather than bringing in components of their own.

"A lot off music business luminaries are also regular visitors, and they enjoy doing business in this space," Henion concludes. "The bottom line is that the Jefferson Theater is now a wonderful place for musicians and for people who love music." ■

Keith Clark *is Editor-In-Chief of* Live Sound International *and ProSoundWeb.*

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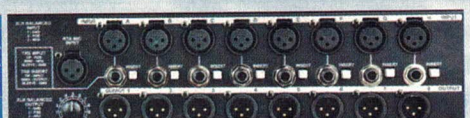

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