

LIVE SOUND

I N T E R N A T I O N A L

INSIDE

DELIVERING THE EXPERIENCE

System design and deployment for Star Wars with the New York Philharmonic

THE PERILS OF CONFUSING AMPLIFIER RATINGS & SPL SPECS

FINDING THE RIGHT MATCH WITH DIGITAL AUDIO INTERFACES

INVESTIGATING INVERTED STACK CARDIOID SUB CONFIGURATIONS



From the Editor's Desk

IT'S ALWAYS A TREAT to present insights from Pat Brown, so we're fortunate in this issue to feature Pat's discussion on interfacing digital audio gear. He provides an in-depth look at the topic, honing in on the key facets in his usual clear, direct manner.

By the way, Pat and his wife Brenda continue to do outstanding work in leading SynAudCon educational sessions around



the globe on a regular basis, and also keep in mind that they offer a great resource of online education at their website (prosoundtraining.com).

Elsewhere, Jonah Altrove delivers valuable clarity to the matter of amplifier ratings and sound pressure levels. Think the two are directly correlated? It's most certainly not that simple, so I encourage you to check out Jonah's analysis.

In addition, Craig Leerman weighs in with two strong pieces. First he supplies a fairly deep round-up of the latest software advancements for a wide range of digital console platforms, and a bit later, he offers a collection of "on the fly" microphone techniques to utilize with drum kits.

Also be sure to check out the cover story by Kevin Young, detailing a recent sound reinforcement application with the New York Philharmonic that's both noteworthy and unusual. Meanwhile, Merlijn van Veen shares some interesting data he's collected with a specific cardioid subwoofer configuration, and don't miss a recent conversation from the Live Audio Board on ProSoundWeb regarding a fundamental law of electricity that we share on the Back Page.

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

Keith Clark

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ON THE COVER:
Lou Mannarino at front of house prior to mixing a recent New York Philharmonic presentation of a Star Wars film at Lincoln Center in Manhattan.

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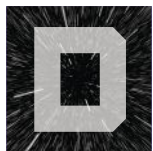
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DELIVERING THE EXPERIENCE

The system design and deployment for Star Wars with the NY Philharmonic. **by Kevin Young**



DESIGNING THE sound and mixing the recent New York Philharmonic presentation of four Star Wars films — *A New*

Hope, *The Empire Strikes Back*, *Return of the Jedi*, and *The Force Awakens* — at Lincoln Center in Manhattan stands as one of the most challenging projects in the four-decade professional audio career of Lou Mannarino.

Given the work he's done with A-list artists, at numerous high profile venues, and in 11 years with the NYP itself, that's saying something, but he stands by that assessment. The performances, presented in surround at 2,700-seat David Geffen Hall, consisted of the film screenings accompanied by John Williams' iconic score performed live by the 100-plus piece orchestra conducted by David Newman.



Lou Mannarino on stage before the K-array line arrays were hoisted into position.



The left-center-right array deployment for the Star Wars series at Lincoln Center, with the New York Philharmonic on stage just prior to a performance.

“When the project came into being in spring 2017, I worked with Disney and Epilogue Media, and I studied the films,” Mannarino says. “I knew them, as everybody does,” while also noting that a performance of this nature, with these films, hasn’t been mounted before. “For the dialogue, sound FX and source music, I got the original studio breakout for the sounds — all of it time coded — but the orchestra was live the entire time.”

One of the biggest tests was making the concert hall feel more like a movie house; ensuring the dialogue was clear, the effects physically palpable, and that the orchestra was able to successfully perform the soundtrack without “blowing people out of their seats.” To do so he created what he describes as a “7.1 reinforcement system times four, because the hall has four tiers” — a solution that provided full coverage throughout the

while preserving each film’s complex sonic imagery.

PUTTING IT TOGETHER

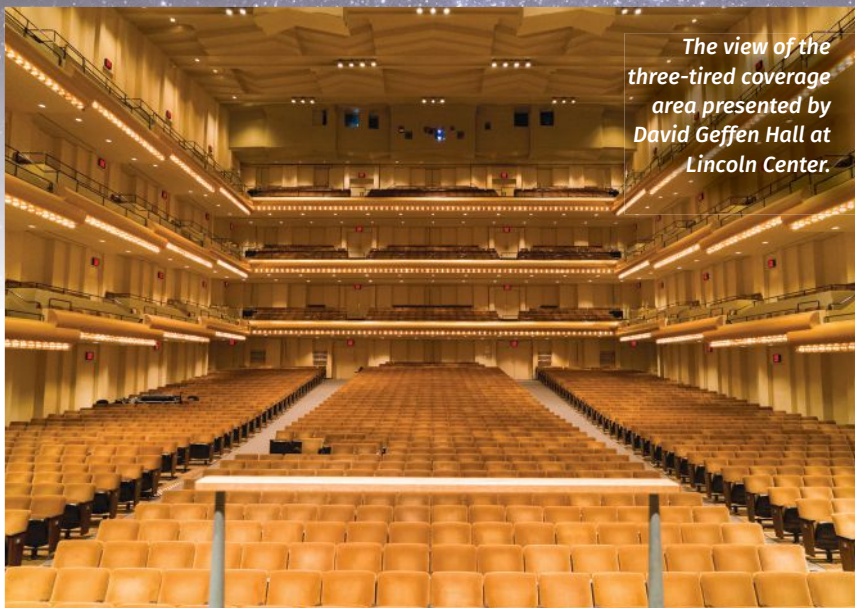
Among the aspects of the sound design requiring a great deal of consideration and planning were an orchestra clocking in at about 92-plus dB, the necessity of placing surround elements (as well as subwoofers) in close proximity to audience members, and maintaining sonic imagery in locations presenting far greater challenges than the average movie theater. After receiving a list of stems (recorded tracks from the films), and deciding where other various audio elements — live and recorded — needed to come from, he began mocking up designs and testing various systems in his production facility.

Ultimately Mannarino assembled a main PA comprised of K-array loudspeakers joined by models from his own com-

pany (L&M Sound & Light, Staten Island) and the venue’s permanently installed d&b audiotechnik loudspeakers. “I tried many different speaker configurations, and K-array, because it’s digitally steerable, proved a key to coverage.”

The main system center cluster consisted of six K-array Mugello KH2 active line array elements flown at the center of the stage proscenium and flanked by a d&b cardioid subwoofer on each side. Pre-existing proscenium-mounted d&b compact loudspeakers delivered fill to the upper seating tiers, driven by d&b 30D four-channel amplifiers.

Left, center and right (LCR) main arrays, also flown at the proscenium, were also comprised of KH2s, each with seven elements. “The KH2 features slim array technology, which provides a fast transient response, as well as less side noise pollution, it allowed me to put



The view of the three-tiered coverage area presented by David Geffen Hall at Lincoln Center.

something in front of people without adding to the reverberant space of the hall,” he explains. “I was also able to digitally steer output from the arrays — open them up at the bottom and not so much at the top — to keep the coverage even, so the middle and back of the hall sound the same as the front.”

Eight LM4 compact full-range loudspeakers were deployed along the front edge of the stage as fills, with power and DSP provided by a QSC PLD4.2 amplifier. For rear surround, Mannarino chose a dozen K-array Pinnacle KR102s, designed to provide line array performance characteristics from a very slim column package.

Specifically, three KR102s were deployed per seating level, placed left, center and right, joined by companion subs and a satellite array for emphasis on higher frequency content. “I utilized these mini line arrays for surrounds because, unlike at a movie theatre, people sit directly in front of them, while they needed to be perceived as being 180 feet away,” he notes.

The compact sub elements of the KR102s were key in bolstering low-end reinforcement, particularly that of FX and

source material, as well as to match that provided by the flown d&b subs. “Typically, movie theatres don’t have subs with the surrounds, but I made a conscious effort to do it,” he says, adding that the subs also helped address the problem of making things louder than they need to be while providing cinematic excitement: “The idea was that a pure array with no compression drivers in the column means a person near the array hears one or two of the 2-inch loudspeakers, while the seats further away are hearing all 16 or 32 loudspeakers.”

COMING & GOING

Although a 7.1 configuration, it was, Mannarino posits, more complex than a typical 7.1 approach. “I really had to think through how to maintain the imagery. There were loudspeakers in the system with up to 36 milliseconds of delay to mirror the clarity of the center cluster. Given the sheer number of outputs required, six Klark Teknik SQ 1 splitters (each 8 input/24 output) were deployed to feed signal to the four tiers of surround loudspeakers.

Placing multiple sources spatially to recreate a sonic image to match the action

of each film in every section of the hall was also daunting. “We had as many as 32 audio outputs for multiple speakers throughout,” he says, noting that simply putting the center content in the front fills wasn’t an option. “I put the front fill feed in left-center-right (LCR) and then matrixed in some of the effects, so those sitting in the third tier against the left of the proscenium could still hear the right side and effects from that side.”

Overall there were 16 audio tracks from the film plus an additional 14 channels from the orchestra, divided, mixed and sent to 32 locations. “The idea was to get an LCR front at the screen — mainly dialog along with some effects — and subs coming from the stage, which had to be divided into the proscenium speakers and front fills. The LCR front and the subs were discreet, while the left stage, right stage, front stage and proscenium mounted fills are not, meaning they received what was required to maintain the image.”

Each film was different in terms of which track and where, spatially, the content was placed. For example, Chewbacca might have been on an effects track, then he was on a dialog track; Darth Vader’s voice was on a dialog track — left and right — but his breathing was on an effects track; in one film R2D2 was on an effects track but in another was on a source music track.

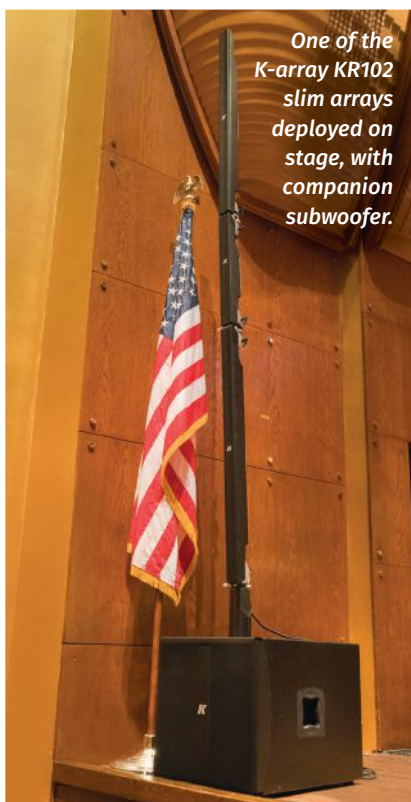
BALANCING DYNAMICS

Capturing the orchestra was about selective reinforcement with respect to orchestration, the creation of an environment for a complicated mixture of live and recorded material. It was designed to ensure that effects, underscoring, and individual instruments prominently featured on the original recordings weren’t lost, without requiring the remainder of the orchestra to depart dramatically from the established dynamics that are central to the power of the soundtrack.

Some vocal/sound effects (material

that varied from film to film) were generated by samples triggered by a keyboardist and captured via an on stage stereo system. Also varying by film was microphone deployment, and overall, they were used sparingly — only when balance, a specific request from the composer, or the need to highlight lower volume instruments was a necessity.

Most commonly, a Neumann KM 184 or Sennheiser MKH 8040 cardioid condenser captured harp, four DPA d:screet 4061s (miniature omnis) or a combination of two 4061s and two d:vote 4099s (supercardioid condensers) were applied to piano, AKG C414 condensers handled marimba, and more Neumann 184s served as percussion overheads. Alto flute, English horn, oboe and bassoon were also captured with Sennheiser 8040s. “I’m a big fan of that microphone,” Mannarino says. “I have a dozen of them and generally they’re my ‘go-to’ live orchestral mic.”



One of the K-array KR102 slim arrays deployed on stage, with companion subwoofer.

Click track was provided but only used intermittently, he adds. “We ran a Shure PSM 900 wireless system transmitter for the maestro (David Newman), fed the click to that, and provided him with a cut-off switch because we didn’t want the click to be resonant on stage, but he wanted it specifically for certain things. We also used the same system to send click to the in-ear monitors — basically one receiver and two sets of ‘ears’ per stand.”

For monitoring, the ability to adjust volume was important for the conductor and the instrumentalists. Consequently, dual Anchor AN-1000x compact powered monitors with external volume controls were deployed for Newman, with eight Galaxy Hot Spot compact monitors (powered by an Electro-Voice TG7 amplifier) for the brass, string and reed sections. Additionally, two coaxial K-array KF12s provided monitoring for the piano and percussion players, and a pair K-array Pinnacle KR202s columns, one per side, supplied stage fill.

“The maestro got dialogue and source music, the monitors for percussion and piano offered time alignment for specific cues and, generally, the Hot Spots were fed dialogue while the side fills supplied samples/keyboards for the orchestra,” he explains.

Even so, some changes were made in terms of dynamics and instrumentation, while composer John Williams also recreated some of the music — because the orchestra was live — to embellish the score, with Mannarino adding that he worked with the maestro, artistic director and others on making beneficial musical adjustments.

WHERE IT’S GOING

He mixed both front of house and monitors with a Midas PRO 2 digital console, using an iPad to generate the monitor mixes and then marking monitor moves per scene and triggering them when needed. Although those moves were

generally predetermined, he continues: “I did make adjustments based on the orchestra’s performance if I heard things pulling apart and knew someone needed something. I also used Midas DN9650s [network bridges] with MADI for record, which went to the recording studio, and a Dante interface that went to specific speaker units and other outputs.”

In looking at the details and technology that went into pulling these shows off successfully, Mannarino says, laughing: “You could dig deeper and deeper and not stop, but I think this is where our industry is going: audio and mixed media.

It’s an application that involves extremely close collaboration between composers, conductors, instrumentalists, sound designers and engineers. “Every word, every note, is a marriage between the maestro and the audio engineer,” he states. “Composers are learning that spatial and immersive audio are tools and my goal has been to make that more understandable for them,” he says, adding that this Star Wars series demonstrates how positive similar ventures can be for business: “We had a success here. People came from all over the world.”

Going forward, extending that success requires living up to a standard that’s increasingly set not just by the audience experiences in movie theaters, but — given the sophistication of modern home theater systems and resulting higher audience expectations — by their experiences in their living rooms at home as well.

“We have to make the experience better than that,” Mannarino concludes. “We have to combine the live experience with the recorded experience in a space — a variable space — that feels intimate when necessary and huge in a way it doesn’t in their homes. We have to make it sensational.” **LSI**

Based in Toronto, Kevin Young is a freelance music and tech writer, professional musician and composer.