

## Dictating The Direction

Factors that can drive a system design

By Dan Garcia



Views of the sanctuary, including the large screened-in chamber that conceals the loudspeakers.

It's no secret that room acoustics and aesthetic considerations play a central role in determining a sound system design. When it comes to selecting loudspeaker components, to positioning them properly, as well as to accurately processing the sound they reproduce, acoustic and architectural constraints always have a direct influence.

All Pro Sound, based in Pensacola, Florida, recently finished a house of worship sound system project in which difficult acoustic and design challenges had to be addressed with somewhat unusual solutions to produce the desired result. The work at the new 1,800-seat sanctuary of Immanuel Baptist Church, located in nearby Pace, Florida, required a two-year partnership between the company and client.

The sanctuary has a complex ceiling configuration, designed by Dallas-based Acoustic Design Associates, to address critical room acoustics and outside ambient noise problems, and to shield audio components from view while making for an aesthetically attractive sanctuary environment. Further, a 30-foot-high lay-in tile ceiling grid, punctuated by acoustic structures below designed to resemble clouds, aids in blocking substantial outside highway traffic noise, creating an aesthetically pleasing environment, and improving the room's acoustics.

"The church staff wanted to be able to control ambient noise, because in the old facility, services sometimes had to be halted if big trucks went by on the nearby four-lane highway," explains John Fuqua, All Pro Sound director of engineering. "The baffling effect created by the ceiling and the cloud structures helps keep that noise out, while at the same time, helps focus the sound energy down onto the congregation seating area."



*The system control position, located at the rear/center of the audience area, anchored by a Yamaha M2500 console.*

### **ADDING TO IT**

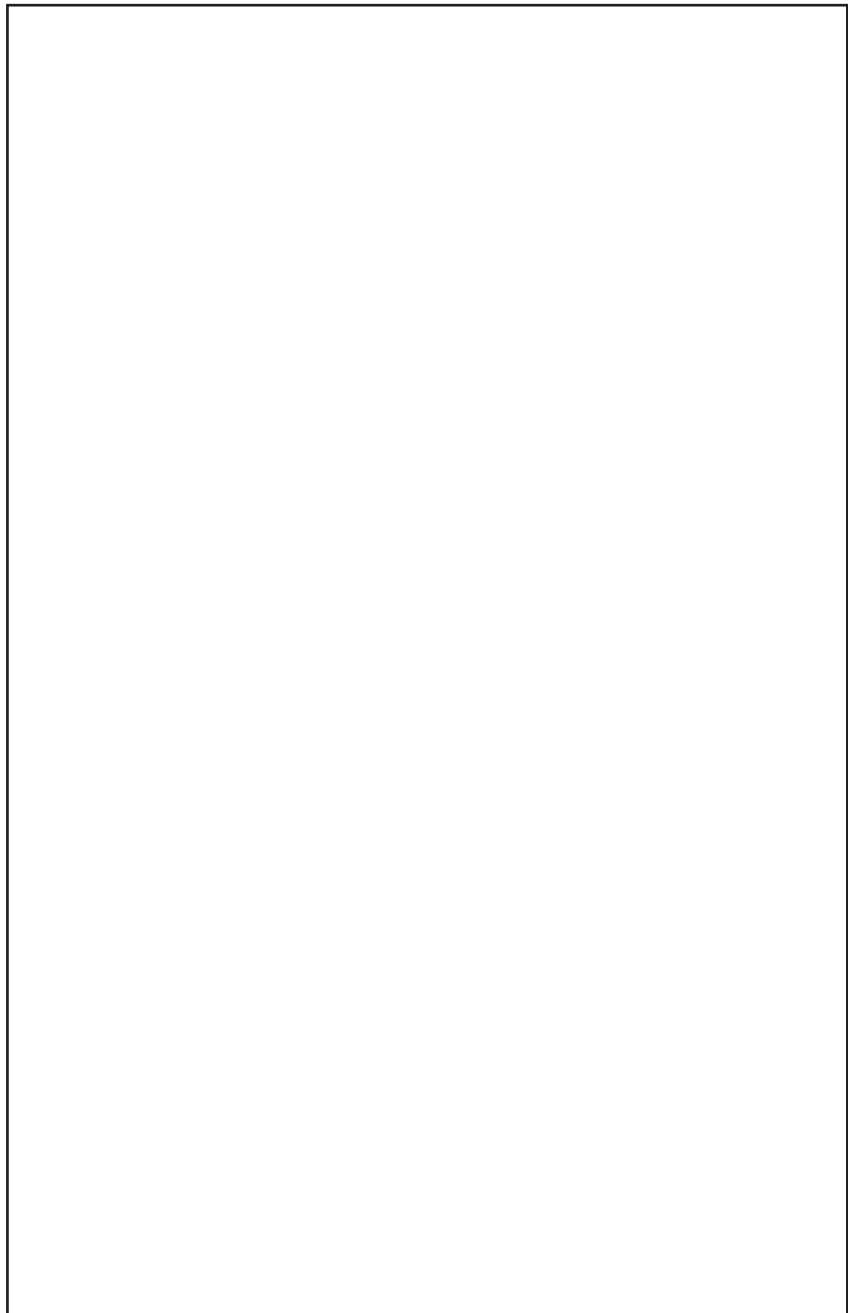
The single-level sanctuary is extremely wide, with the front platform measuring more than 60 feet wide and the room and seating “fanning” out considerably from there. And on top of the complex ceiling construction, the acoustical consultant also called for a chamber-like structure that would serve as a façade to shield loudspeakers from view, in addition to saving space on the platform, real estate needed for the church’s frequent drama productions.

The “hidden from view” rule also applied to the system’s subwoofers, so they needed to be flown with the full-range loudspeakers within the same chamber location. As a result, it was critical to insure that low-frequency energy be kept off of the front platform as much as possible, enhancing gain before feedback and overall intelligibility of coverage.

“This type of speaker chamber construction is becoming somewhat of a trend,” Fuqua says. “Positioned above the front thrust of the stage, it basically creates a cleaner look for the sanctuary and if it’s positioned correctly it can work well. It was included for aesthetic reasons initially, but we interjected our idea that if it was going to be used properly, the chamber design had to be configured to minimize low frequency resonance.

“The chamber was designed to be insulated so you don’t get any lobing from the low-frequency output of the subs onto the stage,” he continues. “We

wanted to provide liveliness in the room but not so much that it came back onto the stage area as reflected energy, which can be detrimental to monitoring. The subs had to be loaded so the energy was directed outward instead of in an omni-directional fashion. We typically place them near the front on the floor or under the stage, but the design and height of the stage required flying the subs. So very early in the project we had to take this placement of the subs into consideration.”



# Project Memo

An “exploded” main loudspeaker cluster, including the subs, became the focus, to place them as closely as possible to the audience given the wide surrounding seating configuration. Upon seeing the plans for the chamber, in addition to the width of the room, Fuqua surmised that specific loudspeakers would be required, with EASE modeling then deployed to assist in mapping out coverage, helping to shore up final position and angle details.

“The specific Turbosound products that were selected, and which we’ve used in the past in other applications, proved capable of providing the intelligibility and coverage the space demands,” he notes. “We knew that, in this project, if we didn’t have the right components we weren’t going to get the right results. Very articulate, very defined coverage

with controllability was key in this project.”

All Pro Sound recommended the chamber be insulated to prevent sound in general, and low frequency energy in particular, from reflecting down toward the stage area. In addition, the components of the Turbosound 811.3s full-range main loudspeakers are used in a “skeleton” configuration rather than being housed in a box enclosure.

“The skeleton version is much easier to work with when arraying speakers in a chamber structure because it allows us to aim the mid-high frequency, which was critical in this application,” he says. One 811.3s skeleton is included in each of four loudspeaker clusters flown from the ceiling and encased in the chamber. In addition, each cluster contains one

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## Immanuel Baptist Audio Gear

### Loudspeakers

Turbosound 811.3 (mains)  
Turbosound TCS-56 (choir fill)  
Turbosound TCS-40 (down fill)  
Turbosound TQ425 (low/mid)  
Turbosound TSW118 (subwoofers)  
Altas (common area ceiling speakers)

### Processing

Peavey AA MediaMatrix  
X-Frame 88 DSP

### Power

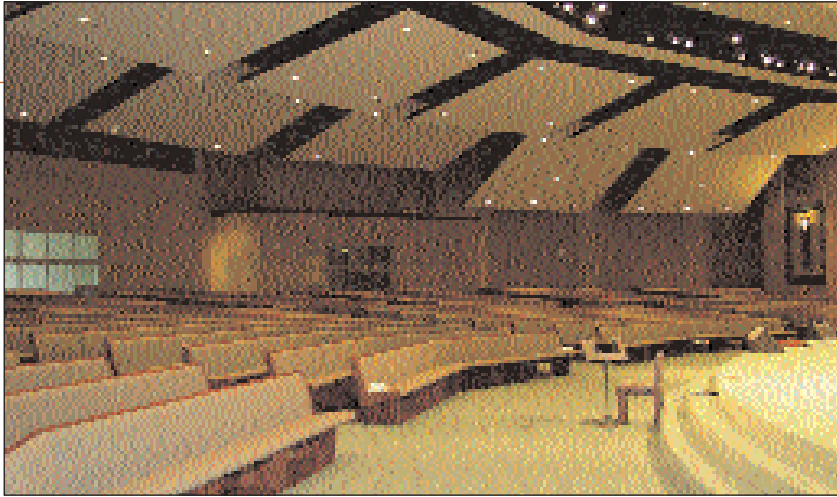
QSC PLX Series

### Console

Yamaha M2500-48

### Microphones

Crown CM700 (choir)  
Sennheiser EW 100 Series  
(wireless)



*A look at the acoustical design from the front platform.*

Turbosound TCS-40 downfill box and one Turbosound TQ425 low/mid box.

Four Turbosound TSW118 subs are situated between the clusters, double-stacked in two locations and arrayed to provide even low-frequency coverage. Two Turbosound TCS-56 fill speakers serve as choir fill monitors, and are flown behind the chamber facing back toward the choir area. All loudspeakers are driven by QSC PLX Series amplifiers that include models 3402, 2402 and 1602.

#### **SYNCHRONIZE ARRIVAL**

Peavey Architectural Acoustics MediaMatrix X-Frame 88, housed in an adjacent equipment room with the system's amplifiers, supplies all processing in the digital domain, including crucial delay settings that synchronize the output arrival times of the the various loudspeakers in the cluster. Both MediaMatrix and the Yamaha M2500 48-channel mixing console play important roles in the system, Fuqua says.

"We use digital processing in almost every installation because it allows us to put whatever components are needed into the mix to create the sound quality we're looking for. DSP also provides excellent tuning capabilities for both main and monitor systems."

The "keep it clean" mantra also applied to the new microphone set. Initially, four Sennheiser EW 100 Series wireless microphones have been supplied, along with a several Crown CM700 choir mics suspended from the ceiling.

"The audio/visual needs and capabilities of the church have grown substantially," Fuqua concludes. "The orchestra is growing, drama productions are expanding and special singing programs are increasing because the new sound system is able to support the growth. They now have a facility outfitted with the tools to sufficiently enhance their worship." ■

*Dan Garcia is a veteran free-lance audio journalist and frequent contributor to Live Sound.*

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