AUDIO SOLUTION FOR
SAMSUNG CINEMA LED

JBL PROFESSIONAL by HARMAN AUDIO SOLUTION

Onyx Cinema LED Technology

STUNNING VISUALS.
COMPELLING SOUND.

Bring the ultimate cinema experience to movie goers with a state-of-the-art cinema screen supported by clear, crisp, evenly distributed sound.

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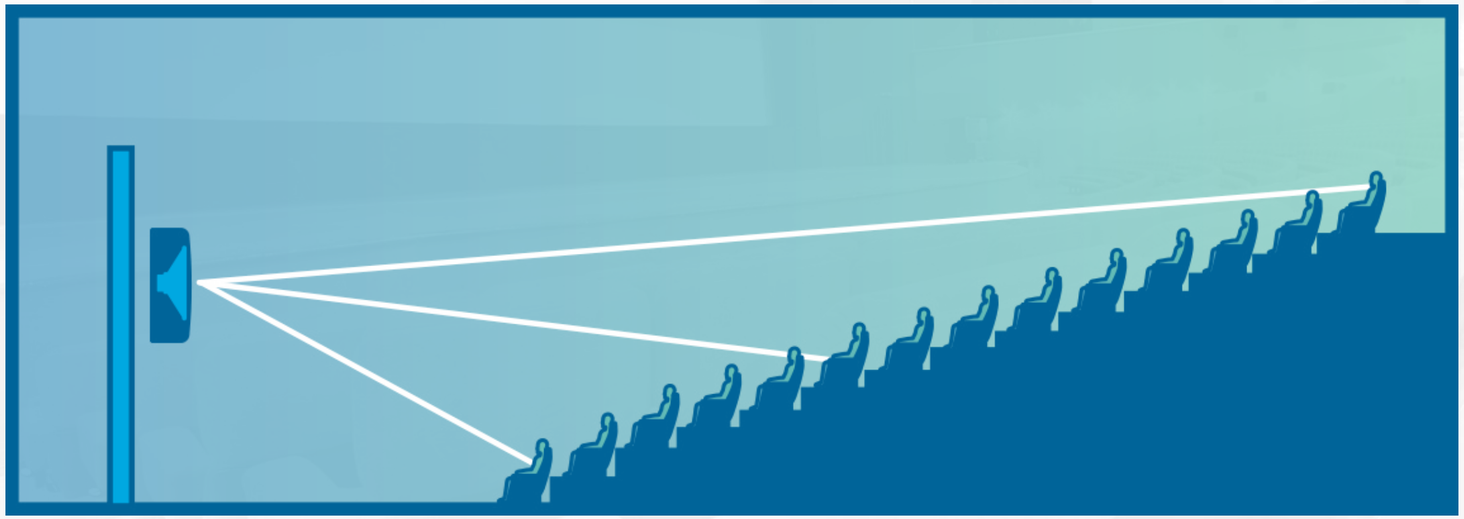
IDEAL SPEAKER LOCATION

But Viewers Can’t Actually See the Movie



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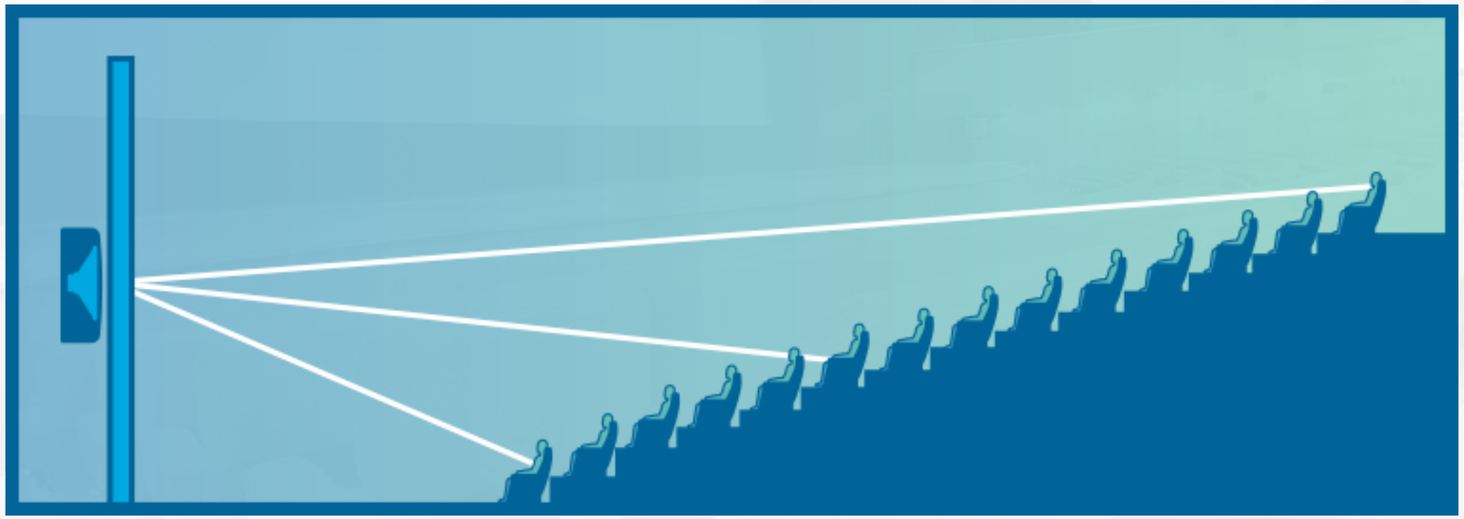
TYPICAL SPEAKER LOCATION

Sacrifices Some Fidelity



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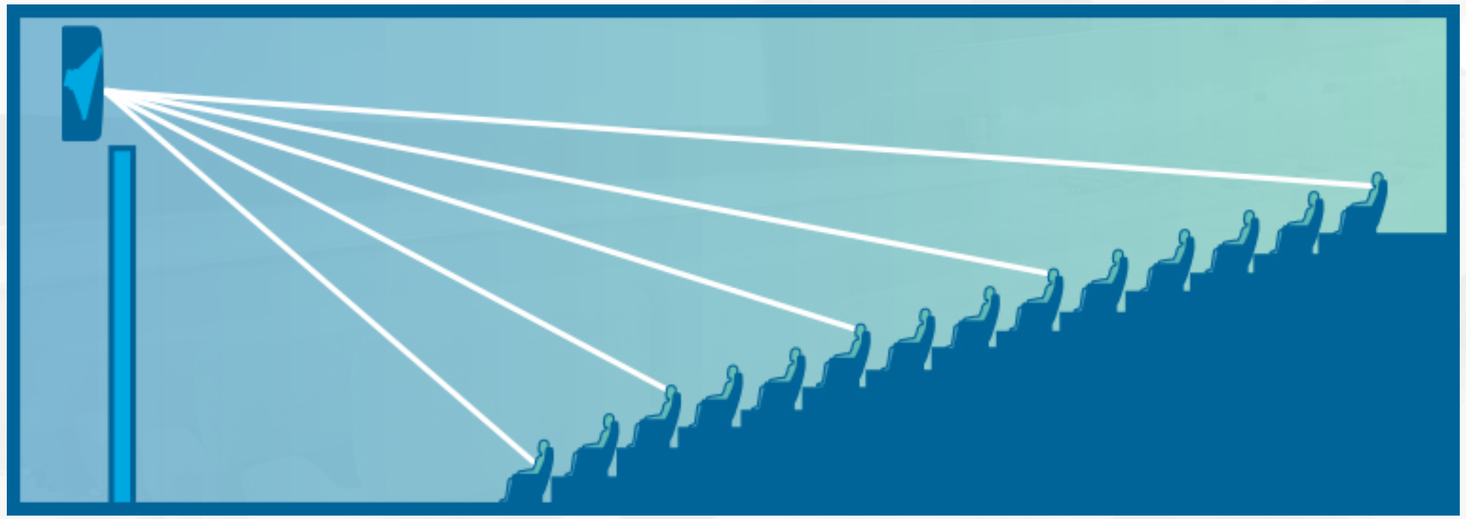
SPEAKERS ABOVE SCREEN

No Impact to Fidelity, but Location Presents Challenges



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HARMAN / SAMSUNG JOINT RESEARCH

- To determine how to accommodate the higher elevation of the front channel speakers, **HARMAN** and the **Samsung Audio Lab** teamed up and conducted extensive in-theater research.
- Research has been presented at Audio Engineering Society (AES) in October
  - Convention Paper 9879 “Apparent Sound Source De-elevation Using Digital Filters Based on Human Sound Localization”
  - Research conducted by Samsung Audio Labs
- Weeks of research took place in Las Vegas, Seoul, and Busan Korea where sound engineers methodically evaluated filter sets and an assessed tuning.

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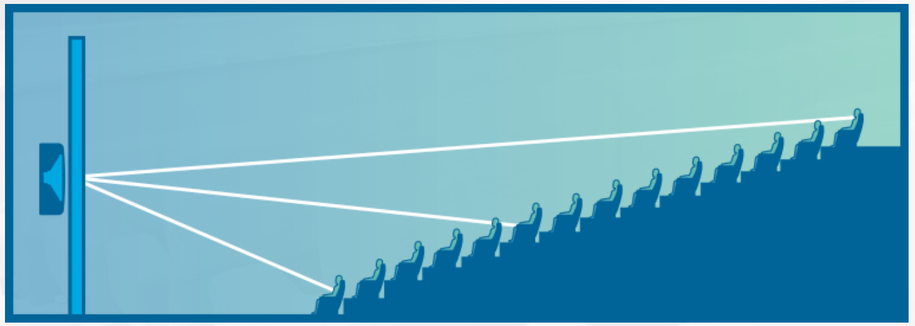
AUDIO CHALLENGE

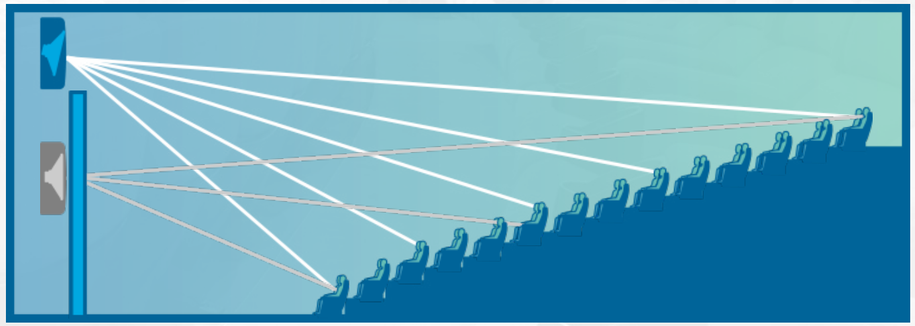
Traditional Cinema Speaker Arrangement

- Front channel speakers are typically placed directly behind cinema screens.
- Though the setup is inherently flawed, speaker technology allows us to work with the barrier to produce high-quality sound.



Traditional Cinema Speaker Arrangement with Samsung Cinema LED Screen

- Samsung's Cinema LED screen requires changes to traditional speaker placement.
- This is an opportunity to overcome the acoustical restrictions of traditional setups and create sound that is pure and without impediment.



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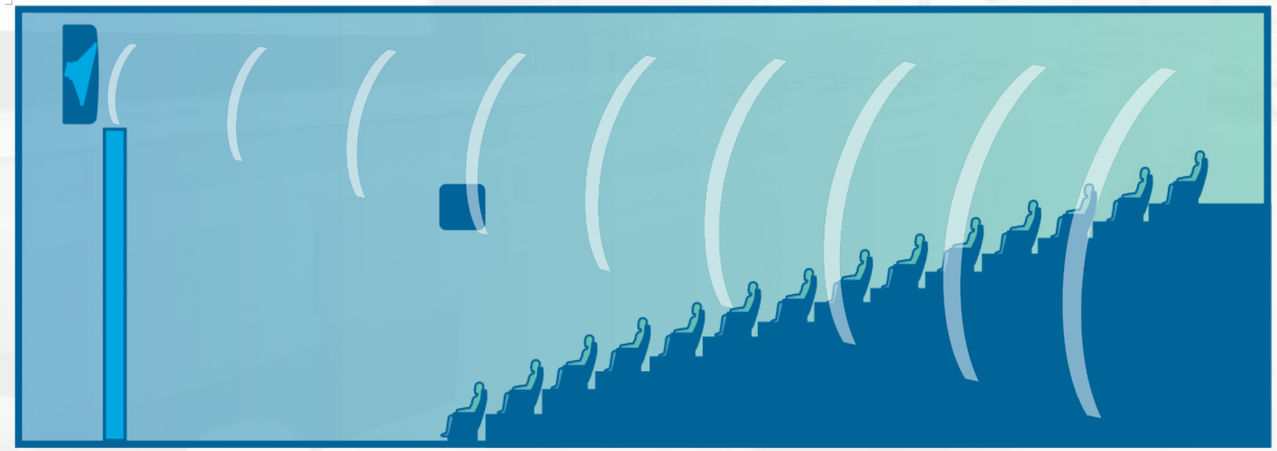
JBL AUDIO SOLUTION

- To accommodate the new Samsung Premiere Room LED screen technology, speaker must be placed above the screen.
- Sound is “de-elevated” by darkening sound



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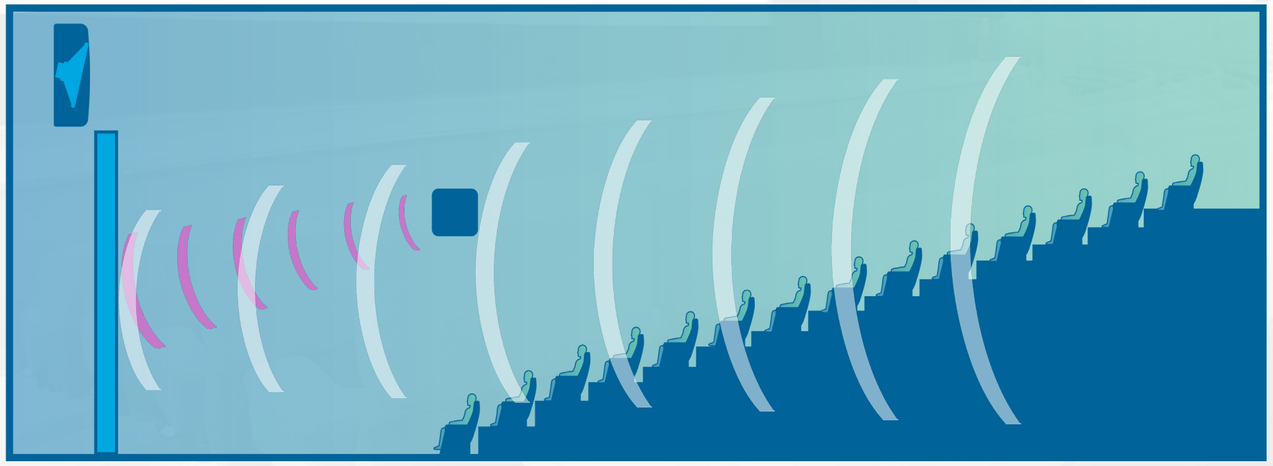
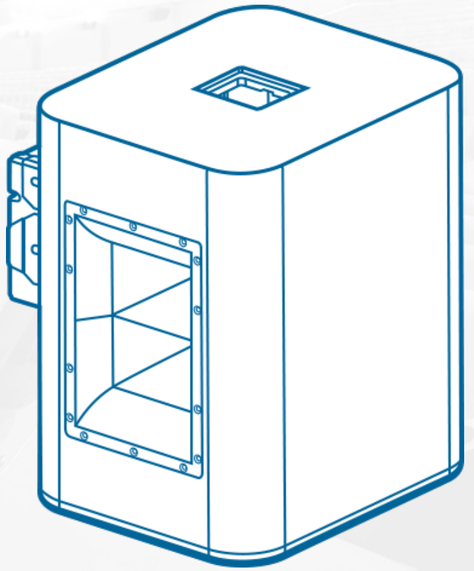
JBL AUDIO SOLUTION: **REFLECTOR HORN**

- De-elevation darkens the sound.
- **Reflector Horns** re-introduce high frequency energy.
- HF is bounced off the screen at the correct elevation.
- Brain perceives HF coming from the screen.





JBL CRF2 Reflector Horn

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MORE THAN JUST **LOWERING ELEVATION**

Sound now is perceived as coming from front, BUT

- System cannot color sound, but must be able to comply with X-Curve
- Lower elevation filter can sound **“dark”**

The answer: Reflector Horns

- Add HF back into the mix
- Reinforce the perception that sound is approaching from the front.

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DARKEN SOUND FOR LOWER PERCEIVED ELEVATION

The answer: FIR filters

- Frequency - Can be surgically precise
- Zero-Phase FIR:
  no phase/timing issues

FIR FILTERS
SURGICALLY PRECISE
WITH ZERO PHASE ISSUES

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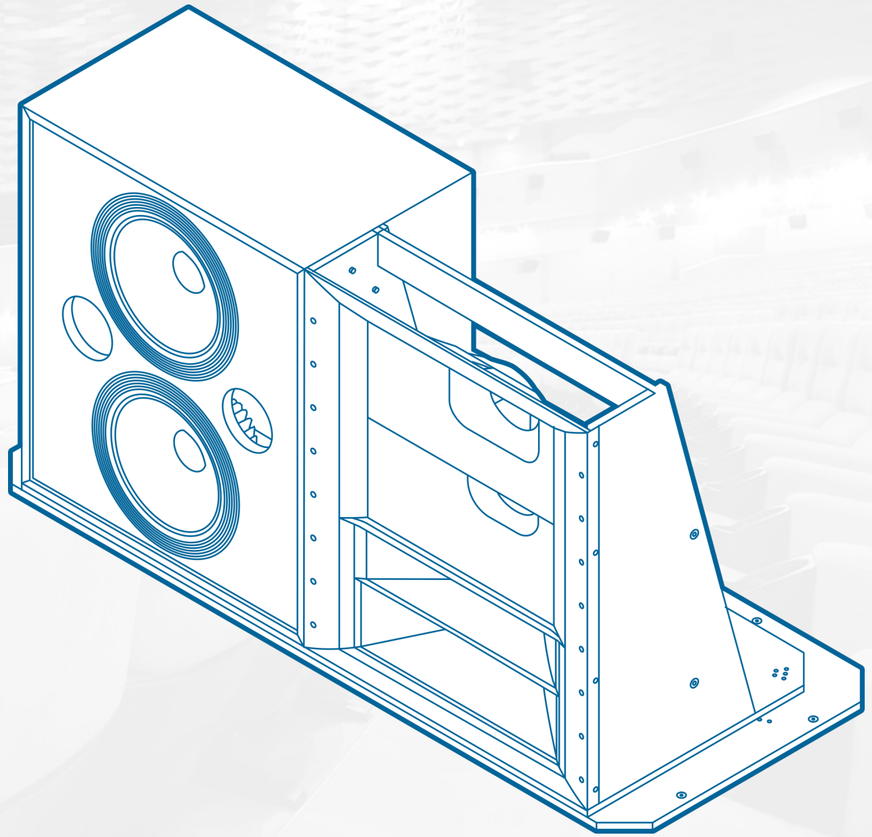
JBL AUDIO SOLUTION: 3733

- Modified 3732
- Utilizes Dual Dissimilar Arraying technology for better HF coverage
- Better LF component for higher output



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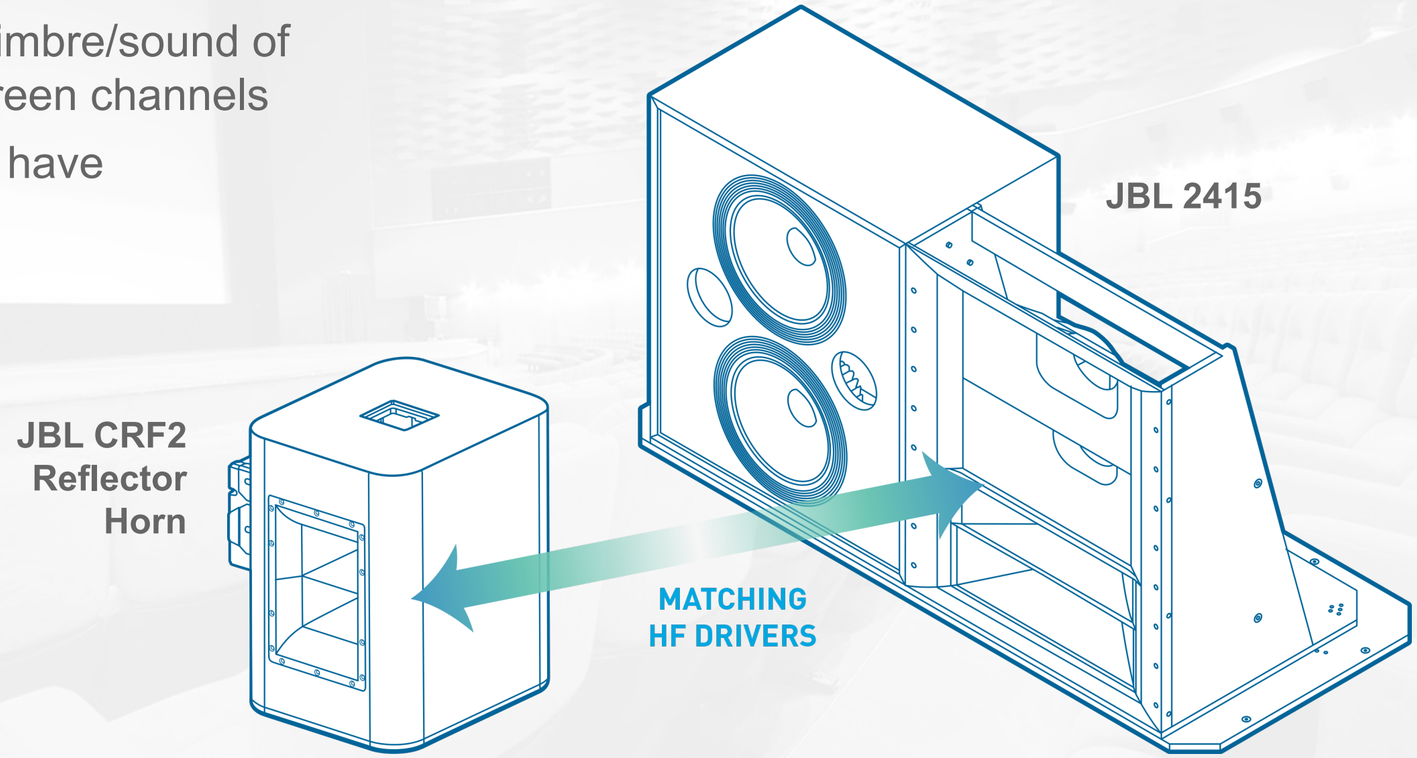
JBL AUDIO SOLUTION: **REFLECTOR HORN**

- It’s critical to match the timbre/sound of reflector horns to the screen channels
- The CRF2 and the 2415 have matching HF drivers



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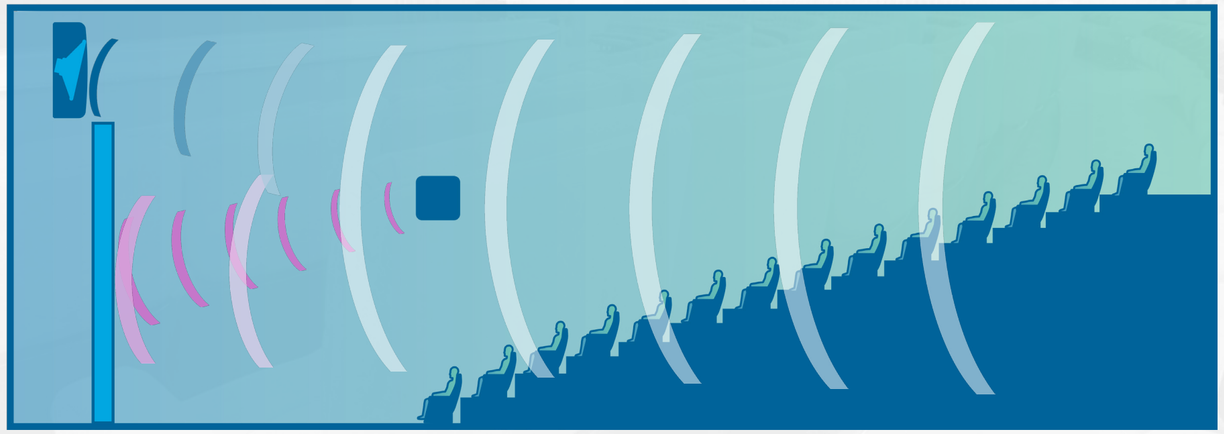
JBL AUDIO SOLUTION: **REFLECTOR HORN**

- Screen channels are time-delayed after reflected HF
- Reflected HF and main screen channels are perfectly synchronized



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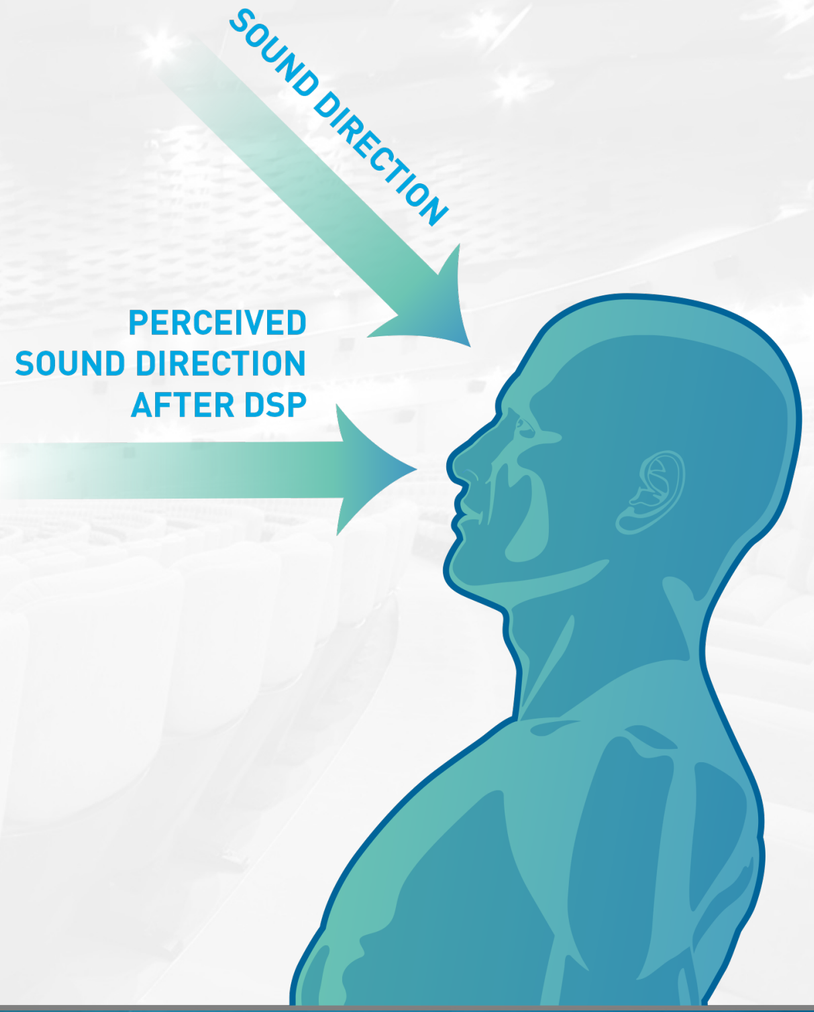
JBL AUDIO SOLUTION: **DSP**

- As a result of the extensive joint research, we developed and implemented proprietary DSP FIR filters the accommodate the elevation and directionality of the sound.
- Additionally, reflector horns were added to further improve frequency response.
- **The result:** Sound is as clear and powerful as ever, and it **appears as if it is coming from behind the screen.**



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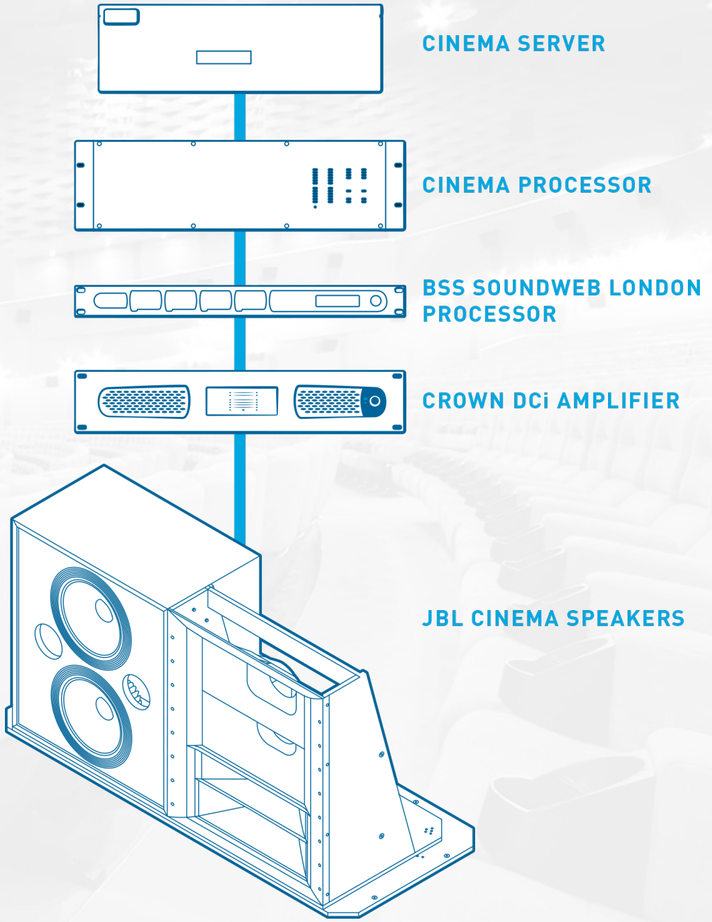
JBL AUDIO SOLUTION: SIGNAL PROCESSING

- BSS Signal Processor
  - 8-Channel Analog Card Configuration
  - 8-Channel AES Card Configuration
- Crown DCi Amplifiers
- JBL Cinema Speakers



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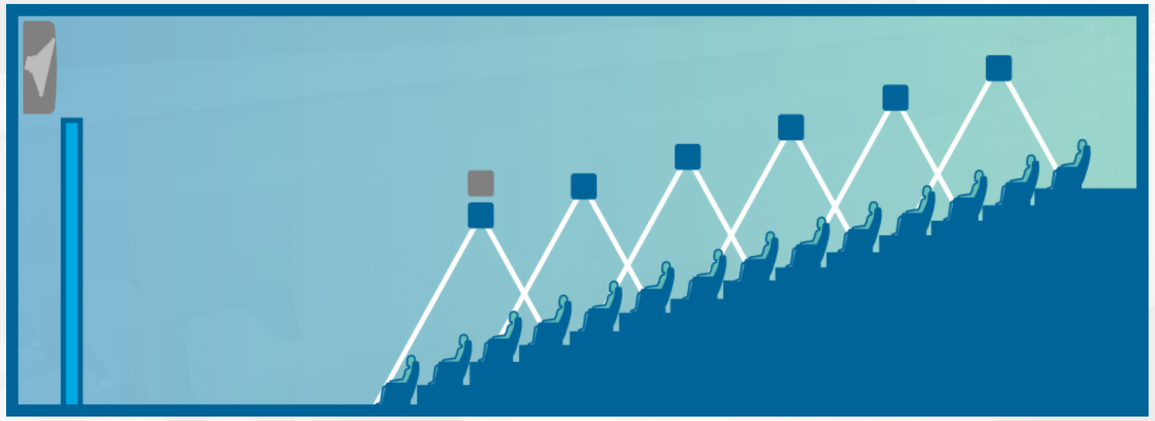
JBL AUDIO SOLUTION: SCULPTED SURROUND

- Pair our front channel speakers with the **Sculpted Surround** system for a full, rich, evenly-deployed audio experience
- **Sculpted Surround** ensures uniformity so that moviegoers experience sound the way moviemakers intended



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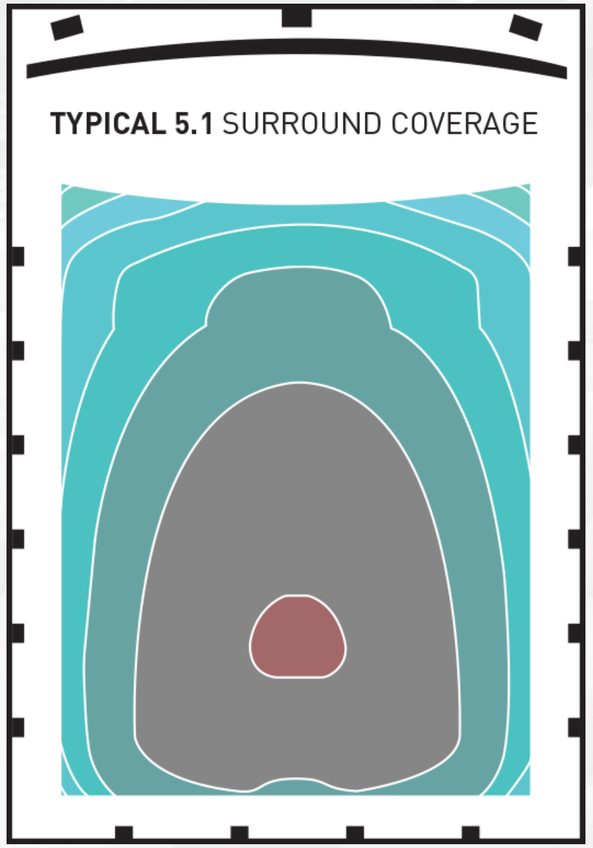
TRADITIONAL SURROUND SOUND (5.1/7.1 SYSTEM)

Most surround speakers are not designed to work with contemporary cinema-style stadium seating. Typical surround loudspeakers that are not adjusted for the inclined rake in theaters can create a buildup and uneven distribution of surround information. As a result, moviegoers may have vastly different surround sound experiences in the same room.



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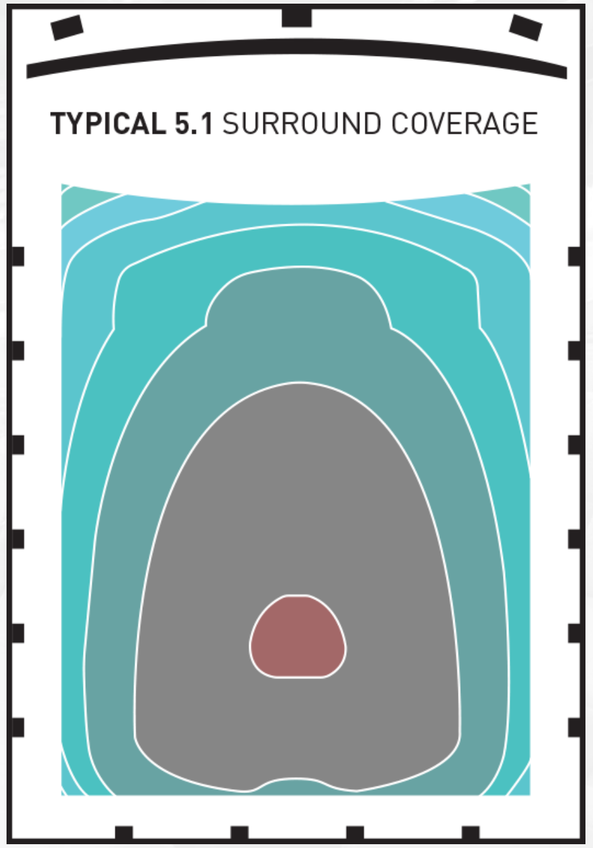
TRADITIONAL SURROUND SOUND (5.1/7.1 SYSTEM)

- Rearward bias
- Poor coverage
- Strong forward cueing for side content
- Reduces the atmospheric audio experience
- Only a small section hears front/rear speakers as intended
- Three zones in the theater with distinctly different experiences



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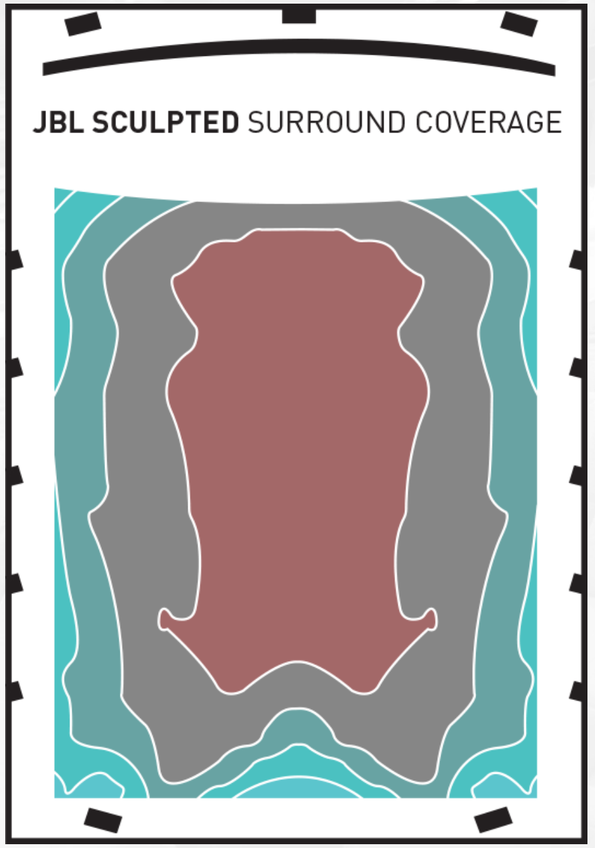
SCULPTED SURROUND (5.1/7.1 SYSTEM)

A sculpted surround system accommodates inclined seating in order to evenly deploy sound throughout the room. Designed specifically for 5.1 and 7.1 surround systems in cinemas, sculpted surround ensures uniformity so that moviegoers experience sound the way moviemakers intended.



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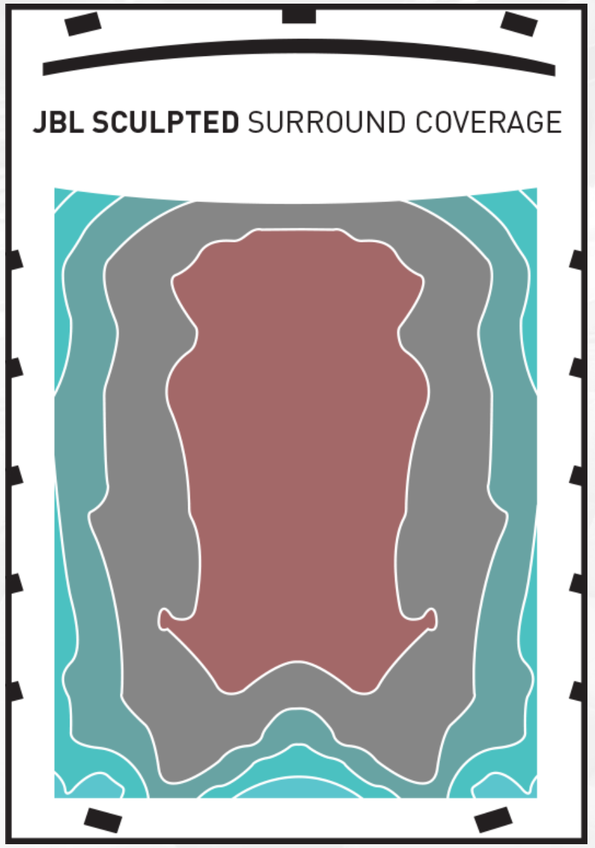
SCULPTED SURROUND (5.1/7.1 SYSTEM)

- All seats receive same signal strength from each speaker
- Speaker directivity and tilting eliminates hotspots and rearward bias
- Broadened sound coverage
- Sound radiation pattern compliments screen channels
- Slightly larger coverage area
- Can potentially reduce number of loudspeakers



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SCULPTED SURROUND IS AVAILABLE WITH THE FOLLOWING JBL PRODUCTS

JBL 9300

JBL 9310

JBL 9350

PROVIDE A FLAWLESS SURROUND SOUND EXPERIENCE TO EVERY SEAT IN YOUR CINEMA

Hear the truth™

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