

Designer Tips & Tricks

'Projection and Coverage Patterns'

What is the effective projection distance for a point source loudspeaker?

Use the 3:1 rule for D2 (Distance to furthest listener) and D1 (Distance to closest listener) to approximate the area over which the loudspeaker provides +/-3dB variation in SPL: $D2 \leq D1 \times 3$.

Which vertical horn pattern do I choose when there are so many options? See Figure 1.

1. Determine the axial aim point to the rear seating.
 - Depending on how much the wall surfaces behind the rear seats present a "slap back" echo, defines how sharp the downward aiming angle should be.
 - For lower trim heights where the loudspeaker must project the full depth of the space, aim for the furthest listeners almost exclusively. Front seats will benefit by close proximity.
 - For higher trim heights or distributed arrays, the aim point will likely be toward the rear third or rear half of the seating.
2. Choose the Nominal Vertical Coverage Angle based on the aiming axis chosen in Step 1 that will include the front seating with priority over the rear seats.
3. If the vertical angle becomes too tall and will project too much on the ceiling or other non-occupied areas, then consider a shorter vertical coverage angle and supplement the front seating areas with fill speakers:
 - Fill speakers can be mounted along the leading edge of the platform to address the first couple rows (i.e. Compact V SERIES or I SERIES models). This will also help those listeners better localize the direct sound to the platform.
 - Otherwise, consider a "down fill" position under the main loudspeakers with a wider angle, lower directivity product.

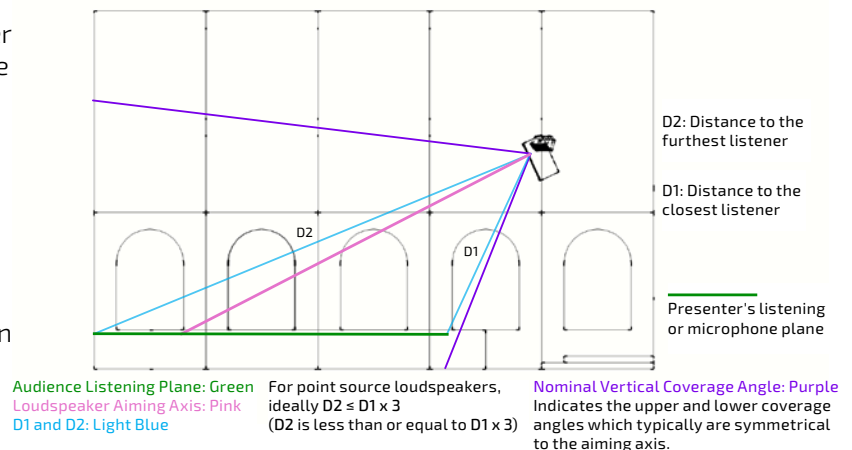


Figure 1. Determine the vertical horn pattern

How do I choose the horizontal horn pattern?

Measure the angle from the furthest listener right to left (from an individual loudspeaker or group of loudspeakers).

Choose a single horn pattern for an individual loudspeaker equal to that angle.

When the coverage need is wider than a single loudspeaker can address, divide the coverage between two loudspeakers and allow 5 to 10 degrees to accommodate the overlap.

Keep in mind that the 3:1 rule also applies in the horizontal plane, and there is a limit to how far a single loudspeaker can project along the breadth of the seating.

Also, the loudspeakers aimed toward the front/center seating can be level adjusted to "amplitude shade" the coverage and maintain proper SPL uniformity.

Figure 2: The dual coverage (light orange) offers a more complete coverage of the full seating area. The single loudspeaker (grey) misses the outside front and front middle of the congregational seating.

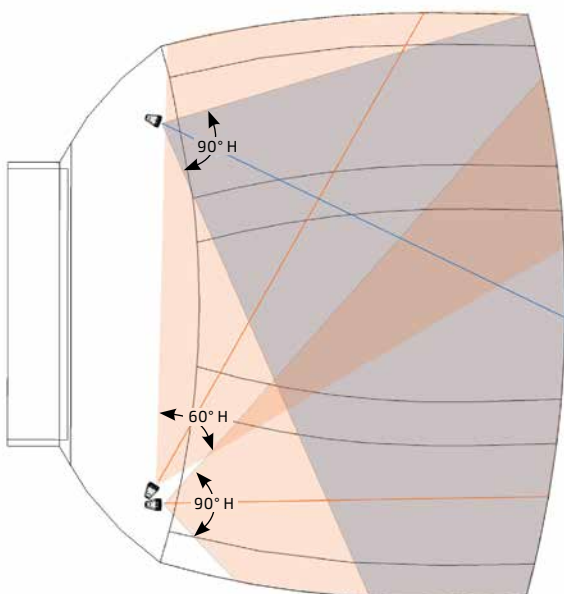


Figure 2. Coverage of single vs dual loudspeakers per side