

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.

- 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.
- 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.
- 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.

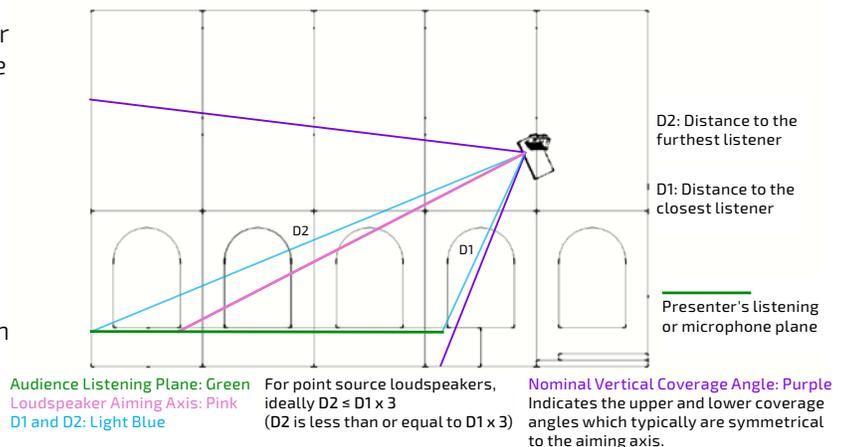


Figure 1. Determine the vertical horn pattern

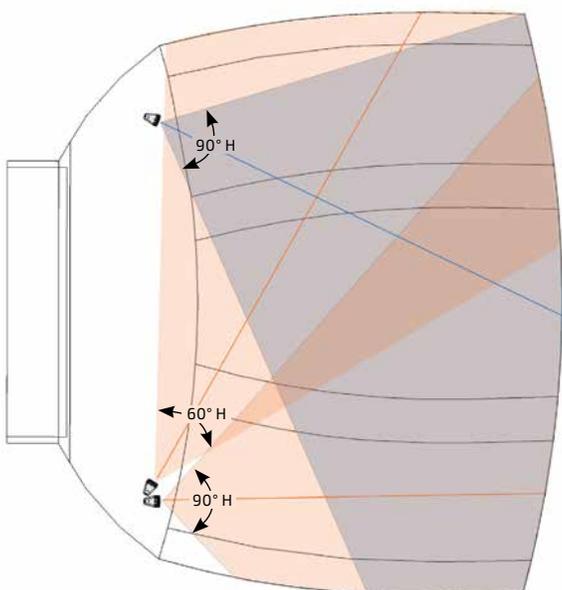


Figure 2. Coverage of single vs dual loudspeakers per side

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.