Typical Venue Applications

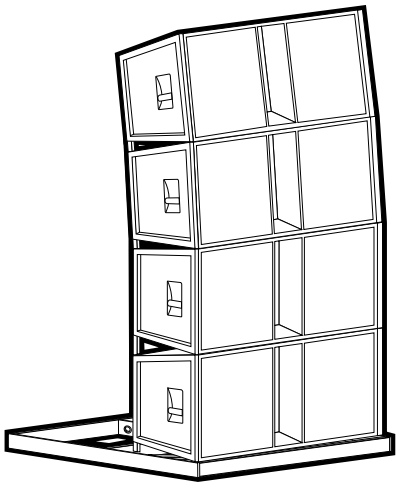
Due to the wide variety of venues and performance spaces you will encounter while using sound reinforcement systems, it is necessary to understand various methods of array design and assembly. To receive full benefit from JBL's Vertical Technology, you will probably want to try a number of different setup configurations. As you do this, over time you will learn what array formats work best under different conditions.

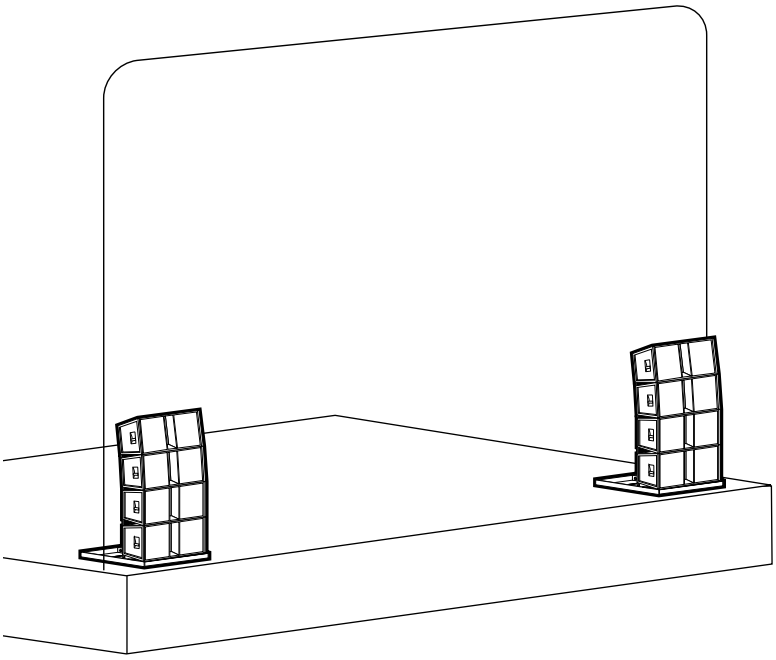
See Chapter 7, "Array Setups".

The mechanical design of the suspension system allows the VERTEC system to be either flown or ground stacked. Either method requires one of the two array frames, and larger arrays may utilize both. Using either the VT4889-AF, the VT4889-SF, or a combination of the two, you can create a broad number of array solutions.

Even the smallest of arrays benefit from a careful review of what vertical coverage is being created, and how that affects the listening environment. Typically, four VT4889 enclosures is the minimum practical array format if controlled coverage and precise directivity is a system design criteria for an event.

The figure below shows a ground stack of four boxes with a mild baffle arc setting. While this array uses the full size VT4889-AF, the smaller SF frame may be sufficient, depending on the angle of the upper boxes. This array solution can be expected to provide controlled directivity. This type of compact array can work well in small venues, including concert clubs and smaller auditoriums.





This figure shows a left-right ground stack such as might be used in a theatre or house of worship where rigging is impractical. You may need to adjust the angle of the upper boxes to cover a balcony.

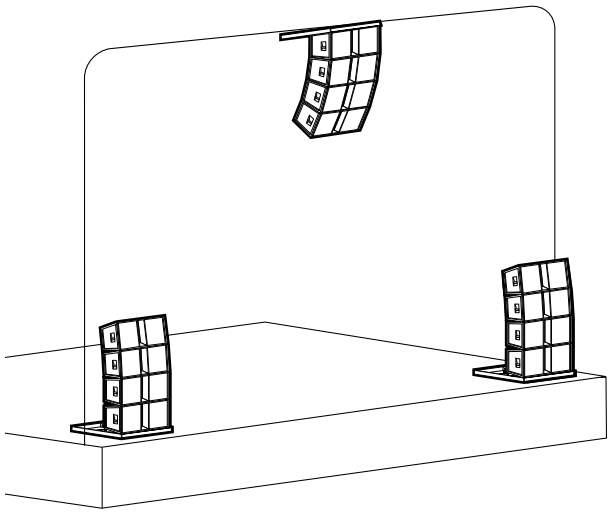
Amplitude Shading

Even on small arrays such as these, you may find it beneficial to apply the technique of amplitude shading to parts of the array. If the system is powered by separate amp channels for every two enclosures, then you can lower the level of the bottom two boxes to keep from over-powering people who are sitting nearby. With amplifiers that are 2-ohm capable, you could put a group of three boxes on one amp rack, making only the lowest or highest box independently adjustable.

While amplitude shading by bandpass is a common industry practice, its use on a portion of the array can affect the coverage pattern of the overall array. This is particularly true with line array systems.

Center Clusters

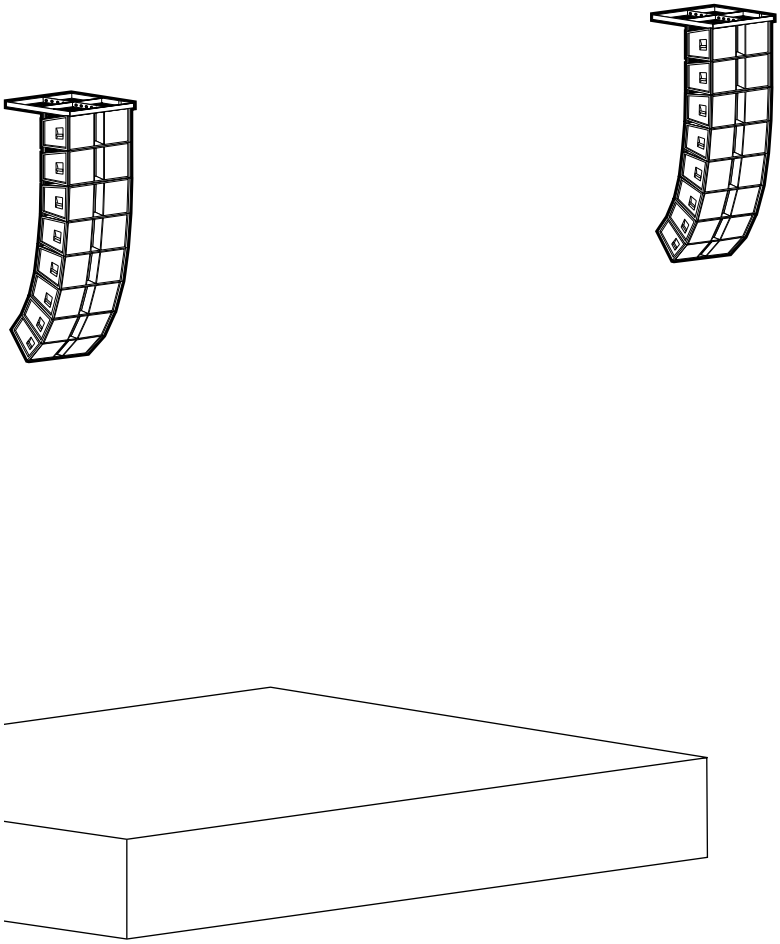
A flown center channel can be added. Left/Center/Right systems can be useful in performing arts centers and auditoriums that feature drama productions or musical theatre. The same caveats apply here, regarding over-powering people sitting near the lowest left or right enclosure. With the center channel present, you can address it independently and use it for vocals and/or speech, gaining the intelligibility advantage of a single source. If there is a balcony, you could send the top two boxes a different mix, perhaps adding in more instruments, to enhance the sound delivered to the balcony seats.



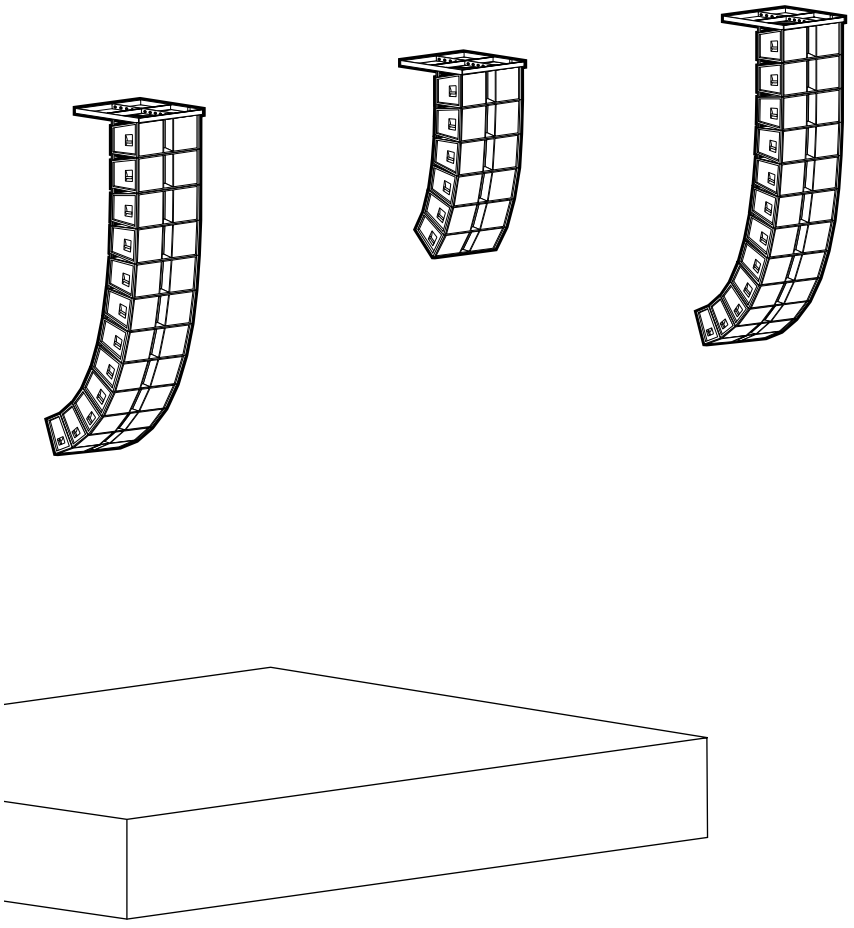
Be sure that the side channels of such a 3-zone system have sufficient horizontal coverage before panning any program input strongly to one side. Something panned center between left and right (as opposed to being in the center channel) will not be as intelligible as having it in the center channel.

Think carefully about dual source versus single-source input placement. You can also have imaging problems caused by the three arrays being outside of the precedence time window (approximately 25 milliseconds). Adding varying amounts of signal delay to left/right versus center helps bring them closer together in the time domain. Splaying the left/right systems in 5°-20° can provide more uniform coverage and better stereo imaging.

This shows a medium-sized 8-box array used in a left-right small to mid-size arena-style hang. For this size array, the large array frame is usually mandatory if the array will be articulated, or curved. You'll probably need the upper part of the array more or less straight to ensure that you have good directivity characteristics in the back of the venuee. Add curvature to the bottom of the array to gain coverage of the near seats. Again, some creativity with the amplitude shading or amplifier patching allows you to drive the upper part of the array harder to overcome the attenuation caused by distance in the far field.

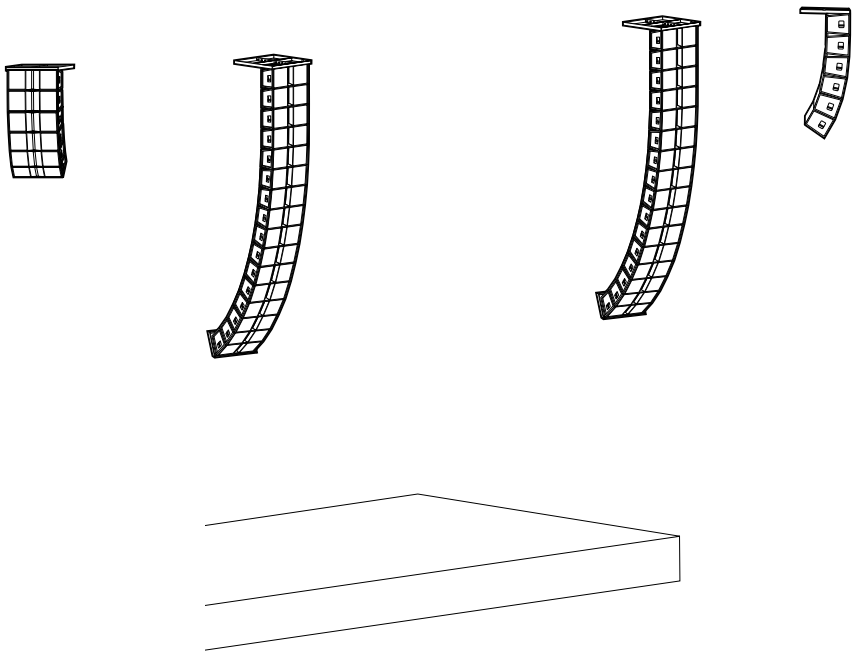


This example shows two 12-box arrays, with a six-box center array added. Such a system might be used in a large arena or multi-purpose venue. The center array in this example uses the VT4889-AF (large array frame), as shown. The Center-Channel caveats for this configuration are the same as those discussed on page 8-3. The Line Array Calculator program helps you to visualize what happens as you bend the array and also what happens with system response characteristics underneath the array.



This array sample shows a 16-box left-right arena hang with 6-box arrays for side coverage. Very large ampitheatres, hockey rinks and other sports palaces often require this approach. Use the Line Array Calculator to ensure that you have enough far field directivity for the rear seats, and enough curvature at the bottom for seats in the near field.

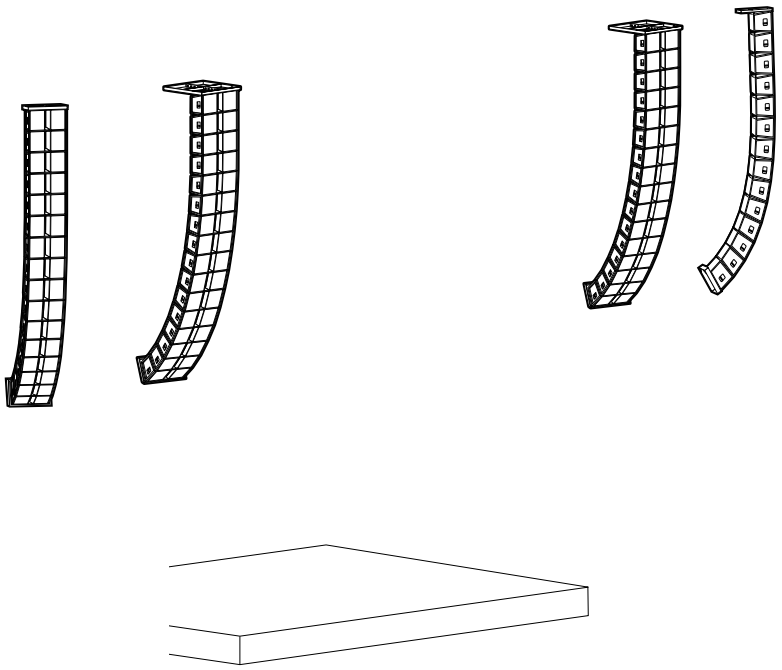
For an understanding of near-field versus far-field coverage areas, see Chapter 1, "Vertical Technology Acoustical Principles".



For optimum performance it is recommended that arrays be spaced apart by a minimum of one wavelength at the lowest frequency of operation, to minimize array coverage overlap and interaction. For example, a 50Hz lower limit would dictate a minimum array separation of 6.5 meters (22 feet).

This shows large 2 x 16 box main left and right arrays, with large secondary side-angled arrays such as you might find in an outdoor stadium venue where both long throws and wide angular coverage are required.

In such situations it is wise to ensure sufficient splay settings of the outer arrays in relation to the inner arrays. This is important to minimize audible array interaction artifacts from this system configuration. A 20°-30° splay angle works well; up to 45° can be set for optimal coverage.



The spacing between such adjacent arrays, and their angle in relation to each other, will affect horizontal coverage characteristics in the listening area.

Satellite Arrays and Distributed Clusters

Sometimes the best sound reinforcement system design for a particular venue or performance space will be a number of small arrays, distributed around the audience area. This includes array designs such as we see below. Here, four smaller 4-box arrays are shown, set up as a distributed, multi-zone system. Very large audience spaces can be covered in such a manner.

This system format is particularly useful in room spaces with lower ceilings such as convention centers and hotel ballrooms. In these situations VERTEC arrays can be angled downwards at steep angles, and box splay angles set at higher numbers, to achieve broader vertical coverage patterns.