FOCUSED SOUND By DAKOTA AUDIO

Evaluating Dakota Audio Arrays

Setting up the array:

1. Power. There is a power transformer and an orange power cord in the accessory box. The labels on the power cord should make hookup self-explanatory. Basically, the two outside terminals on the plug-in transformer are power and connect to the two terminals on the back of the array labeled "power". The center terminal on the plug-in transformer is ground and should be connected to the terminal on the back of the array labeled "ground".
2. Audio Input. There is a black audio cord in the accessory box. Connect the two spade lugs to the terminals labeled "input". Do not connect anything to the terminal labeled "shield". Plug the other end into your audio source. The test cord supplied should work with any stereo or monaural source. If you have noise or hum problems, give us a call.
3. Grill Cloth. We supply a black grill cloth in the accessory box. Most of the time the cloth is not mounted on the array for evaluation. If you do attach the grill cloth, please remove it and put it back in the accessory box before returning the array.
4. Eye Bolts. The eye bolts in the accessory box are for hanging the array into position. Please make sure that the eyebolts are returned.
5. Test Button. When this button is pressed, the microcontroller tests every possible signal path through the circuit board. This can take a couple of minutes. If the button is pushed accidentally the array will appear to go dead for a couple of minutes and then resume normal operation.
6. Mounting Height Button. Press this button until the LED next to the desired mounting height is lit. The average listener's ear is assumed to be at 5 feet above the floor so the focal point of the array is five feet less than the indicated height. Example, if the eight foot LED is lighted, the focal point will be three feet from the front of the array. (8′ - 5′ = 3′)
7. Pattern Width Button. The size of the listening pattern is set with this button. The pattern sizes range from a tight area to a circle approximately ten feet in diameter.

Listening to the array:

We receive comments on our demonstration arrays that range from "fantastic" to "it doesn't work, I can hear it all over the room".

1. It's best to evaluate the arrays in the application where they will be used. A small quiet office is quite different than an open noisy exhibit area.

Phone: 701-224-9331
Fax: 701-223-1296
Toll free: 800-428-3461

1815 Michigan Avenue
Bismarck, ND 58504
www.dakotaaudio.com

Listening to the array: (cont.)

2. If you can't mount the array overhead, and listen to it horizontally, try to mount it so the center of the array is at ear level. If you stand it on a typical desk, the focal point will be about 45 inches from the floor. It's hard to evaluate when you are bent over to find the focal point.
3. Set the listening level at the focal point. The purpose of the focused array is to concentrate the sound in a specific area. Set the level in the listening area, not outside of it.
4. Don't set the volume too high. Seventy dB at the focal point (a little louder than normal conversation) is usually a good starting point.
5. Once you put sound energy into an area, it will bounce around until it is absorbed. In a reverberant room, especially a small room, the sound will bounce around and "fill" the room. (See "Haas Effect" below). Setting the array on a desk in a small office area is probably the worst possible condition to evaluate the array and is not typical of actual applications.
6. In most rooms, the sound absorption is either on the floor (carpeting) or the ceiling (acoustic tile). If the array is evaluated aimed at a wall, the sound will bounce back decreasing the apparent directionality (See "Haas Effect" below).
7. Don't evaluate the array in a quiet area, unless the final application will be equally quiet. Although the sound energy level may drop more than 99% a few feet away from the focal point, our ears keep trying to hear the audio signal. Try to simulate the noise level in the final application.
8. Several evaluators have told us that they had very good results mounting the arrays in a medium size room such as a company lunch room. To simulate the background noise, they placed several radios around the room, set at a low to medium level, tuned to different stations.
9. As with all directional loudspeaker technology, the directionality of the array is greater at higher frequencies than at low frequencies. Other manufacturers roll off the low frequencies to achieve acceptable directionality. We feel that our arrays have acceptable directionality at lower frequencies and it should be up to the customer to determine the desired frequency response. Our arrays have low frequency response to 80HZ.
10. Most rooms have much more sound absorption at higher frequencies than low frequencies. For instance, typical carpeting has very little absorption at low frequencies. Comparing our full-range arrays to other devices with limited response in a listening environment with limited low frequency absorption can place our arrays at a seeming disadvantage. For further information, see our white papers on Exhibit Program Material and Exhibit Acoustics on our website. (below)

Phone: 701-224-9331
Fax: 701-223-1296
Toll free: 800-428-3461

1815 Michigan Avenue
Bismarck, ND 58504
www.dakotaaudio.com

Focused Sound By DAKOTA AUDIO

Evaluating Dakota Audio Arrays

(cont.)

How We Hear & Acoustics Basics: *Factors to consider in how we hear the focused array*

1. Loudness. Our ears hear changes in level in a logarithmic manner. For the apparent loudness of sound to change by a factor of two, the actual power of the sound waves change by a factor of 10. For an audio program to decrease in loudness by a fourth, the energy level of the sound source must decrease by a factor of 100 (99% less energy).

2. Haas Effect. The Haas Effect explains that we localize a sound source based upon the first arriving sound. Subsequent reflections arriving within 45 milliseconds add to the apparent level and intelligibility. In essence, even if the reflections are considerably louder than the original sound, and we hear them as louder, our ears perceive all of the sound as coming from the original source.

3. Sound absorption. It's a basic rule of physics that energy can be neither created nor destroyed. Once sound energy is introduced into a space, it is going to bounce around until it is absorbed by something and changed into heat.

4. Critical Distance. As sound expands from a source, it spreads out. Each time the distance from the source doubles, it expands to fill four times the area. Therefore, as the distance from a source doubles, the energy level of the sound waves decrease by three quarters. As the sound waves continue on and bounce around the room, there can come a point where the millions of reflections "flood" the room with sound. No matter where you go in the room, you are in the field of these random reflections. This is not a function of the type of sound source, directional or non-directional. Once you put the sound energy into the room, unless it is absorbed, it will bounce around and fill the room. The distance from the sound source where the sound level does not decrease (due to the reflections filling the room) as you move away from the sound source is called the critical distance. Naturally the distance is determined by the amount of sound absorption in the room. We have seen highly reverberant rooms where the critical distance was as small as 18" from the sound source. No matter where you were in the room, the level of reverberant sound was the same as if you were 18" from the sound source. Our arrays will typically dump 20 dB less energy into a space than a non-directional speaker for the same level at the listener's ear. However, If you can easily hear someone talking on the other side of the room, exhibit audio will also probably be audible throughout the room.

Phone: 701-224-9331
Fax: 701-223-1296
Toll free: 800-428-3461

1815 Michigan Avenue
Bismarck, ND 58504
www.dakotaaudio.com