

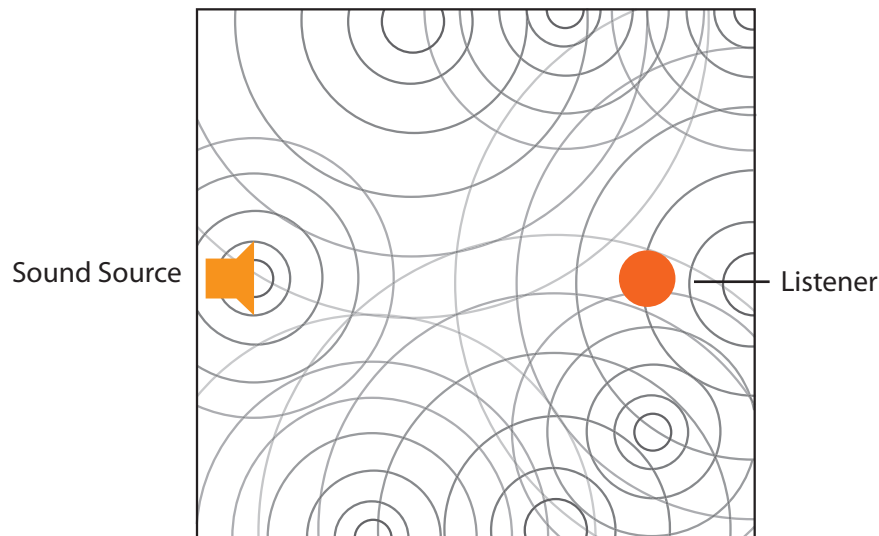
Episode™ Acoustical Solutions

Room acoustics are an often misunderstood and frequently undersold solution within our industry. This brief paper is intended to help with both the understanding and selling of these types of products.

POINT OF VIEW

Typically an acoustic system sale (like audio systems or home theater) will be weighted with a focus on the technology to deliver the sound into the room. Seldom is any attention paid to how the room either contributes or detracts from the equipment chosen, often making a potentially high performance sound system under perform and resulting in disappointment for the customer in the end.

We have experience multi-thousand dollar sound systems sounding terrible, because of the reverberation (sound bouncing around inside the room). All of us have dined in a restaurant that sounded too loud to carry on a conversation. If listened to, typically it isn't the volume of the conversation but rather the continued reflections (echoes) of sound that make it difficult to hear. This is a dramatic example of the same thing that happens in a home theater or music listening room where the reverberations are not controlled.



One of the first scientists to investigate the role of room acoustics in high quality sound reproduction was Roy Allison. Mr. Allison's seminal research in this area was revolutionary and led to a new way of looking at speakers and equipment design. The basic premise is that the acoustical makeup of a listening room plays a significant role in the total system of sound reproduction. Allison explains: "The acoustical parameters of room have not been understood by many audio enthusiasts. The problem is that acoustics as a science is poorly understood by many audio enthusiasts. However, it should be known that one does not need a PhD in the field to properly treat their own listening room; a few modest room treatments can go a long way. The trick is in knowing which ones are best to use".

BACK TO SCHOOL

If you understand the way sound travels in a listening environment then you can fully understand how to control the sound.

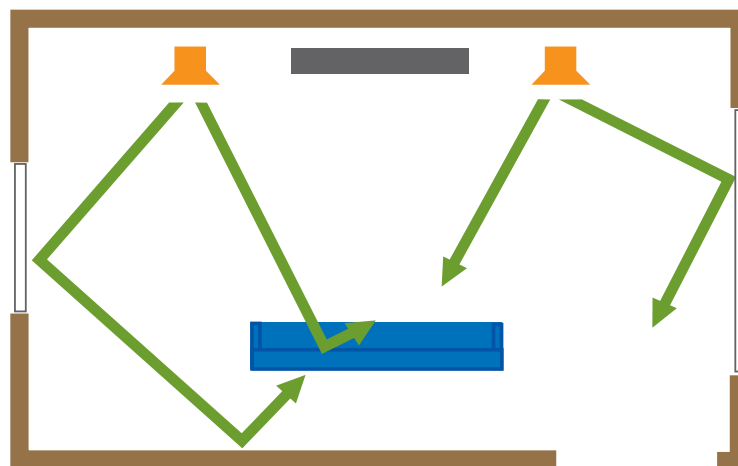
Within an enclosed space the acoustical sound field can be complex but there are three predominant components: Direct sound, Reflective sound, and Reverberation.

- **Direct Sound:** The sound coming directly from the speakers themselves traveling in a straight line to the listener's ear. These sounds are the most significant component of sound because of their large amplitude and direct transmission characteristics. You can experiment with this by sitting directly in front of the speaker then move over to the left or right a few feet and notice the changes.
- **Reflective Sound (often referred to as secondary reflections):** The sound waves that directly bounce off of hard surfaces flanking the speakers and the listeners. Figure 1 illustrates the sound paths as they reflect off nearby walls, ceiling, and floor surfaces. We have all experienced this in a busy restaurant as mentioned above.
- **Reverberation:** These sounds consist of countless random reflections that bounce off other surfaces in the room and eventually arrive to the listener's ear. These sound reverberations reinforce the feeling of the room size and ambiance. This is experienced when inside a large stone cathedral church with the reverb reflecting from the walls giving you the cavernous feeling.

THE LISTENING ROOM

So how do these sound components affect your listening room? When you play the sound system or have a gathering of people, all the sounds bouncing around combine to form an acoustical signature. This signature becomes superimposed to create an overwhelming volume of audio or the feeling that two systems are playing at the same time.

When designing a listening environment it is best to strive for a sonic balance of the three types of sounds mentioned above. For example, you don't want to under estimate reverberation sound or it will sound like you are listening in a tiled bathroom. On the other hand, you don't want to void the room of reflections or the room will sound dead. ***The ideal room allows some of the first reflections and some of the reverberation component to arrive at the listener's ear.***



THE CONTROL

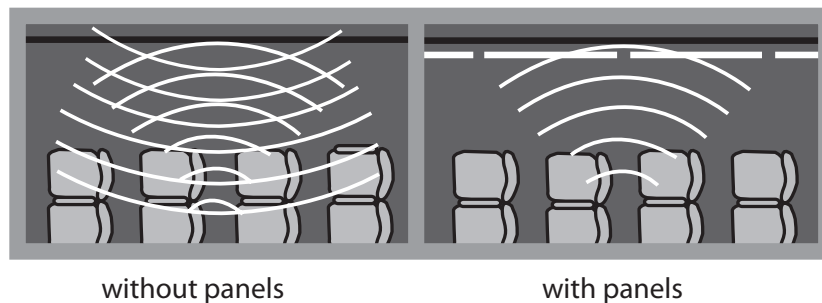
There are two ways to control the first reflection and the reverberation to achieve sonic balance: Absorption and Diffusion.

- Absorption: Surfaces that consist of material that dampen sound waves so only a fraction of the energy is reflected.
- Diffusion: The principle is to take sound waves directed at the diffusive surface and break them into small components, rendering them insignificant to the listener.

THE HOW

There are dozens of methods and hundreds of products available to consider, but we are going to take a more pragmatic approach. Let's consider each individual surface in a room and suggest treatments.

- Ceiling and Floor: These surfaces can be the worst offenders because they are often constructed of extremely reflective material. Fortunately, wall to wall carpet and area rugs do a good job of absorbing sound waves on the floor. As for the ceiling, gluing carpet to it would work but may detract from the aesthetics of the room. A better solution is to install acoustic tiles or panels. Our sound panels are engineered to address these specific types of acoustic issues.
- Walls: Listening room walls present sonic challenges because they are typically constructed of hard surfaces such as dry wall, glass or wood. Since walls are located near the listener, the listener is directly involved with the first reflection of sound. It is important these reflections are absorbed. Some absorption can be achieved using upholstered furniture and drapes, however, the best solution is to place absorption panels on the wall where the first sound reflection occurs. These side-wall locations can be easily identified using a mirror. While someone sits in the listening position, hold a mirror up to the wall opposite the speaker. Move the mirror along the wall until the listener can see the speaker in the mirror's reflection. This is the first sound reflection location where a sound panel should be placed. You will also need to address the rear wall. Sound typically bounces off of this wall and reflects directly to the listening position. Like the side walls, it can be treated with sound absorption panels, although strategic placement is not as important. With these panels in use most rooms will sound remarkably better, making the sound system perform as it is supposed to.



CONCLUSION

Many electronics companies try to make the consumer believe that high cost electronics will guarantee great picture and sound. The fact is that the system cannot be separated from its room.

Attention to the room's acoustic performance will make a significant difference in any listening area, our sound products are engineered to provide a cost effective way to maximize the performance of the sound system that is being installed.