



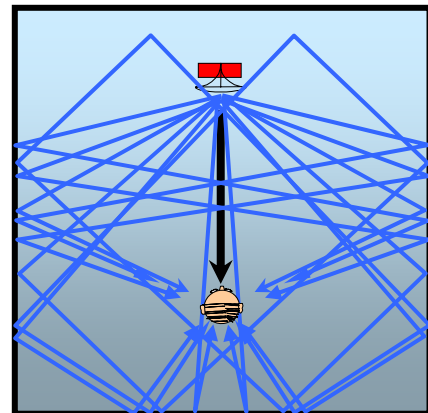
Performance Media Industries, Ltd.

The Acoustic Foundation
5/2004

by A. Grimani

I have been asked a few times recently if acoustic design work for home theaters is important, and furthermore, at what point that design work should take place. Holy Moly! I thought we in the industry had answered these questions already!! Well, maybe not yet, so let me address them again here (again?!).

Acoustics play a vital role in the sound of a home theater. Consider this: In a typical listening room, when you sit twelve feet from the front speakers you are actually listening to more reflected sound energy from the room than direct sound energy from the speakers. Thus, the room's acoustic "thumbprint" affects more than 50% of the sound you hear. Isn't that reason enough to carefully design the character of that thumbprint?



Reflected energy can be louder than the direct sound.

The field of acoustics as applied to home theaters actually comprises several areas. First, there is sound isolation. The room should ideally be completely isolated from the residential environment around it so that loud and distracting sound leaking out of the theater does not bother everyone in the house!

Second, the room should be totally quiet inside. No fans, no street noise, and no vibrations should be heard, or you may miss subtle elements of a film or song. Remember that the latest audio formats theoretically provide up to 144dB of dynamic range, so your room had better be completely silent if you want to hear the full range of sounds these newfangled high-resolution formats offer. Also, noises that turn on and off, like a ventilation unit, can distract listeners from a movie or a concert, which is counterproductive to what you are trying to do: immerse yourself in an entertainment experience that is so optimized that you are transported into the action and completely forget your daily woes.

Third, a home theater's bass resonances should be minimized. If they aren't, the tight, punchy bass from dynamic digital soundtracks turns into a thick mush.

Fourth, the sound reflections within the room should be controlled through careful and strategic use of absorption and diffusion techniques. Controlling reflections will improve dialog clarity and musical articulation, while solidifying phantom images and opening the soundstage. Ultimately, the multiple speakers of a surround system will integrate better in a room with proper acoustical treatments. Acoustical treatment layout is sometimes thought to belong in the domain of experiential art, but it isn't really black art at all. However, it is rather complex, and scientific findings in this area are only very recent. Thanks to this research, acousticians are now know able to predict optimal reflection decay times, scattering patterns that produce the most pleasing sound, and thresholds of audibility for discrete reflections. You can put all this information to good use and design layouts that will work from the word go. There are also very cool acoustical modeling programs, such as Ulysses from IFB Soft, that allow you to build up a 3D CAD version of a room, then place speakers in it and determine all the relevant reflection paths. You can optimize the treatment locations and ultimately listen to a wav file processed through the program's DSP capabilities. Pretty cool, huh?

The good news for you is that materials, services, and products are all available to help you achieve acoustic nirvana. A high-end home theater audiophile recently called up his dealer, who had contracted my firm to perform his acoustic design, and enthusiastically claimed that the treatments we specified had done more to improve the sound of his system than any upgrade he had tried in the last five years – by tenfold. Acoustic treatments use no batteries, don't break down, and require no programming. Can you think of an easier way to add value to your home theater?

This article is based on a column published by A. Grimani in Residential Systems magazine May 2004.