

The Curve Combination Guide: Home Theaters & Music Listening Rooms

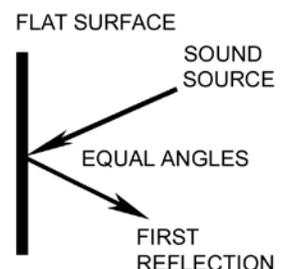
Curve System components may be used in combination to solve most of the acoustic issues found in home theater and music listening room environments.

After a hundred years of acoustical science, we know that smooth reverberation times, a relatively flat frequency response, widely-spaced room modes, and a lack of flutter echos are key elements of the best listening rooms. The classic way to achieve those goals has been the proper balance of diffusion, absorption, and low frequency control. While room size, layout, and dimension ratios place a limit on what can ultimately be achieved, this general guide will help you improve your listening experience, whatever your room conditions.



And please note that a “proper balance” between Diffusers and Absorbers does NOT mean a 50 / 50 split between the number of diffusion and absorption units – it means the right combination to achieve the most properly-balanced sound. Rooms with too-long reverberation times will generally need more absorption than diffusion, and likewise, rooms with too-short reverberation times will generally need more diffusion. The goal is to find the right combination to suit your room and taste.

There are (at least) two schools of thought regarding how to best treat a room for home theater sound. Recording studio designers most



often use first-reflection diffusion; most home theater designers tend toward absorbing the first reflection, which is possibly due to the lack of attractive, affordable, and effective modular diffuser products – until the introduction of the Curve System. For those unfamiliar with the term, “first reflection” refers to the first “bounce” of sound energy from the primary left-right pair of speakers at a point on the side walls and ceiling where the reflection angles between speaker and listener are equal.

This Guide presents two examples of options for diffuser / absorber placement: *Diffusers* at the first reflection point and, alternately, *Absorbers* at the first reflection point. Both examples use the same room dimensions and setup, except for the placement of Absorbers and Diffusers on the side walls and ceiling. You may choose either style, or a different way to set your room up for the results you want. Remember that Curve System components are modular and moveable, so you can experiment to find your best results.

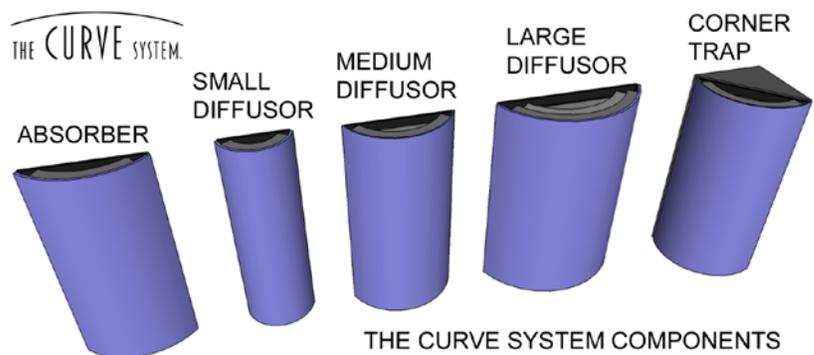
A few points to consider:

- The larger the room volume, the lower the fundamental frequency of the space;
- Rooms with less than 1500 cubic feet of volume are less desirable, due to room-mode buildup above 200Hz and limited low frequency response;
- Proper ratios of height to width to length are necessary in spreading room mode instances. The room shown in these examples is 1:1.49:2.09 (8' high X 11' 11" wide X 16' 5" long); optimum room ratio resources can be found online.
- And most importantly, all rooms are different, and listening preferences vary widely from person to person.

The placement of Curve components is made easier by considering each unit's function:

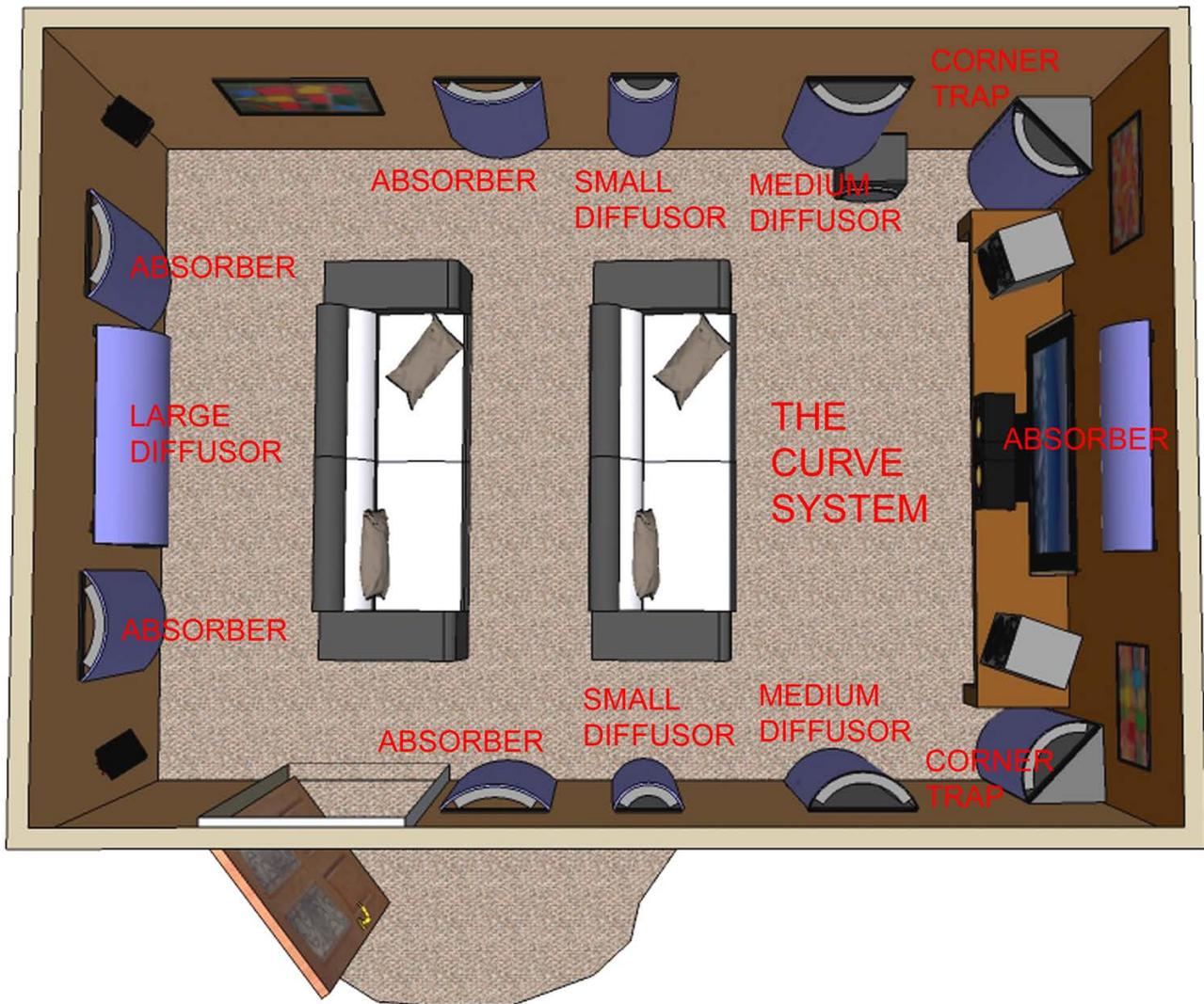
- The three Diffuser sizes are meant to spread the sound energy of flat-wall reflections and absorb low frequencies (by diaphragmatic and membrane absorption). Mixing their order - for example a Medium next to a Small - avoids comb-filter artifacts. Changing orientations, vertically or horizontally, will diffuse sound in different planes;
- Absorbers “soak up” sound in the 200-20kHz range, and their similar form factor allows combining them with Diffusers wherever needed without changing the visual design;
- Corner Traps work where two walls and the floor or ceiling meet. They can also be used where one wall and the ceiling meet, keeping in mind that *all* room modes are present in three-plane corners, while only perpendicular modes are present at two-plane junctions;
- The membrane built into each Diffuser also helps control low frequencies, and correct placement is important.

Example 1: Component Placement With Diffuser At First Reflection



This modest-sized home theater / music listening room has a dozen well-placed Curve components. There are no units shown on the ceiling, but that is an option to consider (more on that later). The room dimensions are 8 feet high by 11 feet 11 inches wide by 16 feet 5 inches long. A room of this size has about 1590 cubic feet of volume and can be built into

most homes.



On the side walls, the Diffusors and Absorbers are placed roughly centered (top to bottom) on the listener's ear level while seated. The Medium and Small Diffusor placement follows the alternating-size rule. For Diffusor location from front to back, use this method: sit in the center of the first seating row and have someone hold a small mirror on the surface of the left side wall at eye level - move it forward and back until you can see the left front speaker in the mirror's reflection – this is the Diffusor's position for first reflection from the front speaker pair. Repeat this for the right wall / right speaker, or place the left-right units symmetrically. This diffuses the primary reflection from the left-right pair – the same can be done for the second set of Diffusors for the rear seating row.

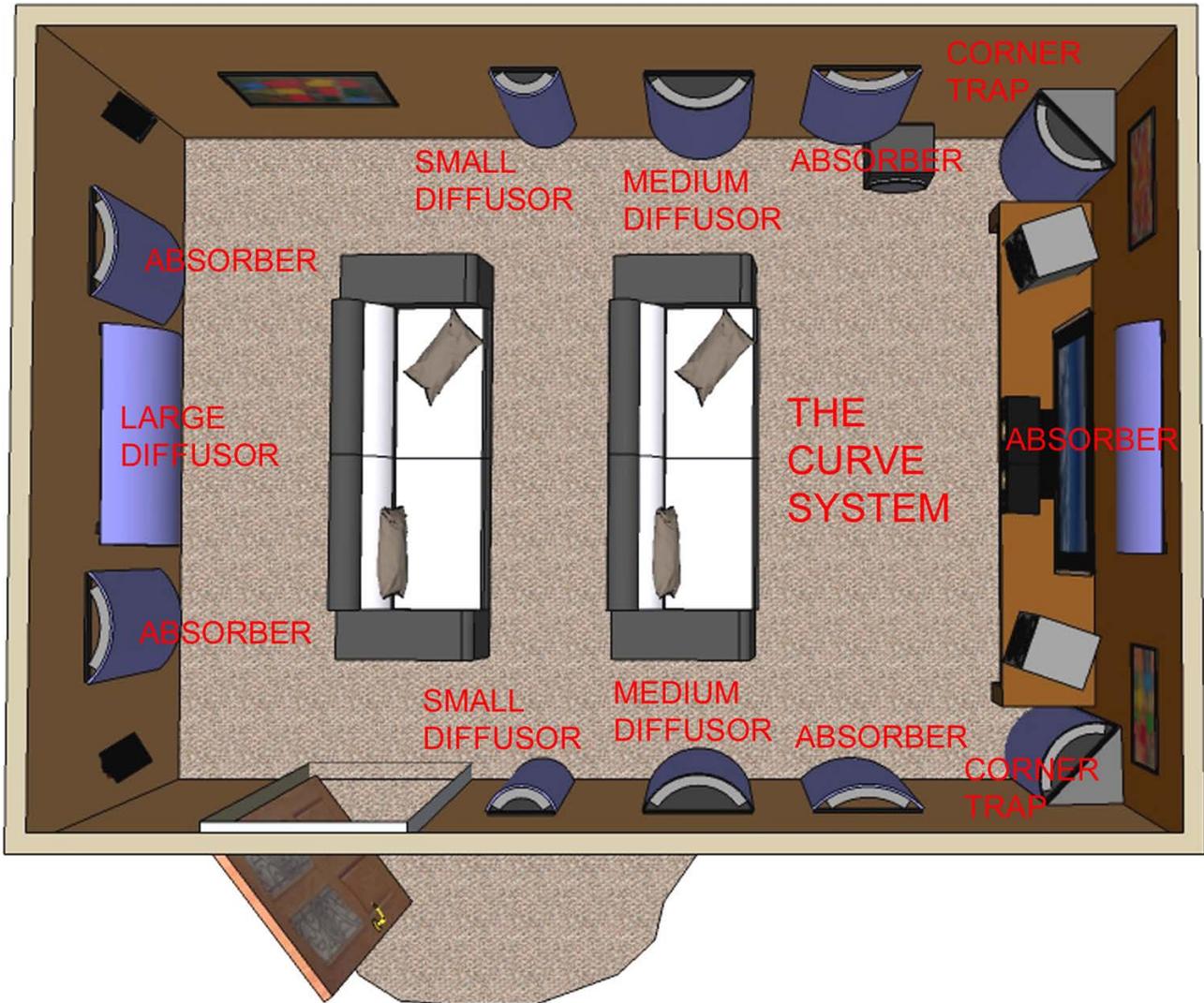


A good general rule is to use most of the Diffusors and Absorbers on the walls for horizontal diffusion (we hear more left-right than up-down). Diffusor placement on the ceiling can help with some vertical modes and flutter echos between floor and ceiling. The recommended placement is two units end-to-end between left and right walls, in the same plane as the first set of Diffusors.



Example 2: Component Placement With Absorber At First Reflection

Like Example 1, this room has a dozen well-placed Curve components. The room dimensions are also the same - 8 feet high by 11 feet 11 inches wide by 16 feet 5 inches long. In this setup, Absorbers are at the point of first reflection and the Medium Diffusors are next, followed by the Small Diffusors toward the back of the room.



The same mirror-positioning method also works for Absorber location from front to back (move the left side wall mirror forward and back until you can see the left front speaker in the mirror's reflection to find the Absorber's position) Repeat this for the right wall / right speaker, or place the left-right units symmetrically. This absorbs the primary reflection from the left-right pair.



The rule for wall versus ceiling placement is true here also - use most of the Diffusors and Absorbers on the walls for horizontal diffusion. In this case, Absorbers are placed on the ceiling instead of Diffusors to match the side wall first reflection positioning. Similarly, two units end-to-end between left and right walls, in the same plane as the first set of Absorbers.



Examples 1 & 2: Front and Back Walls

Here's the front wall – we've placed the Corner Traps here, closer to the low frequency sources, and also to utilize their diffusive properties near the front left-right speakers.



On the back wall, note the Large Diffusor placed horizontally to diffuse sound in the vertical plane. This also places a large membrane absorber (built into the Diffusor) on a surface that will help control low frequencies in the room's longest dimension. The two vertical Absorbers help control reflections off the back wall.



The fabrics covering the Curve System components are available in five stock colors, as well as custom colors and wood veneer options.

If you would like more assistance in choosing Curve units for your room, please contact one of our acoustics professionals at www.cascadeaudio.com.
Email: Info@cascadeaudio.com; Phone: 541-389-6821.

