Five Steps to Home Theater 5 Easy Steps to Maximize Your Home Theater Experience







Speaker Placement

Speaker placement will make or break your sound! When possible, set up your speakers symmetrically left to right in your room, outlining a circle around the primary listening position. That will give you the most accurate sonic representation of the movie soundtrack.

Left/Right Front Speakers

Generally, the ideal location will be located to either side of the TV screen, at least 1.5 to 2 feet away from the screen itself. It's actually best to have the speakers a little forward of the screen and out away from the side and back walls. For the best performance and to minimize interactions with the walls (boundaries) it helps to be sure the distances from the rear wall and sidewalls relative to the speaker are different. The speakers should be placed with the tweeters as close as possible to seated ear height, about 35-40" off the floor. Experiment with them toed in towards the prime listening position or facing straight out into the room.

TIP: Sound staging is a fairly simple concept—when listening to a well-recorded CD on a properly set up speaker system, you should be able to close your eyes while sitting directly at the apex of an equilateral triangle in front of your speakers and hear the distinct placement of all the instruments in the recording as if they were performing for you on your own private stage. If you experiment with moving the speakers further apart or closer together, or change the angle which they are facing in, you will be amazed to hear the effect something as seemingly insignificant as a couple inches can have on your sound. Remember, the better your speakers sound in stereo, the better they'll sound with movie soundtracks.

Center Channel

Ideally, this speaker should be located directly on top of or below the center of the TV screen. The center channel is arguably the single most important speaker in a home theater system, because it handles up to 80% of the movie's soundtrack!

Putting a speaker in the same plane of the TV screen does, however, cause certain problems. Sounds that would normally radiate equally in every direction from the speaker are instead immediately reflected off the television's screen. This causes undesirable sonic "colorations" that make the center channel sound different than the left/right front speakers, even if they are precisely matched.

This is why all Atlantic Technology center channel speakers include one or more controls that allow you to tailor their sound to better match the L/R speakers. Additionally, all Atlantic center channel speakers come with an adjustable mounting base that allows precise aiming towards the prime listening position for better dialogue intelligibility.

One last thing: Try to keep the height of the center channel speaker's tweeter within about 18-24" of the left-right speakers. You want sounds to pan smoothly across the L-C-R front stage, without any unintentionally abrupt changes in the apparent sound source.

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Subwoofers

With traditional box subwoofers, it's best to experiment with placement, since no two rooms are exactly alike. Keep this in mind: room boundaries—such as floors, walls, and ceilings—act like "acoustic mirrors," and will reinforce the subwoofer's output. Therefore, a subwoofer placed 3 feet out from all the sidewalls behind a chair, for example, will sound thinner and weaker than the same sub in the same room place directly at the floor-wall intersection.

Also keep in mind that rooms tend to have what engineers call "room modes" or "room resonances," whereby the room's dimensions will either reinforce or weaken certain bass notes where the bass wavelengths correspond to the room's dimensions. The best way around this (especially if you aren't using expensive, complicated room diagnostic tools and fancy equalization) is to locate the subwoofer asymmetrically in the room with respect to the room's dimensions.

For instance, if the sub is going to be placed along an 18-foot wall, try locating it, say, five feet out from the corner. Five and thirteen feet are mathematically unrelated, so they don't conspire together to reinforce or cancel related frequencies. On the other hand, if you located the sub 6 feet out from the corner, then you'd be left with 12 feet. Not as good, because 12 and 6 are directly related (2:1 or 1:2), and you could get a buildup of room modes around related frequencies. 9 feet out (mid-wall) is even worse, because then it's 9 feet and 9 feet.

If you have the space and budget for two subwoofers, that's even better. Not only can you achieve higher bass loudness levels in your room with lower distortion, but as you now know from the preceding discussion about room dimensions, you can really randomize the effect of room resonances by placing two subwoofers asymmetrically in the room. The response will be very smooth, with great impact and definition.

You get the idea. Experiment with placement.

TIP: For those of you looking for better performance, there are significant advantages to using two subwoofers rather than one. Not only will you gain more bass, more importantly, it will sound smoother at all seats in the room. As for placement, try putting a woofer on the front and back, or sidewalls opposing each other (staggered asymmetrically). The results will be stunning. Try it!

The exception to all this is our 10 CSB Corner Subwoofer. It's shaped and designed to look and sound its best when placed in a corner, so that's where it goes. Simple.

Figure 1

Typical arrangement for a single subwoofer in a home theater.



Figure 2

Asymmetrical arrangement for 2 subwoofers in a home theater, for example, one closer to a corner than the other



Figure 3

Corner placement for Atlantic Corner Subwoofer

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Surround Speaker Placement

Before we talk about placement of surround speakers, it's important to dispel a common misconception: Surround speakers are not "rear speakers" like what you have in a car.

Believe it or not, the surround speakers in a properly set up home theater system should not be noticed unless they are turned off. Surround speakers provide the depth, the three-dimensionality to a movie soundtrack. Recording engineers often call these "effects speakers," because that is what they typically reproduce: the critical surround audio cues that reinforce the action on screen, providing the experience of putting the viewer directly in the virtual environment created for the movie that you are watching.

There are several different types of speakers used for surround applications but the rule of thumb for the best location is the same: try to place them such that their sound can't be specifically pointed to or "localized" by the listeners. (Remember, you can't point to an echo and say, "Aha! There it is!") The goal of surround speakers is to immerse the listening room in three-dimensional, enveloping surround effects.

Dipoles

For dipole surrounds (sometimes called "diffuse field" surrounds), the ideal location is directly alongside the prime listening position, well above ear height when seated, approximately 12-24 inches down from an 8-10 foot ceiling. Dipoles may be placed slightly rearward of the prime listening position on the sidewall, or even located on the back wall if absolutely necessary. For ceiling-mounted dipoles, such as our 6.3e or 8.3e Tri-Vector speakers, the best location is either directly above or very slightly behind the primary listening area. Locate them just outside either side of the sofa.

Bipoles

These speakers can be placed similarly to dipoles, and can even be placed forward of the listening position as well. But it's typically more difficult to get a bipole to deliver a non-localizable sound field unless they're located fairly high on the side walls, well above seated ear level. Bipoles will work satisfactorily on back walls or ceilings, as long as they're far enough away from the listeners so their sound can't be localized.

Monopoles

These are also known as direct radiators—what most people think of as 'regular' speakers. When used for surround speakers they should be placed relatively high up on the rear or sidewalls, with the tweeters firing straight out from the enclosure (not angled down towards the listeners), high above the listeners' ears. This helps to create a more believable "surround experience" and makes this type of speaker less localizable.

What about surround speaker placement in 7.1 systems?

In 7.1 systems, the side speaker placement should follow the same guidelines as outlined above. For the rear surround speakers, bipoles or direct radiators are generally fine. Again, place them so the tweeters are well above seated ear level.

If you are using dipoles for the rear speakers as well as for the side speakers, pay attention now!

Remember when you installed your side surround dipole speakers? They have a "+" side and a "-" side. You oriented them so that the "+" of each speaker faced towards the front of the room.

So here's what you need to do when mounting dipoles on the rear wall to go along with dipoles mounted on the side wall: Switch the Left and Right surround speakers and mount them "backwards" on the rear wall. In other words, the Right speaker will be on the left side of the room and the Left speaker will be on the right side of the room.

Why?

Here's why: By swapping the rear surround speakers, the rear-firing "-" of the side surround will blend right into the out-firing "-" of the rear surround. Then the two inward-firing sides of the rear surrounds will both be "+." Then the out-firing side of the other rear surround is "-", and it will blend seamlessly into the rear-firing "-" side of the other side surround speaker. Everything sounds nice and smooth, very realistic and convincing, with no abrupt, unnatural changes in the soundfield.

This is pretty subtle stuff, but it's these kinds of little things that make the difference between good-sounding and great-sounding systems.

Figure 3

Dipole/Bipole type speaker



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Figure 4 Direct Radiator type speaker







Setting the Crossover Frequency and Speaker Size

Regardless of the actual size of your main speakers, ALWAYS set the speaker size selector on your receiver to 'SMALL.'

Bass is king in a home theater. In fact, many people are drawn to the home theater experience because of the dynamic and engaging bass produced by the subwoofer. Therefore, it's important to understand that your receiver or pre-amplifier distributes low frequencies (bass) based on how the speaker size selector is set: either 'Small,' or 'Large'.

Trust us on this one—ALWAYS set the control to 'SMALL'. By doing so, you will ensure all bass that is contained in the front, center and surround channels is directed to the subwoofer where it belongs. Remember, the subwoofer is what allows a smaller speaker system to sound much larger than it is physically. Otherwise we are faced with the prospect of anemic bass, or very large speakers— which you probably agree are not compelling options!

Set the crossover in your receiver or pre-amp at 80 Hz for optimum distribution of bass between the subwoofer and satellite speaker's.

The crossover found in your subwoofer and receiver or pre-amplifier, acts like an "audio traffic cop" by directing middle and high frequencies to your satellite speakers comprised of the Left, Right, Center and Surrounds; and lower frequencies (bass) to your subwoofer. Consequently, a common question we hear is: "What frequency should I set my crossover at?"

Based on the THX standard, and much documented audio research, 80 Hz is usually thought to be the best place to start. In fact, most higher quality speaker systems on the market today (of which Atlantic Technology offers many) are actually designed to work best with the crossover set at 80 Hz.

Many of today's better receivers and pre-amp processors have userselectable crossover frequencies, with a range from perhaps 40-160 Hz. If you are using very large main left-right speakers, you could set the crossover to 50 or 60 Hz (still set the Left-Right speakers as "small," however). This really frees up your ability to experiment with subwoofer placement, since the very low bass frequencies (below 60 Hz) are virtually impossible to locate by ear.

However, if you have one of those "mini" satellite systems where their little 2" or 3" drivers couldn't reach down to 80 Hz in their dreams, you'll want to set the crossover to the upper end of its range—about 160 Hz or so—to relieve the sats of the strain of trying vainly to reproduce the frequencies in the 80-160 Hz range. By setting the subwoofer's crossover to 160 Hz, you avoid the dreaded "acoustic hole," which robs music of its weight and body, and makes dialogue

sound unnaturally thin and anemic. Of course the higher you set the subwoofer's crossover frequency, the easier it is to "localize" (detect its location by ear), so your sub placement flexibility is greatly reduced.

That's why those cutesy-little micro-sat systems aren't really a good choice for a serious home theater system.

Since powered subwoofers also have crossovers built in to them, it's generally best to bypass their crossover or, if the subwoofer doesn't allow you to do that, set its crossover as high as it will go. The idea is to avoid "competing crossovers" between the subwoofer and receiver, because two crossovers that overlap will cause all kinds of electrical "interference" that degrades the sound.

Remember the traffic cop analogy? It's the crossover that determines which frequencies get routed to the subwoofer and which go to the satellites. Be sure to read your receiver's and subwoofer's owner's manuals to ensure you set the crossover(s) optimally. DO NOT ASSUME ANYTHING! Setting your crossover is one of the most overlooked, yet sonically critical adjustments that you can make in your system.

Special Section for those hotshots who think that your main speakers are so good you don' need no stinkin' subwoofer (in other words, you selected "Subwoofer—No," and "Left-Right speakers—Large" from your receiver's set-up menu):

Wrong!

Keep this in mind:

The LFE channel (Low Frequency Effects) does indeed contain different bass information than the regular front channels. The LFE channel contains the explosions, crashes, earthquakes and other effects that are not present on the other five channels.

Now, when you select "Subwoofer—Yes" from your set-up menu, most receivers/processors gather up ALL the bass below 80Hz (or whatever electronic crossover frequency you've selected, if yours is selectable) from the LCR, surround, AND the LFE channels and then routes it to the ".1" subwoofer output. Therefore, the bass coming from your sub output (assuming you've selected "Left-Right speakers—Small") is a combination of the 75Hz music tones in the LCR channels and the 22Hz warp engine rumblings on the LFE track.

But you didn't do that, did you? You selected "Subwoofer—No," because you think your 7-foot tall Left-Right speakers are SO good that you don't need a sub. Well, two things happen when you select "Subwoofer—No" from your set-up menu. First, you lose the ability to control (via the receiver's or processor's remote control) the LFE/ Sub level from the convenience of your listening chair. One of the best things about using a powered sub is that your receiver's remote lets you raise or lower the sub level remotely from your seat, while the program is playing. Very handy.

The other thing that happens when you select "Subwoofer—No" is that on Dolby Digital DVD's, the LFE channel is folded back into the L/R channel signal, but at a -10dB level compared to what it would

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have been on the separate ".1" channel. In other words, the really impressive bass effects are being CUT IN HALF in loudness by the receiver. Dolby's rationale for this was that when using regular little speakers (no subwoofer), the LFE level should be reduced so as not to damage small 5" 2-way speakers, but still be present nonetheless (at a -10dB level) so you don't miss any content.

It's sort of a safety precaution to prevent your friends from damaging their puny little speakers when they don't have a sub.

The "Subwoofer—no" setting is NOT DESIGNED to feed your big audiophile speakers with a full-range signal so you can show them off. Selecting 'sub—no' cuts the LFE signal in half and eliminates your ability to control the LFE remotely. Now that's not what you had in mind, is it?



Setting Speaker Output Levels

Adjust speaker output levels to experience movie soundtracks exactly as the Director and Producer intended.

Calibrating speaker output levels is not much different than tuning your car engine. It doesn't matter what your car is potentially capable of. If the engine isn't tuned properly, it will run no better than a "junk yard special." This is why many receivers and pre-amplifiers have automated set up routines, which aim to simplify the process of balancing levels. However, correctly setting levels is not something your electronics can always do best.

Therefore, to ensure you are getting the optimum sound and performance from your system, buy yourself a simple sound pressure level meter, also known as an SPL meter. These can be purchased at almost any electronics store for around \$40-60. Besides, your friends will really be impressed when they see you using that meter, because it looks so, well, professional. That alone is worth the 50 bucks.

TIP: Remember, the process of level calibration is not something you do once, but every time you rearrange your system, or add or change speakers or components. See the following section for detailed instructions on how to do this. And once again, read your owner's manual, as it will outline the process for your specific equipment.

Calibrating speaker output levels is simple with the right tools (SPL meter).

Manually adjusting speaker output levels is the only sure-fire way to ensure you experience movies the way the filmmakers intended. And now that you are the proud owner of a shinny new SPL meter, here's what to do with it: First, set the scale to measure 70 dB and engage the 'C' weighting filter. Next, select the internal noise option on your receiver or pre-amplifier and sit in the prime listening position. Hold the meter in your hand directly in front of your face at chin level, pointing up toward the ceiling at approximately a 45-degree angle.

Set the master volume control so that the noise from the left speaker measures 70-75dB on the SPL meter. Consulting the owner's manual for your specific receiver or pre-amplifier, begin cycling around to each speaker as your receiver or pre-amp dictates, adjusting the individual speaker output levels as evenly as possible. Remember, we are not adjusting the master volume level in this step, but instead the relative levels of each speaker in the system.

Figure 4

Sound Pressure Level (SPL) Meter



TIP: It's usually preferable to set the subwoofer around 5 dB higher than the satellites, as most people like the added bass impact. However, listen to your woofer and if you hear signs of "straining", be sure to back this level down, as even the very best subwoofers have limitations. If your woofer seems to be having troubles keeping up, it's probably time to start "saving those pennies," and buy a second matching subwoofer. Besides, in our estimation, you can never have too much clean, powerful bass!

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Compensating for Speaker-to-Listener Distance

"Measure twice, cut once" is a familiar adage for carpenters—and no we aren't suggesting you cut your speakers in two!

This step ensures the sounds from all speakers arrive at your ear at nearly the same time. This is an often overlooked step, but one that can significantly affect the perceived quality of the sound field as images move from one speaker to another around the room.

Our brain is an amazing device, capable of measuring the smallest difference in sounds arriving at our ears slightly delayed in time. Hence, unless you are fortunate enough to have placed all your speakers exactly equidistant to the listener the first time you tried, you'll need to electronically compensate for the specific discrepancies of these "misalignments."

Locate a tape measure and measure in feet (or meters depending on what side of the pond you are on) from each speaker in the system to the listener's head seated at the prime listening position. Round this number up or down to the nearest foot (or meter) using 6" (or .5 meters) as the dividing point. Once you have measured distances from the primary seating position to each speaker in the system, enter the values in your receiver or pre-amplifier setup menu as directed in the owner's manual for your equipment.

Many modern receivers have an "auto set-up" mode and the receiver will make these time/distance adjustments automatically. Most of these built-in programs work pretty well, so it's recommended that you let your receiver go through its process first, and then make whatever additional adjustments you feel are necessary later.

Surround and DSP Modes Revealed

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Electronics manufacturers often feature extra sound field settings on their receivers and pre-amplifiers, usually with titles like 'Stadium,' 'Jazz Club,' or 'Large Room.' However, with all the labels found on the front of most receivers and pre-amps, it can be very confusing to make sense of what they all mean. This leads to a few common questions, such as "Which one should I use?" and "How is 'Stadium' different from 'Jazz Club'?

The answer lies in understanding that DSP (Digital Signal Processing) sound modes are designed to add extra reverb or ambience to program material to simulate the acoustical qualities of being in different acoustic environments, such as a large concert hall or stadium. Whereas Dolby Digital or DTS is the basic decoding process that is built into the receiver to extract multi-channel sound from a DVD, the additional settings like 'Stadium' are merely electronic enhancements, sort of like icing on the basic Dolby Digital cake.

Frankly, most of these additional settings are a waste of time. They tend to sound echoey and boingy. They are a good example of why it's not always a great idea of doing something merely because you can. Therefore as a general rule, we feel it's best to bypass any sound fields or DSP modes built in to your receiver or pre-amplifier. However, just as in cooking, you may find a "little seasoning can go a long way." Bottom line: take a listen and you may actually find something you like.

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