Tip #42 Dispersion and the Center Channel Speaker

Few things affect the way speakers sound in a real-world listening room as much as their sound coverage, or what engineers call dispersion. Let's start with a few basic facts, and then we'll show you why Atlantic's speakers are designed the way they are.

1. Drivers (individual woofers or tweeters) exhibit narrowing dispersion with increasing frequency. That's just the way the laws of acoustics and physics work. Example: An 8-inch woofer will play a lower-midrange 200 Hz tone (in the male vocal region) over a very wide angle. You'll hear the sound quite clearly whether you're standing right in front of the speaker or well off to the side.

But…that same 8-inch driver will beam its sound like a flashlight–straight ahead, practically nothing side-to-side or up-and-down–if it's called on to play a 3000 Hz treble tone.

It's all a matter of the size of the driver compared to the frequency it's being asked to play. Good speaker designers must know the computational formulae for crossing over the driver in the correct frequency range, in order to ensure the speaker will provide good sound coverage. Don't worry–Atlantic's engineers know 'em. (See Tech Tips 7, 11 and 29 for more info on "Crossovers.")

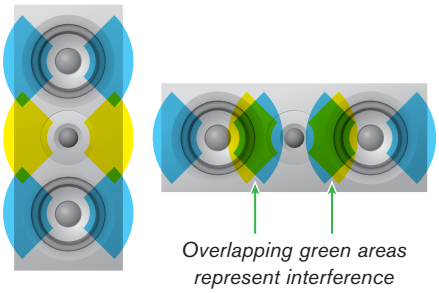
2. Ideally, you want your woofers and tweeters to be arrayed vertically (not horizontally), because a vertical sound source has clear, interference-free midrange-treble output to either side. Side-to-side is by far the most important direction for sound in a home, because that's how people sit in a room: to one side, in the middle, and on the other side. (See figure 1)

3. Another thing you should know: when two drivers are covering the same frequency range, they behave as if they were a single driver of their combined dimensions. So a center channel speaker with two 6½" drivers 2 inches apart has the horizontal dispersion of a single 15-inch (6½ + 6½ + 2 = 15, right?) driver. That's lousy dispersion. Yet, this is the description of most center channel speakers! And the center channel is the most important speaker in a home theater system because it handles anywhere between 50-75% of the movie's soundtrack, depending on the mix. ***50-75%!***

Here's how Atlantic is different–and better: For all our center channel speakers, we bring the two woofers as close together as possible, to minimize their combined dimension for much better side-to-side dispersion. Then we locate the tweeter above them, to provide a very close approximation of the preferred vertically-aligned sound source. (See figure 2)

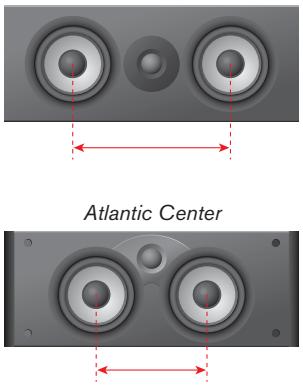
So even if we're limited to a horizontal center channel speaker cabinet because of aesthetic realities (no one wants a vertical box teetering on top of a TV!), we take special efforts to make them sound as good as we can. Now you understand why they're so good.

Figure 1 Vertical vs. Horizontal Drivers



Vertical drivers–clear sound side-to-side
Horizontal drivers–serious interference!

Figure 2 Center Channel Comparison



Closely-spaced woofers: Wider dispersion

Other Tech Tips:

Tip 38: Why no Back Box for 28 SUB?
Tip 39: Receiver setup for the FS-7.0
Tip 40: What is Frequency Response?
Tip 41: Why the 6.1 Is So Good