Atlantic TECHNOLOGY

TECH TIPS

3-08

Tip #28 Setting your Receiver's Subwoofer Crossover

Most people never take the time and effort to understand this issue, yet a little knowledge will go a long way towards maximizing your satisfaction with your Home Theater system.

A little background information: People can hear from approximately 20 Hz in the bass to about 20,000 Hz in the treble. (Well, women and young children can hear that high; a middle-aged man is lucky to make it much past 13-14 kHz.) We hear in octaves; that is a doubling or halving of frequency. So the range from 20-40 Hz is an octave; 40-80 Hz; 80-160 Hz, and so on. There are about 10 audible octaves to the human ear. Dogs make it to 40 kHz (which is why dog whistles at about 30 kHz are inaudible to humans); bats make it past 80 kHz. They fly at night by hearing–very precisely–the very high frequency reflected sound waves that bounce off objects, and that tells them where they are.

One of the phenomena of the manner in which humans perceive sound is that low frequencies tend to be non-directional. We can't really determine the origin of bass tones. Humans get their directional auditory clues from midrange and high frequency tones. Think of it: during a thunderstorm, the very low frequency thunder is just "there," all around you. It shakes the house, it scares the dog, but you can't point to it and say, "Aha! THERE it is!"

But…let a battery in your smoke detector wear out, and the mid-frequency "Beep…beep…beep…" alarm that the detector sends off cues you in right away as to where the offending smoke detector is. It's upstairs, in the hallway.

Think of your receiver's crossover as kind of an audio "traffic cop": it directs different parts of the audio signal to go "here," and other parts to go "there." The point at which the "policeman" makes those 'here-there' decisions is called the crossover frequency. (See figure 1) For a good, understandable discussion of crossovers, octaves, etc. see the Glossary on our web site.

The correct crossover to your subwoofer will depend on two things:

1. The low-end response of your front-channel satellite speakers, and
2. The position of the subwoofer in relation to the front-channel speakers

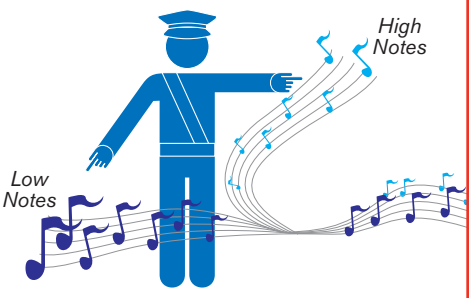
If you're using relatively compact front channel speakers, (say, one with a couple of 4" drivers), then those front-channel speakers will only respond down to about 80 or 90 Hz. This is the "high" bass range, a little above the frequency where bass it totally non-directional. If that's the case, you should position the subwoofer in the same third of the room as your main speakers. Otherwise, you may very well hear the subwoofer by itself, rather than as a seamless part of the whole sonic picture. (See figure 2)

As far as the frequency setting is concerned, a setting of about 10 Hz higher than your front speakers' low-end rating will generally work out well. So if your front speakers are rated down to 80 Hz, start at about a 90 Hz crossover setting.

If you have larger front speakers that can respond lower–say down to 50-60 Hz–then you have the freedom to place your subwoofer pretty much anywhere in the room. If the sub is only covering the 60 Hz and below range, then you will not likely be able to "localize" it (detect its location by ear).

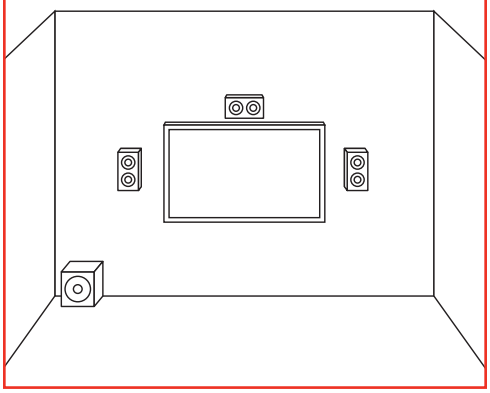
For sub placement (the natural question after "Where do I set the crossover?), see our Tech Tip #15.

Figure 1



Crossover directs highs and lows

Figure 2



Keep subwoofer near front sats if crossover is higher than 80-90 Hz

Other Tech Tips:

Tip 24: How much power do I need?
Tip 25: Do it 'till it Hertz
Tip 26: Creating Good Room Acoustics
Tip 27: IWTS-8 vs. IWTS-8e