Subject: LC Peaking
Posted by Wayne Parham on Wed, 21 Mar 2007 04:25:29 GMT
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Yes, I think that might be caused by LC peaking in the crossover. When capacitance and inductance are in the circuit, a resonant condition is formed. Without the right amount of damping, it can cause peaking. The electrical properties of the driver (including the transformations of acoustic resistance/reactance into mechanical resistance/reactance and eventually into electrical impedance) come into play as well.

Some people, including even some well respected speaker designers, consider a loudspeaker to be resistive, and estimate it as such when doing calculations. It is particularly inappropriate for horns because they are 1/4 wave devices that have several impedance peaks near cutoff. Since this is where they are likely to be crossed-over, it is important to consider the impedance of the horn in the crossover region. Even though a horn approaches pure resistance, it only does this well into its passband and only if adequately sized. Many times, horns are undersized to meet specific design criteria and the crossover point is almost always low in the pasband, so the horn's complex impedance near the low-frequency crossover point must always be considered for best results.

Each year, I give a seminar called "Crossover Electronics 101" at the Lone Star Audiofest. The main emphasis of this seminar is to familiarize people with reactive circuits, to show exactly how peaking can (inadvertently) creep into a crossover design and to show how to damp the circuit properly to prevent it. I present a series of slides with schematics and response charts that show what each circuit does. Then we connect each circuit to a horn tweeter and play sound through it, listening to each one to hear how they sound. I think it's interesting for people to actually hear what various levels of peaking sounds like, and to compare different circuit types.