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Subject: Re: 2 Pi tower

Posted by [Wayne Parham](#) on Sat, 16 Jan 2021 17:13:16 GMT

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I wouldn't suggest making any change to box dimensions in this model. It "rides the line" between being a transmission line and a bass reflex design. There are both internal standing waves and Helmholtz resonance in play in the bass region, so any changes in dimensions will alter the pattern of internal standing waves and may affect performance.

When I designed this model, I started by using the traditional alignments based on Helmholtz frequency and box volume. Then I used Martin King's spreadsheets to analyze the cabinet's standing wave modes, and the positions of the midwoofer and the port. Then, when I was satisfied with the simulations, I built a physical model and measured that.

This is the subject of several discussions on this forum. You can find some of them in the Pi Speakers FAQ, in the "Cabinet Design" section. Specifically, look at the content in the links called Cabinet design, port placement and internal standing waves, Damping material placement and Altering dimensions.

Basically, this issue potentially affects any physically large two-way loudspeaker, one where the woofer acts as a midwoofer and is used up through the midrange band. Midrange wavelengths are shorter than bass, so the larger boxes start becoming close to wavelength scale. Then what you have acts sort of like room modes inside the cabinet, with hot and dead spots. You don't want a hot spot in the midrange to align with the midwoofer or the port.