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Subject: Re: Pattern control and mouth size

Posted by [Wayne Parham](#) on Fri, 09 Feb 2007 03:44:57 GMT

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If the low cutoff is above the point where the horn loses pattern control due to its shortest dimension, then there is no penalty. If pattern control is lost, it widens. The pattern from a diffraction slit isn't actually purely radial, but it's close. There are a few nodes that appear off to the sides, in some cases. Look at the two radiation patterns below. See how the one on the left makes a radial pattern and the one on the right makes more of a focused beam? That's because the one on the left is what results when wavelength is large compared with the width of the slot. This is what happens at low frequency, when the horn mouth is much too small. In that case, the flare wall angle does nothing, and the mouth acts as a diffraction slot. The one on the right is closer to the transition frequency, where the horn still directs the radiation angle. As the horn transitions from being large enough to control the pattern and too small so that the mouth acts as a diffraction slot, you'll see the pattern below. Notice that there are nodes of energy separated by nulls in between. You can see how the pattern changes with respect to wavelength in the applet below:

Single slit diffraction applet

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