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Subject: Horns Length, Frequency Wave Lengths, And, All That Good Stuff  
Posted by [Elliot Thompson](#) on Fri, 18 Oct 2002 13:04:01 GMT

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Greetings! I was wondering in reference to folded horns that are 4 feet. Would length of the horn (4 foot) produce the wavelength somewhere around 200Hz? If not, how can you measure the horns length to determine the frequency? Also, if this box was a 4 cubic foot enclosure, what would that be in horns length? (feet) Thank you, Elliot

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Subject: Re: Horns Length, Frequency Wave Lengths, And, All That Good Stuff  
Posted by [Wayne Parham](#) on Fri, 18 Oct 2002 18:39:21 GMT

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Hi Elliot! Risking oversimplification, a horn's performance is determined by its length, its flare shape, its mouth area, its throat area and its radiating diaphragm, motor and compression. The lowest frequency is determined by its length, which is 1/4 wavelength. The highest frequency is determined by radiator mass and motor strength. Efficiency is determined by motor strength and compression and by its ability to limit directionality and focus the sound with flare size and shape. The shape and ratio of throat to mouth area set the horn's response curve, and small mouths usually result in response curves with ripples unless the horn radiates into fractional space, like

steradians). Wayne

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Subject: questions.....  
Posted by [Anonymous](#) on Sat, 19 Oct 2002 03:54:45 GMT

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How does the ear perceive a low frequency note when the wavelength is so large and you are standing next to the subwoofer? I've heard so many debates, ie, some say you can't hear a 20hz - 50hz note inside the car but your neighbors can hear the bass due to the large wavelength. Other person will say that good headphones can produce 20hz - 50hz notes and you can hear it. Some also say that in order to hear those low frequencies in a movie theater, one should sit in back. When we hear low frequencies up close, do we really hear the actual frequency in question

coming from the woofer or do we hear the actual frequency after the wave has completed the cycle in which case it has bounced around the room for a bit? My personal experience is this. If I hear a car playing low bass notes from a distance, I don't hear those same low notes if I sit inside the car, but you do feel the pressure. Are you just feeling the pressure, but not hearing the actual low frequencies? In movie theaters I also hear much lower bass if I sit in the back vs. sitting in front in which case I hear mostly tweeters. Same theater I go to and they have the subs up front. When I put headphones on and listen to a 40hz-50hz tone, I do hear something like fluttering. Am I really hearing the true 40hz tone or am I hearing something else?

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Subject: Pressure

Posted by [Wayne Parham](#) on Sat, 19 Oct 2002 04:26:36 GMT

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Pressure changes are not dependant on the size of the chamber. You can develop the lowest "frequency" - DC - within an arbitrarily small volume. Any time you pressurize a chamber, like pumping air in a tire, that's what you are doing. But having a chamber large enough for wavelength-scale dimensions is a different matter entirely. The dimensions of the room determine standing wave phenomenon, nulls and peaks. And acoustic devices that require wavelength-scale dimensions like horns and waveguides, one needs larger sizes for deepest bass.

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Subject: Re: questions.....

Posted by [mollecon](#) on Sat, 19 Oct 2002 09:01:24 GMT

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Wayne is right - at frequencies that have long wavelength compared to the room dimensions the whole room is pressurised instead of the waves spreading in a normal fashion. But the idea of low frequencies not being audible in small rooms is quite a persistent one it seems. But think of it; you mentioned headphones yourself - strictly speaking, the only room/dimension they have is the length from the headphone diaphragm to the eardrum - since that distance is less than an inch it would mean that you could only hear frequencies well above 10kHz on a pair of headphones! Which is quite absurd of course. Your listening experience with the headphones at the 40 Hz note doesn't surprise me - most headphones, regardless of price & what the manufacturer claims don't

give out much below 100 Hz or so. So if you turned up the volume in the hope of hearing those 40 Hz you most likely overloaded them - which is probably what you heard. Concerning your other questions: When you're outside a car, you don't hear the rest of the music so loud - hence the bass become more appearant. When you're in the car, the notes at higher frequencies will tend to mask the bass. So, you feel the bass more than actually hearing it - especially in a listening environment as resonant (& leaky!) as a car. The 'masking' effect can to a degree explain your theater experience too - higher frequencies tend to loose their power at distance faster than the lower ones. So when you move back from the front/side speakers, the level of bass seems to rise relative to the rest. Furthermore, if you sit close to room bounderies (walls) like way back in the theater certain bass notes will be amplified due to standing wave modes & the higher pressure close to the walls. You can experience exactly the same at home - try turning your hifi up a bit & move about in the room; if you place your head (& thereby ears!) close to a wall, especially the wall opposite the speakers I bet you'll be able to hear the rise in bass level. OK - the whole question of bass & room behaviour is far more complicated than this, but this answer has become too long already - hope it helped a bit. Regards, Peter.

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Subject: Thank you Wayne. Did You Not Know The Answer To The Second Question?

Posted by [Elliot Thompson](#) on Sat, 19 Oct 2002 10:13:50 GMT

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Good Morning Everyone :^) My second question was; If a reflex box is 4 cubic feet, how much feet would that be in a horns point of view? (In terms of feet) Should you just add all the walls together? Elliot

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Subject: Non sequitur

Posted by [Wayne Parham](#) on Sat, 19 Oct 2002 15:10:09 GMT

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Hello Elliot! The volume of a horn is not a direct indicator of its length. It can be very long and narrow, very wide but short or somewhere in between. Wayne

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Subject: Rooms, headphones, bass.....

Posted by [mikebake](#) on Sat, 19 Oct 2002 15:34:13 GMT

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From a post I made on the JBL forum, on the same issue So I am searching for more insight on the headphone issue, and I found this.....it suggests that we CAN hear low bass from headphones, which doesn't apparently mean that it is producing a 30 foot wave, or at least not with any volume.....? We are hearing the compressions and rarefactions, and not the whole wavelength at once.....? This is an excerpt from a copyrighted article by Doug Blackburn on [www.soundstage.com](http://www.soundstage.com) The entire article is at the link below and was rather interesting. I suggest that you guys may want to read it and see what you think! "Twenty-five Hertz waves in air

able to hear, would clock in around 55 to 59 feet long. Do you need a room with at least one 60-foot dimension in it to hear a real 20Hz in the room? No. Your ears actually pick up sound in a different way, reacting to the compressions and rarefactions that happen in the air as the sound propagates through the room. Twenty Hertz creates 20 compressions and rarefactions per second and your ear will pick that up even if you are listening to headphones that respond to frequencies that low. Otherwise your ear canal would have to be 60 feet long -- we would look rather odd if our heads were 60 feet wide." The rest of the article, dealing with bass reproduction, is here <http://www.soundstage.com/maxdb/maxdb021999.htm>

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Subject: Re: Rooms, headphones, bass.....

Posted by [Anonymous](#) on Sun, 20 Oct 2002 01:33:38 GMT

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Thanks for the info.