Subject: folded voight pipes???
Posted by jim denton on Sat, 10 Dec 2005 16:34:10 GMT
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Recently made contact with a seller on Audiogon about some used Lowthers PM6A's and he said that these will amaze and befuddle one in a Voight folded pipe design----well, since I live in a constant state of Befuddlement....(that's located North of Texas and just South of Kansas,) it took me a few days to, blink.... FOLDED pipe?? Is anyone up on this? I guess I've seen plans for this in a BR box design but not in a pipe design? He also mentioned the Norway Lowther guys building bigger pipe boxes for the 8" over the 6" drivers---wider and deeper at the top --almost 4" seperate the baffles??? I'm searching for some more details to this idea ...JD

Subject: Re: folded voight pipes???
Posted by roncla on Sat, 10 Dec 2005 17:56:37 GMT
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Built many of them for an assortment of different drivers. Basic a folded tapered pipe in which the throat is =Sd in area and the mouth (not the port) is 4-5x Sd and the length is 1/4 wave length of the target Fc(which will only work if its a straight pipe). Advantages over a straight MLTL is a smoother FR curve as the harmonics in the upper range are closer together. Disadvantages are that the Fc is higher. Usually Lowthers are BHL (back horn loaded) or BLH whichever term you perfer. However they can be used in a folded pipe if adequate BSC (baffle step compensentation)can be employed or equaliziation is used. I presently design and build single driver full range BLHs for Fostex applications, well full range i guess if you dont count the ribbon tweet i have with the 208e sigma. IMO they should be used in BLHs for the optitum performance. Do a "Google" on Lowthers and Lowther America.ron

Subject: Re: folded voight pipes???
Posted by Bob Brines on Mon, 12 Dec 2005 14:50:55 GMT
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The "Voigt Pipe" is a design attributed to Paul Voigt, incorrectly, I might add -- Voigt's patented tapered pipe is completely different. It is tapered front to back, coming to a point at the top and being rather deep at the bottom. The driver is roughly 1/2 way down the pipe and there is a port at the bottom front. The best known "Voigt Pipe" is the Lowther Club of Norway design. This design most likely used the PM6A or PM6C.Any "Voigt Pipe" can be folded, that is bent back on itself 180 degrees. The front then is the original pipe from the port up to the driver, and the top part of the pipe folds back toward the floor. In the case of the LCN pipe, this will reduce the height from 72" to ~ 40" high. A variation of the folded "Voigt Pipe" is the "Weems' Pipe", named after David Weems.Neither the LCN "Voigt Pipe" or the "Weems' Pipe" variation are very good designs. They

were build empirically without any real science behind them. They suffer from significant and very audible roughness in the 100-500 Hz range, right where the music is. Now that we have Martin King's worksheets, we do much better. You might investigate the MLTL design.BTW, although I may get flamed for saying so, the "Voigt Pipe" is really a type of back horn. All of the same physics apply.Bob

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Subject: Re: folded voight pipes???
Posted by akhilesh on Mon, 12 Dec 2005 16:55:28 GMT
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HI Bob,Good post. Could you elaborate more on why ot;s rough in the 100-500 hz region? I'll be interested to know. thanks-akhilesh

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Subject: Re: folded voight pipes???
Posted by Bob Brines on Mon, 12 Dec 2005 21:05:25 GMT
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The success of a quarter-wave speaker depends on controlling the first 2 or 3 harmonics. The normal procedure with a "Voigt Pipe", also known as a Tapered Quarter Wave Tube, is to place the driver at the node of the 1st harmonic, which is acoustically, but not necessarily physically, 1/2 way down the pipe. This completely suppresses the 1st harmonic. The problem with a poorly designed TQWT is that the 3rd harmonic (there are only odd harmonics in a stopped pipe) is not properly suppressed. The Lowther Club of Norway TQWT is much too small in volume to allow the suppressed 1st harmonic to affect the 3rd.In an untapered Mass-Loaded Transmission Line speaker, the normal procedure is to place the driver at the first node of the 3rd harmonic, about 1/5 the length of the pipe. Suppressing the 3rd harmonic reflects both ways and helps to suppress both the 1st and 5th harmonic. Generalizations are not real good with pipes, but I have found that if a driver works at all in a quarter-wave pipe, an untapered pipe will usually lead to the smoothest output.The graphs above are are modeled output using a Lowther PM6C diver in the LCN TQWT, a quick hack at an optimized TQWT and an optimized MLTL. The MLTL presents the smallest physical cabinet and the smoothest output. I am treading as close as I think I can to the limits of what a commercial vendor can say, but is worth at least what it cost you.Bob

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Subject: Re: folded voight pipes???
Posted by akhilesh on Mon, 12 Dec 2005 22:48:00 GMT
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Nice post Bob. thanksIN the end you said:"I am treading as close as I think I can to the limits of what a commercial vendor can say, but is worth at least what it cost you. "None of what you are telling us in the post above is copyrighted by you, right.. it's from Martin King's math designs? thanks-akhilesh

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Subject: Clarifying questions
Posted by akhilesh on Mon, 12 Dec 2005 22:55:01 GMT
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In your post above , Bob (i admit I havent really read through voigt pipes so pardon me if this is a basic question) does the harmonic = a multiple of the frequency of tuning of the port in the pipe? so a firts harmonic = the frequency of the port of the box, and so on?thanks-akhilesh

---

Subject: Good Information
Posted by FredT on Tue, 13 Dec 2005 11:35:26 GMT
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Thanks to Bob and guys like him who are willing to challenge some of our commonly held misconceptions with real data. The Fostex FE-166E Voigt pipes I built (and sold to Jim) were loosely based on the Lowther Club of Norway design. To my ears they are pleasant sounding, especially when placed in a room whose dimensions accentuate the 60-80hz range, but they definitely are colored. Having heard Bob's FT-1600 MKII design in one room at the GPAF, with the Voigt pipes only two doors down, I have to agree that Voigt pipes aren't the best enclosure design for Fostex drivers.

Subject: Re: Clarifying questions
Posted by Bob Brines on Tue, 13 Dec 2005 11:49:52 GMT
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Right. The first harmonic is the system tuning frequency. Higher harmonics are are multiples of this.You have to be careful of exactly how the author is numbering things. When talking to anyone not deeply involved in the technical, I use the numbering system above. Particularly when dealing with computer programing, you will see the fundamental listed as F0, the first multiple as F1 and so on. Then there is a numbering system based on overtones. In an open pipe where all harmonics are produced, the first overtone is the second harmonic, or F1. In a stopped pipe, the first overtone is the third harmonic, or F2. Totally confusing to the casual reader.Sorry, I couldn't resist.Bob

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Subject: Re: folded voight pipes???
Posted by Bob Brines on Tue, 13 Dec 2005 11:55:52 GMT
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None of what I posted is copyrighted. It is all pretty much common knowledge. My problem is that I am coming close to proselizing my own product. That is a no-no on this forum.

Subject: Re: Good Information
Posted by akhilesh on Tue, 13 Dec 2005 13:11:04 GMT
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I actually measured these roughly at Jim's house once. They are pretty smooth over 100HZ, but below that are all over the map. I like their sound, though the bass could use a lot of help.
-akhilesh

Subject: Re: Clarifying questions
Posted by akhilesh on Tue, 13 Dec 2005 13:12:16 GMT
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Thanks. So when do we see you next? GPAF? We need to hear your stuff again!-akhilesh

Subject: How much do the harmonics matter?
Posted by akhilesh on Tue, 13 Dec 2005 13:30:05 GMT
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Nah. As long as we back it up with some data or an argument that makes sense, and NOt run someone else down, it's totally kosher to proselytize. At least that's the way I see it. I think we are all learning a lot from this discussion. Esp. since TQWT seems to be so favored by DIYers. BTW, my impression is that these harmonics may not matter, except in the raw Voigt pipe, where the dip is pretty bad. The frequency curves in the fostex & Lowther drivers (the F200A I suppose being an exception, and the FE166/Fe167 also I suppose) is so raggedy that a few db here and there are not that big a deal. THe raw voigt pipe does look pretty bad though. Let me clarfiy what you are saying for my own benefit. I guess you are saying, if a Voigt pipe is tuned to, say, 40 HZ, then the F0 = 40 Hz, and the F2, which is 160 Hz is not well suppressed. What does that mean: not well suppressed? Does it mean that there is a tendency for there to be a peak there, becuase of the box, and this peak is not well suppressed? Whereas in a non tapered QWT, the 160 HZ is better suppressed?I guess I am confused becuase the math cad model shows a dip for the Voigt pipe,

whereas the argument is that it will have excessive peaks. In general, are we saying that the TQWT (hat we are loosely calling a voigt pipe here) produces more of a comb effect than a Non Tapered qwt?thanks -akhilesh

---

Subject: Re: Clarifying questions
Posted by Bob Brines on Thu, 15 Dec 2005 05:20:29 GMT
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After the first of the year, I intend to do some of the club meets in Tulsa and some of the Texas Bottlehead meets.Bob

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Subject: Re: How much do the harmonics matter?
Posted by Bob Brines on Thu, 15 Dec 2005 05:51:48 GMT
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>>BTW, my impression is that these harmonics may not matter, except in the raw Voigt pipe, where the dip is pretty bad. The frequency curves in the fostex & Lowther drivers (the F200A I suppose being an exception, and the FE166/Fe167 also I suppose) is so raggedy that a few db here and there are not that big a deal. THe raw voigt pipe does look pretty bad though.

Subject: Re: How much do the harmonics matter?
Posted by GM on Thu, 15 Dec 2005 17:13:27 GMT
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Greets!Harmonics are multiples of the fundamental, so F3 (aka F2 in a stopped pipe) = 40*3 = 120 Hz..... GM

Subject: Re: How much do the harmonics matter?
Posted by akhilesh on Thu, 15 Dec 2005 17:55:55 GMT
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YEah you are right. I don't know why I was thinkiong logarithmic. habit I guess.-akhilesh

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Subject: Re: How much do the harmonics matter?
Posted by Martin on Fri, 16 Dec 2005 11:54:10 GMT
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"Harmonics are multiples of the fundamental, so F3 (aka F2 in a stopped pipe) = 40*3 = 120 Hz..... "I think that this simple relationship is only true for straight constant area pipes. If the pipe is tapered or expanding, like a TQWT, the frequency of the harmonics will not be simple multiples of the fundamental frequency.Martin

Subject: Re: How much do the harmonics matter?
Posted by Bob Brines on Fri, 16 Dec 2005 14:13:31 GMT
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Perhaps this will make things more obvious. This is a plot of driver and port response on a linear X-axis. This is a straight MLTL.The system is tuned to 40 Hz, which is the first spike. The next spike is the 3rd harmonic. Note that is is up at about 180 Hz, not the expected 120 Hz. The 5th harmonic is missing because the driver is placed at the first node of this harmonic.There is a minor spike in the port response, but it is 30dB down. The 7th and 9th harmonics are present, but the remainder of the series below 1000 Hz is suppressed by the port placement.Now, why is the harmonic series shifted to the right? I suspect that there is interaction between the cavity resonance and the pipe resonance, but I have never been able to prove that. I would like to see some double humping at the tuning point, but I have never seen it. Someone with more mat/physics horsepower than I might discover something.Bob

Subject: Re: How much do the harmonics matter?
Posted by GM on Fri, 16 Dec 2005 15:12:29 GMT
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Greets!?! Considering the ~accuracy of your horn math models, I'm flabbergasted that you could think this. If true, then a horn could only produce discordant sounds. What changes is the harmonic structure's fundamental (F0) and number of harmonics since horns are 1/2 WL resonators, ergo below this frequency their resonance structure is non-harmonic as a function of its flare rate ('M', aka 'T' factor) and frequency (Fc).GM

Subject: Re: How much do the harmonics matter?
Posted by GM on Fri, 16 Dec 2005 16:19:34 GMT
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Greets!Straight ML-TLs are two summed resonant structures of which one is a 1/4 WL and the other a 1/2 WL resonator, so there's an unbalanced number of both even and odd order harmonics, ergo the system is non-harmonic in its passband, comb filtering with the driver's harmonics, screwing up its response until the vent's output has decayed to ~ -25 dB.GM

Subject: Re: How much do the harmonics matter?
Posted by Martin on Fri, 16 Dec 2005 17:06:13 GMT
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GM,As an example of what I am trying to say, please refer to Appendix C of my TL alignment tables article. I have displayed the results for three TL's (tapered, straight, expanding) all tuned to 30 Hz. The fundamental 1/4 wavelength resonance is at 30 Hz for each geometry but the 3/4 wavelength resonance is at 120 Hz only for the straight TL. I won't go into the mode numbering schemes because I use a different method of labeling. Maybe we are talking about different things or I have misunderstood the thread discussion.Martin

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Subject: Re: How much do the harmonics matter?
Posted by Bob Brines on Fri, 16 Dec 2005 18:04:44 GMT
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?The only way that a 1/2 wave mode can be supported is to have a node at the top and closed bottom of the pipe, and this fundamental would be twice that of the 1/4 wave mode. In this case, that would be 80 Hz. Since the 1/2 wave mode is trapped between the ends, it would produce no output but would modulate the driver. I don't see it in the model above, nor do I remember you mentioning 1/2 wave modes in stopped pipes.See Modeled/actual comparisons.Bob

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Subject: Re: How much do the harmonics matter?
Posted by Martin on Sat, 17 Dec 2005 02:00:37 GMT
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Bob,What is the pipe diameter and length?Martin

Subject: I mean port. (NT)

Posted by Martin on Sat, 17 Dec 2005 02:01:30 GMT
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NT

Subject: Re: How much do the harmonics matter?
Posted by Bob Brines on Sat, 17 Dec 2005 02:09:59 GMT
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The port is 3" dia x 4" long. Would you like to see the plans, just for grins?Bob

Subject: Re: How much do the harmonics matter?
Posted by Martin on Sat, 17 Dec 2005 11:51:44 GMT
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I think I can explain why the frequencies shift, it is something I have been studying recently. If you could send me the worksheet file that you used to make the pictures, that should be good enough to test my theory and hopefully explain what is going on. I will keep the details of your design private but would make and post some plots with my results.Martin

Subject: Re: How much do the harmonics matter?
Posted by GM on Mon, 19 Dec 2005 21:31:29 GMT
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Greets!The vent is a 1/2 WL resonator with its own harmonic structure activated by the 1/4 WL pipe's pulses, creating a very non-harmonic summed system as clearly shown in the 'woofer and Terminus Far Field Sound Pressure Level Responses' plot. Driver and/or vent locations away from the ends just screw it up more.GM