Subject: Making some progress on my PVC pipe/ RS 1197 project
Posted by lon on Thu, 05 Feb 2004 18:32:00 GMT
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I suppose this is my first scratch project. I've built kitsover the years (crossovers prewired) and modified cabinet/speaker combinations. Had a successful mod of some old Nakamichi enclosures that went with their mini receiver byreplacing the woofer with the Fostex FE87e and knocking a big hole in the backs. This worked out well and I'm using thoseas my computer monitors. I got a couple RS 1197's when they were being closed outfor (I think) $3 ea. or so. And I got on to the PVC pipeidea because it requires few tools and no power tools at all. The PVC's I've seen have a small baffle made of MDF. To fitthe speak to a 90d elbow, I used a toilet adapter with ashort ring of 4" diameter pipe as a baffle. The whole thing (I've completed one for testing) consists ofRS 1197 with foam insulation as a gasket screwed to the toilet ring and inserted into the 90d elbow. I have a linelength of only about 50 cm total and that includes a PVC t-fittingat the base which acts as a 4" diameter port. I intend to make the final length 101 cm as the exampleproject shows. But to test I just used a piece of the PVCto see how it sounded.
The rest of this test rig is as sparse and inexpensiveat the speaks: I have a Radio Shack SA155 mini amp and a turntable from Pioneer that a friend gave me. I purchaseda Grado Black cartridge and that's my source for now. Playing some mono LP's through the single speak initially gave what I felt was a muddy end to stringbass and the low frequencies in general. (This is stillthe 50 cm overall length.) I've been able to smootheout the sound of this little driver with some dacron stuffingin the 90 elbow and nothing else down the length of the line. My question is: will increasing the line length totypical TL proportions make the lower end more crisp (stringbass sounding like a string bass and less muddy?) There's a long way to go on this but it has been a biglearning experience.
an example of a PVC pipe speaker

Subject: Re: Making some progress on my PVC pipe/ RS 1197 project
Posted by Wayne Parham on Thu, 05 Feb 2004 19:27:21 GMT
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Gerat write-up! Looks like an interesting project.About transmission lines: Naturally, the longer the line, the lower the fundamental resonant frequency. If augmentation begins in the upper mid-bass where the driver is already strong, you might develop pretty strong peaking that would sound in a way that many would describe as muddy. For example, I would expect the driver is pretty strong above 100Hz. If the fundamental resonance is between say 80Hz and 160Hz, then your speaker will be maybe 10dB louder in that region. That's definitely going to sound "muddy."A longer pipe that shifts the fundamental down to 50Hz would be better, and then you would need to damp the system so that the next successive higher frequency pipe harmonics (at 100Hz, 150Hz, and so on) were de-emphasized. They will be attenuated slightly from the fundamental anyway. But you will want to de-emphasize them as much as possible because your driver will probably be working strong by that point.Ideally, you would want the cabinet to provide augmentation where the driver response begins to fall off. It might be good to set the fundamental frequency similarly to the way you would set the Helmholtz frequency on a bass-reflex system. I'd suggest checking

with Martin King at www.quarter-wave.com about that. Another good reference is Daniel Russel's paper, "Acoustic Filters, Waveguides and Transmission Lines."

Subject: Re: Making some progress on my PVC pipe/ RS 1197 project
Posted by lon on Fri, 06 Feb 2004 05:03:19 GMT
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Thanks for the reply. I am using Rick Schultz's article onAlpha transmission lines as general guide. According to that piece,I could achieve 63 hz with some polyester stuffing (which is what I have) and an overall length of 49 in. I suppose that is a good place to start. I can always get the length down, but I wanted to make sure not to trim too much for a first fitting. On the other hand, I'd need 70 in of length to go down to 45 Hzand that length would be awkward. In any case, I am at last getting to hear what all the theoryis about with a $3 driver and some plumbing parts. At some pointI'm going to want to push some big band music through them. Anyoneknow where I can get a good recording of Ted Heath's version of "Love For Sale?"

Subject: Re: Making some progress on my PVC pipe/ RS 1197 project
Posted by Wayne Parham on Fri, 06 Feb 2004 07:35:56 GMT
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Hi Lon!You wrote:>> According to that piece, I could achieve 63 hz with some polyester>> stuffing (which is what I have) and an overall length of 49 in.Sounds about right. One quarter wavelength of 70Hz is 49 inches, so the first peak should be somewhere in that area. Other factors than just pipe length come into play such as pipe area, baffle area, stuffing, etc.>> I suppose that is a good place to start. I can always get the>> length down, but I wanted to make sure not to trim too much for>> a first fitting.I think you're probably in the 60-70Hz ballpark with 49" length.>> On the other hand, I'd need 70 in of length to go down to 45 Hz>> and that length would be awkward.Maybe so, but I'll bet your driver is pretty strong at 70Hz and so if your pipe is tuned to 70Hz, your system may be peaking quite a bit. Seems like 50Hz pipe tuning might be better, but then again, that's just a guess. I've not examined the facts, so I'm just thinking out loud here. If your pipe is tuned to 60Hz, that's splitting the difference and might be right where you want it to be.The main things I would consider are the first and second standing wave peaks. If the first peak is rather high frequency - in the midbass where the driver is strong - then system output may be too high at that frequency. On the other hand, if the first peak is too low, then the second peak might be shifted down into this midbass region. Careful placement of these first couple of peaks must be the balancing act when designing and building speakers like these.>> In any case, I am at last getting to hear what all the theory>> is about with a $3 driver and some plumbing parts.Well, there you go. That's where the fun is and you can't beat the price!Wayne

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Subject: Re: Making some progress on my PVC pipe/ RS 1197 project
Posted by lon on Fri, 06 Feb 2004 20:48:32 GMT
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Taking into consideration all your advice I got another partfor $1.06. I can try to straighten out the line and not usethe rear ported part. This would make it more like a traditionalline and I'd have to make a base with feet for the wave to exitthrough the bottom. I'm going to keep as much length beforecutting as necessary to allow some wiggle room.

Subject: Re: Making some progress on my PVC pipe/ RS 1197 project
Posted by Wayne Parham on Fri, 06 Feb 2004 21:58:28 GMT
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Sounds interesting. Please keep us posted.

Subject: Re: Making some progress on my PVC pipe/ RS 1197 project
Posted by lon on Sat, 07 Feb 2004 02:18:19 GMT
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Am making a test tonight using the organ recital fromMinnesota Public Radio called Pipe Dreams. The length inthe current config is 54 inches which I'll have to get down toa more workable size. No stuffing in them yet except what is behind the driver in the elbow. Accordian from Angelo Di Pippo sounds pretty good. He is a jazz accordianist, one of the few. :-) In a day or so I'll have a workable base. The base is moreodds and ends from my practice making cutouts. This is a story in itself: To practice making cutouts withoutaccess to a router or a spin saw (Rotozip) I got some rotozipwood bits and chucked one up in my electric hand drill that is in a Sears drill guide. I have my choice of three centers from the available machinings on the guide. No trigger lock on the ol'drill, so I got one of those new ratchet clamps and kept the drill going that way. Go ahead and laugh. I was surprised that it worked at all.But I wear eye protection on this job. I snapped a couple bitsbefore I got the speed right. So my practice bases havecutouts through a square of particle board stacked 2 highand for feet... well the local Farm and Fleet had bags ofwood plugs so a couple of those glued up will be the feet. Maybe someone in here can tell me if, with this combinationof driver and enclosure, I should attempt the other 99 cent modification of the driver which is to damp it with rope caulkaround the basket (?)