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Subject: Boomtoobz

Posted by [lon](#) on Fri, 12 Mar 2004 23:28:20 GMT

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On Fri, 12 Mar 2004, Lon Ponschock wrote:> > Looks pretty goofy still, but I now have the tubes coupled> differently to keep the length of the line but not standing 7 ft high.> > > a.> |-(> |-(b.> | |> | |> | |> |++ |> \_\_\_\_\_> > So the tall part has the speak in an elbow at a. The sound goes> down through the pipe, makes an upturn and comes out through another> elbow at the port end b.> > > The interesting thing here is that the whole assemblage is> demountable to reconfigure without new construction.> > Once you get past the sewer pipe idea it sounds pretty good.> A question I have for the experts is: should the port more properly> be placed on the short end and closer to the listener with the 1197> driver at the higher pipe a farther from the listener? Also, since> I'm just messing around with lengths, is there some ideal to> shoot for?> > > Since these things are on rotateable elbows, the base can be put out> of the way next to a wall and the elbows turned to focus toward the> listener.> > > The only modification internally is a small piece of pillow> stuffing directly behind the driver sort of wadded in there.> > My leads are soldered onto the driver and the speaker wire> length is runs from the driver all the way out through the> port tube. Connection to the speaker leads is with wire nuts.> > > So far I've only assembled one of these things. There is no stereo> image but the clarity seems pretty good.> > > > The organ concert is on tonight... that's the big test. [Note on stick figure drawing above: The editor does not show the same image you see, so you'll have to use your imagination.]> > >

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Subject: Re: Boomtoobz

Posted by [Wayne Parham](#) on Fri, 12 Mar 2004 23:48:09 GMT

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It will be good to get Martin's take on your project. My thoughts are that you'll have three primary pipe resonances. The first being set by the entire pipe length, the second by the longer section between the speaker and the floor bend and the third set by the length of the shorter section between the floor bend and the opening termination. Then there will be harmonics for each of those.

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Subject: Re: Boomtoobz

Posted by [lon](#) on Sat, 13 Mar 2004 03:14:28 GMT

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Friday night is organ recital night and this is going pretty good. [www.pipedreams.org](http://www.pipedreams.org) O410 - March Again. My goal, aside from not having beaucoup dinero to spend on either tools or audio goods was to use inexpensive materials at high efficiencies so as to be able to get large sound

outof, say, one of those mini units they sell at the Best Buy. I know this goes contrary to all the theories and conspicuous consumption that goes on in the audiophile world, but hell, it keeps this board going, right Wayne? :-) Thanks for your reply. And yes, I'd like to get the professional lowdown on this (no pun intended). I don't know of experiments with PVC that have gone in this direction, or with a little ado about calculations or internal treatment. I mentioned those shelf systems to test out high efficiency speakers but I don't have one. My playback is from a Yamaha RP U100. The Yam is an integrated peripheral for PC use which has a USB connection to control the stand alone receiver/amp from the computer. It works either as stand alone or in conjunction with the PC. These were on deal with rebates at giveaway prices at buy.com a few months ago: after rebate \$89.00 including shipping. I should have got more than one and possibly an RP U200 5:1 system as well. 'Been watching Ebay for these to turn up from bulk purchases. So explain a bit more about the harmonics. I am not hearing any strange dissonances from this arrangement. And I haven't done any of the numerous tweaks to the Radio Shack 1197. Because the RS 1197 is discontinued, I'm anxious to test something in current production from Tangband (to maintain the budget approach) or one of the smaller Fostex'. Please send other suggestions for inexpensive full range drivers I might have missed. Next listening test is with a VHS video of the Civil War called Gods and Generals. There should be some boomers in that one. by the time this project gets finalized, I may have a digital camera to show some pix. Stay tuned. lon@athenet.net

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Subject: Re: Boomtoobz  
Posted by [lon](#) on Wed, 17 Mar 2004 04:58:49 GMT  
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Wayne, did you mean Martin King? I've only seen MK in the Full Range Driver forum.

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Subject: Re: Boomtoobz  
Posted by [Wayne Parham](#) on Wed, 17 Mar 2004 05:44:57 GMT  
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Martin King posts here as "Martin". I think he may be busy with other things and hasn't seen your posts yet.

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Subject: Re: Boomtoobz  
Posted by [Martin](#) on Thu, 18 Mar 2004 01:12:17 GMT  
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Hi Lon, Wayne woke me back up, I drifted off for a while and was busy working on other things

(horns!). I am struggling to understand your "sketch", I tried cutting and pasting it into notepad, and changing the font, but I could not get it to line up so I could get a clear picture of your layout. Is there a particular font or application that it will line up all of the typing to form a clear picture for me to see? Martin

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Subject: Re: Boomtoobz

Posted by [lon](#) on Thu, 18 Mar 2004 02:31:15 GMT

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Hello Martin, Thanks for your gracious reply to a newbie. The link below you might well be familiar with from James Melhuish's Full Range Driver site. I started out with that design. So I had one ten foot length that I was going to cut down to the proper length for 2 speakers with RS 1197 drivers. I didn't know what I was doing so I made some baffles from closet fittings because the cutout was the right size. To get the fittings attached to the 90d elbow I used a short length of the 4" diameter PVC glued onto a closet flange. Before cutting down the rest to make 2 speakers I assembled one complete speaker with the entire remaining length. This was a little over 7 feet. Unlike the PVC Periscope, my port at the base was a 4" tee fitting. So port is the same diameter as the pipe and faces front. Listening to this configuration was a gas during the weekly organ recital on Wisconsin Public Radio. I loved the depth of the sound right away. After all, I had been reading about speaker designs for years but had no listening opportunities. I then tried out some electronic music from Steve Roach and Tangerine Dream too. These listening tests were also good. But I still had this Wilt The Stilt speaker nowhere near ear or listening height. It took me a few days to realize that a second tee fitting at the bottom coupled to the port on the base would allow me to cut the pipe down while retaining the overall line length. To get the idea of what the assembly looks like, imagine you are on the deck of a cruise ship near some stacks that protrude through the deck: one is 5 ft high and there's another 3 ft length in front of it coupled at the base. There's some other flanges and stuff holding the thing upright on some MDF squares with through bolts and t-nuts. Wayne was wondering how the harmonics would work and I was wondering which is the best way to tweak them. The only interior treatment is a couple 12" squares of pillow stuffing directly behind each driver. If I had to put a number on it, the length of the boomtoob from driver to port is about 8.5 ft. Not much sound pressure at the port end but it is definitely noticeable. A fellow over at the t-line discussion has also done some assemblage of PVC. Those interested can look for the piece called "Laying Pipe with Audio Leggo" at the t-line site. But I have not seen anything like what I put together. It may be goofy and impractical to duplicate, but I was looking for something to build with a minimum of tools. I have no shop and live in an apartment. So a hack saw and some other hand tools are all I've used. I have one of the boomtoobz completed and there is another of 5 ft. length from the original design so some comparison listening can be done. Perhaps 2 boomtoobz would be too many? Many questions remain. :-)

[lon@athenet.net](mailto:lon@athenet.net)

PVC Periscope from Full Range Driver site

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Subject: Re: Boomtoobz

Posted by [Martin](#) on Fri, 19 Mar 2004 00:08:58 GMT

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Hi Lon, About two years ago I bought 10 of the RS 1197 drivers when Radio Shack started dumping them at about \$5 each. All of my drivers are the older purple and blue box models. I measured the T/S parameters for all 10 and got the following average values.  $f_d$  (Hz) = 84.2  $Q_{ed}$  = 0.419  $Q_{md}$  = 3.578  $Q_{td}$  = 0.375  $R_e$  (ohms) = 7.59  $V_{ad}$  (liters) = 4.87  $S_d$  = 49.5  $cm^2$   $BL$  (T-m) = 4.95  $SPL$  (dB) = 90.2 I came up with a whole directory full of interesting MathCad designs for the drivers but never got around to building anything. I still have all ten drivers stored in my workshop for a time when I want to experiment. So if we assume your drivers are similar to mine, then I don't see any reason why a sewer pipe speaker would not be a nice design. Since this is a constant area line I would tune the length to the driver  $f_d$ .  $L = 344 / (4 \times 84.2 \text{ Hz}) = 3 \text{ ft } 4 \text{ inches}$  For a  $3/4$  wavelength pipe tuned to the driver  $f_d$   $L = 3 \times (3 \text{ ft } 4 \text{ inches}) = 10 \text{ ft}$  and the fundamental tuning frequency would be 28 Hz. Your pipe is very long! I have never tried a longer pipe like this so I am not sure what to expect. Interesting experiment. What is the inside diameter of the pipe? I don't see any problem bending it like you did and I also don't see any issue with have the driver in front of the open end or the other way around. At low frequencies these types of separation distances are not important. Martin

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Subject: Re: Boomtoobz

Posted by [lon](#) on Fri, 19 Mar 2004 05:24:44 GMT

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My pipe diameter is standard 4" with the fittings. I do not have golden ears for listening to what's here..more like cabbage ears. Most of my listening is done with the Yamaha RP U100 receiver. I originally began experimenting with the 1197's across the room on a bench system. The bench system consists of a Radio Shack SA155... the smallest and lowest power unit there is on a commercial basis. I got that used because it has a built-in phono preamp. On the bench set-up I managed to transfer a couple phonograph tracks. That was my primary intention for the bench machine. Somebody donated an old Pioneer turntable to me and I bought a fresh Grado cartridge for it. I figured I could upgrade parts as I went. My 1197s are blue box and cost about the same. I read about them in the forums and so word of mouth sent me to the store to go see if there were any left. As part of this dialog I began reading your introductory pages the t-lines but am not very far with that yet so I don't have any sensible sort of questions. I'm moving the 1197's from one project to another. They started out in cardboard boxes. I had wondered how SPL effects pushing the sound through such a long length... or which of the parameters addresses the issue of pushing the sound through a long length. Send me a mail with your address. I will take some snaps and send them to you. The footprint of these things isn't really that large. Both toobz sit on a piece of chipboard shelving I get for \$.69/ea. The shelving is 10 1/2 inches by 23 1/2. I'm reminded of some recent postings in the Full Range Driver forum which related to building with sonotube. More dimension is available with that and the upshot of the article was that sonotube sound (which I figure is similar to what I have) sounded better to the listeners than more expensive rigs in the same room. I have not found any fault with the boomtoobz except insofar as announcers on their various mic setups can sound from ok

topeculiar. But those shortcomings are transparent when listening to concert performances like Pipe Dreams and other classical reproductions. To conclude, you said up there that a 3/4 wavelength pipe would be a total of 10 ft. What could I expect by adding on another short length to go the full 10 ft. distance? Would anything be gained? Since the 3 ft. 4" length for a TL is pretty close to my shorter tube, I'm thinking that the driver should be on the shorter length which would be closer to listener's sitting height and the back tube would be open and may not even need an elbow for "directionality" if I'm reading what you're saying correctly. In that configuration it'd prob'ly look more like a calliope. Which way to go for a driver upgrade or leave well-enough alone? lon@athenet.net

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Subject: Re: Boomtoobz

Posted by [Martin](#) on Fri, 19 Mar 2004 14:27:14 GMT

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Hi Lon, "My pipe diameter is standard 4" with the fittings. I do not have golden ears for listening to what's here... more like cabbage ears." So you probably have an  $S0/Sd$  of about 1.6 which is a little low but not too bad. As a TL's area gets bigger the bass response gets better. I have found that this effect starts to reach a diminishing return at about  $S0/Sd = 3$ . The classic rule of thumb recommended  $S0/Sd = 1.25$  which in my opinion is too small and chokes the bass response. "My 1197s are blue box and cost about the same. I read about them in the forums and so word of mouth sent me to the store to go see if there were any left." I did the exact same thing, I hit every Radio Shack I came across in my daily travels. I think my wife even hit the mall stores and scored a couple of the 1197 drivers. I think we have the same versions of the 1197 drivers." As part of this dialog I began reading your introductory pages the t-lines but am not very far with that yet so I don't have any sensible sort of questions. I'm moving the 1197's from one project to another. They started out in cardboard boxes. "I bet you are learning a lot and having a great time in the process.

If I were to recommend a classic TL per my understanding of the topic, I would recommend the length I previously posted and a pipe diameter of at least 5 inches. If you could find a way of mounting the driver 20% to 33% along the length you would get additional improvement. Maybe a "T" could be used. "I had wondered how SPL effects pushing the sound through such a long length... or which of the parameters addresses the issue of pushing the sound through a long length." The sound does not really get pushed through the length. The pipe responds at discrete frequencies that are related to the length. At these frequencies the air in the pipe resonates, attenuates the driver's motion, and almost all of the sound comes from the pipe's open end. This is similar to a BR but at more frequency values. "Send me a mail with your address. I will take some snaps and send them to you. The footprint of these things isn't really that large. Both toobz sit on a piece of chipboard shelving I get for \$.69/ea. The shelving is 10 1/2 inches by 23 1/2. I'm reminded of some recent postings in the Full Range Driver forum which related to building with sonotube. More dimension is available with that and the upshot of the article was that sonotube sound (which I figure is similar to what I have) sounded better to the listeners than more expensive rigs in the same room." I used a sonotube for my test TL and it worked great. I seen many TL designs using sonotube both tall straight ones and folded ones using nested tubes of different diameters. If you can cut cardboard easily and glue joints that are air tight then sonotube would probably be as flexible to use as the sewer pipes. Nothing wrong with cheap and easy. "I have not found any fault with the boomtoobz except insofar as announcers on their various mic setups



can sound from ok to peculiar. But those shortcomings are transparent when listening to concert performances like Pipe Dreams and other classical reproductions. To conclude, you said up there that a  $3/4$  wavelength pipe would be a total of 10 ft. What could I expect by adding on another short length to go the full 10 ft. distance? Would anything be gained?" I have no idea how a  $3/4$  wave pipe would work and if there is an advantage or disadvantage to using one. I always try to keep things small. TL's tend to be big enclosures and I struggle building big boxes and getting up two flights of stairs from the basement to my listening room. "Since the 3 ft. 4" length for a TL is pretty close to my shorter tube, I'm thinking that the driver should be on the shorter length which would be closer to listener's sitting height and the back tube would be open and may not even need an elbow for "directionality" if I'm reading what you're saying correctly. In that configuration it'd prob'ly look more like a calliope." I think that this experiment would answer the question above. Try the two different lengths and see what you hear. Maybe one will be far superior to the other. The proof is in the listening. "Which way to go for a driver upgrade or leave well-enough alone?" The two manufacturers that come to mind are Fostex and Tangband (spelling?) for an upgrade that would not cost an arm and a leg. I don't know anything about Tangband and have seen mixed reports on different models. Some appear to be very good and others are reported to be not so good. In my gallery is a back loaded horn using one of these drivers and it is reported to be excellent. I think any of the smaller Fostex drivers would be a step up but at a little more money. Hope that helps, Martin

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Subject: Re: Boomtoobz

Posted by [lon](#) on Sat, 20 Mar 2004 08:58:19 GMT

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Re: Boomtoobz Hi Lon, "My pipe diameter is standard 4" with the fittings. So you probably have an  $S0/Sd$  of about 1.6 which is a little low but not too bad. As a TL's area gets bigger the bass response gets better. I have found that this effect starts to reach a diminishing return at about  $S0/Sd = 3$ . The classic rule of thumb recommended  $S0/Sd = 1.25$  which in my opinion is too small and chokes the bass response. I bet you are learning a lot and having a great time in the process.>> Yes, lack of tools meant that I had to find a design without much cutting that could be done with a hand saw. But I am still mathematically challenged. If I were to recommend a classic TL per my understanding of the topic, I would recommend the length I previously posted and a pipe diameter of at least 5 inches. If you could find a way of mounting the driver 20% to 33% along the length you would get additional improvement. Maybe a "T" could be used.>> Ok. So a speak made this way could use the 6" diameter PVC at 40" of length using the information from the previous post as a guide(?) The issue that I had when making my initial length was: How does downfiring into carpet affect what is heard? I could understand downfiring onto a wood floor but carpet would have to absorb the energy of the sound would it not? So then I got onto the idea of getting the pipe pointing forward like the driver. That was on the single length tube. Then I used the longer length, cut it down and bent the tube up with a fitting at the open end identical to the elbow for the driver. 6" pipe at 40" is going to look like a narrow trash can sitting in the living room...or maybe two of them. Sonotube is no decorator's dream either, but someday I am going to fool with that depending on how the current work goes. So you probably have an  $S0/Sd$  of about 1.6 which is a little low but not too bad. As a TL's area gets bigger the bass response gets better. I have found that this effect starts to reach a diminishing return at about  $S0/Sd = 3$ . The classic

rule of thumb recommended  $S0/Sd = 1.25$  which in my opinion is too small and chokes the bass response. I bet you are learning a lot and having a great time in the process. If I were to recommend a classic TL per my understanding of the topic, I would recommend the length I previously posted and a pipe diameter of at least 5 inches. If you could find a way of mounting the driver 20% to 33% along the length you would get additional improvement. Maybe a "T" could be used. I had wondered how SPL effects pushing the sound through such a long length... or which of the parameters addresses the issue of pushing the sound through a long length. "The sound does not really get pushed through the length. The pipe responds at discrete frequencies that are related to the length. At these frequencies the air in the pipe resonates, attenuates the driver's motion, and almost all of the sound comes from the pipe's open end. This is similar to a BR but at more frequency values. I used a sonotube for my test TL and it worked great. I've seen many TL designs using sonotube both tall straight ones and folded ones using nested tubes of different diameters.>> Where are examples of the nested tube approach? These would be new to me. If you can cut cardboard easily and glue joints that are air tight then sonotube would probably be as flexible to use as the sewer pipes. Nothing wrong with cheap and easy.>> The next tool I will get is a spin saw. RotoZip is the commercial name and there are examples of their use here in AudioRoundtable. I've made a homebrew spin saw using an electric hand drill, a drill guide (type found at Sears) and RotoZip(c) bit. I've found that using this rig makes little dust and what waste is created goes down more than up into the air. There are some holes in the drill guide which I've used as centers to cut circles. But I am limited to using this rig for the 3 circle diameters available. The spin saw comes with an adjustable circle guide. To conclude, you said up there that a 3/4 wavelength pipe would be a total of 10 ft. What could I expect by adding on another short length to go the full 10 ft. distance? Would anything be gained?" I have no idea how a 3/4 wave pipe would work and if there is an advantage or disadvantage to using one. I always try to keep things small. TL's tend to be big enclosures and I struggle building big boxes and getting up two flights of stairs from the basement to my listening room.>> I am asthmatic. I live on one level. So the things you are saying apply to me as well. Small tools, low dust levels, and minimal lifting. At age 56 I have no work and would like to learn something I can do at my own pace. "Since the 3 ft. 4" length for a TL is pretty close to my shorter tube, I'm thinking that the driver should be on the shorter length which would be closer to listener's sitting height and the back tube would be open and may not even need an elbow for "directionality" if I'm reading what you're saying correctly. In that configuration it'd probably look more like a calliope." I think that this experiment would answer the question above. Try the two different lengths and see what you hear. Maybe one will be far superior to the other. The proof is in the listening.>> That will be my next step: reverse the construction keeping the same lengths and test individually. Then after that, add some additional length out to 10 ft of length total. Hope that helps,>> It certainly does, though I don't know if I will ever be able to apply theory over intuition and listening experience. Bill Schultz' followup article in audioXpress on Alpha t-lines should provide some additional clarification.>> I have scouted the Tangbands and Fostex extensively and I use the FE87e in my computer setup. I use the FE87e's in some doctored mini enclosures from an old Nakamichi shelf system. Being in Wisconsin, Madisound is within driving distance or fairly inexpensive shipping. Ion

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Subject: Re: Boomtoobz

Posted by [Martin](#) on Sat, 20 Mar 2004 20:05:54 GMT

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Hi Ion,I think a 40 inch long piece of 6 inch diameter PVC would work well. Having the open end near the floor should not be a big problem, you might try using a 12 inch square wood base and mounting the pipe 3 or 4 inches above the base on attached legs. I have seen similar things done many times without any hints of poor performance resulting.I remember seeing a sub done this way on the DIY Forum, I think. Basically it was something like a 12 inch diameter tube with the driver at one end near the floor. The sond came up this tube and then wnet back down a 15 inch tube mounted concentric ans paced about 3 or 4 inches above the end of the inner tube. The sound then exited the outer annulus near the floor. This arrangement was a different way of folding the line in half.I am also waiting to see the next alpha TL article from Schultz. I have communicated with him a few times and we have swaped ideas. He approaches TL design and alignment a little different so it is always interesting hearing about his results.Martin

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Subject: Re: Boomtoobz  
Posted by [Ion](#) on Mon, 22 Mar 2004 03:43:13 GMT  
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So the outer 15 in tube was capped on the top? I'm trying to visualize this thing: 12in. driver facing up at the floor attached to a tube (what length I wonder?) Then a 15 in. tube inserted over itwith little legs or something keeping it off the floor. The top would have to be capped then ennit? Ceramic tiles would work well on a base too I think. I've made the switch on these tubes putting the driver on the shorter lower front tube and the open end with an elbow at the rear. On the other one I put an extra length of pipe onthe rear portion with no elbow like a smoke stack. Too early tosay if this is practical plus it is not cut to a specific length.Overall the length of that one from throat of the terminus to driver is... omigod 9 ft 9 in... just shy of the 10 ft 3/4 wave length.If I put the elbow back on I'd have it all. Soundwise, I have no test equipment so not sure about that last one up there. I spoze I should figure out what I have here by calculation but the 8.5 length is the closest thing to 'fitting a room' that I've come up with and sounding good to boot. I'm starting to get curious about how a different driver would sound.

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Subject: Re: Boomtoobz  
Posted by [Martin](#) on Tue, 23 Mar 2004 00:31:26 GMT  
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Hi Ion,Your description of the nested sonso-tube sub is correct. I don't remember the details but the builder was very happy. I think that you could find details in the DIYAudio forum Loudspeakers subforum if you go back far enough. I think it was at least a year ago.As for your PVC pipes. You are on uncharted ground as far as I am concerned so I am looking to hear about your impressions. Does a 3/4 wavelength pipe offer any advantages over a 1/4 wavelength pipe. I have no idea.Martin

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Subject: Re: Boomtoobz  
Posted by [lon](#) on Tue, 23 Mar 2004 04:06:11 GMT  
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Thanks for sticking around on this one. I made some progress in reading your theory pages... got distracted once... it's not like book reading. Anyway, being pretty isolated socially from any other hobbyists I have no effective gauge of what I'm hearing. The first impression I have of making the toobz length nearly 10 ft overall is that effective listening is put too far out. In other words, just like my 8.5 ft straight pipe open at the front bottom, you have to get way back in order to appreciate the lower frequency reproduction... with considerable volume. The folded U-shape has given the most satisfying listening experience. Other thing to try is going in the other direction: shorter. I will follow up with the link (when I find it) of another approach. It'd be good if all the tubes were archived in the same place but I guess not many are doing this kind of building.

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Subject: Re: Subwoofer Horn  
Posted by [Mike.e](#) on Sun, 04 Apr 2004 05:37:57 GMT  
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Hi if you have a picture you need to show on a forum draw it in MSPAINT, save as say a 16 colour bmp, then resave as a GIF or PNG file (png is less distorted) email it to me, and I can save it on my webspace then ppl can see the pic to get the idea :- ) basshorn\_guy(at)yahoo.co.nz Cheers!

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Subject: Re: Subwoofer Horn  
Posted by [lon](#) on Sun, 04 Apr 2004 06:53:23 GMT  
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That's "Lon" and hello. :- ) My drawing talents wouldn't be up to the job. But over time I'd like to show how the design progressed. That's easy to do since all that needs to be done is reassemble the parts a few times. There's a small amount of webspace that's available at my ISP account. It's just getting a proper image into it. lon@athenet.net

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Subject: re pics  
Posted by [Mike.e](#) on Sun, 04 Apr 2004 10:32:48 GMT  
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No problem I've always had that problem, Is and Is :P

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