Subject: Building YOUR single driver speaker:
Posted by akhilesh on Wed, 17 Mar 2004 16:07:48 GMT
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HI Everyone,Just thought i'd summarize the tweaks I have done to my single driver, and sort of capture the little bits of knowledge I have gleaned from luminaries. Of course, it's just my 2 cents, YMMV, and every other cliche you can think of. 1. If you are starting out, then the CHOICE of driver is VERY important (duh). Are you a skilled wood worker or have money to spend with a skilled woodworker? Then you may want to think of a complicated horn design. In that case one of the fostex drivers (or if you are loaded a more expensive driver like the Lowther) may be the way to go. If you do do that, cost would be around $2-3,000 and if it's your first project, it;s probably not wise to spend it. If you want to spend less, then a simple bass reflex box is easier (cheaper) and often has less coloration than a horn design. If you do a BR box, then driver Q is important:Qts of at least 0.3 is good, and a bit higher is even better. Lowthers are usually out (Q is too low). Try one of the bigger fostexes. Basically, you want a driver that goes from about 50 HZ (lower is better) to at least 10-12 K cycles (higher is better). Efficiency is important, and a higher efficiency driver is better. 2. After you choose the driver you need to make sure you have the box calculated & designed according to the T/S parameters of the driver.3. Then make the box or get a carpenter to make it. 4. After you have the driver fitted in and running, you will notice the following, hopefully: great midrange, but could use more bass, and maybe rolled of at the top. This is what I noticed with my driver, esp. when compared to my Khorns. 5. The biggest improvement in my setup (a stephens 80FR driver, which is vintage, but resembles a fostex 8 inch) was the addition of a supertweeter. This was a HUGE improvement. The soundstage was sudeenly huge, deep, and decay of instruments was phenomenal. Large instrument ensembles became uncompressed. For a super tweeter we need to match efficiencies as closely as possible (or use a voltage divider), and a first order high pass filter is best. You will need to experiment and blend it. I used a VIFA tweeter (95 db eff, goes till 25,000 cycles) from parts express, and have settled on a 2.0 uf value for the cap. 6. My next tweak was a contour circuit (thanks martin for your friendly goading to try this!) that emphasized the bass frequencies relative to the other frequencies. This is basically an inductor & a resistor in parallel and then in series with the driver. I settled on 2.2 mH and 2.5 ohms. Lots of experiemntation is required to get it right...but it's real fun! You may have to decrease the value of the supertweeter high pass at this point too, though i did not have to. The contour circuit created more bass, and much more body in the below 600 HZ region. With this, the bass is very satisfactory, and i don't need a sub woofer at all. 7. After the contour circuit (i have called it a BSC circuit in other posts) and more importantly the super tweeter, my system sounds the best I have ever heard it. I also tried a zobel circuit (it made my system sound too flat and it lost some "life") and a straight voltage divider to the driver. The contouring circuit worked best for me. AS an aside, I asked Jim & Phil to come by and hear the driver, and at that time, it has a zobel circuit on (NOT the contouring circuit fellas, becuase i was using an inappropriate inductor). I still consider the system a single driver, because frequencies until 14,000 cycles are handled by one driver (this is the cutoff point for the super tweeter). For those of us worried about phase shifts, i wouldn;t worry. I can;t hear them, and i suspect almost no one can. The improvement in sound is so huge with the supertweeter & contour circuit, that any perceived phase shifts are pretty much negligible. Imaging, etc is actually better now. Everything is in balance. I LOVE it. If you want to get started with minimum hassle, then a) classic audio sells a fostex 206E driver in a 1.3 cubic foot box which actually is almost the right optimal dimensions for the driver (though i don;t know about the port in their cabinet)b) madisound sells a horn cabinet kit with fostex driver &

a fostex supertweeter that is a SCREAMIN deal, though i have yet to see it reviewed. Hope this helps us get started, if we are looking. And let me assure you, a single driver systems does have the "magic". My Khorns, which are touted as being "alive" now sound a little more dead than my single driver set up....and I STILL LOVE MY Khorns, but thgis should give you an idea of how good the single driver setup can be. -akhilesh

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Subject: Re: Building YOUR single driver speaker:
Posted by Martin on Thu, 18 Mar 2004 01:30:17 GMT
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Hi akhilesh,I like you summary and agree almost entirely. I think that a full range driver project is an excellent first project due to the lack of crossover and multiple drivers. I found when I was starting out that building a box and getting the tuning right was not so hard but the crossover ruined several of my early projects. Using a full range driver makes the project so much easier and the chance of a great success is significantly better. Comparing the cost of multiple drivers and a crossover to a full range driver is also appealing.What I would like to point out is the lower model Lowther drivers. If you are going to buy an eight inch Fostex driver from Madisound, then you will spend between $150 and probably $350 a pair depending on which model is selected. If you look at the prices of the Lowther PM6C (Qts = 0.33) and DX2 (Qts = 0.30) they are a little higher but in my opinion the performance increase is worth the cost. I have both drivers and when comparing them to my Fostex FE-208 Sigma's they are clearly better. If you can stretch a little bit more a pair of PM2C drivers are amazing in a ported design. I had a loaner pair to audition and expect delivery of my own pair in the next week. Yes they cost more but if you can spend a little bit more then I don't think that you will be disappointed. I don't think that going for the top of the line PM2A or DX4 is required.Martin

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Subject: Re: Building YOUR single driver speaker:
Posted by akhilesh on Fri, 19 Mar 2004 11:32:58 GMT
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HI Martin,Thanx for the pointer on the lowther models. Since you have obviously had experience with both Fostex & Lowther, your views on the differences between them are meaningful. Based on your website, it seems the lowthers are more revealing. I guess it would help me & others if you could further elaborate on the following, based on your experience:1. Many people on the web say lowthers are not great for a BR design, that they need horns. A Qts of 0.33 for the PM6C is not too bad though. Have you ever built a BR box for a lowther that has been satisfactory?2. Does a well designed TL box, as described on on your website give better bass than a well designed BR box? I read somewhere else that a TL design does that, but i haven;t really gotten into the theory. I suspect a lot of us, starting out on a project, would like to know this, since the cost of the TL and the BR would be about the same. Further, how would this compare to a "simple" horn design...i'm thinking like a front firing horn. 3. Finally, i have read on the net that

lowthers have high variances in manufacturing. Have you found quality to be an issue in Lowthers, versus Fostexes?thanx!-akhilesh

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Subject: Re: Building YOUR single driver speaker:
Posted by Martin on Fri, 19 Mar 2004 14:26:21 GMT
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Hi akhilesh,"1. Many people on the web say lowthers are not great for a BR design, that they need horns. A Qts of 0.33 for the PM6C is not too bad though. Have you ever built a BR box for a lowther that has been satisfactory?"I have not built a classic BR enclosure using T/S alignment table values for determining the geometry. I have built an ML TL (Project #4 on my site) and used Lowther drivers with a correction circuit. This particular enclosure has had DX2, DX3, DX4, PM6C (currently playing), and PM2C (loaners) installed and they all work very well. The Lowthers are eight inch drivers with an fs of between 55 and 60 Hz and the ML TL is tuned to about 40 Hz so you do not get subwoofer quantity bass from them but the bass is balanced, tight, and in my opinion natural sounding on acoustic music. I don't know if these would make good rock speakers, however the PM6C definitely does have some thump when my kids play the stuff that passes for music on the radio today. No bloated or boomy bass is exhibited, very tight. I am sure that Wayne's big woofer Pi designs would produce much louder bass output."2. Does a well designed TL box, as described on on your website give better bass than a well designed BR box? I read somewhere else that a TL design does that, but i haven;t really gotten into the theory. I suspect a lot of us, starting out on a project, would like to know this, since the cost of the TL and the BR would be about the same. Further, how would this compare to a "simple" horn design...i'm thinking like a front firing horn."I have been asked the TL or ML TL versus BR question many times before. I really do not have a definitive answer. If you simulate a classic BR and overlay a plot of a ML TL the differences in the plots would be minor. A TL would be easy to spot due to the ripple associated with the standing waves. Which sounds better? I have never built side by side designs using the same driver so I cannot tell you with certainty that a TL is better then a BR. But I believe that a TL and ML TL will perform better primarily due to the internal damping that the fiber provides. You are designing the enclosure with this damping accounted for and it does help control the midrange standing waves in the box and the boomy bass that many associate with a BR enclosure. I have also found that the standing quarter waves in a TL do not excite the box as much as the constant pressure generated in a bass reflex at resonance. I don't use a lot of internal bracing in my boxes and do not feel vibrations in the cabinet walls. I cannot make the bold statement that a TL style design is always better then a BR design, or the other way aroundAs for "simple" front loaded horns, I have not finished examining horns yet and have not built a horn design. If you put a Lowther in a front loaded horn then I think you are also looking at a sub for the bottom end. My real interest in horns is a back loaded design where a sub is not required. My thinking is that a back loaded horn would still be a truely single driver design. It will probably be several more months before I have a real well formed opinion on this topic. Sorry, no help from me on horns at this time. "3. Finally, i have read on the net that lowthers have high variances in manufacturing. Have you found quality to be an issue in Lowthers, versus Fostexes?"I have never had a problem with quality of Fostex drivers and the measured T/S parameters are usually close to the manufacturer's specs. Extremely high qaulity control and very well made drivers.I cannot say the same for some of my Lowther driverss. The manufacturer's

specs on the websites are pure fiction. When I first started with Lowther DX series, about two years ago, I did get some significant variability in the T/S parameters. Any driver that I felt was really off was replaced immediately with out any hassle. But yes, I did have some problems. The problems all centered around the spider and the stiffness of the suspension. Lowther has indicated that they have addressed the problem and based on the PM6C drivers I bought last month I have no complaints. My new PM6C drivers are very closely matched and the T/S parameters fall right where I expected. I have PM2C, PM6A, and PM2A drivers on order and should take delivery in the next couple of weeks. If these are as consistent as my new PM6C drivers then I would have a lot more confidence in Lowther's quality control and am a very happy customer. My advice, if you buy Lowthers make sure you measure the T/S parameters. I have no hidden interest in selling Lowther drivers, I paid for these drivers and do not recieve any kick back or commission on future sales. I really believe in these drivers and feel the effort is worth the return. I guess I am very biased so please take that into account.I am not sure if Lowther's quality control is better or worse then other manufacturers. In the past 20 years, I have tested many different drivers and had problems with quality once or twice. I once had a pair of Focal 10 inch woofers with bad coils. I had a lot of trouble getting those replaced. I have bought many Radio Shack drivers for $5 and $10 just to use in experiments and have never had to return a single driver, quality control was exellent. I am sure that Wayne has a much better feel for manufacturer's quality control history with all of the speaker systems he produces.Hope that helps,Martin

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Subject: question
Posted by Seeker on Fri, 19 Mar 2004 16:43:46 GMT
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Has anyone heard the Classic Audio 1.3 bass reflex box with either Fostex or Lowther drivers? I have read so many posts at the other place on how Lowthers won't work in a bass reflex box, but this guy at Classic Audio swears by them. I am interested in hearing how this speaker sounds.

Subject: Re: question
Posted by akhilesh on Fri, 19 Mar 2004 17:11:00 GMT
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Phil Wilson in Tulsa has a 1.3 box with a fostex 206 driver in it. It sounds quite good, though i heard it a WHILE back. It so happens, that around 1 cubic foot is the best size for the particular driver. I do not know how the port is configured in this box that is sold by classic audio. I would be careful about other drivers (like the lowther) in this box. My guess is the bass will go WAYY down.
-akhilesh

Subject: Re: Building YOUR single driver speaker:
Posted by akhilesh on Fri, 19 Mar 2004 17:27:30 GMT
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Thanx Martin. your opinion does help a lot. BTW, in my home brewed BR boxes, I use carpet, 3/4" baltic birch and 3 braces, and i don;t hear the bass as boomy at all... i think the bracing may be helping a bit in that regard. The midrange is now controlled by the contour shaping circuit. AS far as rear loaded horns go, i have a pair of Klipschorns, which are nice. But i will tell you...placement is a problem, as is imaging, etc. One thing i have been thinking about after reading scotts's review is an active crossover and bi-amping, with a 15 inch high eff driver in a 4th order box. I have a pair of EVforce 15s lying around that are 100 db eff. The curve looks real flat in the bass region, down to about 25 Hz! The Khorns, which are cool, only go down to about 35 HZ. My guess (not having heard actively crossed subs, i can only base it on other people's reviews) is that an actively crossed biamped system, with a sub, a fullrange driver and a super tweeter will sound better than a corner loaded horn....but the proof of the pudding will be in a hear-off. I know you are a solid state man, and yet you were blown away by the clarity of the lowthers. I think at this point, i would URGE (challenge ;-)) you, if you have not already, to try a good tube amp with your lowthers and see if that does not make a difference!-akhilesh

Subject: Re: Building YOUR single driver speaker:
Posted by Martin on Sat, 20 Mar 2004 00:15:34 GMT
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Hi akhilesh,I did not mean to imply that all BR are boomy, but it is not too hard to have a homemade design end up being a little boomy. With a TL the stuffing helps overcome and uncontrolled resonance so it is hard to achieve a boomy response.I would love to try my Lowther design with a tube amp. I would show up with a bag of resistors and adjust the response to an optimum and then listen to determine if there are advantages or short comings. I think the key is adjusting using the resistors to get an apples to apples comparision. I am in the market for a new amp at some point this year and would like to take the challenge. Unfortunately, where I live it is hard to find somebody with a tube amp set-up or even a dealer that sells this type of amp. Hi Fi dealers in upstate NY are not very plentiful. All of my friends are solid state users and not many of them are into it enough to care.Martin

Subject: Re: Building YOUR single driver speaker:
Posted by akhilesh on Sun, 21 Mar 2004 12:01:28 GMT
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HI Martin,I can intuitively see how stuffing traps the midrange & upper bass, and only allows those waves to escape that we want. I haven't looked at your models, but it seems prima facie, that the density & size of stuffing will influence the wavelengths we trap, and the remaining empty box will

behave like a standard vented enclosure. Feel free to correct my "intuition". TL seems like a cleaner design than BR, which allows ALL waves to float around the box. My guess is a BR would be more colored than a TL, (more like a "horn" than a TL). In my particular case, the contouring circuit (BSC) reduces the midrange & upper bass, and the super tweeter augments the upper midrange and highs and the two effects combine to produce sound that is pleasing to my ears. However, a TL design would probably be more neutral. The only reason i mentioned tube amps is becuase you already have an important prerequisite: high eff speakers (92 db +) that would sound great with low powered (and cheap) tube amps. One amp i would recommend is the zen amp (www.decware.com) that goes fro $499 and has a money back guarantee i think if you don't like it. This owuld be a good way to experience a good tube amp and see if it is indeed for you, with very little cost. thanx-akhilesh

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Subject: Re: Building YOUR single driver speaker:
Posted by Martin on Sun, 21 Mar 2004 15:36:21 GMT
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Hi akhilesh,I have looked at the Bottlehead and the Decware sites. The Bottlehead site looks very straight forward and I believe I could build the amp and preamp myself. I tried reading the Decware site and became very confused. I cannot determine what each product is, there is just too moch hype and not enough short concise senetences for me to be able to understand the differences between each product. Very confusing!Martin

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Subject: Re: question
Posted by roncla on Sun, 21 Mar 2004 16:05:38 GMT
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Over in the full ranger forum it was discovered that the seller of the BR box was using extensive EQ to bring the LF response to a given point. The 206e will not perform correctly in either a BR or MLTL without use of series resistance to upp the Qes (which upps the Qts) of this driver.The only thing you will lose is some sensitivity.ron

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Subject: thanks for the update
Posted by Seeker on Mon, 22 Mar 2004 14:07:06 GMT
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Well, now I see how he did it. I thought I saw on the website that the speakers had no crossover, but I couldn't understand how the speakers would sound good without it. Anyway, a crossover done right isn't bad thing.

Subject: Re: question
Posted by akhilesh on Mon, 22 Mar 2004 15:01:38 GMT
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Hmmm....that seems odd. I haven;t looked inside any of these boxes sold by them. However, their site says the following:"Best of all, the music doesn't pass through any inductors (coils), resistors, or capacitors. A crossover is a necessary evil in all other speaker systems. With Lowthers, there is no crossover to deal with." in the technical discussion page. This indicates that they are NOT using any EQ. Guess the best thing is to open the box & check!-akhilesh

Subject: Re: question
Posted by roncla on Mon, 22 Mar 2004 17:32:37 GMT
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The seller wasent using a crossover , he was using one of those EQ devices in his jukebox type CD player. A reviewer (i believer it was from TNT audio) went to hear the speakers and during a change in CDs the EQ graph suddenly came up on the LCD readout.It was set to the ROCK setting. All i am stating is that without some sort of series resistance to raise the QTS a lower QTS driver is not designed or really ment for a BR.It will burn your ears off with the mids and highs.Its either that or a notch filter or both. Again all i am stating is that for some sort of a near flat response a low QTS driver will require either a crossover(from a sub)or series resistance and probably a notch filter (for the rising response from the FR curve)or a properly tuned rear loaded horn.ron

Subject: Re: question
Posted by akhilesh on Mon, 22 Mar 2004 20:42:03 GMT
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I agree Roncla. Didn't mean to imply you were wrong... just wondered is all. -akhilesh

Subject: Re: question
Posted by roncla on Tue, 23 Mar 2004 01:56:33 GMT
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Never hurts to imply i am wrong, as i have been wrong so many times in my life.I have nothing against the seller of the Lowther/Fostex BR cabs, its just i hate to see ppl purchase a cab that cost as much as they do under the impression that when they get it home it will sound the same as

they heard it in a demo.Please read the reviews of this product,i believe it was TNT audio. I will say this in the sellers behalf, he does have some good prices on his bare drivers.ron

Subject: Re: question
Posted by akhilesh on Tue, 23 Mar 2004 17:43:36 GMT
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Hi Roncla,I agree with you. A link to the review you are referring to was already posted below in this forum....several posts below, and some other people have given comments on the review. thanx-akhilesh