Subject: RatShack 40-1034 Sub
Posted by Spinjack on Thu, 01 Mar 2007 10:47:39 GMT
View Forum Message <> Reply to Message

I have a pair of RS 40-1034 drivers that I was planning to use for a subwoofer, but when I model the cabinet in WinISD it comes up with a massive sealed box (basically 3ft x 4ft x 6.75ft)if I want a fairly flat response. To get the box to a "reasonable" size (approx. 1ft x 2ft x 3ft) there is a huge bump starting at about 100Hz, hitting 2 db at about 45Hz, then dropping off to 0db at about 31Hz and -3db at about 27Hz.Is there anything I can do in the crossover/filter that would help flatten the response? My worry is that if a have the filter roll off sooner to compensate then the drop on the back side of the curve will be pretty severe and I'll loose the bottom end. Alternatively, I thought about crossing them over at about 60Hz. But that seems a bit of a waste.I couldn't find actually T-S parameters for these, but one source suggested that they are essensially 40-1026A's whcih have T-S parameters of:Nominal Impedance:.....8 ohmsFrequency Response:.....30 Hz - 3000 HzFree Air Resonance (Fs) Frequency:.....25 HzInfinite Baffle Resonance Frequency:.....23 HzPiston Area (SD):.....0.0523 m2Rated Power Input - Nominal:.....50 WRMS Thermal Power Limit (PMAX):.....100 WFlux Density (BL):.....6.66 TMDC Voice Coil Resistance (RE, ohms):.....5.6 ohmsVoice Coil Inductance (LVC at 1 kHz):.....0.45 mHSPL:.....88 +/- 2 dB/1W/1mMoving Mass (Mms):.....61.5 gElectrical Q Factor (QES):.....1.13Mechanical Q Factor (QMS):.....3.13Total Q Factor:.....0.83Equivalent Acoustic Volume (VAS):.....297.19 IMechanical Suspension Compliance (CMS, UM/N):...766 UM/NMechanical Mass of Cone Assembly and Free Air Load:.....61.46 gMechanical Mass of Cone Assembly Only:.....54.59 gPeak-to-Peak (maximum) Linear Excursion:.....2.90 mmCutout:.....10 1/4 Inches/28.5 cmDepth:.....5 1/4 Inches/14.3 cmPower Handling:.....50 Watts RMSMagnet Weight:.....17.7 ozSpeaker Weight:.....72.9 ozAny thoughts? I was going to use these to supplement some computer monitors I wanted to build, but they now seem a pit overkill for that. So, maybe I'll use them with my Fostex horns.

Subject: Re: RatShack 40-1034 Sub
Posted by Wayne Parham on Thu, 01 Mar 2007 14:52:27 GMT
View Forum Message <> Reply to Message

It's a high Q driver, so its specs pretty much dictate it will need a large box. I don't think I'd try an electrical filter, like a very low Q notch filter, because the components required would be large. Maybe you could mount it on a sturdy plywood panel and install it in the ceiling? That would make it sort of an infinite baffle with the attic serving as your "large box".

Subject: Re: RatShack 40-1034 Sub
Posted by Spinjack on Thu, 01 Mar 2007 18:41:36 GMT
View Forum Message <> Reply to Message

Would these work in an infinite baffle arrangement? I'm thinking of maybe a boxless design (maybe the room could be the enclosure). Or maybe some sort of psuedo-cornerhorn with no enclosure?It sounds like these were meant for car audio applications.

Subject: Re: RatShack 40-1034 Sub
Posted by Wayne Parham on Thu, 01 Mar 2007 21:30:12 GMT
View Forum Message <> Reply to Message

You betcha. Infinite baffle or open baffle, either one would work well with this driver. I think I would lean towards the infinite baffle approach though, as it is essentially a very large box, approximating an infinite space. The open baffle approach would have to be very large to work at subwoofer frequencies. Even then, excursion is high, so I'm not sure that's a good approach for subs. And unless outdoors or in a very large room, the directional lobes created from a dipole arrangement would be modified by wall reflections, so that aspect wouldn't be going for you either. My thinking is dipoles are probably best suited for midrange frequencies, not bass.

Subject: Re: RatShack 40-1034 Sub
Posted by Herbsbuddy on Sat, 24 Mar 2007 12:54:23 GMT
View Forum Message <> Reply to Message

Hello, Assuming your posted driver parameters are correct, I also typed them into WinISD (version 0.44) and modelling a single driver in a sealed box it recommends a 41 cu. ft. box for a Qtc of 0.93. Since the EBP (Efficiency Bandwidth Product) is 22.1 for that driver, that is on the lower end of the scale and a sealed box is recommended for that. To help solve your problem of getting a reasonable size box, you can mount both of your woofers in a face to face "clamshell" arrangement which is one of the simplest implementations of isobaric (equal pressure) alignments. By doing this, you can then reduce your box size to half of 41 cu. ft without changing the frequency curve. So now we are down to 20.5 cu. ft. Still a rather large box although I have made a 24 cu. ft. box before and it worked very well. The 2 driver isobaric setup can be taken a step further by using a double clamshell arrangement. You will need 4 identical woofers for this. I actually have four 40-1026As. You basically mount the pair of clamshells so that only 1 woofer is outside the box (with magnet end sticking out) and the other ones are inside the box. There would be a very small subenclosure inside the box to isolate all but one of the woofers from the large part of the box. That is, you basically "cram" the woofers into a small section of the box so that only 1 woofer sticks out the front of the box and only 1 woofer "sees" the large internal part of the box. The small subenclosure effectively couples the pair of clamshells so they operate as 1 big "team" of 4 drivers. It sounds a little complicated but if you see a picture it is actually quite

simple both conceptually and to build. Now with 4 identical woofers in this arrangement, the Vas of the quad setup is basically 1/4 that of a single driver which means now you only need a box 1/4 of the single driver requirement for the same freq SPL curve! So our original 41 cu. ft. requirement is now down to 10.25 cu. ft. That is a very reasonable size to build. I currently have a pair of these 40-1026A 12" Radio Shack poly woofers in a 6.67 cu. ft. sealed box in an isobaric face to face "clamshell" arrangement and am getting decent bass down to about 25Hz which is the F3. If I go with the quad isobaric setup, the F3 will drop to 23.5Hz. I model the quad isobaric setup in WinISD ver 0.44 (free download by the way) by selecting iso-barik (compound) driver, then "artificially" doubling the actual box volume. So in my case with 4 woofers, instead of typing 6.67 cu. ft. as the actual box size, I type 13.34 cu. ft. for the 4 woofers even though it is really only 6.67 cu. ft. actual box internal volume. This is a correct modelling technique as far as I know. You might think that a few Hz difference is trivial but that is not true. Around 20Hz, every 1Hz represents a different musical note. For example, 19.4Hz is an Eb and 18.4Hz (1 Hz lower) is a D. Since the lowest note on some pipe organs is a super low C (16.3Hz), when I design a subwoofer, I try to make it have an F3 of 16.3Hz or lower so that note will have some "growl" to it. 2 other "side" benefits of this quad isobaric setup is the 4 woofers can be wired so the impedence matches that of a single woofer. In my 40-1026A case, a single woofer is 8 ohm nominal so wiring 4 of them together in series+parallel would also yield an 8 ohm nominal impedence but with much more thermal power handling. The 2nd "side" benefit is cancellation of some distortion. The woofers working together in a "push-pull" setup help cancel some distortion that a single woofer has. There is a technical name for this like 2nd order linear distortion or something but the bottom line is you are improving the quality of sound over a single woofer although I am not sure if the distortion of a 4 woofer clamshell setup is better, worse, or simliar to that of a 2 woofer clamshell setup. I am also somewhat suspicious of the 2.9mm maximum excursion (Xmax) parameter you posted on this woofer. That seems very low for a 12" woofer since that is only a little over 1 inch. I dont think that will affect the box size calculations but it doesn't seem to me to be enough to move large volumes of air. Another 12" woofer I have has an Xmax of 13.0mm which is about 5 inches (peak to peak). That seems much much better especially for sealed boxes because excursion is "intense" near Fb (fun to watch too). Another solution to your smaller box requirement (although not recommended by WinISD) is to use a ported box. This will allow you to use your 6 cu. ft. setup using a pair of 40-1026A equivalent woofers in an isobaric alignment. Tune the box/port combo to 20 Hz using an 11" long 4" internal diameter round duct such as PVC pipe. This should give you a +4dB peak at 40Hz but a F3 of 21.5Hz. The peak you can "fix" with an EQ. The last solution which I haven't really tested yet but might work (at reasonable volume levels) is to just put the woofers in any reasonable size sealed box and EQ it. For example, if you use a 6 cu. ft. sealed box for an isobaric pair of 40-1026A equivalent woofers, you will have an F3 of about 26Hz but for pipe organ music, you will be down about 12dB at 16Hz. Just buy an EQ with a 16Hz band and boost it +12dB. I am a little suspicious that this will actually work because usually a woofer will not make much output below it's resonant frequency (for this woofer it is 25Hz) unless you port it in which case the output of the woofer is almost silent at Fb and the sound comes almost exclusively from the port (at Fb). Also, by boosting the 16Hz aggressively with the EQ, excessive cone excursion of a sealed system will probably cause mechanical noise which will ruin the bass output. Bass is only good if it is clean sounding and not "mechanical" sounding. Hope this helps I have been playing around with this type of stuff off and on for about 20 years with success. Anyone can contact me directly at my AOL account regarding this or similar subwoofer topics. My knowledge and experience is mostly in sealed and simple ported system although I recently purchased a speaker book detailing other designs (bandpass, passive radiator...). Current projects I am working on are building a ported subwoofer for my apt

with a F3 of 15Hz and a box size of only 8.2 cu. ft. I already have the woofers and did the design I just have to build the box out of 3/4" thick MDF and port it. I will also be transferring the 6.67 cu. ft. box to my van and possibly porting that too although I will try it sealed first to hear how low it goes. Good luck to all in your speaker endeavors.

Subject: Re: RatShack 40-1034 Sub
Posted by Herbsbuddy on Wed, 28 Mar 2007 10:28:28 GMT
View Forum Message <> Reply to Message

Correction: 2.9mm is much less than an inch and 13.0mm is a little over half of an inch. I was wrongly thinking 2.54mm = 1 inch but actually 2.54cm (25.4mm) = 1 inch so my original posting is off by a factor of 10 which I am correcting here. Also the distortion "cleaned up" by isobaric mounting is called 2nd order harmonic distortion. Basically by 2 identical woofers working together in a push-pull configuration, this distortion is greatly lessened compared to just a single woofer. Also the Vas of an isobaric woofer pair is half of that of a single woofer which means the pair can be placed in an enclosure 1/2 the volume (size) of that of a single woofer with a very similar frequency curve. The clamshell isobaric orientation is very simple to use just make sure the surround on your woofers doesn't extend past the gasket segments of your woofer at rest position otherwise there may be issues when mounting them isobarically.
