

The Bargainhunters

Goal:

I had some very nice tweeters, some leftover wood and other cabinet parts lying around from previous projects. I had also purchased 8 dirt-cheap Parts Express Factory Buyout woofers. The goal was to see what I could make using as many leftover parts as is possible – keeping the cost as low as is possible.

The drivers:

- PE 299-609: This is a \$7.98, 6½” plastic cone, factory buyout (no-brand) woofer from Parts Express. With a little digging I learned it was used in the older version of the Dayton Audio Classic B40.
- Swan (HiVi) SS1ii: A very nice 25mm soft dome tweeter.

Cabinet design:

No T/S parameters are published for this driver. I tried to measure them myself using the added-mass method and PE's DATS V3, but I got nonsense numbers which VituixCAD couldn't model. I've had problems measuring T/S parameters in the past. I tried both magnets and sticky-tak, but that's for another post. PE recommends 0.4 ft³ in a sealed cabinet. I didn't have enough wood to put 4 in a cabinet, so I went for a WTW design in a 28 liter (1ft³) sealed cabinet. I made the baffle as small as possible, then adjusted the depth to whatever was necessary. End result was a 20.5” X 8.5” X 14.25” cabinet made of ¾” MDF. I had wood for plenty of bracing.

Build:

Build was really straightforward. I'm a member of the Guild of Oregon Woodworkers which has a fantastic shop. I used simple butt joints for all joints. I used a Milescraft Small Circle Compass to router out the baffle to flush-mount the drivers.



You can never have too many clamps!

I opted for acoustic foam instead of polyfill because I didn't have the patience to comb out all the tight tangles the polyfill always comes with.

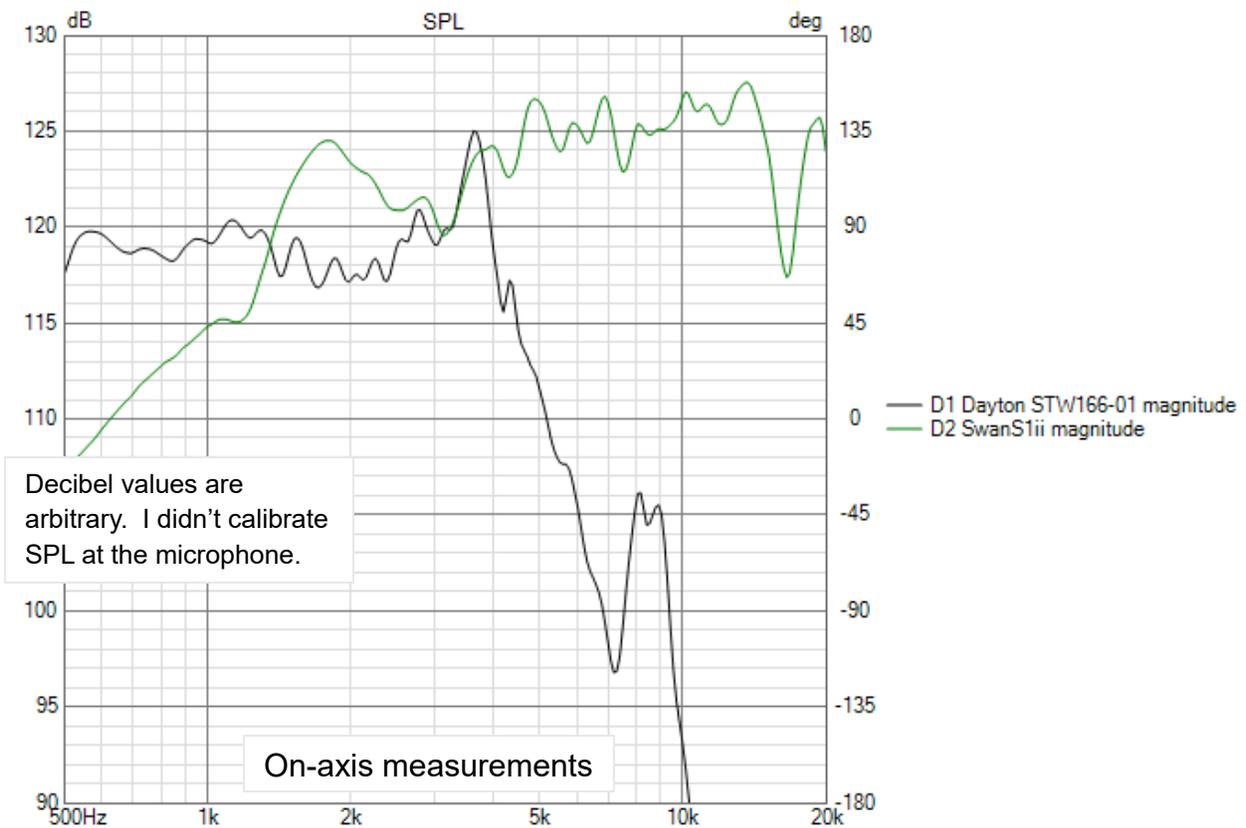
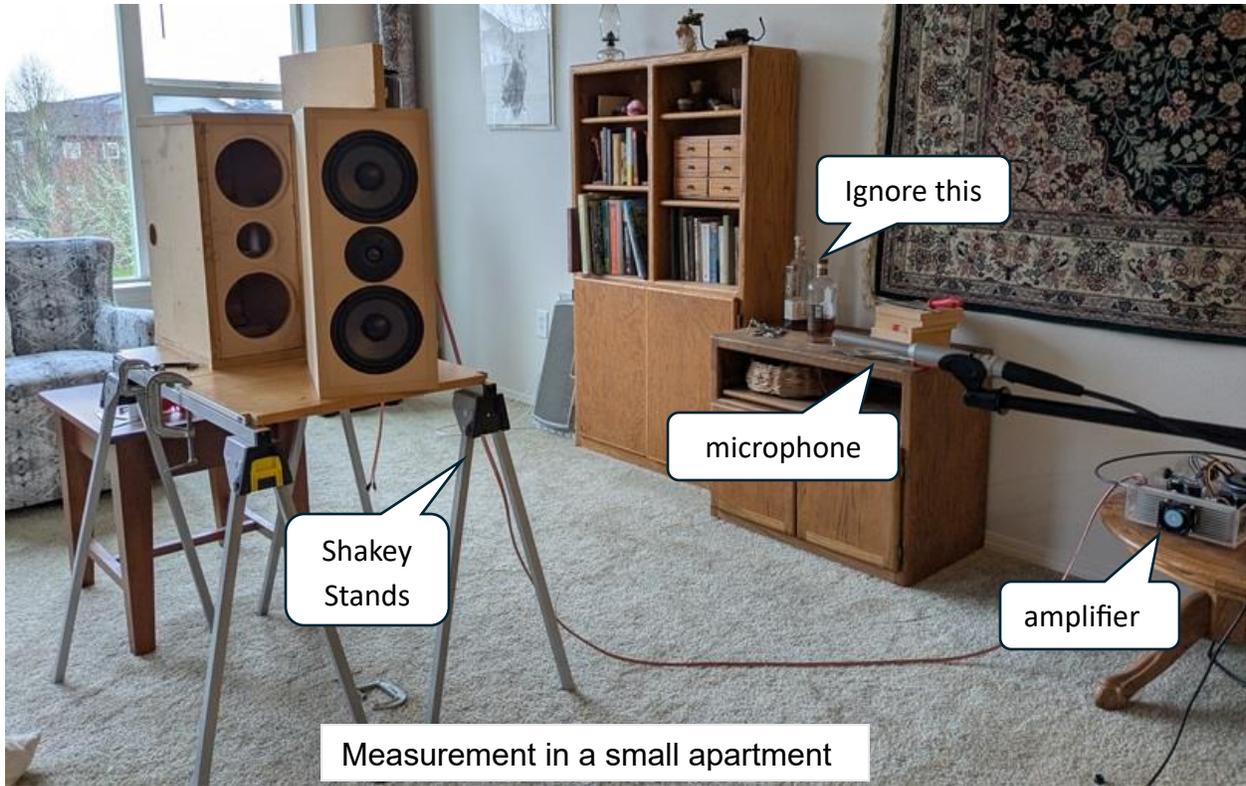
Measurements:

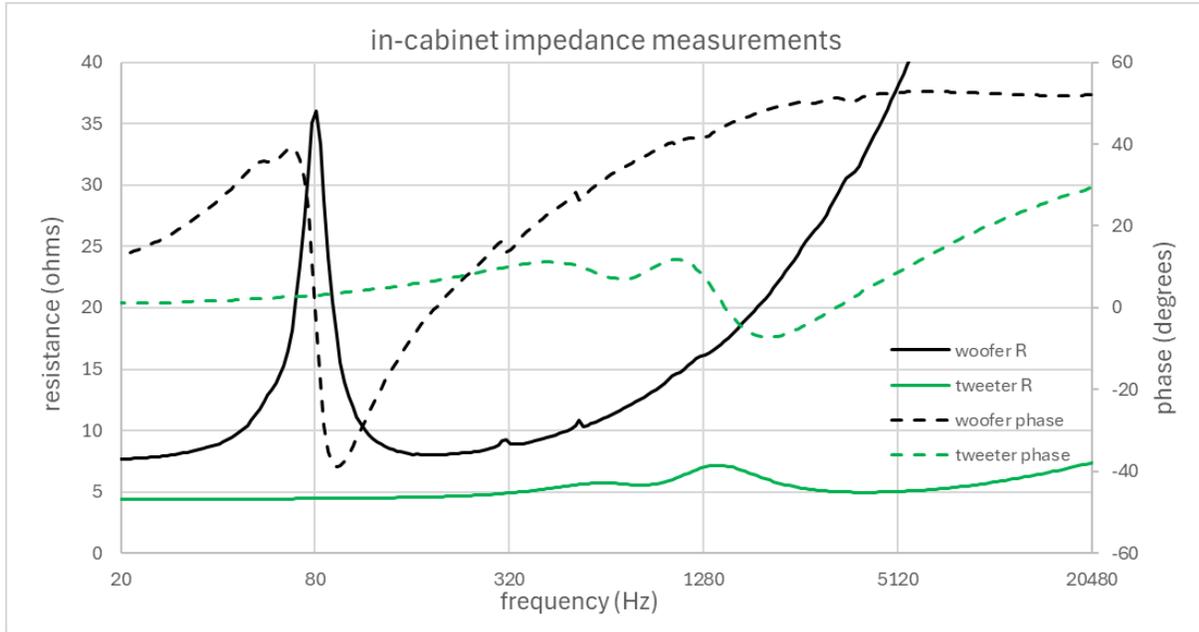
For frequency-response and impedance I used the following:

- PE's DATS V3 for impedance
- Presonus Studio 24C for audio interface and microphone preamp.
- Dayton EMM-6 microphone
- Home-built LM3886-based amplifier
- Arta software for FRD files

I don't have a big room for taking measurements, so I had to gate at about 300Hz. I got measurements at -90° , -45° , -22.5° , 0° , 22.5° , 45° & 90° at 1 meter. I'm not super confident about the measurements. I don't have an ideal setup.

Woofers were wired in series and treated as a single driver for all measurements.

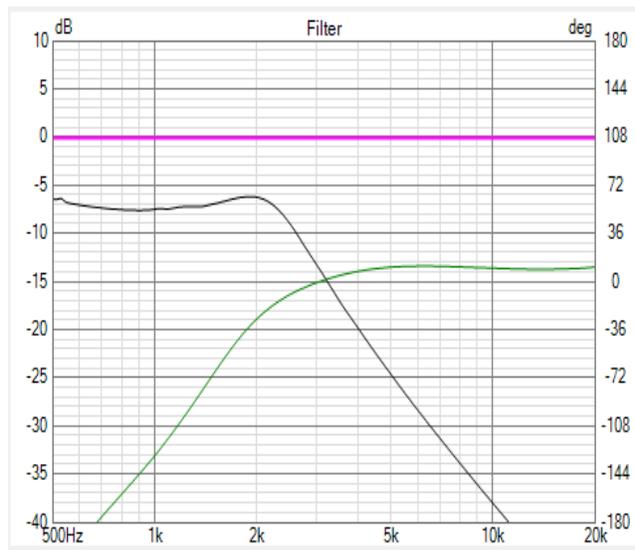
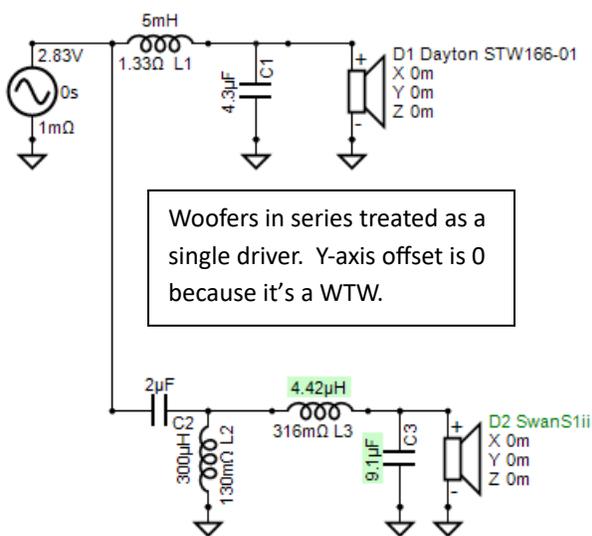




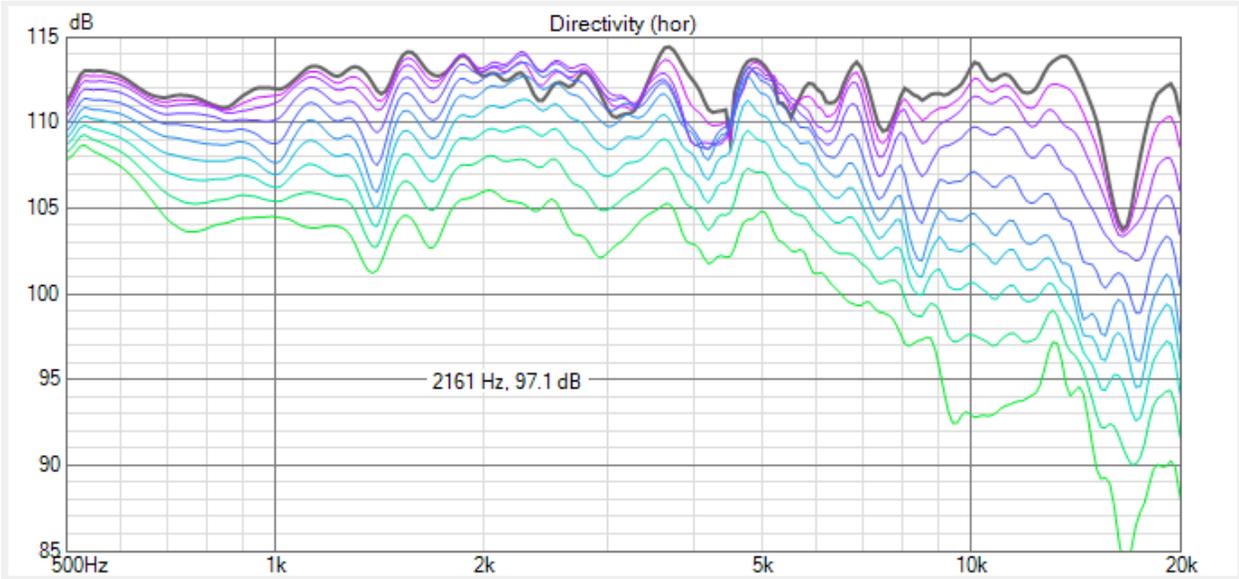
I didn't think to take close-miked measurements of the woofer, but it's not like I was going to rebuild the cabinets anyway.

Crossover design:

Modelling was done in Vituix CAD. I had a couple problems to deal with. First, there's that nasty resonance in the woofer at 3650Hz. A second order low-pass filter at about 3KHz mostly took care of that. I couldn't make a filter for the tweeter that kept its output flat. It wanted to gradually increase output up to 14Khz. I ended up using a high-frequency low-pass first order slope to keep the tweeter down. Here is the filter modeled in VituixCAD:



Modeled frequency response:



Crossover ready for installation

Final result:



No final measurements! I'm not motivated to set up all the measurement equipment, and I'm not going to make any changes based on measurements.

The sound:

They're . . . OK.

The Swan is a very nice tweeter, and it comes through well here, with clear and detailed highs. I think I did as well as anyone could have done with these flawed woofers. They're doubled up in a very solid cabinet. The bass is quite warm, which is a surprise considering my box volume is 25% larger than what PE recommends. I wouldn't say the imaging is the best I've heard. The soundstage is broad, and they definitely fill up a room, but imaging is not precise, instruments don't have that lifelike presence. I think they are good for electronic rock and pop music, but I wouldn't want to listen to my favorite vocalists on them.

Cost:

So, the goal was to use up leftover stuff while keeping the price down. How did I do?

part	manufacturer	model	price	#	price
woofer	Dayton	STW166-01	\$ 7.98	4	\$ 31.92
tweeter	Swan	S1ii	leftover		
5.0mH inductor	Dayton	257-846	\$19.49	2	\$38.98
0.3mH inductor	Dayton	257-306	\$14.98	2	\$29.96
4.3uF capacitor	Dayton	027-419	\$1.49	2	\$2.98
2uF capacitor	Dayton	027-214	\$2.69	2	\$5.38
8.2uF capacitor	Dayton	027-242	\$ 6.69	2	\$13.38
acoustic foam	Parts Express	260-525	\$14.98	2	\$29.96
Cabinet grill foam	Parts Express	260-519	\$12.98	1	\$12.98
fake wood veneer	VViViD XPO	350-521	\$22.98	1	\$22.98
terminal cups			leftover		
wood, glue, wires			leftover		
feet			leftover		
total					\$188.52

Not too bad! I don't think I could buy speakers this good for \$188.52! Overall, I would call this project a **success**.