

Altec is actually the “grandson” of Western Electric and their horn designs were created the hard way with slide rules and graph paper. The older Altec horn drivers fitted with the metal slotted phase plugs and alnico magnets are where the magic lies. The later products were “value engineered” (*aka. cheapened*) to lower costs such as the “tangerine” phase plugs. Same with the woofers – the woofers with the alnico magnets are the ones to have. There is a lot of vintage literature that discusses the differences between Alnico and ceramic magnets with the main feature being that the Alnico acts as a conductor by completing the motor circuit providing self damping whereas ceramic magnets do not.

My versions of the A7-800s were actually the ones offered by Heathkit and have 8-ohm drivers. When I first set them up -- in stock form -- my immediate thoughts were why hadn't I gone down this road before? I found out quickly that setting the horn levels is not something you can do by ear. I fired up my octave-band analyzer and quickly found that sweet spot where the horns and woofers match up perfectly. Kudos to Altec engineers for that alone!

So I then found myself with a speaker project. OH-BOY!! I went for broke and spent about 150 man-hours on it over several years – time well spent.

The horn drivers were dialed in like tiny speaker enclosures. I used a combination of the original pad that I bonded to the back, cut-to-size carbon impregnated foam (*the foam that I.C.s are shipped with to prevent static damage*) on the driver itself, plus a piece on top of the original pad, then some fine fiberglass padding. My choices were not arbitrary – it took a number of trials to dial them in. The original acoustic pad was added to with a carbon impregnated foam pad and both set in place with RTV silicon. Also venting the horn driver enclosures is important.

I drilled two rear vent holes using a 1/8-inch drill bit. The venting kills the cavity resonance and the added materials tune it like a miniature speaker enclosure. The end result will put a smile on your face. BTW – the venting trick was originated by Matthew Polk and JBL. Both manufacturers vented their dome tweeters.



The horns themselves needed damping and I used a combination of lead sheet, ceramic tiles, clay sealants together with RTV silicone. Lead sheet and tiles adhered with silicone provided constrained layer damping. After all of the work I did there was still a metallic coloration that I thought I would have to live with.

By the time I was done with the horn drivers and horns, the remaining metallic coloration could have been judged subtle, but I am never satisfied especially after so much success. I have a spare horn that looks crappy but good for testing ideas. Anyhow, even with aggressive damping on the horns the sectoral blades still had their influence. When I linked them together with shrink-tubing-covered $\frac{1}{8}$ -inch steel rod formed to fit in casting gaps at the back of the blades and adhered in place with RTV caulking (*G.E. Silicon II*) the remaining coloration disappeared like magic. They're completely neutral now, but still very efficient exponential/sectoral horns.



The crossover capacitors for the high-pass function create a composite 9-ufd capacitor. I ended up with a combination of a surplus Russian hermetic Teflon cap (*the large green cap*) then bypassed with mil-spec polystyrene caps, a smaller value Teflon capacitor, and a Miflex copper/polypropylene/oil capacitor that complements the big Teflon as that cap alone can be glassy sounding. What I ended with yielded a sweet and delicate yet amazingly transparent playback quality with a big voice. I kept the stock laminated-core crossover coils as they were found to be superior to any you can buy on line – I determined this by testing.

The low-pass function ended up with a total of 24-ufd value comprised of a 21-ufd polypropylene industrial grade cap bypassed with a 3-ufd Multi-cap. The low-pass is not too critical as long as the dielectric absorption and dissipation factor values are very low.



Also damping resistors, with values as low as 350-ohms across capacitors, but no higher than about 600-ohms -- and across coils that should be at least 500-ohms. These resistors prevent series/parallel capacitor/inductor resonances that can mimic mechanical colorations. The real world has me using 450-ohms in each case and they work well.

The woofers did not escape untouched either and were made selectively more rigid with a lower free-air resonance by virtue of an additional 30 grams of weight added to lower the free-air resonance plus the empty cavity under the dust cap was treated with acoustic fill to eliminate that cavity resonance. The square-shaped area that can be seen in the photograph is saturated with a polymer otherwise known as Varathane®. That helped the upper mid-range performance and integration with the horn.



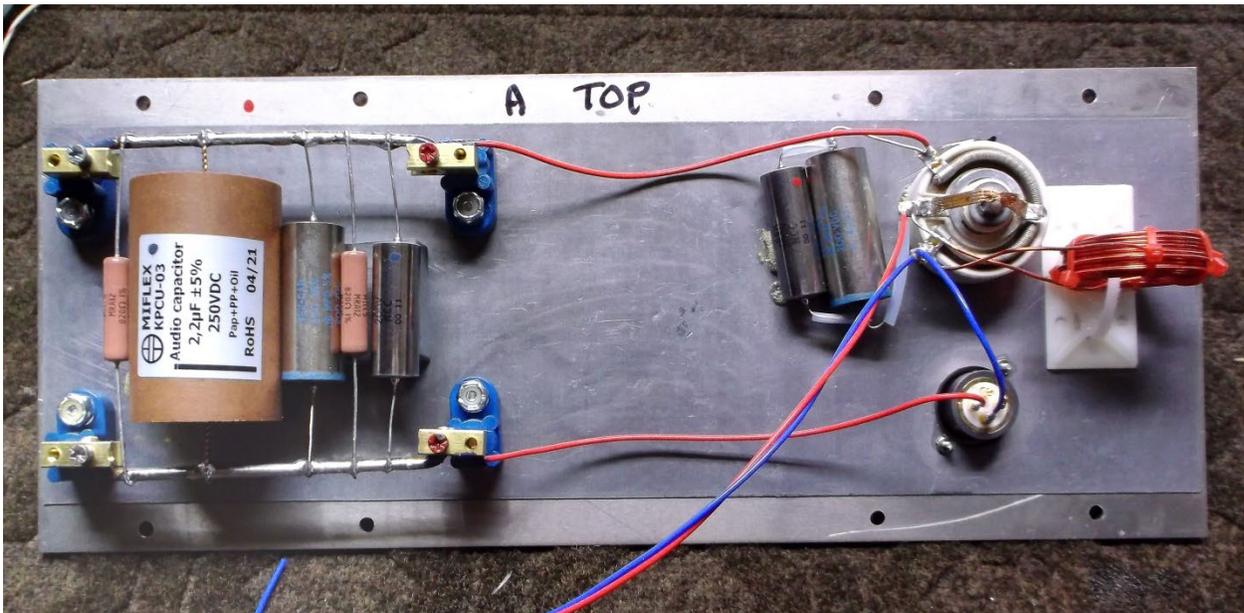
The 15-inch modified woofer is fast and gets the lower midrange as though it was only a 4-inch diameter driver. Upright bass is reproduced in a way that puts it in the room with you. A good drum recording can be scary – especially the toms – holy crap! Strings are reproduced as they should -- rosin bows on strings – not sandpaper on saw blades. Additionally the cabinets were “tamed” further with ceramic and marble pavers layered with RTV silicon to create massive constrained layer damping. To assure control I installed weather stripping on the back so that the rear cover has a tight seal enabling the vents to dominate.



Also, the cabinets were tuned with the end result of minimum box coloration, a neutral midrange, and detailed bass performance.

I ended up with what I call a “half-ass” transmission line as opposed to the original vented reflex design.

Then to extend the frequency response beyond what the Altec horns are capable of I added a JBL-077 slot tweeter (*ring radiator*). The crossover was built around a Miflex copper/polypropylene/oil capacitor together with mil-spec hermetic Teflon capacitors and damping resistors. This tweeter not only extended the treble it impacted the midrange in ways that were unexpected. The midrange quality actually opened up further. ???





You'd have to hear it. A horn system that sounds (*if you want to call it sounds*) like the beautifully neutral Quad electrostatics with liquid transparency, imaging that is difficult to describe, and with extreme dynamics. If I could sit you down here in my living room you would be shocked by the delicacy and imaging. Some recordings even produce imaging behind seating – it's a bit freaky.

BTW – some old literature discussing the benefits of the Altecs (*and horn systems in general*) even talk about hearing the first arrival rather than the room the speakers reside in.

Walt D'Ascenzo