by: Jim Griffin - Small MLTL for Mark Audio Alpair 6 Drivers [1]

Recently I reported on a new MLTL design with the new Mark Audio Alpair 10 (A10) full range driver. Concurrent with the A10 activity I also developed a MLTL using the Alpair 6 (A10) driver. The Alpair 6 is constructed much like the A10 variant with a heavy composite polymer frame surrounding the spun aluminum cone. Both the A10 and A6 drivers have the large diameter round frame which is 4.5" diameter for the A6. The cone disk of the A6 is only approximately 6 cm (2.36") diameter so we are talking about a very tiny driver. As with the A10 model the A6 cone is attached via a concave surround versus the usual top mounted convex surround. The A6 is a 4 ohms driver so some amplifiers may not be able to handle this impedance.

Normally you would think of the small A6 driver as a small surround speaker or perhaps a desktop computer monitor application. The SPL output for the A6 is specified to be 86 dB so we aren't talking about public address usage because even with a one way Xmax of 5 mm you aren't moving much air. But often small speakers will suffice for smaller rooms and less intrusive use—aka more SAF friendly speakers. In this case I decided to push the limits a bit and just see what the A6 could do in a full range MLTL. The A6 MLTL design was developed with help from Martin J. King's excellent worksheets. With the MJK worksheets the design process develops by entering the T/S parameters of the driver and a set of starting dimensions for the box and driver to port locations. Then you iterate the dimensions to achieve a desired response. I had a starting point from my 'Smart as a Fence Post MLTL' project which was derived a few years ago for Tang Band 3" drivers. For the A6 I settled upon a design with an F3 of 45 Hz for the low frequency response. The port is tuned to 51 Hz. Lengthening the port tube from 3" to 4" will lower the port tuning and the F3 point a couple of Hz's with minimal frequency response changes.

My Alpair 6 MLTL prototypes were built from solid walnut hardwood for the sides and top with MDF for the front, back, and bottom panels of the box. The overall external box dimensions for my enclosure (with 0.75" thick material) are 35.25" H x 5.5" W x 5.5" D. I am using a false bottom to raise the driver to be closer to listening height.
In this case the active part of the MLTL internal dimensions are: length (top to bottom) 30", driver distance from the top 10", port distance from the top 27", with a straight cross-sectional area of 4" wide x 4" deep, stuffing density of 0.50 lbs per cubic feet, and port radius of 0.75 inches with a port length of 4". The false bottom adds 5.25" to attain the height of the finished box. I have added flush mounted embedded magnets in the front baffle face for grill attachment.

From the conception I knew that these speakers would sound acceptable with good music at moderate volume. I suspected that they would strain when pushed toward their limits. Well, color me surprised at just how impressive these little guys sound on favorite tracks. The speakers can be run without any baffle step filtering as there is some help from their frequency response. If you observe Mark Audio published frequency response for the A6 you'll notice that the driver has a hump of up to 3-4 dB in the 175-550 Hz range. Thus, for the 5.5" wide cabinets there is some inherent gain in this area for baffle step compensation.
Now these speakers will not win any bass SPL contests but you'll be impressed at how well they perform. Vocals are natural with no sibilance for both male and female voices. The high frequencies are very nice with the shimmer of cymbals and such.

So in conclusion these little guys get the job done for the size and satisfy the SAF goals that I had established. Don't expect wall shaking performance but a solid reproduction of music in a small/mid-sized is delightful.

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1. http://www.diyaudio.com/forums/showthread.php?s=&threadid=138750