

The AviaTrix

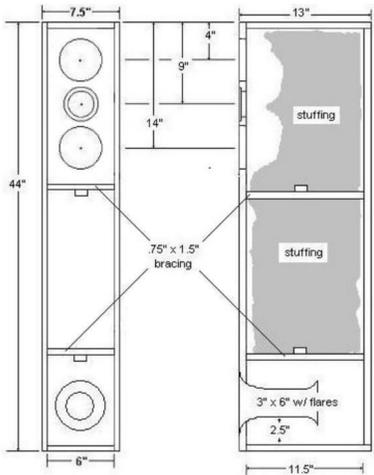
Floor Standing version:

External dimensions: 7.5" x 44" x 13" deep.
The AviaTrix was developed in two enclosures. The Floor standing version is a mass loaded transmission line. I used Martin J. King's MathCAD worksheets to investigate the various transmission line enclosure possibilities, the MLTL version provided the greatest low end extension in a nicely sized package. Not surprisingly, due to it's high Qts, the ND140 did not model well in a more traditional vented topology. While the MLTL enclosure appears to be a simple vented floor stander, the enclosure internal height was carefully chosen so the quarter wave resonance was a bit higher in frequency than the port. This helped augment the response sag in what would otherwise have been an extended bass shelf alignment. This resulted in a nice slow initial roll off below 100 Hz of about 3 dB / octave until shortly before the f_s at 30 Hz, where it reverts to the expected vented response roll off of 24 dB per octave. An enclosure volume of 48 liters appeared to be the best compromise between enclosure size and low end performance, and should be acceptable in most any size room.

MTM Enclosure designs

- Links to:
[Aviatrix Main / Design Goals](#)
[Driver Selection](#)
[Sealed MTM Cabinet Construction](#)
[MLTL MTM Cabinet Construction](#)
[MTM Crossover Design](#)
[MT Cabinet Construction](#)
[MT Crossover Design](#)
[Measurements](#)

AviaTrix MTM MLTL



NOTES:

Port can also be rear or bottom mounted. Maintain center of port 4" from the inside bottom panel. Bottom mounting should optimally have the inside flare tip 4" from the bottom panel.

Start out with 1 lb. stuffing per enclosure and tune to suit.

Crossover can be mounted under port and is accessible through the port hole if flared ports are used.

Drivers are horizontally centered on baffle

Woofer through hole 4.75"
 Tweeter through hole 3" + 3.5" at tabs
 Tweeter rebate 4.125"

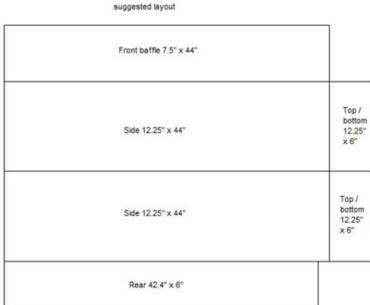
CUT LIST:

- Front Baffle: 7.5" x 44"
- Sides x 2: 12.25" x 44"
- Top/Bottom: 12.25" x 6"
- Rear Baffle: 42.5 x 6"
- Braces x 2: 1.5" x 6"
- Braces x 2: 1.5" x 11.5"

The MLTL is roughly twice the size of the sealed version, at 7.5" x 44" x 11.5" deep. This puts the tweeter at a nearly ideal height of 35", although the design is quite forgiving of actual listener height. If you are considering using the sealed version for mains, this one will save building the stands, and provide a more low end extension as well. The construction is very similar to the sealed version, with the addition of 2 small cross braces to provide stiffening for the panels. Outside of handling the larger panels, the only additional difficulty with building this version is needing twice as many clamps for gluing.

While the high driver Qts of the ND140 precludes use in a traditional vented design, I was able to use its attributes well in a transmission line. I modeled quite a few variations of transmission line designs, and in my opinion, found the best solution in a mass loaded iteration. A typical vented design using this driver might exhibit an extended bass shelf profile for its low end response, but the high Qts made for some significant peaking just before roll off, which would result in unacceptable performance. In the mass loaded t-line I was able to use the quarter wave response to fill in the droop, and a lower tuning of the vent ameliorated the peak. This resulted in a 3 dB per octave roll off starting at 80 Hz, and extending below 40 Hz. The modeled f_s is 40 Hz, and the f₀ is 30 Hz. One might expect this kind of performance in a 8" woofer, but it is quite unusual performance for a 5.25" midwoofer. Due to the design, the enclosure internal height, the driver positions, and the port height cannot be changed. The port can be rear mounted if desired.

AviaTrix MTM MLTL



The AviaTrix

Sealed MTM Version

External dimensions: 6.5" x 20" x 11.5" deep.
 The sealed version, while it was not the first design built, was envisioned from the beginning to be the home theater workhorse, the enclosure was specifically designed to be as compact and narrow as possible, to optimize it's use as a center channel speaker. The crossover was also optimized for use in a horizontal orientation, as well as a vertical orientation. It is appropriate for home theater use as mains, center, and of course surround duties. While the enclosure provides a Qtc of approximately 1.1, capacitive loading of the midwoofers allow the system to emulate a lower Q transfer function, and lower the FS by nearly 15 Hz as well. Even though the transfer function ultimately reaches 18 dB per octave, the F10 has not been compromised, and is still roughly 40 Hz. A conventional sealed alignment with a Qtc of .7 would require an enclosure 4 times larger, yet would still have an F10 of around 40 Hz.

Links to:

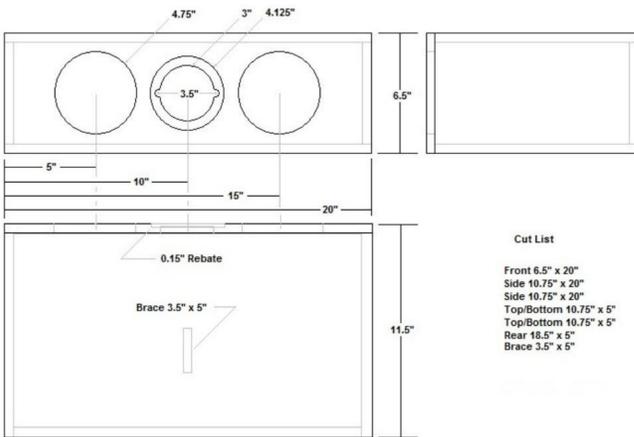
[AviaTrix Main / Design Goals](#)
[Driver Selection](#)

[Sealed MTM Cabinet Construction](#)
[MLTL MTM Cabinet Construction](#)
[MTM Crossover Design](#)

[MT Cabinet Construction](#)
[MT Crossover Design](#)
[Measurements](#)

MTM Enclosure designs

AviaTrix Sealed Enclosure



AviaTrix Sealed Cut List

Top/Bottom 10.75" x 5"	Top/Bottom 10.75" x 5"	Rear 18.5" x 5"	Brace 3.5" x 5"
Side 10.75" x 20"	Side 10.75" x 20"	Front 6.5" x 20"	

This is a very compact and easy speaker to build, since it is of built joint construction, and only the tweeter flange needs to be flush mounted. The front baffle external dimensions are 6.5" x 20", and an external depth of 11.5", making for easy placement in most any size room. A single brace is specified to reduce the wall resonance, and support the weight of a monitor, should one be placed directly on the AviaTrix center channel.

The flattest L/R mains response was with the speakers oriented orthogonally with the room, only toed in slightly. For center applications, the speaker should be mounted slightly above or below the screen or monitor. 3/4" MDF is specified for the enclosure. I stuffed each speaker with about 8 oz. of acousta-stuff, so figure 1 bag per pair of speakers. The crossover can easily be mounted on the top or bottom panel (assuming a vertical orientation) and presuming the crossover board is no wider than 4.5", can be removed and reinstalled through the woofer cutout. If you want to trade a little extra baffle width for a reduced enclosure depth, external dimensions of 7.5" x 20" x 10" is also acceptable with no crossover change.