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NFX Full-Range Single-Driver Loudspeaker Design

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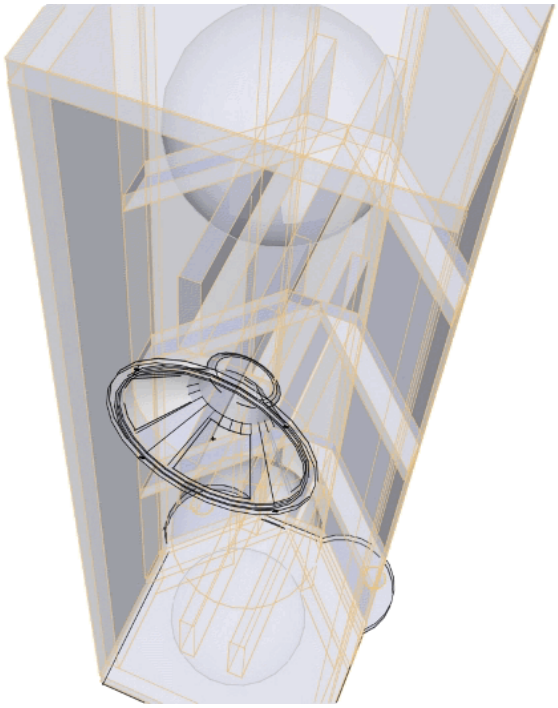

NFX transparent front view

The NFX is a cabinet design that was specifically created to deal with destructive rear waves from low-mass full-range drivers. Lowther, Fostex, and similar 8 inch full range drivers all share one thing in common - ***a super thin cone***.

Any sound inside a typical cabinet will reflect back through the speaker cone and be heard at nearly the same volume as the sound coming from the front of the speaker. This makes designing cabinets for these types of drivers far more difficult than it would for say your *classic 87dB hi-fi woofers*. **The rear wave chaos that happens inside most reflex cabinets and horn designs is what causes the infamous "midrange shout" that these drivers are incorrectly known for.**

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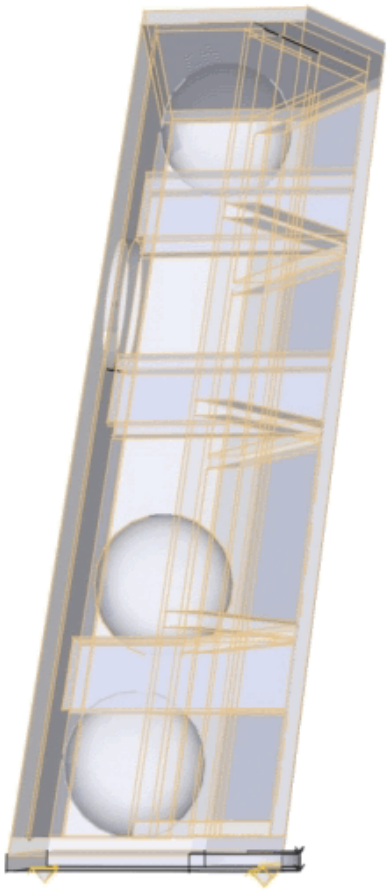
Imagine a design where the cabinet acts like a check valve allowing the rear wave to completely exit the cabinet before the next wave appears. To pull this little trick off, the NFX cabinet is carefully shaped and features two vertical ducts that run from top to bottom on either side of the cabinet.

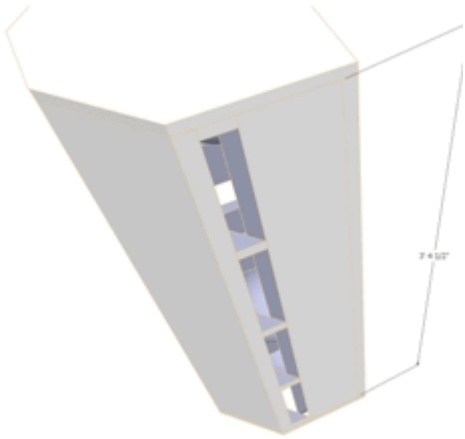
The NFX design is similar to what used to be known as an "Ultra-Flex" cabinet which was popular in the 1950's. An ultra-flex as it were is similar to a ported cabinet but large ducts are used rather than port tubes. The ducts typically run the entire dimension of the cabinet on both sides. Naturally the mach speed of these ducts is far lower than a port tube so there is virtually no port noise.

Another advantage to these large ducts is symmetrical loading of the cabinet with an instantaneous release of pressure. Where this variation of the ultraflex differs is in the cut rear corners and of course the 8 degree angle that the entire cabinet is raked back at. These two things eliminate many of the parallel surfaces inside the box. The parallel surfaces that remain are busted by foam spheres.

Additionally, the 45 degree angled back also causes the ducts to be at an angle facing into the listening space. Since the sound output of these ducts are driven by both duct resonance and the midrange energy inside the cabinet their output is significant to frame the output from the front of the speaker. This in turn widens the dispersion of the front driver giving the sensation of great height and width normally not found in single driver designs.



The lower frequencies are evacuated through the ducts at each cycle rather than standing inside the cabinet. At the turn over frequency where the wavelengths are not long enough to bend through the ducts, reflection begins to occur as it does in all cabinets. This problem has been solved by installing 7 inch diameter poly foam spheres inside the cabinet stacked from the bottom to the top. These act like a wave guide for lower midrange frequencies and help to absorb high frequencies that otherwise could reach the back of the speaker cone.



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THE SOUND:

The closest thing you can compare the sound to would be an open baffle, but without the drawbacks. Unlike the open baffle, the NFX rear wave is redirected back to the front. This makes it easier to set up in a given listening room making the distance from the front wall less critical. Also open baffles are typically into cancellation of bass frequencies at 100Hz or higher so they often lack any real weight unless another low frequency driver is used. The large size of an open baffle makes it a huge reflector that is angled directly at the listener sending all the room reflections it collects to the listener - usually bad for image focus.

With the NFX you get an open sound similar to an open baffle, but an entire octave more bass. The speaker does not sound thin and can be enjoyed without the addition of a low frequency driver. If a sub is used to extend the response it should be crossed over around 50 Hz.

We challenge you to take any 8 inch full range driver and compare the NFX cabinet to any ported box, or folded horn design. Hearing the NFX cabinet side by side will make either of the other two designs sound congested in the midrange.

There will be those who own single driver full range cabinets who are fully satisfied that their speakers do not sound congested, I was one of them. Like everything, it's your point of reference. Hearing these cabinets next to my previous reference speaker made it sound congested for the first time, so much so that I had to modify the design significantly just to get it listenable next to the NFX.

When you hear stories about these full range drivers taking forever to break in, at least 200 hours or more - lots more... before they sound good - try this experiment: Take your well broken in driver in your favorite cabinet and purchase a brand new driver and place it in the NFX cabinet. Compare the two speakers side by side. The brand new driver in the NFX cabinet will appear to sound more broke-in than the seasoned driver does in the other cabinet. That also happened to me, and that's the kind of difference a cabinet can make folks. It may not be easy to build but the results more than justifies the cost or effort of this esoteric cabinet design.

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BUILDING THE NFX cabinet

The NFX are not pricey cabinets to build from a material standpoint, however they will test even the most experienced craftsman. Be prepared to cut most of the boards wrong at least once. The reason for the difficulty is the 8 degree angle of the cabinet. Everything that would normally be straight cuts down to every last brace has been skewed by 8 degrees. Also this skewing creates a compound angle at the rear of the cabinet where the panels are at 45 degrees.

No doubt someone will wonder if they can build it without the 8 degree skew and then just lean the cabinet back 8 degrees after it's finished. This will work but the sound and appearance will be lacking compared to the building it the proper way.

Be sure to keep the right and left panels marked, and dry fit the entire cabinet before gluing. Material can be your choice of MDF or Birch cabinet grade plywood.

DRIVER SELECTION

We recommended the DFR-8 Decware Full Range driver for best results, but you may also use drivers like a stock FE206E Fostex driver, the Audio Nirvana 8 inch driver, Most of the Lowther's will also fair well in this cabinet.

FOAM SPEARS

If you want to build your own from the plans, you'll need to get the correct foam spheres to put inside the cabinet. The foam balls (up to 4 per cabinet) can be found at www.poof-slinky.com

These are 7 inch foam balls.

PLANS or FINISHED SPEAKERS are available at www.decware.com

SUPPORT FORUMS can be found for this speaker on the DECWARE web site also.