**Live Edge Dipoles Online Supplement**

**Additional Design Notes + Mods for Beryllium Tweeter Diaphragms**

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My January 2021 AudioXpress article “The Live Edge Dipoles” describes my original speaker design which is for Aluminum tweeter diaphragms. This online supplement provides links to more DSP files and additional application notes.

Also: Below you’ll find a modified design that takes advantage of Radian’s available beryllium diaphragm ($400-$500 each, obtainable from [www.RadianAudio.com](http://www.RadianAudio.com) as well as [www.USspeaker.com](http://www.USspeaker.com)).

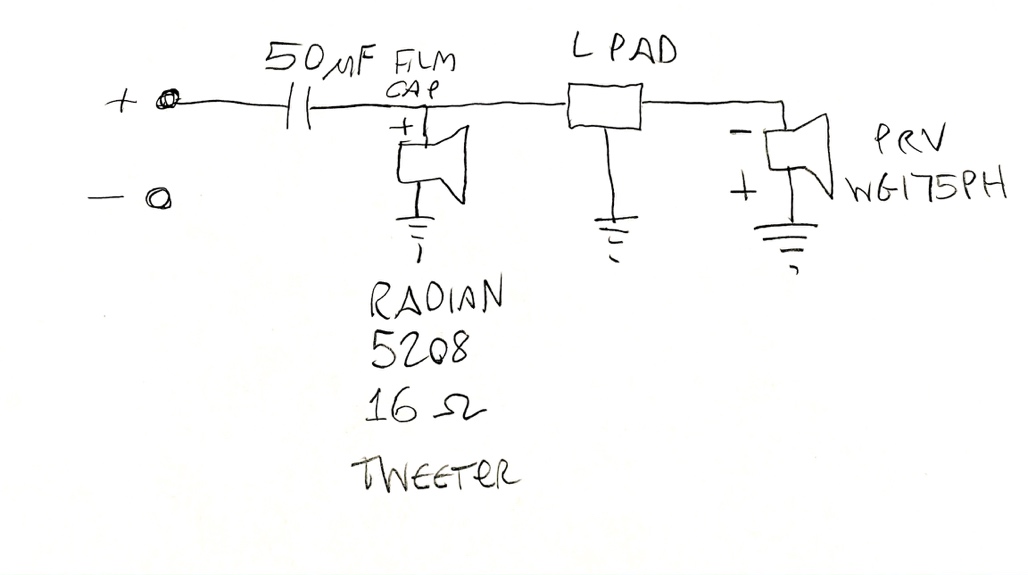
The Live Edge Dipole design you see here presumes you are using the 16-ohm version of the 5208 coax. The observant reader will ask an obvious question:

“Why are you bi-amping your design and then putting those resistors in series with the tweeters? Doesn’t that degrade the sound?”

Answer: Because when your tweeter has 105dB sensitivity (instead of 85-95dB as is typical of most dome tweeters), amplifier hum and noise can become a real problem! There are several ways to deal with this:

1. Find an amp with less noise
2. Pad down the tweeters with resistors
3. Turn down the input controls on your amp, which will likely work if the potentiometers come after the input gain stage. (I don’t know how often this is the case.) Oftentimes, turning down the inputs will reduce amplifier noise considerably. Of course you have to compensate with the DSP volume setting for the tweeter channels.

If you can dodge the amplifier noise problem, then I recommend the following schematic for the tweeters:



You will notice that I have inserted a 50uF capacitor between the amplifier and the tweeters. The reason for this is to protect your expensive tweeters from amplifier mishaps – clipping, DC offsets, or losing a ground by unplugging a patch cable and blasting those delicate voice coils with 60Hz hum. It’s inevitable that such mishaps will happen.

These capacitors do not play any significant role in the crossover per se; the rolloff is below 1KHz. But they do protect tweeters from damage.

Based on my ears and measurements, the most accurate setting for the L-PAD with this circuit is around 12 o’clock.

**Inductor and capacitor quality**

I’m not going to get into a religious debate about the audible differences between various kinds of capacitors and other passive components, except to say this is a *very* high-definition system. So I suggest you achieve at least a third of your capacitance with premium quality film capacitors and not just use electrolytics. In the woofer section, half of my 200uF comes from film caps and the other half from electrolytics.

**It is VERY important that you choose inductors with low DC resistance**. This directly affects how much protection the midrange driver gets from low bass, because it uses a series crossover. Please remember, the low bass is boosted 20dB by the DSP. The most DCR that is permissible in the 5mH inductor wired across the Radian 5208 woofer is 1.3 ohms. I recommend that you choose more expensive inductors with less than 0.6 ohms resistance. See the original AX article for the woofer schematic.

I also recommend that you use air coil inductors and not iron or steel core, as iron cores have hysteresis distortion that is likely to be audible. Please go ahead and spend the extra money. This is a premium system and it rewards incremental choices of quality.

**Where to download DSP files for Radian Aluminium Diaphgrams for the 5208-16 coaxial driver:**

The files can be downloaded in ZIP format at <https://tinyurl.com/liveedgedsp>

Important notes:

1)These will ONLY work in the MiniDSP 2x4HD. Any other DSP requires your own files.

2)These are based on actual measurements for my exact drivers. If you want to base these on the drivers you buy (you should!), you need to make your own measurements and convert them to a .bin file using a program such as Eclipse Audio FIR designer https://eclipseaudio.com/and upload them to the DSP software.

3)You will have to adjust levels of the drivers, and perhaps even the time delay between them, to your situation.

4) You can probably use my FIR files, measure your drivers, and tweak the IIR EQ in the MiniDSP to compensate for whatever differences there are between my correction and the correction that is ideal for you. You should EQ the left and right channels separately.

Of course you will also need to measure and adjust the overall EQ of the system to match your room and tastes. The files I’ve given you here are just a starting point.

**Even Better: Beryllium Diaphragms!**

Radian Audio offers a Beryllium version of the 5208-16. If you already own the Aluminum version, you can upgrade by simply purchasing Beryllium diaphragms (model # Radian 1450BePB) and replacing them by unscrewing the rear assembly of the coax driver.

They cost over $400 each and measure very similarly to the aluminum diaphragms. However, they do *not* sound the same! The Beryllium version has a transparent, holographic, liquid clarity that is utterly remarkable. You will hear detail and definition to a degree most listeners have never experienced. It has a different signature sound than aluminum, which by comparison is slightly harsh and grainy.

The beryllium is unquestionably superior to the standard aluminum version. If you’re a high-end listener who’s ever spent big bucks on commercially available high-end speakers, you will feel that the extra $900 is a very worthwhile investment.

When I upgraded my diaphragms to Beryllium, I re-did the EQ. The Be DSP files are here:

<https://tinyurl.com/beryllium5208dsp>

The same notes and disclaimers about my specific DSP files apply for this version as above.

**“Rock & Roll” EQ Setting**

In the above ZIP file, you will find two HTML files. One is the standard setting, which has a 20dB boost at 30Hz and a fairly gentle roll-off below that point. If you are not a “Bass head” and if you listen to normal music at normal volumes, this is the setting to use. It’s ideal for jazz and classical music. This configuration does not use steep rolloffs, because I am trying to preserve time, phase, impulse and step response.

However, if you like to push your speakers really hard with super low bass below 35Hz, you will sometimes hear the Eminence woofers complain. Because this is a dipole with no acoustic suspension loading, no bass reflex ports etc., the “clutch really starts to slip” below 30Hz. These 18” woofers are not very effective at all below 25 Hz.

So if you’re into high volume levels and aggressive bass, I added a “Rock & Roll” EQ setting that is more appropriate for loud and electronic music with lots of high-power low bass. It’s in the ZIP file and adds a rapid roll-off below 35 Hz. It adds more phase shift, but it gives you a measure of mechanical protection and increases the power handling of the system.

If you’re a true “Bass Head” and you dig large quantities of super low bass, I recommend that you match these with a subwoofer. Do make sure you use a digital crossover with digital outputs so you can send digital data directly to the MiniDSP 2x4 HD and that way you don’t degrade the signal. Like I said, these speakers will mercilessly reveal the faults of upstream equipment. So don’t compromise on anything.