Boozhound Laboratories JFET Buffer

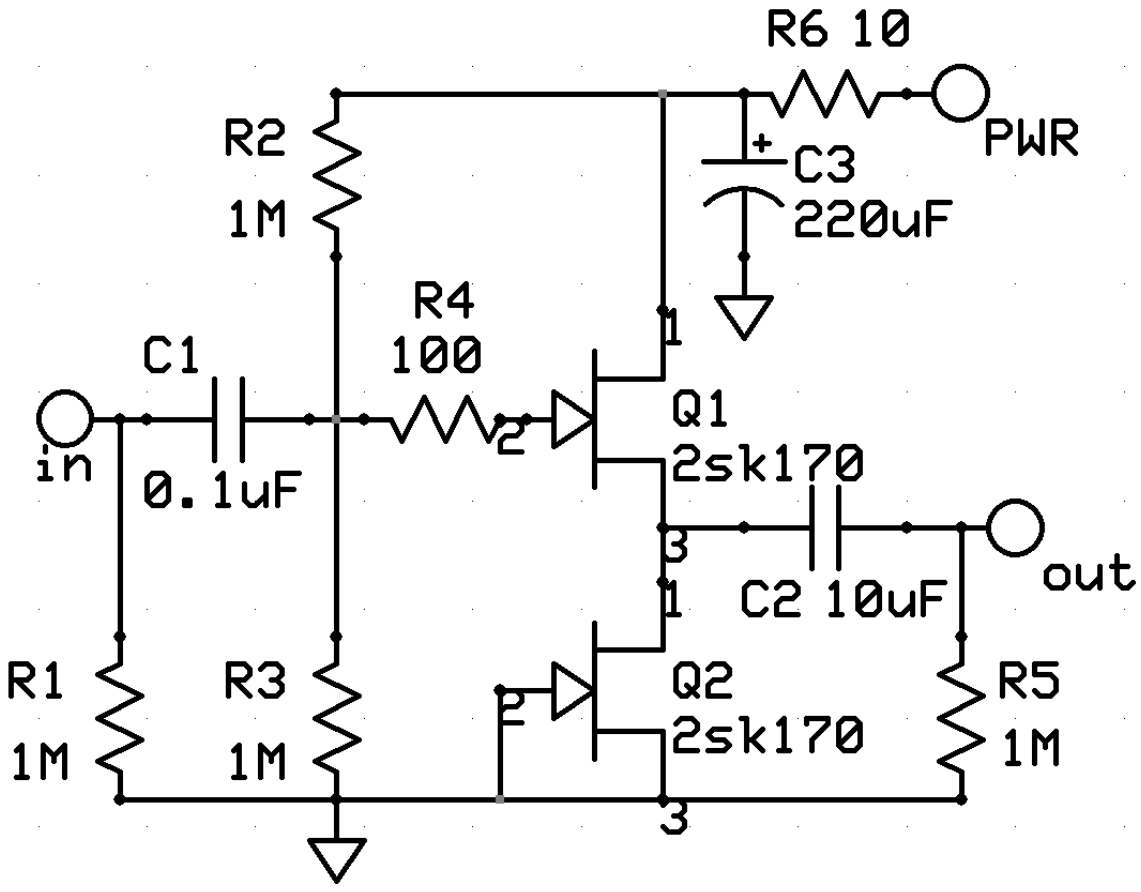
Assembly manual (rev.1)

The Boozhoundlabs Philosophy

The plan here is to offer kits that let the curious audiophile experience designs that they would otherwise have to build from scratch. The parts used in this kit are for the most part considered obsolete and are probably no longer being manufactured. I source this stuff from overseas via eBay.

I think simplicity is a huge part of why classic equipment sounds so good, and modern stuff can sound so bad. In the days when capacitors and transformers were expensive, designers minimized the parts count in any design, and this approach is audible even when designing with modern devices. And for those of us who not only want to build stuff, but to understand how it works, simple designs are much more comprehensible, with no "black boxes" that we only understand through the abstraction of a spec sheet.

Why not have fun building stuff instead of just pouring dollars into your system on the quest for ultimate-ness? Part of the fun for me is the ability to try something new without having to shell out the big bucks.



The JFET Buffer

Perhaps the most obvious question is WHY would we need something in the signal chain that provides no gain? The answer is impedance. If you have a device like a phono stage that has a relatively high output impedance, or an amplifier that has a relatively low input impedance, you might not get an ideal match between the two. When impedances don't match well, you can lose low bass frequencies or get a generally sluggish sound. What the buffer stage offers is a very high input impedance (a bit more than 300k ohms) and a very low output impedance (~100 ohms)

This is also useful if you need to drive long cable runs or highly capacitive loads. Indeed, many similar circuits known as "line amps" were developed to drive long runs of twisted pair wiring in the old analog phone system. The old tube based devices relied on transformers for impedance matching, and tube stages to make up the gain lost when stepping the impedance down (no free lunch). JFETS are a much more convenient way to accomplish this.

Again, the circuit here is a very basic textbook buffer with a minimum of added enhancements.

Because this buffer is designed to drive low impedance loads, the output capacitor must be large enough not to create a high pass filter in the audio range. The 10uF capacitor will allow bass frequencies under 20Hz to be unaffected with loads greater than 800 ohms. For the typical 10k input impedance of most modern solid state amplifiers, the capacitor will pass frequencies above ~2Hz which passes the "ten times" rule of thumb for a complete absence of any phase effects. Bottom line – if you are missing bass, it is not because of impedance mismatch.

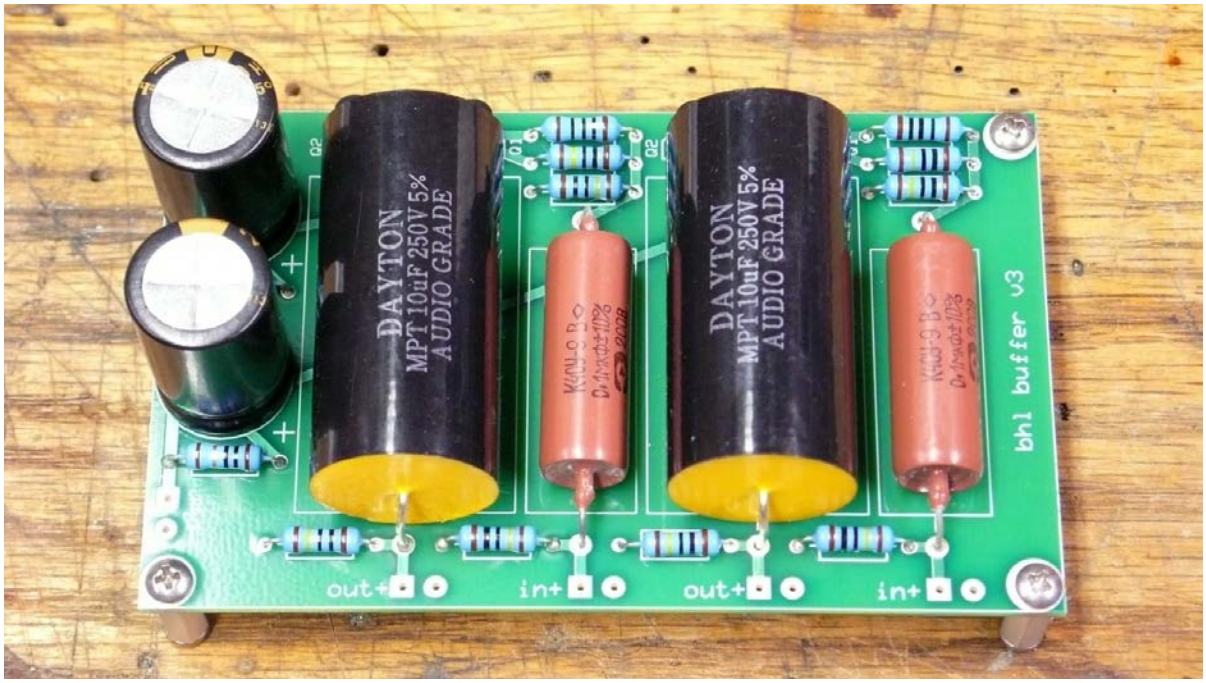
One more possible use of this buffer would be to drive impedance-sensitive filter networks, such as a line-level baffle step compensation network, or a very simple crossover.

Inventory

Start by verifying that you have all of the parts you need. I endeavor to make sure I send only complete kits, but it is always possible I missed something. If I screwed up and left something out, please email me immediately at jsn@boozhoundlabs.com and I will make it right.

Here is what is included with each kit, with checkboxes to make it easy to verify that you have all of this stuff:

( ) 1	Printed Circuit Board	
( ) 4	2sk170 transistors	
( ) 2	220uF electrolytic capacitor	Nichicon Muse
( ) 2	0.1uF PIO capacitor	Russian K40-Y
( ) 2	10uF PP film capacitor	Russian K42-Y
( ) 2	10 ohm resistor	Brown, black, black, gold, brown
( ) 2	100 ohm resistor	Brown, black, black, black, brown
( ) 8	1M resistor	Brown, black, black, yellow, brown



Assembly

This is almost self-explanatory, but I will offer a few tips, and a few photos.

It is generally a good idea to install the little stuff first and the big stuff afterwards, so that you aren't melting the big stuff trying to get to the little stuff. Start with the resistors and the JFETs.

There will be 4 JFETs included. They are taped together in a matched quad.

I like to solder from the bottom of the board because it is easier to get to things, and the odds of overheating a part are lower because you are that much further from the part itself. Be sure to heat the pad and the leads sufficiently to let the solder flow all the way to the top of the board though. These boards have through-plated holes, so it will be easy.

These boards have traces only on one side, leaving the bottom side to be nothing but a huge ground plane. This will reduce grounding problems and make this a very quiet design.

The points where the components do attach to the ground plane will take a bit more heat to solder properly since the ground plane will act as a heat sink.

Next install the capacitors. Or instead of "next" I should say "last" because you are done!

The only thing left to do is visually inspect the solder joints to make sure everything looks good and there are no solder bridges or obvious cold solder joints.

Integration

Connecting this to the various inputs and outputs is also super easy. The in and out pads are obvious. There is one more pad I probably should have labeled "gnd" that should go to the single point "star ground" for your chassis.

The pwr pads need to be connected to a source of roughly 24 volts filtered DC. There is a bit of filtering (more like decoupling) on the board, but not enough to filter AC. I use a mid-grade switch mode wall wart power supply for this because they are cheap, easy, and very quiet. An upgraded regulated power supply would be a nice upgrade I'm sure. Batteries are easy and sound great.

There is no onboard fuse. The wall wart power supplies I imagine almost everyone will be using for this are internally current limited. If you use another power supply, a fuse might be a good idea. Current draw is less than 50 mA.

The mounting holes at the corners are designed for 4-40 thread screws.

-jsn