Boozhound Laboratories Deluxe JFET Phono Preamp

Assembly manual (rev.3)

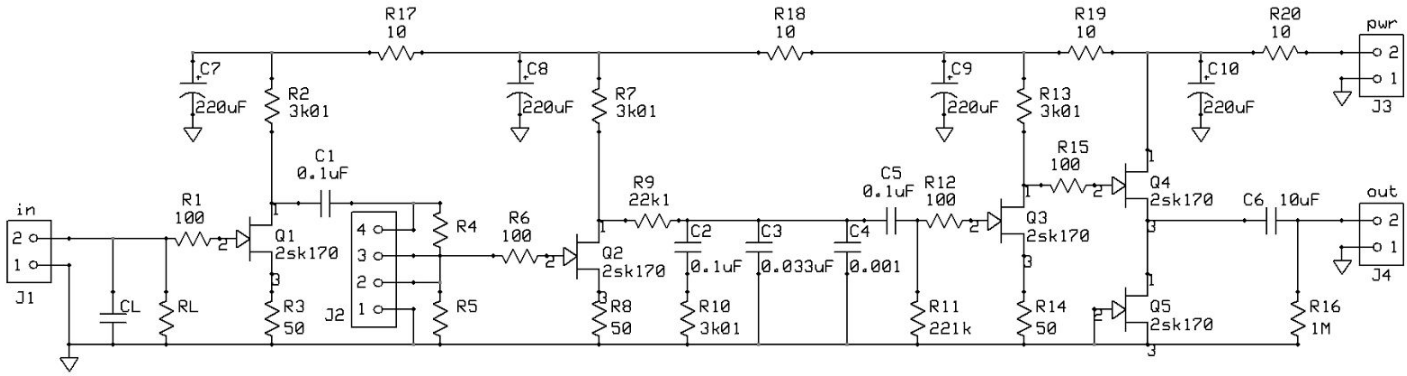
The Boozhoundlabs Philosophy

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.

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 Deluxe JFET Phono Preamp



What we have here is the original JFET phono stage, with an additional gain stage, and an output buffer. We also have a resistor divider after the first gain stage so that you can adjust the gain to match your cartridge and your system.

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:

Qty.	Part	Value	Position
10	JFET Transistor	2sk170	Q1-Q5
8	Electrolytic Capacitor	220uF	C7-C10
2	Film Capacitor	10uF	C6
6	PIO Capacitor	0.1uF	C1, C2, C5
2	PIO Capacitor	0.033uF	C3
2	PIO Capacitor	1000pF	C4

8	Resistor	10	R17-R20
6	Resistor	50	R3, R8, R14
10	Resistor	100	R1, R6, R12, R15, RL
8	Resistor	3.01k	R2, R7, R10, R13
4	Resistor	22.1k	R9, R5
4	Resistor	47k	RL, R5
2	Resistor	221k	R11, R4
2	Resistor	1M	R16
8	Standoffs		
10	Wire Headers		
2	Circuit Boards		

Customization

A few decisions need to be made before construction can begin. You will need to decide how much gain you want, and what the load impedance and capacitance should be.

Let's start with the easy one. Load Capacitance. Most phono cartridges do not need any added capacitance, so I don't even include a capacitor for this. If your cartridge prefers a load capacitor, simply add it in the CL position.

Load Resistance - this is the value of the resistor in the RL position. I include the most common values - 47k Ohms for most Moving Magnet carts, and 100 Ohms for most Moving Coil carts.

If you want to incorporate a switch that lets you choose the load resistance, you can do that between the input and the phono board, and just omit RL on the board itself. If you want this resistor to be replaceable, you can use the input wire terminals to connect it across the input.

Now for deciding how much gain you want. The resistors R4 and R5 form a voltage divider that will let you attenuate the signal to get the gain you need. Most people wanted either slightly more gain than was provided by the original phono kit, or lots more gain for Moving Coil cartridges.

The wire terminals will allow you to swap resistors for R4 and R5 if you want, rather than soldering them permanently in place, to allow the phono stage to match whatever system you have now or in the future.

Here are some options for gain/attenuation via R4 and R5.

With no attenuation (jumper and 47k), this circuit will give you around 70dB of gain, which is tons of gain, even for low output Moving Coil cartridges. To reduce gain, use the following as a starting point. It is best to keep R4+R5 under ~50k or so, especially for higher gain settings to reduce the chance of oscillation.

R4	R5	dB
jumper	47k	0
10k	40k	-2
20k	30k	-4
25k	25k	-6
30k	20k	-8
35k	15k	-10
40k	10k	-13
45k	5k	-20

Assembly

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.

I include matched quads and pairs of JFETs. If they are in the same little bag, they are matched. You want to make sure that Q4 and Q5 are matched to each other, and to Q4/Q5 on both channels, so this will require one of the matched quads. The rest of the JFETs just need to be matched between channels and not to each other.

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 slightly 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. 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.

The wire headers are optional. They provide an easy way to make connections, and are great if you are constantly altering your system like many DIY-ers. I like for things to be modular because I am always changing things around. Soldered wire connections will probably be better if this is a permanent installation and you are sure you will not need to re-wire anything.

When you are done soldering all of the components in place, 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 connections are obvious. There is one more pad with the "chassis ground" symbol that is for a wire to connect to the chassis, ideally at a ground lug where you connect the ground wire from your turntable.

The power connection need to be connected to a source of roughly 18-24 volts filtered DC. There is a bit of filtering (more like decoupling) on the board, but not enough to filter AC. The BHL Power Supply is a great sounding option, but you can use a switch mode wall wart power supply, or a bunch of AA batteries too.

In my experience, wall wart power supplies can either be just fine, or be very noisy. It is always a gamble to try one of these. If you are having issues with noise, try batteries as the first troubleshooting step.

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.

Now go play that dusty old Neil Young album you just picked up at a yard sale!

-jsn