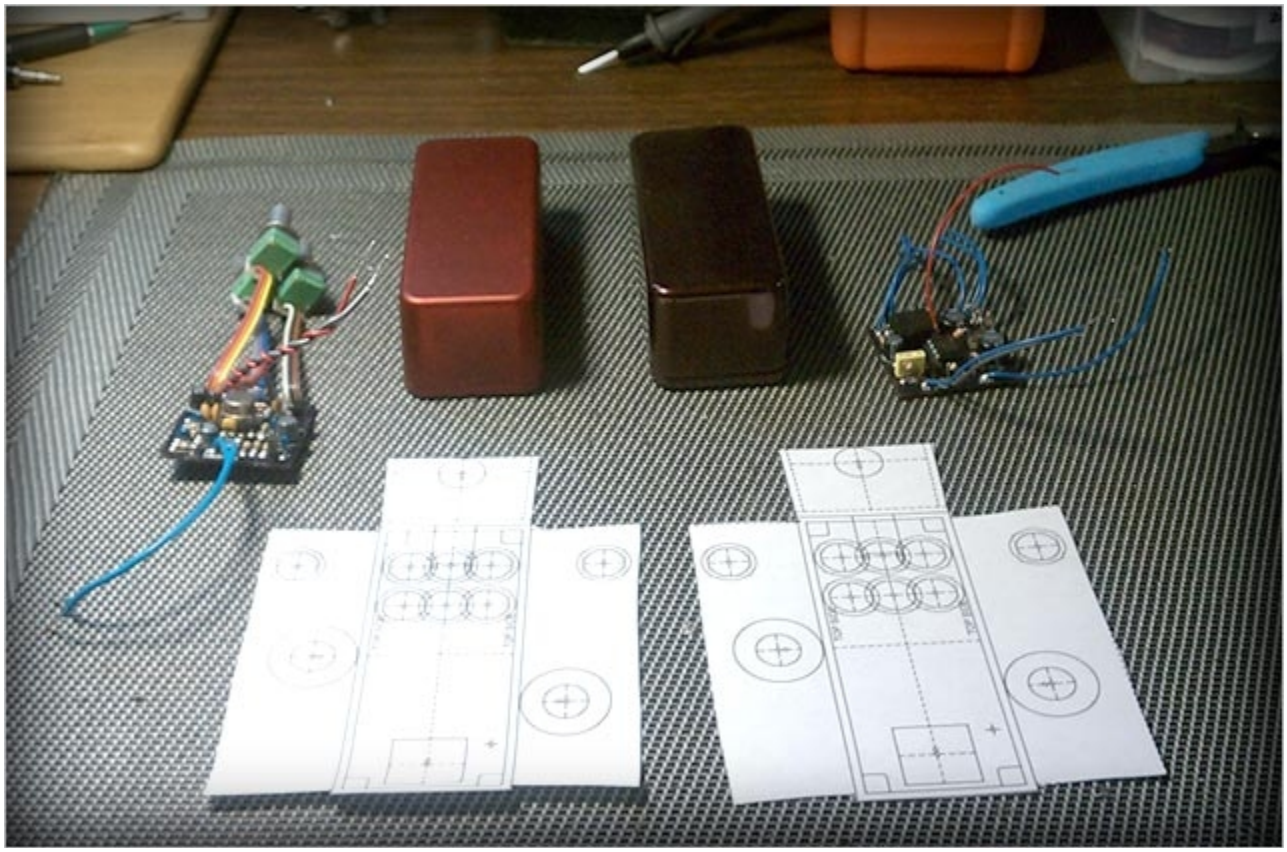
BABY BOARD BUILD GUIDE

GENERAL LAYOUT, BUILD TIPS & COMPONENT SELECTION

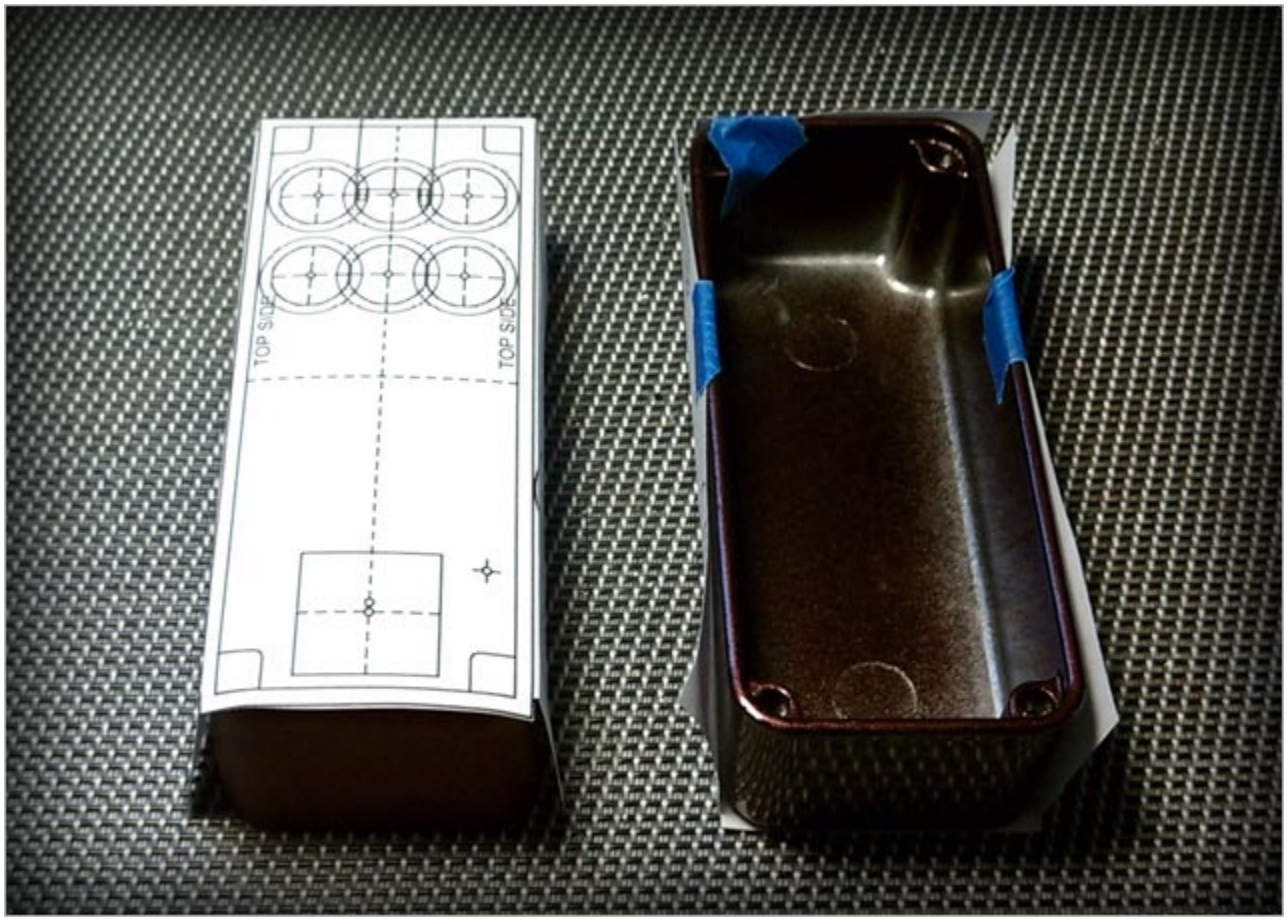
This document provides general guidelines in building the madbeanpedals “Baby Board” projects. It includes tips on how to lay out your build, proper lead dress and info on what types of components work best for this style of project. There is also a template at the end of the document you can use as a drill guide on 1590A enclosures.

We'll use the “Runt” project as an example. Note that this tutorial does not cover building the actual circuit, but what comes after. If you need guidance in populating and soldering PCBs, please visit the madbeanpedals forums where you can find lots of tips on how to build effects.

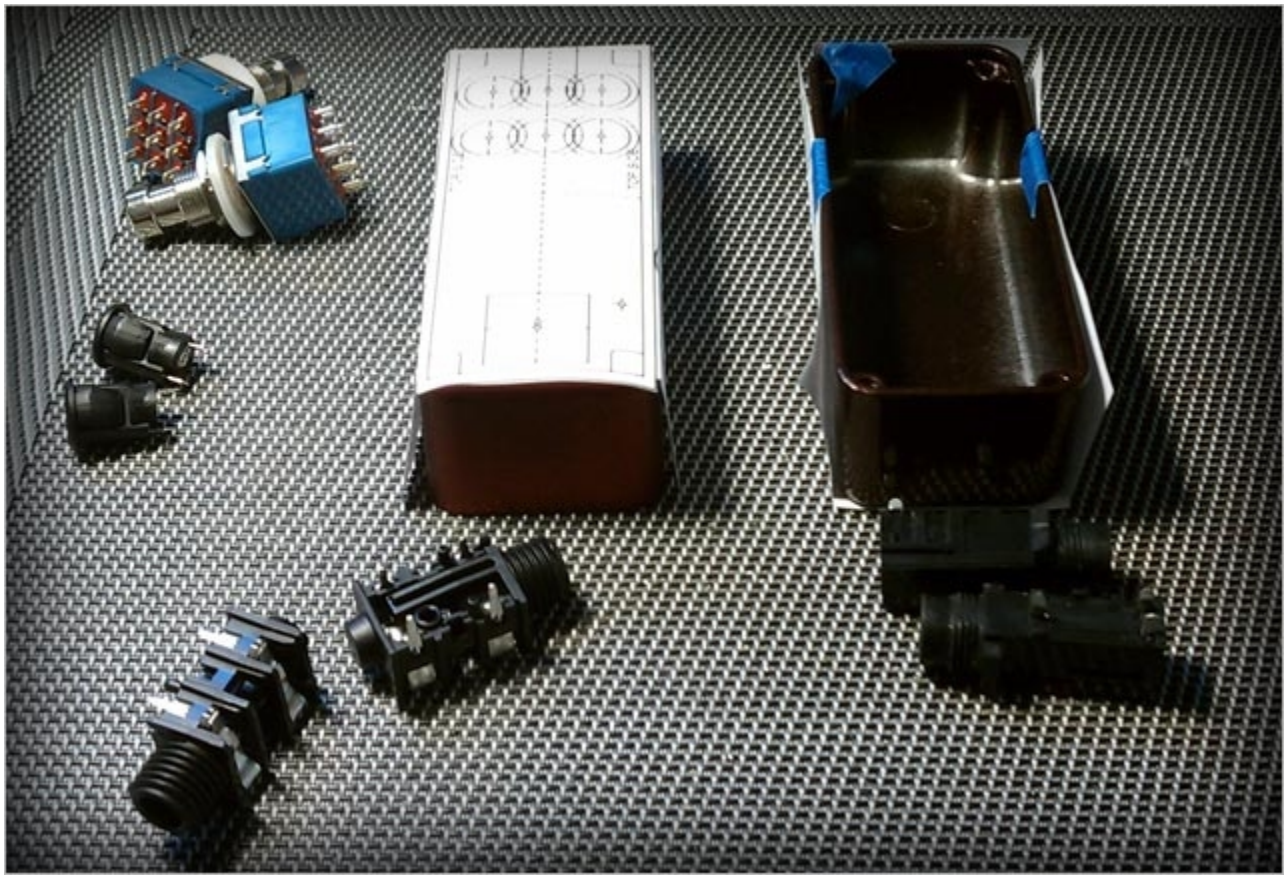
Let's get started!



I've got a couple of circuits ready; the Runt and the Afterlife. The enclosures were purchased from PedalPartsPlus. I've already cut out a couple of drilling templates. The template will act as a guide as to where to the hardware should be placed.



The templates have been folded at the edges and fixed with some tape. I prefer blue painter's tape over Scotch since it is very low tack and will come off easily. You can see the six overlapping circles at the top. These are some possible locations for the pots to go.



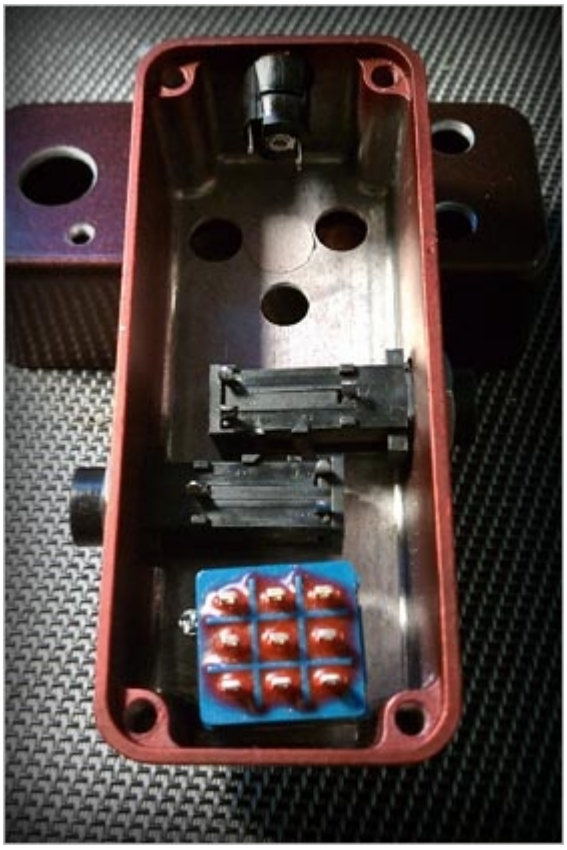
I usually keep some hardware handy while I'm deciding where to place everything. The paper template is very useful, but not exact. Slight variations in where you fold the edges can sometimes make you think you have room in places you don't. I've got the DC jacks and a couple different types of 1/4” jacks to choose from. I use these to line up around the marked drill holes to make sure the physical dimensions will fit properly. Usually I end up marking my drill points for the jacks just a millimeter or two off the actual drill holes on the template to give myself just a little bit of added room.

After I feel confident of where to place the hardware I hit each spot once with the center punch. The “Runt” box is on the left. You can see the three spots for the pots at the top, the 3PDT near the bottom and the spot for the LED on the right. I decided not to use an LED bezel for these builds. Instead, I will use the actual footswitch to hold it in place (more on that later).

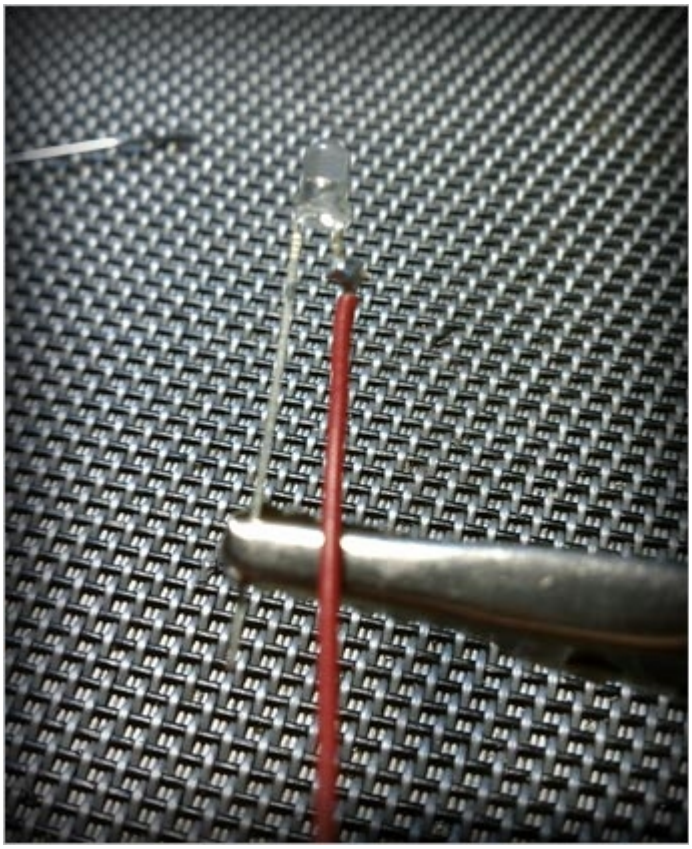
Here's the final drilling. I ran into a couple minor flubs when I drilled these. On the Runt box, the hole for the pot on the upper right was drilled slightly out of line with the one on the upper left. To compensate, I over-drilled the upper left spot a to allow some “fudging” on the alignment.

One important point: the 1/4” jacks used in this build (listed under the component selection guide later on) require fairly large holes. If you are using a standard stepped bit for drilling, you will find that you get to the other side of the enclosure before you get your final hole drilled! So, it is a good idea to have either a large, non-stepped bit or one of the thicker diameter step bits on hand.

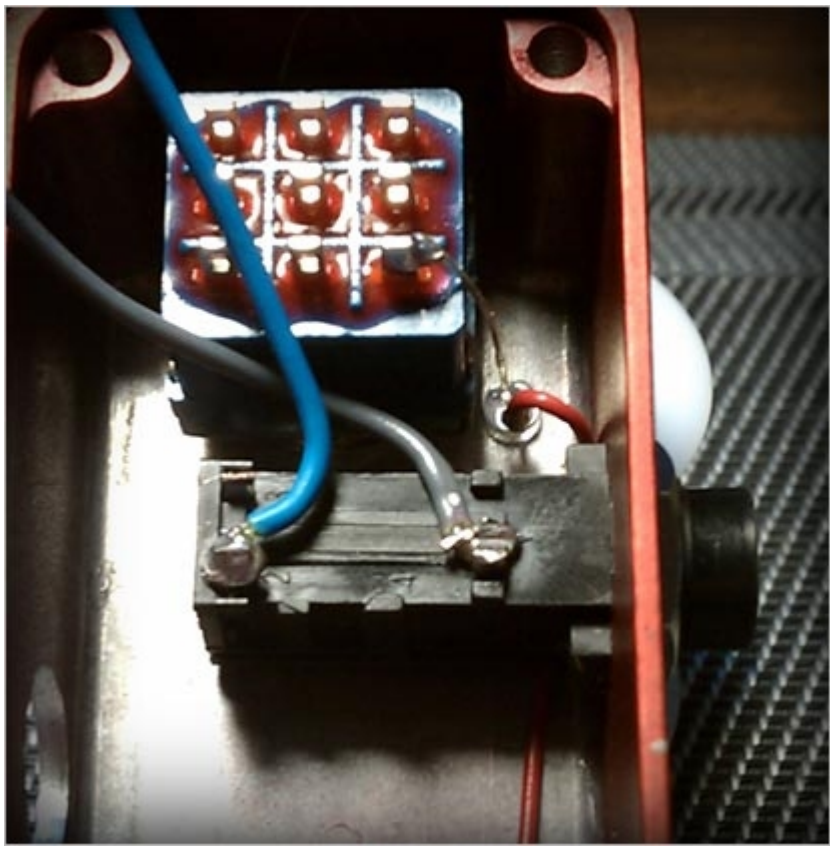
This is similar to what I used to finish off the holes for the 1/4” jacks after first drilling with the standard step bit:
http://www.harborfreight.com/1-4-quarter-inch-3-4-quarter-inch-high-speed-steel-step-drill-44460.html



Here's the “dry fit”. The hardware, pots and LED all go in smoothly. Next up, some LED wiring.



I'm going to use the negative lead on the LED as a brace to keep it in place in the hole I've drilled. On the positive end, I bent the lead at 90° a few millimeters from the base of the casing and soldered a wire to it. The current limiting resistor will be soldered directly to the DC jack, and the other end of the wire will be soldered to the resistor to complete that portion of the circuit.

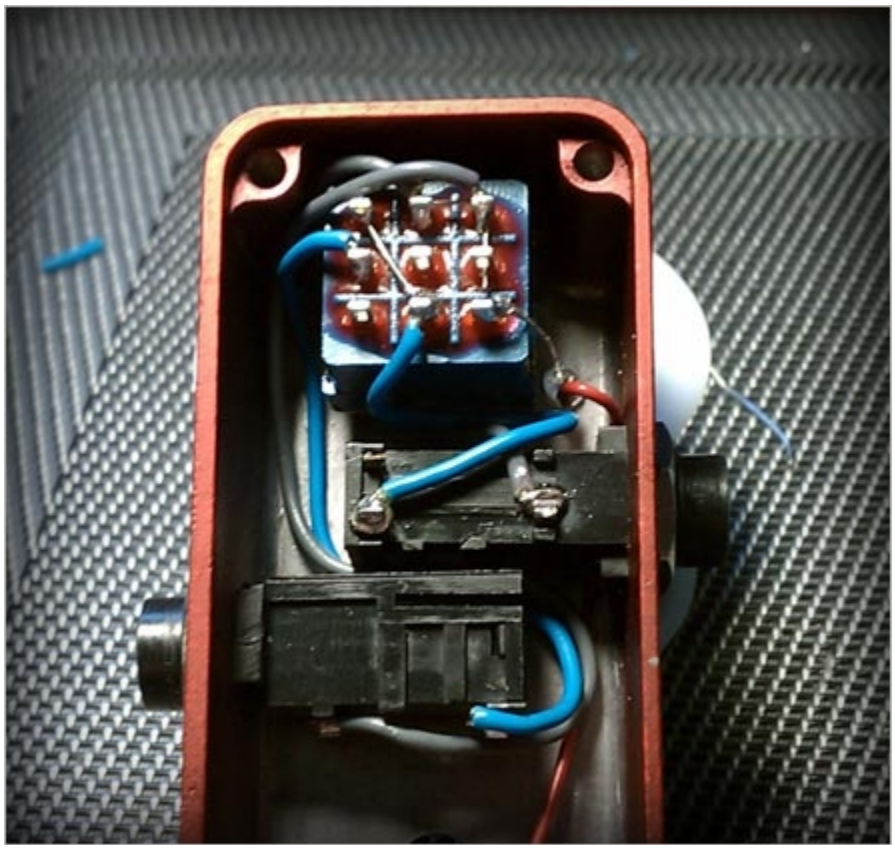


The negative lead of the LED was bent into place and soldered directly to the 3PDT. Look closely and you can see that I also bent the red wire in a “U” shape before running it up toward the top of the enclosure where the DC jack will be. This gives the LED a little more upward pressure on the enclosure. At this point, I could use hot glue to lock it down tight, but it feels pretty solid so I just left it like it is.

You can also see I have the input jack installed and the red LED wire under it to keep it out of the way. The jack is a special “low profile” type I got from Smallbear which works perfectly for this kind of build. The three pins are not marked, so I used my continuity checker to determine which is tip, ring and sleeve. The sleeve has the gray wire and the tip is the blue wire. I left the ring unconnected. The other end of the red wire is also not connected to the resistor/DC jack. I'll do that as the very last step.

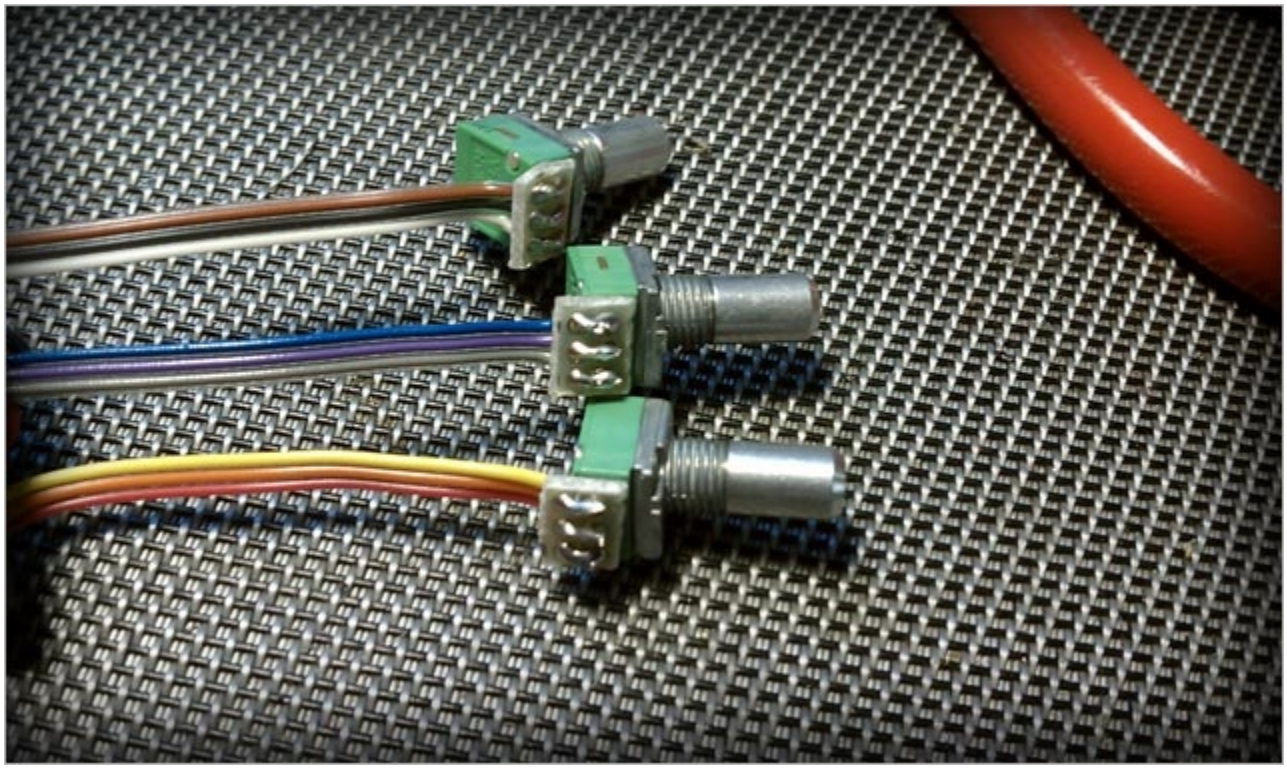
The pins on these jacks stick up just a bit, so after I soldered my wires, I clipped the excess off in case I need a few more millimeters of space when I lay the PCB on top of the jacks.

Now the input wire has been clipped and soldered into place. I'm following the Standard Wiring Diagram, so I've used some extra leads to connect the input to the upper left lug on the 3PDT and another bit of wire bent in a “U” shape to go through the three lugs on the upper right that contact ground. I've only soldered the lug with the gray wire at this point since I will be attaching other wires to the other two ground lugs.



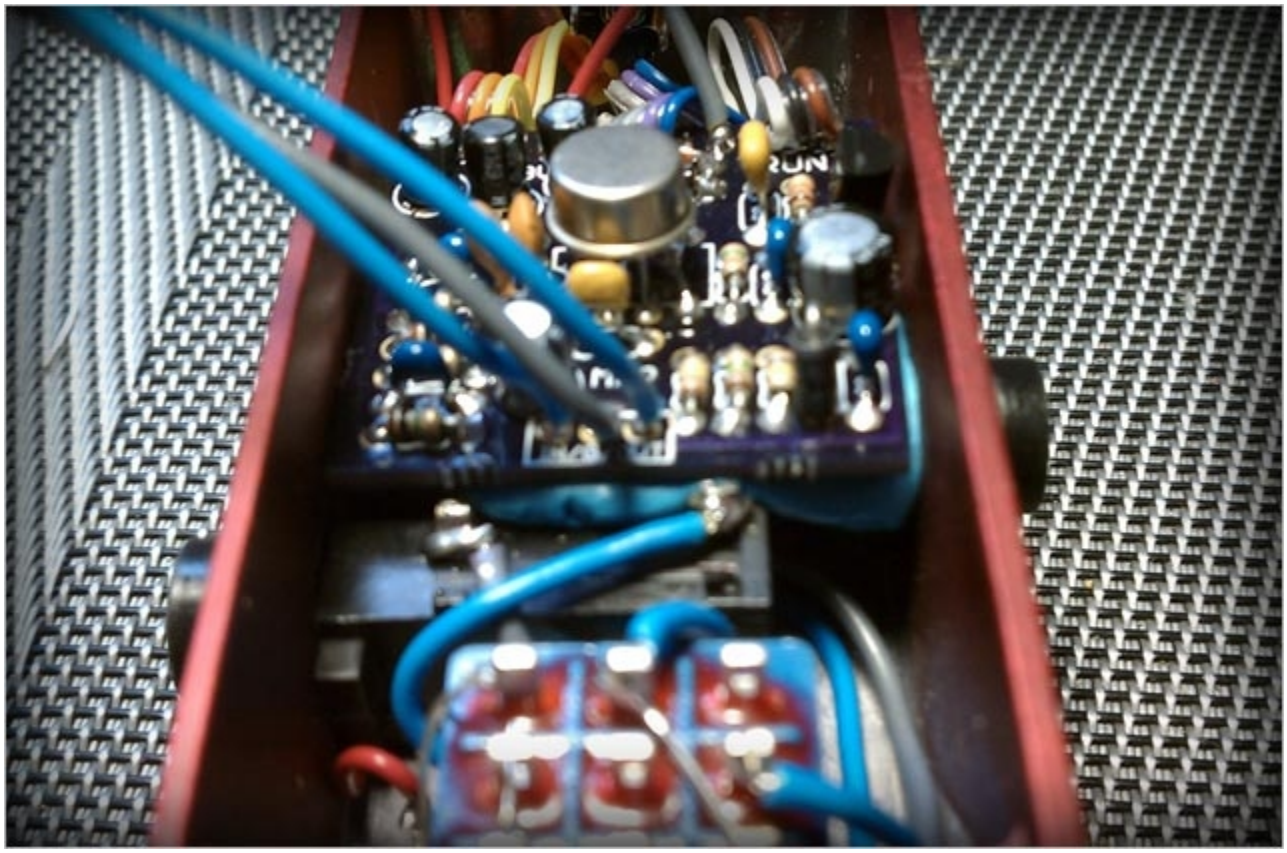
The output jack is installed and the wires for the tip and sleeve are soldered in place. Note the second ground spot in the upper right of the 3PDT got the sleeve wire, and has been soldered. I also turned the jack on its side. This keeps the pins for the jack away from the bottom of the PCB, thus preventing any possible shorts.

At this point I stopped and hooked up a guitar and amp to the jacks just to test the bypass. This is a good idea, in general, since once the effect is complete you will not have easy access to the jacks. My bypass is working, so I'm ready to install the pots and PCB.



Here's an example of how I do the pots. I've got a small piece of perf board for each pot, with three columns and two rows. The pins from the pots go on one row, get folded down toward the second row and then the wires are soldered in place. Pretty neat, huh?

I had plenty of room for the pots, so I just installed them in the direction that required the least amount of bending. I will be bending the wires some to fit in the enclosure later on, so it's a good idea to start from a point where they are under the least amount of stress, and therefore less inclined to become damaged or break.



The PCB in now in place. I usually use 3M foam on the bottom of my PCBs to keep them locked down. Since I was out of that, I used blue putty (the low tack stuff) over the output jack, placed the PCB on top and pressed down firmly. Since I installed the output jack on its side earlier, there is no worry of shorts because the jack's pins are facing toward the side.

Almost done!

Here's a top view. In these last steps I will clip and solder the input, output and ground wires at the bottom of the PCB to their proper lugs on the 3PDT switch. Then I will clip the 9v and ground wires at the top of the PCB and hook them into the lugs on the DC jack. Finally, I will attach the lead of my current limiting resistor to the DC jack and the solder the red wire from the LED to the other end. Solder, solder, done.

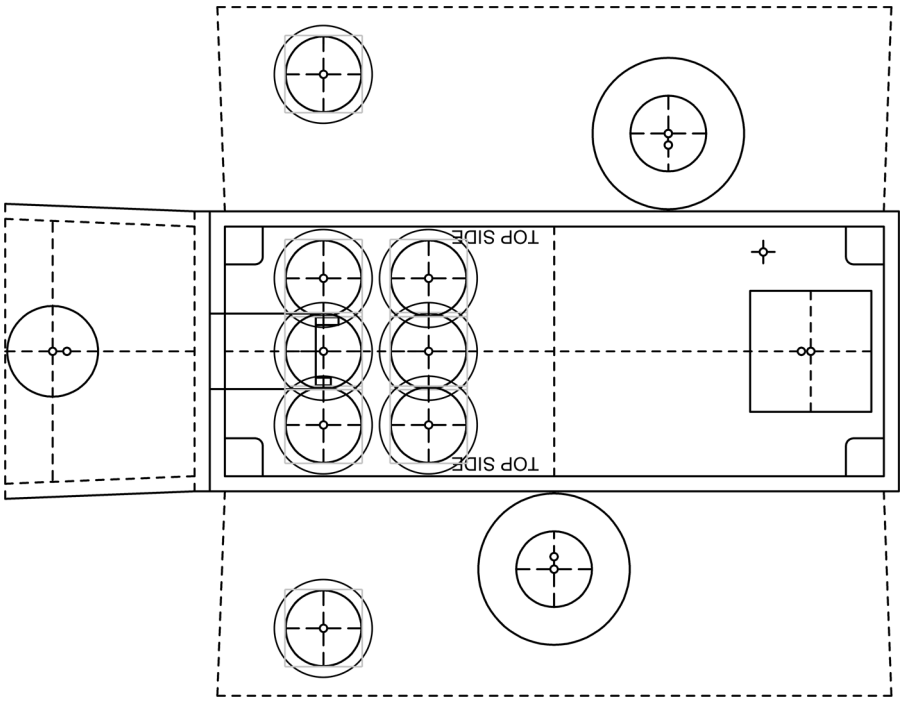
All wires clipped and soldered. Time to see if it works!

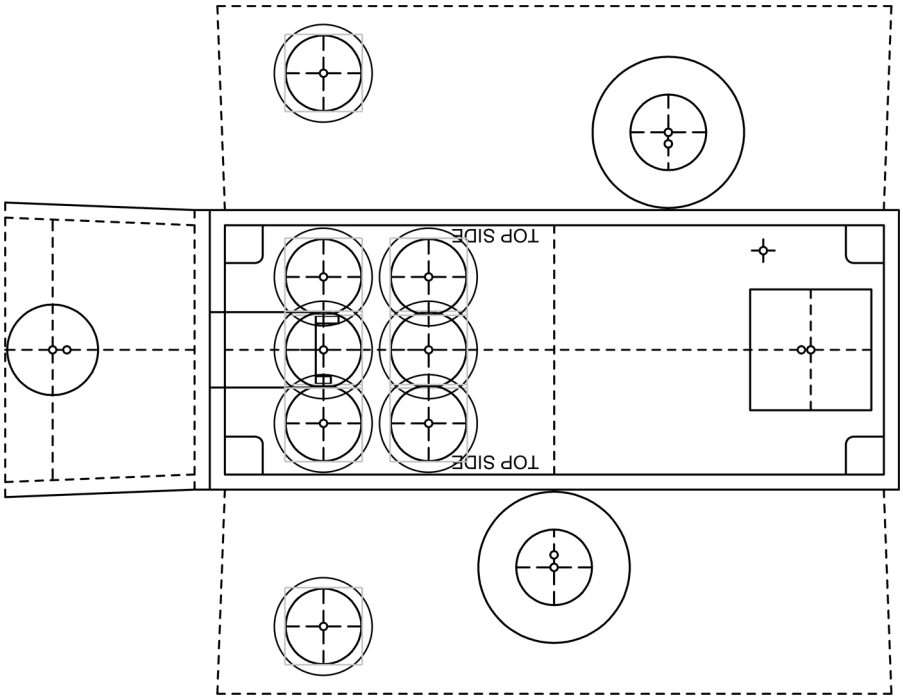
(It did)

Here's the final product. About one hour from start to finish on the drilling, installation and final checkout.

Download the full, uncompressed pics used in this tutorial (4.8MB)

The light squares indicate the dimensions of 9mm Alpha Pots. The circle furthest outside the square is ½" and indicates knob dimension. Jacks and switch have two circle targets which indicate "fudge" areas. Different brands of jacks may require a little fudging depending on their dimensions. Place your hardware on the template to be sure of the correct drilling spot BEFORE using a center punch to mark their positions.





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COMPONENT GUIDELINES

Use the right components!

You should use 1/8W resistors, box caps or multi-layer ceramic caps (MLCC), tantalums and/or low profile electrolytic caps, and 9mm Alpha pots.

- **Resistors** - Xicon 1/8W resistors are available on Mouser: type in “299-value” in the search field to pull up the carbon film resistors (ex. 299-100k for a 1/8W 100k resistor). You can get ten resistors for $.60.

  Xicon 1/8W through-hole resistors

- **Film Caps** – Box caps should work on the Baby Boards for values between 1n-100n. Some caps over 100n will be physically larger and therefore may present problems when fitting these PCBs into 1590As. MLCC are all very small, and just about any value of cap will work for the Baby Boards. For the MLCC there are a variety of them on Mouser. I am using a mix of TDK and Murata caps for my 1590A builds and simply select them based on best price. The TDK common values like 1n, 10, 100n, 1uF are quite cheap and sound fine. The Muratas are pricier and even smaller than the TDK.

  Topmay Box Caps
  TDK 5mm MLCC Caps
  Murata 5mm MLCC Caps

- **Tantalums** - These are expensive on Mouser—consider alternative sources. You don’t HAVE to use tants, but they are good for the 10uF decoupling caps on the PT2399s.

  AVX 10uF Tantalum

- **Electrolytics** - Miniature electrolytic caps – I use the Lelon ones. You want radial, 25-50v, with heights of 5mm or so. Some are 7mm height and those are probably okay. Don’t use 11mm high caps-they won’t fit.

  Lelon 1uF Mini Electrolytic
  Lelon 2.2uF Mini Electrolytic
  Lelon 4.7uF Mini Electrolytic
  Lelon 10uF Mini Electrolytic
  Lelon 47uF Mini Electrolytic
  Lelon 100uF Mini Electrolytic

- **Pots** – You can probably get away with using the standard 16mm pots on projects that require only one knob. However, for projects that require two or more knobs, I recommend using the 9mm Alpha pots. These are actually quite expensive on Mouser, so Smallbear might be a better choice.

  9mm Alpha Pots

- **Sockets** - It's preferable not to use an IC socket due to the added height. However, if you are using the low profile jacks shown in the tutorial and you keep them very close to the top face of the enclosure, you should be able to use IC sockets. If you choose not to use sockets, please be careful when soldering ICs directly to the PCBs. DO NOT solder all pins at the same time. Solder one or two at a time, then wait 15 seconds or so for the IC to cool down. This will prevent overheating and/or damage of the part.

- **1/4" Jacks** – I do recommend the low-profile, stereo PC mount jacks at Smallbear for these builds. There are also some Neutriks at Mouser that will work which are less expensive and about the same dimensions. However, they do not include the nuts. Those can be purchased separately.

  Low Profile Jacks at Smallbear
  Neutrik Jacks at Mouser
  Nuts for the Neutrik Jacks at Mouser

- **DC Jacks** – These are my favorite type of jack to use in all my builds. They are snap-in, smaller than the traditional DC jacks used in pedals and work for any build that you do not intend to use batteries on.

  Kobiconn Snap In 2.1mm DC Jack

- **Knobs** – Obviously, you are going to have to pick the correct knob type according to how many you need. For one knob effects, like the BaconBits and Smoothie, just about any size will work, including a chicken head. For projects with two knobs or more, stick to the smaller diameters.

  http://www.smallbearelec.com/Detail.bok?no=547
  http://www.smallbearelec.com/Detail.bok?no=690
  http://www.smallbearelec.com/Detail.bok?no=707
  http://www.smallbearelec.com/Detail.bok?no=727
  http://www.smallbearelec.com/Detail.bok?no=1034

All of the remaining hardware, LEDs, 3PDT, etc is standard. Good luck and have fun!