



General Building Instructions for Projects at www.generalguitargadgets.com

Version 2009March09

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This file contains general guidelines to follow when building projects from the <http://www.generalguitargadgets.com> web site. Please read this document carefully and be familiar with it as you build some great guitar effect projects from the site.

Each Project Includes:

- **A Schematic File** or a link to the schematic.
- **A Parts Layout File** - the parts are labeled on an image that represents the top the board layout. The traces of the underside of the board are also show in these diagrams usually in very light blue color. If you hold a translucent FR4 PCB up to a back light with the copper trace side of the PCB facing away from you, you can see the traces through the board and this is similar to the view that the diagram represents.
- **Ready for Transfer Board Layout File** - Transfer or draw the image of this file onto the copper side of copper-clad printed circuit board (PCB) (and then etch and drill the board). Many of the PCBs are available to purchase from the site and are ready to solder the parts right on to them. If you purchase a Ready-To-Solder (RTS) PCB, you won't need this PCB layout file. For information on etching your own PCBs, see the site, on the menu options: **Tech Pages - Building Information - Fabricating Printed Circuit Boards**
- **A Wiring Diagram File** - shows the off-board wiring connections to jacks, switches, pots, etc. Note that usually the Parts Layout and Wiring diagram are combined in one diagram.
- **A Bill of Materials File** - a parts list for the project. If you have a **Complete Kit**, you will use this file to identify the small parts in the kit.
- **A Build Instructions File** - Instructions on how to put it all together. Use in conjunction with this document.
- **Other** - there may be other links included for even more information about the project.

All of these detailed documents are online and should be printed out before you start building your kit or project. A color printer gives best results, but black and white printouts will work as long as you carefully reference the resistor codes and wire colors when needed.



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The Steps to Building Are:

1. Be familiar with the information on The **Tech Pages** and the **FAQ Technical** pages of the site.
2. Download and print out all the documents for the project before you begin. Make sure you understand the diagrams and schematics. You don't need to know every technical detail about what makes the pedal work, but it will be helpful if you can trace the schematic through the parts layout and wiring diagram.
3. Check your **Complete Kit** to make sure all the parts are included and correct. We make every effort to send complete and accurate set of parts, but sometimes there are some errors with the part selections.
4. Plan out the enclosure layout and acquire the enclosure.
5. Populate (solder the parts to the board) the PCB with on-board parts
6. Finish (paint & label) the enclosure
7. Mount the board and off-board parts in the enclosure
8. Wire the off-board components to the circuit board.

Assembling the Circuit Board

Here's what we have on our bench when we are assembling a board:

A close-in bright light (desk lamp)
Small Side cutters
Wire strippers
Soldering iron and stand
Solder
Hookup wire
A small Magnifying glass
Multimeter
Circuit board and required parts (resistors, caps, etc)
The project documentation

Solder parts in this order:



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1. Sockets (if used)
2. Resistors
3. Capacitors
4. Diodes and transistors
5. Integrated Circuits (ICs)

After the soldering is done, look at it closely under the bright light (through a magnifying glass if possible). It is helpful to keep an eye on the quality of the work as you go.

Painting The Enclosure

Getting a good coat of paint on a stompbox enclosure that will resist chipping is difficult to say the least. If you can get a powder coat finish, it's probably the best, but almost any paint will work, but might be more susceptible to chipping and scratches.

Sand down the surface very smooth, most of the smoothing is done with #220 paper.

Wipe down the surfaces with Naphtha (or Ronsonol Lighter Fuel).

Apply 1 coat of automotive gray primer (or marine primer).

Light sanding with #300 paper.

Wipe down with Naphtha.

Apply one coat of Gray Hammer tone paint (plasti-kote Gray Hammer Finish)

Apply labels (see previous section)

Apply one coat of spray-on clear satin polyurethane (to protect the labeling).

Labeling The Enclosure

There are several ways to label enclosures

- Permanent Marker. This method is even used by some professional builders. If you have neat hand writing or an artistic flair, this can be a very good and easy method.
- Free-Hand Painting. Again even done by some pros, e.g. ZVex.
- Computer Printed Labels. These are usually the same size as the top of the



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box. They designed and printed then stuck on and usually clear coated over to protect against damage.

- Press-N-Peel or Tee-shirt transfers. These methods take some patience and experimentation, but you can get very good results. The Press-N-Peel can only be used on bare metal as far as we can tell. After the transfer is done, a clear coat is applied to protect the labeling.
- Screen Printing. This is what most professionally built pedals use. The setup and cost is high, so it's probably not cost effective or feasible for most home builders who build only one or two of any given effect.
- Decals. (described below).

Here's the steps we have used to label enclosures with **decals**:

- Design the labels on a computer word processor. I design an entire 8.5"x11" page at a time.
- Print the labels.
- Photocopy the label page to a decal page. we use decal paper available from Micro-Mark, Item #81485.
- Follow the decal instructions to put the decals onto the enclosure.
- We use the Micro-Mark Decal Softening Solution to "set" the decal. This stuff works GREAT, we highly recommend it (Item #81263). We bought the entire "Decal Finishing System" (Item #81261), but the only thing worth having is the softening solution, save some money and just buy the bottle of softening solution.
- Apply one clear coat over the decals.
- Using the softening solution with the decals, you can barely tell they are decals after you apply a clear finish over them. It really does look fantastic! Applying decals is a delicate operation. You should use tweezers and good lighting. When you cut the decals out - cut round corners, we found that will help prevent the decal from folding under when you apply it. We've had trouble with labels with big fat letters (large areas of toner). The toner will sometimes chip off. we touched it up with a sharpie and it looks great. It looks like the "Laser Decal Fixative" (Item #60765) might prevent the chipping toner, but we haven't tried it.



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Putting It All Together

If you've used sockets, make sure you plug in what goes in the socket before you fire it up.

Mount the jacks pots and switches before you begin soldering. Make sure the board will mount properly and everything is going to fit in place before you start soldering parts in place. The exception to this is if some of the parts, such as jacks, get in the way of soldering some of the other parts. For the 125B or 1590BB enclosures, we usually mount the input and output jacks after we have soldered all the other connections.

Mounting Parts to the Enclosure

If you have a kit from the site, the enclosure is pre-drilled. You should mount the parts in the enclosure as follows:

- 1. Mount the potentiometers.** The potentiometers have a small lug at the base of the stem that can be used to hold it in place when it is mounted. We don't use these lugs, we have found them to be unnecessary. Most commercial stompboxes do not use them either. You will need to remove the lug so that the potentiometer can be mounted flush to the inside surface of the enclosure. These lugs break off very easily by just bending it to the side with needle nose pliers or a side cutter. Note in the photo below the lug is not being cut off, but just grabbed with the tool and sort of twisted off to side.

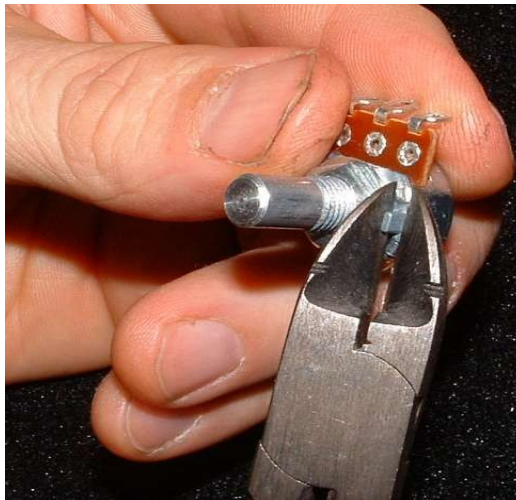
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2. **Mount the DC Jack.** This can be a little tight since it may be directly over a potentiometer, but you can hold the nut in place on the inside of the enclosure and screw it in from the outside to get it started.
3. **Mount the populated and pre-wired PCB** with the self-stick standoffs.
4. **Wire and solder** all the connections to the potentiometers, DC jack and switch(es).
5. **Mount the Input and Output Jacks** and wire and solder them.
6. **Solder in the battery Snap.**

This sequence allows for more space for getting your soldering iron in and out to do most of the wiring before the big input/output jacks get in the way. We have found this sequence to be the easiest way to get the wiring done.

The Wiring Details

We use 24 gauge stranded insulated wire. 22 or 26 gauge is also acceptable and used by many builders. Try to use several different colors to help make tracing wires easier. Don't use low grade hookup wire, it can make assembly much more difficult and may lead to problems with connectivity. Pre-bonded stranded hookup wire is an excellent choice for wire.

The pots are shown in the wiring diagrams as you see them when you solder wire to them (looking at them from the back) and are numbered with standard numbering.



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Wiring for grounding (earth) can vary. You may bring the ground from each jack and pot back to the board or "daisy chain" the grounds of the jacks, pots and switches together and then bring them back to the board ground with just one wire. Either way or combinations of both ways will work and most of the board layouts have enough ground pads on the board so you don't have to daisy chain off-board grounds if you don't want to. The wiring diagrams will work as they are shown, but you may wire the grounding differently if you like, as long as **all the grounds are connected together**.

We recommend that you never use the chassis (enclosure) for ground connections for the jacks, pots, switches, etc. This will work with steel and aluminum enclosures and many commercial pedals do this. If the bolt holding the jack or potentiometer ever works loose from the enclosure you may end up with unnecessary intermittent shorting problems if you don't have ground wires soldered to the parts. This is a situation that could cause a needless disruption at a gig sometime down the road.

Lead dress is the "art" of laying out wires so they don't affect each other in ways that could cause hum, noise, oscillation, etc. Very important in amps but also important in effect pedals.

- Run the wire neatly and don't use any excess length other than what is required to access the PCB for service or mods.
- Run the input and output wires as far apart from each other as possible.
- Never run wires over the PCB so that it is difficult to access the PCB.
- Use good quality wire, and don't use solid wire unless you are experienced with lead dress for solid core wiring.

Wiring the Jacks

The wiring diagrams show connections to input and output jacks. Here are photos of the jacks that show the wiring of the actual jack lugs.

Input Jack

Output Jack

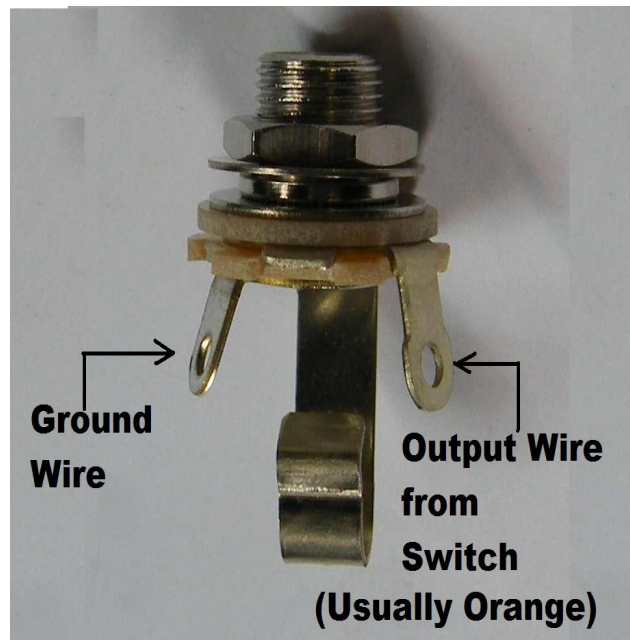
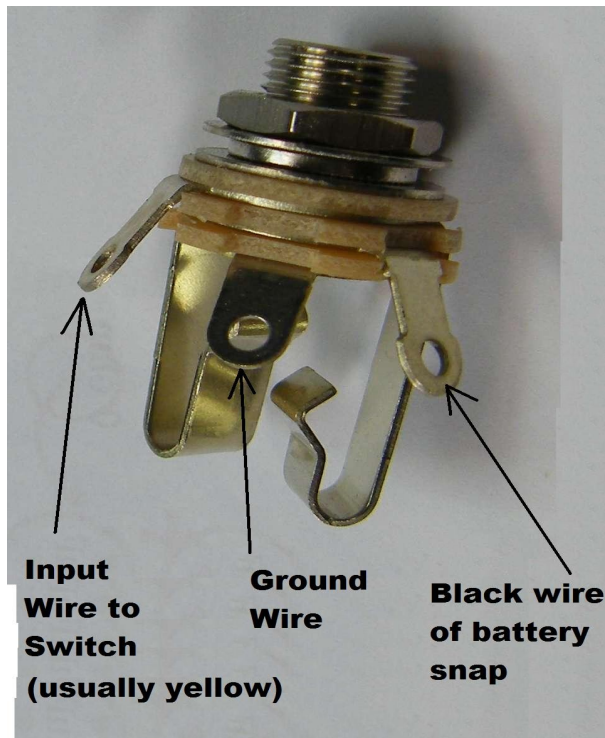
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Getting it to work

There is a chance that after you get your project all together and plug it in, that it will not work. There is a lot of information and links on **The Tech Pages** section of the web site. Look at these links and files thoroughly. Be patient and work your way through the problem from as many "angles" as you can. Keep in mind that it is almost always **much** more likely that the problem is a mistake or bad solder joint than it is to be a faulty component. Always check that the correct parts were mounted in the correct places and that the wiring is correct. Then check for cold solder joints, with bright light and magnification.

Most project have some voltage data for the circuit that may help locate problems. Start by checking voltages to make sure the circuit is actually getting power to the right places. Start at the DC jack or battery and work your way right into the circuit. If



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the voltages seem to check out, then you may need to follow the audio path through the circuit and see if you can narrow down and locate the area that is causing the problem. You should use the Audio Probe to do this as described in the Tech Pages.