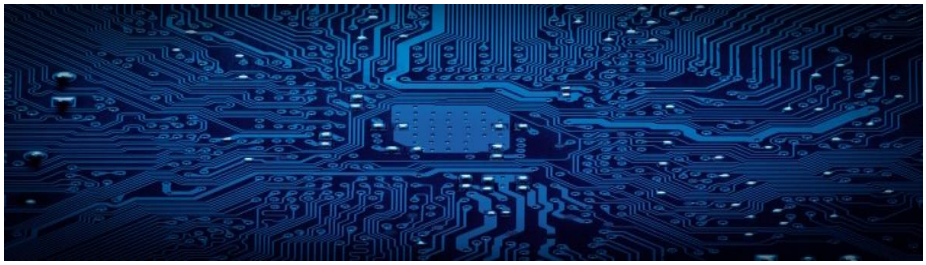


BUILDING YOUR FROG GUITAR EFFECT PEDAL PCB – A General Guide

Version 2, By Mark Price, mark@frogpedals.com

Thank you for purchasing a Frog Guitar Effect Pedal PCB (or two or three)! The following instruction, though helpful for any effect pedal build, is specifically for the low voltage effect pedals (9VDC). For the Frog high voltage tube preamp PCBs, please see the specific documentation for that particular PCB.

Please read the complete documentation before starting your pedal PCB build!

I want you to have a successful experience, so, I have put together a small guide to help you build your own guitar effect pedal. These come from a lot of experience, so, these processes that follow have been learned from a lot of frustrations and mistakes I made. **The main thing is to take your time**. The amount of time you will save by building slowly and methodically will actually SAVE you a lot of time by not having to fix your mistakes, and there is plenty of opportunity to make mistakes! I have made every mistake you can make on these.

Preparation for building your Frog guitar effect pedal PCBs:
Print out your effect building documentation for your specific PCB project.

- Read COMPLETELY through the documentation. Please! You will be glad you did.

- Purchase all your parts. It is easiest to use as few vendors as possible:
  - Mouser.com
  - Taydaelectronics.com
  - Smallbearelectronics.com
  - PedalPartsPlus.com
  - Lovemyswitches.com

  These are a few examples in the US.

- Make sure you have a digital multi-meter (DMM). A continuity tester is a good idea too.

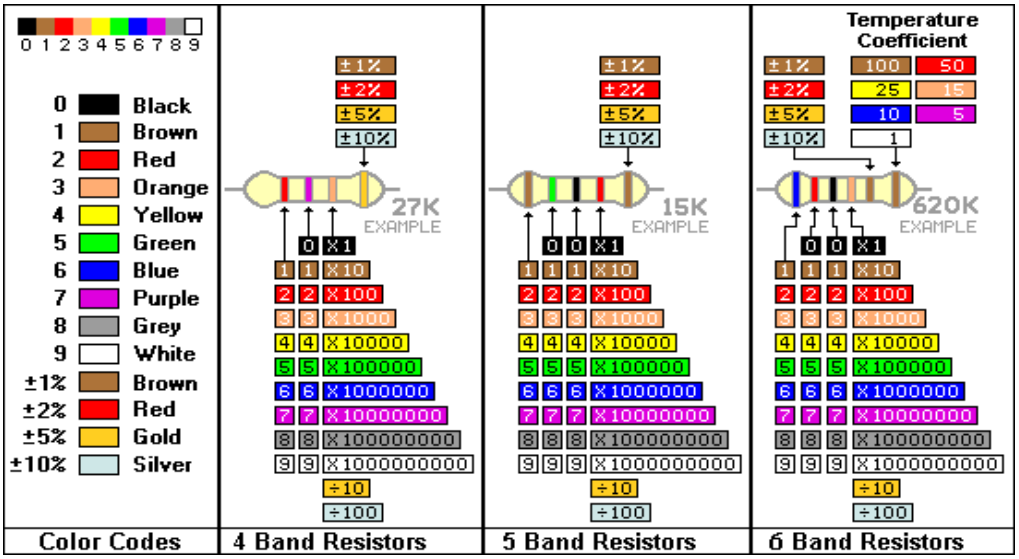
- A good soldering iron is a necessity if you are going to have good solder joints. It needs a fine conical tip. (I use a Weller brand which should last a long time!)

- Buy some tip tinner and a soft coiled brass pad. You will be able to clean the tip. After every 5-10 solder joints clean the tip and re-tin it. It will significantly lengthen the life of the tip!

NOW START BUILDING YOUR GUITAR PEDAL

- Populate the PCB starting with the resistors. Most resistor, diode and capacitor components are installed on the side with the component labels except potentiometers and LEDs. You will solder these on the opposite side. Pots and LEDs will be installed last. Always test each resistor with your digital multi-meter (DMM). I promise, the time you take doing this, will save TONS of time later. You won't put the wrong resistor in the board, you will save a lot of diagnostic time and won't possibly ruin your PCB. I install about half of the resistors at a time, and then solder them in, because there can be so many resistors.

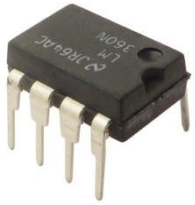
- Here is a resistor chart thanks to **diyaudioandvideo.com.** Print the chart below and keep it handy. It is a good reference, but still TEST EACH RESISTOR WITH THE DMM!



- Next insert the diodes. Check twice regarding which direction they are to be inserted. There is a line on the diode, and there should be a line on the PCB image of the diode. Insert per the PCB diagram. Solder the diodes.

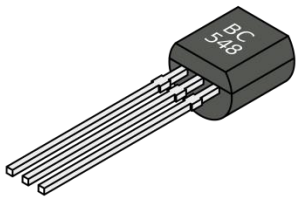
- You will install the ICs later, for now install any sockets for ICs. You can, BUT DON'T solder ICs directly to the PCB. They are the most delicate component and can sometimes fail. You can easily replace it if you used a socket. Solder the socket. You can put the socket in the PCB holes and temporarily tape it with painters tape to keep it in place when you turn it over. Solder one leg and make sure it is still tight to the PCB. If it has moved, you can easily re-melt the solder on one pin and press on the IC socket to hold it tight to the PCB. By the way, the socket has a little curved spot and that should correspond to the curved spot diagramed on the PCB:

- The IC itself will have a corresponding curved spot or a dot, (or both) near the edge that should be oriented with the curved spot in the socket.



- Next, insert small capacitors (film and MLCC). These are not polarized, so can be inserted any direction. Depending on the number of capacitors, you may want to put half of them in, solder and then install the other half of the capacitors and solder those.

- Next install transistors if needed. There is usually a flat side on the transistor and it should be oriented with the PCBs transistor diagram flat side so it will be oriented correctly. You can install sockets for the transistors, but I don't. I don't like how poorly they seem to hold the transistor and most the time are pretty cheap. I put the transistor in only part way, with the top of the transistor about even with your tallest capacitor. That leaves longer leads so, if you need to replace them, you can clip the leads on the transistor, de-solder the leads and install a new one.



- Install electrolytic capacitors (the ones in the metal cans) now. They are some of the last items installed because they tend to be the tallest. Most can-type electrolytic capacitors have two things that will help you get them in the correct direction (or polarity). Electrolytic capacitors have a positive + and a negative – side. The positive side will have the longer wire lead. The negative side has a stripe down the side of the can that indicates it is the negative side (see the minus sign on the stripe below?). If you put it in incorrectly, it probably will fail.

- DON'T install the pots or LEDs yet!

- Install the trim pots if there are any in your build.

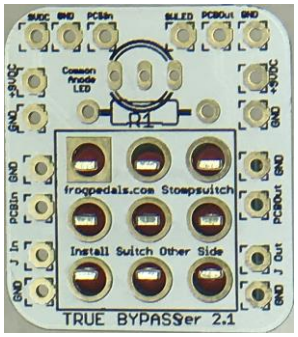
- After all the small components are installed, use a magnifying glass and look at EACH solder joint.
    - A good solder on a part looks a little like a miniature Hershey's kiss shape.
    - First, make sure there aren't any solder bridges between solder pads that ARE NOT supposed to be soldered together.
    - Second, look for any questionable solder joints, if needed, add a little solder if needed, if not, reflow by touching again with a soldering iron until it re-melts and is shiny.
    - Only stay on the solder joint for as long as it takes to re-melt (reflow) and let off. Heat can cause issues with some components

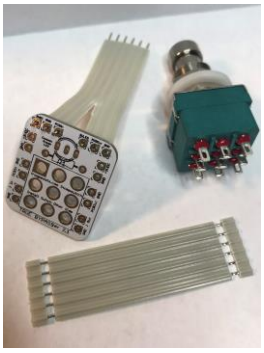
- You can install the IC in the socket now, or any time before you power the PCB on.

- Install short wires for the power connector

THE STOMPSWITCH

- NOW it is decision time. Do I install a stomp switch PCB on the stomp switch or, do I wire directly to the stomp switch? How much is your time (and frustration) worth? For the small amount of money it costs to purchase a stomp switch wiring board you will save tons of time and frustration with the stomp switch wiring board:





- The white stomp switch board I designed and sell costs $2 USD, is a True Bypass board, it includes the ability to have a bicolor LED on it so you can, for instance, have a bicolor red and

green LED that will show when the effect is on (Green) and when it is in True Bypass mode (Red). It also has some really nice documentation on the frogpedals.com website! This is the link to the documentation: https://frogpedals.com/wp-content/uploads/2017/03/FrogStompswitchPCBWiring.pdf
Print out the stomp switch documentation. It is one page.

- An additional important item is that the stomp switch itself needs to be oriented where the **solder lugs are in the horizontal position** (as in the picture above) when installed into the PCB (the direction shown in the documentation picture of the stomp switch). If you have questions, send me an email at mark@frogpedals.com.

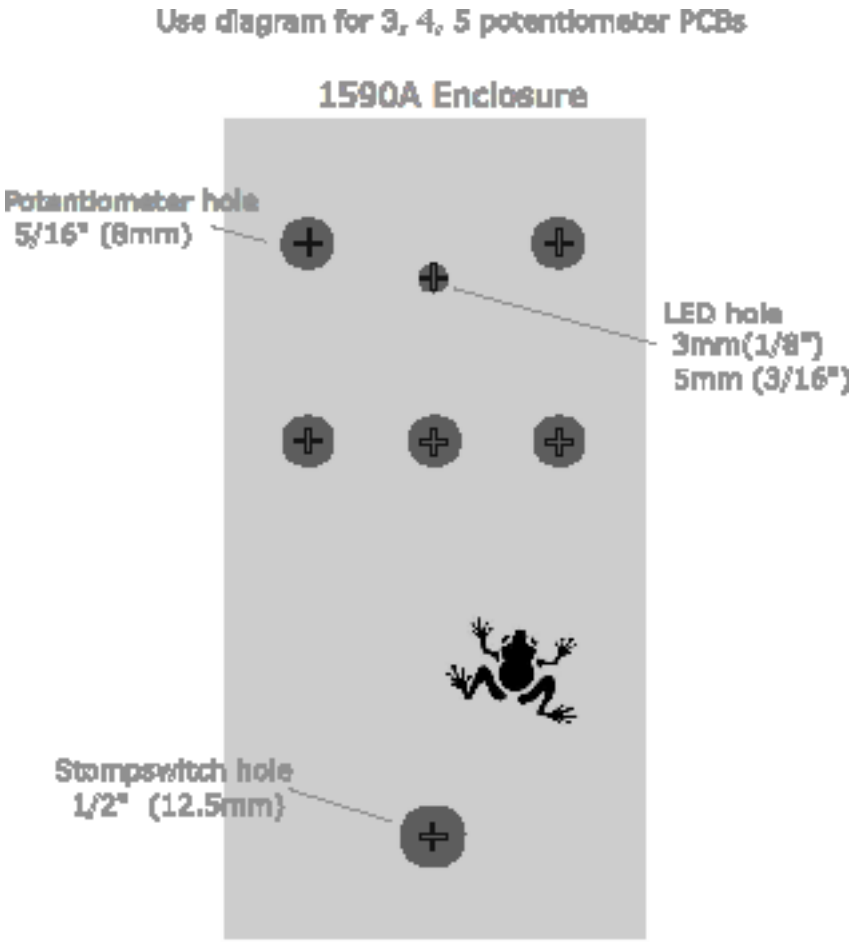
- Next, if applicable, wire the effect PCB to the stomp switch PCB. I suggest using the 6 conductor flat cable that is available on my site. It is pre-tinned and pre-stripped.
    - Signal OUT on the effect PCB goes to Brd Out on the stomp switch PCB,
    - Signal IN on the effect PCB goes to Brd In on the stomp switch PCB.
    - Hook one of the signal ground pads on the effect PCB to one of the ground pads on the stomp switch PCB. You don't need both. Ground is Ground.
    - If you want to power an LED on the stomp switch, hook the 9VDC pad on the effect PCB to the 9VDC on the stomp switch PCB or other 9VDC source.
    - If you want to control the LED on the effect PCB, connect the SWTCH pad on the effect PCB to the SWLED pad on the stomp switch PCB (if it has it).
    - Add input and output jacks per the stomp switch PCB instructions.

ENCLOSURE DRILLING

Most **frogpedals** PCBs have 3, 4 or 5 pots, one LED. When installing in an enclosure, you may also need: A power jack hole, one stomp switch and two Jacks (in/out). Once you know how many holes you need, you can use the templates included below to lay over your enclosure and then mark and drill the holes. The in and out jacks can be drilled on the left and right side of the enclosure, or, at the top (top mounted).

I use a step bit in a drill motor, or drill press to drill the holes. They do an amazing job. I use isopropyl alcohol to cool the bit as it is cutting through the enclosure. Sounds weird, I know, but it works and prolongs the life of your bit. Go slow.

- Below is an actual size enclosure drilling diagram you can use for reference (there can be some variance with different brands of enclosures, determine hole size by measurements):



- Drill the input and output jacks. They can go on the left and right side of the enclosure, or, if you move the PCB and pot holes down a little, they can be top mounted. Top mounting takes a bit of extra planning because you have a DC power jack and other clearance issues to keep in mind, so there is a lot of extra planning for top mounted jacks. There are many types of jacks, enclosed or open frame ¼ inch jacks.
    - **NOTE ON SOLDERING AND GROUNDING ¼ inch Jacks:** Some people rely on the metal enclosure providing the ground part of the signal circuit. You can do that, but I do not rely on that. I always connect a ground wire to the input and output jack. It is a more sure way to provide ground to the jacks. It is a good idea though to ground the metal enclosure as well.

- Drill the holes on the face of the enclosure illustrated in the diagram above and then dry fit your components into the enclosure. That will help you determine the best location and size of the holes. The same goes for the power jack location.

- You can solder the pots. Again, use enough heat and time to get solder to flow, but don't keep the heat on too long. The potentiometer can be damaged my too much heat.

DISCLAIMERS, SAFETY, ETC…

Please, use common sense. A hot solder iron can cause burns, an unattended soldering iron can cause a fire and burn your house down, but I shouldn't have to tell you that. Electricity can

cause shock, but honestly, 9 volts DC isn't going to hurt you too bad, but a short could cause smoke and maybe a fire, so, be careful!

- Pay close attention to what side of the PCB that certain components need to be soldered on. Typically, the small components like resistors, capacitors and diodes are installed on the side with all the component markings but other components like pots and LEDs are on the opposite side, usually with only minimal markings. The pots and LEDs stick through the enclosure of course.

Sometimes there are optional components that may or may not be needed for the version of effect you are building. AGAIN, READ THROUGH THE INSTRUCTIONS COMPLETELY BEFORE BEGINNING.

- I hope you enjoy your project. I really work hard to make the PCBs as high quality as possible. Most PCBs are prototyped 2 to 3 times, built and tested before I decide they are ready for public sale. So I know these boards work, but, though I don't provide direct support for each of the PCBs, I can answer some questions to get you through some tough spots. You may have to be patient waiting for my response.

- Some of the projects are more complex than others, so, I will include a build rating of:
    - Green – Beginner friendly. Usually component count is low, and there is a lot of room between components. This doesn't mean the effect pedal project is low quality, in fact, some of the greatest vintage pedals you have heard of are fairly simple to build.

    - Yellow - Intermediate. Higher part count and parts are relatively close together, so possibility of solder bridges between components is increased, there may be optional components, jumpers and extra wiring required. It is better that you have experience building guitar effects with success before trying this level.

    - Red – Expert Level- High part count, parts close together, solder bridges much more probably, so be careful. Many optional component configurations, jumpers and off-board components probable.