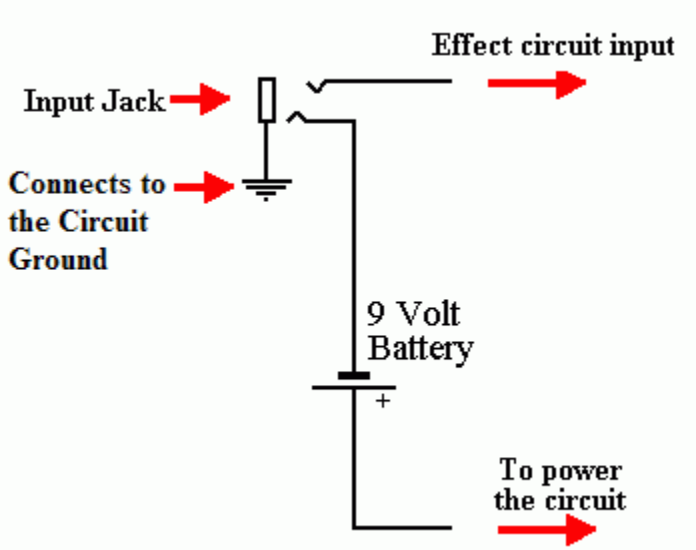
Powering Projects at www.generalguitargadgets.com

This document contains a detailed explanation of getting DC voltage to your stompboxes.

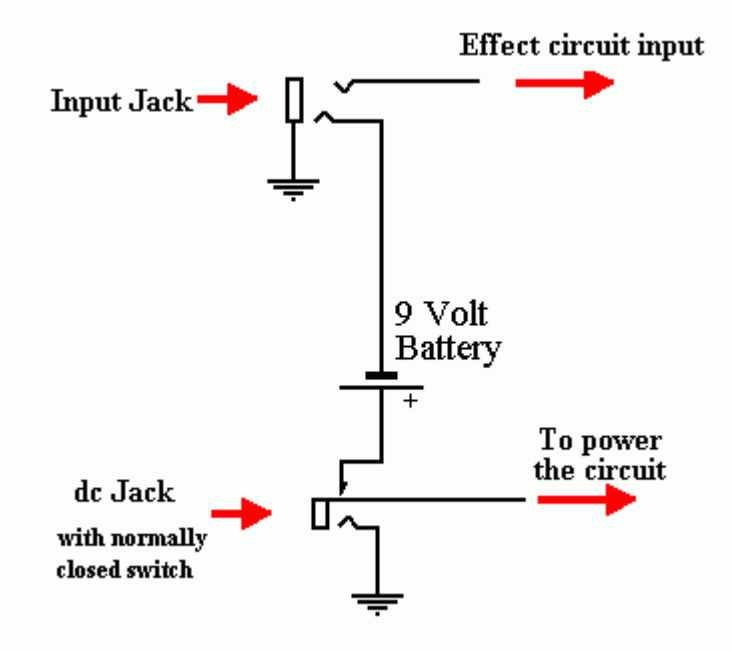
Most guitar effect stompboxes us a single 9 volt battery. Some use two batteries or even a special power adapter to get power. Let's look at the simple 9 volt power circuit first and then move on to the more complex. Here is a schematic of a typical vintage stompbox power supply:



This is simply a 9 volt battery snap hooked up to the circuit to provide power. But you will notice that the negative lead of the battery snap does not go directly to the ground of the circuit. It attaches to the ring of a stereo quarter inch stompbox input jack. Note that even though the stompbox itself is not a stereo device, it uses a stereo jack as the input. This is an ingenious power switching idea that became the standard in almost all stompboxes. If the black battery snap hooked directly to the ground of the circuit, the battery would be powering the circuit at all times, even when it's sitting around not in use. So you need a way to switch the battery on and off. The solution is that when you plug a mono plug into the stereo input jack of stompbox, it makes a connection from the battery black lead to the ground of the circuit, causing the circuit to be powered on.

As the 1970's progressed, stompboxes became more and more popular and multi-effect setups became prevalent in guitar rigs everywhere. The potential problems of always plugging and unplugging cables to the inputs of stompboxes and of buying

many 9 volt batteries was solved by the addition of a DC jack on many stompboxes. Here's the power circuit now:



We can see that the stereo input jack switching is still there to turn the battery power on and off and now the DC jack is included in the positive power side of the battery. Here's how it works. There is basically a **Power Source Selector Switch** built into the DC power jack shown in the lower part of the diagram. The power jack has a "normally closed SPST switch" built into the jack. It is a closed switch (on) when nothing is plugged into the jack and is a open switch (off) when there is something plugged into the jack. When there is a plug in the DC jack the switch shuts off the battery connection and power will flow in from the power jack only. Power from the battery is connected to the circuit when the jack is unplugged. Another ingenious way to add some switching with just the plugging of a jack. DC jacks with this built in "normally closed SPST switch" are commonly available at most electronic parts stores that sell DC jacks. If your DC jack has 3 connector lugs, you can bet that it has this feature built in.

Positive Ground/Negative Ground

During the 1960's when transistors began to replace vacuum tubes in electronic

circuits, it was easier and less expensive for transistor companies to produce PNP transistors than it was to produce NPN transistors. We won't go into the details of PNP and NPN transistors in this document, you can study that in most elementary electronics books. What we do need to know about PNP and NPN transistors is that many circuits with PNP transistors had a positive voltage ground. In today's electronics world, almost all circuits have a negative voltage ground. There are some stompboxes that have positive ground circuits. Examples are: Fuzz Face, Tone Bender, some Big Muff Pi, some Octavia, and there are others, mostly circuits that have germanium transistors, even some current production pedals. This presents a potential problem for multi-effects users who use power supplies and not batteries. You **cannot run positive ground and negative ground stompboxes on the same power supply**. You may have tried this before and found that your power supply goes dead if you try this. Usually it does not harm the power supply, but it will not work. You will need to run a separate power supply for the positive ground stompboxes to get everything working correctly. Note that with battery power there is not a problem mixing positive-ground and negative-ground stompboxes in a multi-effect setup. There are some additional complications from this when we start to look inside the stompboxes. How do you wire these positive ground circuits with a DC jack? One way is to simply reverse the wiring going to the DC jack. This works great and is simple to do, this is the way the Fulltone PNP stompboxes are wired. The potential problem with this is that now you need a power adapter with a positive-tip jack. Fulltone sells a special DC adapter for their PNP pedals (69, SoulBender & OctaFuzz) with a positive-tip adapter. For those of us who would like to use a standard, commonly available negative-tip adapter, there is a solution. You can check the Tech Pages, Switching Section and see another wiring that allows you to use a negative-tip adapter. Note that you will still need two separate power adapters, one for negative and one for positive ground stompboxes effects, but you can use the run-of-the-mill negative-tip stompbox adapters for both. The only side effect of this wiring scheme is that the DC power will turn off when you unplug the input jack, no big deal for most of us.

We hope this helps give you a better understanding of powering stompboxes. This information can be used not only for building, but for modifying.

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