



MINITAUR EURORACK CONVERSION KIT



DIY GUIDE also includes expander.

RE-Engineering

What is it and why should I care?

Normally when a product is engineered to perform a certain way the design is made to accommodate basic physical functions. How something fits and is secured in its normal operating destination is all handled in the original design.

Moog engineered the Minitaur to fit in its own custom enclosure. You are now purposefully removing it from its comfy enclosure and are now re-purposing it into a different use. YOUR EURORACKING the sucka!

YOU ARE VOIDING YOUR WARRANTY!!!

To some of you, that might freak you out! It is understandable. Even more so as you review this DIY manual and review the steps it will take to make it work in eurorack.

If you later on decide to put it back into its original enclosure it might not work without reversing some of these steps.

ONE LAST THING TO REMEMBER AS YOU GO THROUGH THIS KIT!

Please realize I have performed this modification on at least three dozen Minitaurs. I have tried to design this re-engineering procedure to make it as painless as possible. It however is not pain free!

Please review this ENTIRE manual FIRST! Once familiar you may decide you want to go your own way on a couple of steps. This is ok and I fully encourage you to do so. If you find a better way to do something, please let me know. I am always willing to learn and share.

Since I am RE-Engineering, I have had to make compromises that normally would not have to be made if I had originally engineered the Minitaur. These compromises have been thoroughly thought through and while not perfect, I believe they are the best solutions based on an entry level perspective for the masses!

What if I get in over my head?

If you are unable to complete, or even start your DIY kit, contact me about doing it for you. I charge a \$75.00 fee, not including shipping to or from Denver, Colorado USA. chris@millionmachinemarch.com

What's in the Kit?

The image displays the contents of the Million Machine MRCB kit. The central component is a black printed circuit board (PCB) featuring numerous potentiometers and switches, each labeled with functions such as "VCA FREQUENCY", "VCA ATTACK", "VCA RELEASE", "VCA SUSTAIN", "VCA DECAY", "VCA HOLD", "VCA LFO AMT", "VCA LFO FREQ", "VCA LFO PHASE", "VCA LFO SHAPE", "VCA LFO RATE", "VCA LFO SYNC", "VCA LFO MODE", "VCA LFO ON/OFF", "VCA LFO RESET", "VCA LFO STORE", "VCA LFO LOAD", "VCA LFO SAVE", "VCA LFO DELETE", "VCA LFO CLEAR", "VCA LFO EXIT". The PCB also has a "MINITRAUR" logo and a "MILLION MACHINE MRCB" label. Other components include a grey ribbon cable, a red LED, a blue LCD screen, several small electronic modules, two AA batteries, and a bundle of colored wires.

- ### **Tools you need:**

- **X-acto Knife**
with NEW blade!
- **Soldering Iron**
- **Rosin core solder**
- **Wire cutters**
- **Two Part Epoxy**
- **Electrical Tape**
- **Pliers**
- **Standard Screwdriver**
- **Phillips Screwdriver**

Optional:

- **Deep well sockets**
- **Hot Glue**
- **Desoldering Iron**

DO NOT USE SUPER GLUE!!! DO NOT USE HOT GLUE!!!

Step#1



Remove plastic nuts from jacks on back. While you are here, also remove the tiny screws holding the MIDI connector.

Take a piece of tape and slide under the knob and use a screwdriver to slightly lift the knob. This will give you space to use your fingers and gently remove the knob.

These are plastic shaft pots, so

GO EASY,
and take your time!

You only need to use tape if you don't want to scratch the old shell.



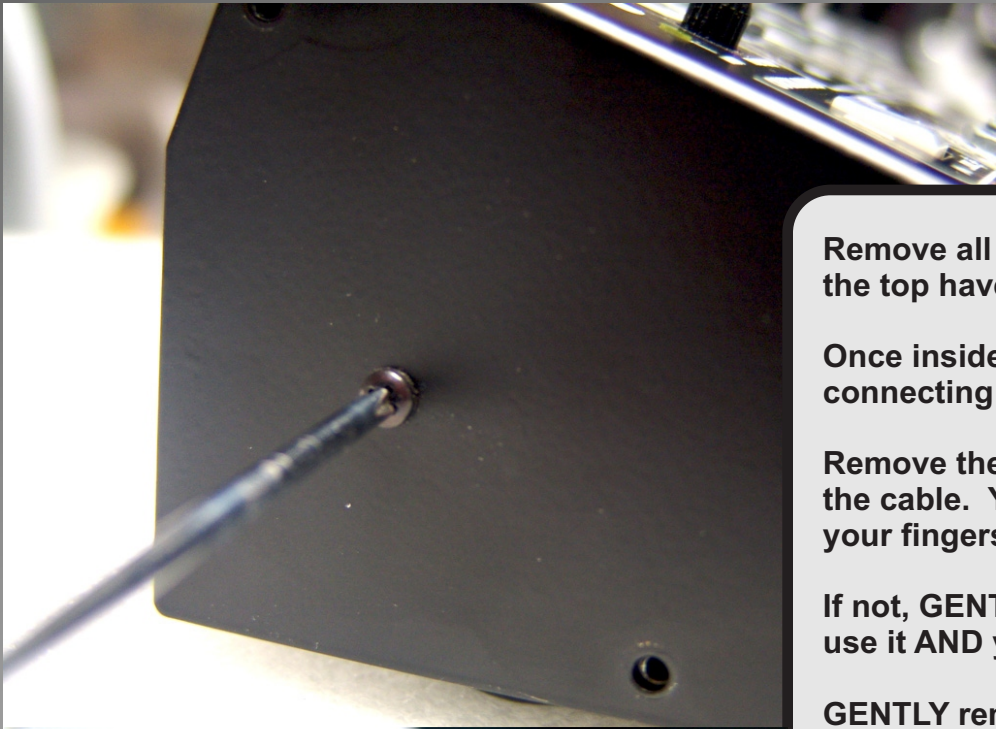
While removing the knobs some of the metal resistance clips may stay stuck on the shafts. Please make sure to gently remove them and re-insert them back into their respective knobs.

DO NOT LOSE THEM!!!!

I have not found a source to replace them!

Place all knobs into a plastic bag for safe keeping.

Step#2



Remove all chassis screws. Both sides and the top have screws.

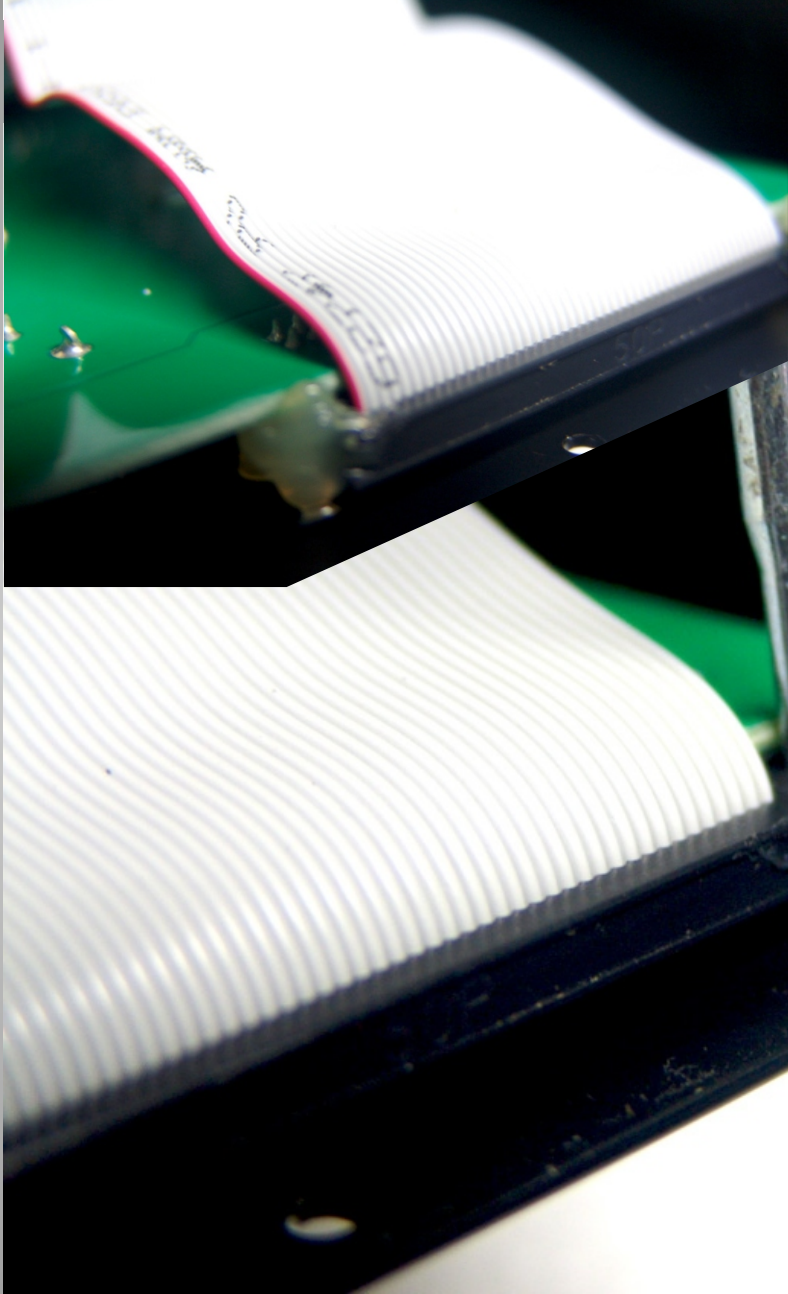
Once inside, observe the ribbon cable connecting both circuit boards.

Remove the silicone gel from the corners of the cable. You should be able to do this with your fingers.

If not, GENTLY use a small screw driver and use it AND your fingers to remove.

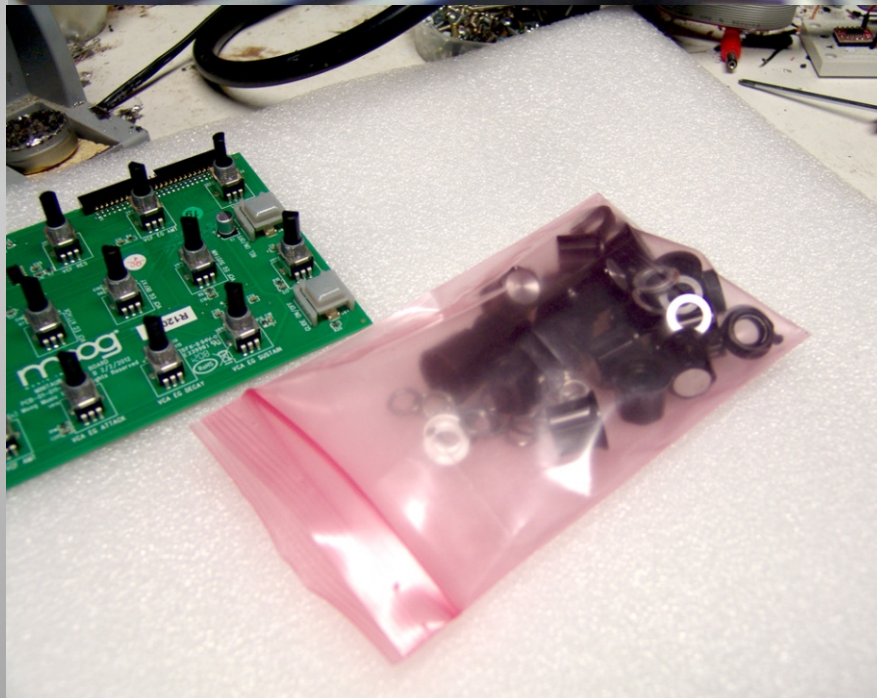
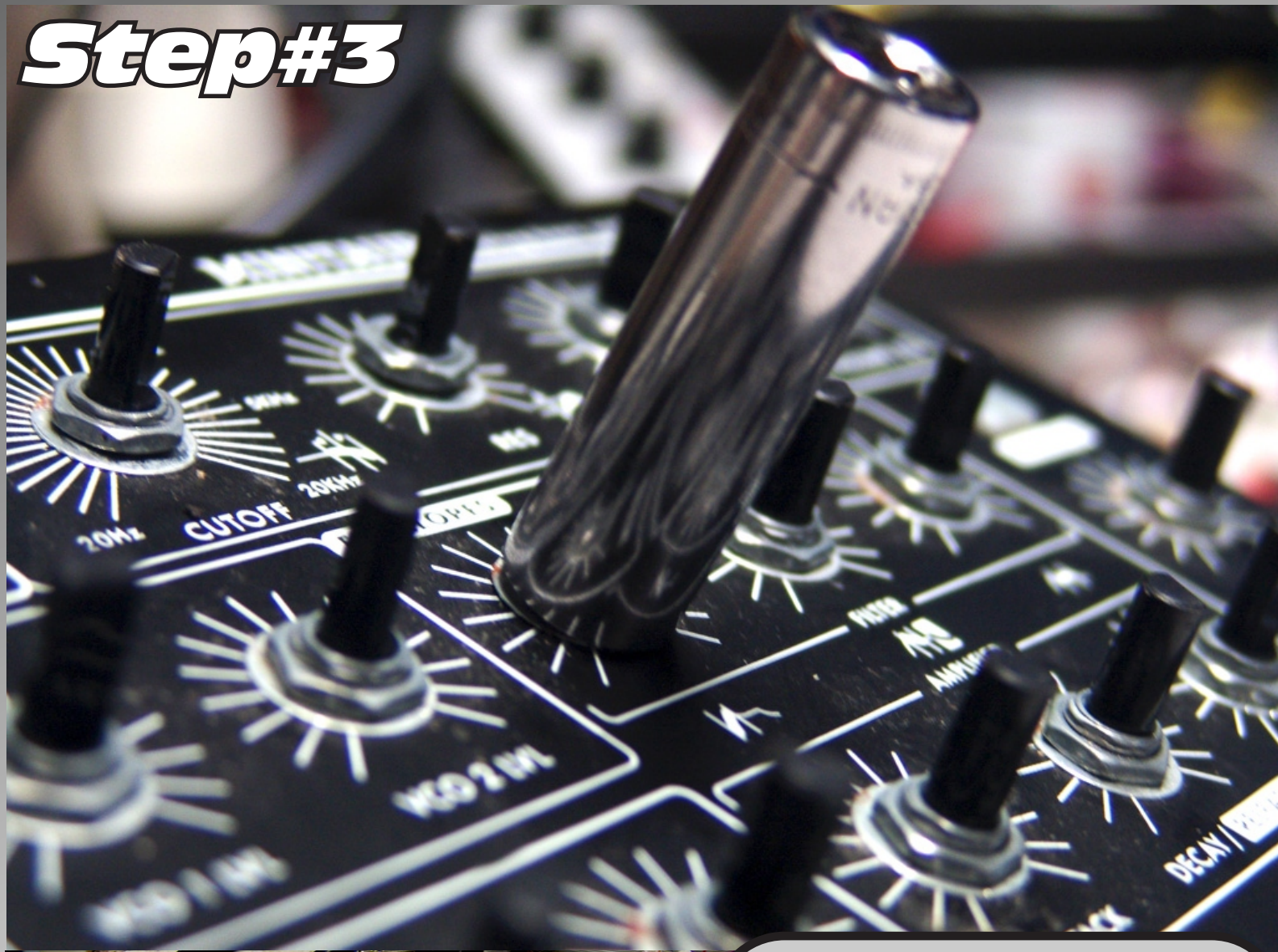
GENTLY remove the ribbon cable from the front printed circuit board.

Once removed, set the bottom to the side.



**Some later models have no silicone!
Lucky you!**

Step#3



Using a deep well socket or **CAREFULLY** using pliers, remove the nuts and washers from the front panel. Please use sockets if at all possible! Removing now is no big deal if you scratch the old shell, but scratching your new front panel will not make you happy!

Again use tape if you don't want to scratch the front of the old shell.

Put all knobs and screws and washers into a plastic bag!!

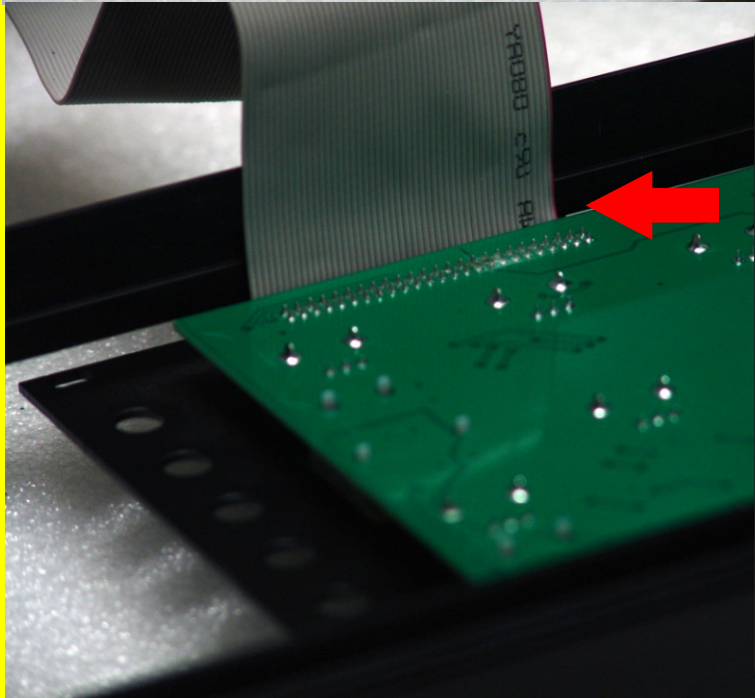
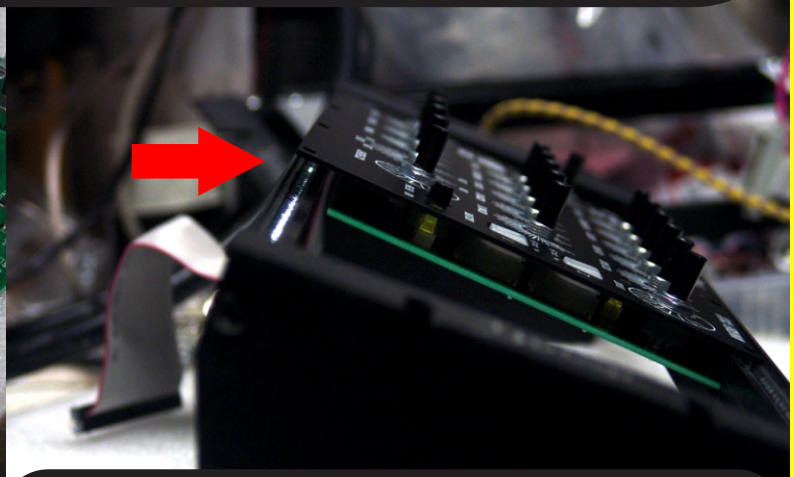
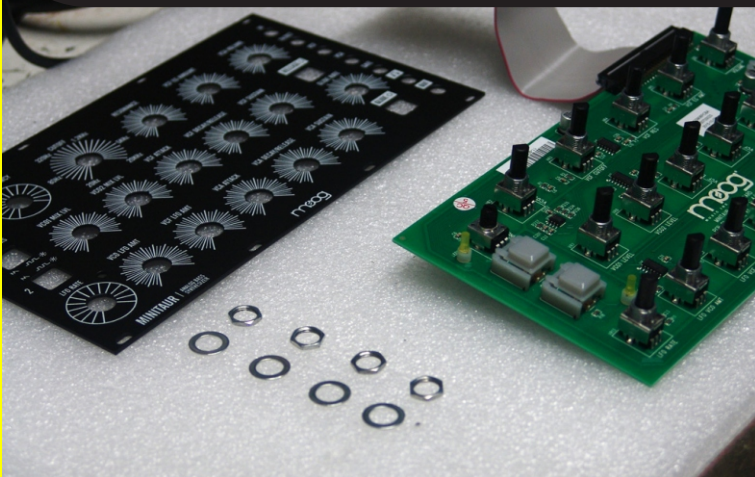
Step#4

Now we need to determine where this module is going. The front circuit board is a VERY tight fit. We need to make some room. The easiest way to get an idea of the problem is to test fit where it will be going.

I have several types of racks in the lab and I have found that the Doepfer/TipTop rails to be the tightest fit. So I am using them as my guide for this manual. You might be using vector rails in a custom unit, if so, your tolerances will be looser and you might have no size issues.

Just because you have no issues now, does not mean the next guy who you sell your Minitaur to will have no issue, so please keep that in mind while performing the next steps!

If you plan to never sell your Minitaur, then NO WORRIES. Just custom fit to your rack dimensions and you are good to go.



Test your final rack opening by taking a couple of washers and nuts and attach the front panel. This is temporary.

Now place into your opening and you might immediately see a couple of issues.

The cable might be hitting on top and the circuit board might be getting hung up on the bottom. In these pics I am using TipTop rails.

Again if you have no problems and you have no plans on selling it, than you are home free!

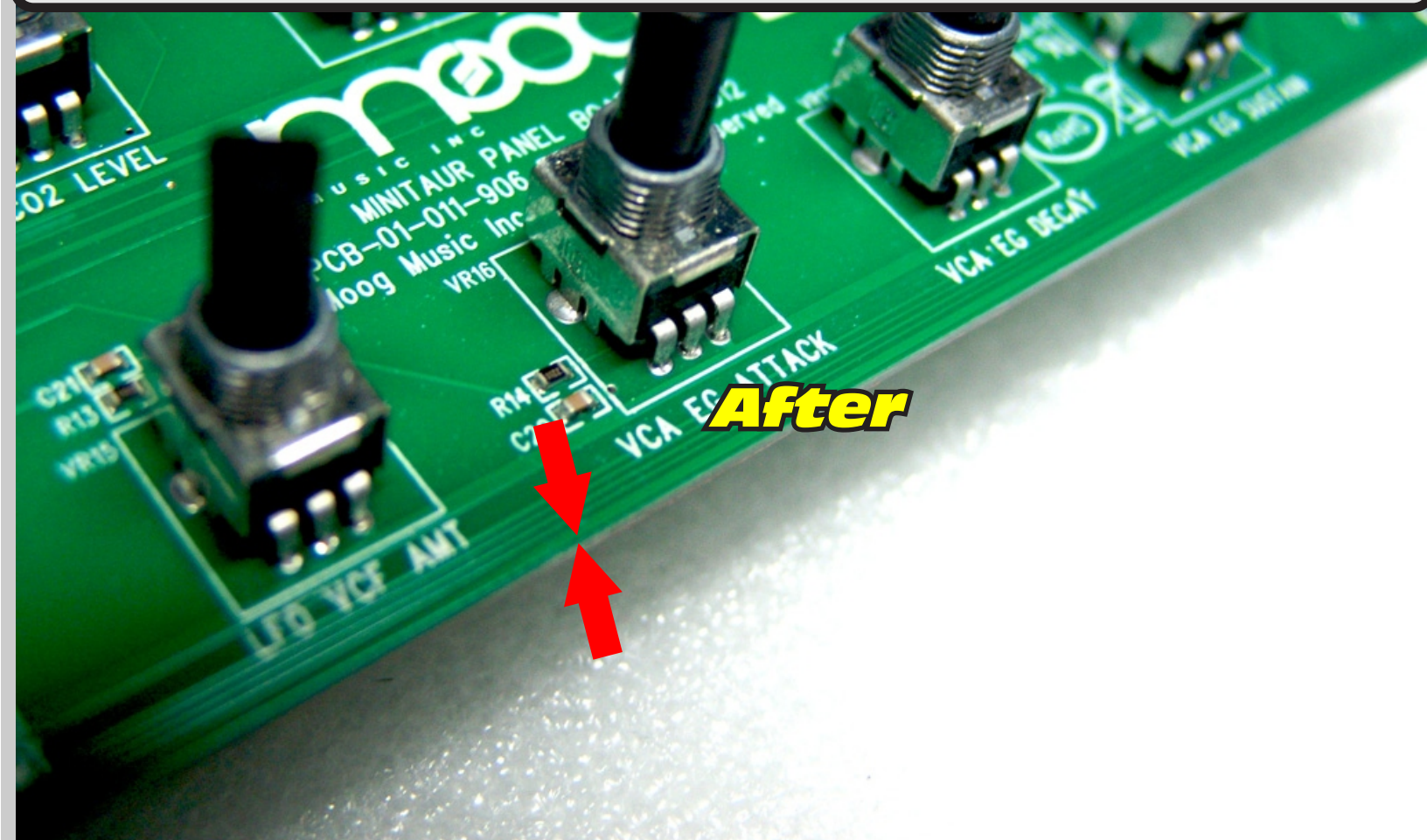
If you do have problems, let's move to the next steps to see what we can do to eliminate them!



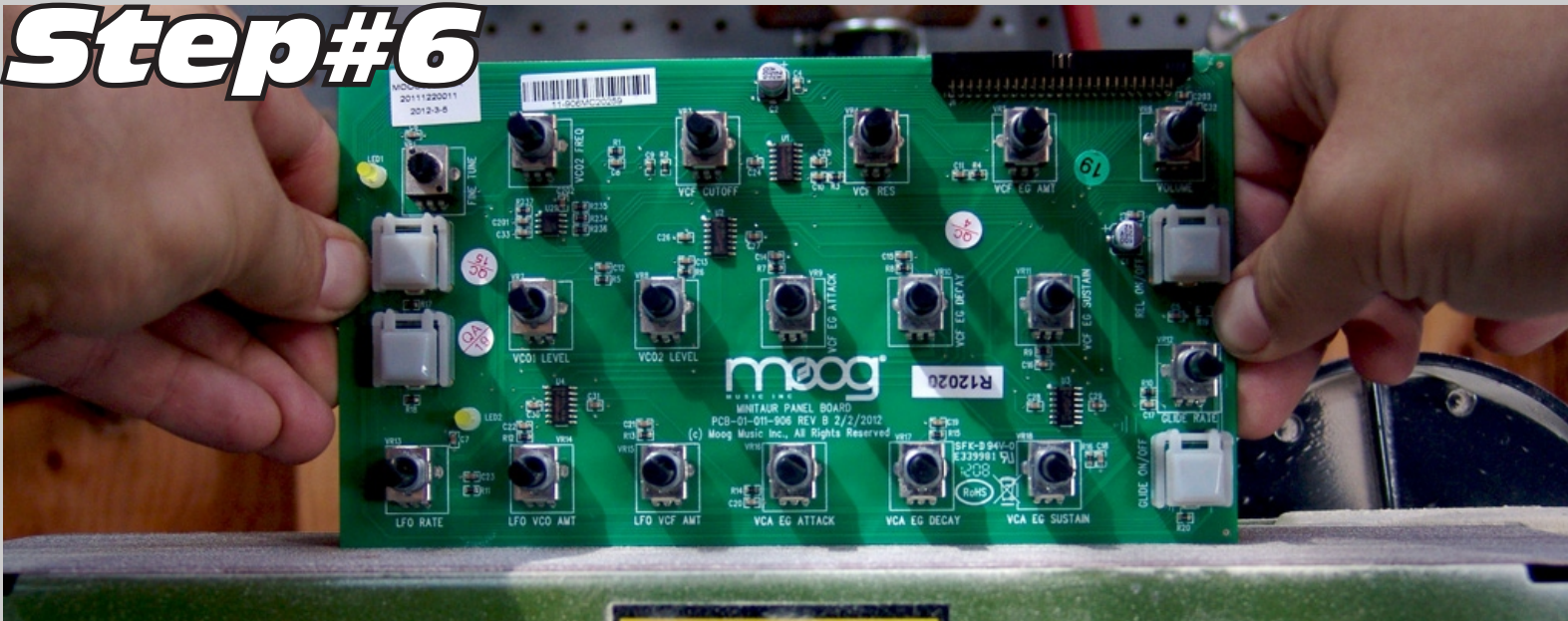
Step#5

First we will focus on the bottom, the circuit board. The first thing we can do is sand down a couple of millimeters. The pic above shows the un-altered board. The bottom pic is after sanding. You can sand down VERY close and still not touch the bottom trace.

How should you sand this down? Next page, please.



Step#6

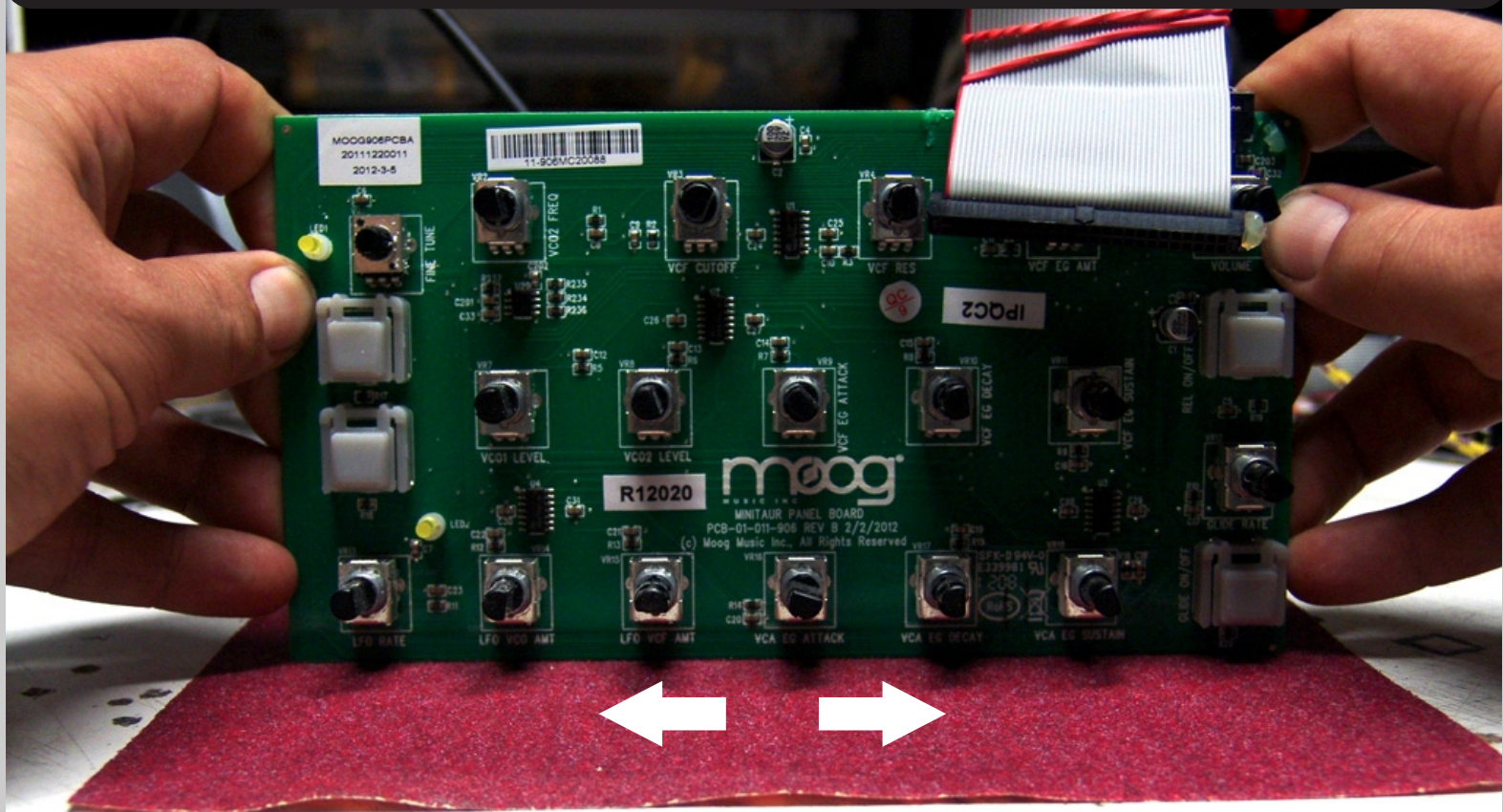


Here is where a belt sander can come in really handy!! Even so, if you go this route, **GO SLOW!!!!** You can go too fast and permanently damage your circuit board.

Ok, so you don't have a belt sander handy, did you notice your kit included some sand paper? Yes, believe it or not you can actually do this by hand! Takes about 35 minutes of focused work, but I have done this.

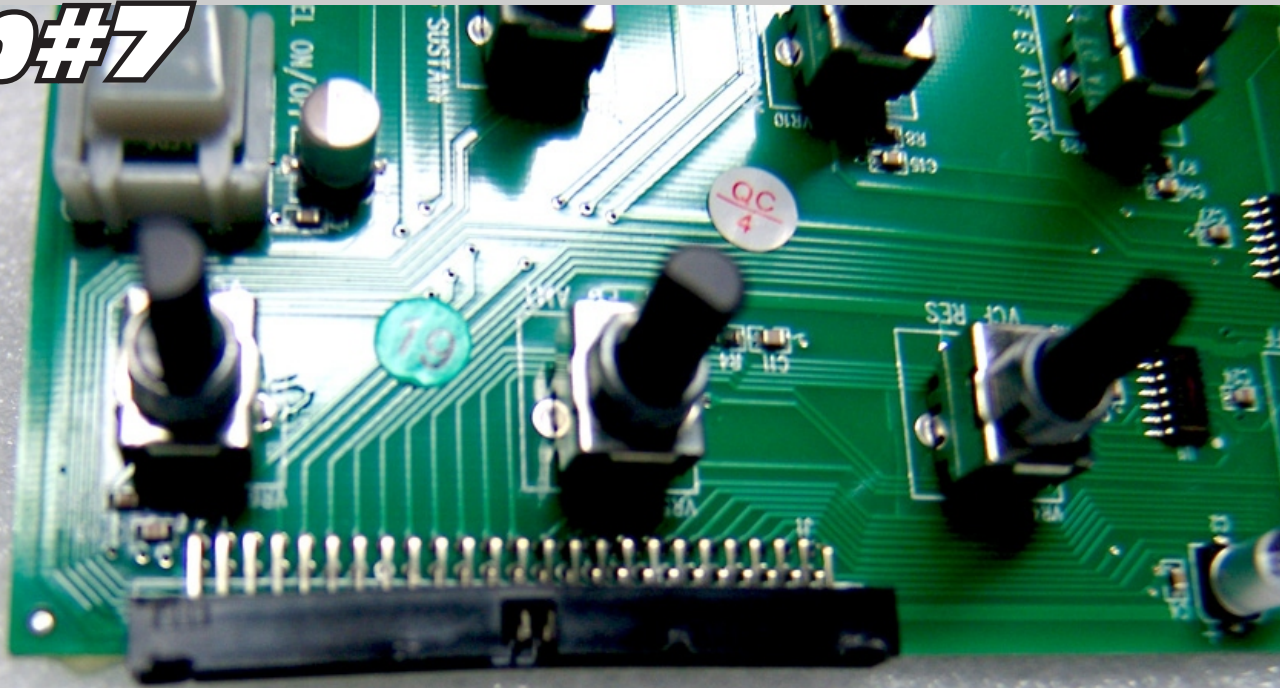
Think a few minutes of pain for many hours of pleasure. **Please be careful and take your time!**

You can use other methods, like a Dremel etc. And if you feel confident using those tools, then please do what feels best for you.



Keep the circuit board firmly secure and use even pressure and even strokes!

Step#7



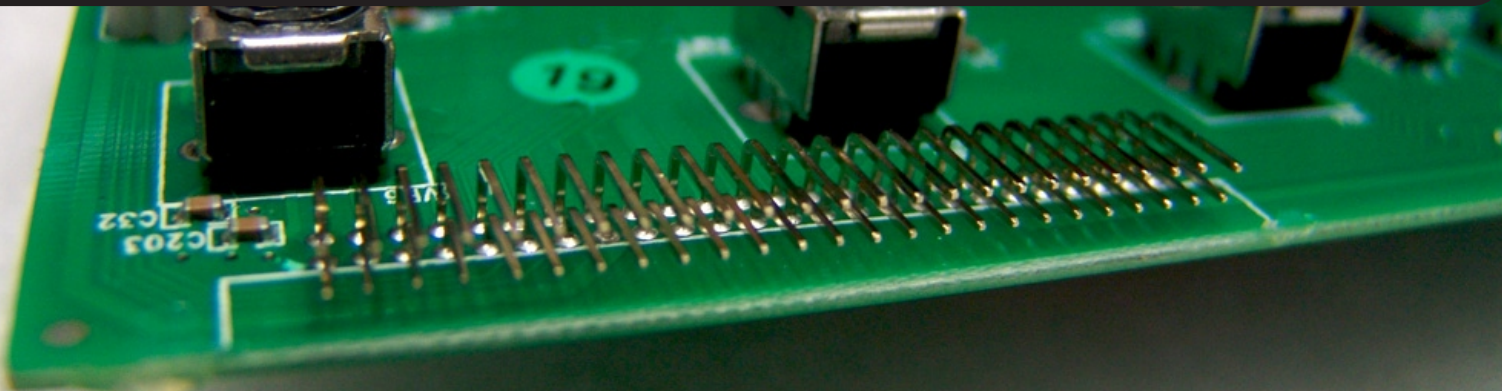
Now to the top of the board and the cable.

THIS STEP DEMANDS PATIENCE!!! Part of the pain I spoke of earlier. We need to slide off the black plastic shroud around the two rows of pins. This can be done **VERY** slowly by pulling each side back and forth. You can use a hair dryer to heat the plastic making it a little easier.

DO NOT USE TOOLS!!! You can easily slip and damage the circuit board.

On average with constant effort, this will take at least 30 minutes to accomplish. Go slow and don't give up. A little pain now for lots of pleasure later!

Some more recent versions this little guy flies right off, but older ones don't!



If you have test fit your front panel and circuit board and find you have plenty of room and don't need to do this step, then by all means, skip it! However, if you ever plan to sell your Minitaur to someone else, please realize they might have a 'tighter' rail set up than you and might experience problems with their fit.

DON'T LEAVE THE PINS EXPOSED LIKE THIS FOR VERY LONG!

They are **VERY** fragile in this state. Please reattach your ribbon cable. Make sure to attach the correct end of the cable and go very slow re-attaching to make sure not to bend any pins!

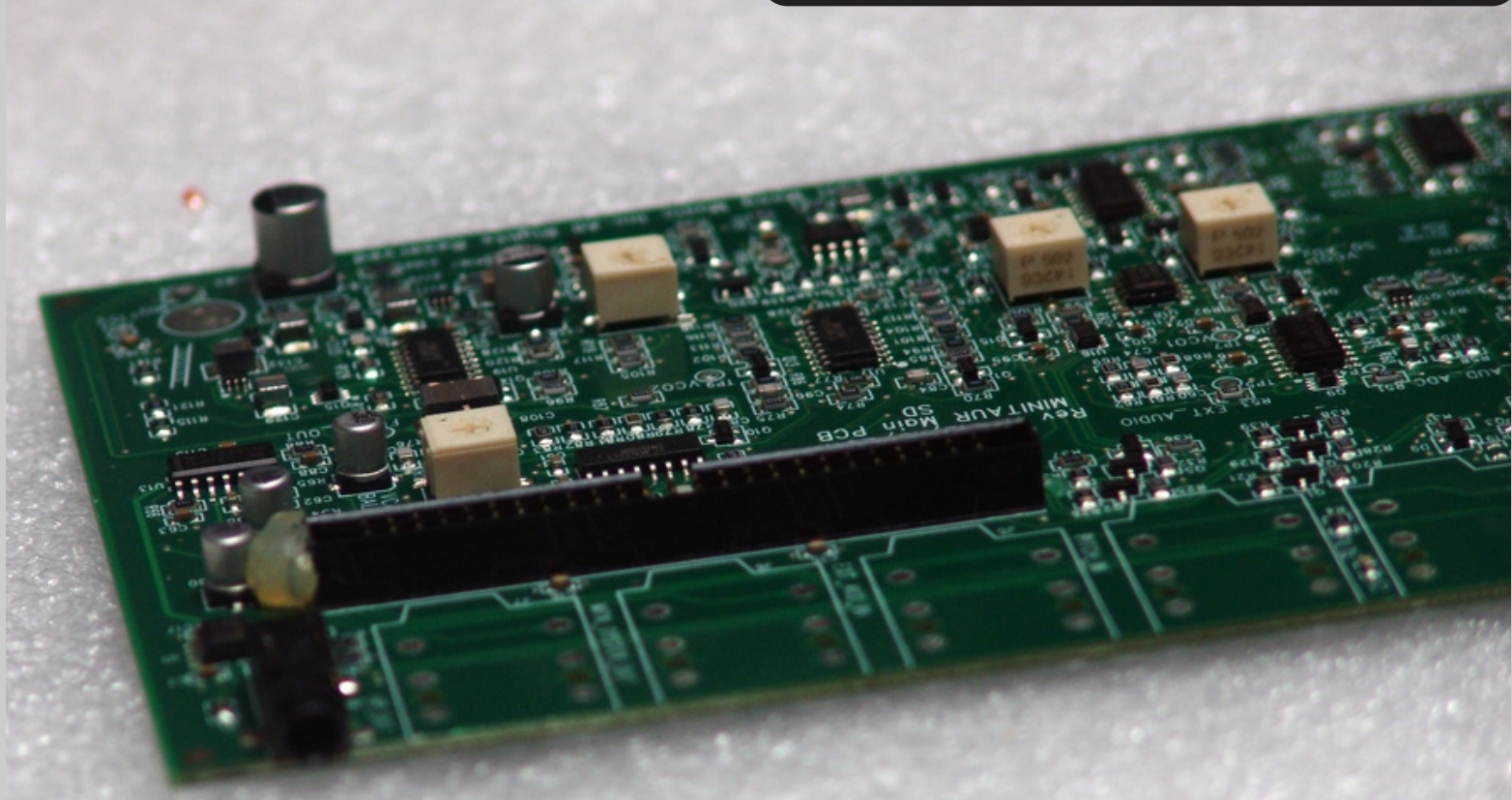
Step#8



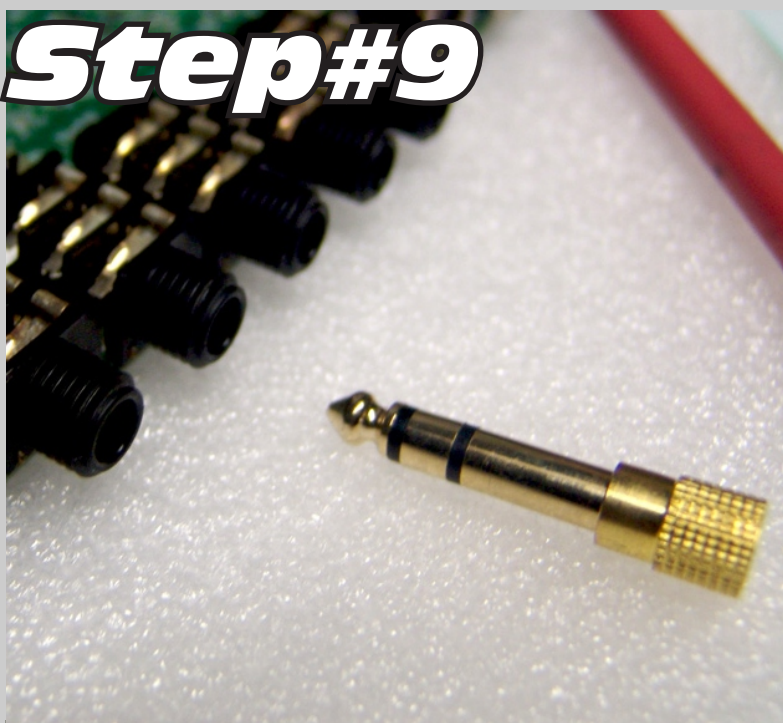
Ok, let's move to the back circuit board.

If you have a desoldering gun/iron please remove all quarter inch jacks and MIDI socket. Now you can skip to step 12.

If you don't have a desoldering gun/iron please go to the next step.



Step#9

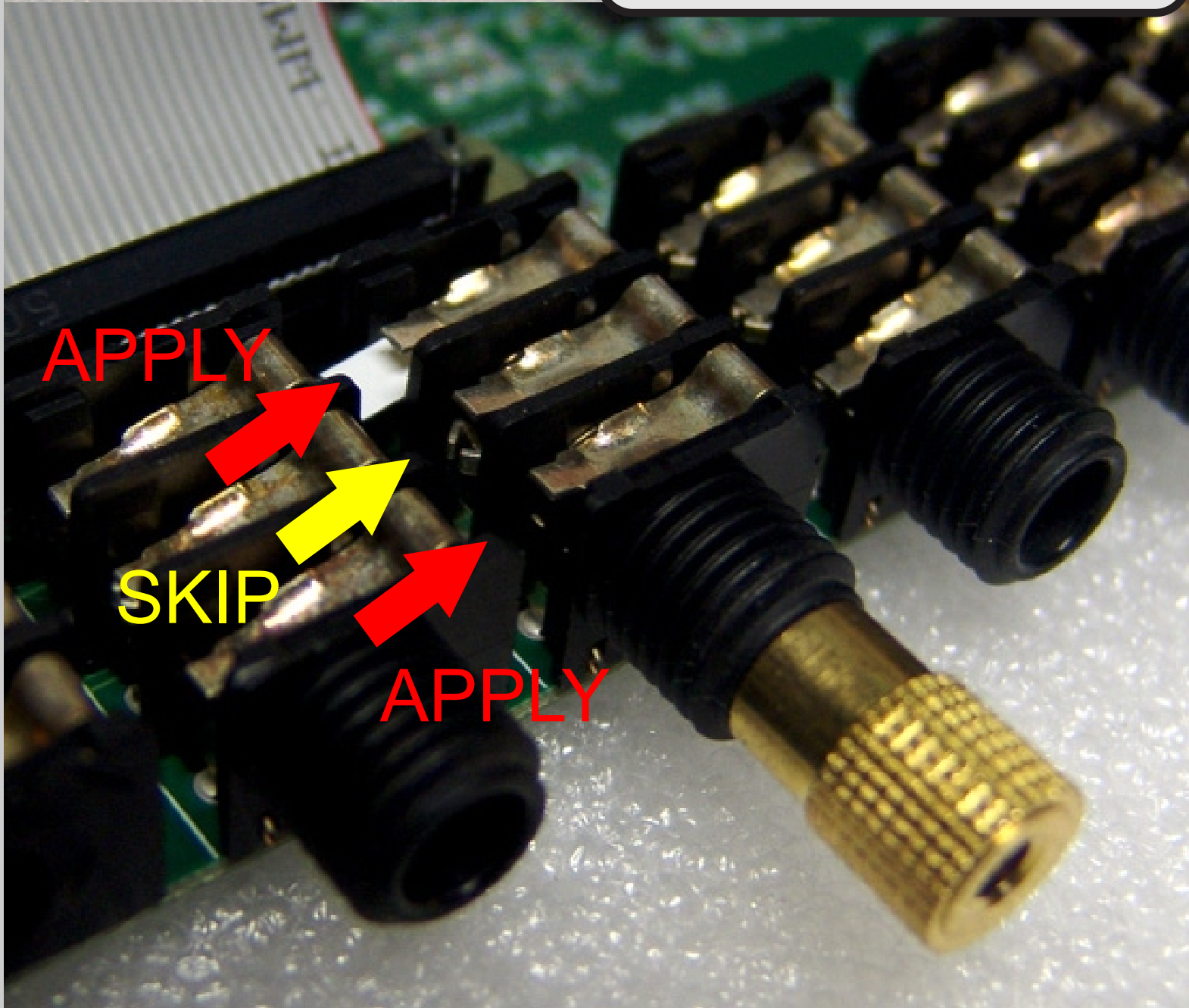


First we need to add the 'shorting' vinyl stickers. When no plug is inserted into the jack the metal fingers reach over and make connection to the other side. We will be removing these 'shorts' and then reattach them to our new jacks.

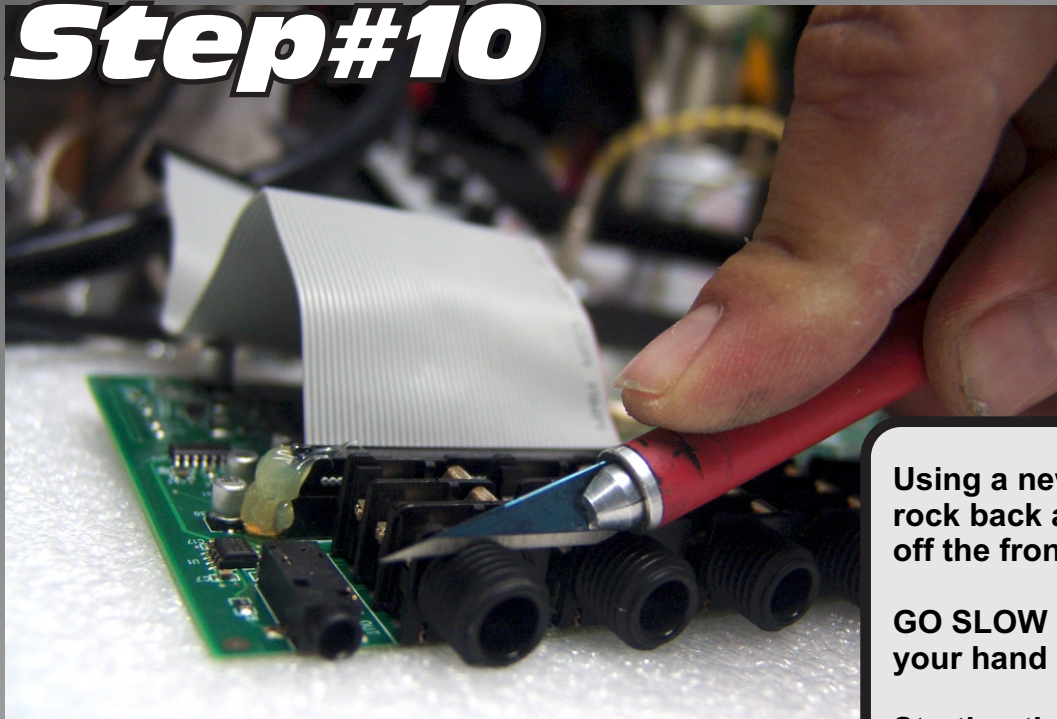
This is easier to do if you have any quarter inch plug. Stereo or mono it does not matter.

Insert the plug into the jack and watch the metal fingers lift up. This gives you easy room to slide in shorting vinyl stickers. There are 6 jacks and you have 12 stickers.

Please apply stickers to the front and back switches. Skip the ones in the middle!



Step#10

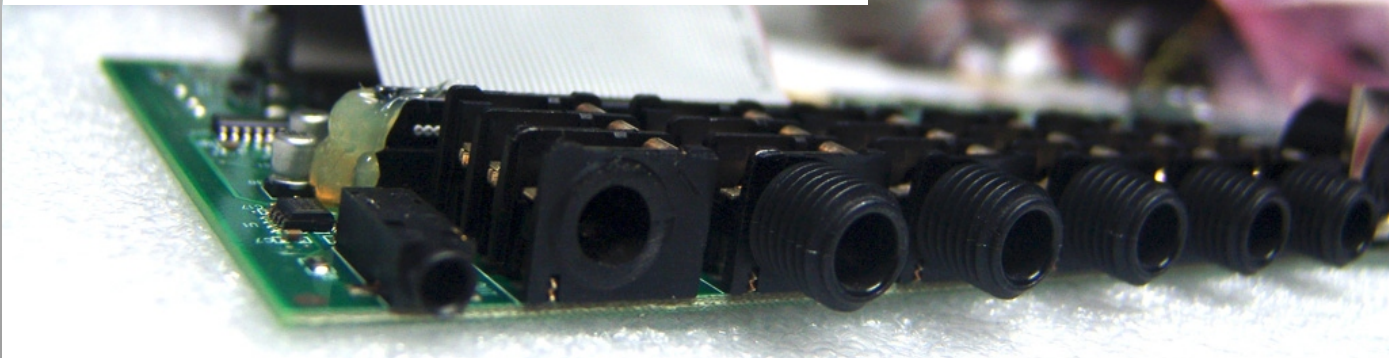
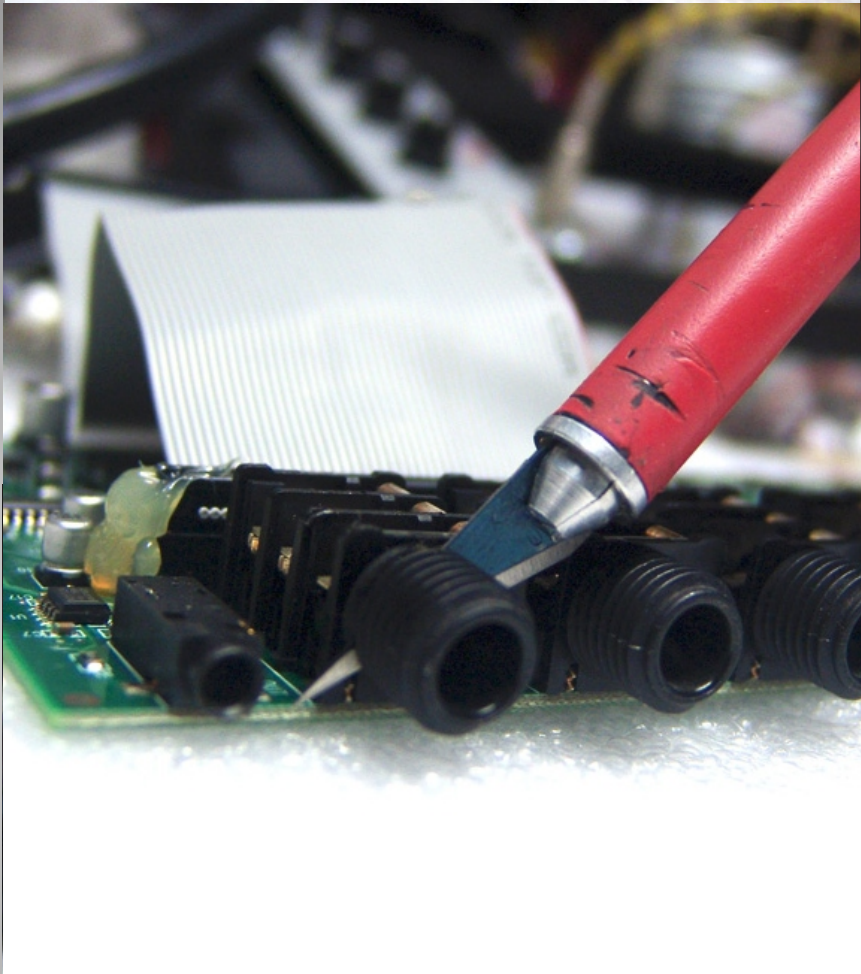


Using a new Xacto blade carefully rock back and forth cutting the threads off the front of each jack.

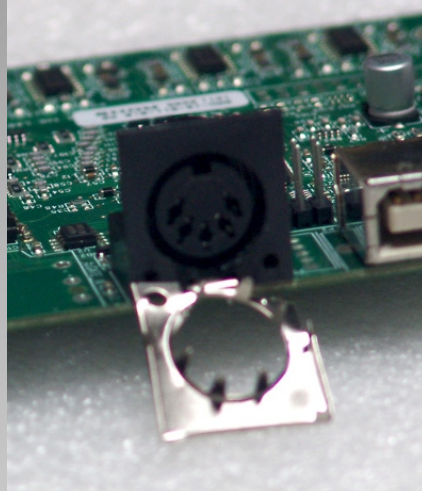
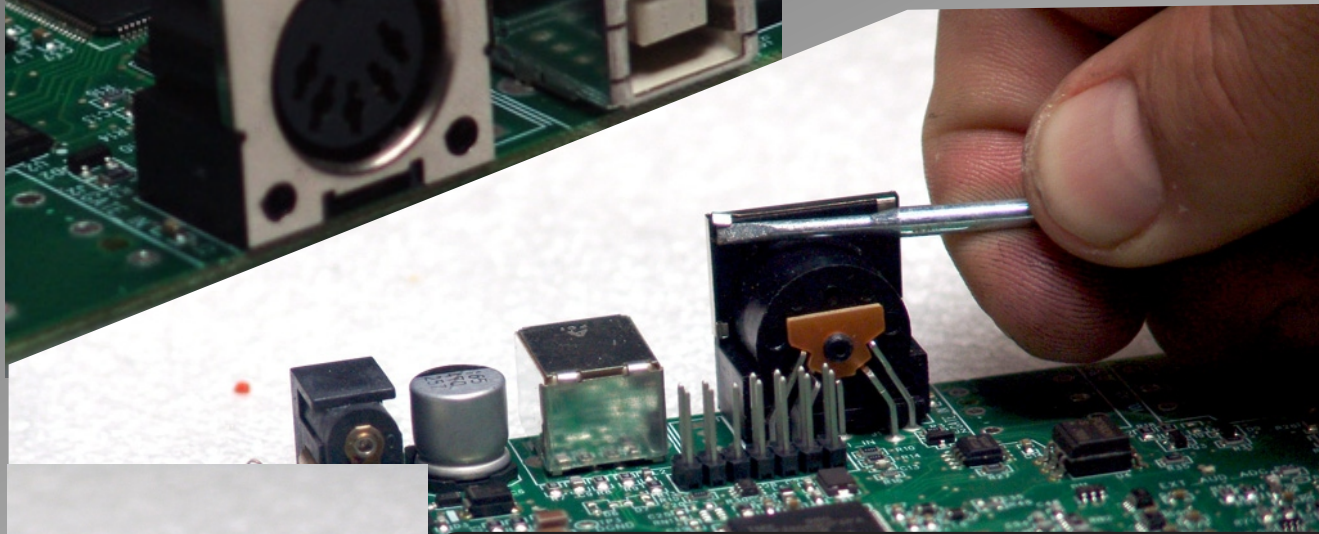
GO SLOW and for God's sake don't cut your hand off!

Starting the cut is the hardest, but once you are through the rest is easier.

The jacks stick out too far and need to be shortened.



Step#11

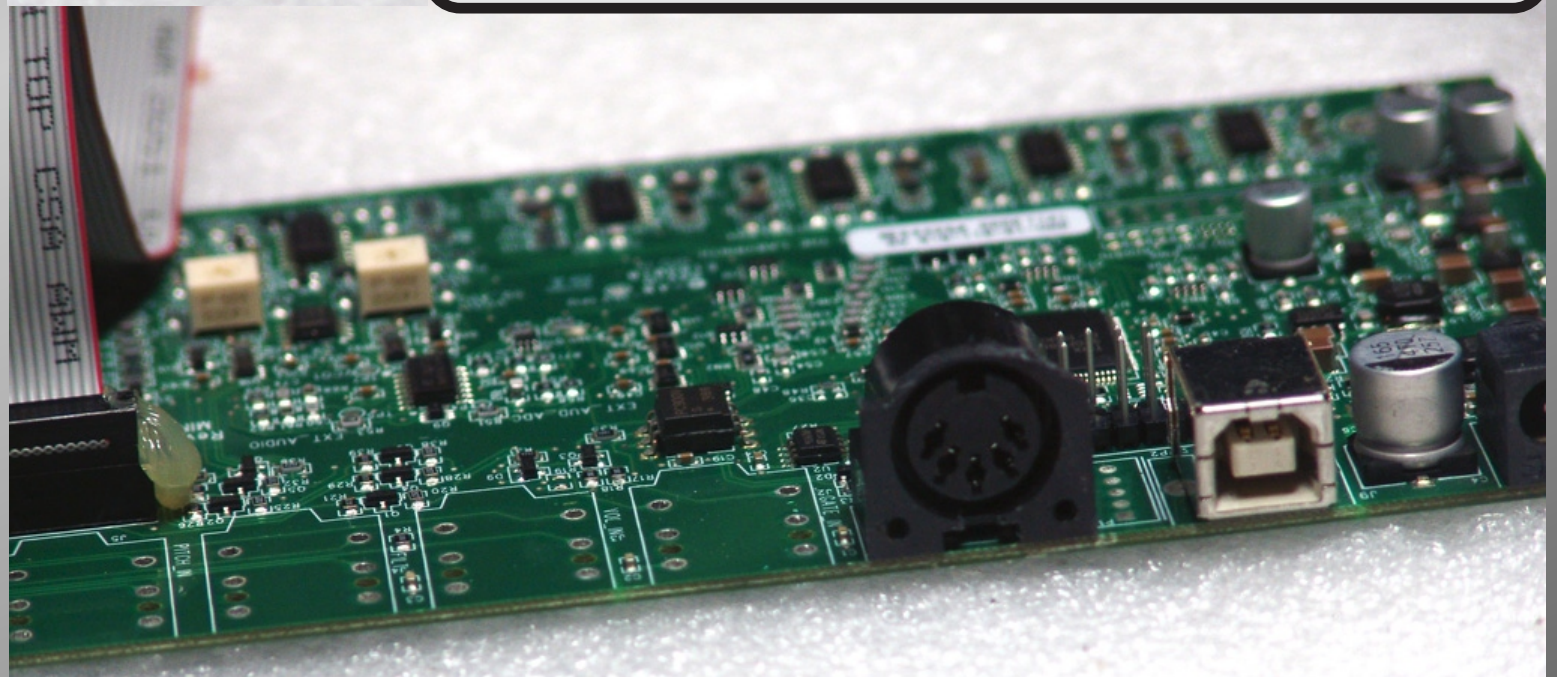


The MIDI jack itself can stay, but the top part sits up too high and we want to be as 'skiff friendly' as possible, so the top plastic part of the jack needs to be clipped down.

Carefully remove the metal shroud, by bending it back and forth until it snaps off. Then use a set of wire clippers and make several cuts and round off the top so it looks similar to the pic below.

Obviously I used my de-soldering gun to remove the jacks as pictured. Yours will still be there and that is ok.

Congrats, the back is done, let's move back to the front.



Step#12

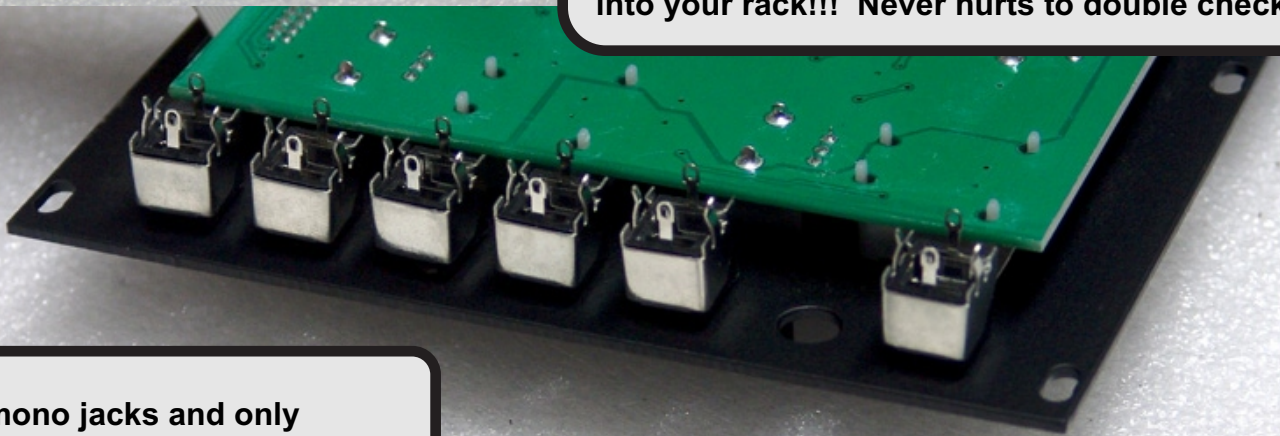


Take your new front panel and attach the front circuit board. I designed all of potentiometer holes and jack holes with extra room around them. This is done so you can get the best overall fit. Each of these seem to be just so slightly different, so I hope to have given all of us enough fudge factor.

The best plan seems to get the square buttons to align as best as possible and then using a socket, cinch the nuts down.

MAKE SURE NOT TO CROSSTHREAD THEM!
It is very easy to do and can destroy the threads.

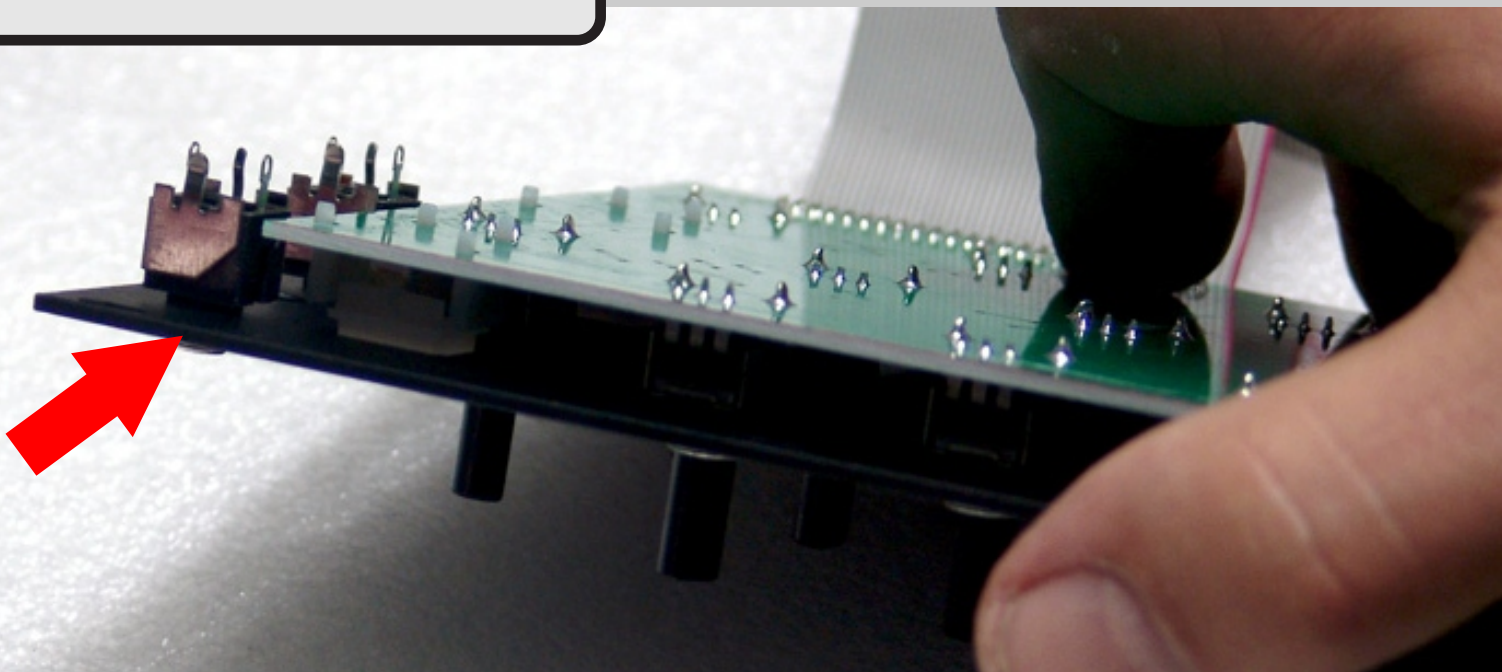
Now is a great time to double check your fit into your rack!!! Never hurts to double check!



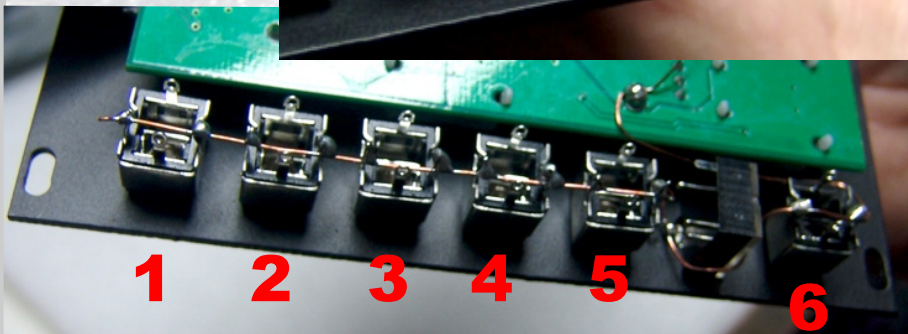
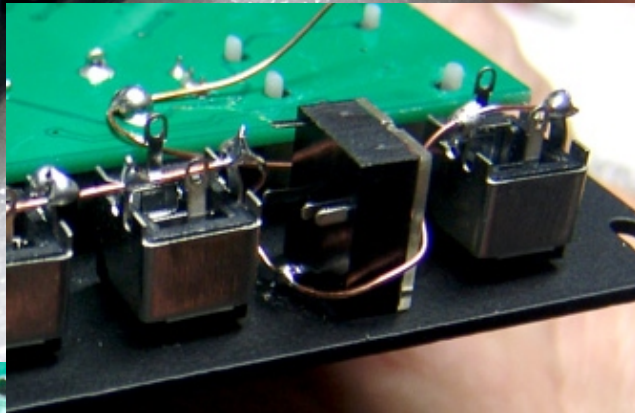
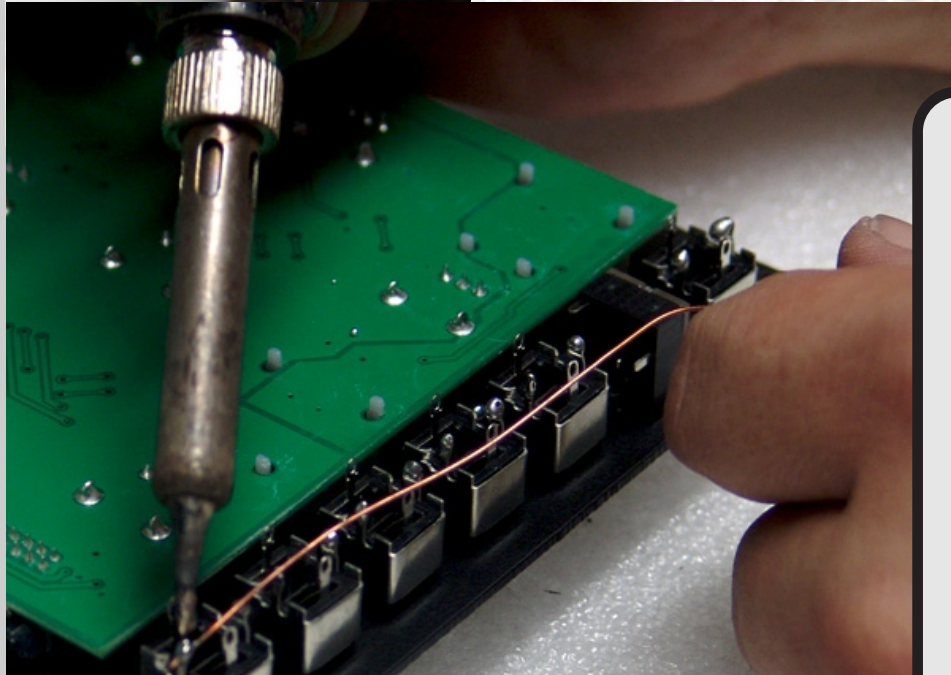
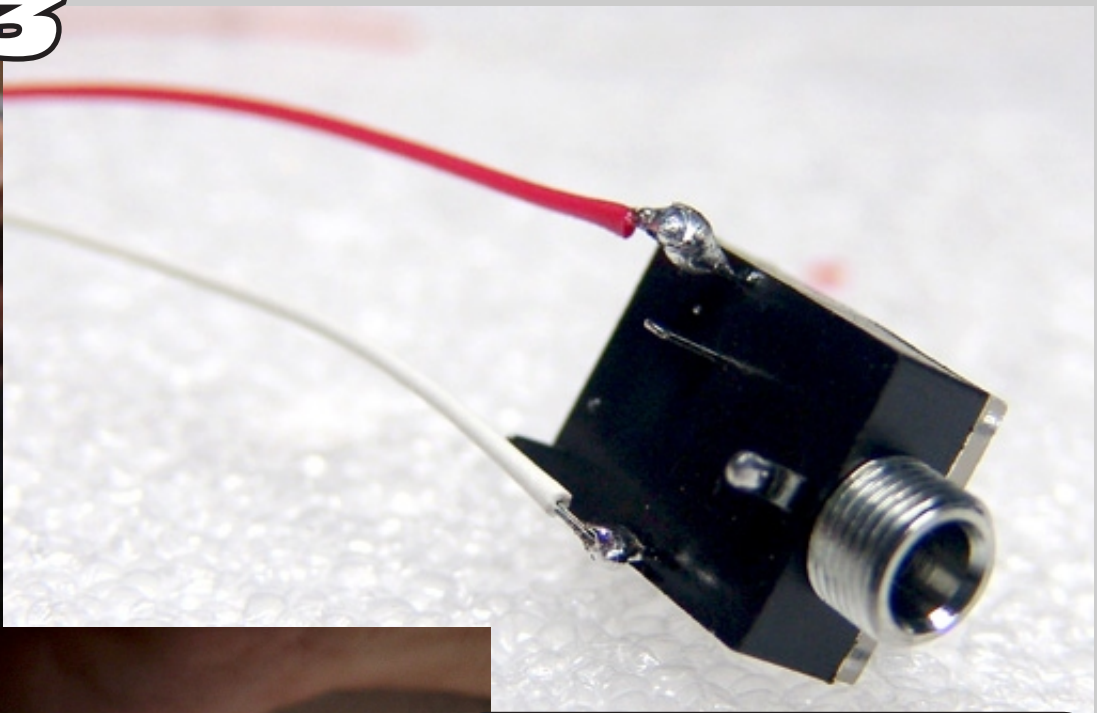
Insert the 6 mono jacks and only tighten the nut by hand.

Beware to how they are orientated!
It makes a difference!

Have the black notch pointing inward towards the circuit board.



Step#13



Onto the soldering! Probably easier to solder the red and white wires to the headphone jack before inserting it. Also don't forget to add solder to the ground post too! You will need it in a minute. Solder each color wire exactly as you see in the above pic.

RED/RIGHT/RING is how I always remember it. White is the tip.

Go ahead and get some solder on all of the ground legs of the mono jacks.

Now solder one end of the bare copper wire that is included.

Start by soldering the first ground leg of the first jack. Then skip ahead to jack number 5 and solder the ground wire to it. Keep slight tension when doing so, now you can go back and solder the ground legs on jacks 1-5.

Now bend the copper wire down to the ground leg of the headphone jack and solder it. Bring the wire back up and solder it to the last mono jack's ground legs.

Now bring it around and solder it to the ground leg of the 'glide pot' on the circuit board.

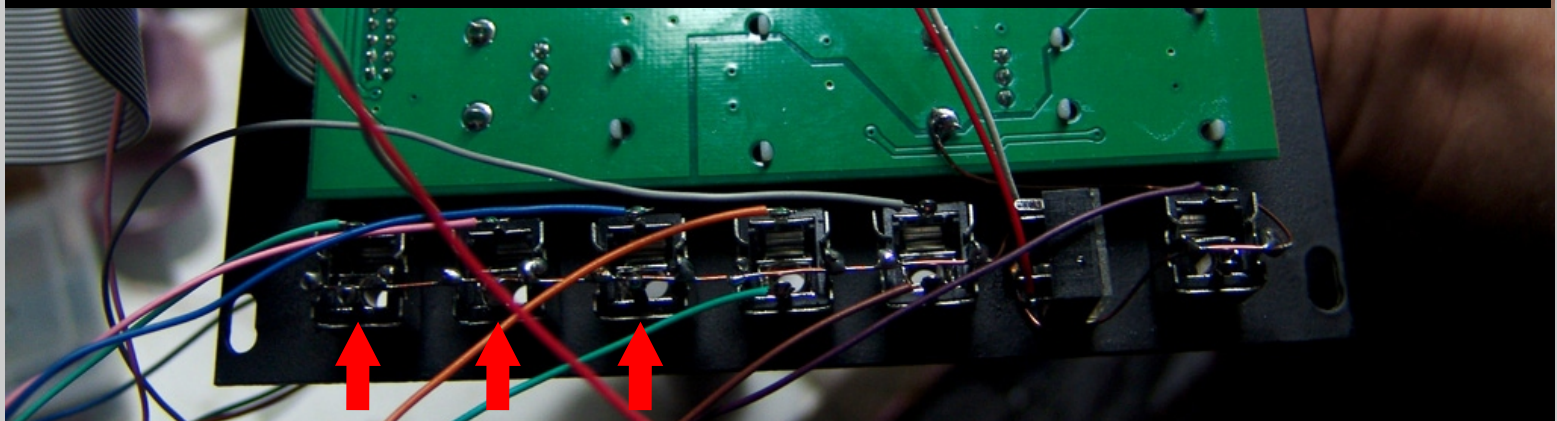
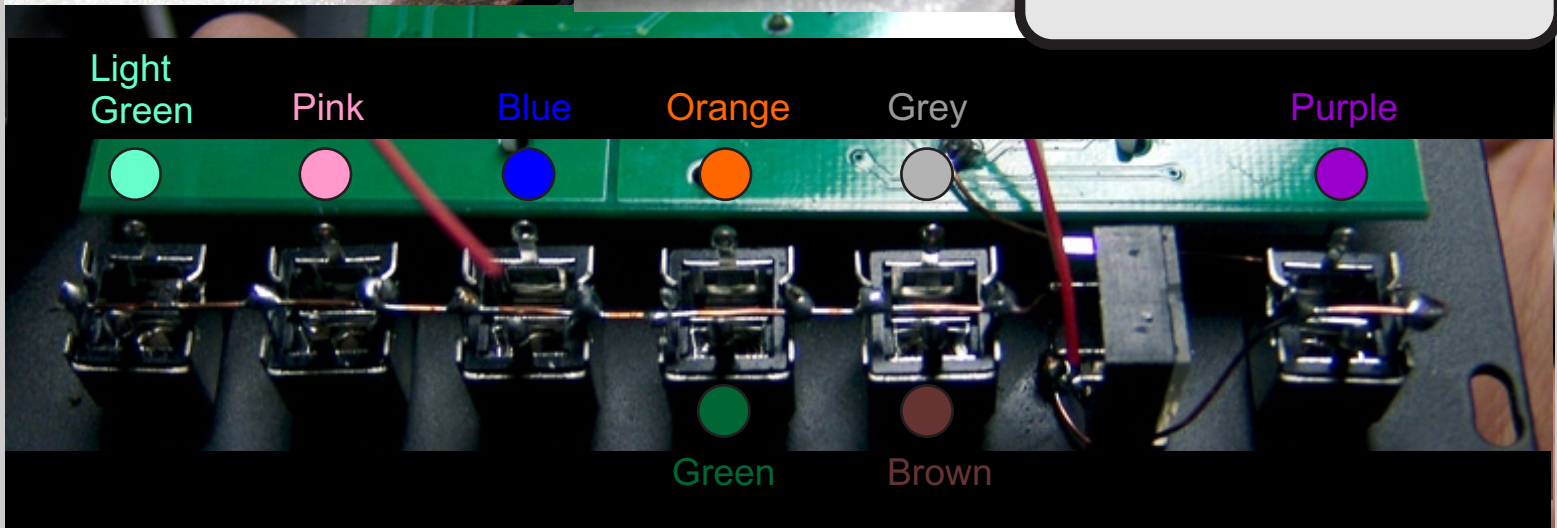
Step#14



Align the jacks and then tighten them down. If some are out of alignment, then gently nudge them back into place and tighten them down. This is easier to do now that you have the copper ground wire holding all of them.

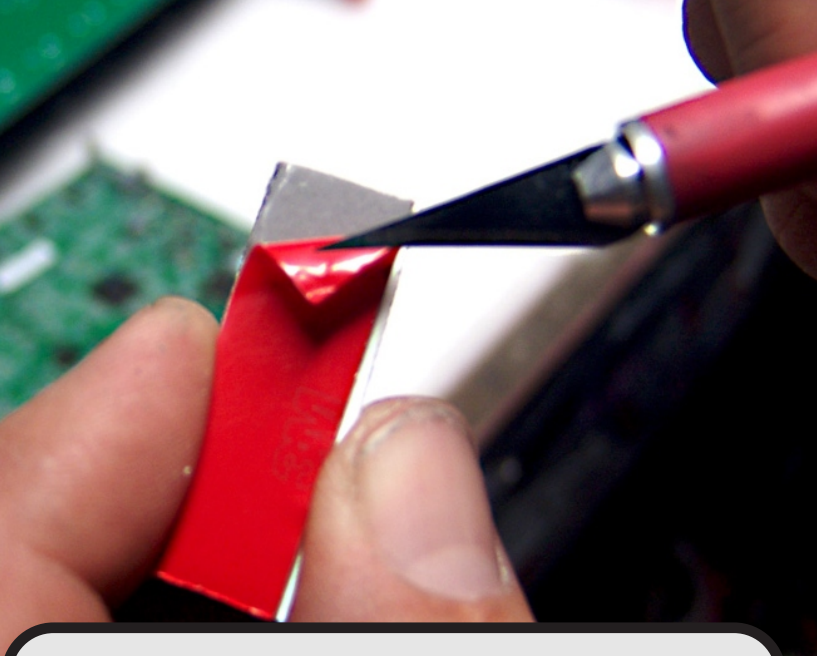
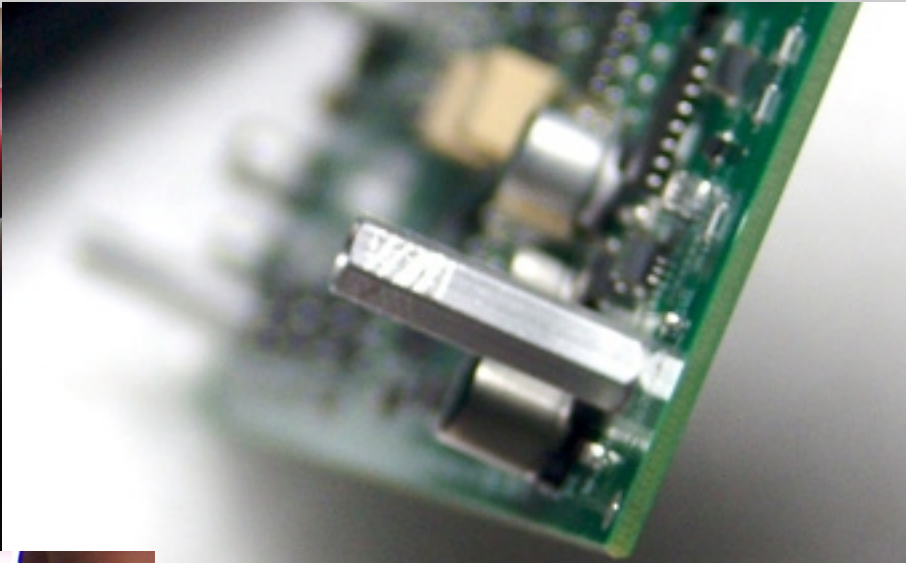
After tightening them down, make sure the jacks have not spun slightly behind the panel. If they have, straighten them back.

Prep the rest of the wires by trimming back the wire's plastic insulation and solder them by color to the posts



When there is no plug inserted to the top three jacks, their connections must be forced to ground. To do this, bend the tabs on the other side inward toward the ground wire and solder them directly to the ground wire.

Step#15



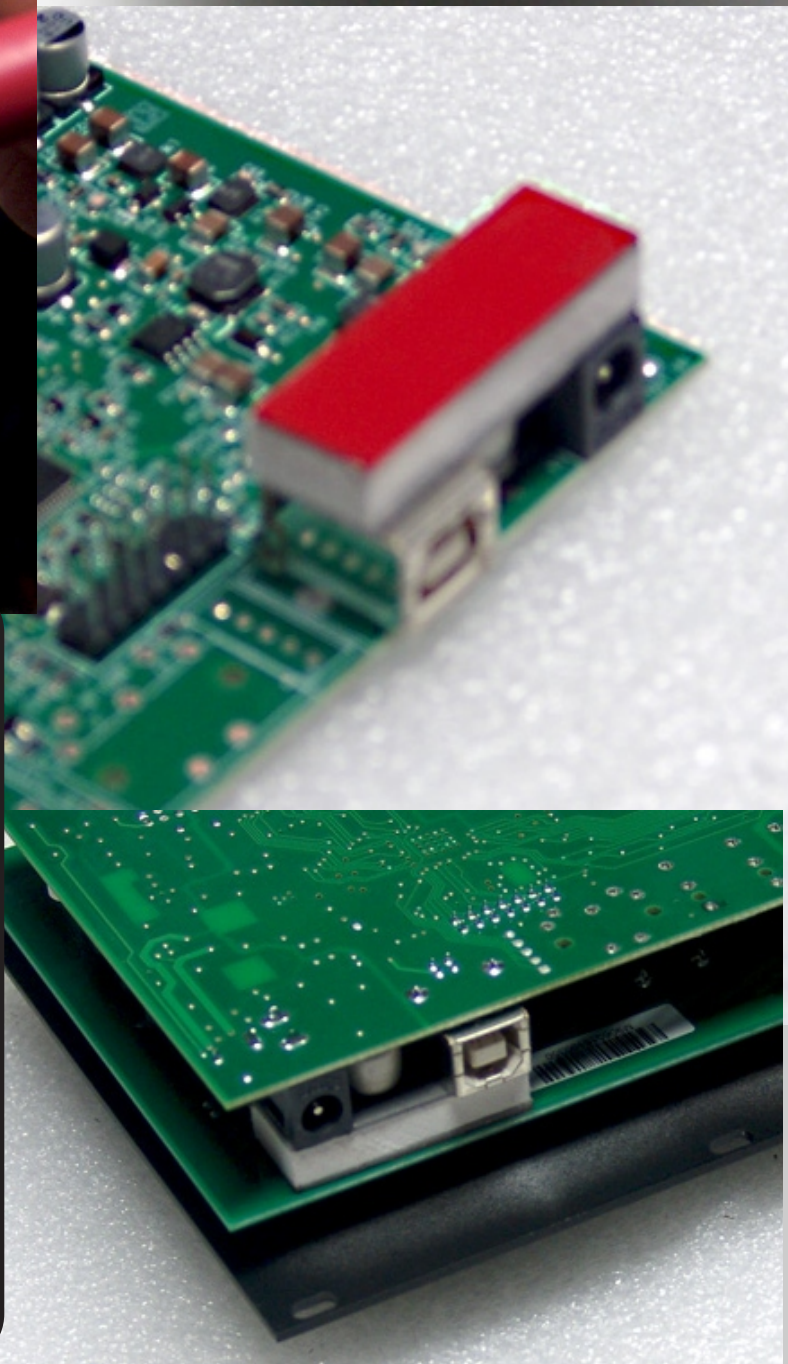
Find both aluminum standoff's and score one of the ends on both. Make sure to score them several times from different directions. Using the supplied screws, mount them into the only two mounting holes on the back circuit board, so that the scored ends of the standoff's are pointing away from the circuit board, as pictured above.

Peel one side of the backing away from the adhesive block and firmly press onto the USB and power connector.

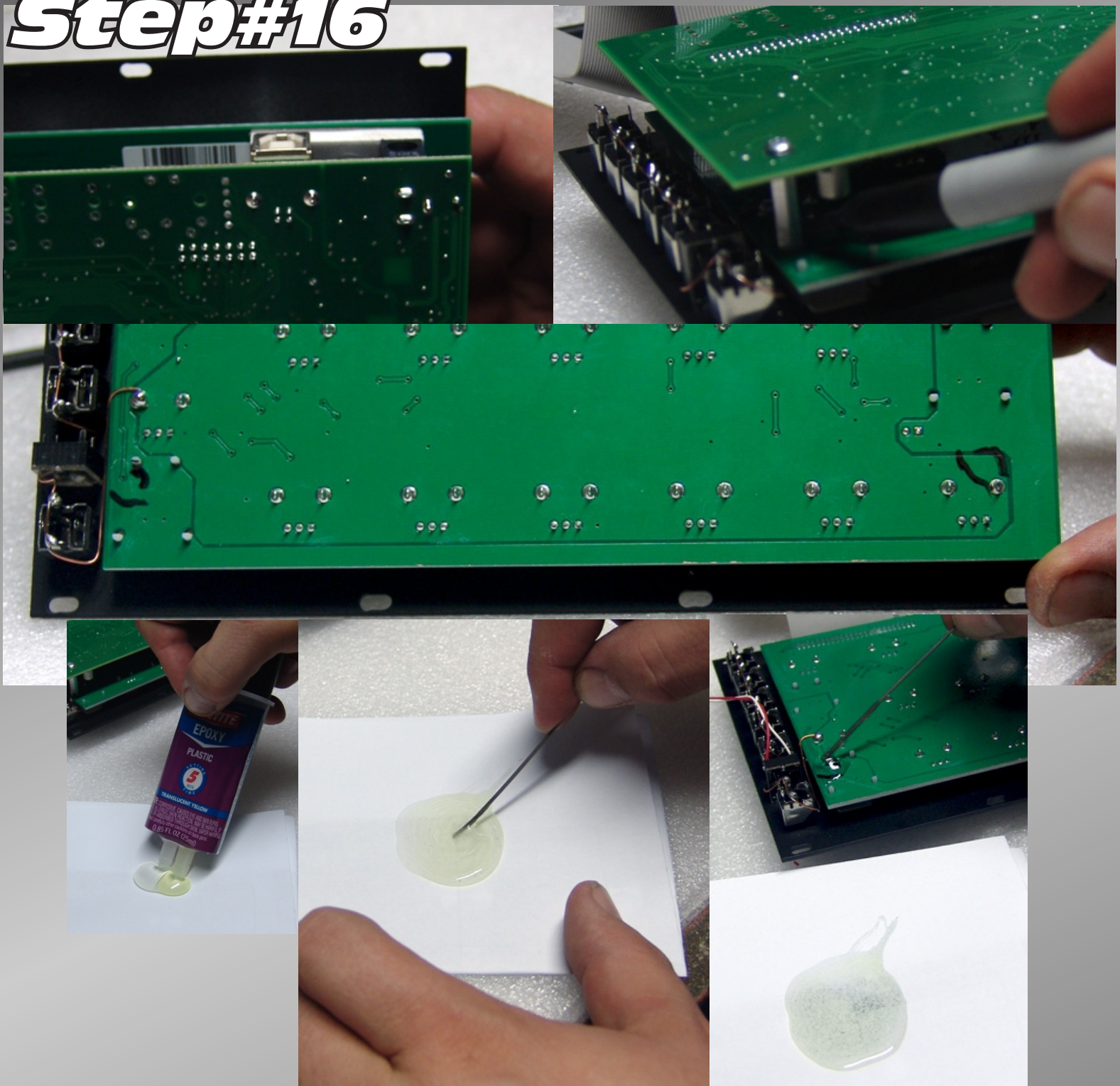
DON'T PEEL BOTH SIDES, just one for now!

Flip the circuit board over and rest it and check to make sure it is sitting level on the front circuit board.

WE ARE JUST TEST FITTING IT NOW!



Step#16



We are now going to glue the standoff's in place. To do this we need to keep checking the alignment of the circuit boards. We can use the top right corner to check this. With the circuit boards resting in place we can use a Sharpie or marker and roughly mark the position of where the standoff's are. See the above pic of where your marks should be.

Prep the two part epoxy with a small stick and make sure both parts are equally mixed. Apply some to the area where you have your marks.

Apply some to the ends of the standoff's and then rest them back into place.

DOUBLE CHECK YOUR ALIGNMENT and Adjust if necessary!

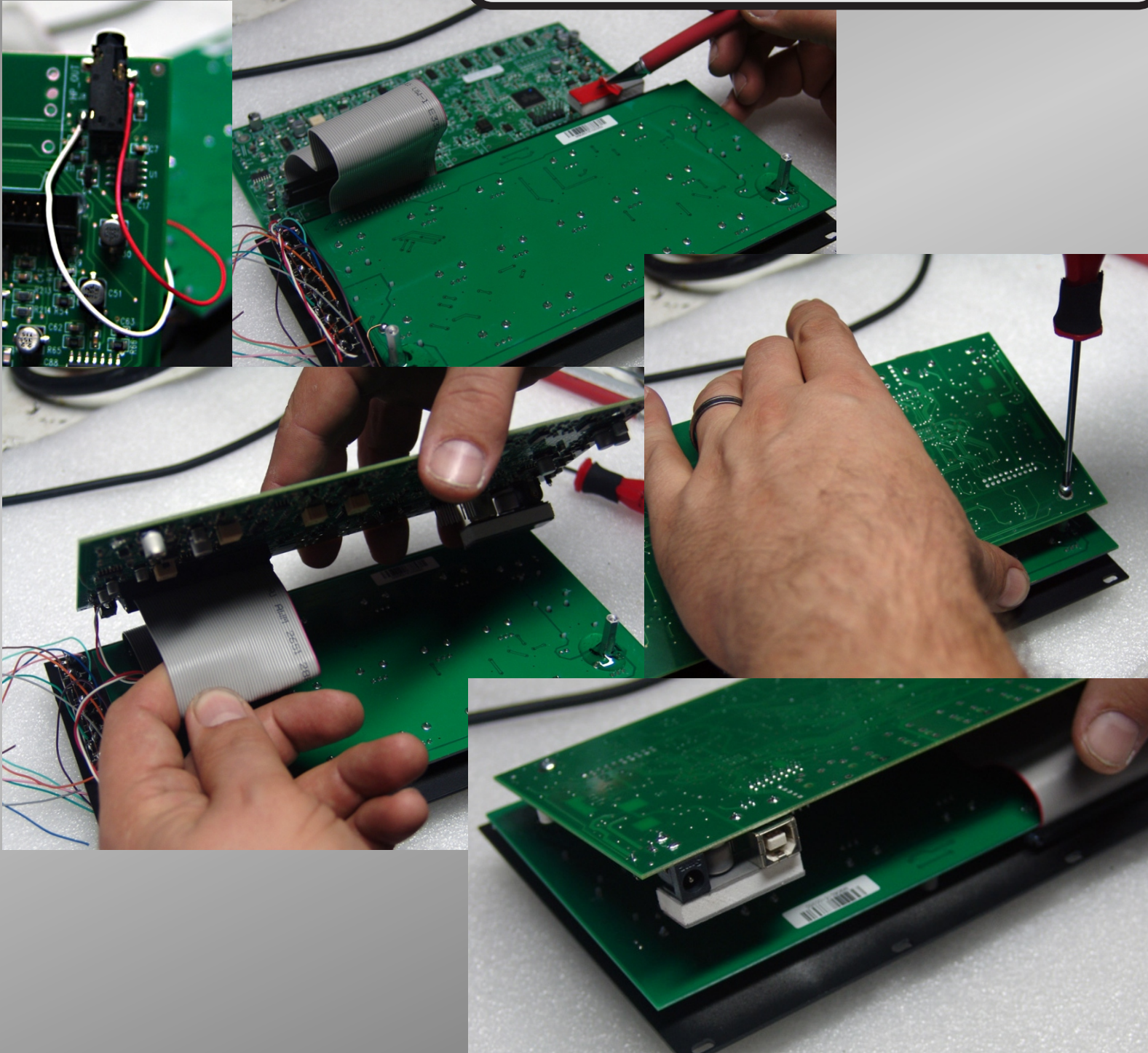
Leave it alone for one hour! Sixty minutes should be plenty of time to let epoxy set up.

Step#17

Unscrew the screws and place the bottom circuit board to the side. Now prep the other ends of the red and white wires and solder them to the headphone jack as pictured.

Place the bottom circuit board just above the top circuit board, as pictured below. You can now remove the other carrier sheet from the adhesive block.

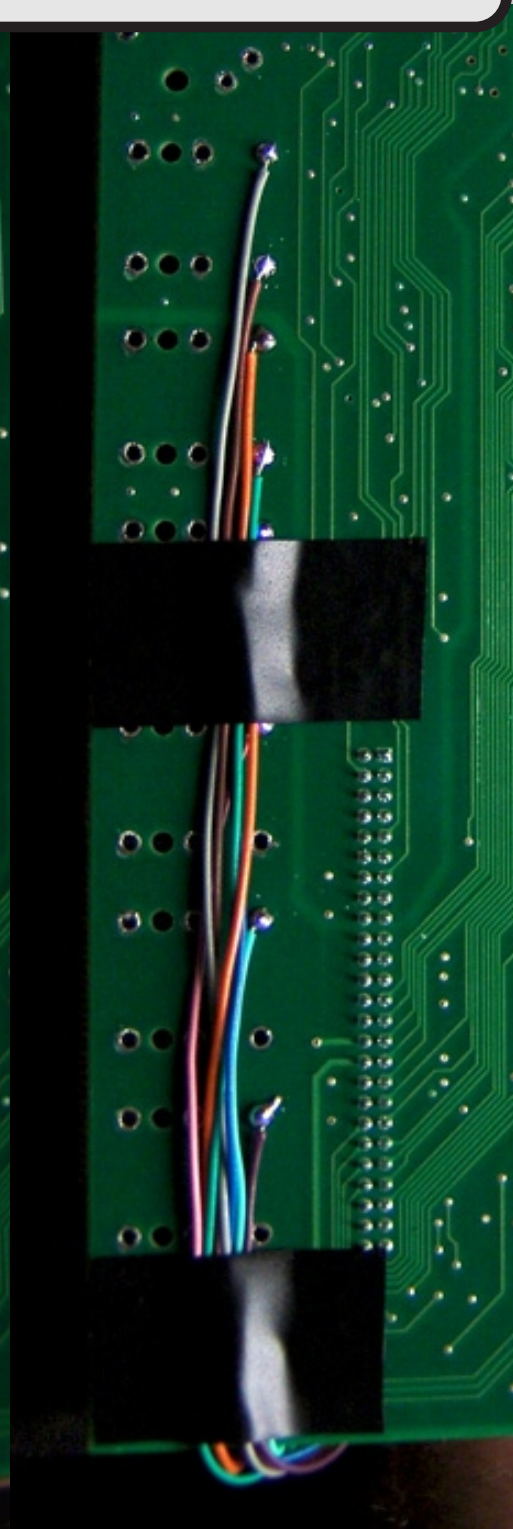
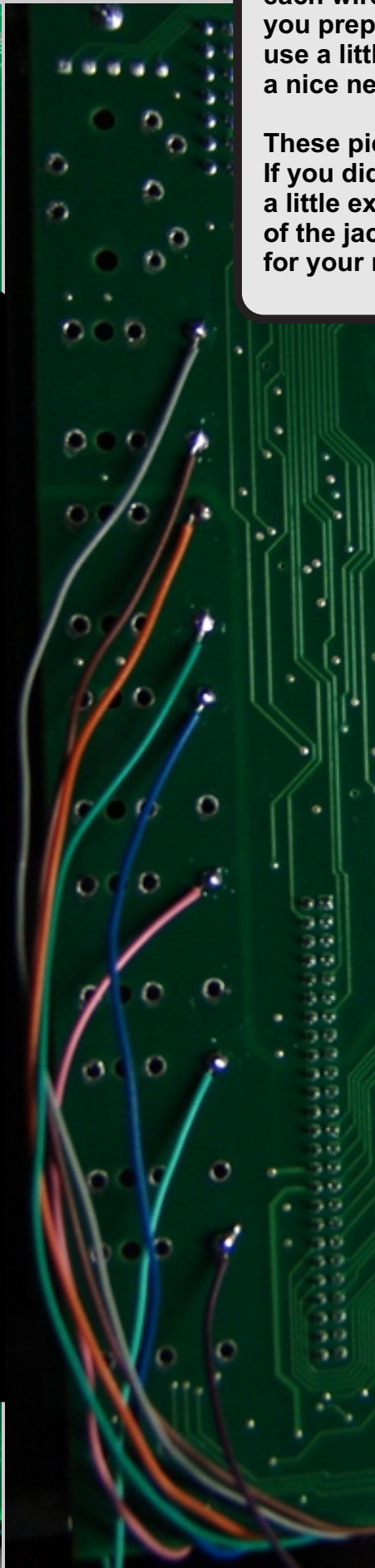
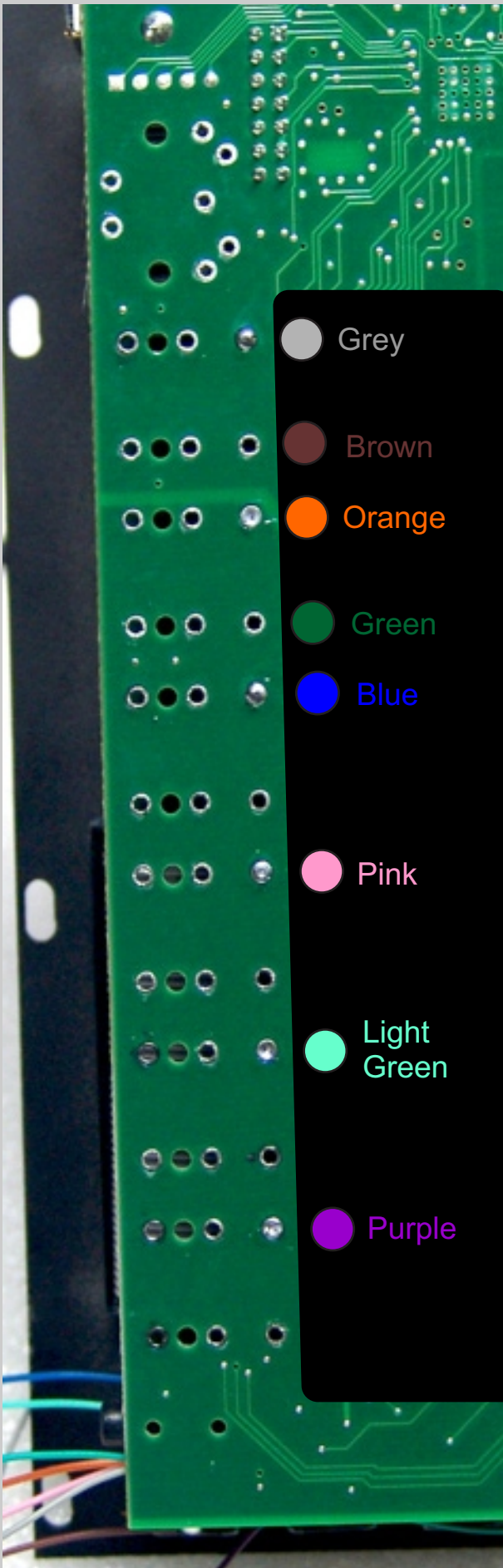
Carefully move the ribbon cable and tuck it between the boards. Hold the bottom board at an angle so the adhesive DOES NOT make contact yet. Now insert and rotate the screws a few times to just get them started. With both screws started you can now fully seat the board on top of the adhesive block.



Step#18

Time to solder the wires from the jacks. If you work from the corner and measure each wire and trim accordingly before you prep the wire with solder, you can use a little electrical tape and make a nice neat bundle out of them.

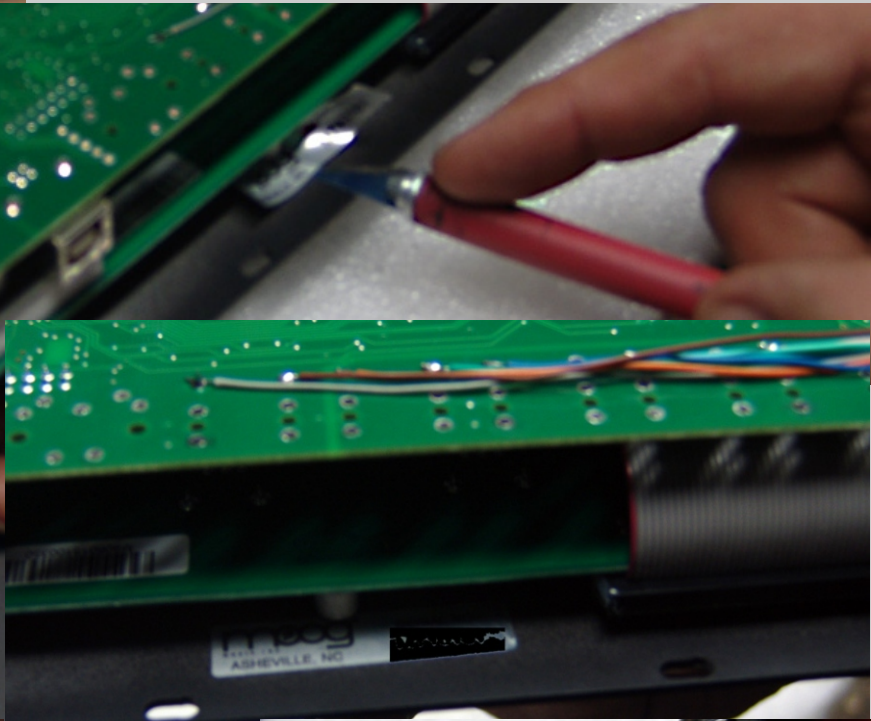
These pics show the jacks removed. If you did not remove them, then just use a little extra solder and prep the posts of the jacks. This will get them ready for your newly soldered wires.



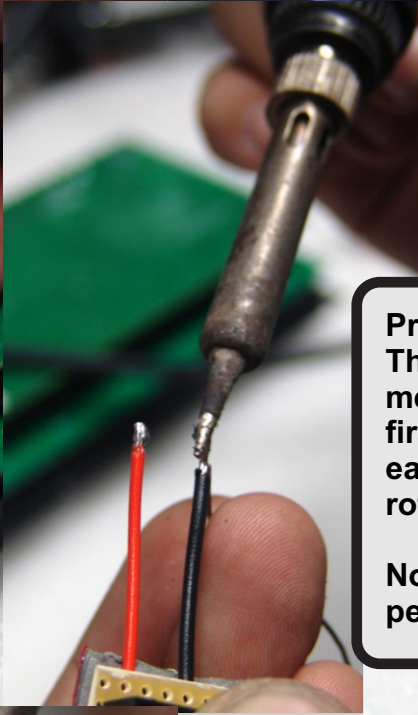
Step#19



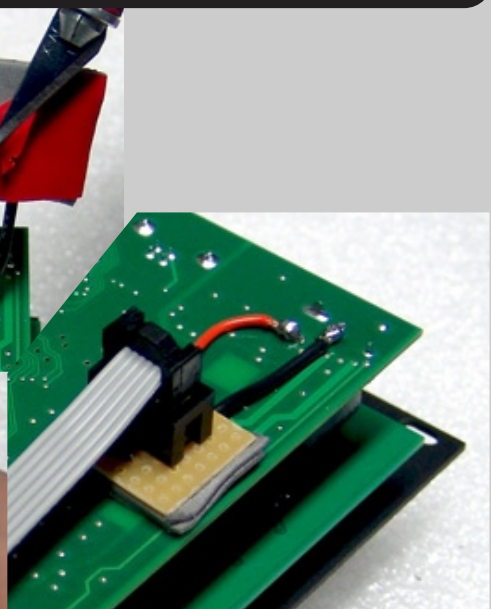
Carefully remove the serial number sticker from the bottom shell. The sticker is a metal foil, so please don't apply to the circuit board. Apply it at the top on the panel as pictured below. Sometimes the sticker will get ruined trying to remove it. Please use the new one included in the kit. Or use both!



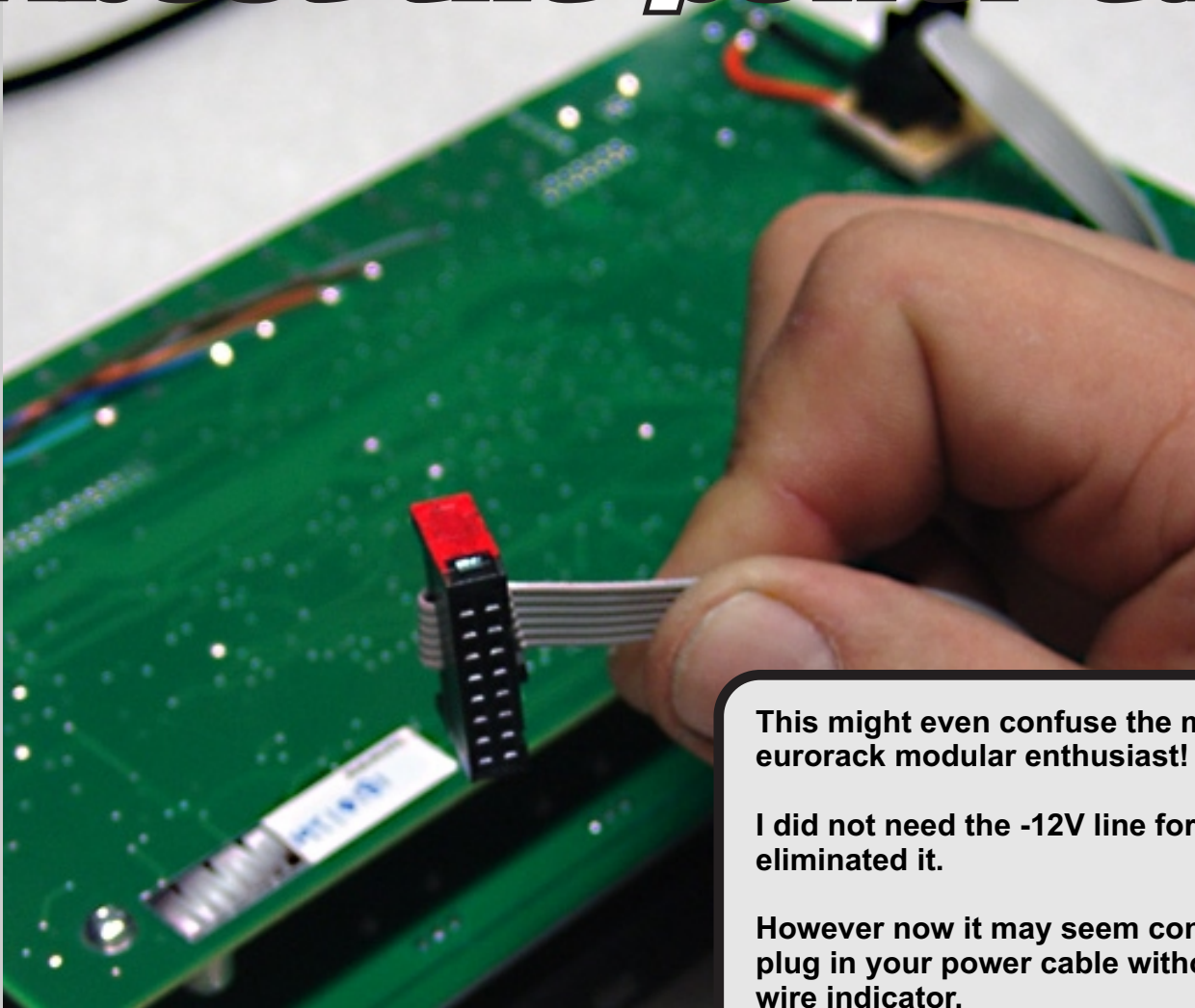
Prep the power block wires with solder. Then add some solder to the existing metal tabs. Then solder the orange one first by holding it to the side, making it easier and a better connection. Then rotate slightly and solder the black one.



Now remove carrier sheet and permanently affix. Install power cable.



About the power cable!



This might even confuse the more experienced eurorack modular enthusiast!

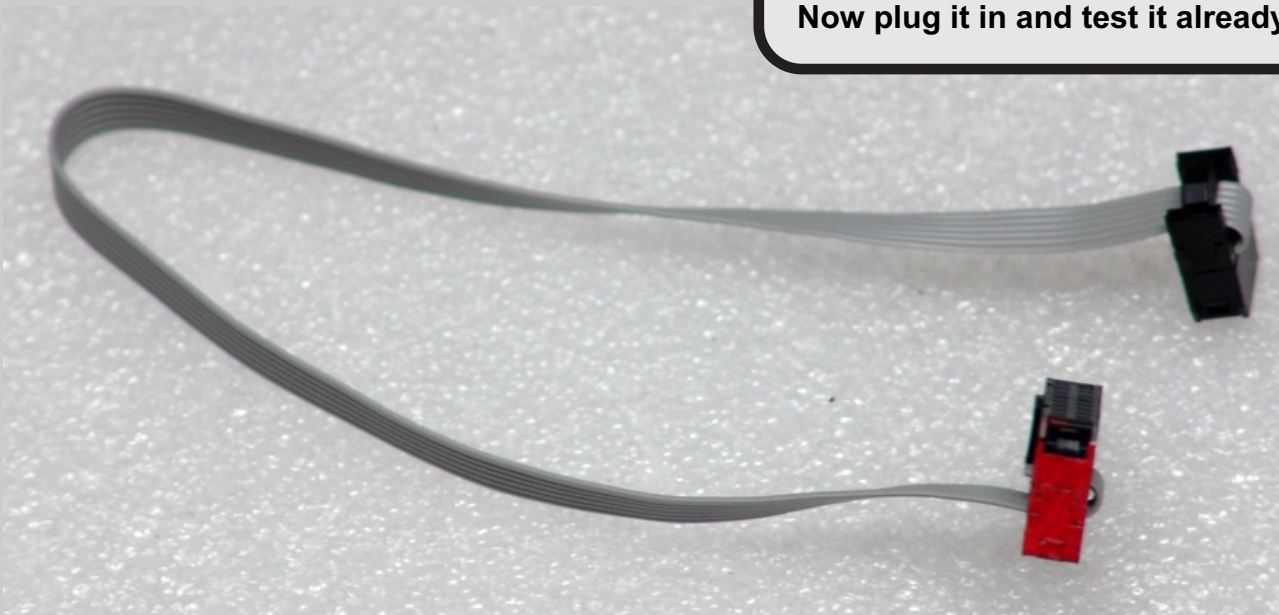
I did not need the -12V line for this mod, so I eliminated it.

However now it may seem confusing on how to plug in your power cable without the usual red wire indicator.

I have painted the -12V end of the power connector RED to indicate how to insert.

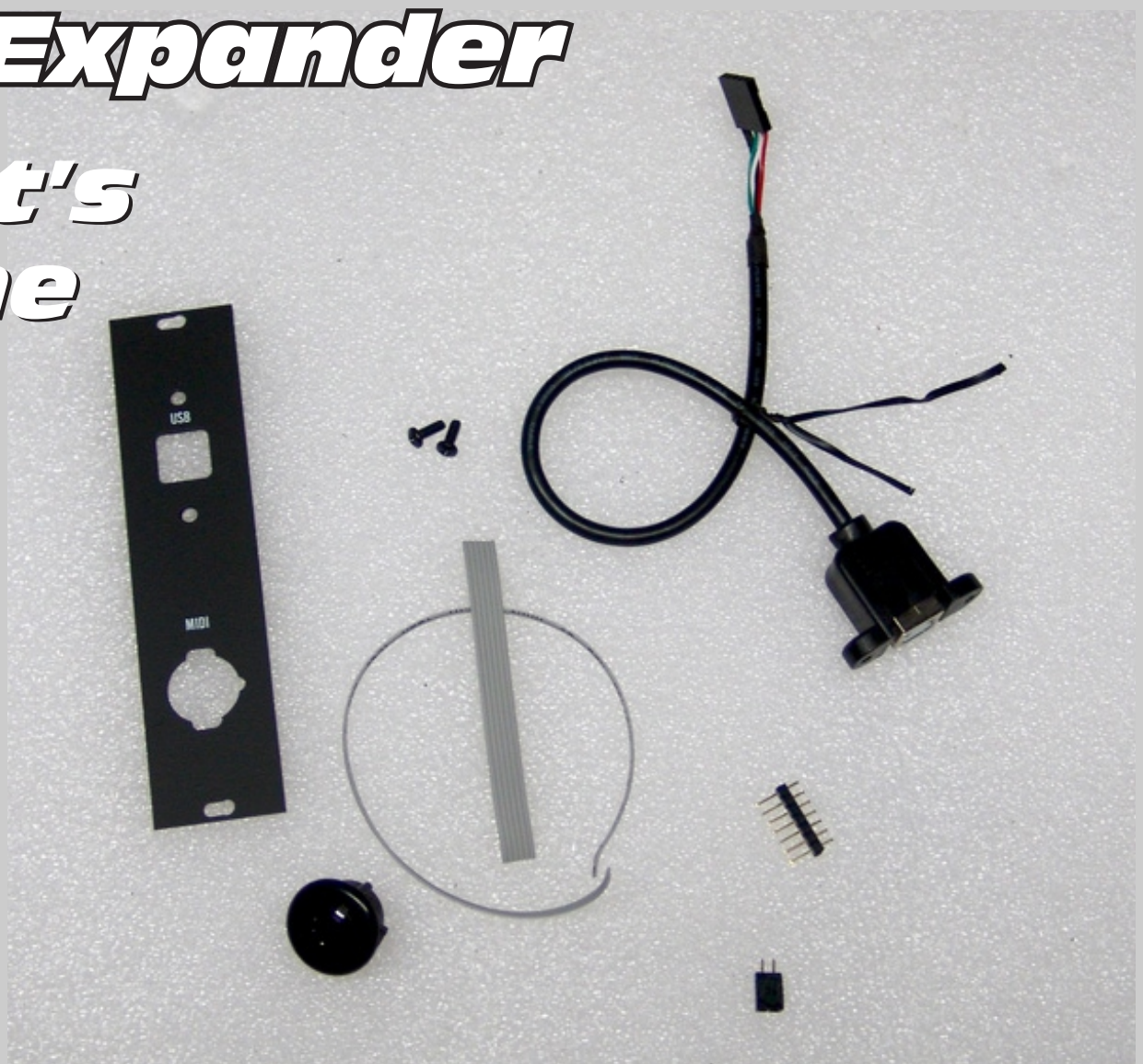
This cable is proprietary to this kit, on purpose! So you can't get it confused with your other module cables.

Now plug it in and test it already!



The Expander

What's in the Kit?



- Panel
- USB cable
- 6 pin ribbon cable
- 2 pin ribbon cable
- MIDI Jack
- 7 pin header
- 2 pin female header
- Twist Tie
- Screws

Tools you need:

- X-acto Knife
- Phillips Screw Driver
- Soldering Iron
- Rosin core solder
- Wire cutters
- Electrical Tape

Optional:

- Helping hands
- Hot Glue

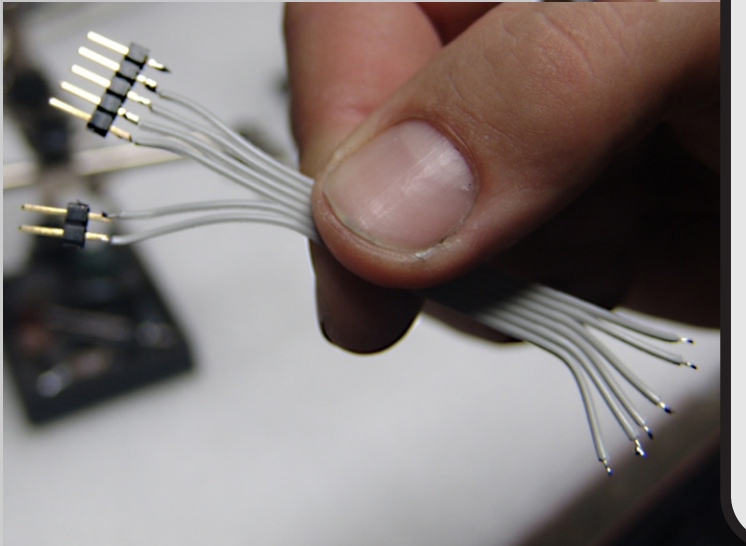
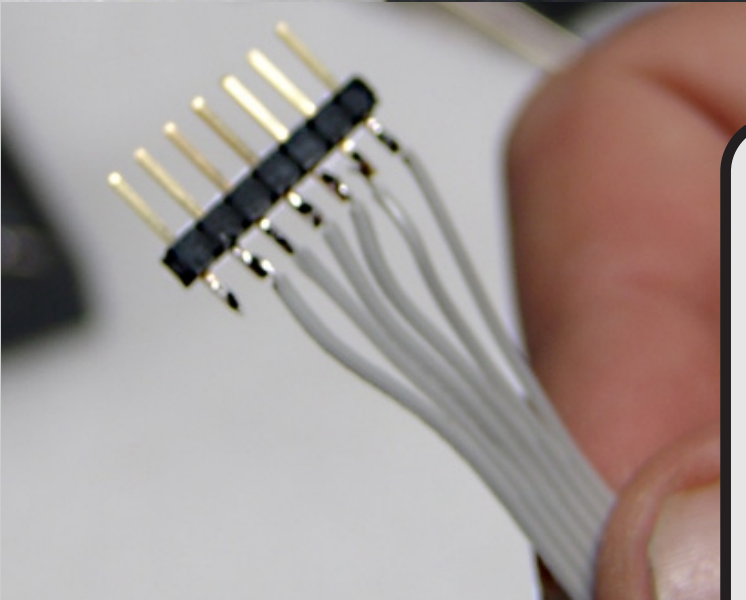
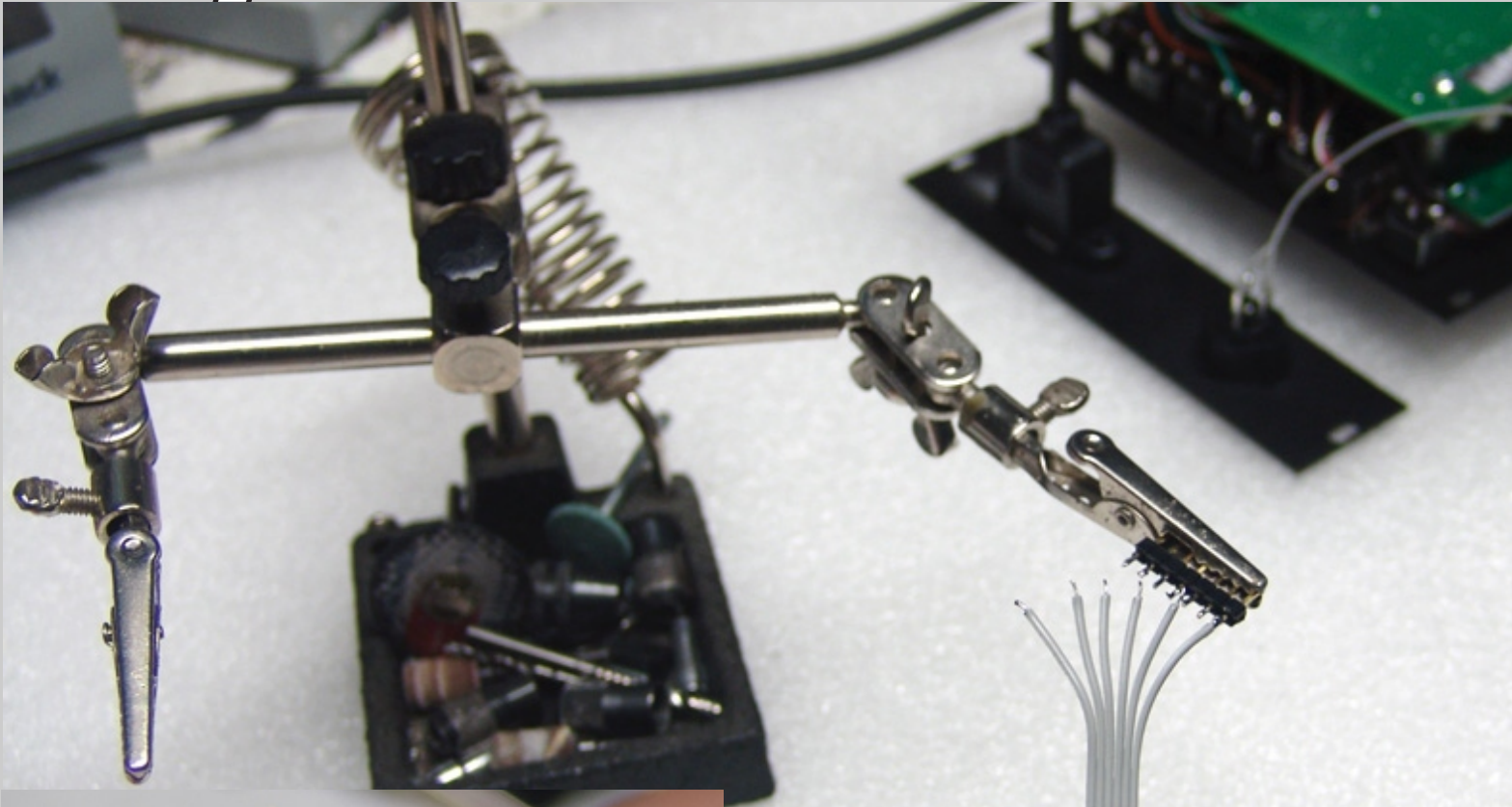


Step#1

Take the MIDI connector and snap it into the panel. It is keyed and will only go in one way! Locate the black screws and also mount the USB pigtail to the panel.

Take the 6 wire ribbon cable and prep one end of it as pictured to the left.

Step#2



If you have a pair of 'helping hands' this step is much easier. If not you can tape the connector to an edge of a table.

Remove the ends of insulation and solder them. Then add solder to the ends of the header connector.

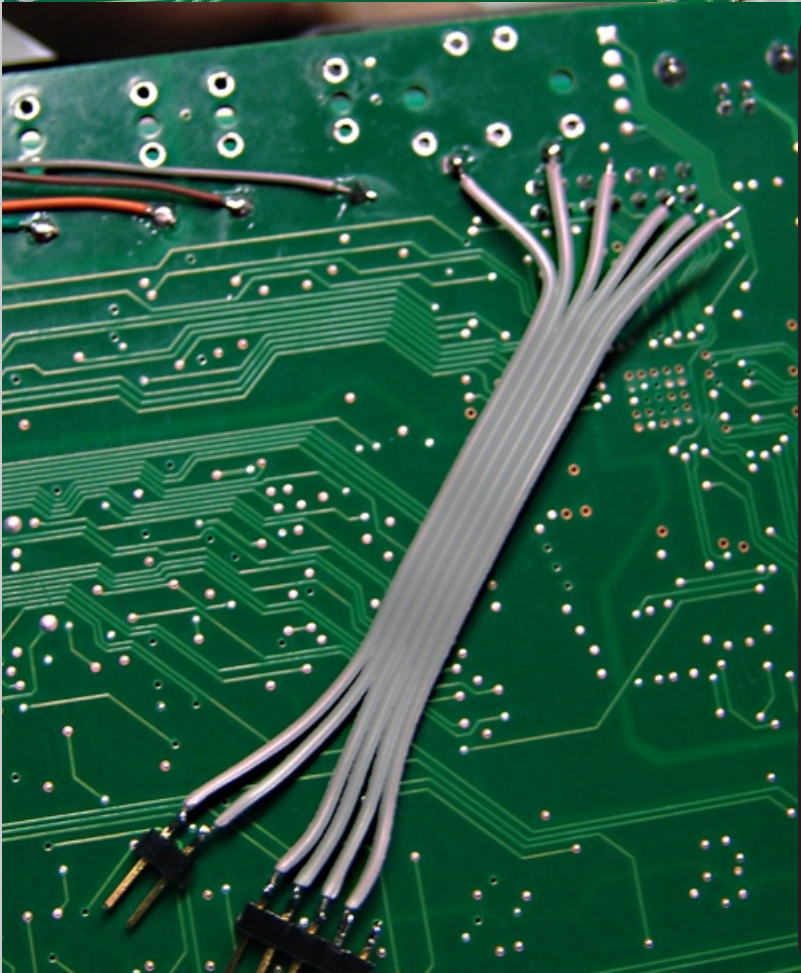
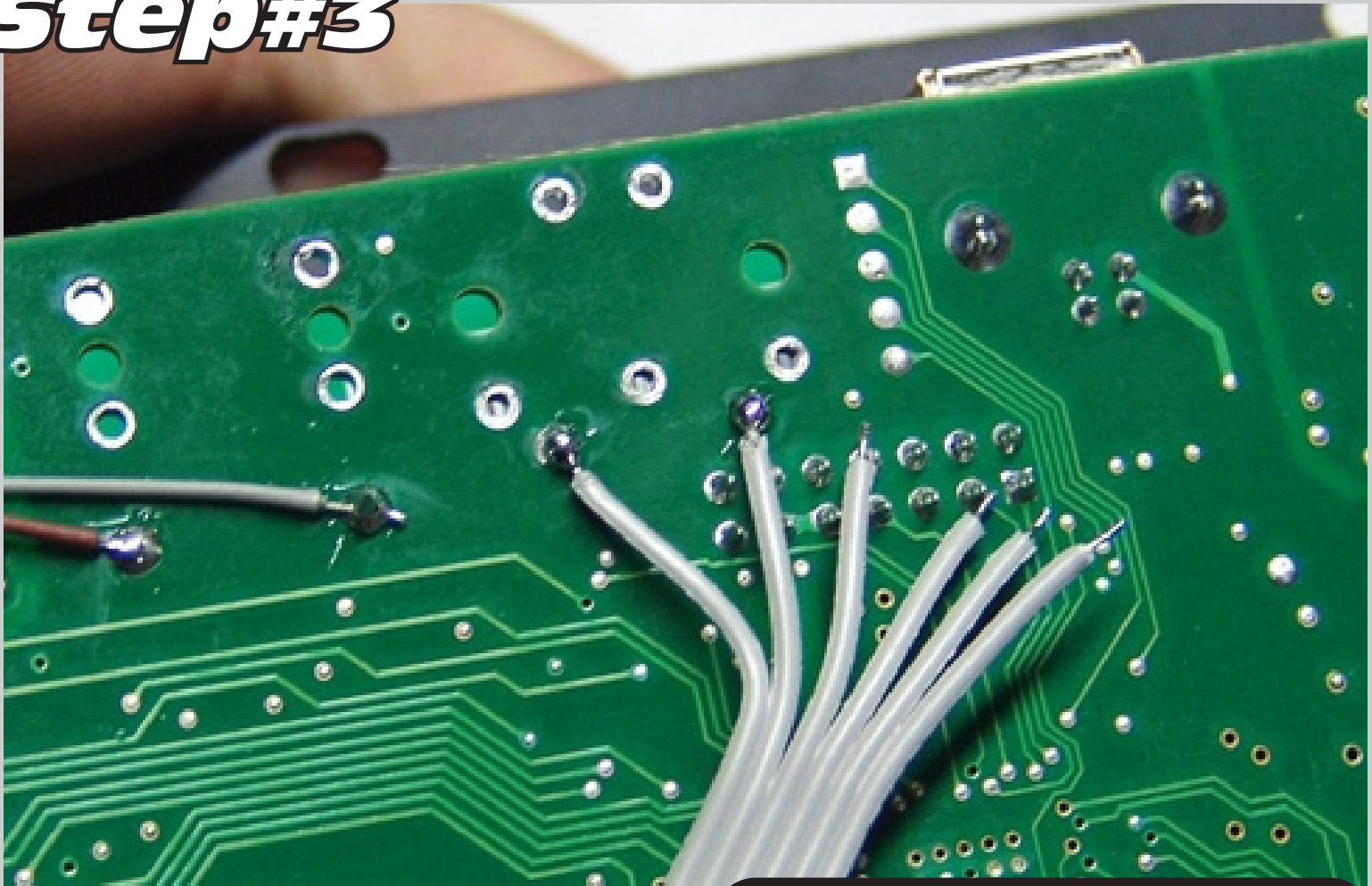
Now solder the ends of the wires to the header connector so it looks as pictured to the left.

Using a set of wire cutters, cut the two off from the end so they are separated like pictured to the left.

Prep the other end of the cable and remove the insulation from the ends and solder them as pictured.

The missing wire from the connector is there on purpose. It will act as a 'key' so you know which way to insert the USB connector.

Step#3



The end with the two wires needs to be soldered to the MIDI connector pins as pictured.

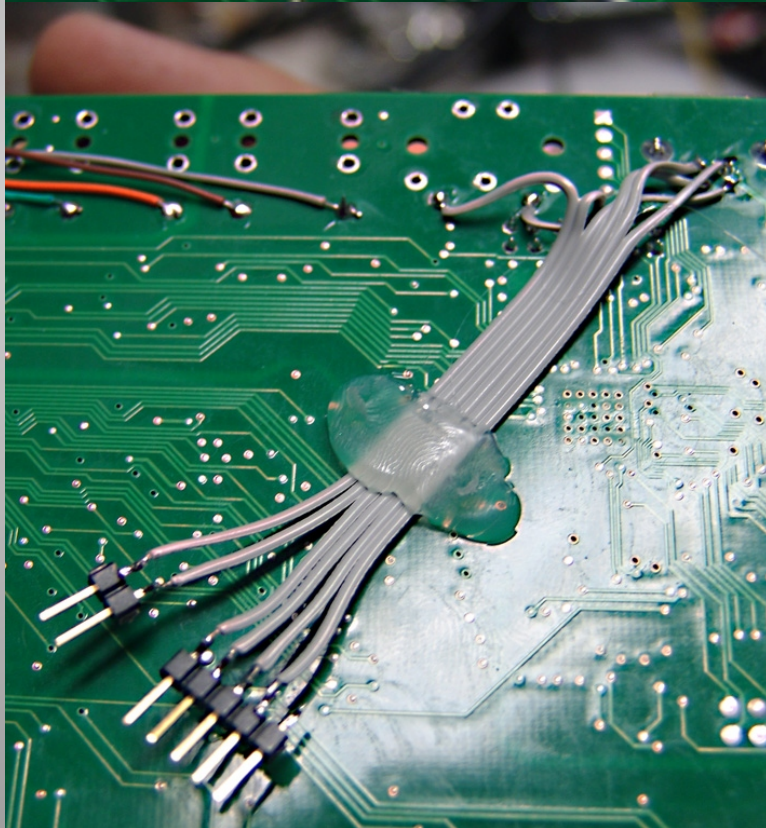
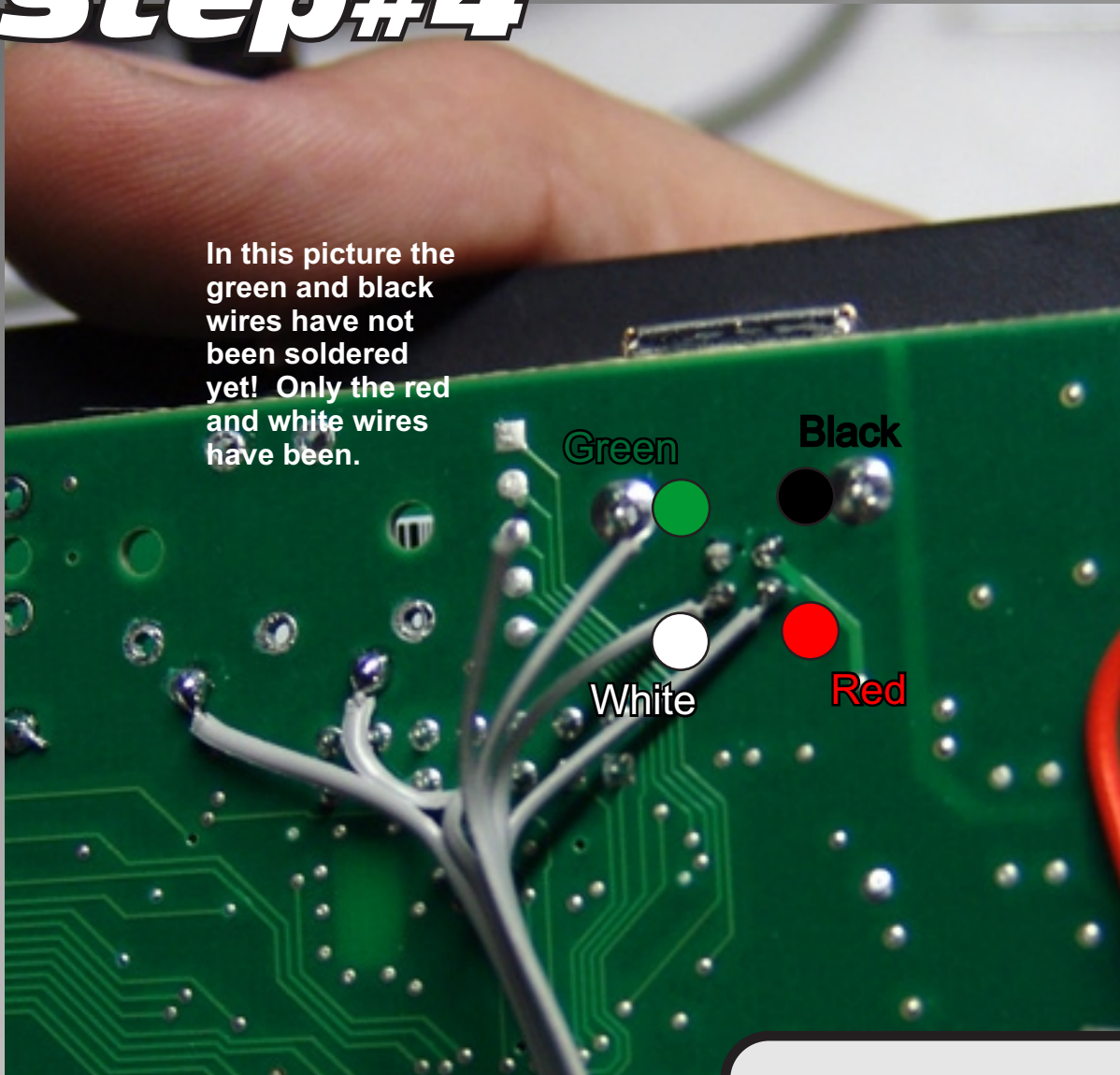
Don't worry about orientation as we will deal with that later.

Make sure the solder joints are nice and strong.

Loose connections here will make interfacing your Minitaur problematic.

Step#4

In this picture the green and black wires have not been soldered yet! Only the red and white wires have been.



It is important to get the wires in the correct order for the USB connector!

Starting from where we left off from the MIDI wires, solder the first wire to the bottom right post of the USB connector.

That is the RED wire.

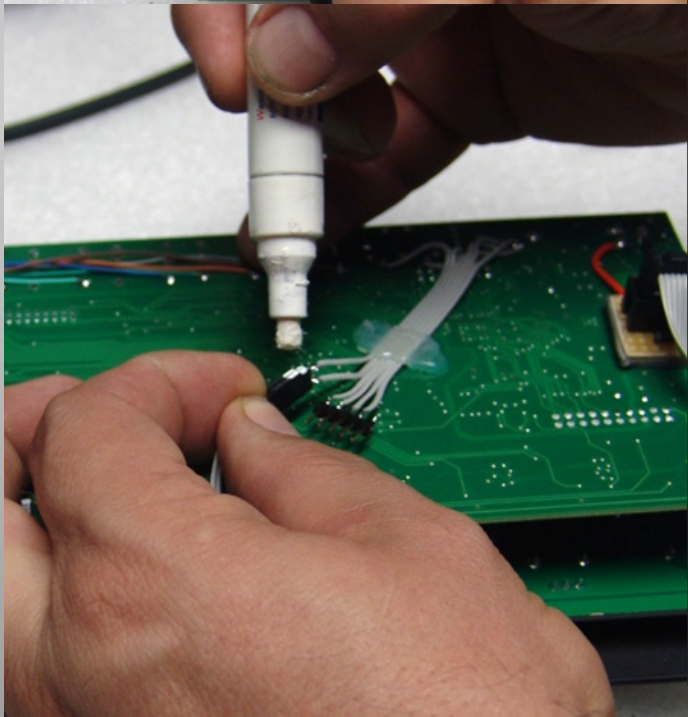
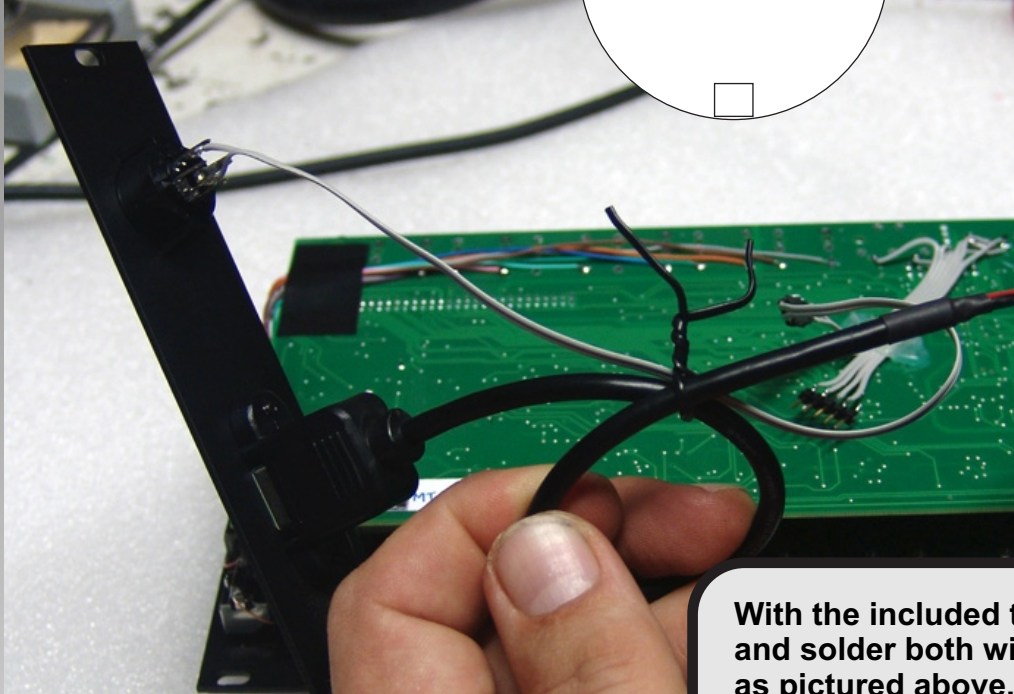
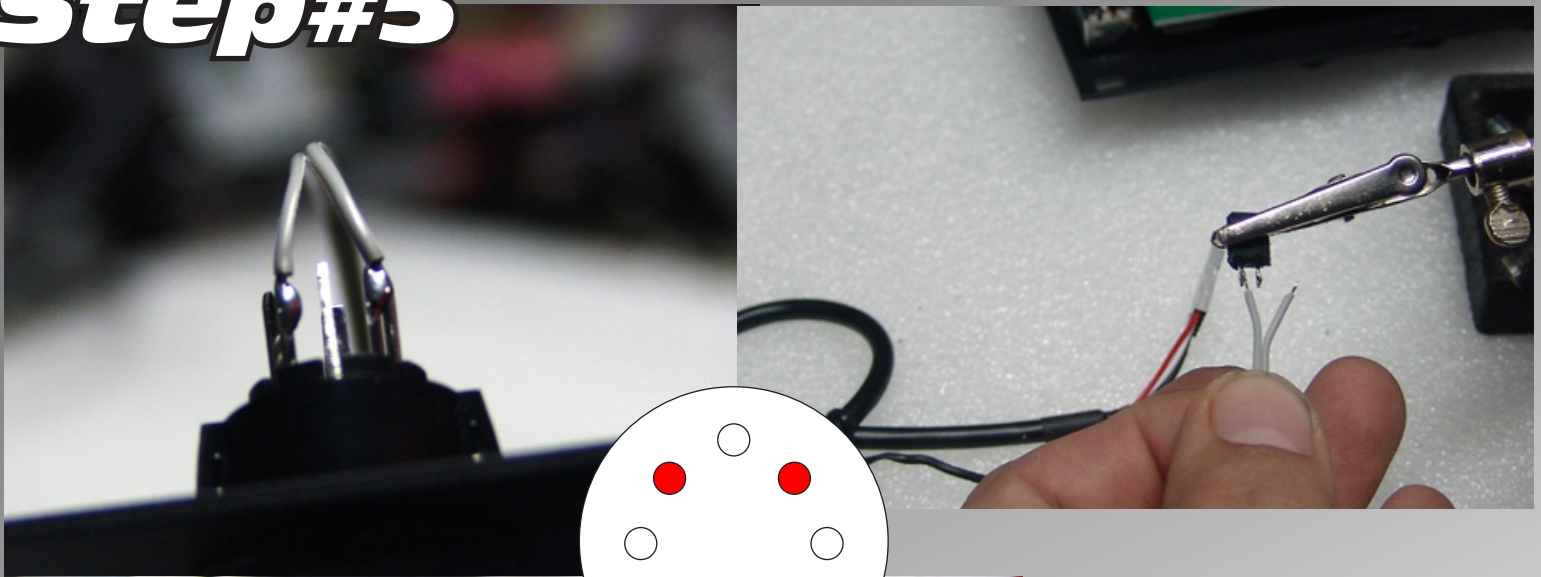
The next wire, solder to the bottom left. That is the White wire.

Next wire solder to the top left, that is the green wire.

And the last wire gets soldered to the top right. That is the black wire.

To act as strain relief for the cable you can add some hot glue or a strip of tape to the ribbon cable, as pictured to the left.

Step#5



With the included two wire cable, prep the ends and solder both wires to the MIDI connector pins as pictured above. Again we will work out orientation in a minute.

Now solder the other end of the cable to the included 2 pin female header.

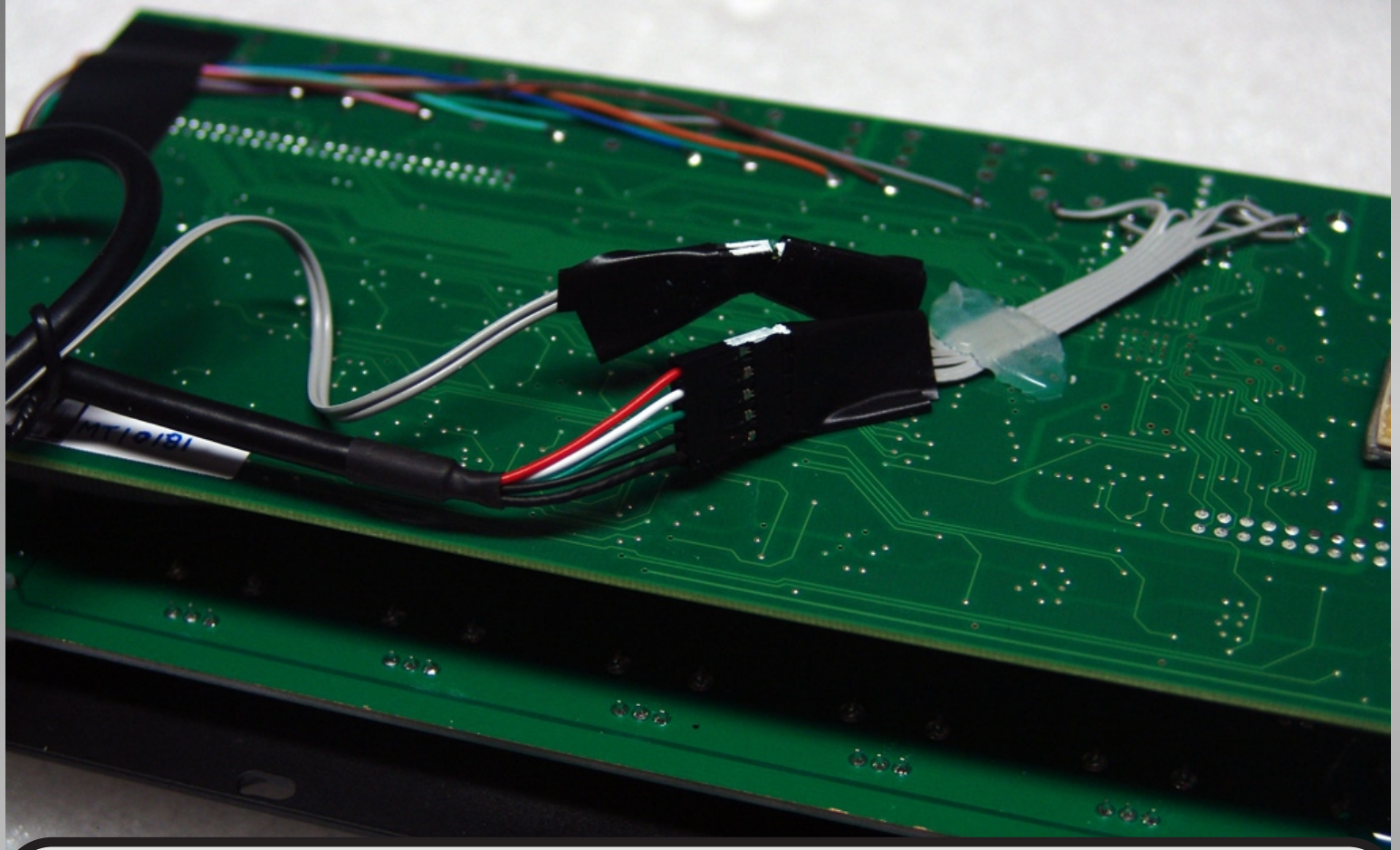
Use the included twist tie and create a small loop in the USB cable and twist the MIDI cable in with it to act as strain relief.

Connect the two pin MINI connectors.

Now you can test your MIDI connection. Plug in a keyboard or some sort of reliable MIDI source, and turn on your Minitaur. If your MIDI connection works, then mark the header with a paint marker. Mark the side of both ends. If your connection does not work, pull the connection and reverse the wires.

Don't worry, you will not blow anything up.

Step#6



Now double check your USB cable and connect accordingly. You will notice that the last black wire connects to nothing. That is ok, it is the shield of the USB connector. I see no reason to introduce any digital noise into your signal via your metal rack.

Please mark the red connector side with the red connector side wire that you just soldered. Now test your USB cable and your MIDI cable again.

If you have no problems, please use some electrical tape, or shrink wrap to protect the exposed wires.

If you do have any problems or questions, please contact me at chris@millionmachinemarch.com

***Thank you for your
support!***