Arduinoboy Kit Assembly Instructions
Brendan Byrne – Xiwi Electronics
GitHub Repository - http://tiny.cc/uyscbx
Product Page - http://tiny.cc/potcbx
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Hello and thank you for purchasing an Arduinoboy kit from Xiwi Electronics. Follow the instructions listed below and you'll be making chiptunes in no time at all. Enjoy, friend.

This kit assumes you have introductory knowledge of electronic components and soldering. At the very least, you will need a soldering iron, solder, wire strippers, flush cutters, helpy hands, pliers, and Phillips head screwdriver.

It is recommended that you reference this doc from a computer rather than printing.

For more detailed information such as PCB layout, laser cutter files, and schematics, please refer to the GitHub Link at the top of this document.

For questions or problems related to the Arduinoboy Kit you may contact me, Brendan Byrne, at xiwicontact@gmail.com. I'll do everything I can to make sure you have a fully operational unit.

(Loose black wire and operational document not pictured)

Bill of Materials
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Main Bag:
1 - ATMEGA328 - Flashed with AB Software
1 - 6N138 Optoisolator
1 - 28 pin IC Socket
1 - 8 pin IC Socket
1 - 7805 Voltage Regulator
1 - 16 Mhz Crystal
2 - 220 Ohm Resistors (Red-Red-Brown)
1 - 4.7k Ohm Resistor (Yellow-Purple-Red)
1 - 5.6k Ohm Resistor (Green-Blue-Red)
1 - 270 Ohm Resistor (Blue one)
2 - 1N914 Diodes
1 - 1uF Capacitor
2 - 22pF Capacitors
1 - Pushbutton
3 - MIDI Connector Panel Jacks
1 - MIDI Plug
1 - 2.1mm Barrel Jack
4 - 1/4" 4-40 Flat Head Machine Screws
4 - 3/8" 4-40 Flat Head Machine Screws
4 - 4-40 Hex Nuts
4 - 25/32" Zinc Standoffs
4 - Rubber Feet

LED Bag:
6 - 3mm LEDs of Your Chosen Color
6 - Corresponding Resistors
  Red - 2k Ohm (Red-Black-Red)
  Blue - 10k Ohm (Brown-Black-Orange)
  Green - 1.2k Ohm (Brown-Red-Red)
  Orange - 820 Ohm (Grey-Red-Brown)

Loose:
1 - Arduinoboy PCB
1 - Acrylic Faceplate
1 - Acrylic Bottomplate
1 - Half of Original Gameboy DMG Link Cable
1 - Loose Black Wire
1 - Operational Document

PCB and Faceplate Assembly
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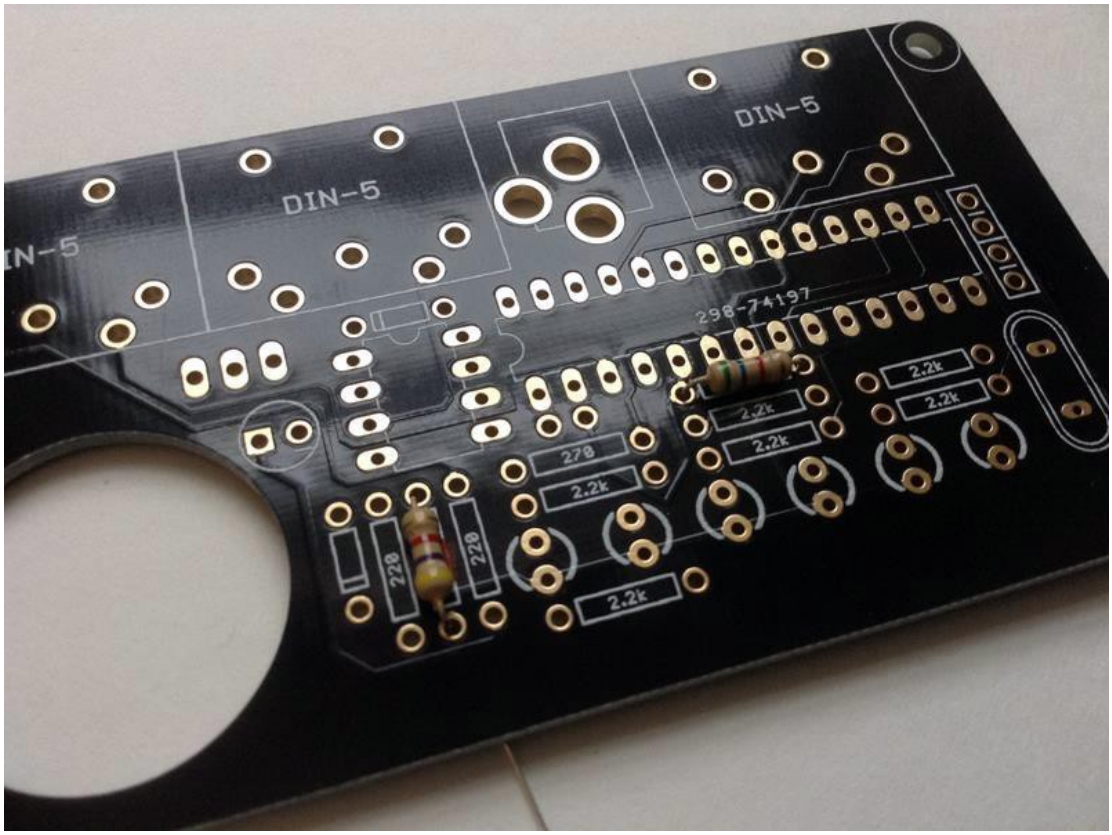
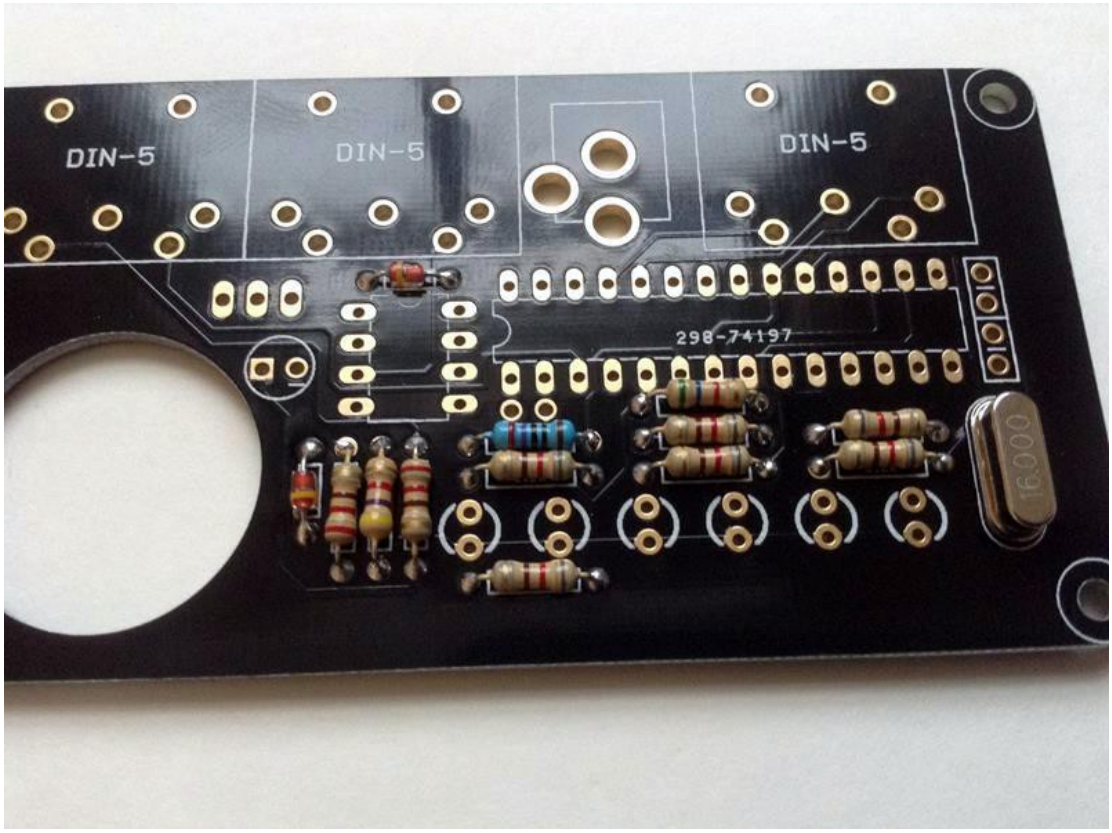
The board is labeled with the values of resistors and their corresponding locations. However, there are two mistakes. I apologize. These locations have been marked with a red sharpie. The position marked 270 will take the 4.7k Ohm resistor and the one marked 2k will receive the 5.6k Ohm resistor. Make sure your board resembles the one pictured below.

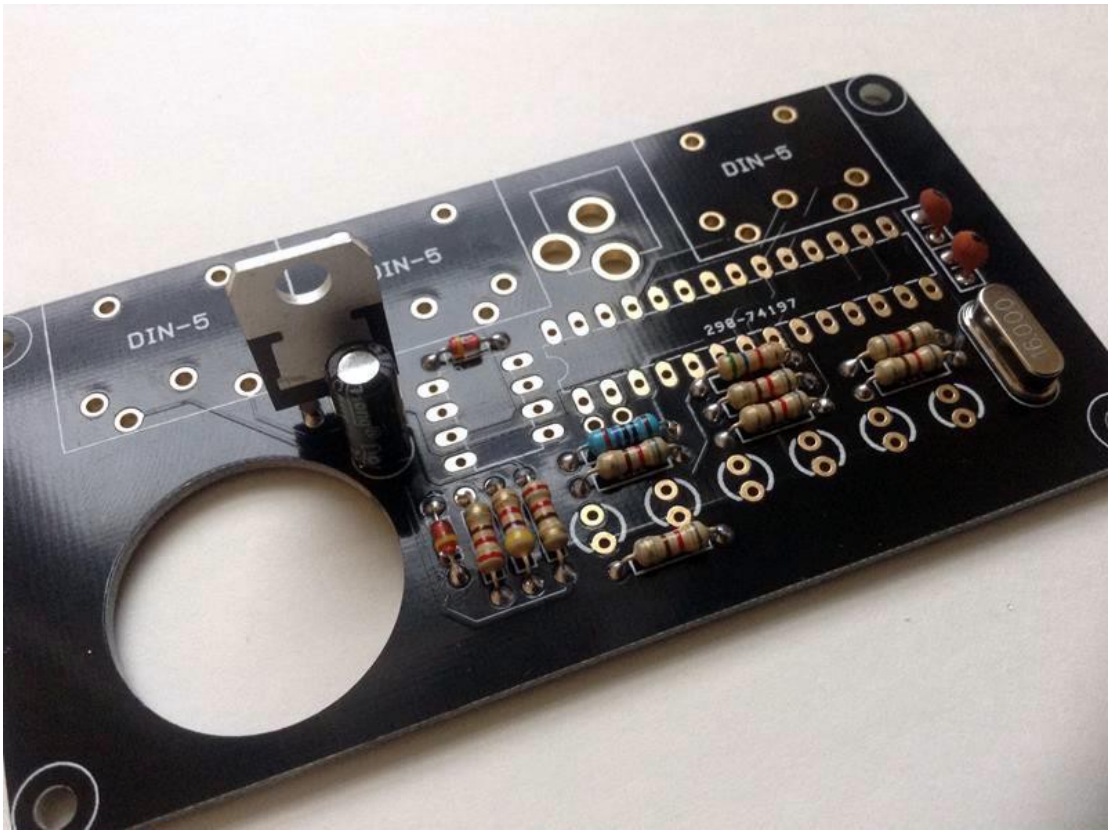


Following this step. You may proceed with populating the circuit board with the rest of the low level components (i.e., resistors, diodes, and the 16 Mhz crystal). The location marked “270” receives the blue resistor.

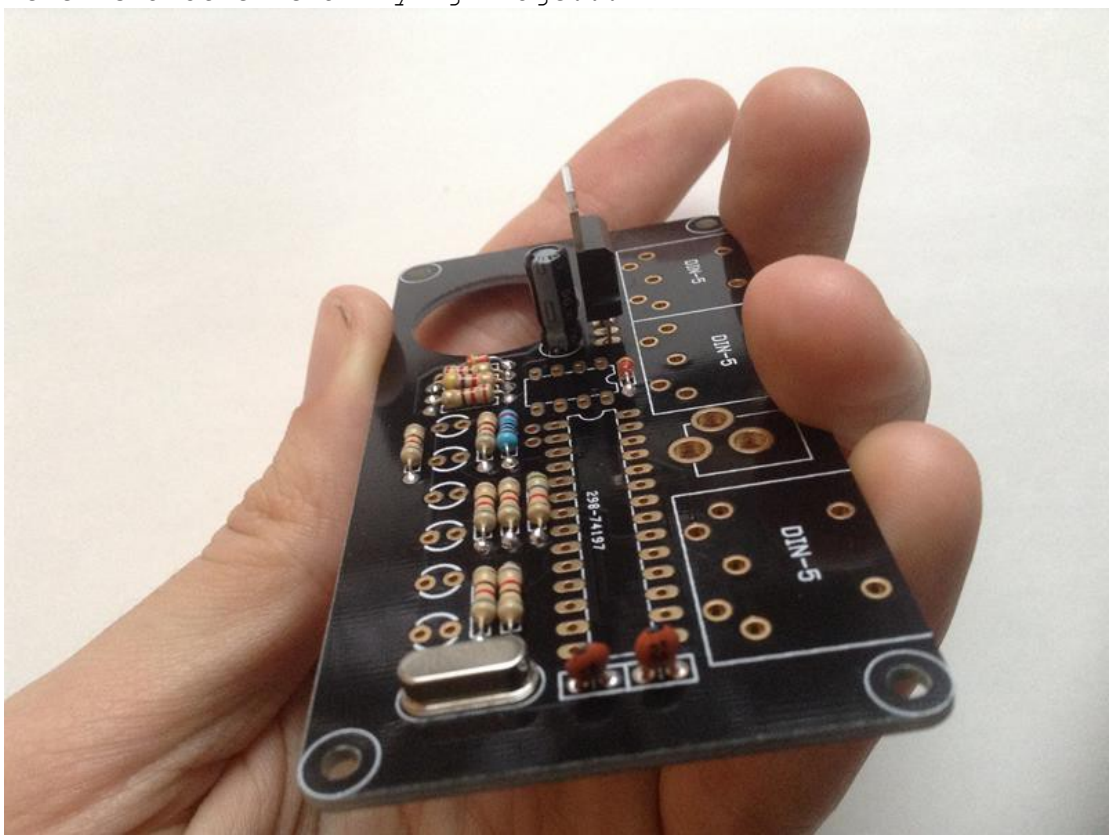
Take note that wherever you see a “2.2k” label, this is where you will place the resistors from the LED bag. In this example, I am building an orange Arduinoboy and am using 820 Ohm resistor.



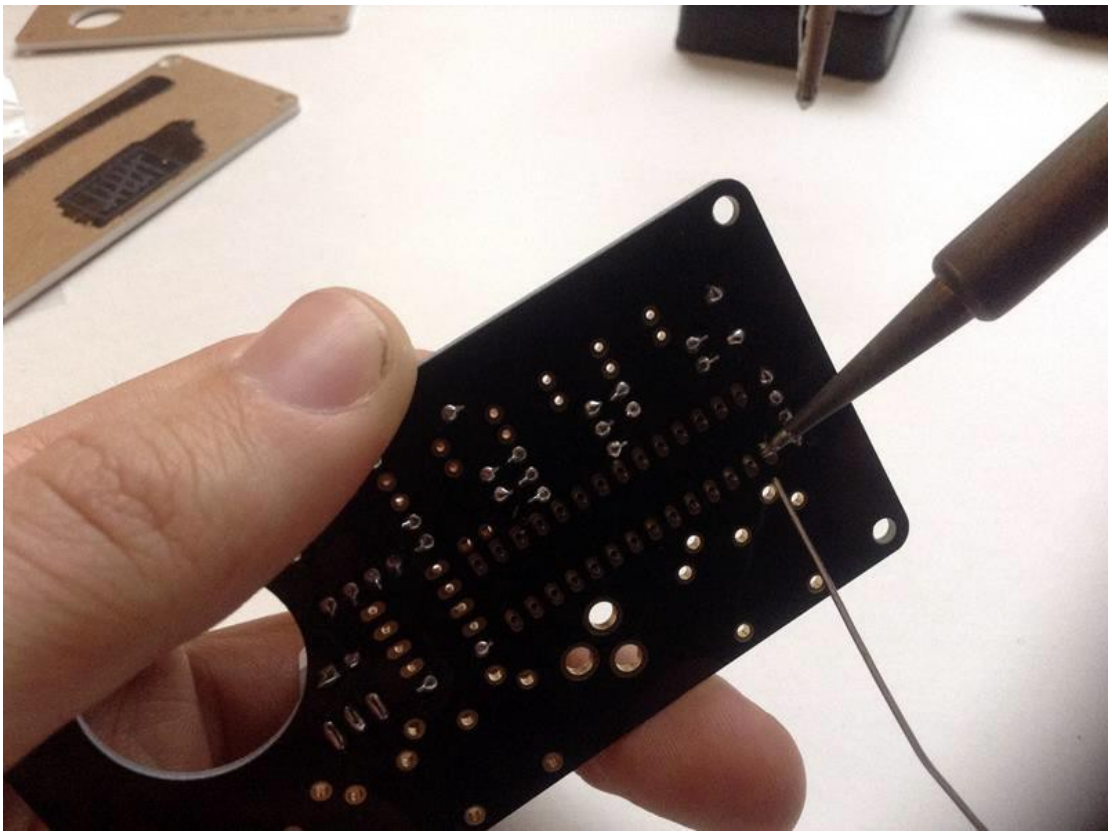
Next, add the capacitors and the 7805 Voltage Regulator. Insert the regulator as seen below otherwise. The heat sink will be closest to the 1uf capacitor.



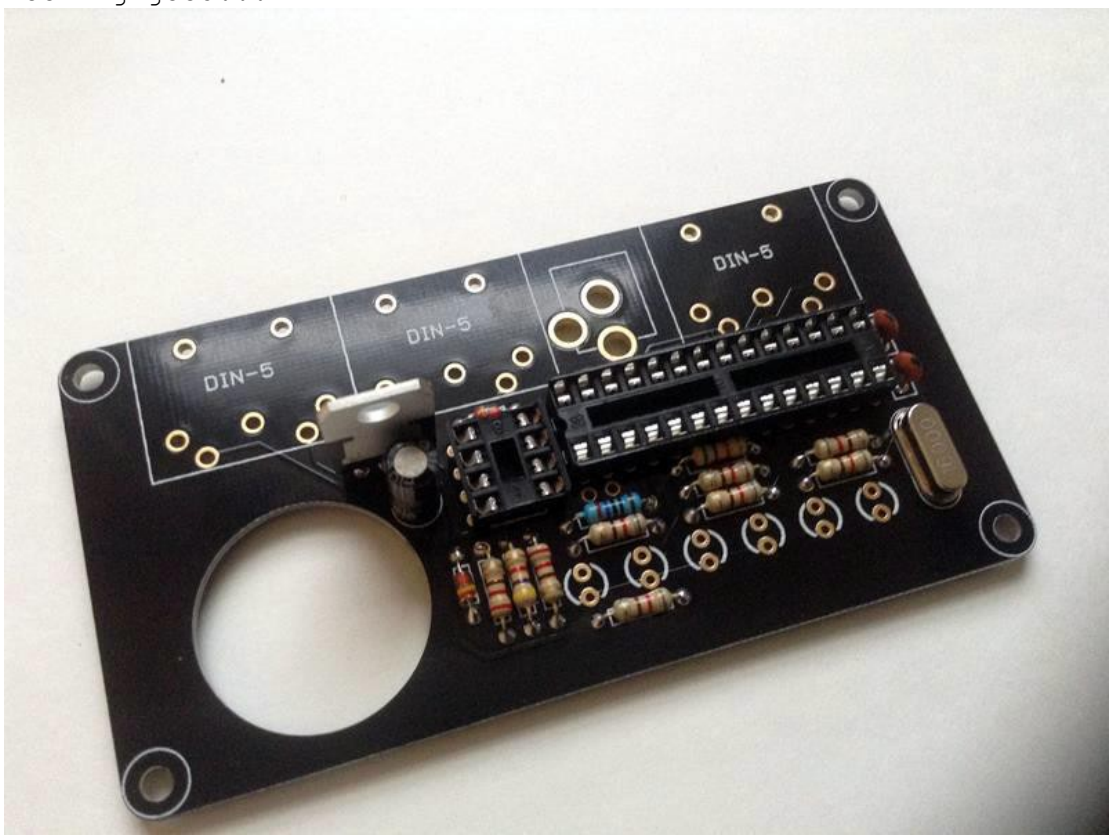
Here is another clarifying image...



Following this, you will add the IC sockets. Everyone has their own technique for accomplishing this. I prefer to hold the piece in place with my finger, heat one of the corner leads with my soldering iron, and move the whole board towards some solder. The drag and drop method works as well, but be sure to resolder the joint once you've done the others.

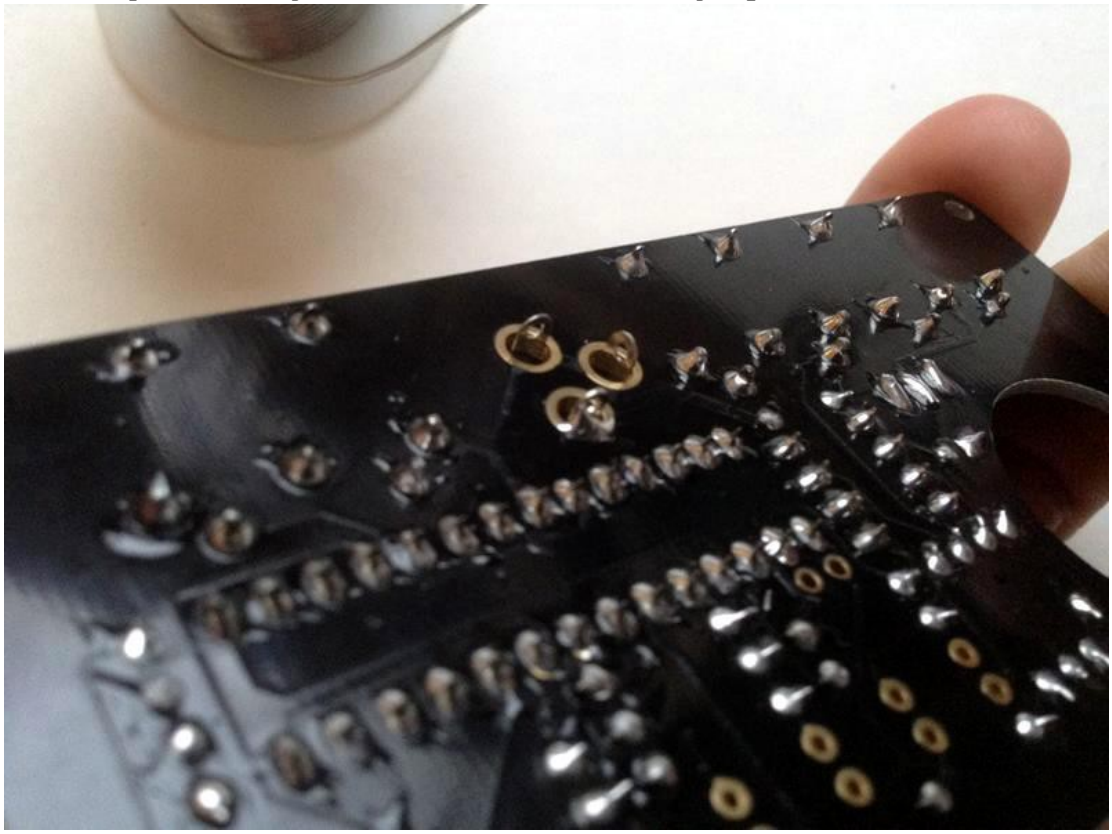


Looking good...

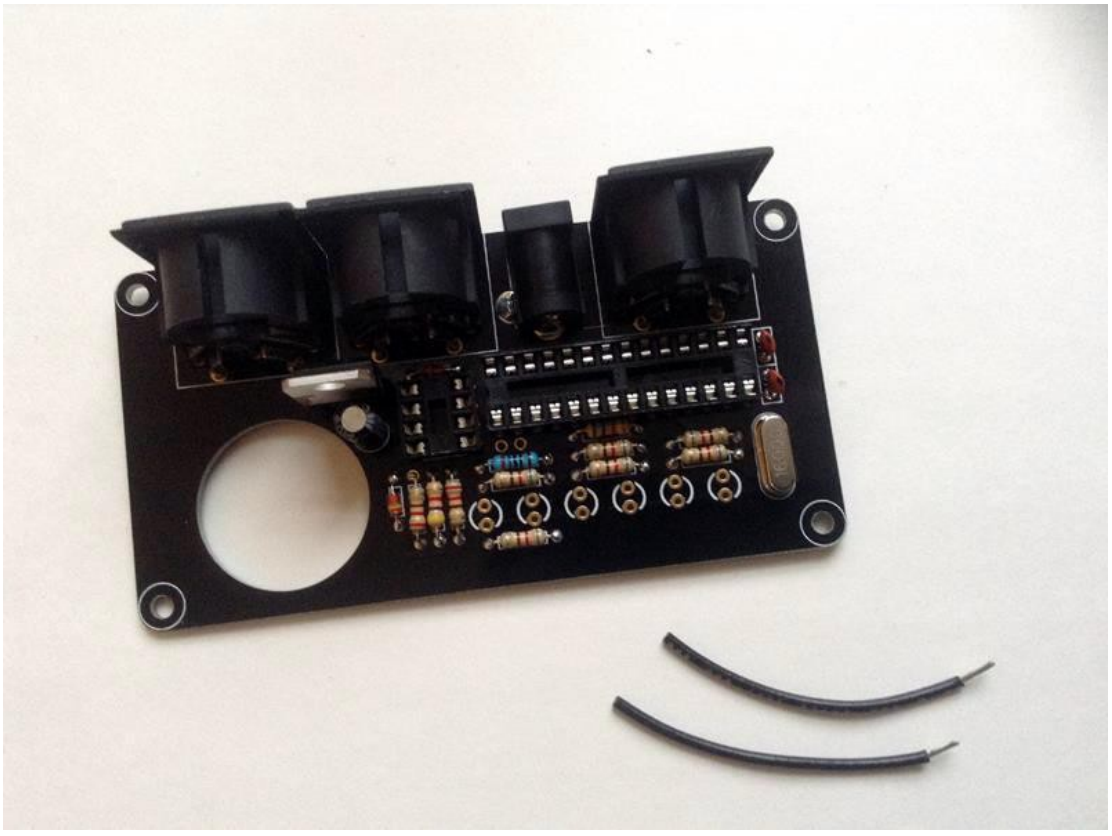


Next, you will solder on the MIDI Connectors. I do this using the same method for ICs. Solder one or two points using the method to hold the piece in place and then solder the rest. It is important that they are mounted firmly. You will be stressing these points when connecting cables.

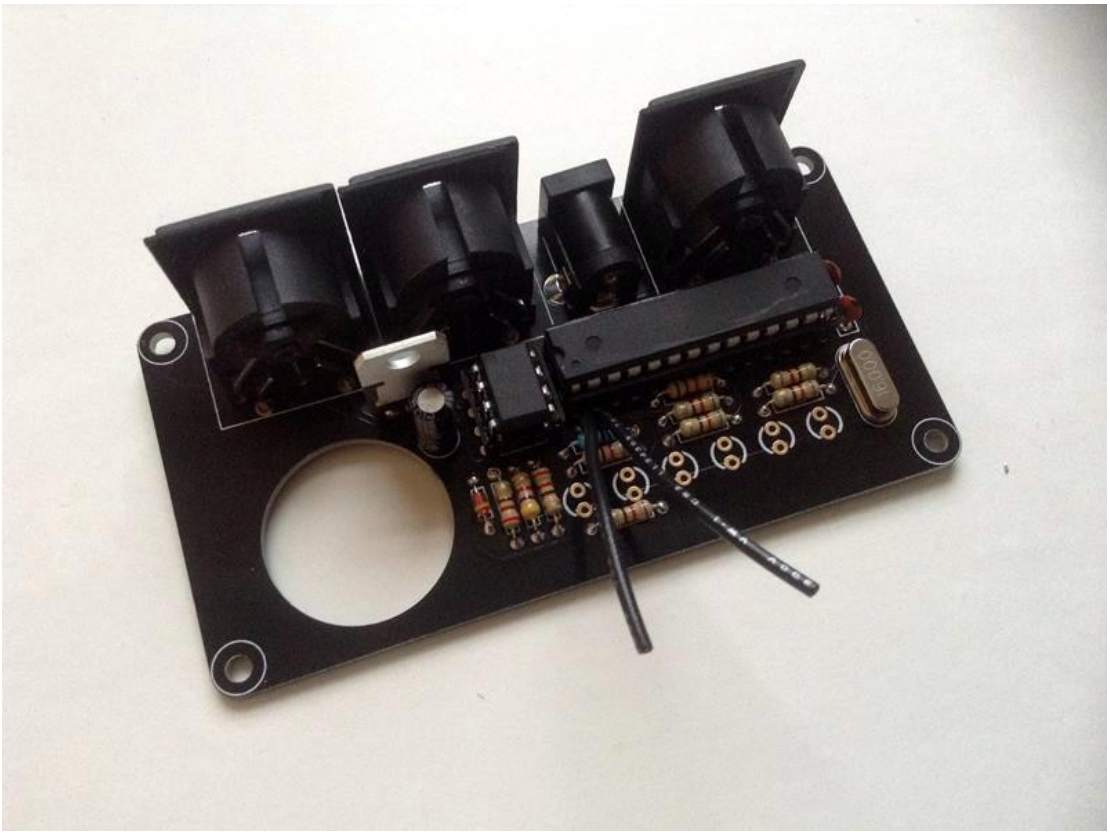
Next, you will add the 2.1mm Barrel Jack. This piece can be tricky, because there is a lot of space for it to move around. This will be improved upon in later versions. I recommend using the drag and drop method here. Add some solder the tip of your iron and then place it to the point. Enough will stick to hold the component in place. Make sure it is straight before proceeding to solder more thoroughly.



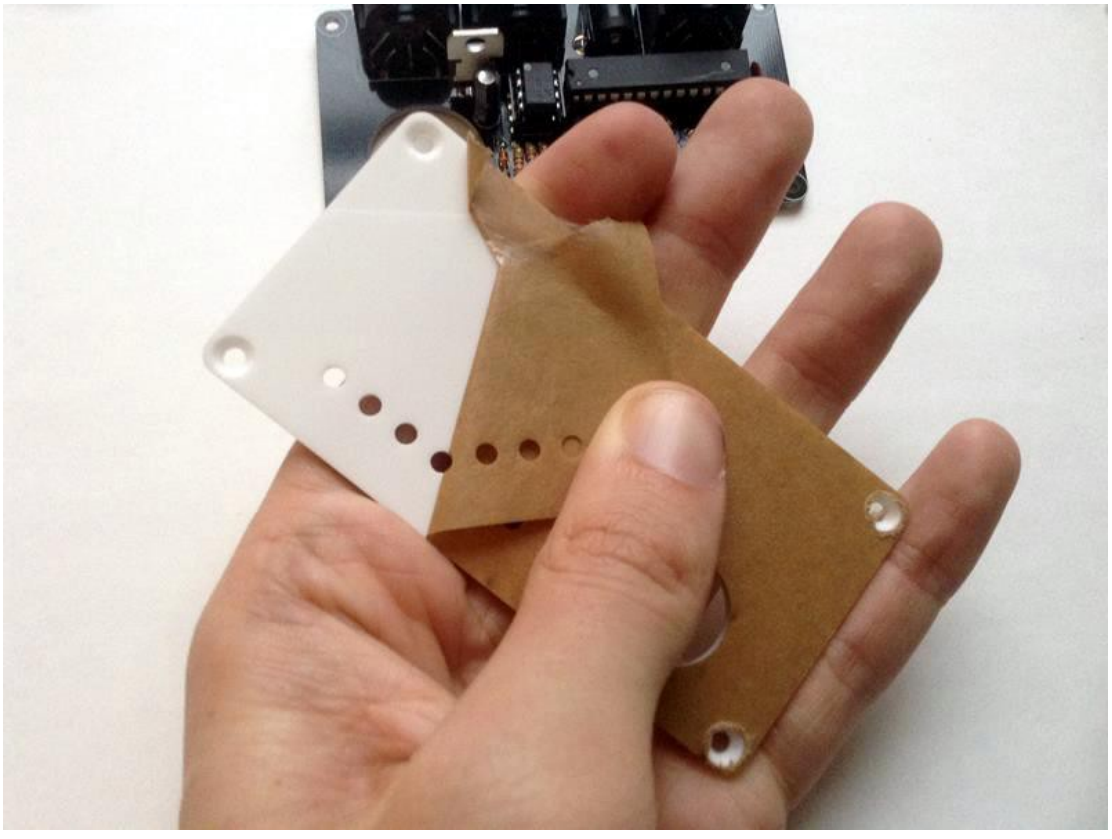
Next add wire to the two points above the 270 Ohm Resistor.



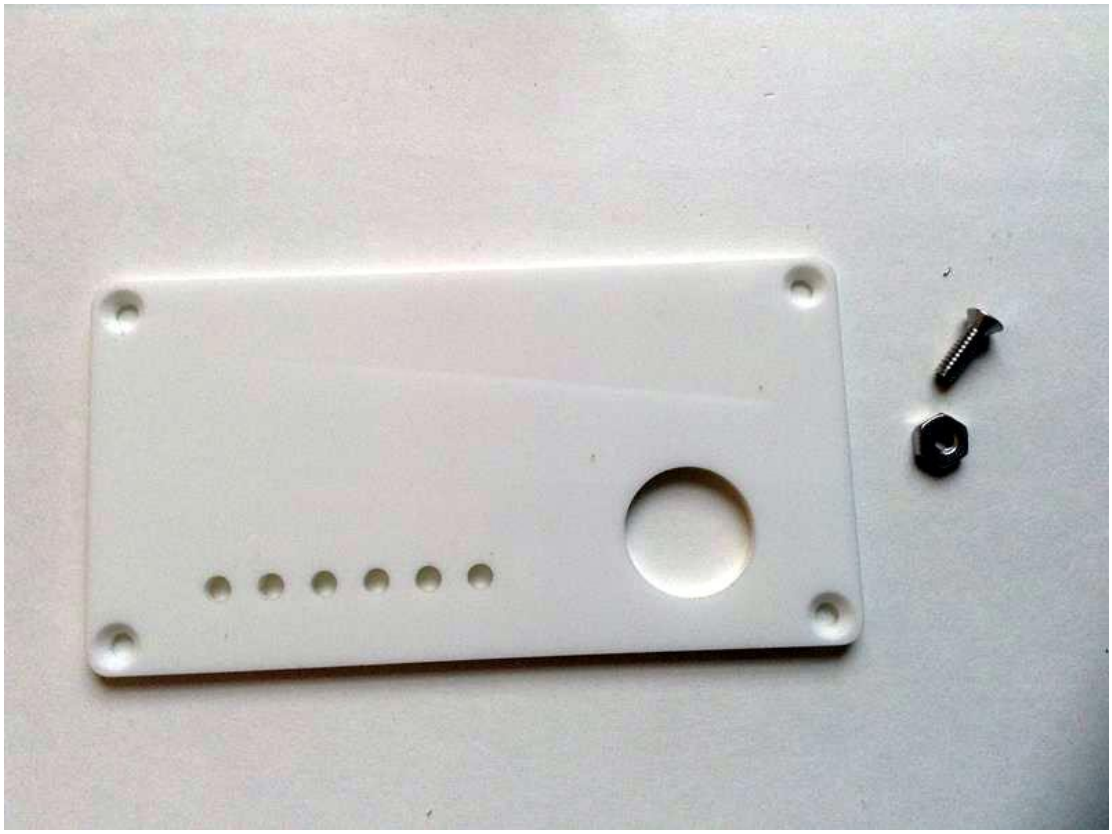
You may now insert the ICs into their sockets. Take extra special care to insert them in the proper direction. This is indicated by the PCB. Nice work.



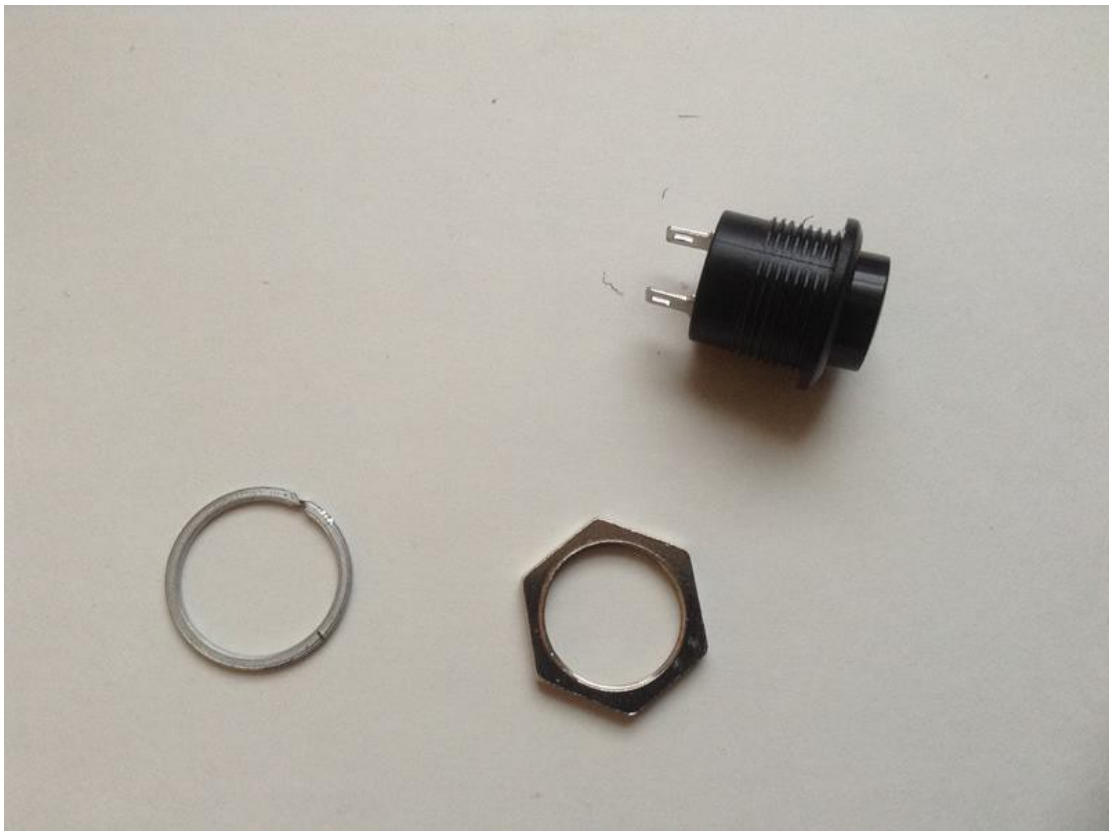
Prepare the faceplate by removing the brown paper. The side with counter sunken holes will face you upon completion.



We'll be working with the 3/8” long 4-40 screws and the hex nuts. Make sure you have the right kind ready to go.

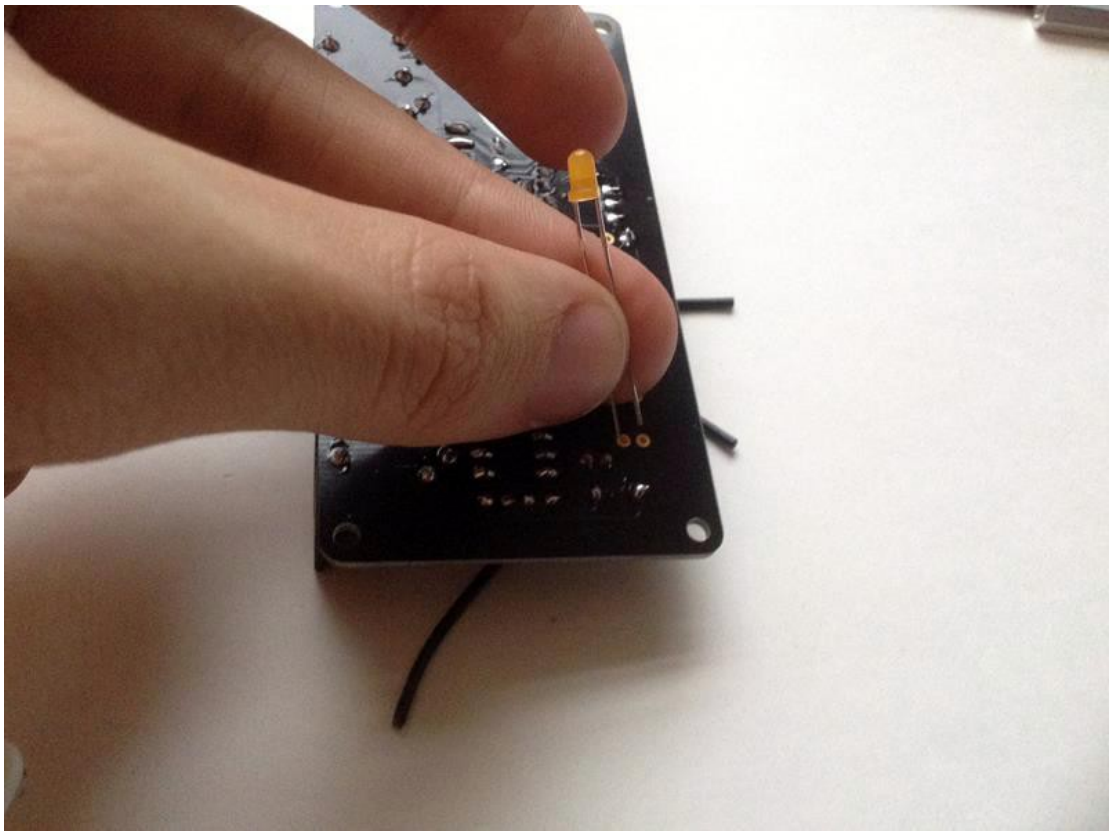


You will also be mounting the button. The lock washer seen here on the far left is not needed and can be discarded.

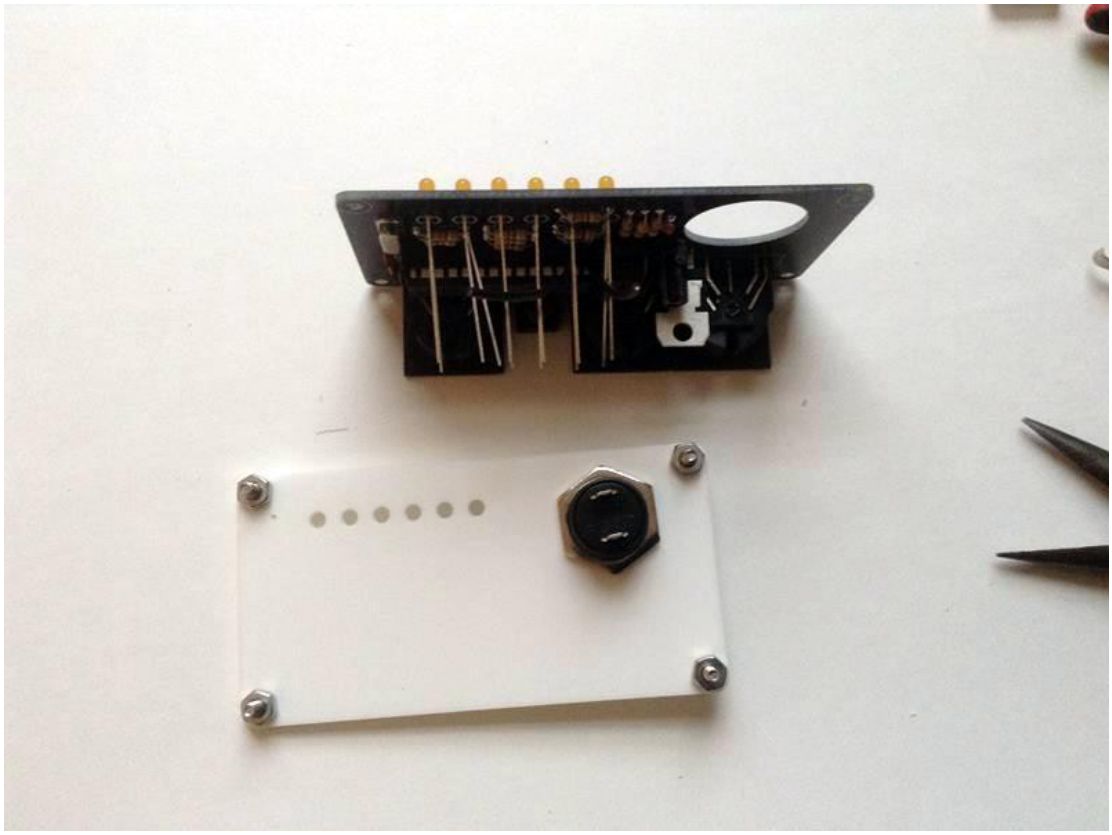


Mount the button and the screws.

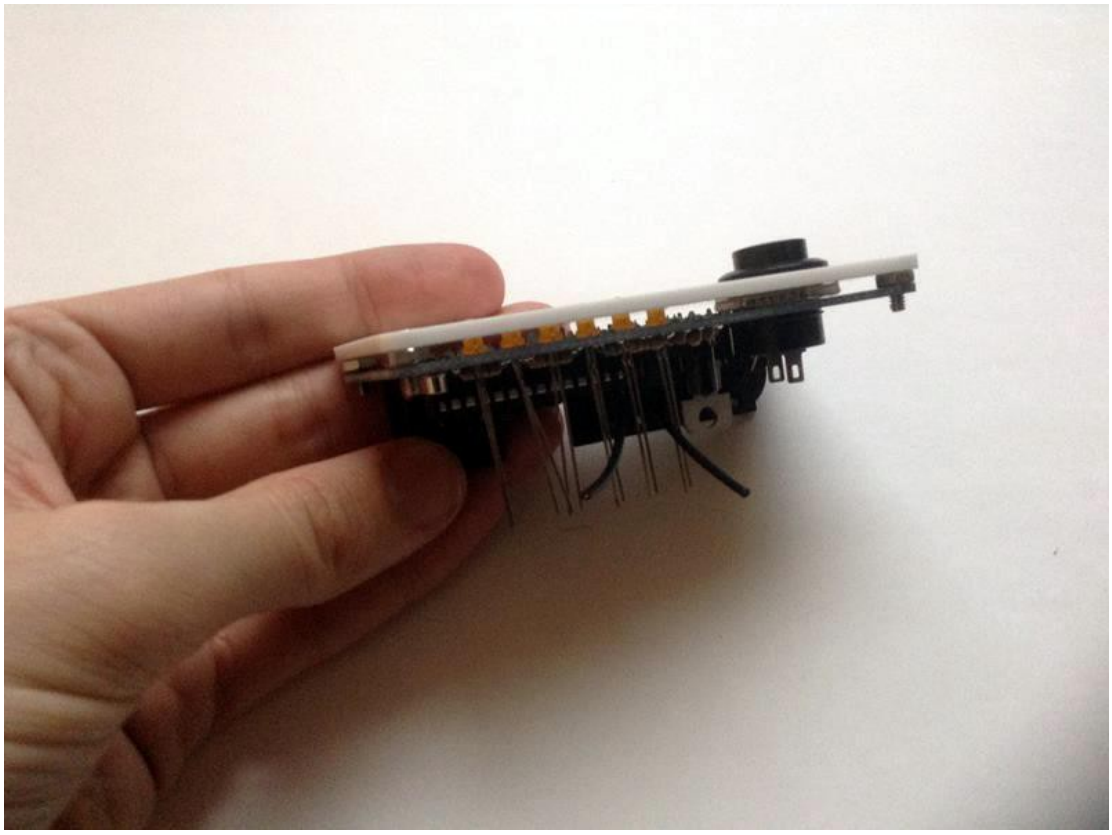
Next we will prep the LEDs. You will be inserting them into the OPPOSITE side of the PCB. Take note the photo. The longer lead will be closer to the ATMEGA chip.



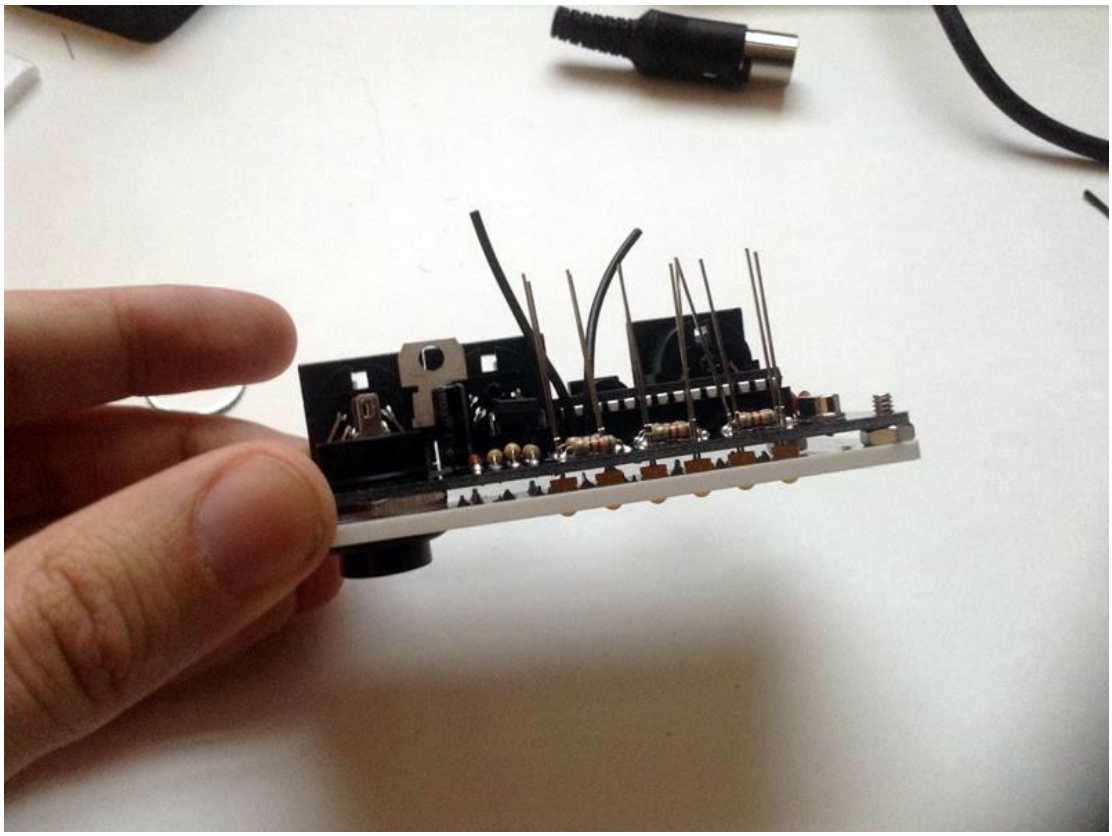
Don't start soldering yet. The following photo demonstrates where you should currently be.



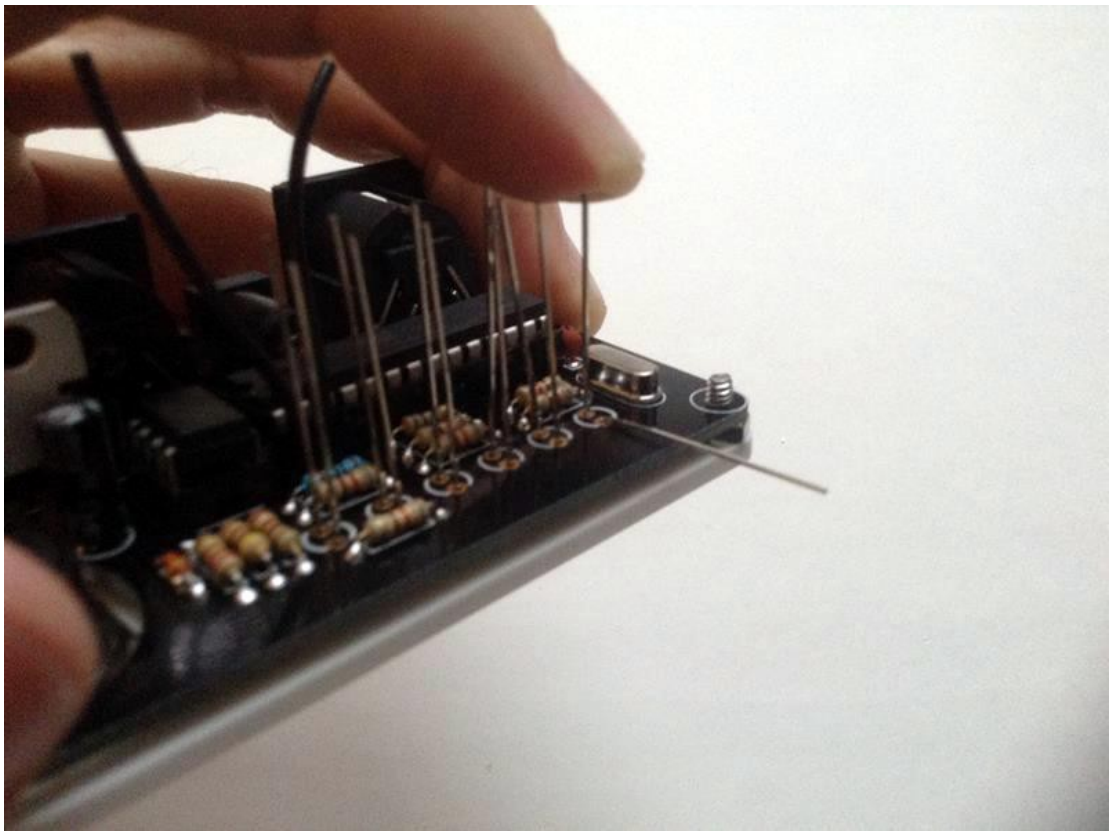
Now place the PCB on to the 4-40 screws. This is a tight fit. Don't be afraid to apply some pressure, but do try to fit the PCB holes to the screws. If a large angle occurs, it will not fit. Keep it as parallel as possible to avoid problems.



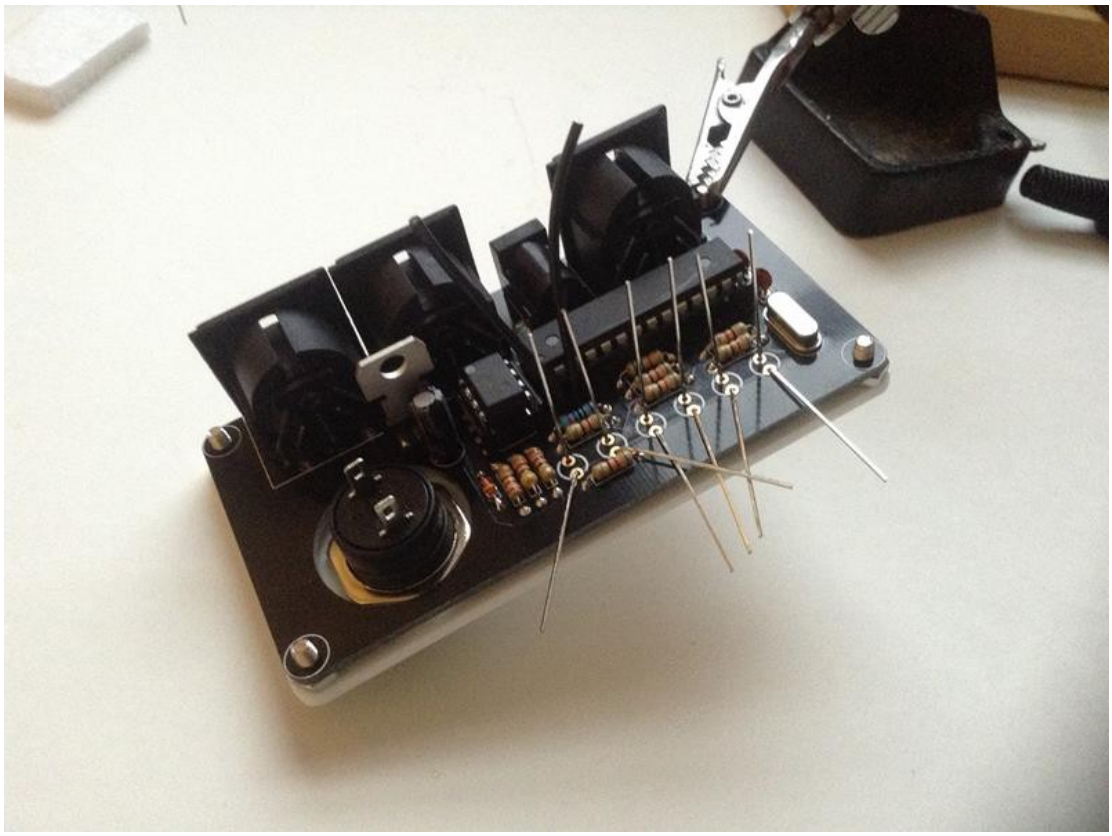
Notice that when you flip the board upside down the LEDs will fall nicely into the slots of the faceplate.



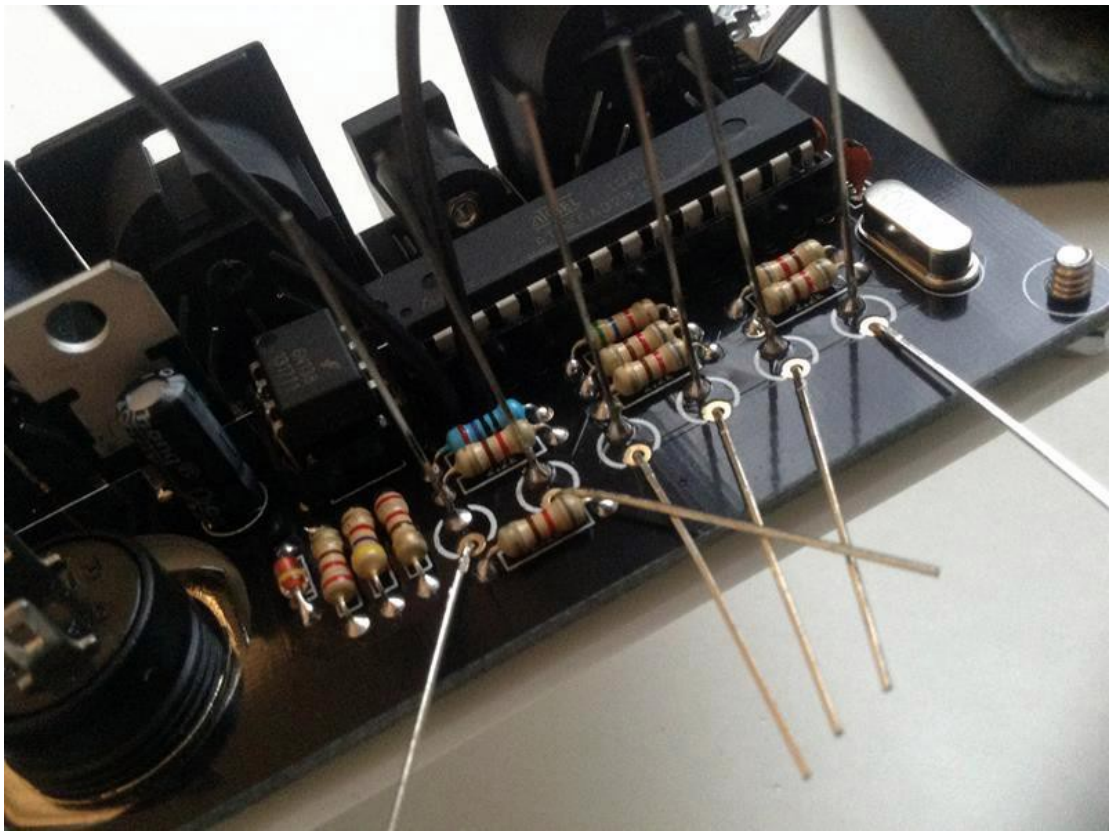
Using one finger, apply downward pressure to the longer lead of the LED. With another finger, bend the shorter lead outward. This will hold the LED in place for soldering.



Once all leads are bent, use helpy hands or another clever contraption to float the board slightly above your table. You don't want any force pushing the buttons towards the PCB.

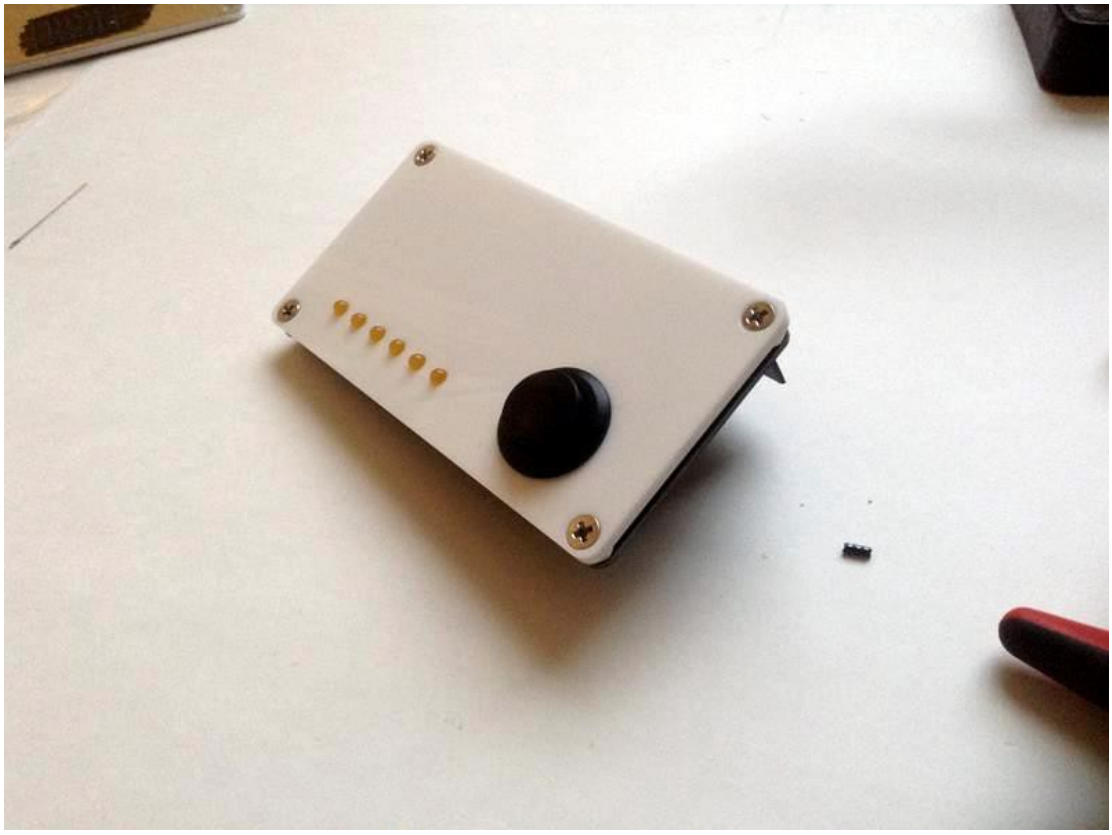


Before soldering, double check to make sure the LEDs look good on the other side and the PCB is flush with the hex nuts. Proceed if happy with results.

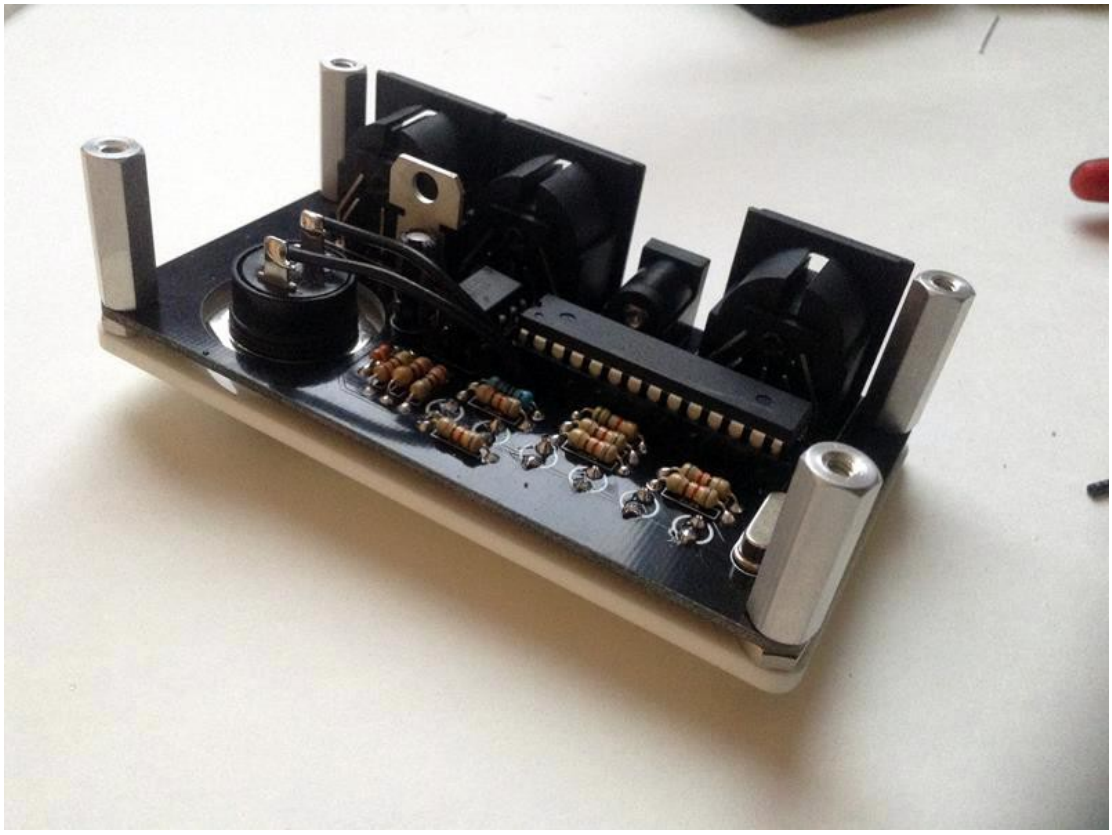


Solder and then snip. This will cut back on positioning problems. Finally, you can connect the wires to the push button. Orientation does not matter.

Looking good.



Add the standoffs to the 4-40 screws. This will hold the board in place.



You are done with this section!

Cable Construction
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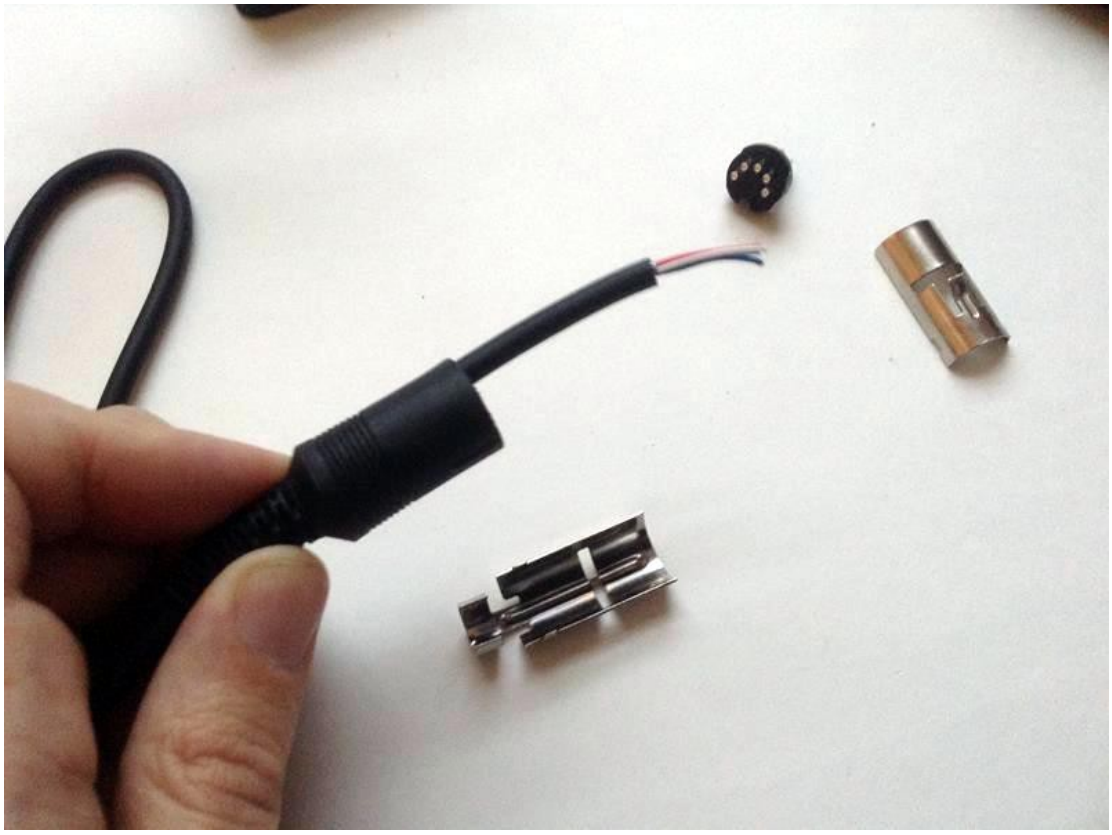
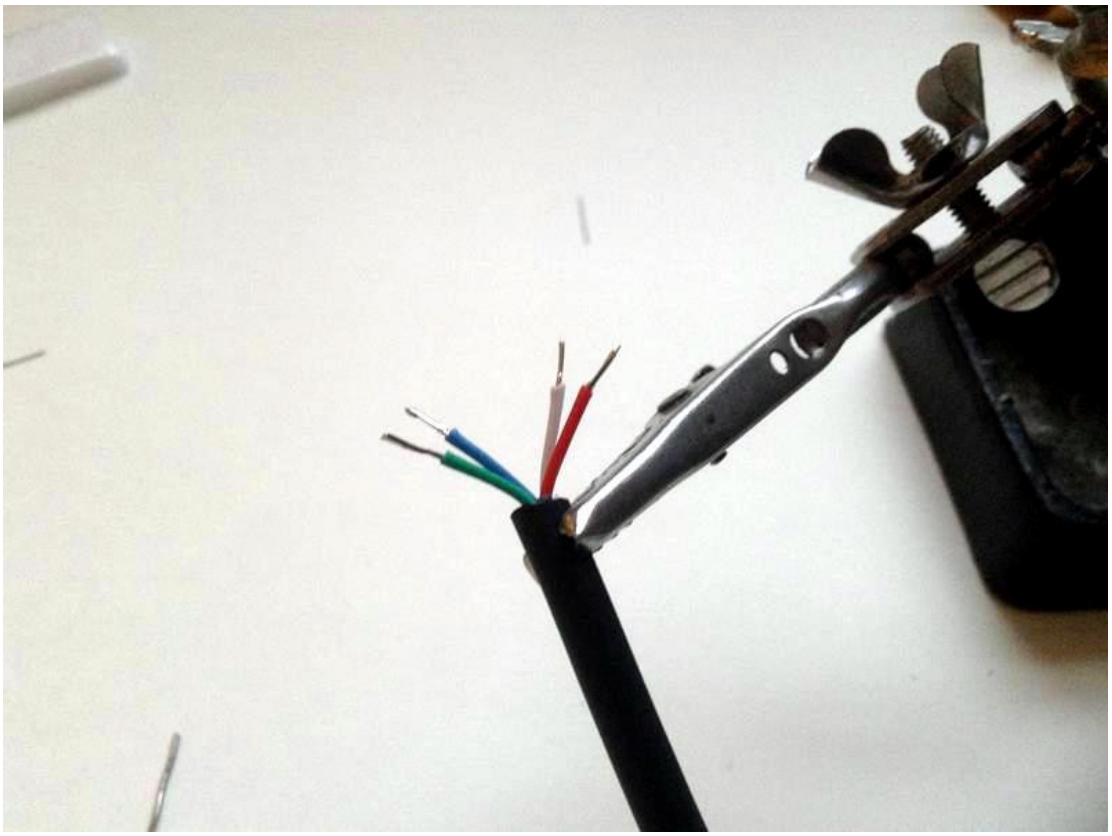
First thing is first, take the DMG cable and the MIDI plug.
Place the rubber MIDI plug jacket on to the link cable.

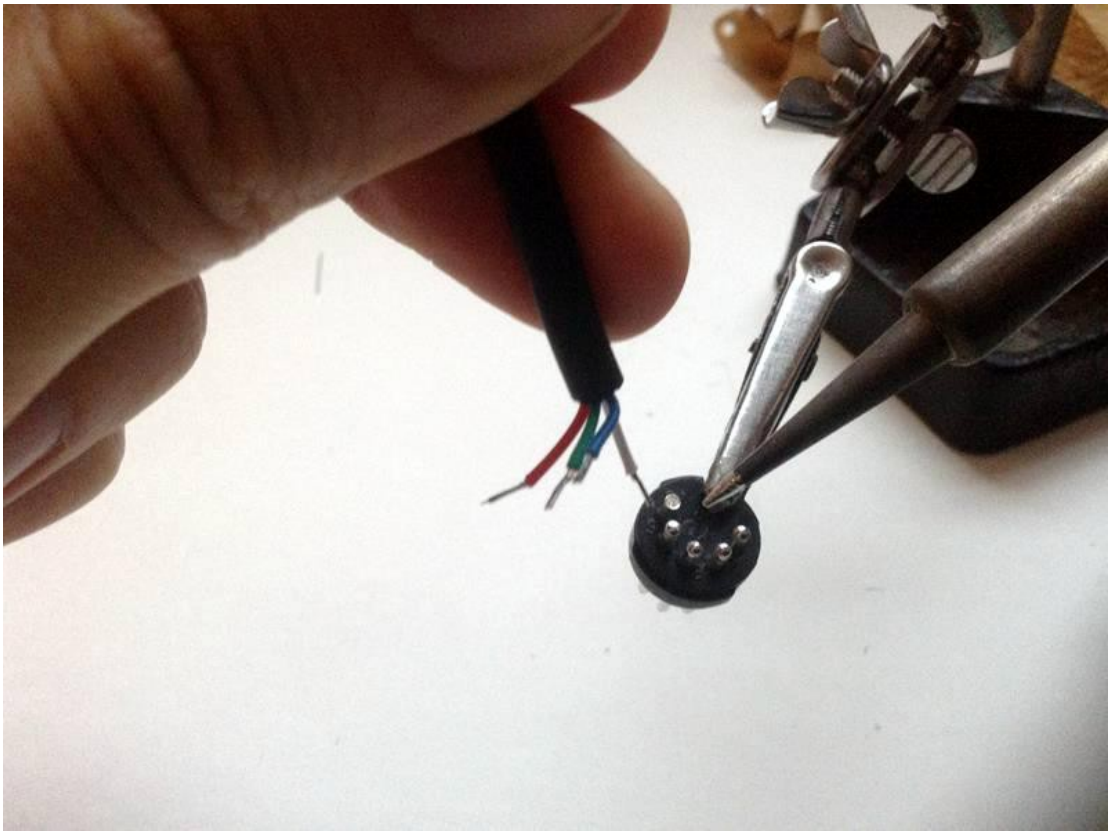


Next, strip and tin each wire. The insulation is cheap so
don't spend too much time on it with your iron. Work until
you're happy with the results.

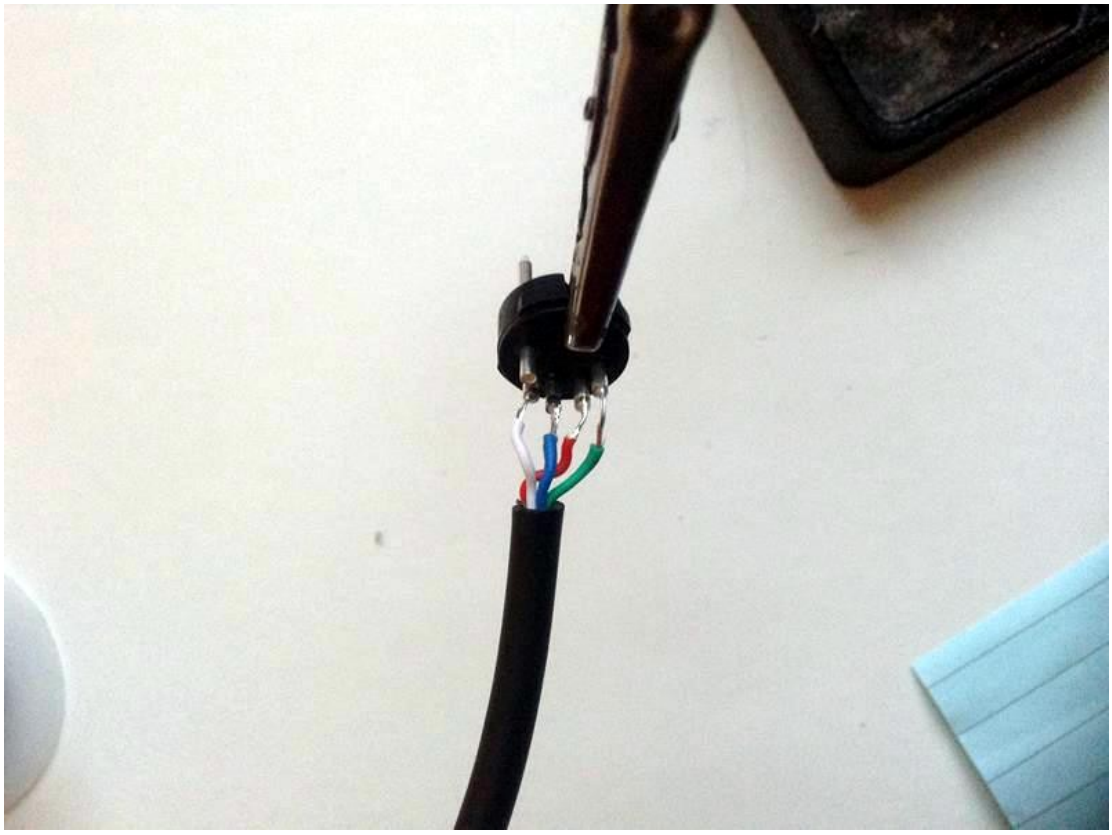


You will also want to tin these pins on the MIDI connector.

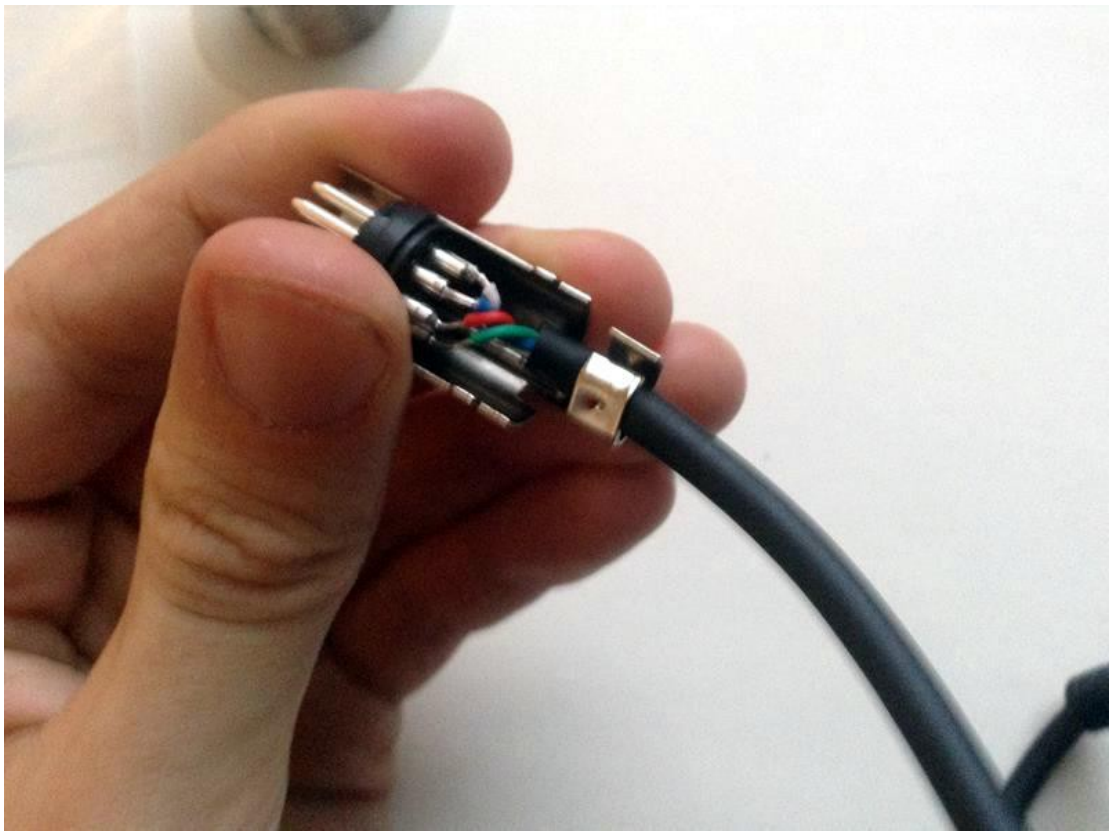
Looking at the back of the connector, from left to right, you will solder the following wires to each pin.
---------- NOTHING - WHITE - BLUE - RED - GREEN ----------
Hold the connector in place. Heat up tinned pin on the connector. Insert tinned wire into pin. Clean up later.



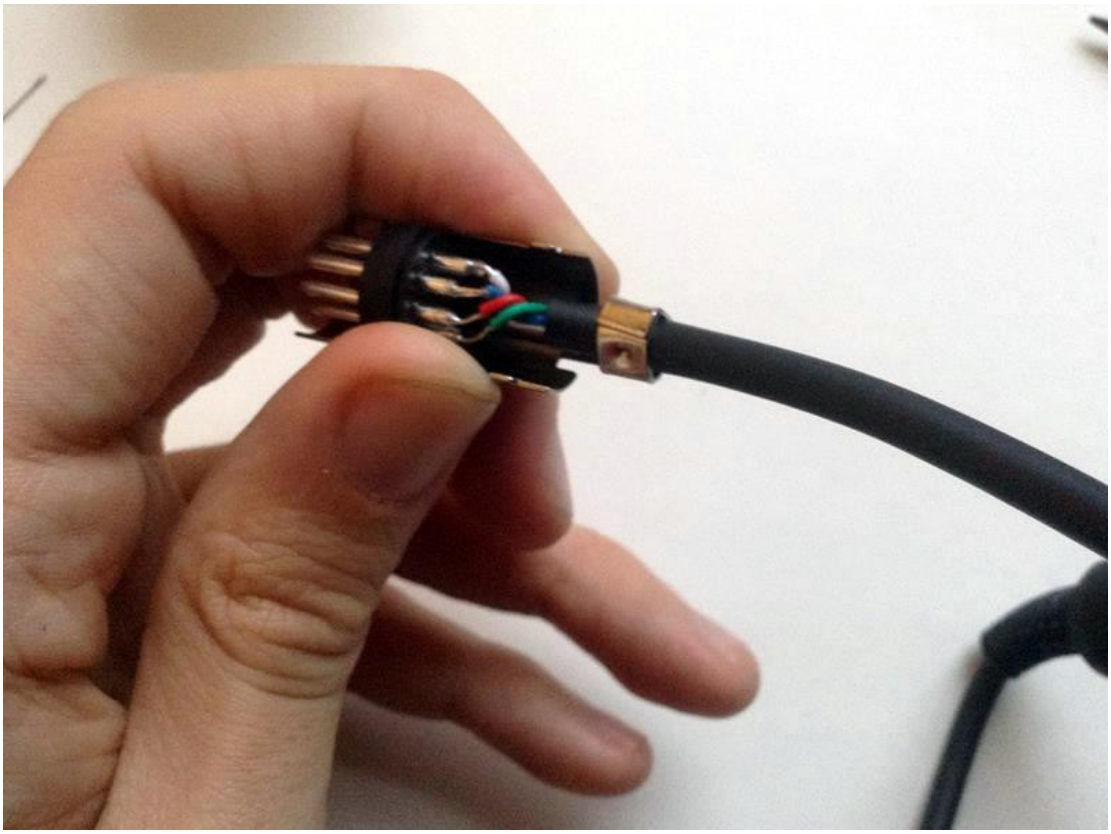
This is the desired result...



Next, you will attach the case of the connector. At the strain relief. Fold over one side first as seen below.



Then fold the other over and squeeze with pliers. Make sure the strain relief successfully prevents the connection points from moving while the cable receives stress.



Next, add the top part of the cable casing and then slip the rubber jacket over the whole unit.

You've completed this portion!

At this point it is recommended that you power on your Arduinoboy and connect it to your Gameboy. Run some test MIDI information into or out of it and see if it is working properly. Refer to the Arduinoboy documentation on the Google code page for proper operation code.google.com/p/arduinoboy/

If you suspect your Arduinoboy isn't functioning properly, return to the circuit and perform basic troubleshooting to discover the problem. You may also want to refer to a schematic and the board layout. These can be found on the GitHub page. http://tiny.cc/uyscbx

If it's working properly, then proceed with instructions...

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Finishing Touches
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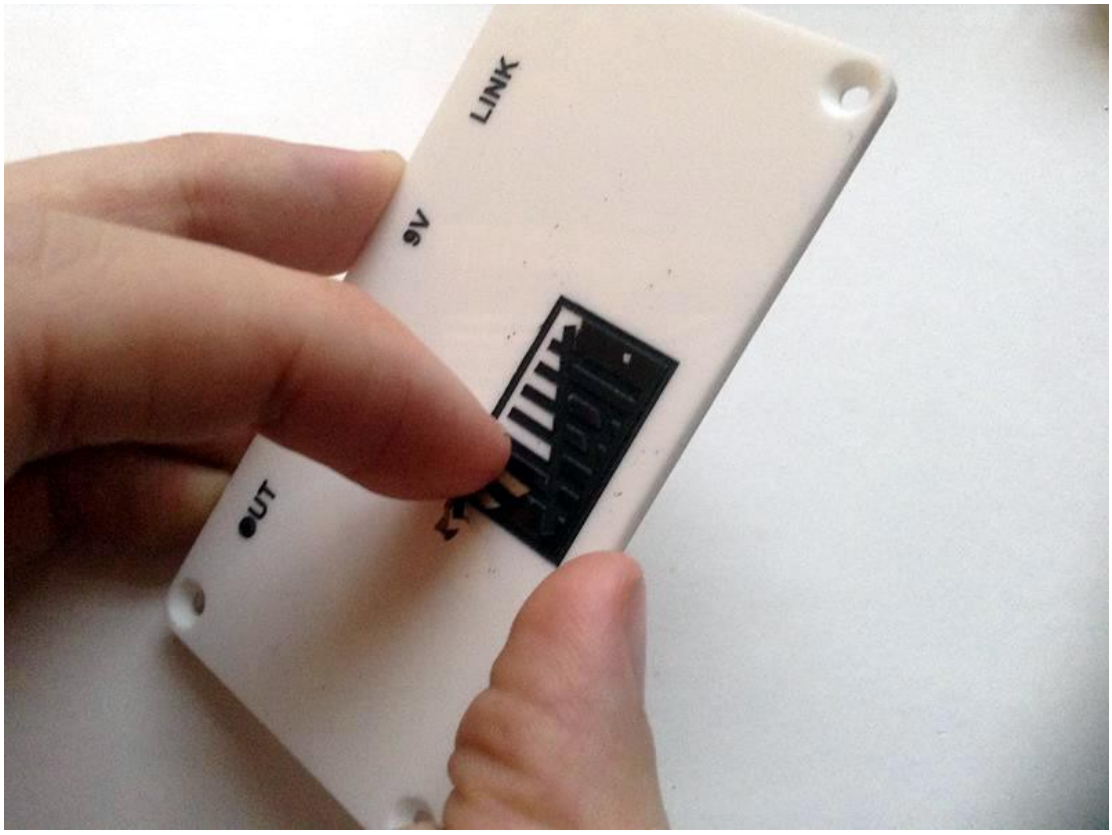
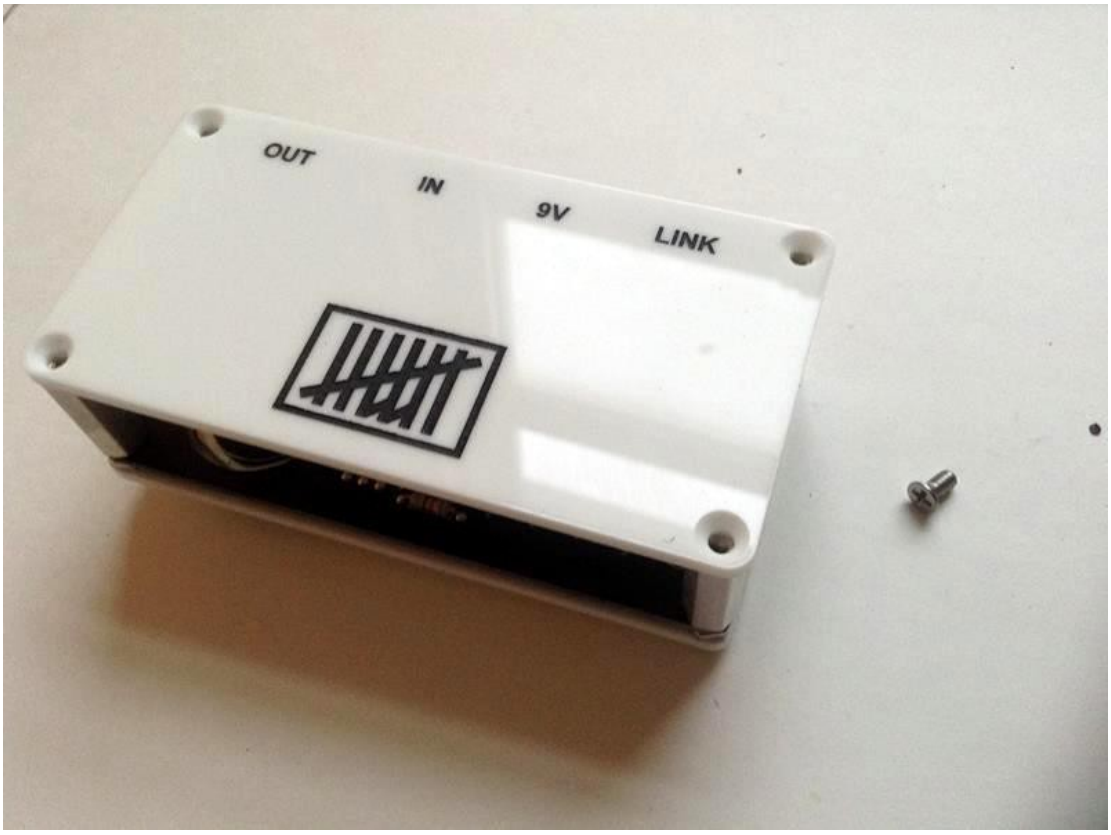
Remove the protective paper from the acrylic bottomplate. You can use your fingernail to remove the small pieces of paper without fear of damaging or scratching the surface.

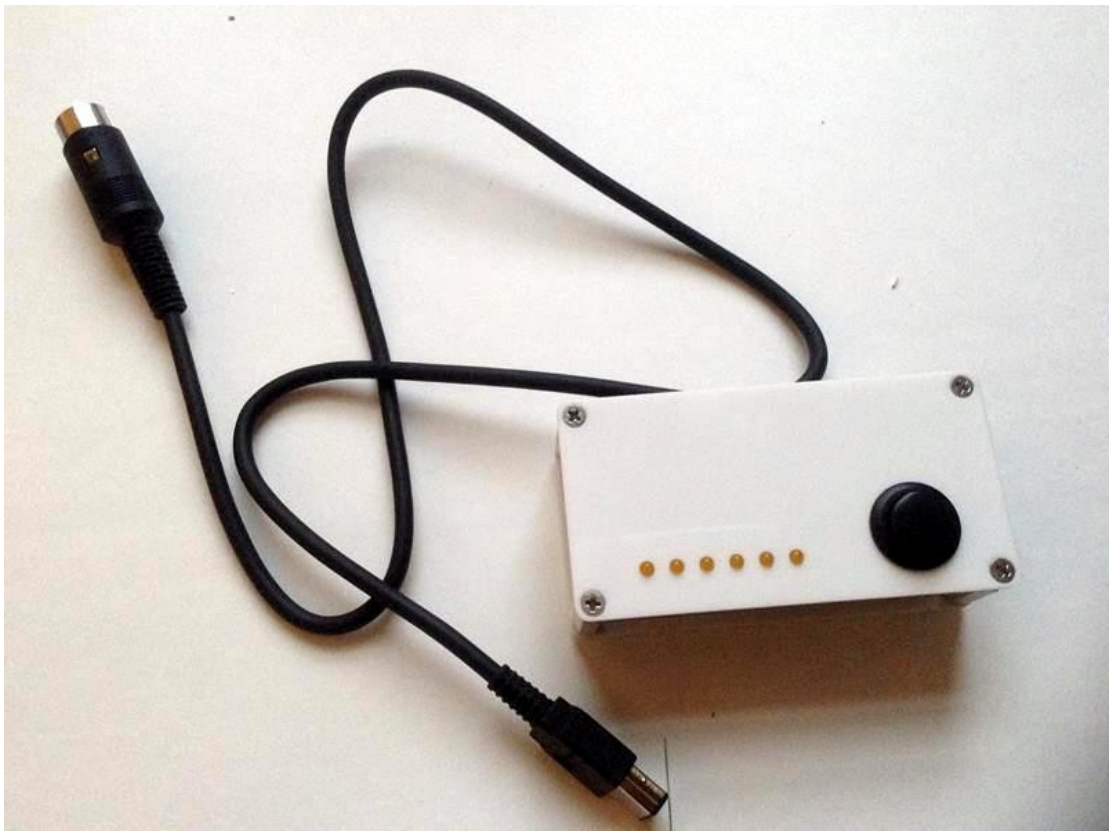


You'll be using 1/4” 4-40 screws to mount the bottom plate.



After having secured the plate. Add the rubber feet. The following photo is only a suggestion of where to place them. Do as you like.

Congratulations. You are now the proud owner of a totally awesome device for making killer music and you built it yourself. High five!



Thank you.

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