

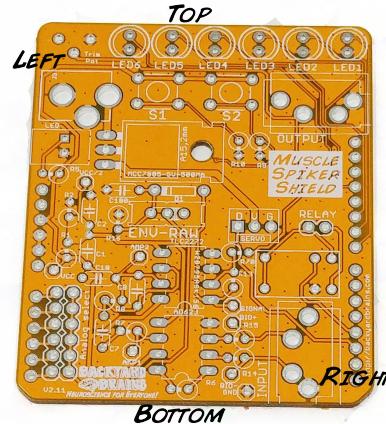


MUSCLE SPIKERSHIELD V2.11 INSTRUCTIONS

Prepare yourself. In 2-4 hours, you will have built your own Arduino-compatible Muscle SpikerShield which you can use to control electronics, robots, and programs with your Muscle activity.

Materials Needed:

1. DIY Muscle SpikerShield Bag of Parts
2. Soldering Iron
3. Solder
4. Magnifying Glass to read labels on Chips and Capacitors
5. Silly Putty to hold components in place on board while you solder on the back of the board
6. Wire Strippers and Wire Clippers to trim leads
A Soldering Iron can be purchased at RadioShack or any local hardware store. The Magnifying Glass and Silly Putty are available at drug stores.



Muscle SpikerShield Circuit Construction (refer to photograph on page 4 while building):

Resistors & Capacitors

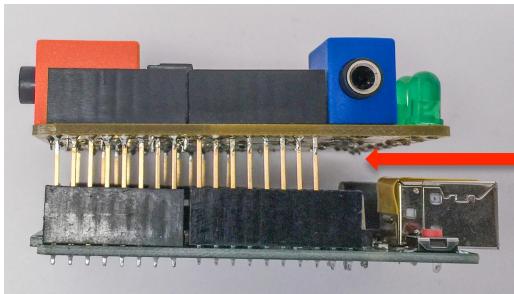
1. Install Diode at position marked D1 (*note-- the black mark needs to be on the left side, aligns with white mark on the board*)
2. Install four blue 10uF Capacitors at C1, C2, C10, and C100 (blue ones – "106" label on them)
3. Install one yellow 0.47uF Capacitor at C7 ("4742" label)
4. Install one yellow 560pF Capacitor at C8 ("561" label)

For resistors, bending the leads so that they make a U with the thick part on one side. This leg of the U is inserted in the hole that has the circle around it on the board. The stripes of color indicate the resistor and are noted in the steps.

5. Install two 1kΩ Resistors at R7 and R70 (brown-black-red)
6. Install one 390Ω Resistor at R5 (orange-white-brown)
7. Install one 33kΩ Resistor at R6 (orange-orange-orange)
8. Install four 10kΩ Resistors at R1, R2, R9, and R10 (brown-black-orange)
9. Install one 270kΩ Resistor at R8 (red-purple-yellow)
10. Install two 47kΩ Resistors at R14 and R15 (yellow-purple-orange)
11. Install one 100kΩ Resistor at R13 (brown-black-yellow)
12. Install one 20kΩ Resistor at R16 (red-black-orange)

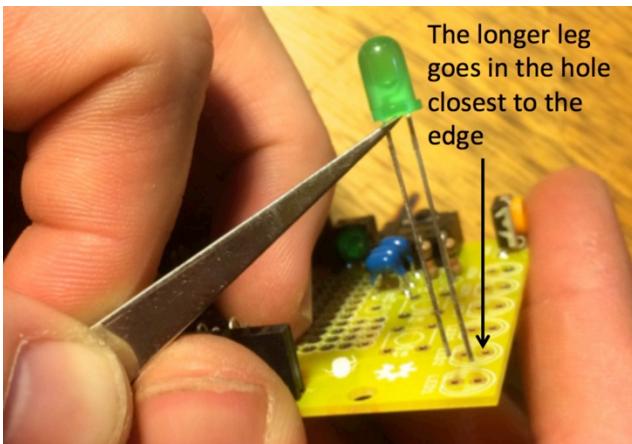
Larger Components

13. Install 3.5mm orange connector in the bottom right position marked INPUT
14. Install 3.5mm blue connector top right position marked OUTPUT
15. Install LED (Light Emitting Diode, green) on the top left of the board marked LED
16. Install the black switch under the diode, marked ENV-Raw
17. Install the two chip holders under the switch, in the center of the bottom of the board. Align the half circle on the side of the chip holder with the half circle on the board.
18. Install potentiometer/trim pot where it is marked "Trim Pot" on the top left corner of the board
19. Install the two 6-pin headers on in the positions next to "Analog Select" on the bottom left of the board. Place the jumper on the topmost pair of headers as a default. (refers to Analog In 0 on Arduino) You can move the jumper to other pins if you want to change which Analog In you want the muscle signal to feed through.
20. Install Relay above the orange connector
21. Install Relay header where it says RELAY
22. Install programmable buttons in positions S1 (white) and S2 (red)

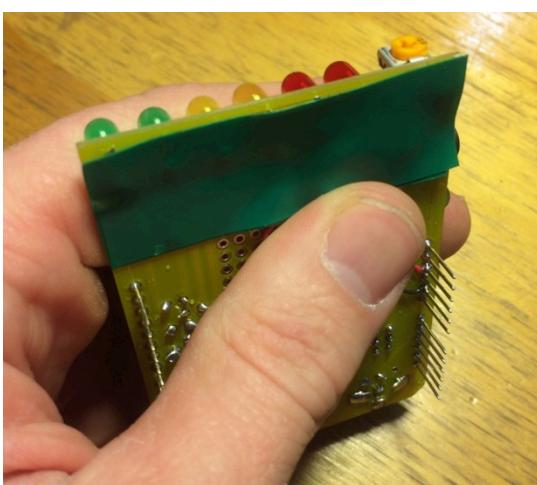


Warning: DO NOT CLIP THE HEADER PINS.
THEY ARE NEEDED TO MATE WITH ARDUINO

23. Install one 8-pin female header on the far right edge of the board, in Digital I/O bank 0-7
24. Install one 8-pin female header on the far right edge of the board, in Digital I/O bank 9-Aref
25. Install one 6-pin female header on the far left edge of the board, in Analog In bank 0-5
26. Install one 6-pin female header on the far left edge of the board, in bank Vin - RST
27. Install the 6 colored LEDs along the top edge of the board. From left to right, install two red, then two yellow, then two green. The "longer leg" of the LED goes in the hole closest to the top of the board, and there is a flat part of the back of the LED that lines up with the marking on the board.



28. Install chips in the chip holders. Align the circle/half-circle mark on the chip toward the half-circle on the end of the chip holder. AD623 chip goes into the bottom chip holder (below the mark AD623), and TLC2272 chip goes in the top chip holder (below the mark TLC2272).
29. Add a strip of electrical tape over the LED contacts after they've been soldered and trimmed to avoid a potential short circuit when mated to Arduino.

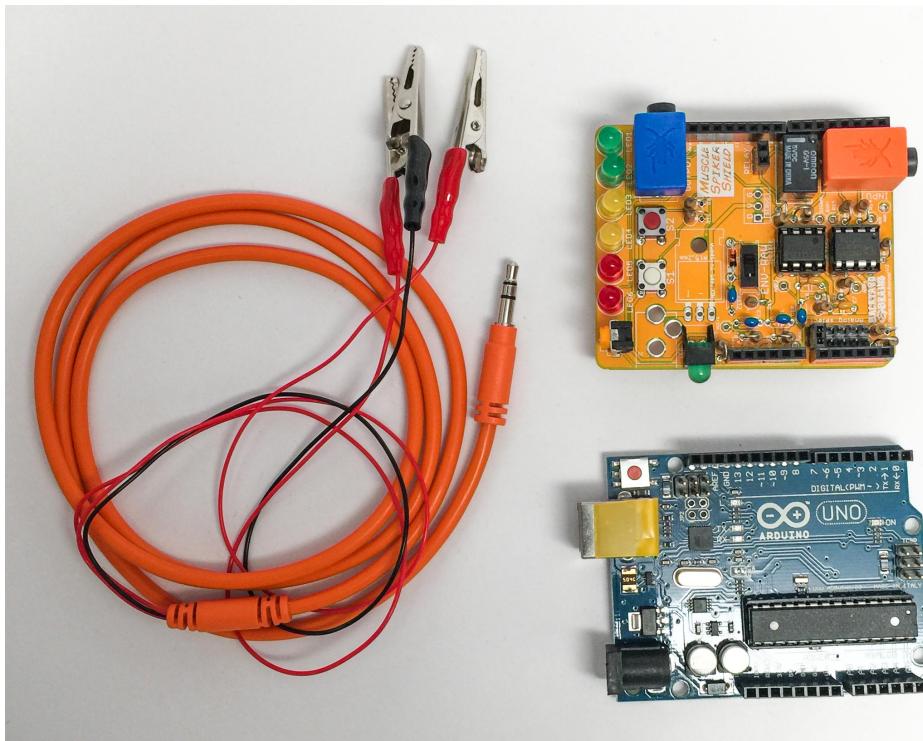


FINAL ASSEMBLY

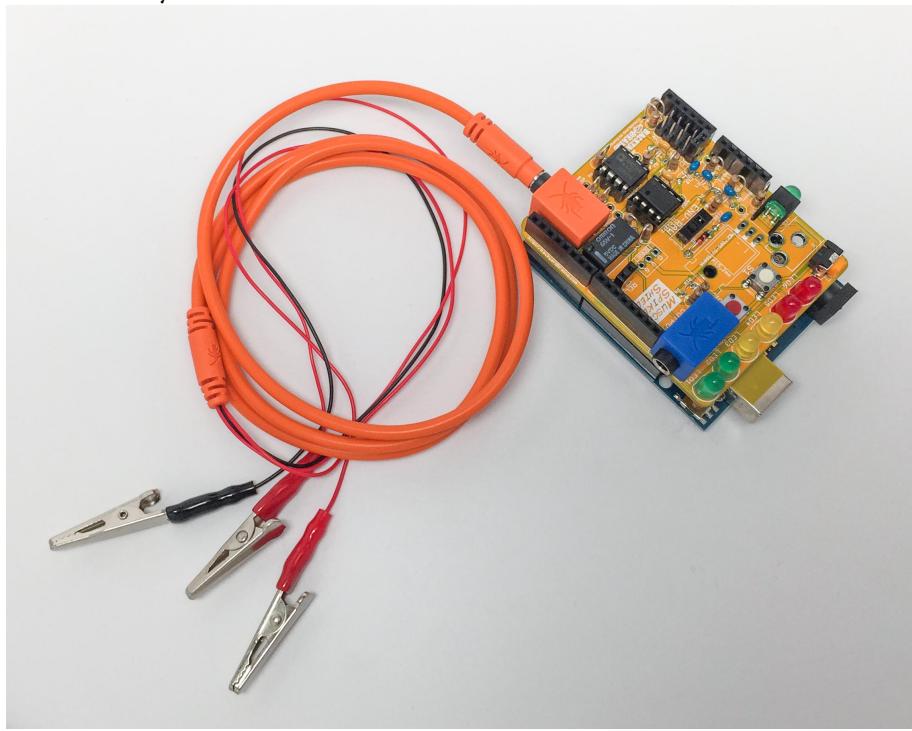
1. Stack your Muscle SpikerShield on top of your Arduino Uno, making sure all the pins are in place. You can buy an Arduino Uno from RadioShack, SparkFun, Make, etc.

NOTE that the Muscle SpikerShield does not fill every single header on the Arduino.

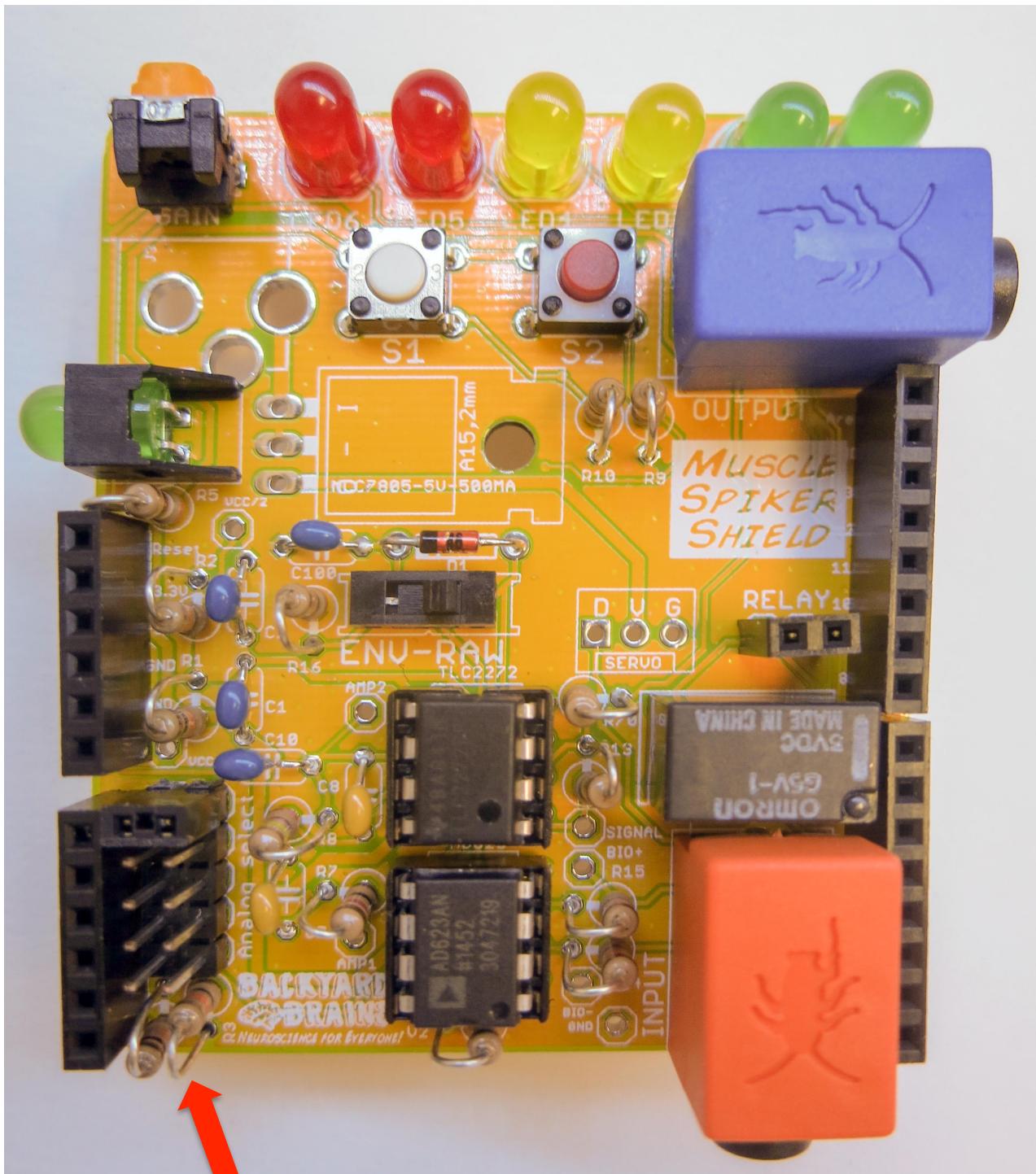
NOTE SpikerShield board shown below is older model and may not be the exact one you have. The orientation, however, is the same.



2. Plug in your electrode cables, and you are done! To power the Arduino, it needs to be plugged into a USB Power Source. Visit the Experiments page on our backyardbrains.com website to learn how to use your new tool for creativity!



This is generally how your board should look after you finish it!



NOTE - This version with R3 and R4 is only available on version V2 of the Muscle SpikerShield