BACKYARD BRAINS
NEUROSCIENCE FOR EVERYONE!

Muscle SpikerShield V1.7 and V2 Instructions

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

Materials Needed:
1. An Muscle SpikerShield Bag of Parts
2. Soldering Iron
3. Solder
4. Magnifying Glass to read labels on Chips and Capacitors
6. Silly Putty to hold components in place on board while you solder on backside
8. Wire Strippers and Wire Clippers

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):
1. Install 3.5mm orange connector where is marked as INPUT
2. Install Audio Out Connector. 3.5mm Blue connector where it says output
3. Install LED (Light-Emitting Diode – green)
4. Install switch
5. Install the two chip holders (align the half-circle on side of the chip holder with the half circle on the board)
6. Install potentiometer
7. Install the two 5-pin headers over AI_select and place jumper over left-most position as a default – which refers to Analog In 0 on Arduino). You can move the jumper to other pins if you want to change which Analog In (0,1,2,3,4, or 5) on the Arduino you want your muscle signal to feed through.
8. Install Relay
9. Install Relay header
10. Install programmable buttons (which color is which does not matter - you can choose!)
11. Install Diode (note the black mark needs to be on the right side)
12. Install 10 uF Capacitors at C1, C2, C10, and C100 (blue ones – they have 106 labels on them)
13. Install 0.47 uF Capacitor at C7 (this has 474 or 4742 label on it)
14. Install 560 pF Capacitor at C8 (561 label)
15. Install 1kΩ Resistor at R7 and R70 (brown black red)
16. Install 390Ω Resistor at R5 (orange white brown)
17. Install 33kΩ Resistor at R6 (orange orange orange)
18. Install 10kΩ Resistors at R1, R2, R9, R10and R16 (brown black orange)(R3 and R4 on V2 or higher)
19. Install 220kΩ Resistor at R8 (red red yellow)
20. Install 47kΩ Resistors at R13, R14, and R15 (yellow purple orange)
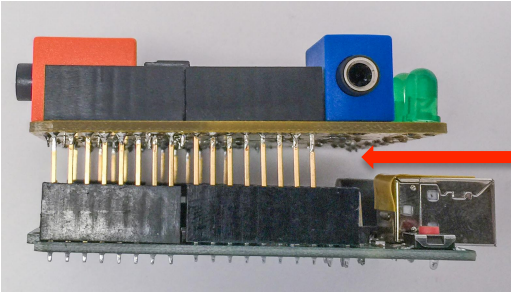
Warning: DO NOT CLIP THE HEADERS PINS.
THEY ARE NEEDED TO MATE WITH ARDUNO

16. Install 8 pin female header in Digital I/O bank 0-7
17. Install 8 pin female header in Digital I/O bank 9 – Aref
18. Install 6 pin female header in Analog In bank 0-5
19. Install 6 pin female header in bank Vin – RST
20. Install the 6 LEDs along the edge of the board. The "longer leg" goes in the hole closest to the edge of the board.

The longer leg goes in the hole closest to the edge
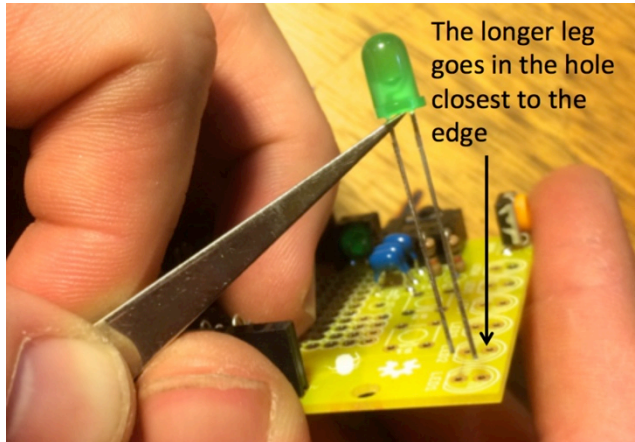
21. Install chips in chip holders, with circle mark on chip towards the RCA input. AD623 chip goes in U1, and TLC2272 chip goes in U2
22. Add a strip of electrical tape over the LED contacts to avoid a potential shortcircuit when mated with the Arduino Board
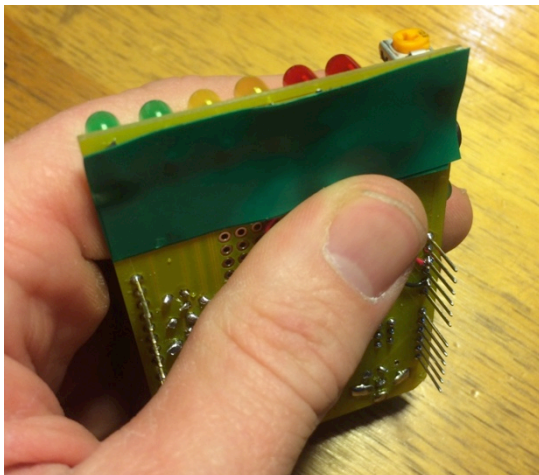
1. Stack your Muscle SpikerShield on top of your Arduino Uno, making sure all the pins are in place. You can buy an Arduino Uno from RadioShack, SparkFun, Make, etc. Note that the Muscle SpikerShield does not fill every single header on the Arduino. Note SpikerShield board shown below is older model and may not be the exact one you have. The orientation, however, is the same.
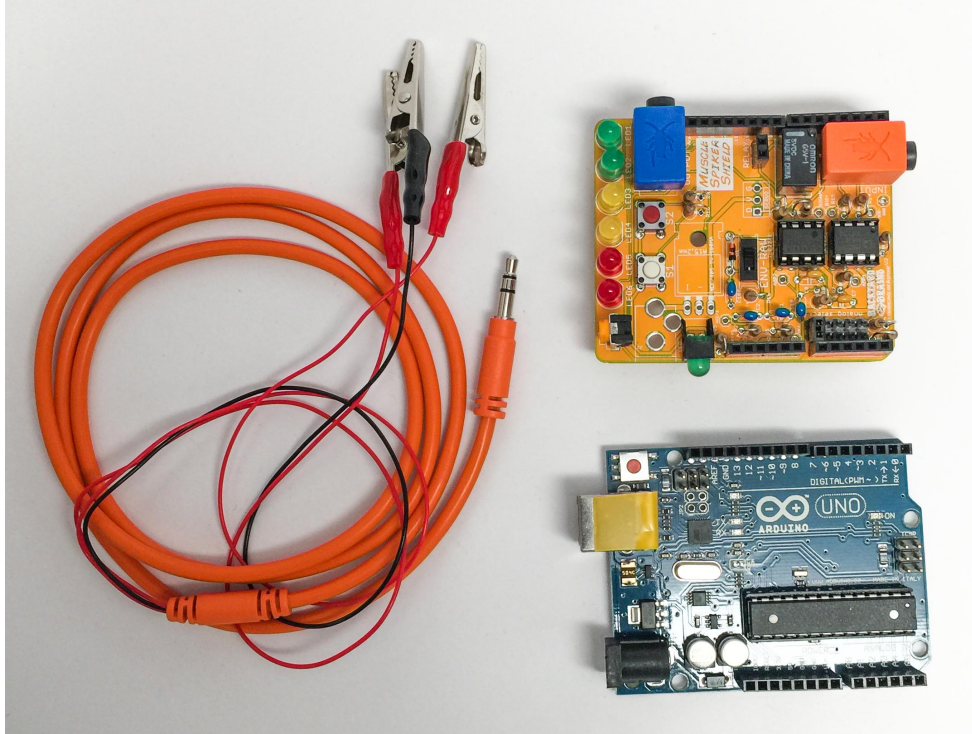
2. Plug in your electrode cables, and you are done! To power the Arduino, it needs to be plugged into a USB Power Source. Go to the experiments page on our backyardbrains.com website to learn how to use your new tool for creativity!
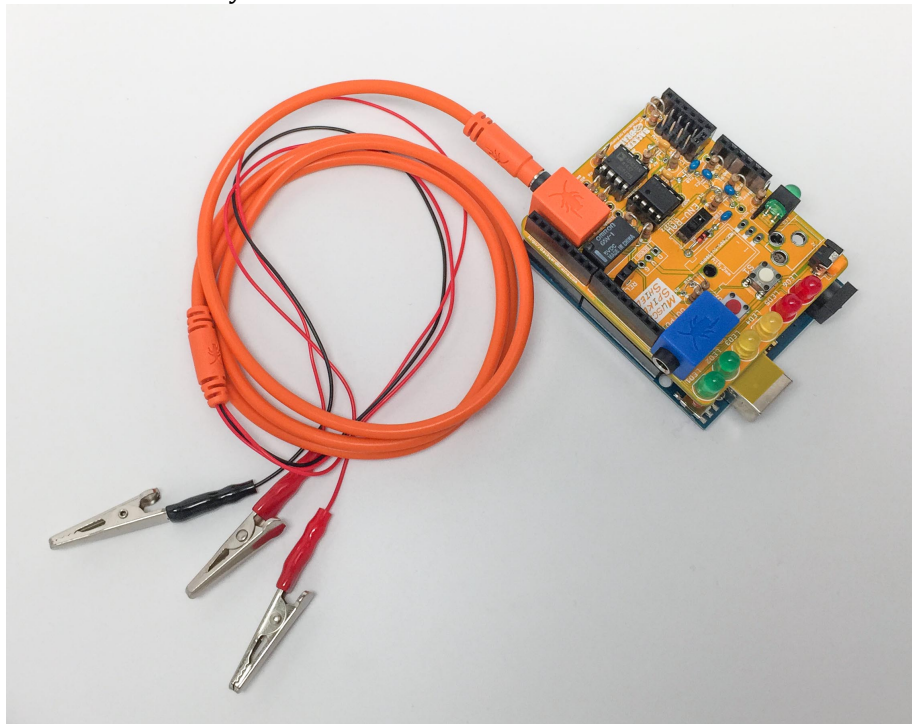
That is how your board should looks like after you finish it !
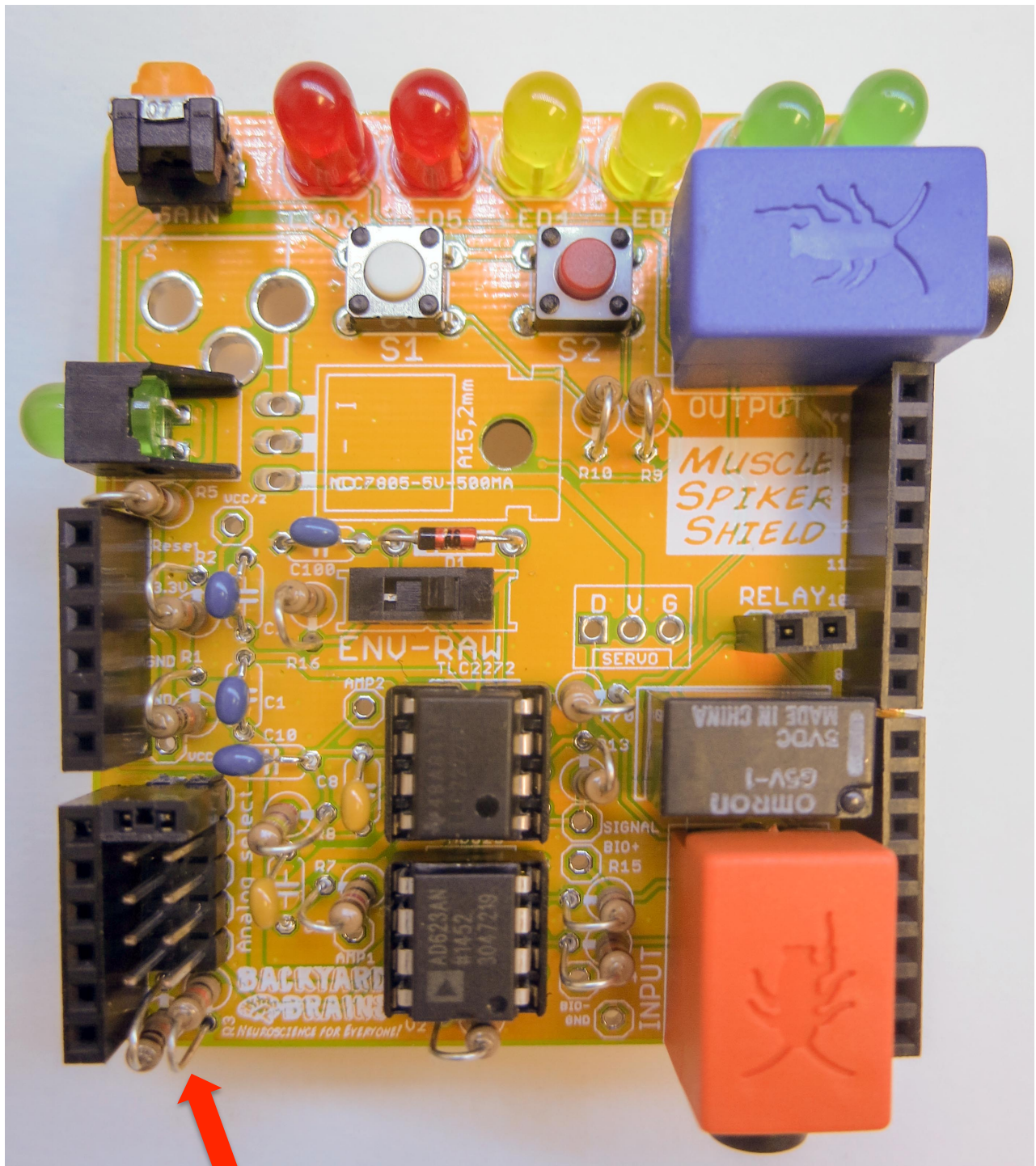
R3 and R4 is only
Available on
version V2 and higher !