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The Useless Machine Counter™

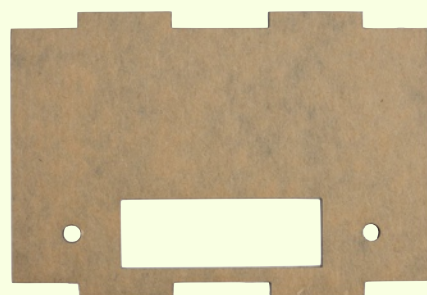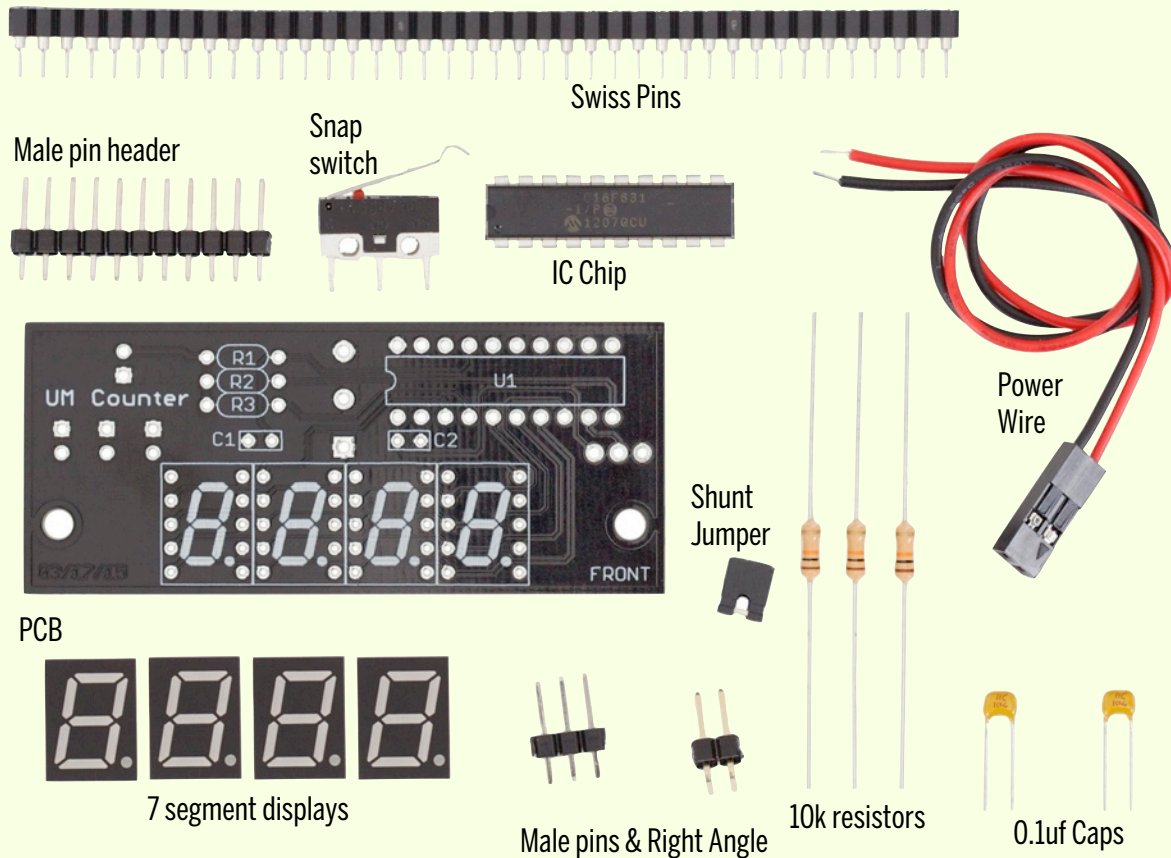## Hobby Electronics Soldering Kit

Instruction Guide

For the best outcome, follow each step in order.
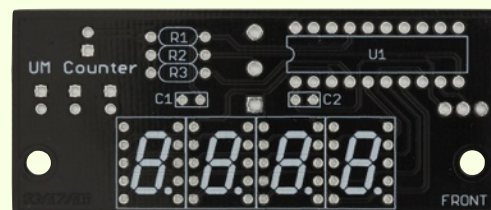We recommend reading this guide entirely before you get started.

Tools required:
Soldering iron, solder, flush cutters, flat blade screwdriver, safety glasses, masking tape.
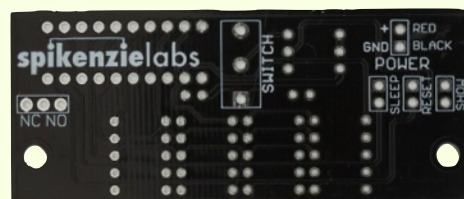
Electronics & acrylic parts

Swiss Pins

Male pin header

Snap switch

IC Chip

Power Wire

UM Counter

R1
R2
R3

U1

C1
C2

FRONT

PCB

Shunt Jumper

10k resistors

0.1uf Caps

7 segment displays

Male pins & Right Angle

Screws

Standoffs

Nuts

Short side bezel

UM Counter

R1
R2
R3

U1

C1
C2

FRONT

Front side of the PCB

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SWITCH

POWER

+ RED
GND BLACK

SLEEP
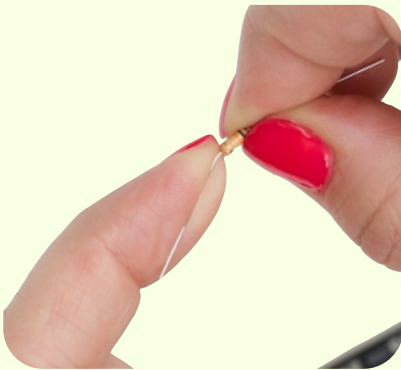RESET
SHOW

NC NO

Back side of the PCB

Note: Some components in this kit are to be soldered on the front side, and others on the back side of the PCB. Look for the white outlines printed on the PCB to show where the parts go.

Preparing and placing the resistors

Resistor bending:

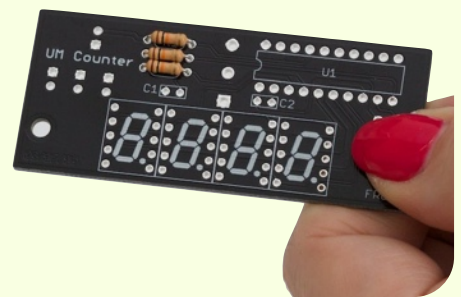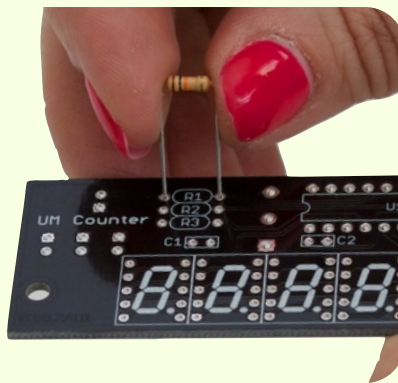Bend each of the resistors like in these photos:

You want to have the bend of the leg
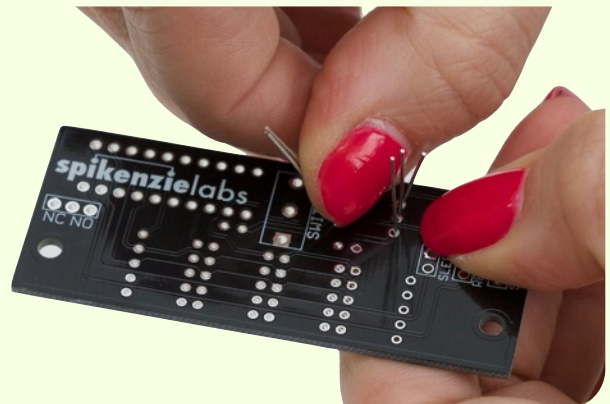as close as possible to the body of the resistor.

Resistor placing:

The Basic Counter takes 3 x 10k
resistors. They get installed in the
spots noted as R1, R2, and R3.

Slide the resistors all the way down so
that they are flush with the PCB.

Flare out the legs to keep them in place. Be sure that
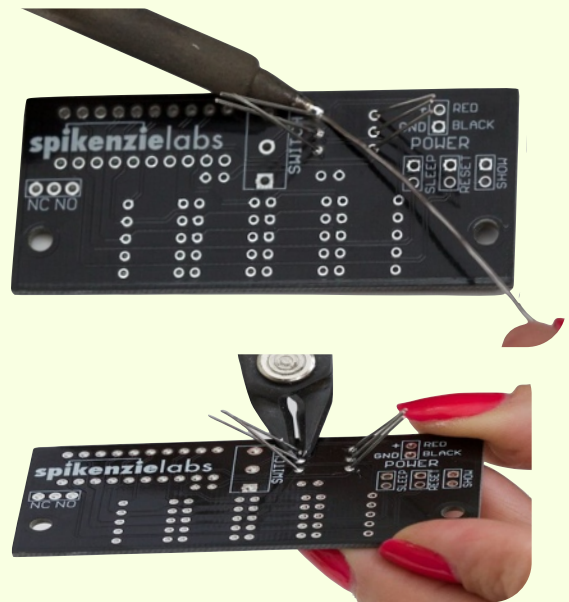the body of the resistor is flush against the PCB.

Solder the resistors in place. Make sure you don't forget to solder any of the legs.

! **Safety Glasses On!**

Snip off the ends of the legs. Be sure not to scratch the surface of the PCB. Keep your safety glasses on!
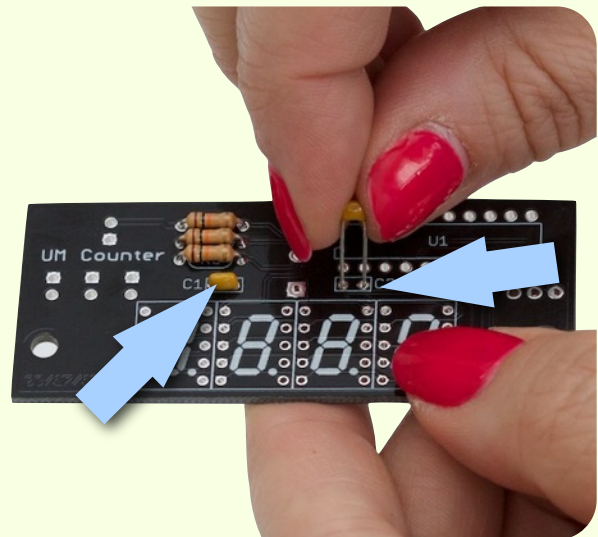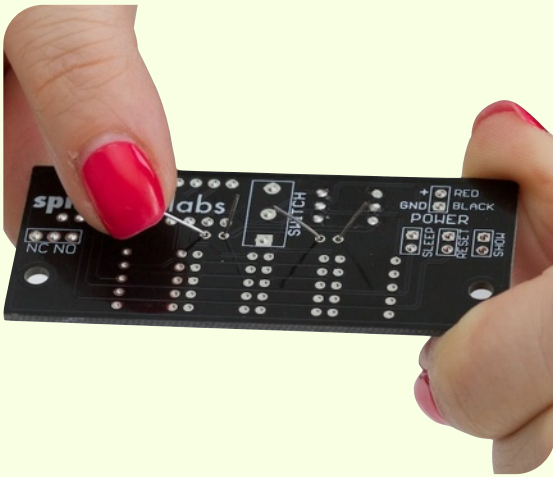
Capacitor preparation

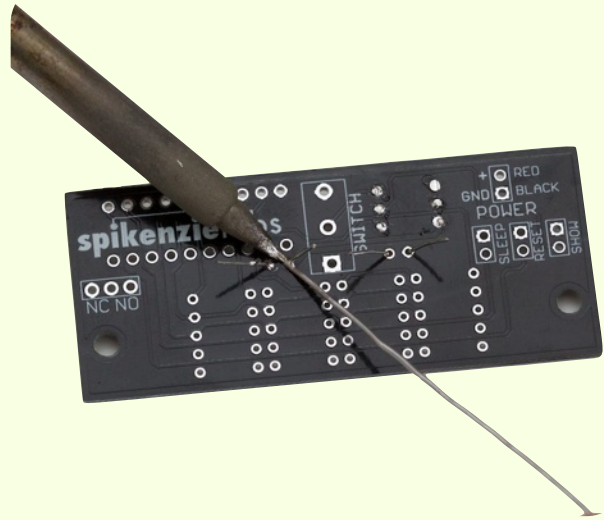Snip the capacitors from the paper tape.

Place the capacitors in the two locations as seen in these photos. Marked as 0.1uf on the PCB.
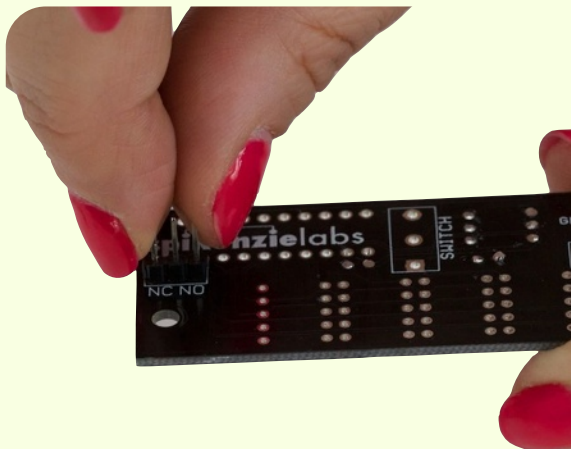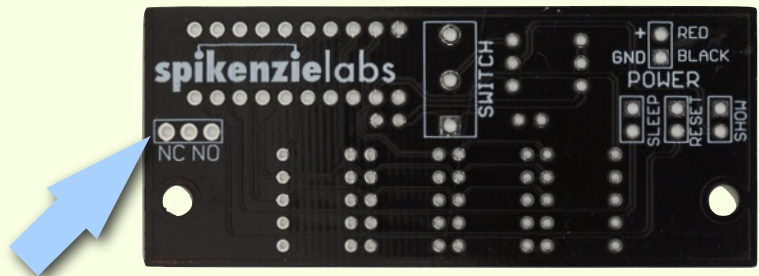
Flare the legs out as your did for the resistors.

Solder both capacitors in place. Snip the ends of the legs.
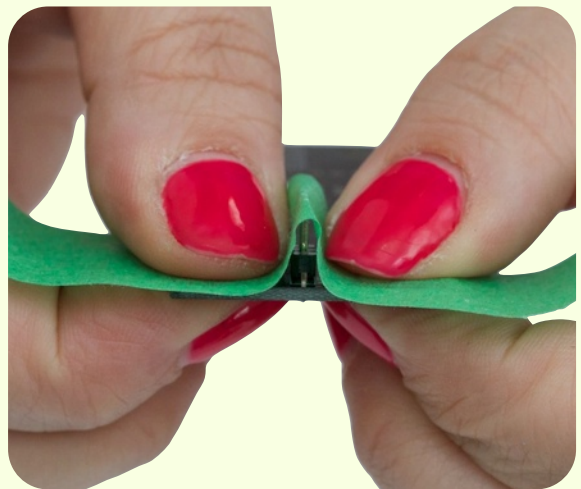
Male pin headers

The 3 pin header gets placed on the back side of the PCB.

Place the 3 pin header as indicated above.

You can hold the pin header in place with a piece of masking tape. This makes it easier to solder.
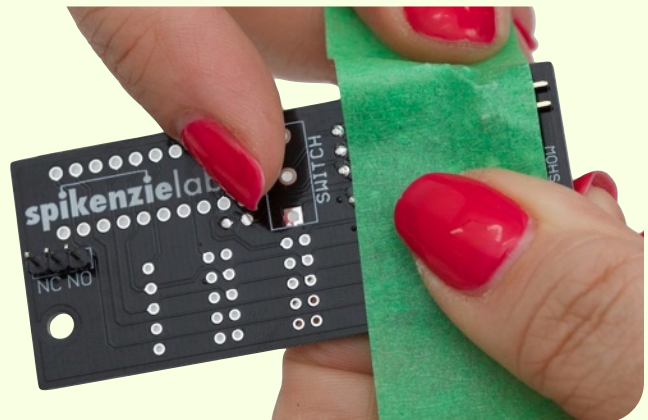
Solder the pin header on the front side.
You do not need to trim these.

The 2 pin right angle header gets placed on the back side of the board.

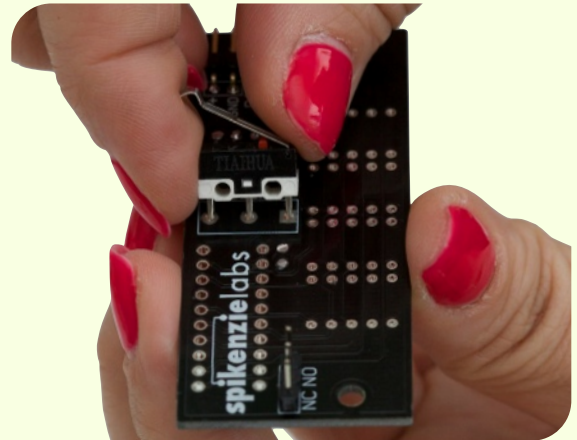You can hold the pin header in place with a piece of masking tape. This makes it easier to solder.

Solder the pin header on the front side.
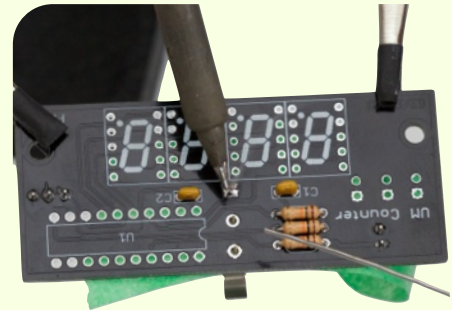You do not need to trim these.

Snap switch

The snap switch also gets placed on the back side of the PCB. The hinged side aiming down as in this photo.

Hold the snap switch in place with a piece of tape, and solder on the front side.

Solder one lead and check to be sure that the snap switch is flat against the PCB.

Swiss pins

In your kit, there is a strip of 40 Swiss pins. Cut the Swiss pins using your flush cutters into eight segments of five pins each.
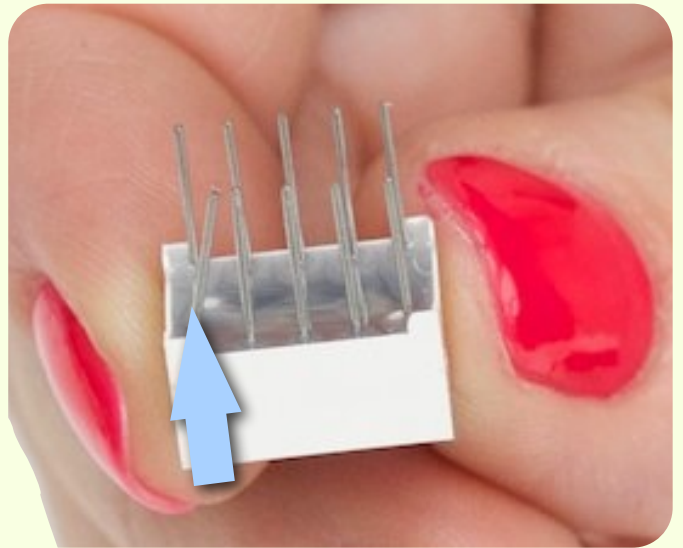
Note: If you break off a single pin, keep it, you will need all 40 pins.

Make sure that the legs are straight. The LED modules will fit onto the PCB much easier if you adjust them as needed.

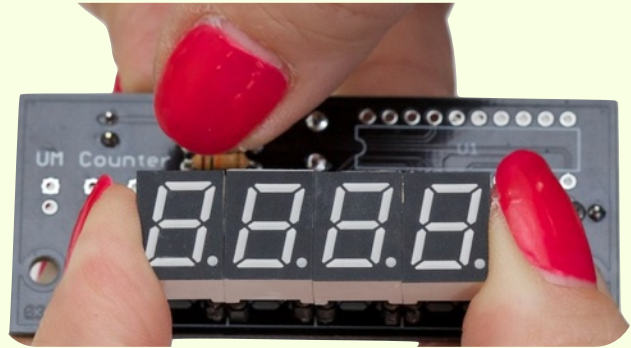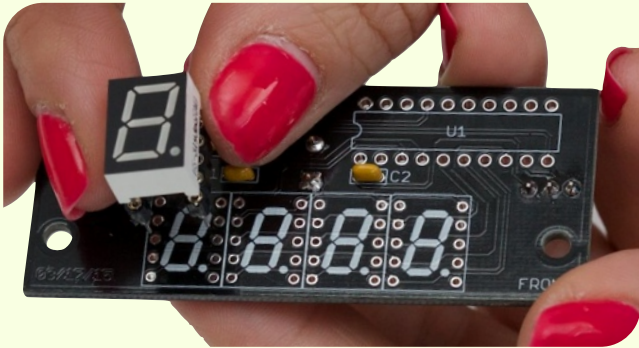Bend any leg that is not perfectly straight to be as straight as possible.

Place a pair of cut Swiss pins over the legs of each LED. This gives the LEDs more height. Line them up, and evenly press down so that the LED leg enters the Swiss pin hole. Do this for all four LED modules.
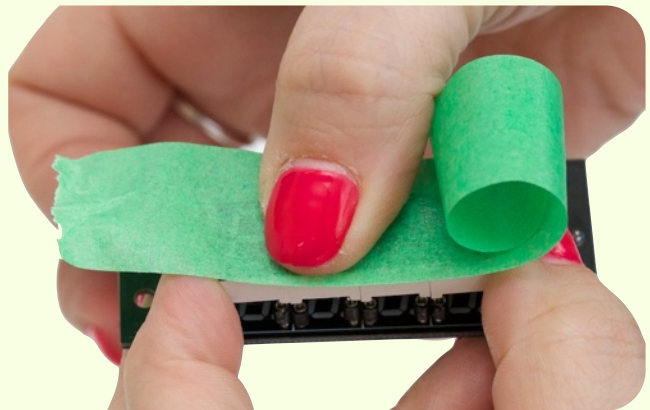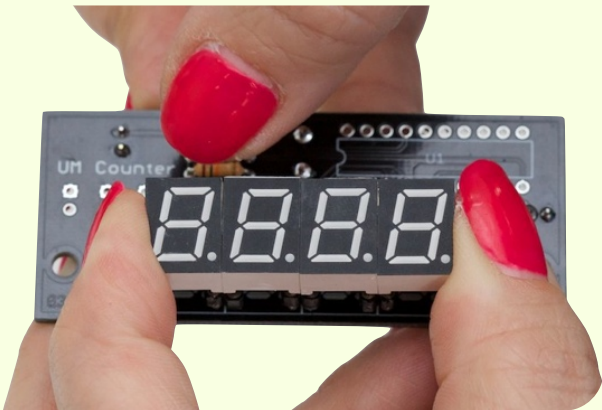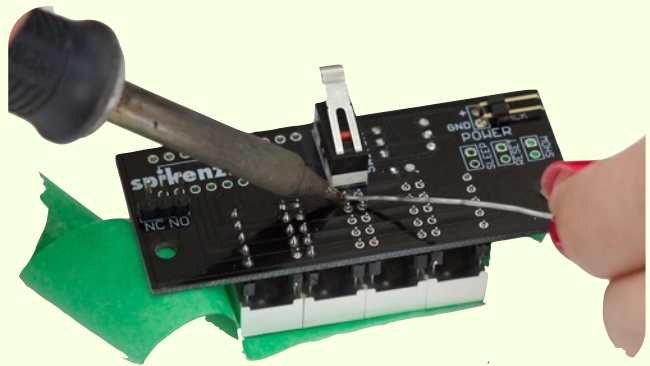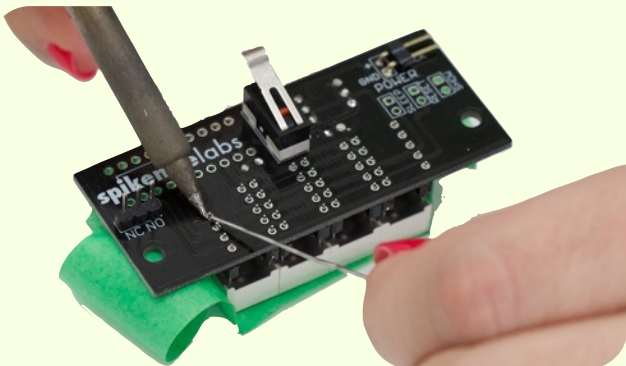
Mounting the 7 segments displays

Make sure that the decimal points are lined up on the 7 segment display and PCB when you're setting these in place. Place all 4 of them.

Pinch the displays together to have any gaps between the displays as minimal as possible. Also if they are slightly off-set in terms of height, correct for this as well in the same way. Hold them with masking tape.

Start soldering all of the pins. Take your time, and be especially careful when you're soldering close to the snap switch. The body is made out of plastic, and a couple of taps from the hot iron can damage it.

IC chip preparation

When manufactured, the legs are flared out slightly. To be mounted to the socket, the legs need to be closer to the body of the IC.
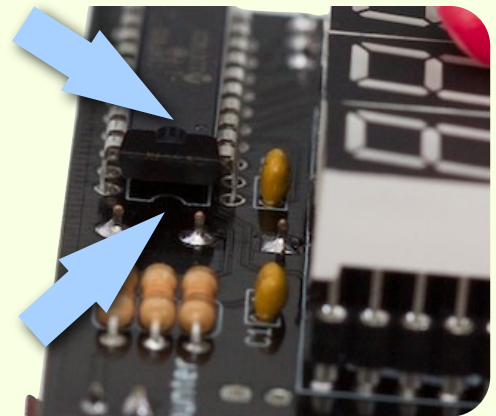
Remove the IC from the antistatic foam. Hold it firmly on either end, and press the legs down on a flat hard surface.

You can test fit it on the PCB if you think you have them straight enough.

!

Mind the notch!

The IC, and the PCB both have a notch indicating the correct orientation for the IC. Make sure they are lined up. If you insert the chip in the wrong orientation, it will not work.

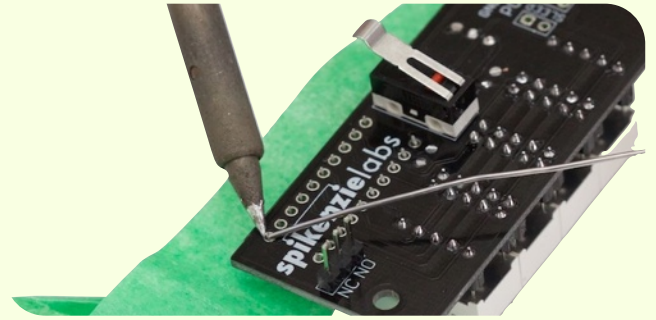Proper placement for soldering the IC on the PCB.

Hold the IC in place with a piece of masking tape if you like.

IC Soldering

Solder the IC. Make sure not to forget any pins.
Be careful not to heat the IC pins for too long.
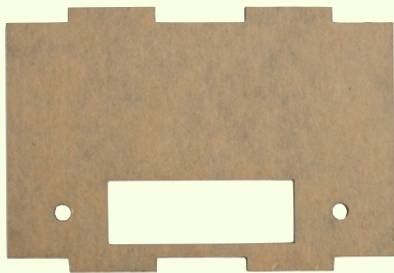3 seconds maximum each.

Shunt jumper

Place the shunt
jumper over the NC
and middle pin.

Acrylic peeling

The Useless Machine Counter comes
with a bezel with an opening for the
LED modules.

Peel the protective paper from both sides of
the black laser cut acrylic.

Bezel & PCB Assembly

Slide both of the black screws through the holes in the bezel. Send both screws through the same side of the bezel.
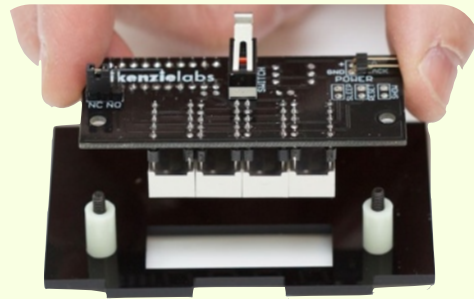
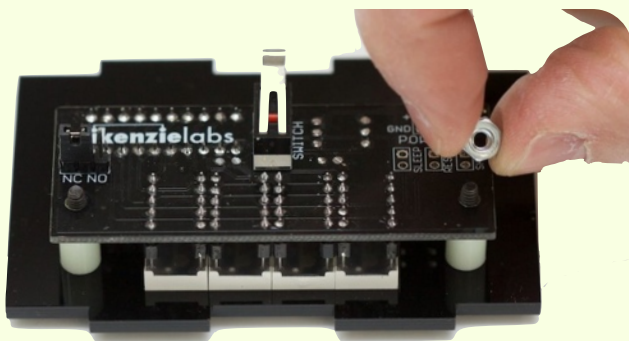With both screw heads against the table, lay the bezel flat in this orientation.

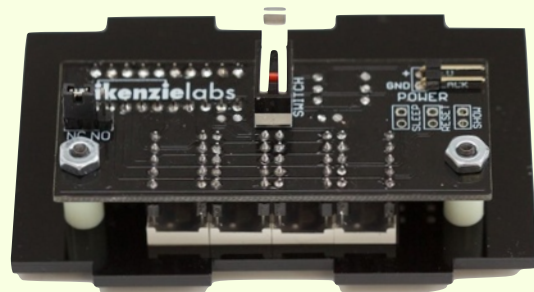Slide the plastic standoffs onto the screws.

Place the PCB LEDs down over the opening in the bezel, and line up the ends of the screws so that they go through the screw holes in the PCB.
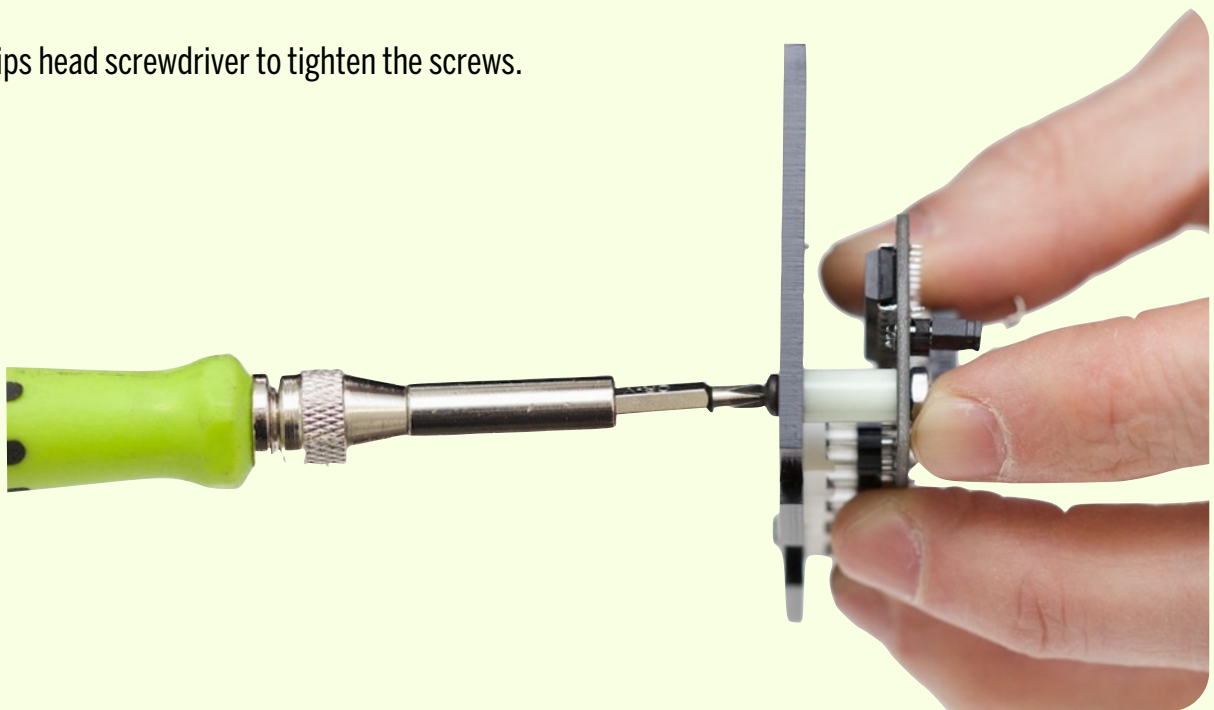
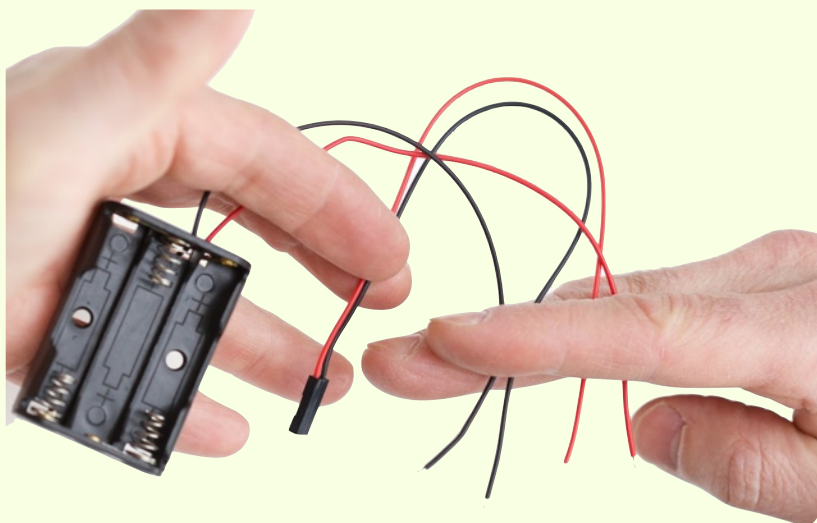Place the two nuts over the screws, and spin them down.
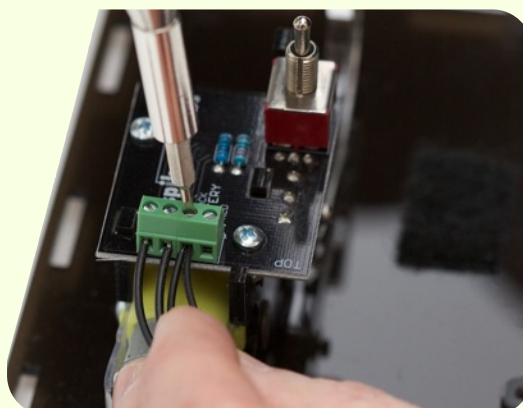
Here both nuts are in place.

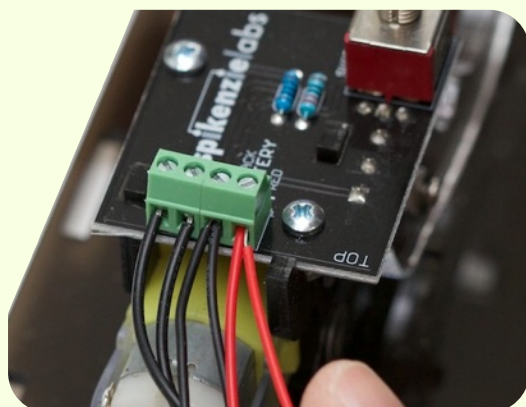Use a Phillips head screwdriver to tighten the screws.

Line up the pair of black wires from both the battery holder, and the power cable. Do the same for the red wires.

Take the pair of black wires and slide them into the screw terminal marked Battery (-) on the Useless Machine PCB.

Tighten the screw on the screw terminal housing.

Take the pair of red wires and slide them into the screw terminal marked Battery (+) on the Useless Machine PCB.

Tighten the screw for the red wires as well.

Note: Make sure to tighten the screw terminals onto the bare metal part of the wires and not the plastic coating.

Slide the power cable onto the power pins. Make sure the red wire lines up with the (+) RED marking, and the black wire to the (-) BLACK marking on the back side of the PCB.
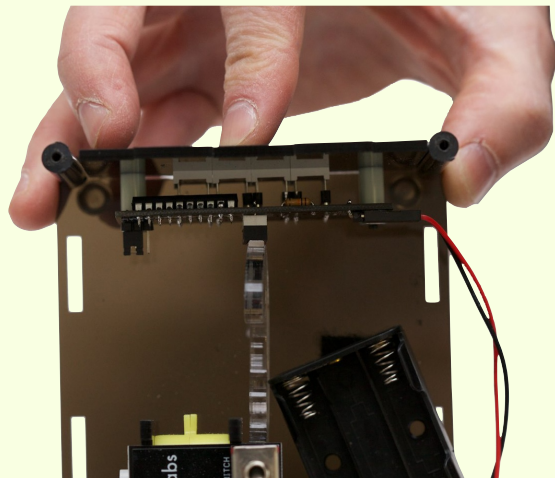
Place the bezel and attached PCB assembly into the slots into the bottom panel of the Useless Machine acrylic.

Note: The snap switch will press against the Useless Machine arm when you are at this stage. Make sure not to snag the metal part of the snap switch as you are placing the panel assembly.

FRAGILE

Place the bezel and attached PCB assembly into the slots into the bottom panel of the Useless Machine acrylic. Make sure the power jumper does not come loose.

Continue The Useless Machine assembly, in the same way as documented in your Useless Machine build guide.