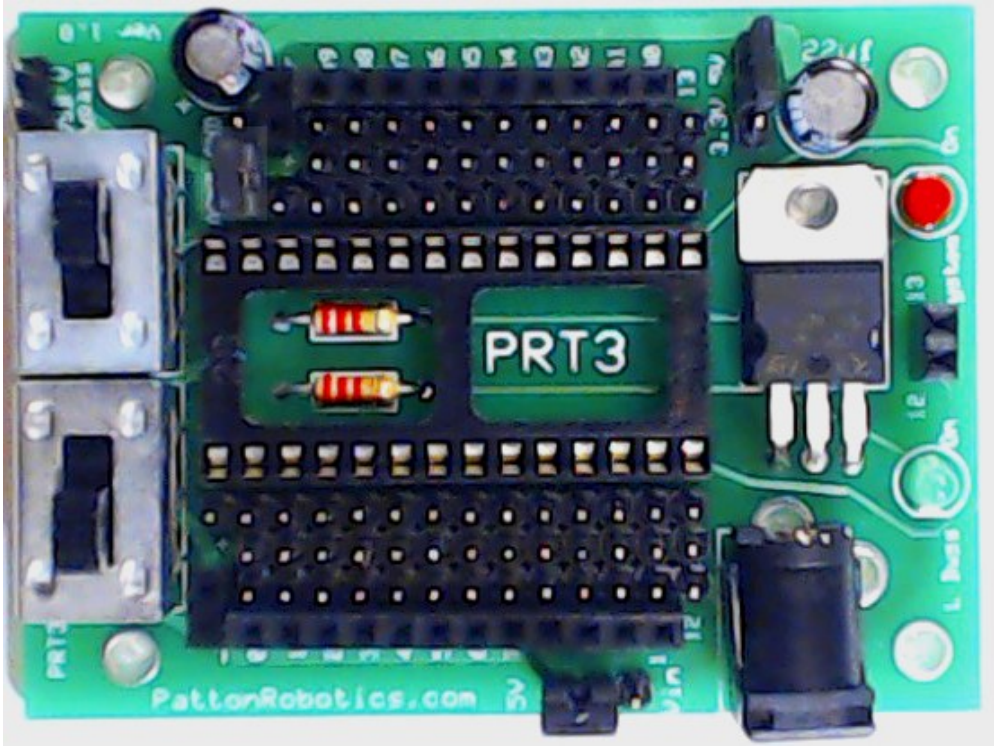
Patton Robotics LLC



Patton Robotics T3 Motherboard

Assembly Instructions

Version 1.1

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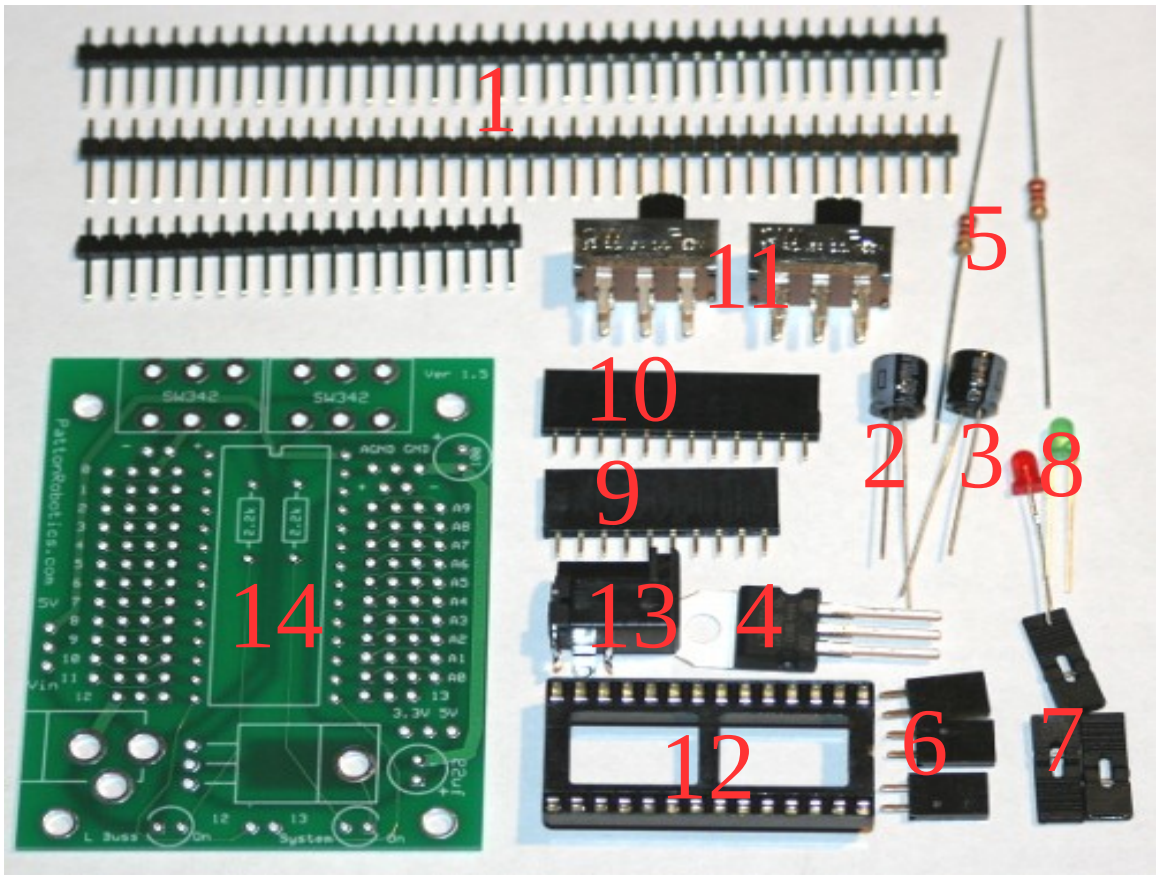
Patton Robotics T3 Kit Contents:



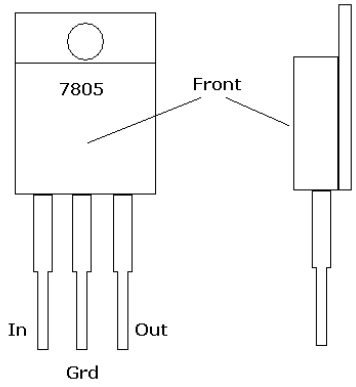
1 Male Header Pins
2 100µF Cap
3 22 µF Cap
4 Voltage Regulator
5 2.2 kΩ Resistors
6 Three 2 Pin Female Header Pins
7 Three Shunts
8 Two LEDs
9 Ten Pin Female Header Pins
10 Twelve Pin Female Header Pins
11 Two Switches
12 28-Pin Socket
13 Barrel Power Connector
14 PRT3 Circuit Board

Assembly:

Great care should always be taken while soldering electronic components. As a general rule, the components with the lowest profile should be soldered first.

Identifying Parts:
The Voltage Regulator

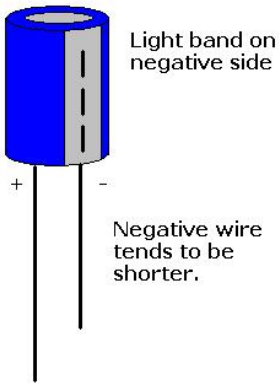
When assembling your motherboard, pay close attention to the orientation of the components. Let me diagram the voltage regulator here first:

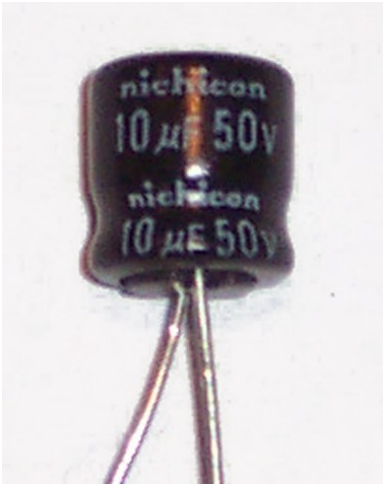


The “In” is the pin that your switch and battery pack supplies. The “Grd” is the pin that connects to the ground plane. The “Out” is the pin that outputs the regulated 5 volts.

The Capacitors:

The capacitors you are using also have an orientation. It is very important that they get connected in the correct way. The negative side of the capacitor is indicated by the light-colored gray band. The negative wire terminal is also shorter than the positive one, but always trusts the light colored band over the wire length. The bottom line is the negative side needs to be connected to the ground plane on the circuit board. Check out the diagram below:

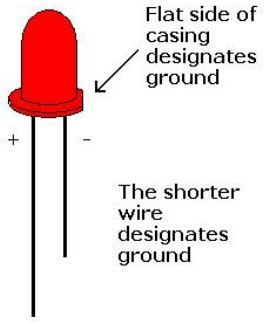




Careful examination of the capacitor will also be needed to identify the value. In the picture on the right, a 10uF 50Volt label is clearly seen.

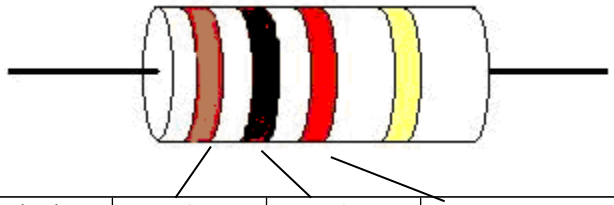
The LED

Well, come to think of it, almost everything has an orientation. So I suppose that you are not surprised to see the LED here:



Resistors:
Thankfully, the resistor has no particular arrangement. We just have to stick it in there. It does however have a code.

Check out the colored bands on the resistor. Each band specifies a number, a multiplier, and a tolerance. I will attempt to diagram the resistor code here:



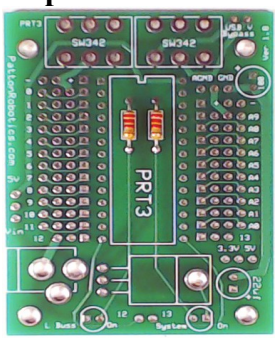
Black	0	0	X 1
Brown	1	1	X 10
Red	2	2	X 100
Orange	3	3	X 1000
Yellow	4	4	X 10,000
Green	5	5	X 100,000
Blue	6	6	X 1,000,000
Violet	7	7	X 10,000,000
Gray	8	8	X 100,000,000
White	9	9	-

The forth band specifies tolerance or accuracy. Gold is + or – 5%. Silver is + or – 10%. No band is + or – 20%.

Examine the two resistors in your kit. Note the color band pattern should be Red-Red-Red, indicating the resistor's value is 22 x 100Ω = 2200Ω or 2.2kΩ.

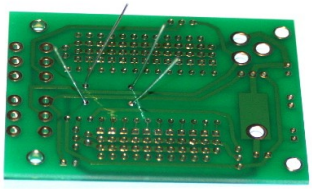
Assembly Instructions.

Step 1



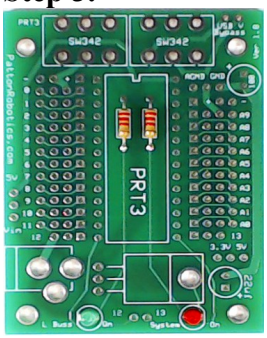
With the Patton Robotics logo facing up, insert two 2.2kΩ resistors into the circuit board as shown.

Step 2.



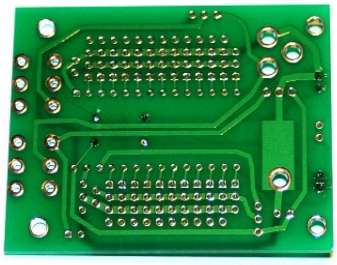
To help with holding parts in until soldering, gently bend the wires out at a slight angle if needed. It is good practice to solder just one lead of each component and check for alignment. Once you're sure the parts are properly aligned, solder in the remaining leads.

Step 3.



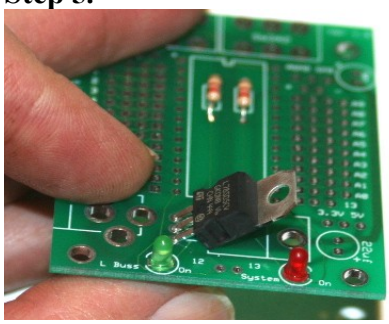
Next place the Red and Green LEDS into the board as shown. The board is oriented with the green LED on the left and the red LED on the right, which is the preferred placement. Be sure to match the flat side of the LED with the flat side of the white line trace on the board.

Step 4.



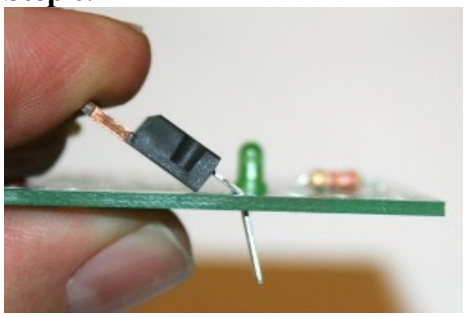
Once you have soldered the remaining pins, closely trim the excess wire off the components.

Step 5.



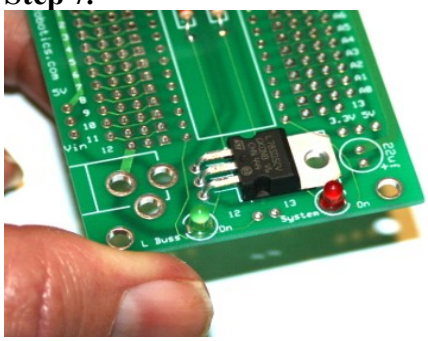
Soldering in the voltage regulator is best done in a few steps to ensure proper alignment. Start off by inserting the voltage regulator until it hits its wire stops. Make sure the front of the regulator (with the words) is facing the green LED. (The metal back of the LED should then be facing the red LED.)
(Note: Shown board may differ from your own)

Step 6.



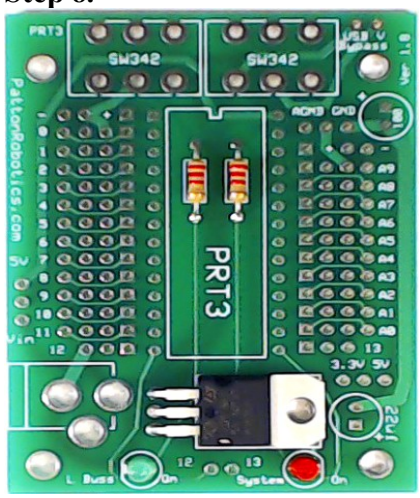
Gently bend back the voltage regulator until it hits its back edge on the board.

Step 7.



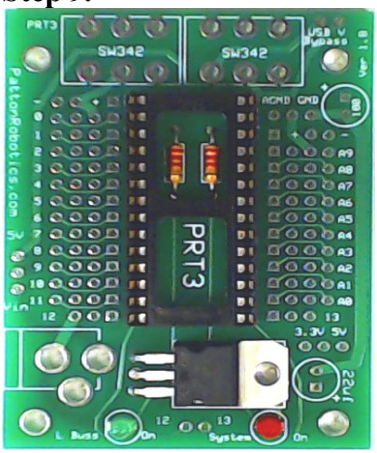
Pull up on the voltage regulator slightly and bend it toward the board again. Continue in this manner until the metal back of the regulator lies flat on the circuit board.

Step 8.



With care it is quite easy to get the hole on top of the voltage regulator to align with the hole in the circuit board. When aligned, solder in the voltage regulator and trim off the excess wire.

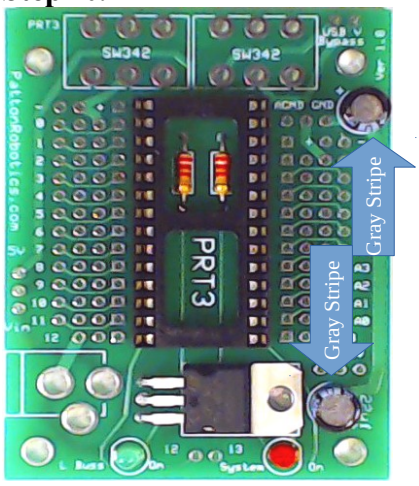
Step 9.



Being careful not to bend the tiny pins, insert the 28-pin socket into place on the circuit board. The notch in the socket should be nearer the top of the circuit board (opposite the voltage regulator) as shown. Once the board is in place, solder just one of the pins. Flip the board over to ensure the socket is lying flat on the board. If so, solder the remaining pins.

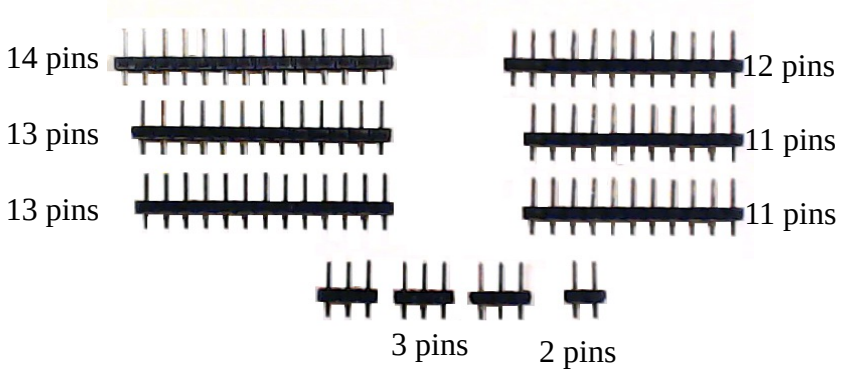
For groups that may be assembling several boards (such as schools or camps) please see appendix A before proceeding to step 10.

Step 10.



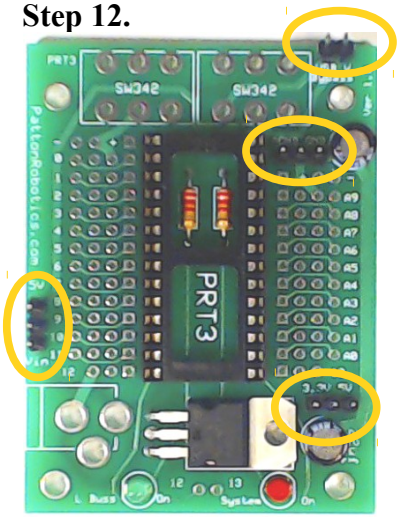
Insert the capacitors into the circuit board being sure that the 100µF capacitor is nearest the edge of the board and the 22µF capacitor closest to the voltage regulator. Carefully check that the capacitor's long positive wire lead is in the hole marked with a '+'. Double-check that the negative gray stripes on the capacitors are positioned as shown in the image. Once both are in place, carefully solder both to the board.

Step 11.



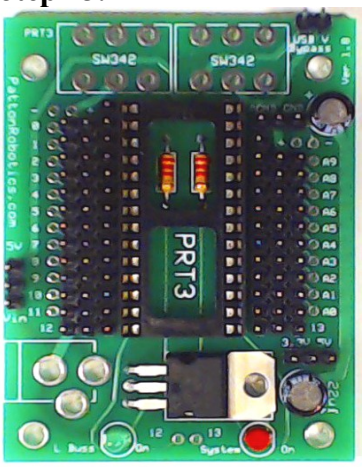
Break the long rows of male header pins into one row of 14 pins, two rows of 13 pins, one row of 12 pins, two rows of 11 pins, three rows of 3 pins and one row of 2 pins as shown.

Step 12.



To help reduce confusion, I have shown the placement of the three 3 pin rows and the one 2 pin row first. Place these in position before placing the longer rows as shown in step 13.

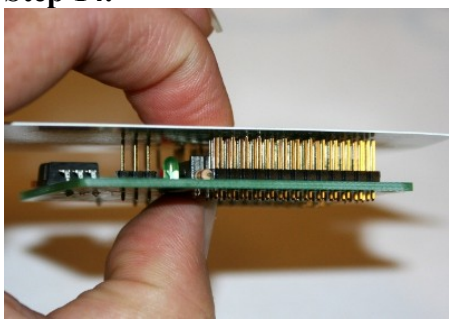
Step 13.



Insert the remaining rows into place as shown in the image at the left. (It may be a good idea to place and solder one or two rows at a time if you are not well experienced in soldering.) Be sure to insert the short ends into the board with the long ends sticking out of the board. It is important that the outer-most row of holes on each side of the board remain empty for now.

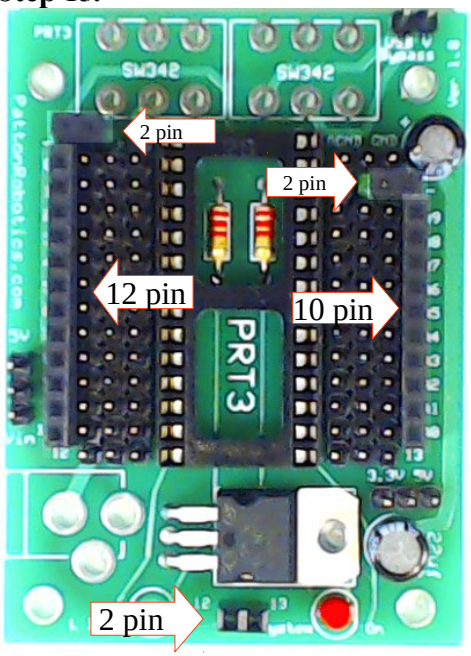
Solder just one of the pins of each row, verity that they lie flat on the board, and then solder the remainder of the pins.

Step 14.



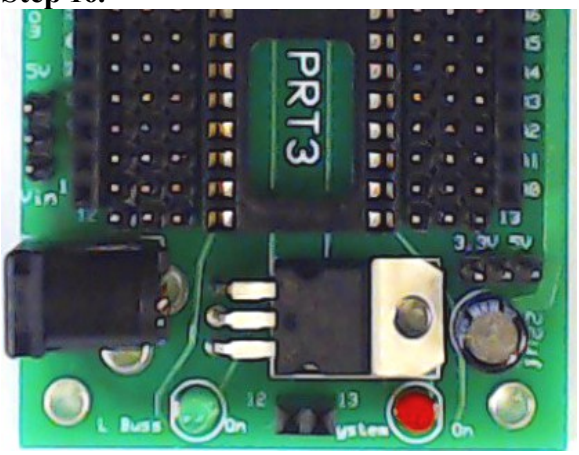
I use a business card to hold the pins in place as I turn the board over to solder them in place.

Step 15.



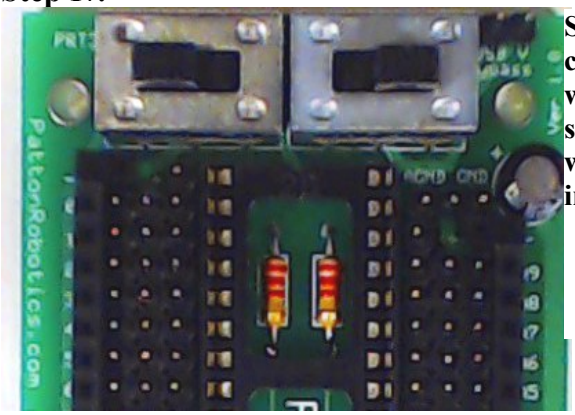
Insert and solder the 12 pin, 10 pin and three 2 pin female headers as shown.

Step 16.



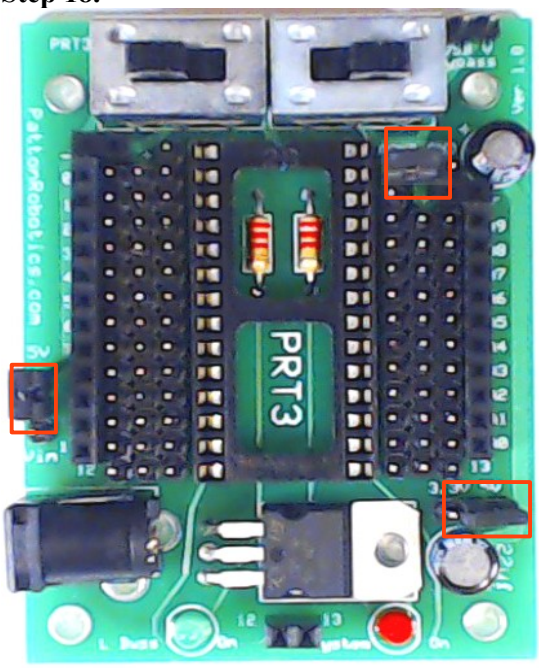
Insert and solder into place the barrel plug socket. Be sure to apply plenty of solder so the socket is securely affixed to the board.

Step 17.



Solder into place the two switches. These are beefy components so be sure to apply to plenty of solder. I would also recommend soldering one pin from each switch at a time, alternating between switches. This will allow some time for cooling of the switch's internal mechanical parts.

Step 18.



Place the 3 jumpers on the three pin headers and you're done.

Congratulations! You are ready to insert your Teensy and get started.