Warranty Disclaimer

Purchaser acknowledges that Top Cat Engineering L.L.C.has agreed to provide this kit for evaluation purposes only. Purchaser further acknowledges that Top Cat Engineering has no obligations whatsoever to repair, replace or service the kit in any manner or to provide purchaser with any future upgrades to the kit, if any. Purchaser is solely responsible for the use of kit in any applications, including those of an experimental nature.

THE KIT IS PROVIDED TO THE REQUESTOR ON AN "AS IS, BASIS, WITHOUT WARRANTY OF ANY KIND (EITHER EXPRESS OR IMPLIED), INCLUDING BUT NOT LIMITED TO ANY IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A SPECIFIC OR GENERAL PURPOSE AND THOSE ARISING BY STATUTE OR BY LAW, OR FROM A CAUSE OF DEALING OR USAGE OF TRADE.

Limitation of Liability

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WARNING: READ ALL INSTRUCTIONS THOROUGHLY BEFORE ATTEMPTING TO ASSEMBLE AND OR APPLY POWER TO ANY COMPONENT OF THIS KIT.

WARNING: THIS KIT CONTAINS A NUMBER OF SMALL PARTS WHICH CAN FALL INTO SMALL SPACES AND INTERFERE WITH OTHER MACHINERY. TAKE GREAT CARE WHEN YOU OPEN THE PACKAGES TO CONTAIN ALL COMPONENTS TO YOUR WORK AREA.

WARNING: THIS KIT CONTAINS A NUMBER OF SMALL PARTS WHICH CAN EASILY BE SWALLOWED BY SMALL CHILDREN AND PETS. TAKE GREAT CARE WHEN YOU OPEN THE PACKAGES TO CONTAIN ALL COMPONENTS TO YOUR WORK AREA.

WARNING: BE VERY CAREFUL AND CAUTIOUS WHEN WORKING WITH SOLDERING IRONS AND SOLDER. KEEP CHILDREN AWAY FROM THE WORK AREA AND ALWAYS USE SAFETY GLASSES WHEN SOLDERING.

WARNING: DO NOT INSTALL ANY COMPONENT OF THIS KIT INTO ANY MATERIAL THAT IS FLAMMABLE. THIS INCLUDES PAPER, CARDBOARD, FLAMMABLE PLASTICS, WOOD, AND FABRICS WHICH CAN CATCH FIRE.

WARNING: KEEP AWAY FROM FLAMMABLE LIQUIDS!

WARNING: NEVER APPLY MORE THAN 5 VOLTS OF POWER TO ANY COMPONENT IN THIS KIT.

WARNING: NEVER APPLY REVERSE POLARITY TO ANY COMPONENTS OF THIS KIT

WARNING: NEVER SUBMERGE IN LIQUID

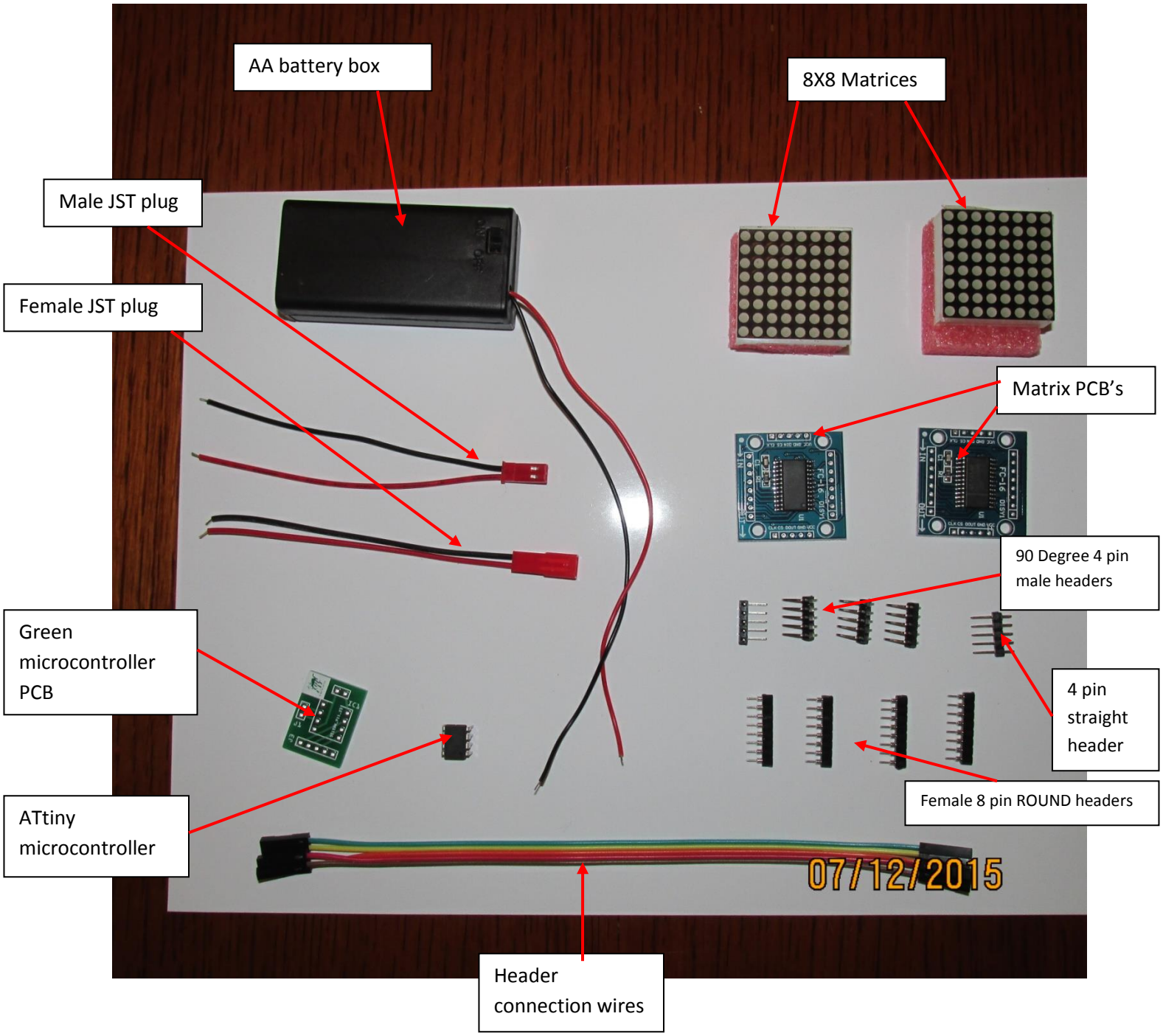
MATRIX EYES ASSEMBLY INSTRUCTIONS

Congratulations you have purchased a very unique holiday decoration kit. These animated eyes are created from 8x8 matrices composed of 64 LED's each . The display is controlled by an Atmel ATtiny 45 micro controller specially programmed for this kit to give the effect of random eye movements.

Remove all items from the bag and make sure you have all the components

The component list is as follows:

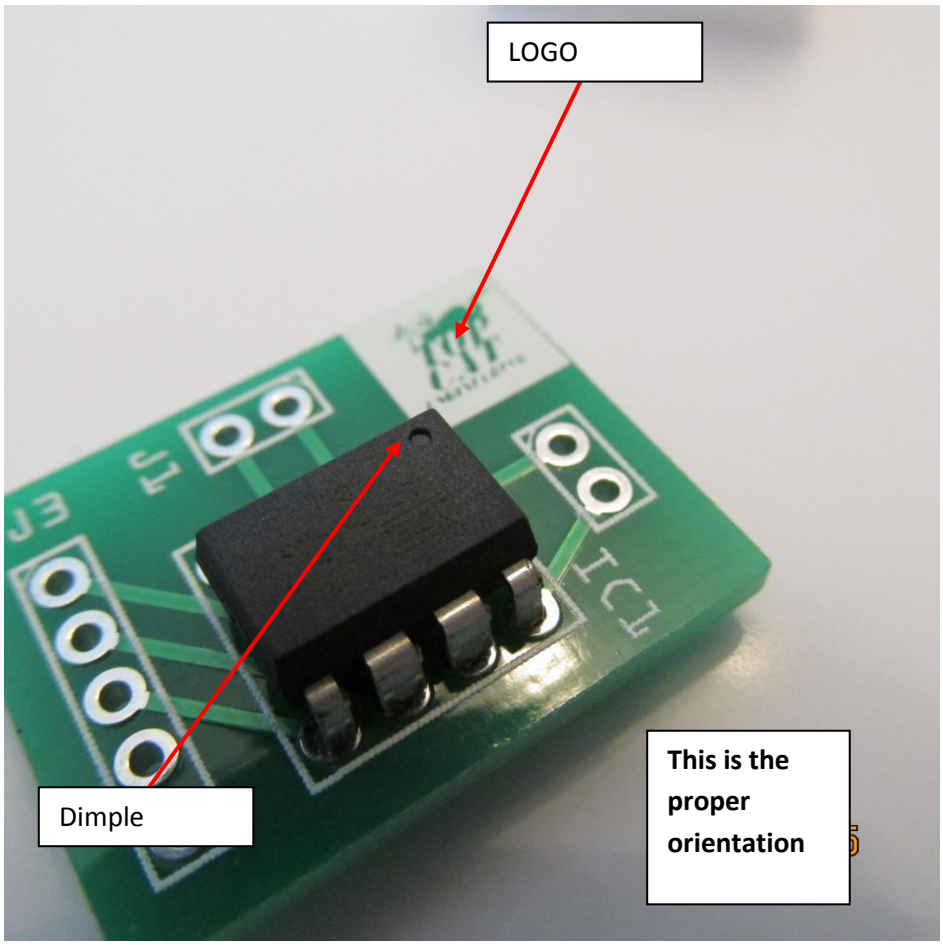
A. 2- 8x8 matrices
B. 4 -90 Degree 4 pin male headers (you'll only need 2)
C. 4- female 8 pin ROUND headers
D. 1- 4 pin straight header
E. 2 – Matrix PCB's with SMD driver chip already soldered
F. 1- Green microcontroller PCB
G. 1 – ATtiny microcontroller
H. 1- Male JST plug
I. 1- Female JST plug
J. 1 – AA battery box
K. 4 – Header connection wires (bundled)


AA battery box
8X8 Matrices
Male JST plug
Female JST plug
Matrix PCB's
90 Degree 4 pin male headers
Green microcontroller PCB
4 pin straight header
Female 8 pin ROUND headers
ATtiny microcontroller
07/12/2015
Header connection wires

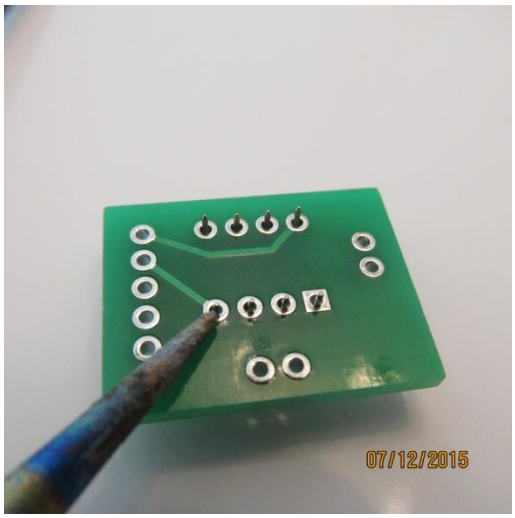
Start out by finding the green microcontroller PC Board the ATtiny microcontroller. They look like this.

This part is **VERY IMPORTANT** so pay attention! Take the micro controller and install it into the 8 hole pattern of the green PCB. The orientation of the micro controller is very important. **If you get this wrong the display won't work and you will have to un-solder (YUK!!) the microcontroller from the PCB and do it all over again!!.**

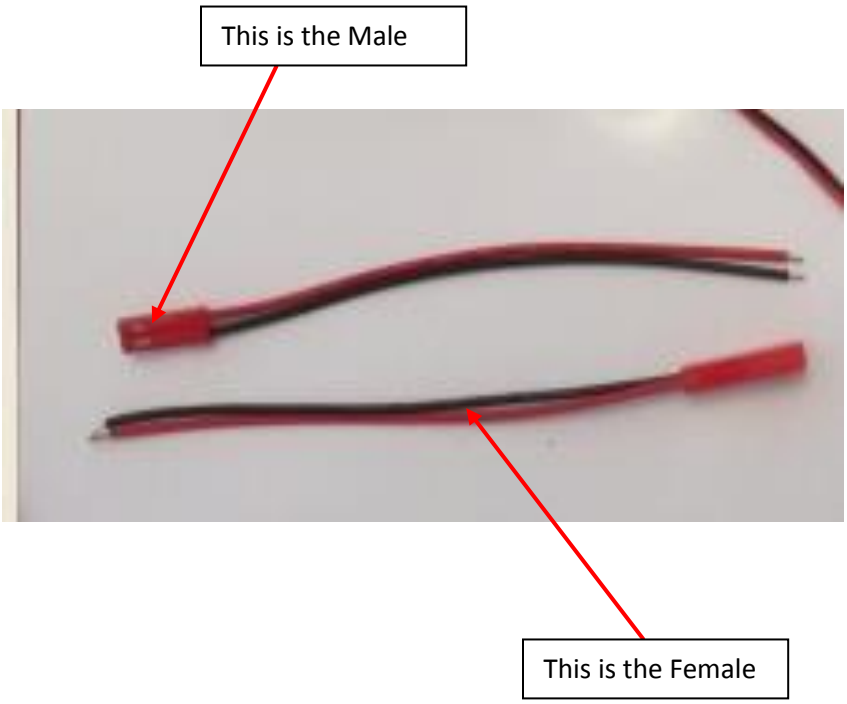
The micro controller has a small circular dimple molded into the case. It's difficult to see but it's there. If you can't see it use a magnifying glass. The dimple is in one of the corners of the microcontroller. The microcontroller must be placed into the PCB with the dimple closest to the white logo in the corner of the PCB (see the picture below)



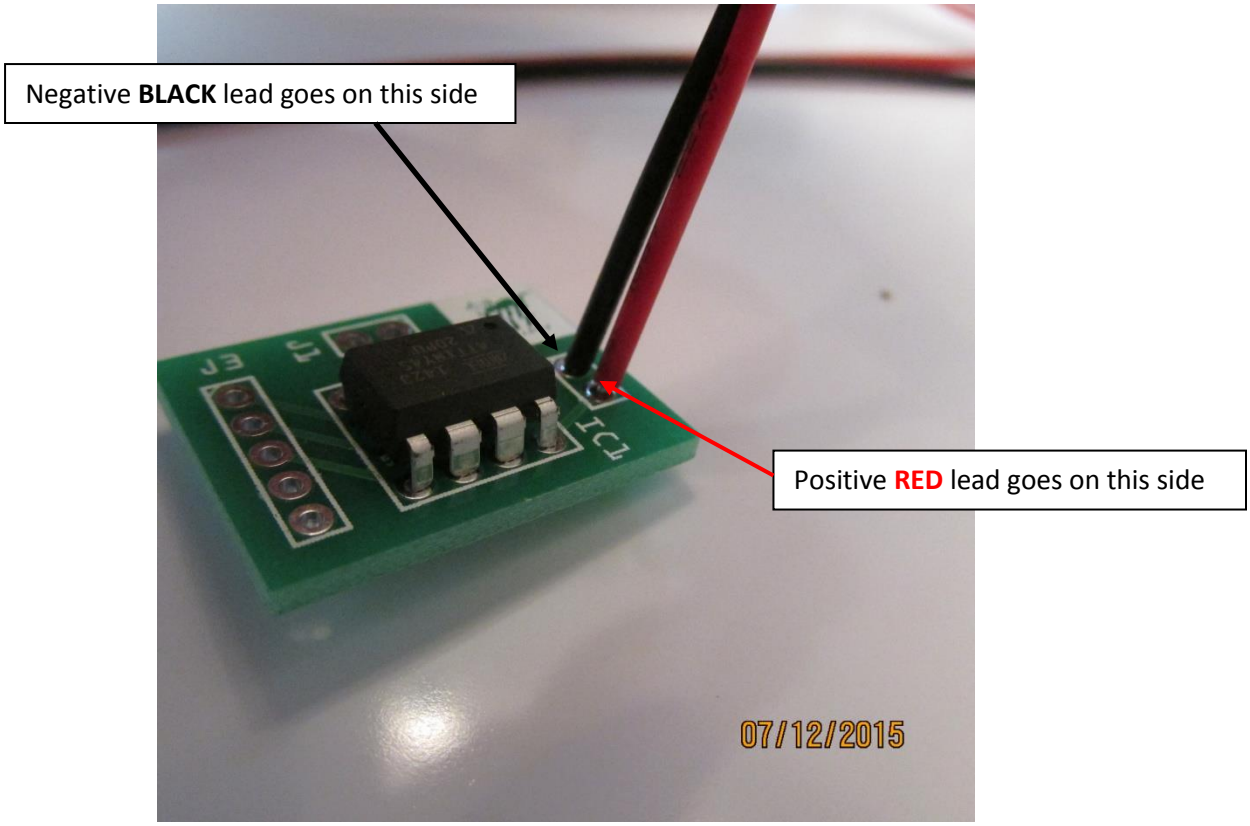
Solder it up at all points even though we only use three. See the next picture.



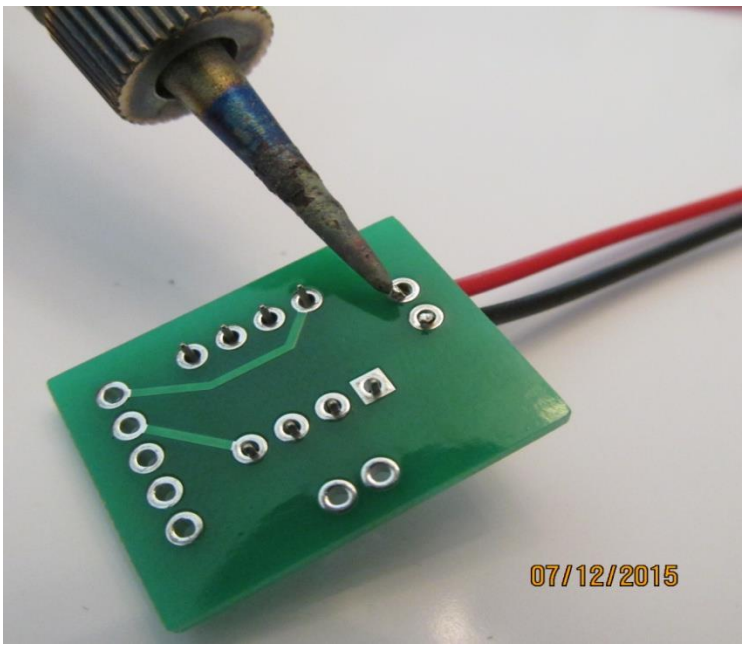
Next you'll want to solder the JST power connector. It is important to get the correct polarity or the display won't work and YOU WILL FRY THE MICROCONTROLLER! Now you may choose either the male or female connector to solder to the board. It really doesn't matter however I like to use the female for the project side and the male for my batteries. Remember it's only preference ☺



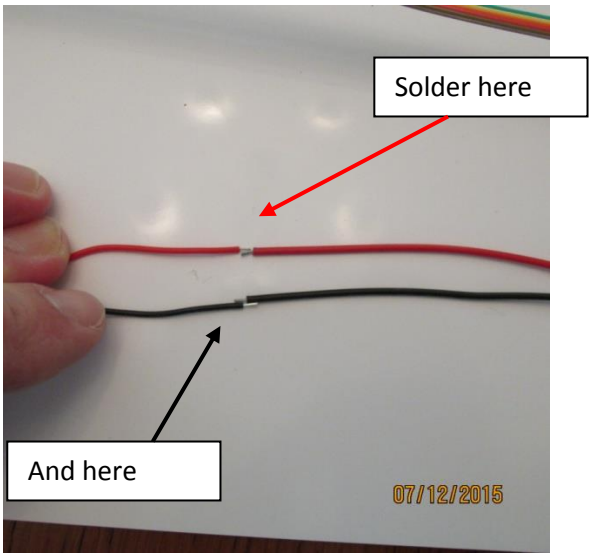
This next part however is very important and yes you guessed it, if ya get it wrong THE DISPLAY WON'T WORK. The proper polarity is critical but very easy to manage just check out the next picture.



Turn it over and solder the wires.



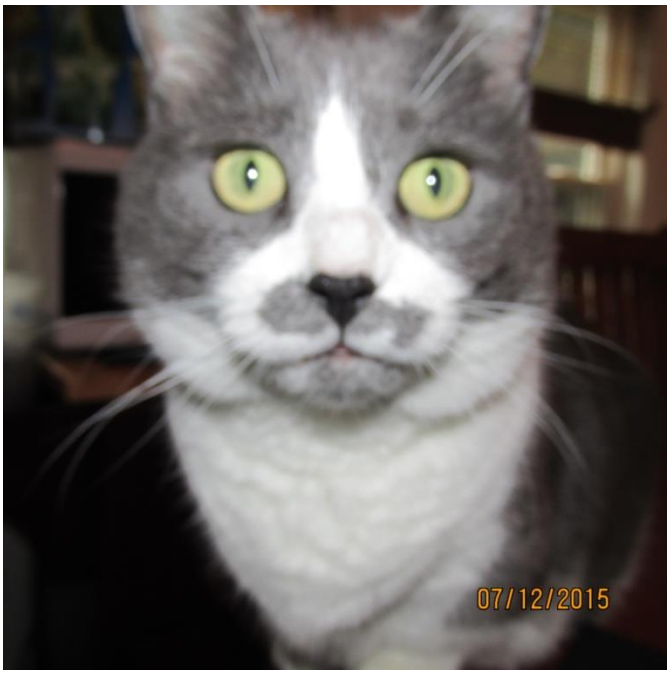
At this point you can go ahead and solder the male JST connector to the corresponding RED and BLACK wires of the AA battery box. You may want to use some heat shrink tubing (not included) to cover up the bare wires and prevent a short circuit.



We have now finished the PCB assembly as well as the battery box assembly.

See, that wasn't so bad.

Wait a minute …my cat Charlie says it's time to take a break.



OK bud …how about a snack ;-)

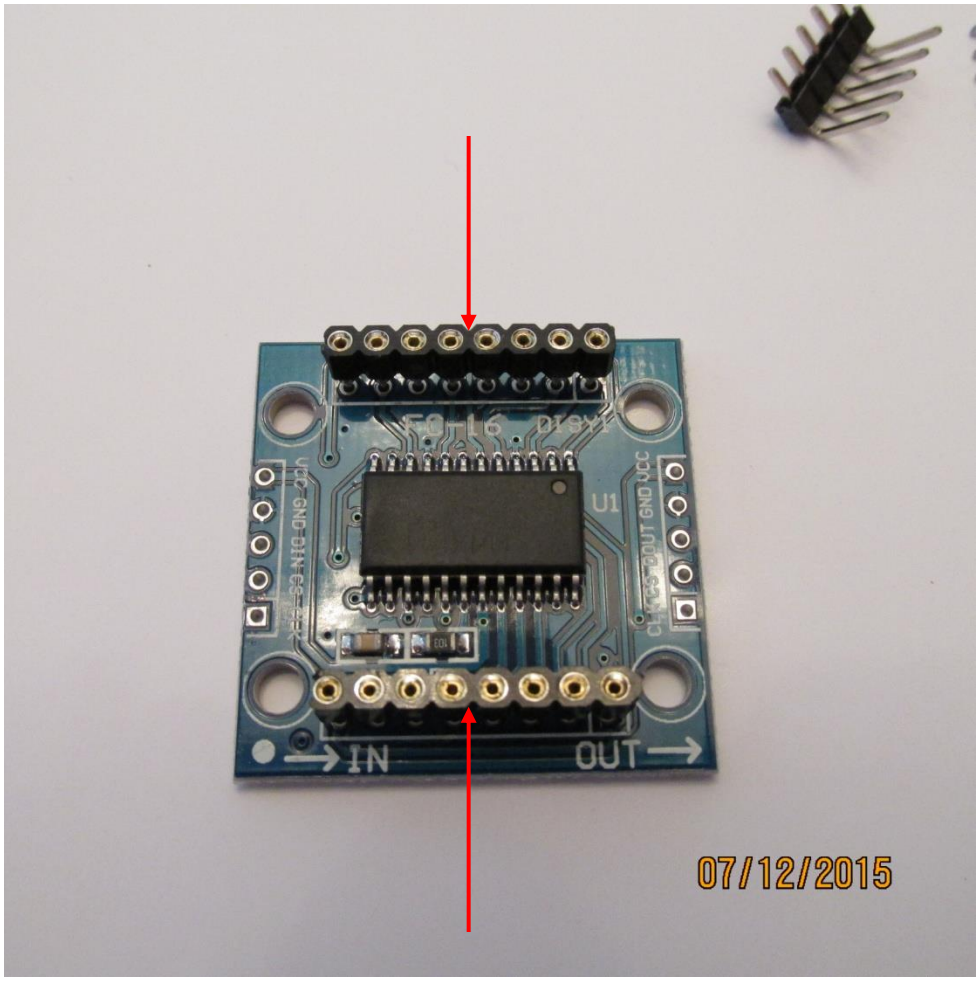
Well you've made it this far so don't quit on me now!
It's time to tackle the matrix PC boards they are really not that bad they just need a little time and effort.

If you look at the boards you will see that they have some writing on them and that there is a "chip" already soldered onto it. That is a MAX 7219 display driver and

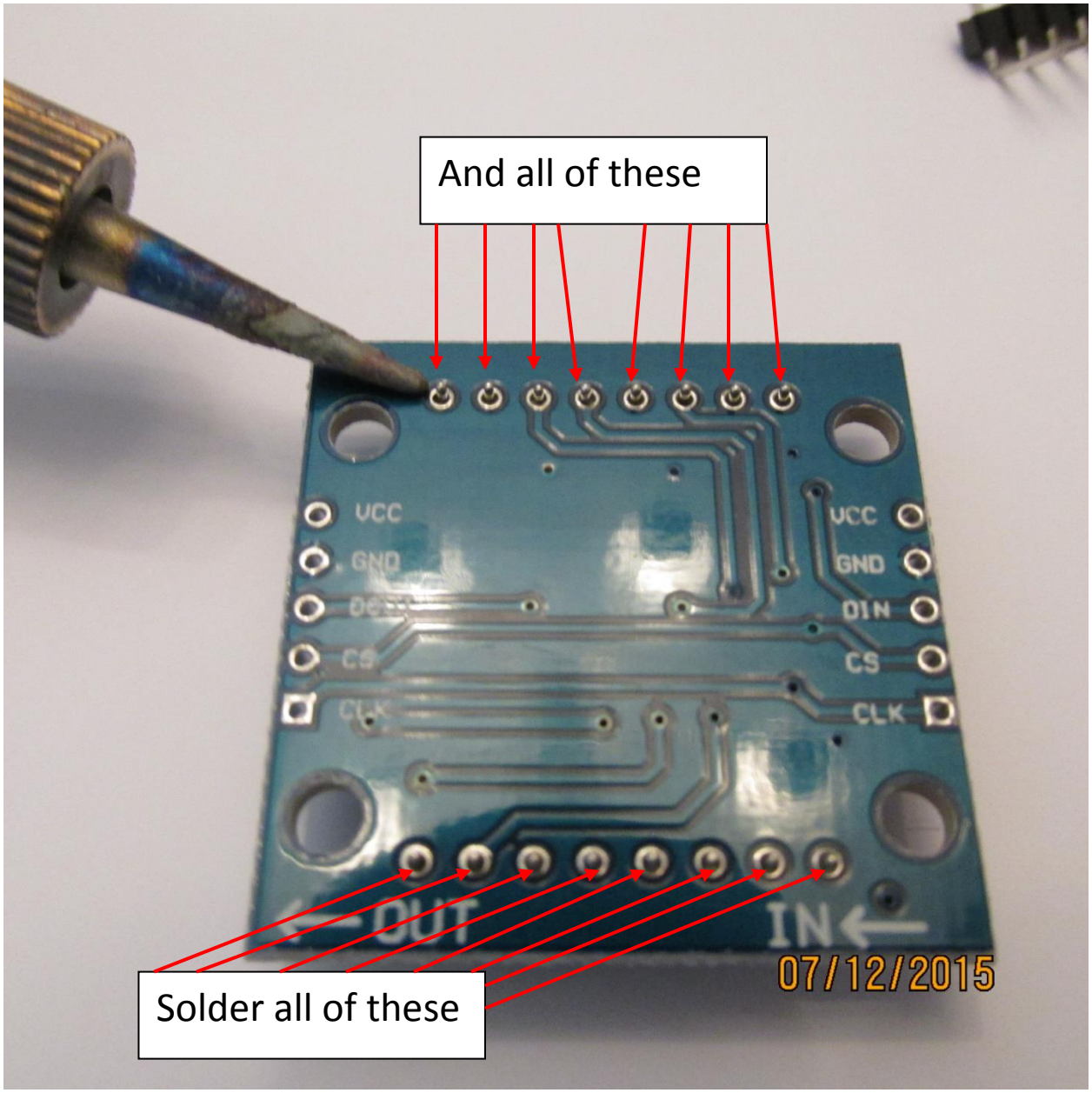
THANK GOD it is already soldered into place for us, All we need to do is solder the header pins.

There are three types of header pins that will be used for these boards. Straight headers, 90 degree headers, and Round female headers.

We will start with the round female headers. These are the headers that the matrices will plug into. Lay the board onto a flat surface like the picture shows. The 'chip' should face up and you should be able to read the writing on the board that says "IN" and "OUT".
Place the headers in the holes as shown.



Turn the board over and solder every pin as shown.

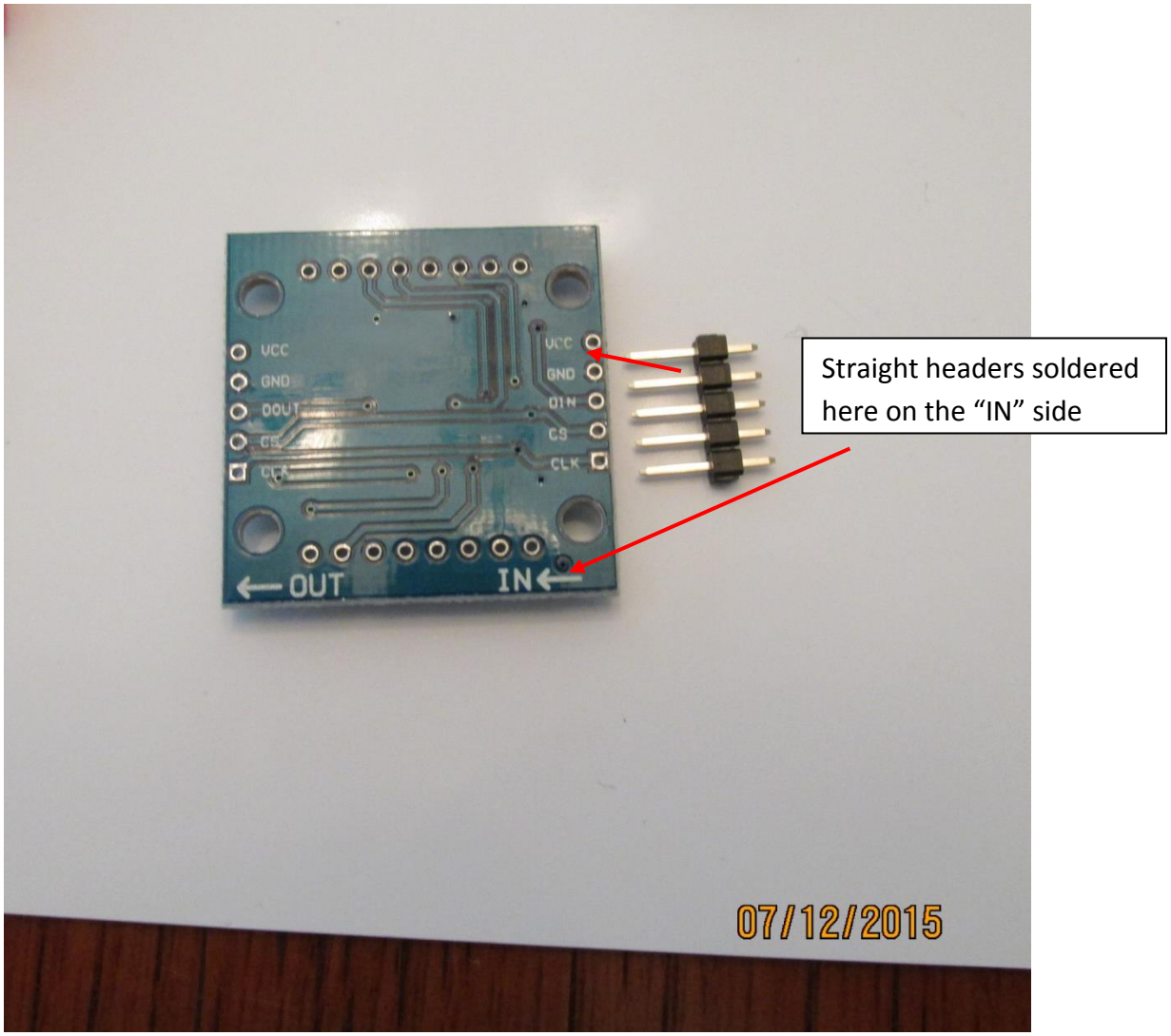


GOOD JOB!!

Do this for both matrix PCB's

Now let's focus on one of the matrices (pick either one it doesn't matter which). This is the matrix we will call #1. This is the matrix that will be the Output and the other one (matrix #2) will be the Input.

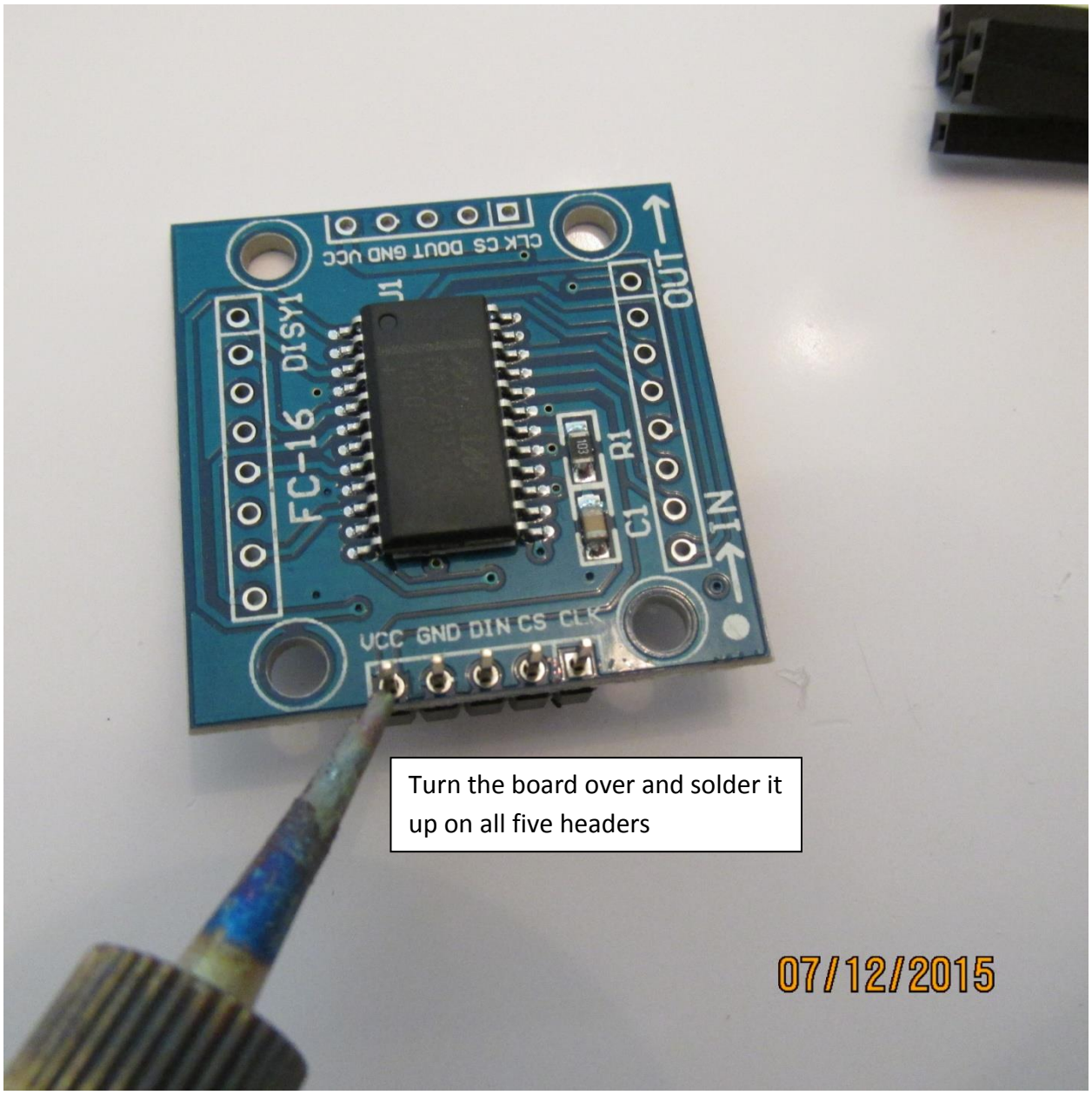
After soldering the round header pins find the straight headers. Ther should be 5 of them in a row as one piece. They will be inserted into the holes of the matrix PCB that are labeled "IN". Like the picture below.



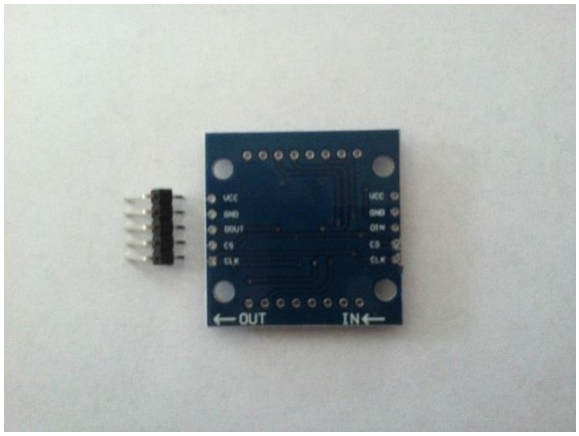
This is important!! The reason is that the display driver gets serial data IN from the micro controller at the IN ports and then passes that information OUT through the data OUT port. You can see that by looking closely at the silk screening on the

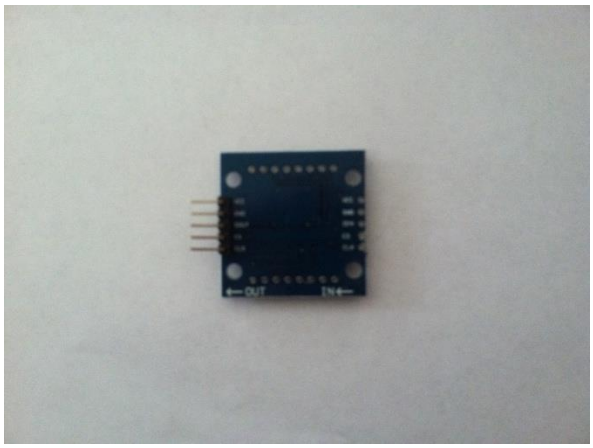
individual header holes. They are labeled at the IN side of the board, VCC (Voltage input), GND (ground), DIN (data input),CS(a latch), And CLK(clock). The only difference from side to side is DIN and DOUT.

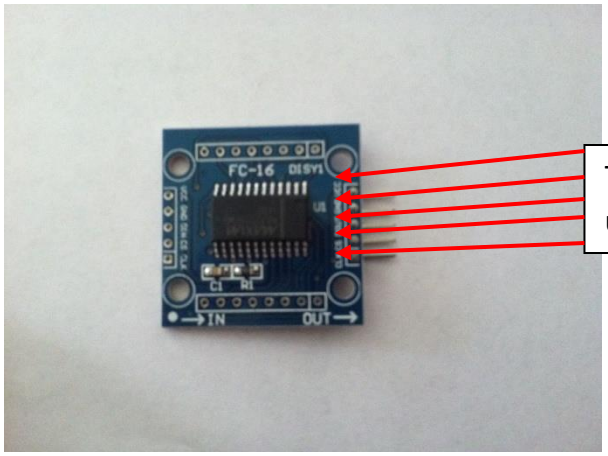
Now turn the board over and solder all five of the header pins.



OK now that you have the board in soldering mode, take one set of the 90 degree headers and place them in the holes on the opposite side (OUT) of the board and solder them in place the same way.



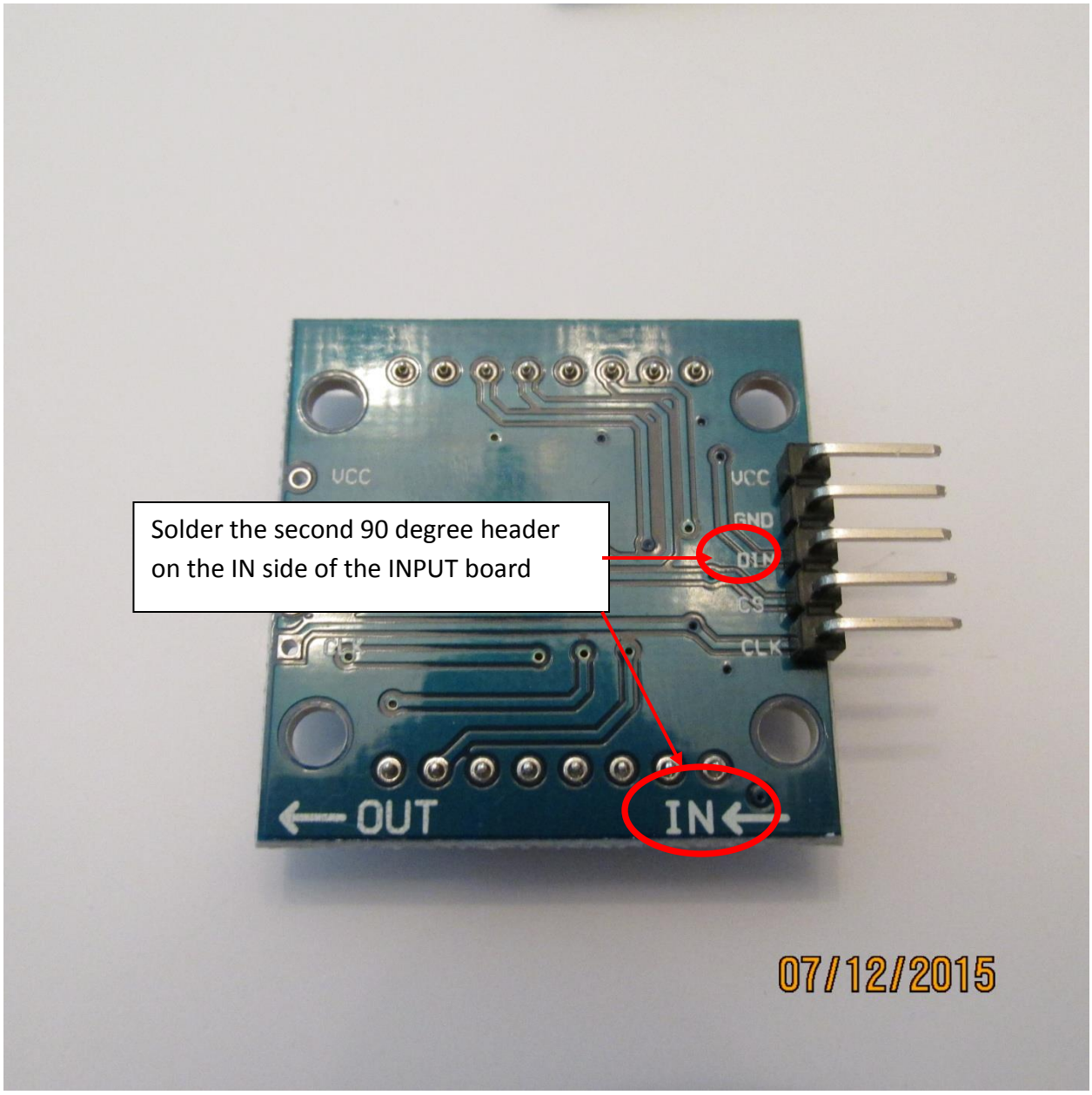




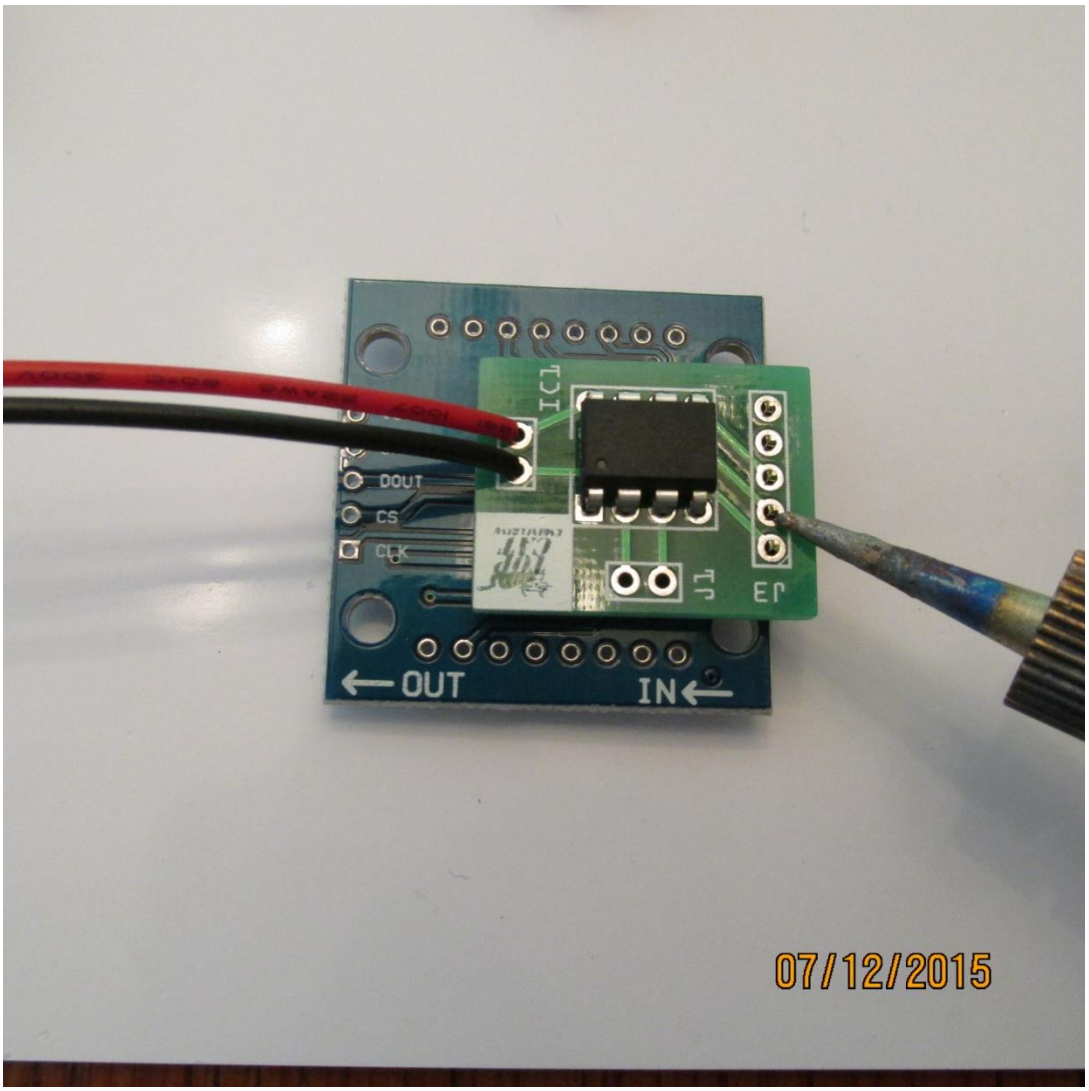
Turn the board over and solder it up on all five headers

Lot's of soldering huh, don't worry we are almost done!

Now on the matrix PCB #2 the INPUT board all you need to do is solder the 90 degree header to the five ports that are on the "IN" side of the board like so.



Now find the green PCB that you sub assembled earlier. This is where the fun starts. Place the green PCB onto the straight header pins that you soldered on earlier just as the picture shows and solder it on all five pins. (a tip here is to quickly solder one of the headers and get the boards parallel while it solidifies. Then the board will be parallel and you can continue to finish soldering the rest of the headers)

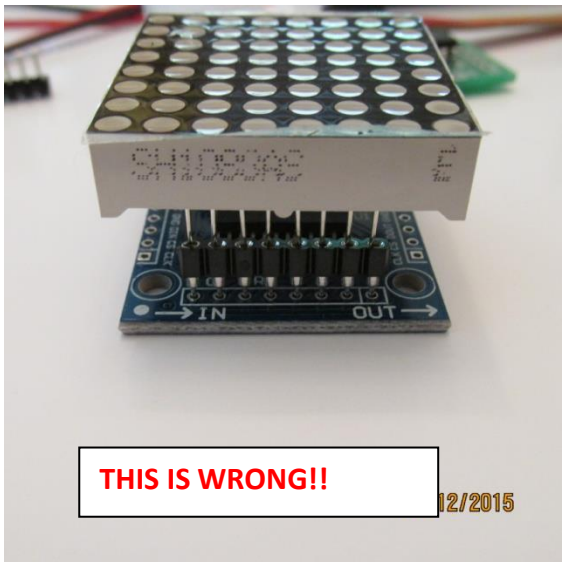


If you like you can fill the gap between the green PCB and the matrix PCB with clear silicon. It’s not necessary but I like to do it as it prevents short circuits and adds a bit of structural stability between the two boards.

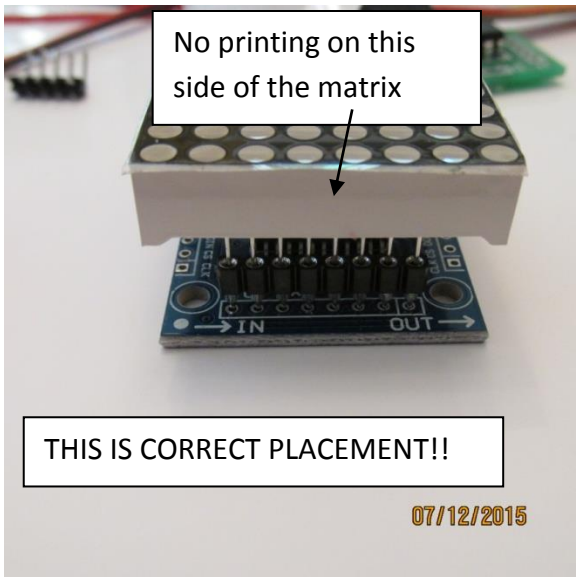
Now this is the part that's a little bit tricky but it is simple. You guessed it…If you get it wrong the matrix won't light.

Now there is some dot matrix printing on each of the matrices. It is critical that you line up these correctly when plugging the matrices to the matrix PC boards.

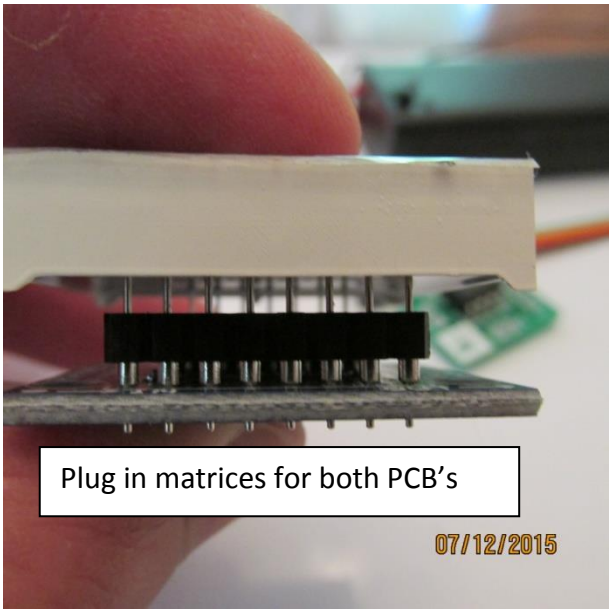
If you look at the picture below you will see that the dot matrix printing is line up on the end of the board that has the silk screening that says IN and OUT on it. THI IS WRONG! The matrix will NOT light up if you plug them in this way!



<u>THE NEXT PICTURE IS CORRECT!</u>



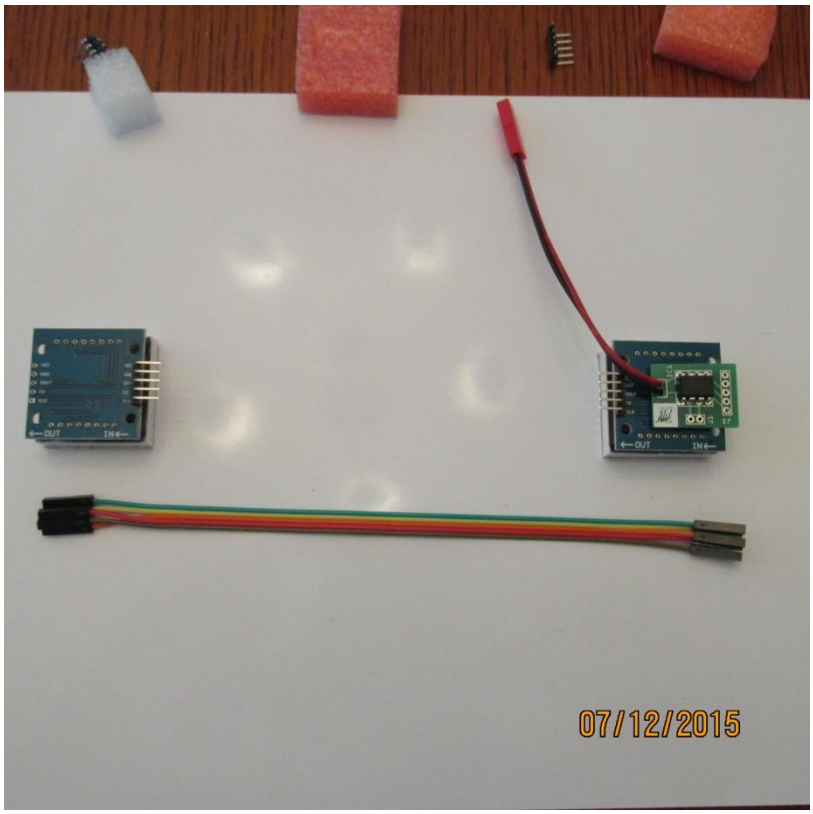
Plug both matrices into their respective sockets. You may have to push hard. Just make sure the pins seat firmly into the round headers being careful to **be sure none of the fragile pins gets bent.**



WOW! look how far you've come. We're almost finished

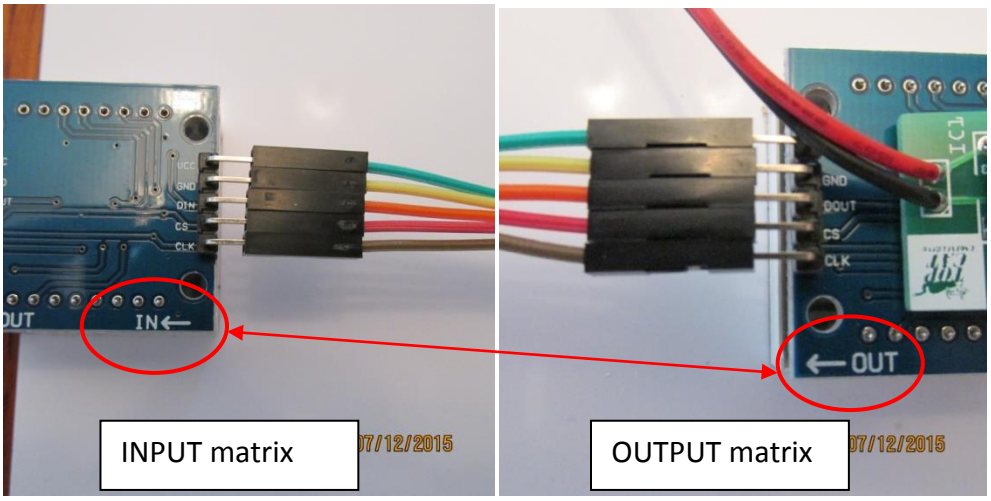
At this point you should have three major components:

1. An OUTPUT matrix with a micro controller cleanly soldered to it and a 90 degree header.
2. An INPUT matrix with a 90 degree header.
3. A Colorful wire harness.



At this point it is a simple matter of connecting the two matrixes PCB's using the wire harness.

We'll start with the OUTPUT matrix #1. Please look at the picture below.

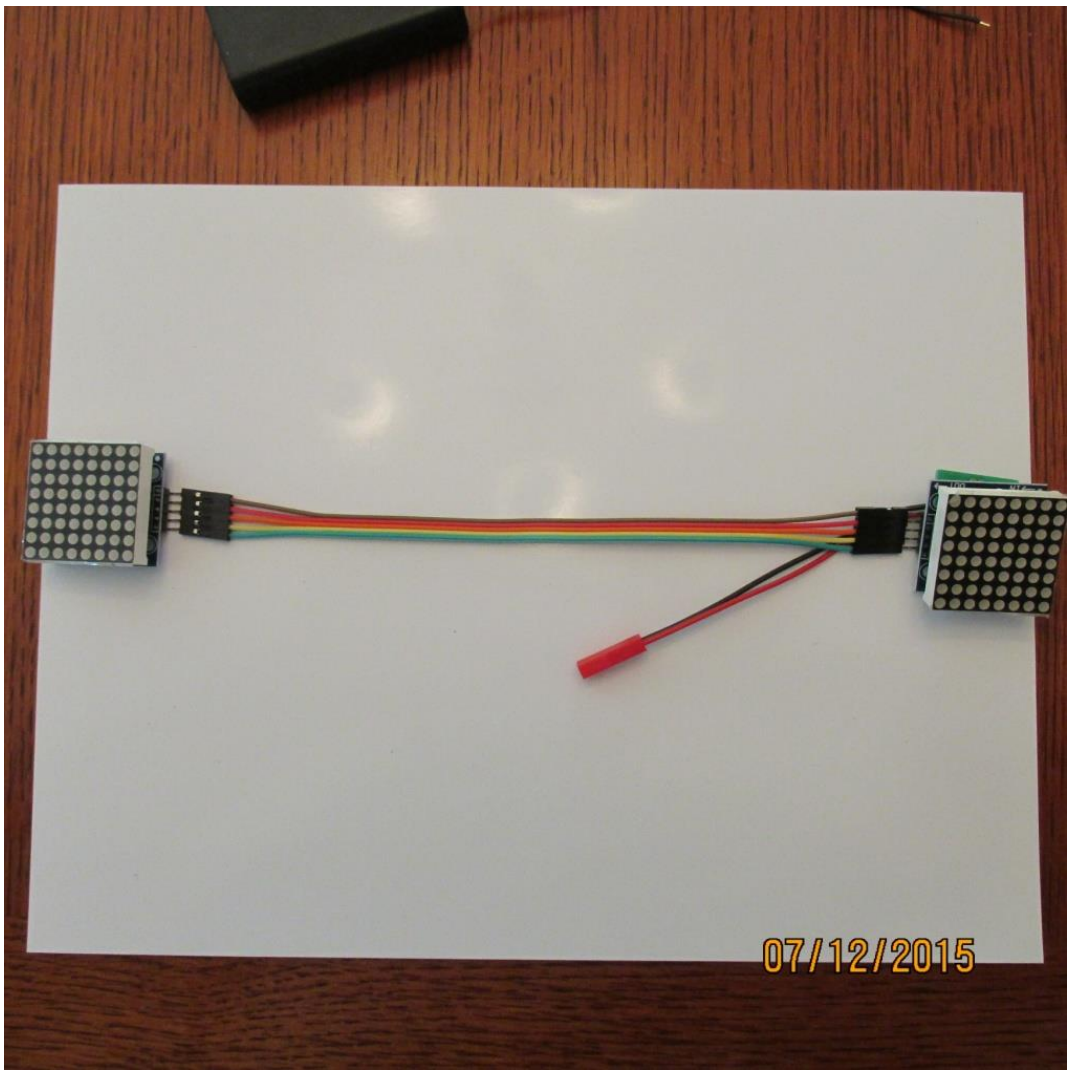


Simply push the female ends of the wire harness onto the male ends of the header. **The wire colors may be different than what is pictured here due to particular suppliers sending different wire colors.**

The color of the wires <u>is not important</u>. What is important is that the "out" terminals of the OUTPUT matrix are connected to the same "in" terminals on the INPUT matrix.

	VCC ⟷	VCC	
	GND ⟷	GND	
OUT Pins of the output	DOUT ⟷	DIN	IN Pins of the INPUT
	CS ⟷	CS	
	CLK ⟷	CLK	

You should now have a complete assembly that look like this!



You may now insert 2 AA cells into the battery box attach the JST connector and the matrix should start blinking!! The matrix can also be powered up to 5V.

Under normal conditions the matrix should operate for several hours on two AA batteries.

THAT'S IT! You're done!!

Charlie Says "Nice going"! And thank you for purchasing this kit.