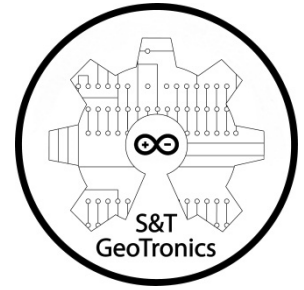


S&T GeoTronics LLC
Open Enigma Mark 4 with Plugboard
Assembly Instructions



First, make sure you have all the required components:

HARDWARE

Qty	Item
1	Motherboard PCB
1	Daughter Card PCB
1	Plugboard PCB
1	Arduino Mega2560 clone
4	16Segment Display LTP587
26	White LEDs for Lampfield
5	Red LEDs 5mm for Modes
36	Pushbuttons 12mm x 12mm w/cap
2	40 Female Header Pins
3	40 Male Header Pins
2	40 Double Male Header Pins
1	On/Off/On Switch
29	Resistors 470 Ohms
63	Resistors 1K Ohms
5	Resistors 10K Ohms
7	IRF9Z24N P-Channel MOSFET
1	Dual Battery Holder
2	Battery Li-Poly 3.7V 18650
1	Battery Connector
1	Battery Charger 8.4V
1	Perforated Top Plate
2	Enigma Logo
1	Perforated PlugBoard
26	Banana Jacks
1	Cloth Covered Wire
20	Banana Plugs
	Optional & Not Included:
1	Wood Box
2	Hinges
1	Half-Mortise Lock



NOTE: Extra Resistors, Male /Female Pins & Lampfield LEDs are provided for your convenience.

SOFTWARE

To be downloaded from www.openenigma.com:

- Enigma M4.ino

TOOLS

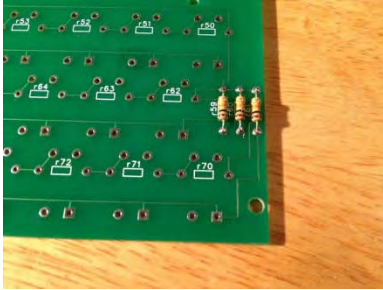
- Wire cutters
- Soldering Iron & solder
- Screwdriver

ASSEMBLY

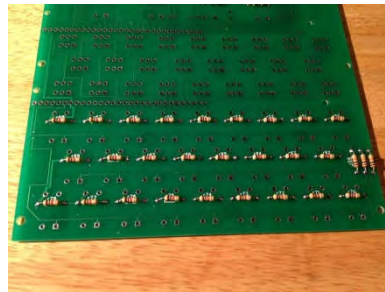
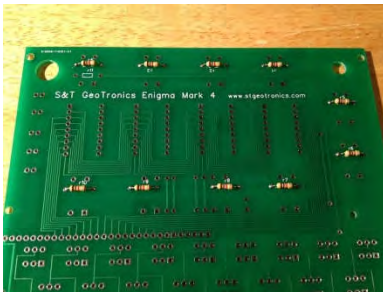
Read through the following instructions once completely before starting the assembly.

Start with Motherboard (the bigger one).

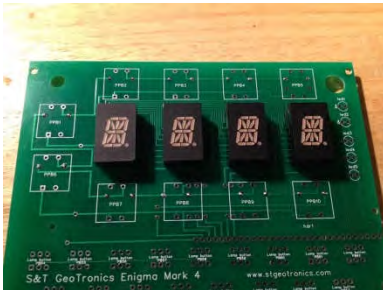
1. Solder 3 of the 10K Ohms Resistors to positions r59 to r61.



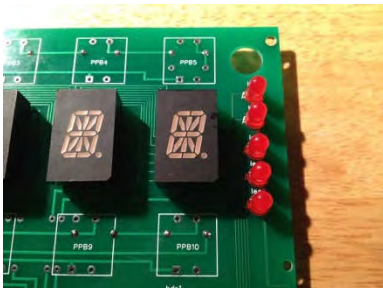
2. Solder 37 of the 1K Ohms Resistors to positions r1 to r11 & r50 to r58 & r62 to r78.



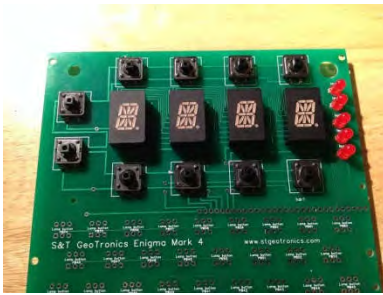
3. Solder all 4 16 Segment LED displays to positions 16seg1 to 16seg4, making sure Decimal Point is at the bottom.



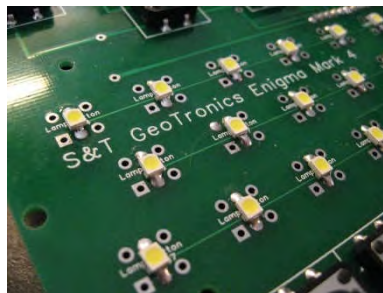
4. Solder all 5 Red LEDs to positions led1 to led5, making sure Anode (+, normally longer leg) is on A side.



- Solder all 36 Pushbuttons to positions PPB1 to PPB36.



- Solder all 26 Lampfield LEDs to positions PB37 to PB62 (using center holes), making sure the corner notch is at top right corner. It is easier if you pre-tin both center holes (filling them with solder) for each led location BEFORE.



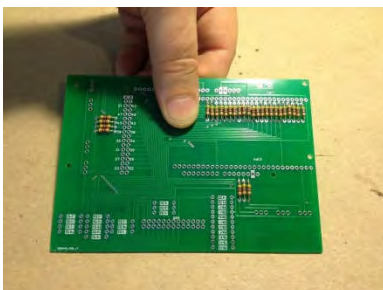
- Solder each row of 30 Male pins to hdr1 & the bottom hdr, making sure that the long end of pins end up on the resistor side (bottom).



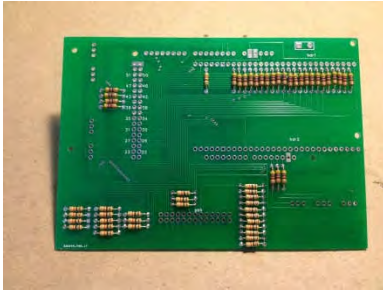
MOTHERBOARD assembly is now complete.

Proceed to Daughter card (the one connecting to the Arduino Mega)

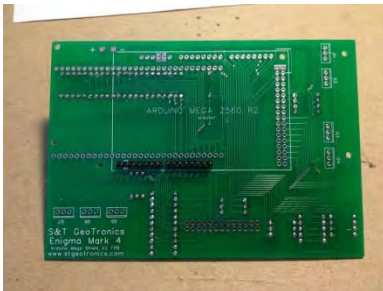
- Solder all 29 of the 470 Ohms Resistors to positions r1 to r22 & r24 to r30.



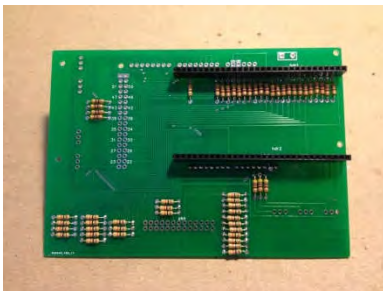
9. UPDATED: Solder 1 of the 10k Ohms Resistors to position r40 and solder 1K Ohms Resistors from r31 to r57 at bottom of board.



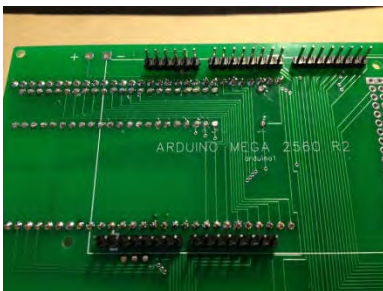
10. Solder 2 groups of 8 male pins to positions right above r28 to r30, making sure that the long end of pins end up on the Arduino side (bottom), NOT the resistor side (top).



11. Solder each row of 30 Female pins to hdr1 & hdr2, making sure the female connectors end up on the resistor side (top).



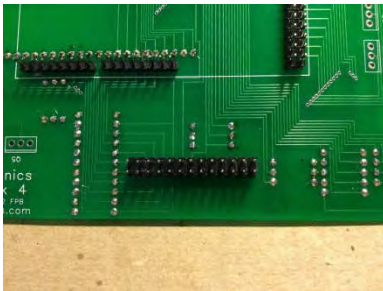
12. Solder a group of 6 & 2 groups of 8 male pins to the positions right above hdr1, making sure that the long end of pins end up on the Arduino side (bottom), NOT the resistor side (top).



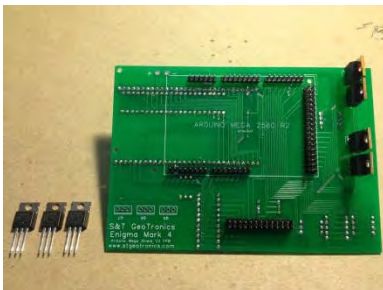
13. Solder a group of 18 double wide male pins to positions 20 to 55, making sure that the long end of pins end up on the Arduino side (bottom), NOT the resistor side (top).



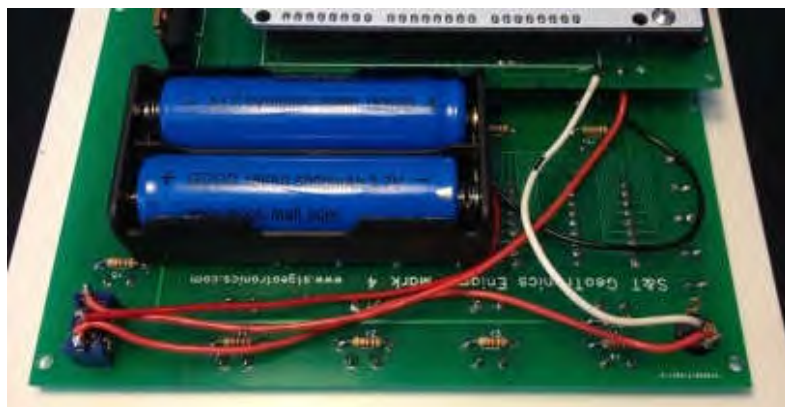
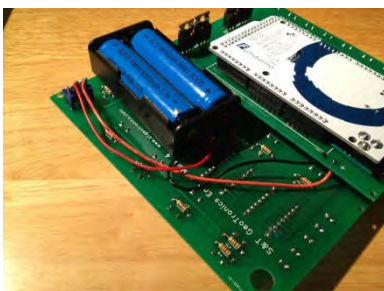
14. Solder a group of 13 double wide male pins as per pictured below, making sure that the long end of pins end up on the Arduino side (bottom), NOT the resistor side (top)



15. Solder all 7 MOSFETs to positions Q1 to Q7 making sure you respect the orientation of the silkscreen.



16. Proceed to step 17 & first test the whole assembly using USB power from computer. Then. connect the Battery holder black wire and the power connector white wire to the – (neg) power input port on daughter card & the red wire to On/Off/On switch middle pin then run a jumper wire from one on/off switch edge pin to the + (pos) power input port of daughter card and another jumper from other on/off switch edge pin to the + (pos) pin of the power connector.



17. Snap the Arduino Mega to the back of the Daughter Card.



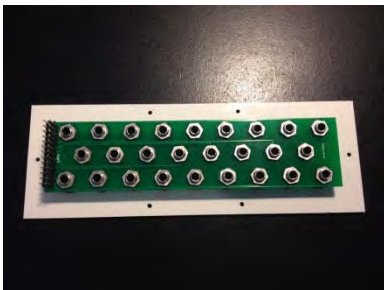
18. Snap the Daughter card behind the Motherboard.



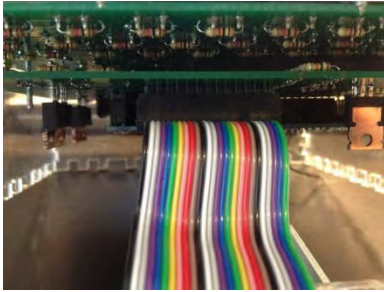
19. The assembly is complete & ready to test. Power your Open Source Enigma Replica & test all functionality.



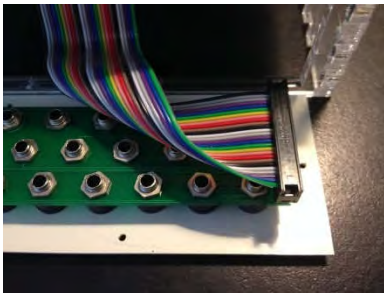
20. After soldering a group of 13 double wide male pins as per pictured below, making sure that the long end of pins end up on the side with "hdr1", assemble each of the 26 banana jacks making sure rounded side of nuts are on PCB side.



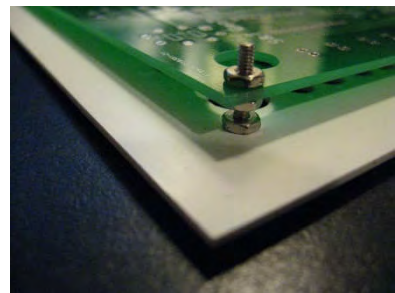
21. Connect the ribbon cable to the daughter card making sure the black wire (pin 1 with the arrow) is on the left side.



22. Connect the ribbon cable to the plugboard making sure the ribbon cable is at the bottom right and the black wire (pin 1 with the arrow) is under the "L".



23. Once everything tests good, please remember to add qty 2 #2-56 x $\frac{3}{4}$ " screws through bottom of Arduino to top of Daughter card with a nut on both sides of daughter card to ensure the screw locks properly & add a drop of paint or nail polish so it does not loosen. Then install qty 3 #2-56 x $\frac{3}{4}$ " from top of Motherboard through bottom of Daughter card using the same method. Then install qty 6 #2-56 x $\frac{1}{2}$ " screws through top plate and install 3 nuts under top plate to create proper spacer. Tighten firmly but do not over tighten, to avoid cracking top plate. Add a fourth nut to bottom of Motherboard to secure it to top plate.



24. CONGRATULATIONS! Assembly is complete. Enjoy Encrypting & Decrypting. Please refer to the Enigma User Quick Reference for operating instructions.