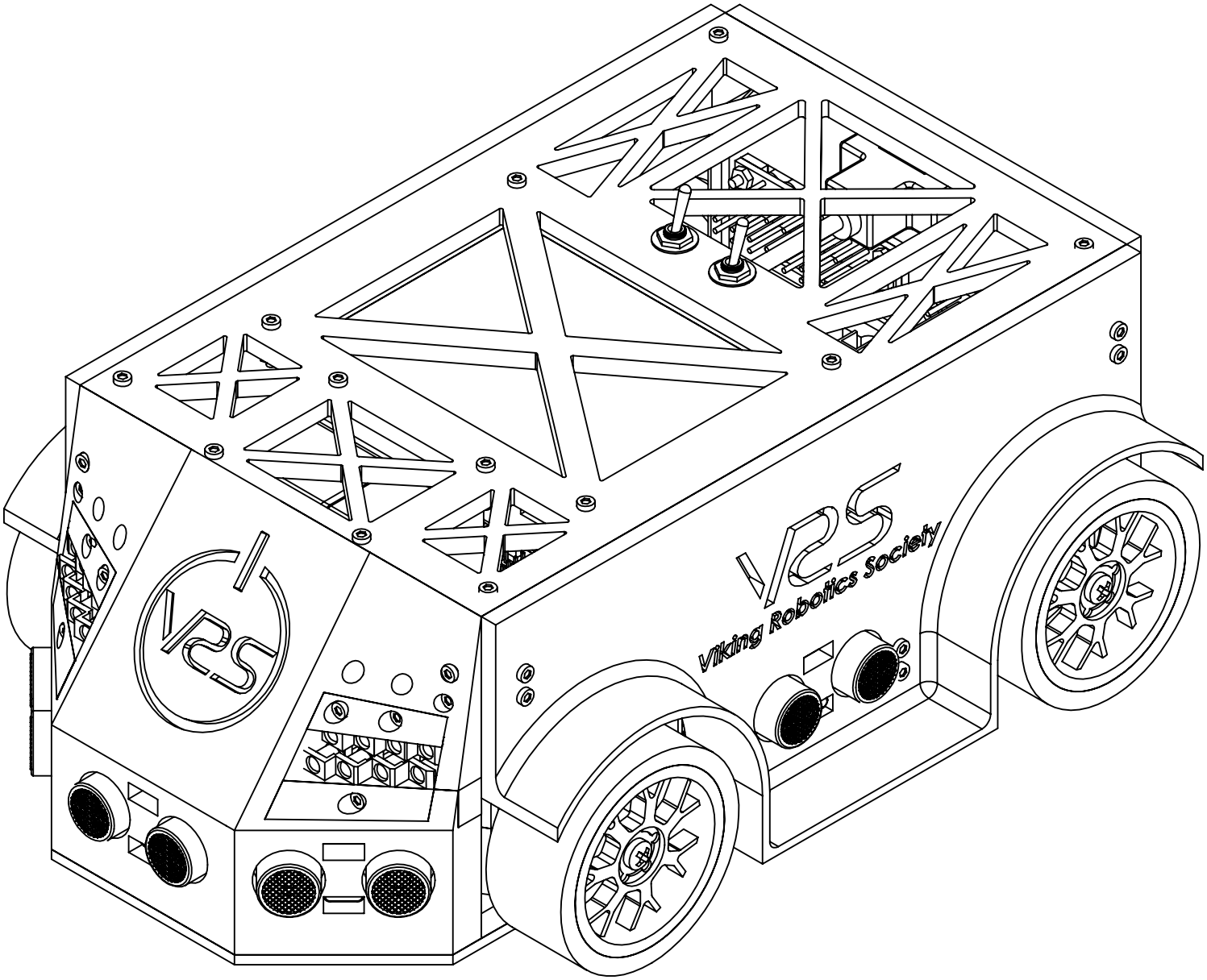
vrsLearningKit

By

Michael Nguyen



Bill of Materials I

ITEM NO.	PART NUMBER	QTY.
1	bottomChassis	1
2	rearShellToBottomChassisBracket	1
3	M2.5mmx12mmHexCap	60
4	M2.5mmNut	100
5	rearShell	1
6	ultrasonicHCSR04	7
7	M2.5mmx18mmHexCap	14
8	rearDistanceSensorBracket	1
9	M2.5x10mmStandOffScrew	10
10	daguDCmotor	4
11	hexCoupling	4
12	setScrew	8
13	daguDCmotorBracketPiece1	2
14	M2.5mmx25mmHexCap	10
15	couplingCollarBracket	4
16	daguDCmotorBracketPiece2	2
17	L298NmotorDriver	1
18	M2.5mmx6mmPhillipsHead	10
19	arduinoMega	1
20	arduinoMegaSensorShield	1
21	tailLightsRearBracket	2
22	redLED	14
23	yellowLED	22
24	tailLightSpacer	4
25	tailLightsFrontBracket	2
26	M2.5mmx16mmHexCap	18
27	M4mmx12mmPhillipsHead	6

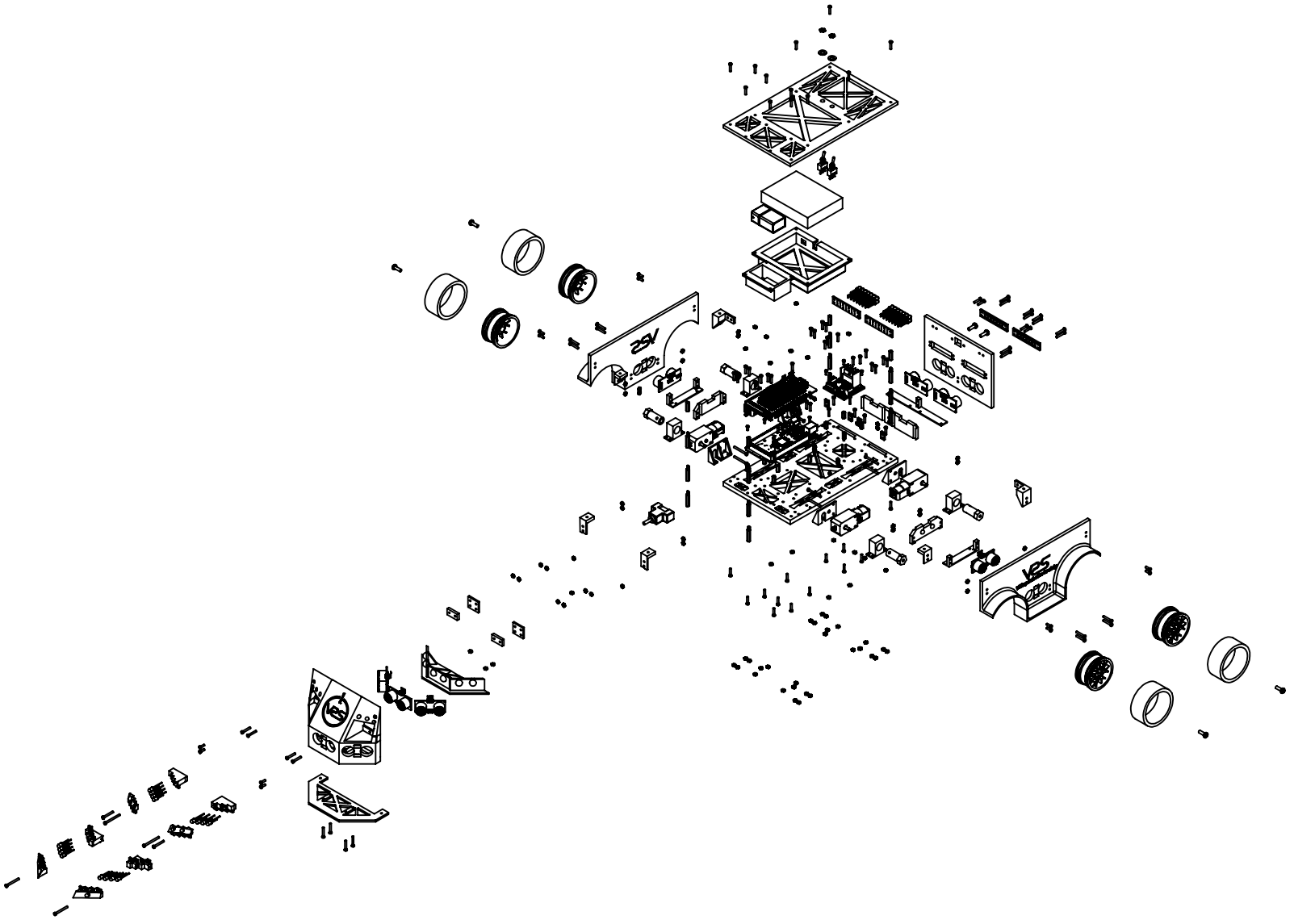
Bill of Materials II

ITEM NO.	PART NUMBER	QTY.
28	usbTypeAtoUsbTypeAcable3	1
29	M2.5x20mmMale-FemaleStandOffScrew	12
30	M2.5x15mmFemale-FemaleStandOffScrew	4
31	sideShellRight	1
32	sideShellToBottomChassisBracket	2
33	sideDistanceSensorBracket	2
34	frontToTopChassisRightBracket	1
35	rearToTopChassisRightBracket	1
36	M2.5mmx8mmHexCap	12
37	sideShellLeft	1
38	frontToTopChassisLeftBracket	1
39	rearToTopChassisLeftBracket	1
40	frontShell	1
41	frontDistanceSensorBracket	1
42	frontShellToBottomChassisBracket	1
43	topHeadLightSpacer	2
44	topHeadLightToFrontBumper	2
45	frontShellToTopChassisBracketRight	1
46	frontShellToTopChassisBracketLeft	1
47	topHeadLightLeftRear	1
48	clearLED	8
49	topHeadLightRightRear	1
50	bottomHeadLightLeftRear	1
51	bottomHeadLightRightRear	1
52	topHeadLightLeftFront	1
53	M2.5mmx30mmHexCap	2

Bill of Materials III

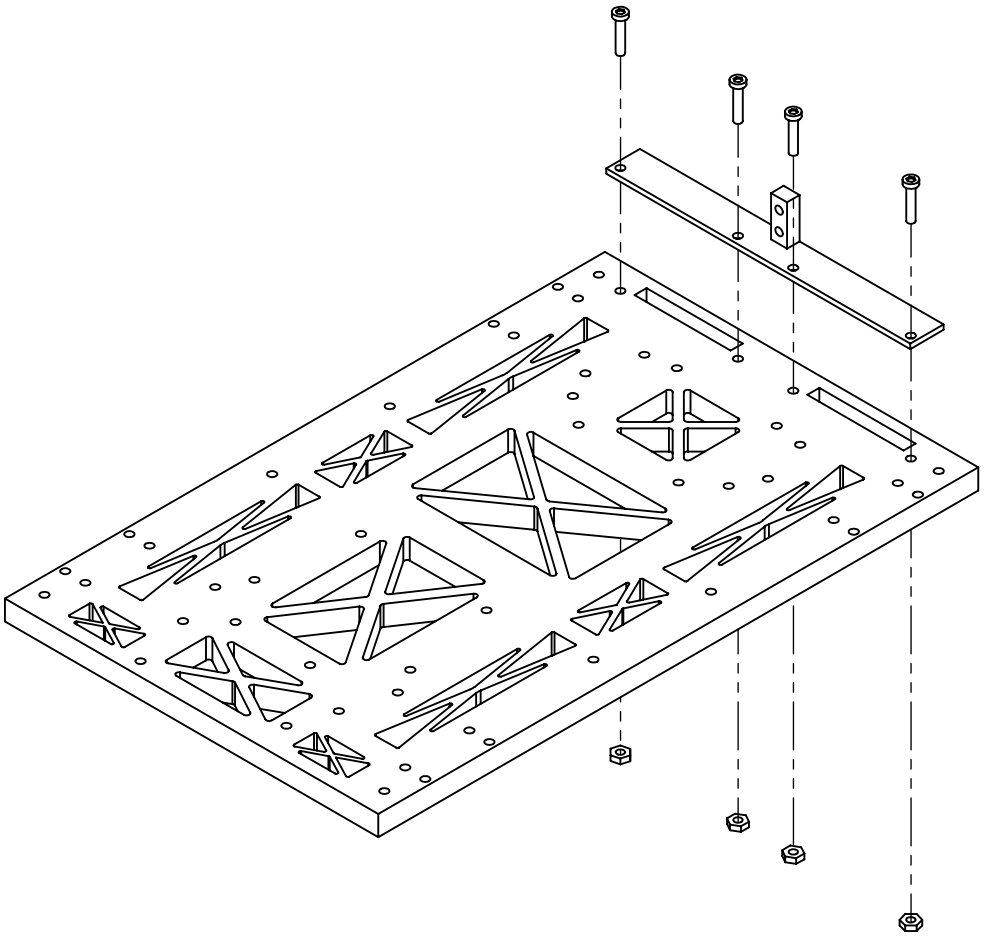
ITEM NO.	PART NUMBER	QTY.
54	M2.5mmx20mmHexCap	2
55	topHeadLightRightFront	1
56	bottomHeadLightLeftFront	1
57	bottomHeadLightRightFront	1
58	maleDCbarrelJack	1
59	topChassis	1
60	9Vbattery	1
61	9VbatteryBracket	1
62	AAbatteryPack	1
63	AAbatteryPackBracket	1
64	toggle_mts_1_base_thread	2
65	toggle_mts_1_lever	2
66	toggle_mts_1_washer	2
67	toggle_mts_1_nut	2
68	wheel	4
69	tire	4

Exploded View



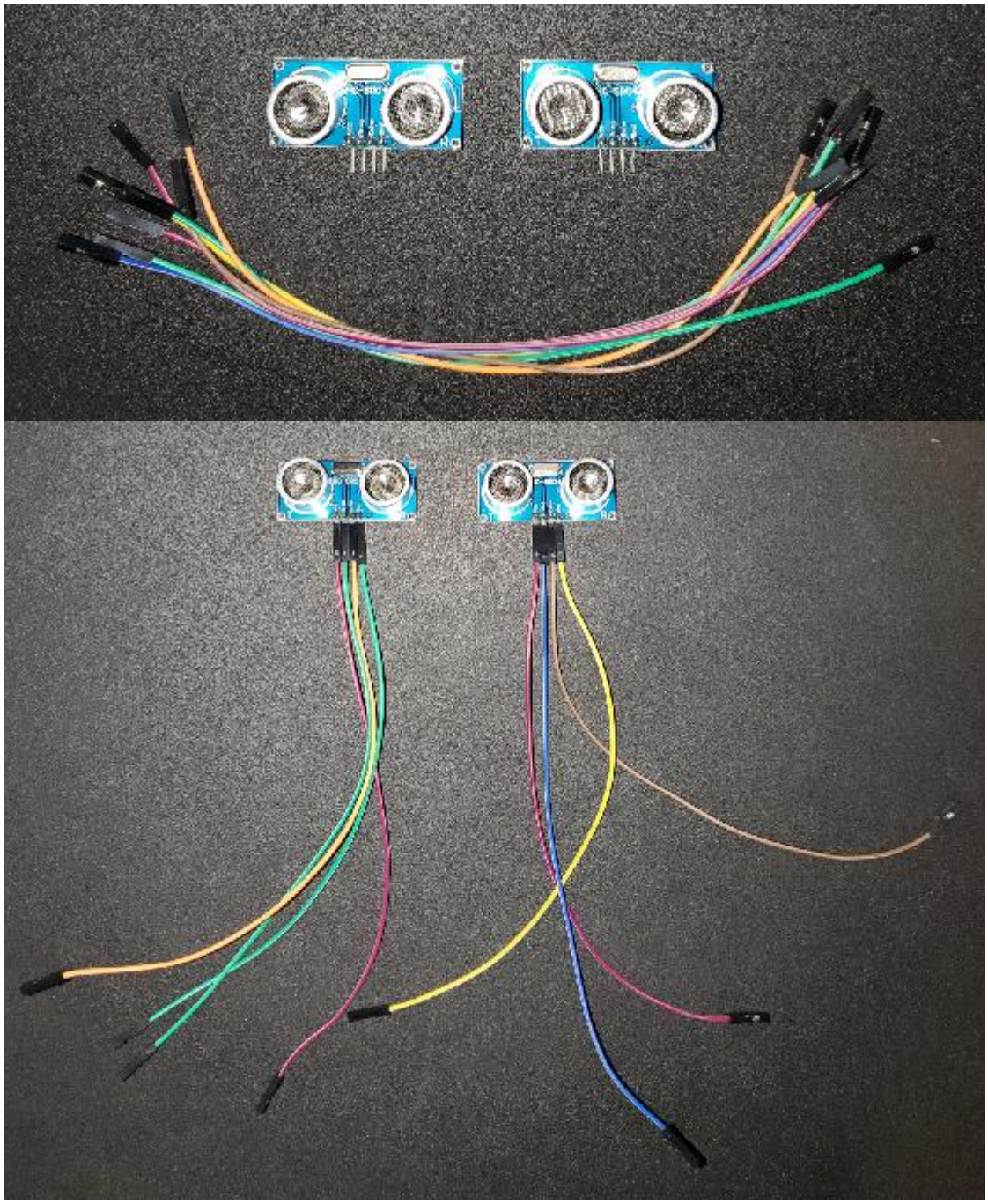
Step 1:

Using four (4) M2.5 x 12 mm hex socket cap screws and M2.5 nuts, fasten the rearShellToBottomChassisBracket part onto the bottomChassis part.



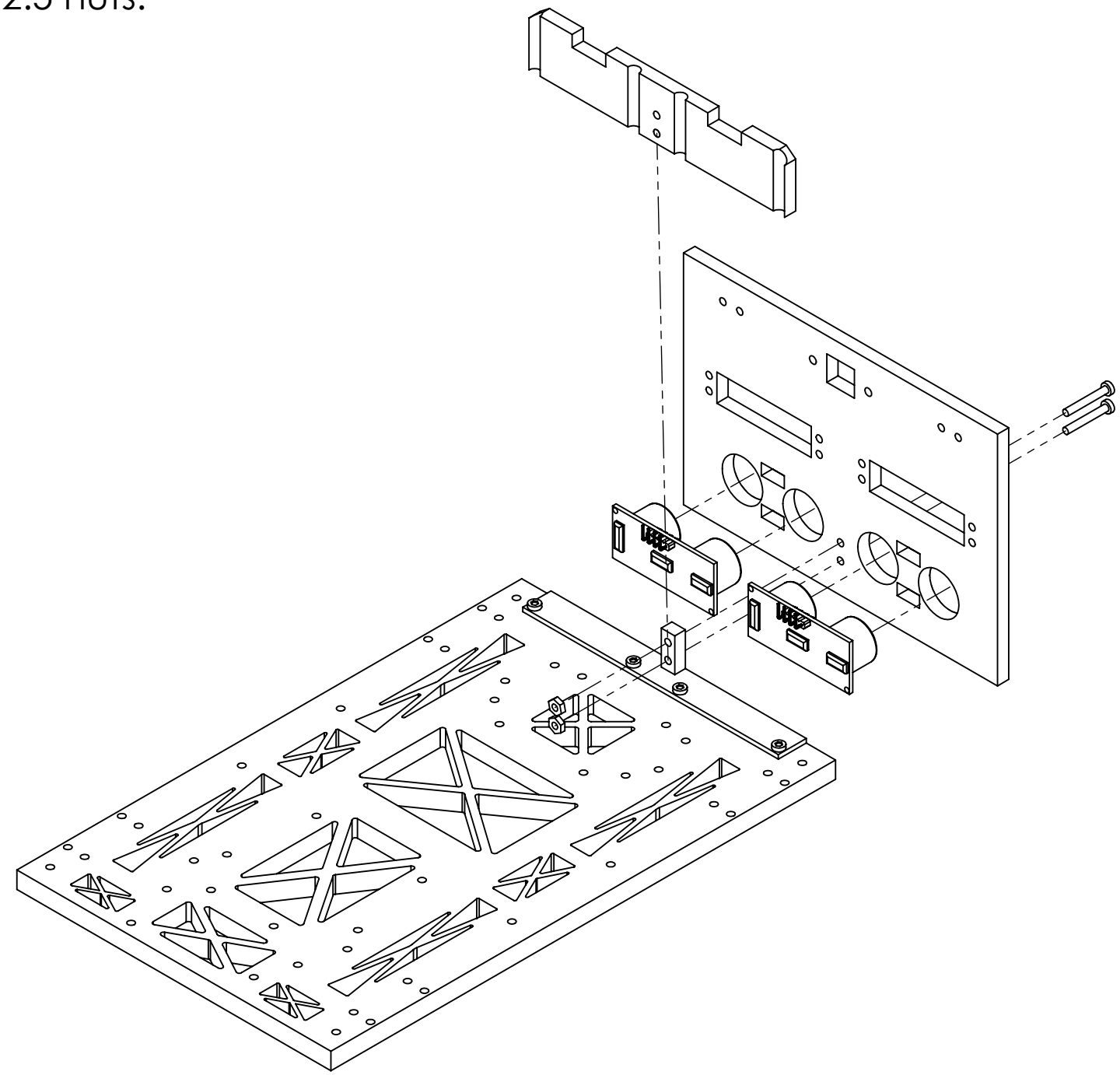
Step 2:

Obtain two (2) HC-SR04 ultrasonic distance sensors and eight (8) female-female jumper wires and connect them to all four (4) pins.



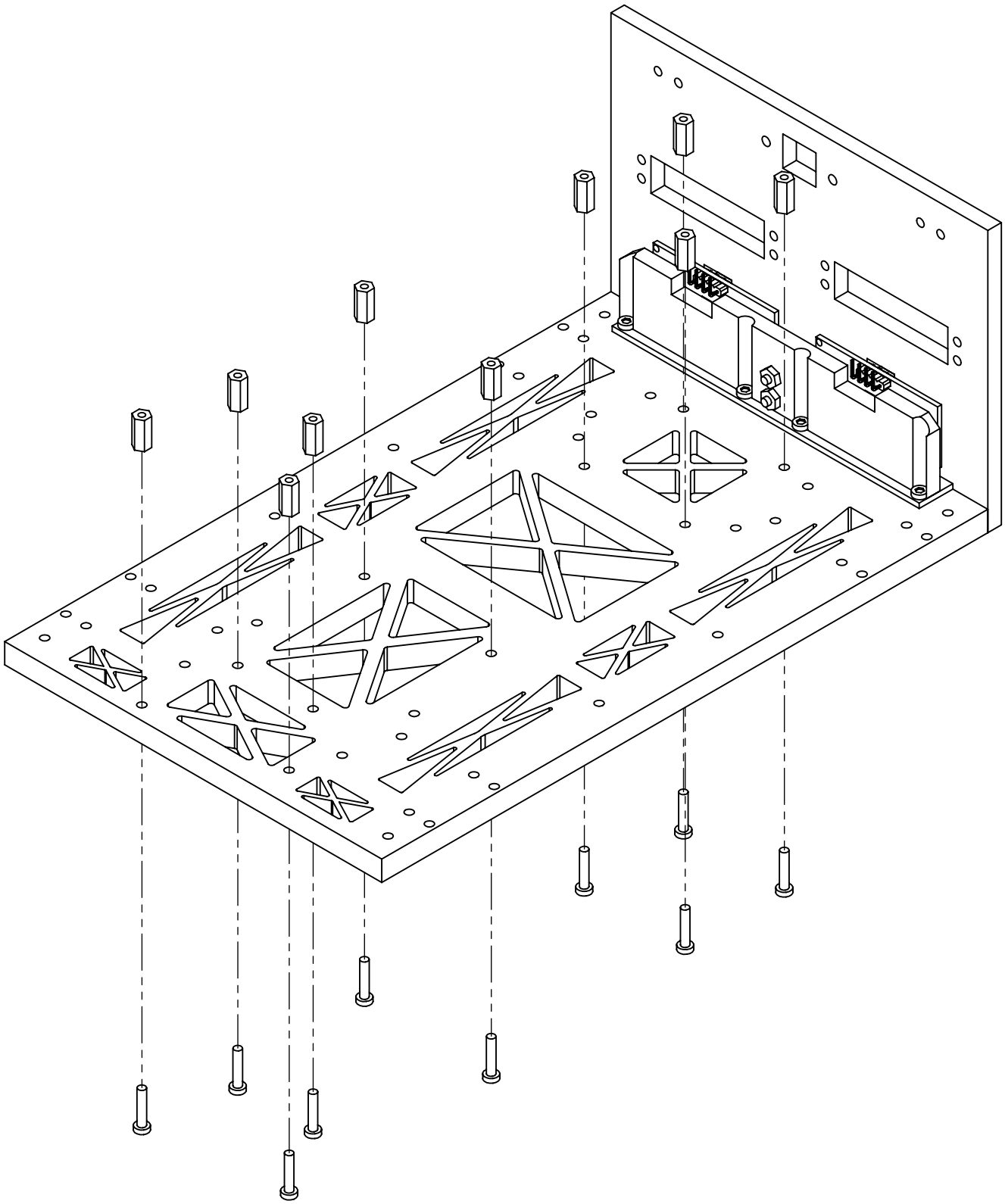
Step 3:

Install the two (2) HC-SR04 ultrasonic distance sensors onto the rearShell part, insert two (2) M2.5 x 18 mm hex socket cap screws through the holes pictured, install this subassembly onto the rearShellToBottomChassisBracket, install the rearDistanceSensorBracket and then fasten them using two (2) M2.5 nuts.



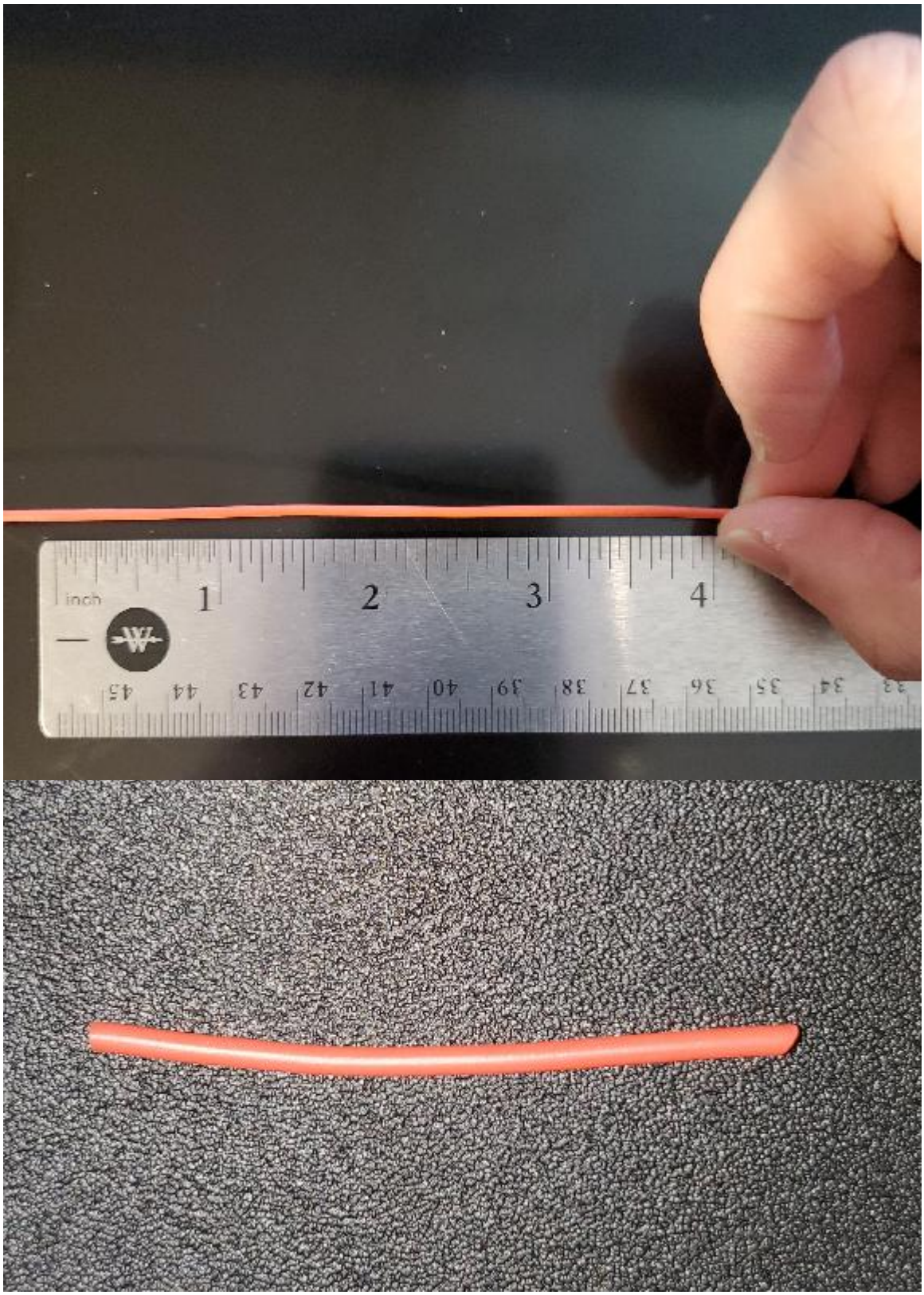
Step 4:

Obtain ten (10) M2.5x10mm female-female standoff screws and M2.5 x 12 mm hex socket cap screws and fasten them onto the bottomChassis part.



Step 5:

Cut 4" of red 22 AWG wire from its spool.

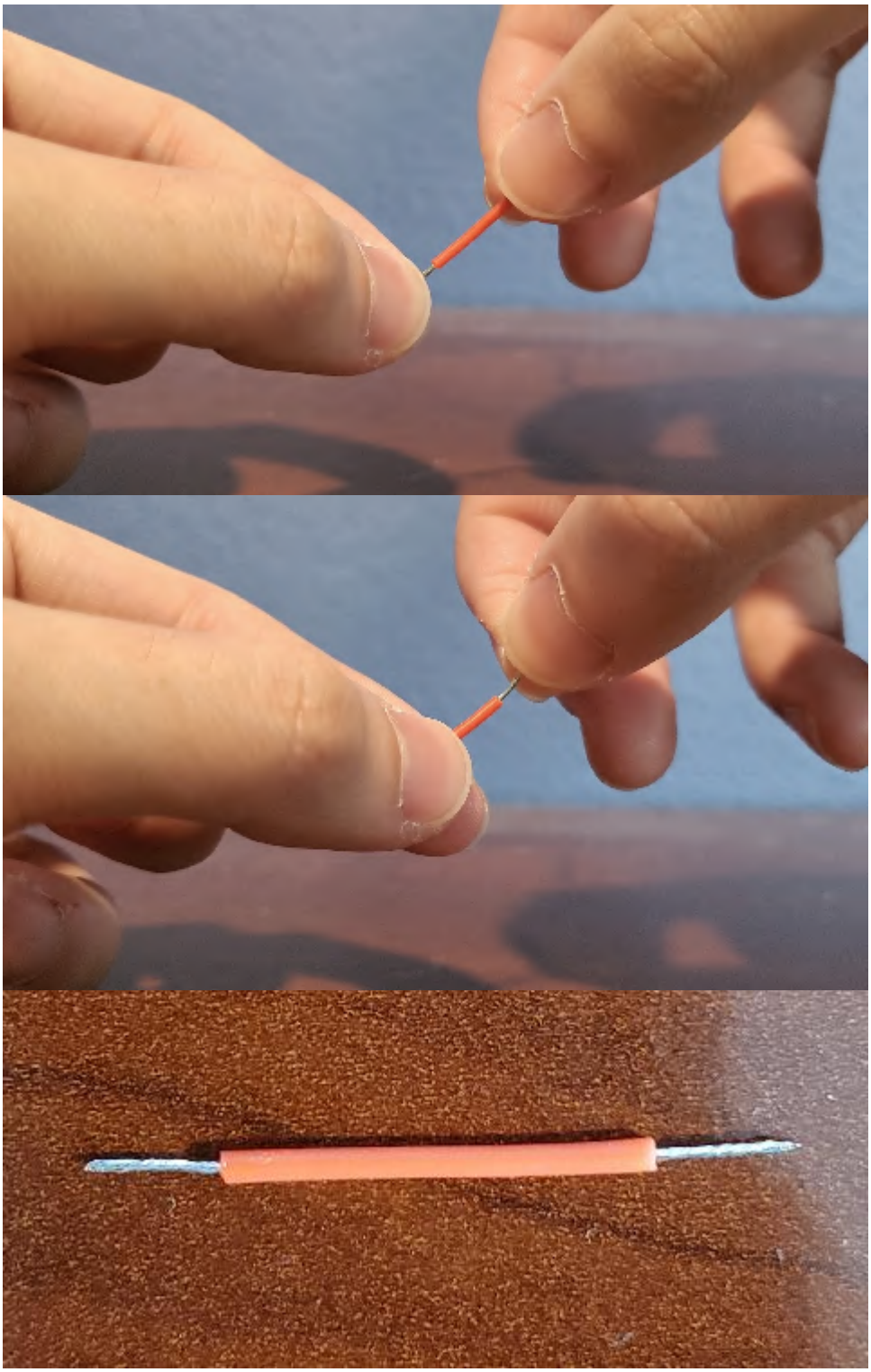


Step 6:

Obtain wire strippers and strip a ¼" of the wire's insulation on both ends.

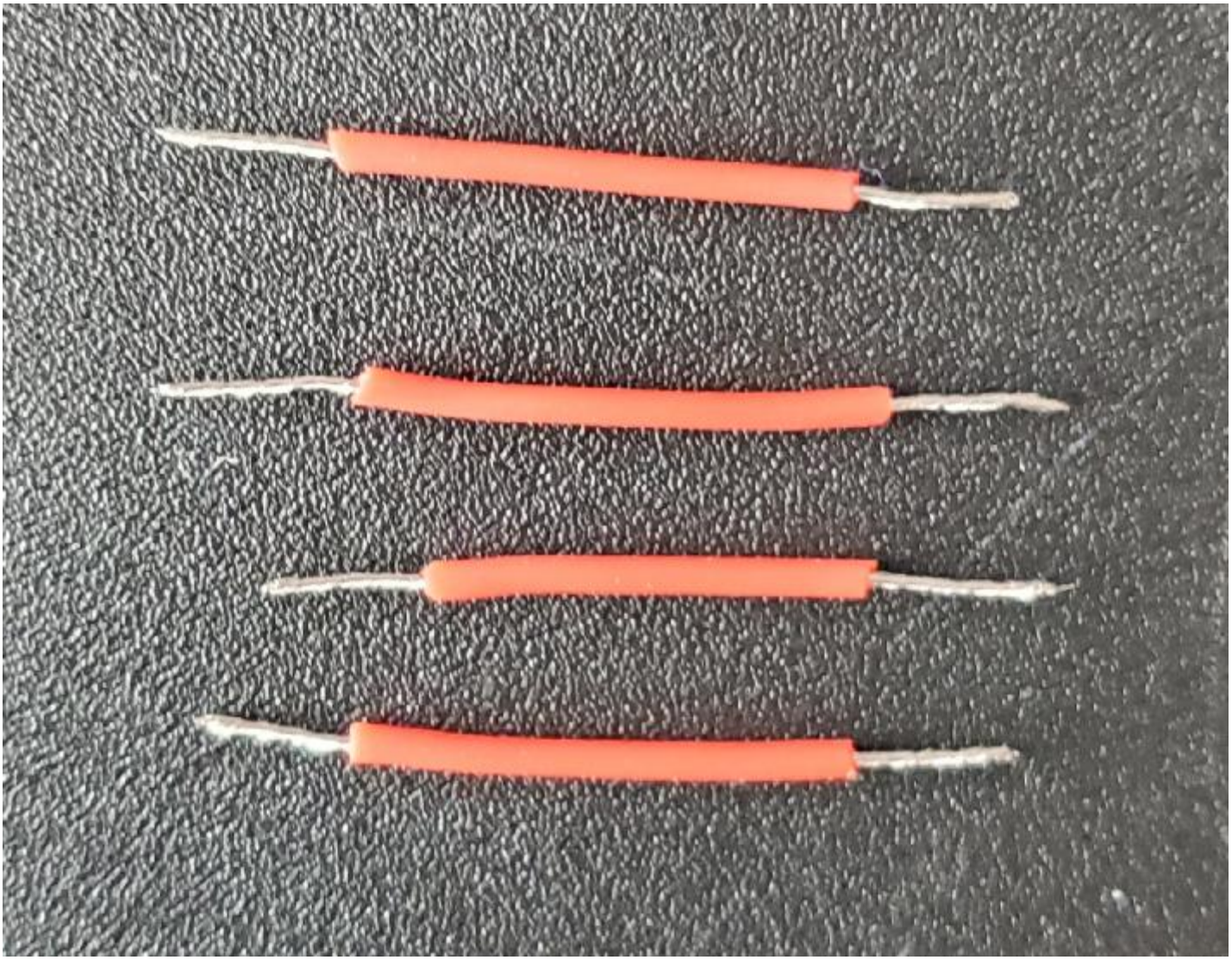
Step 7:

Grab and twist both stripped ends until they are no longer frayed.



Step 8:

Repeat steps 5-7 for three additional wires.

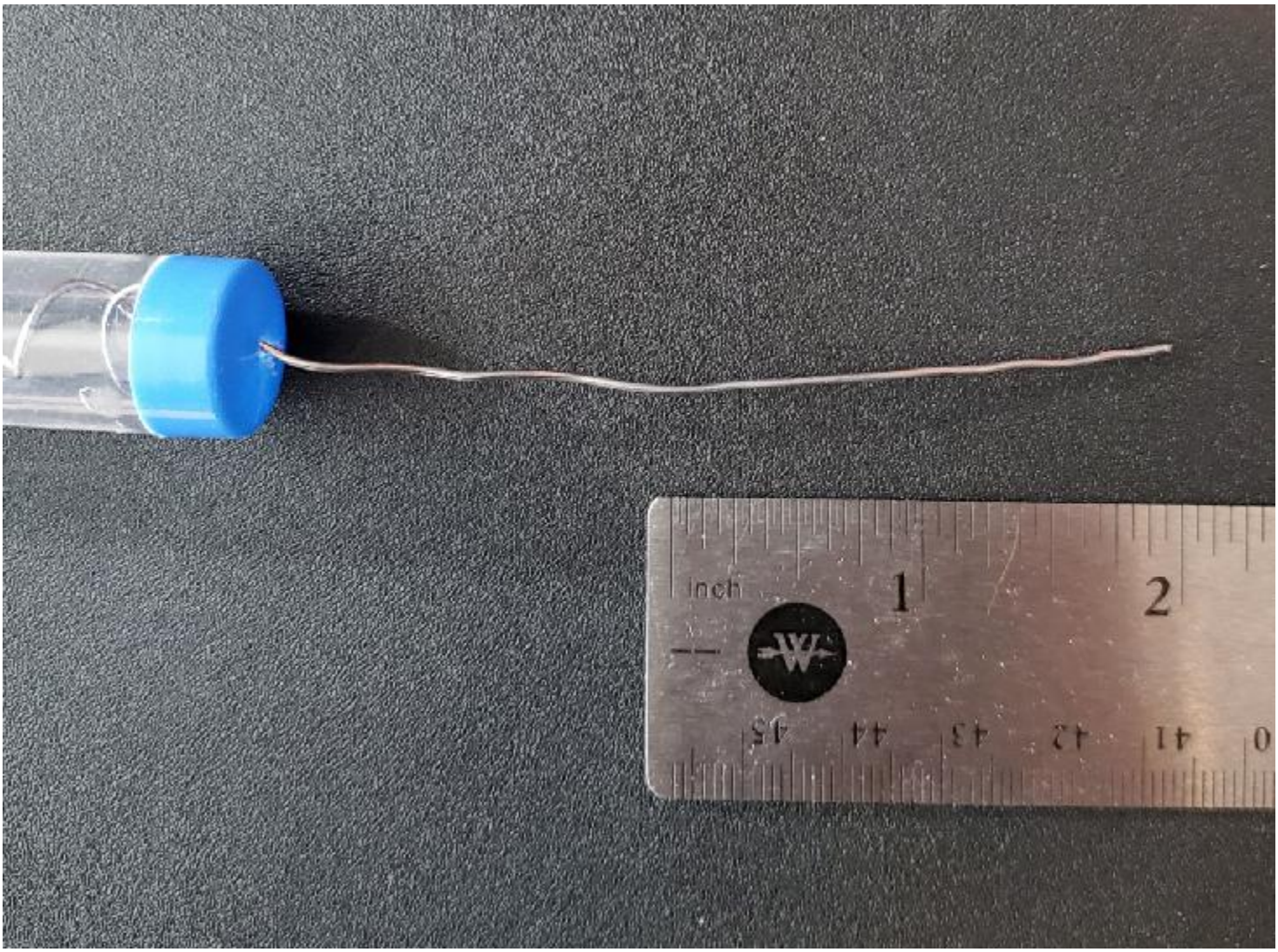


Step 9:

Obtain a soldering jig and mount a DAGU DC motor on one of the clips by its tab and a wire from steps 5-8 on the other.

Step 10:

Obtain the coil of solder and straighten its free end to a length of 2".



Step 11:

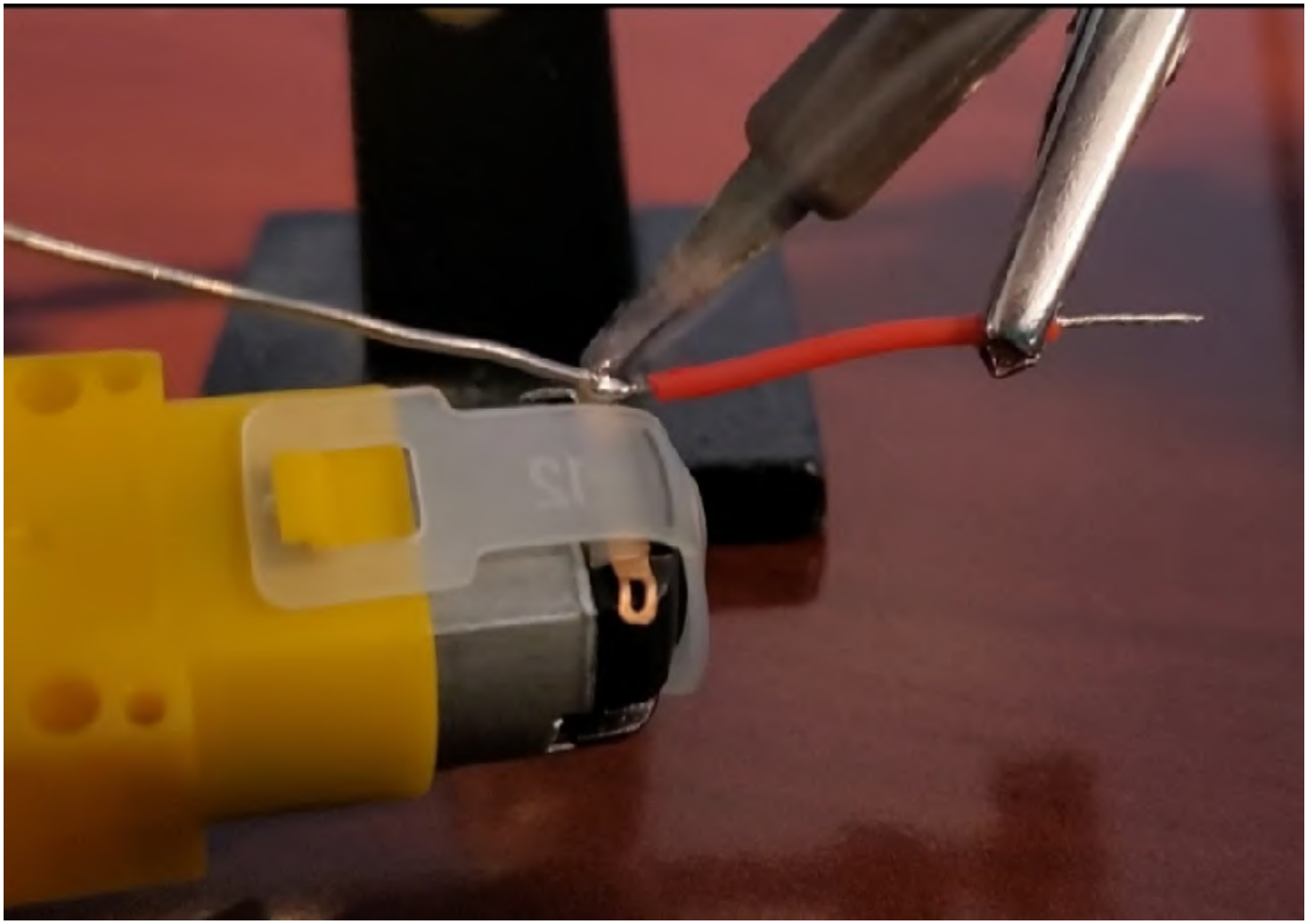
Obtain a soldering iron, turn it on and adjust its temperature settings to a temperature that is sufficient for the solder being used.

Step 12:

Route one of the stripped ends of a wire from steps 5-8 through the specified lead of the DAGU DC motor.

Step 13:

Carefully place the tip of the soldering iron on the routed lead of the DAGU DC motor and quickly apply solder before its components begin to melt.

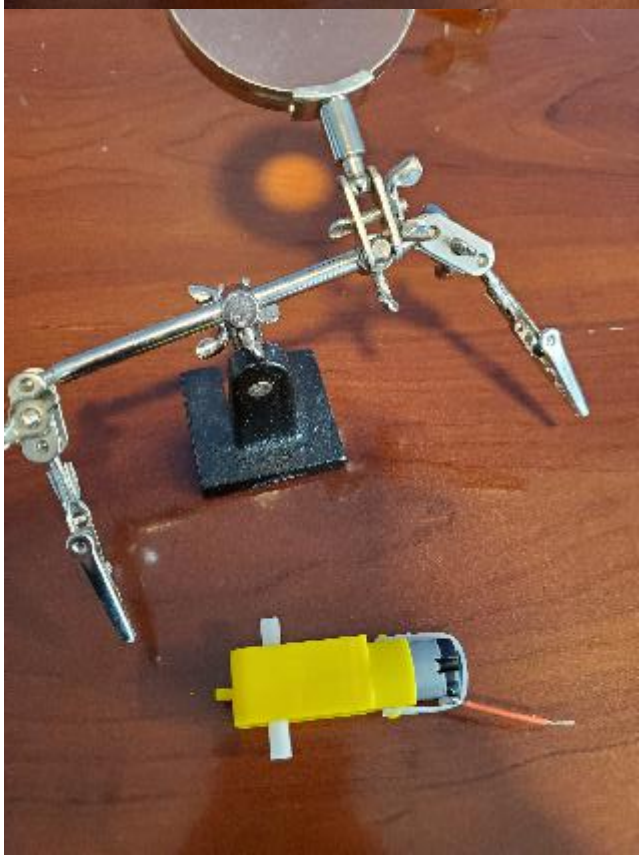


Step 14:

If needed, obtain flush cutter pliers and trim excess solder.

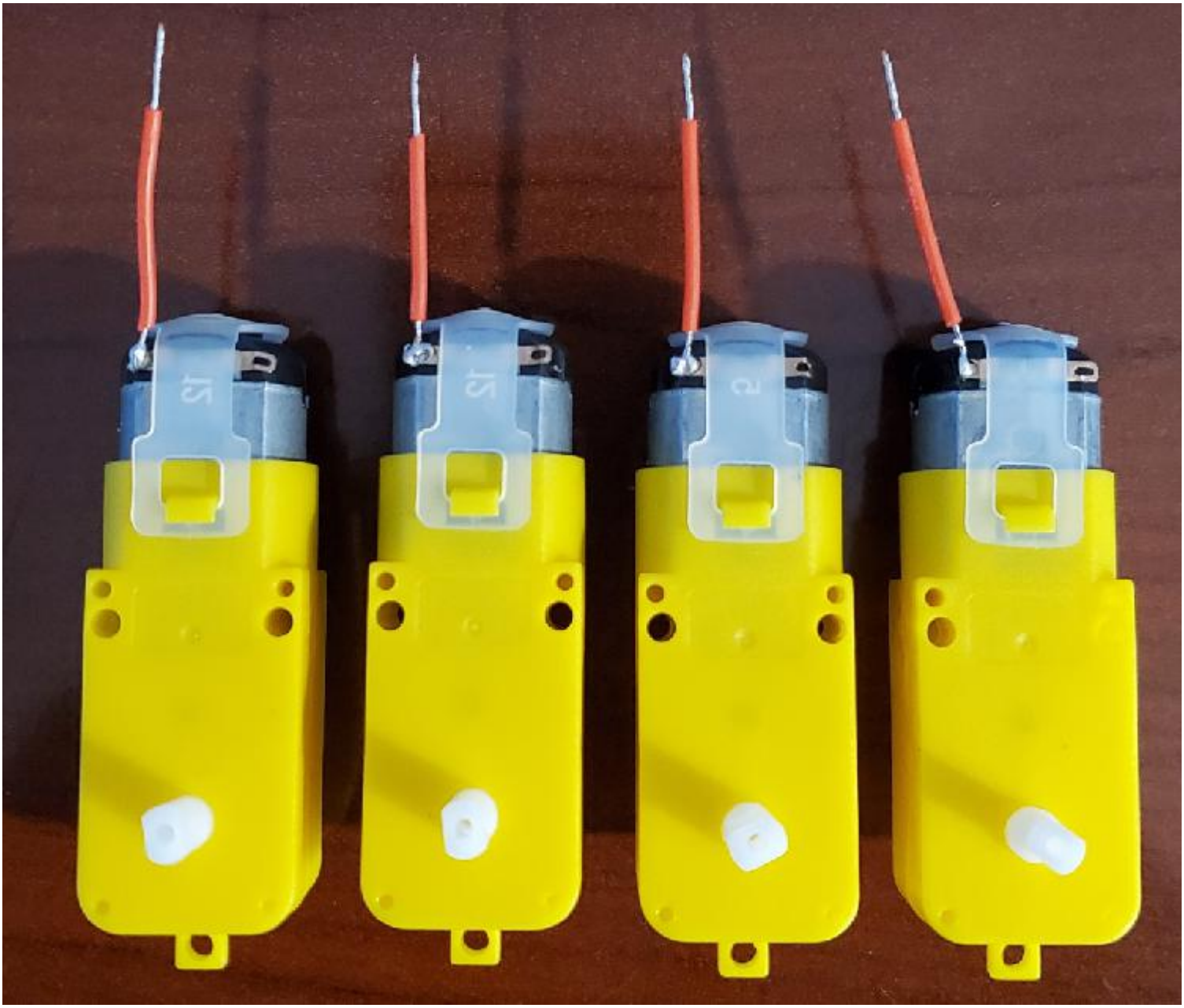
Step 15:

First, unmount the wire from steps 5-8 and then the DAGU DC motor from the soldering jig and place them on the workspace.



Step 16:

Repeat steps 9-15 for the remaining DAGU DC motors.

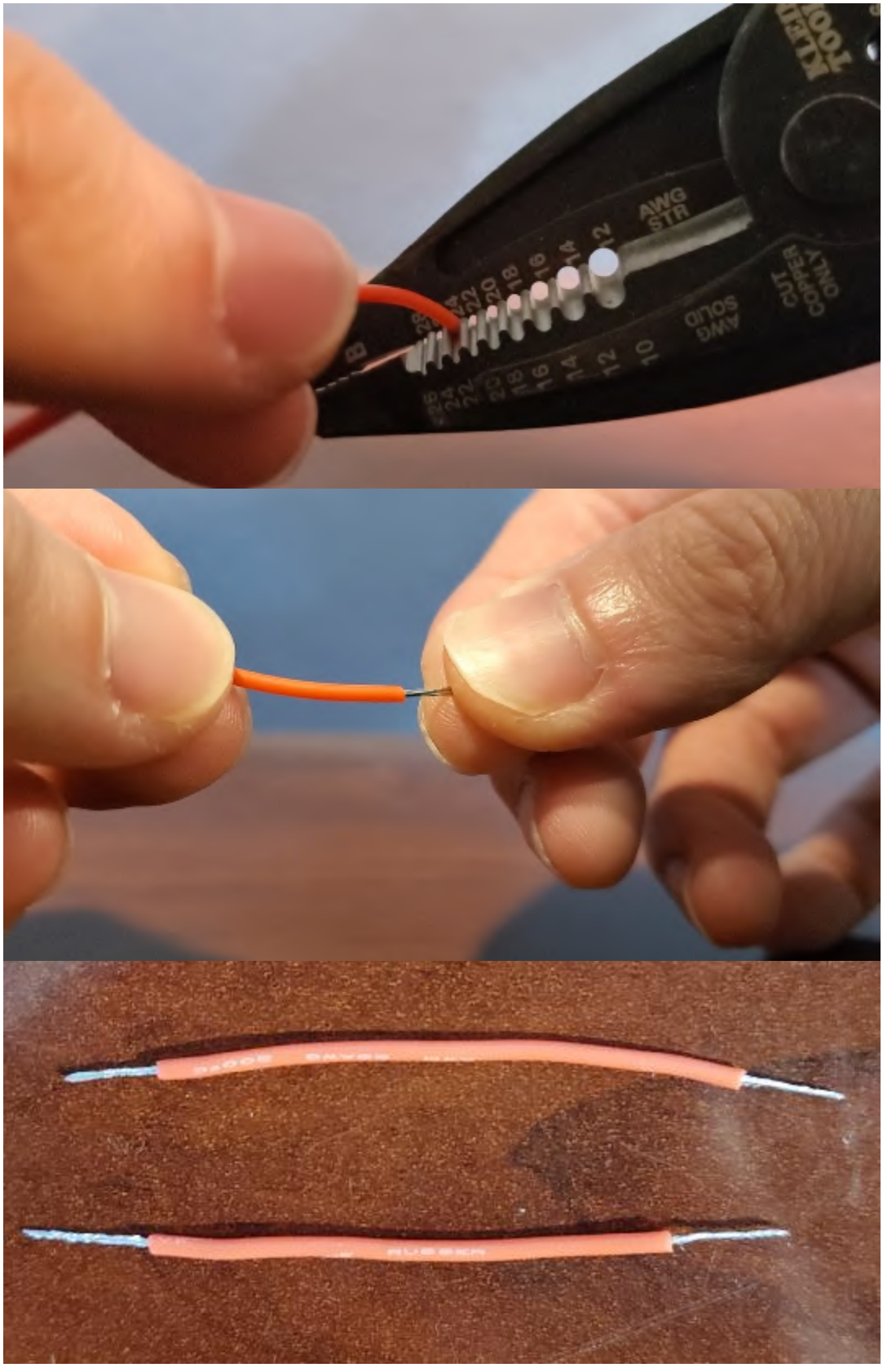


Step 17:

Cut two 4" red 22 AWG wires from its spool.

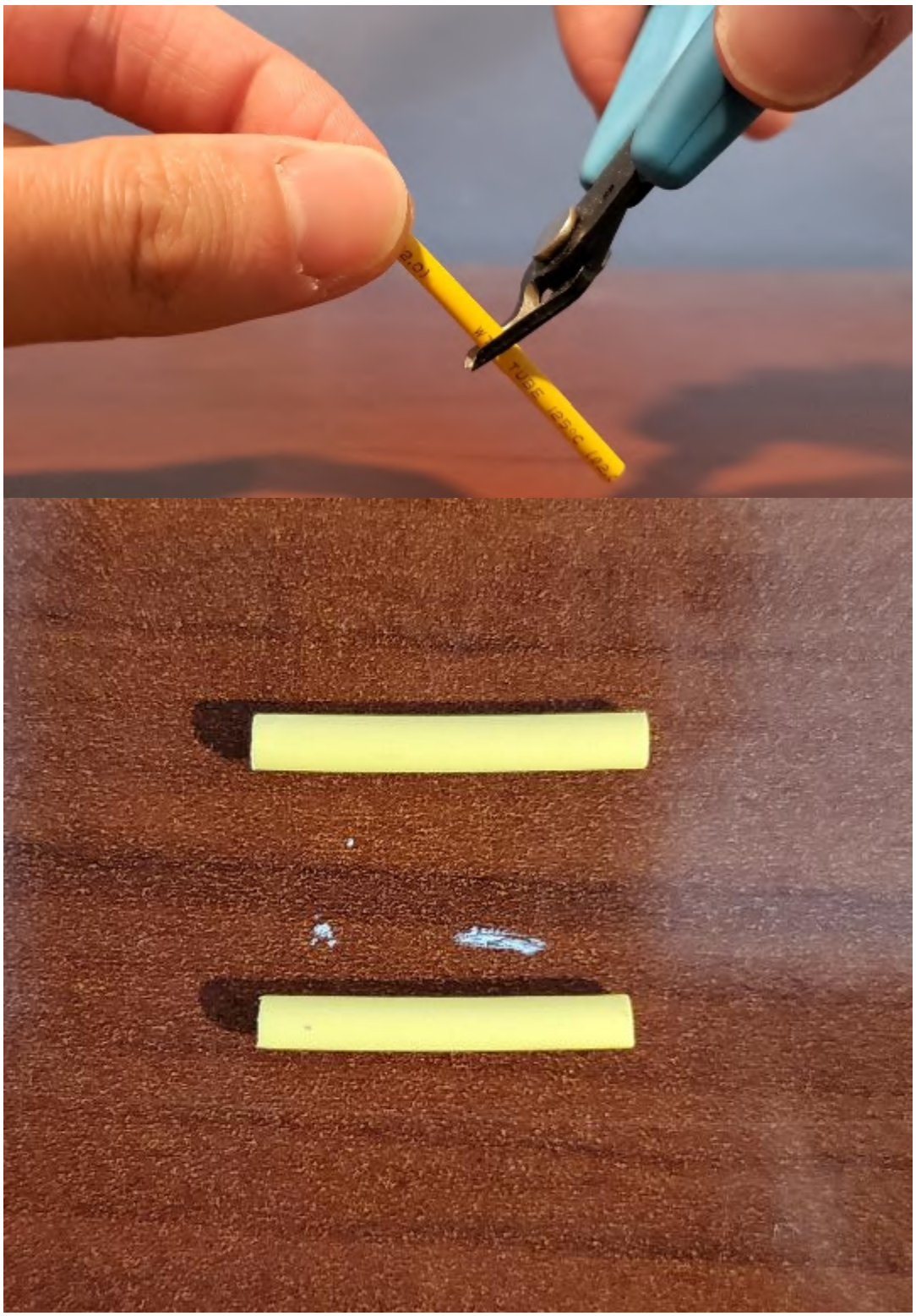
Step 18:

Obtain wire strippers and strip a ¼" of each wire's insulation on both sides and twist their ends until they are no longer frayed.



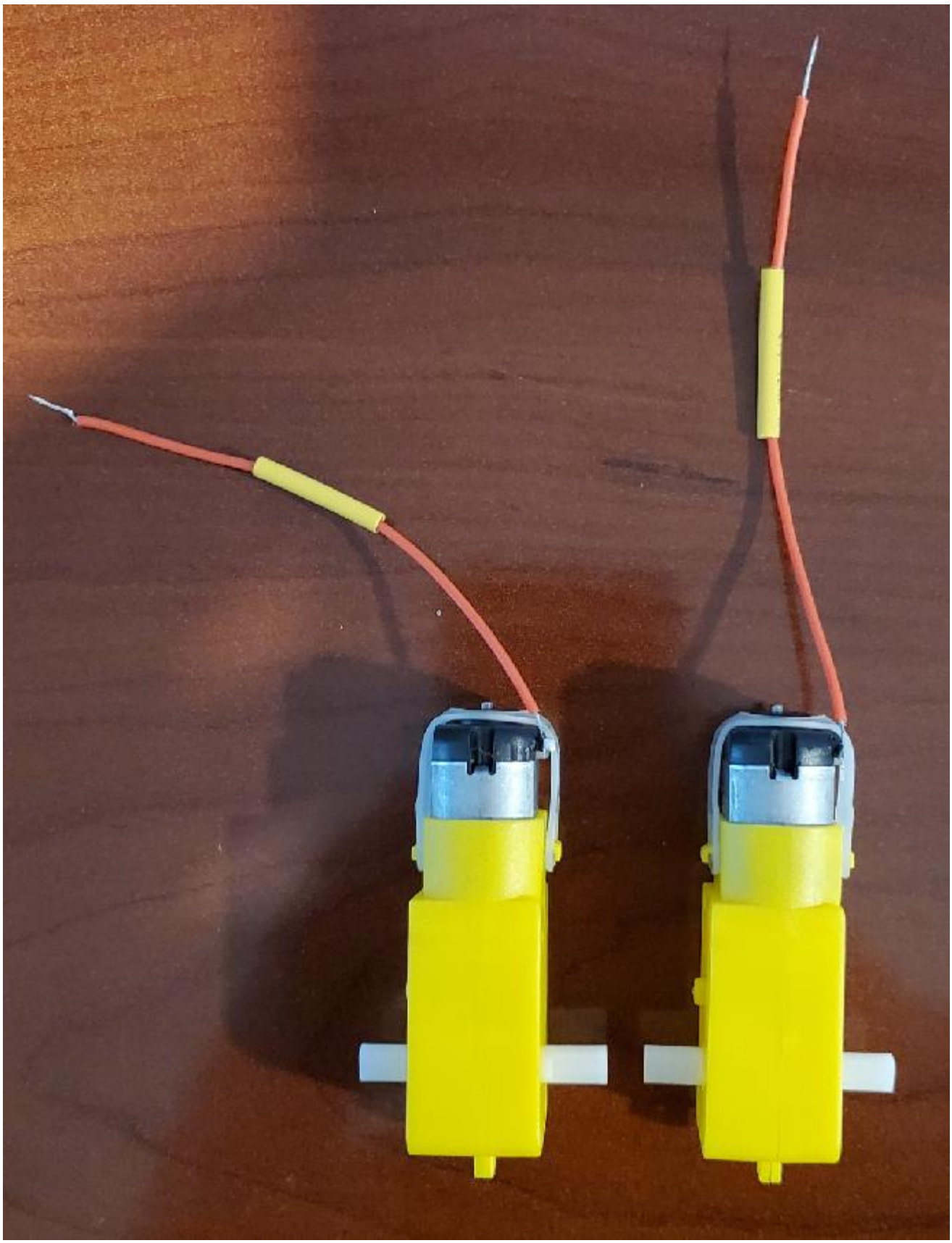
Step 19:

Obtain a 2.5x45mm heat shrink tube and cut them in half using flush cutter pliers.



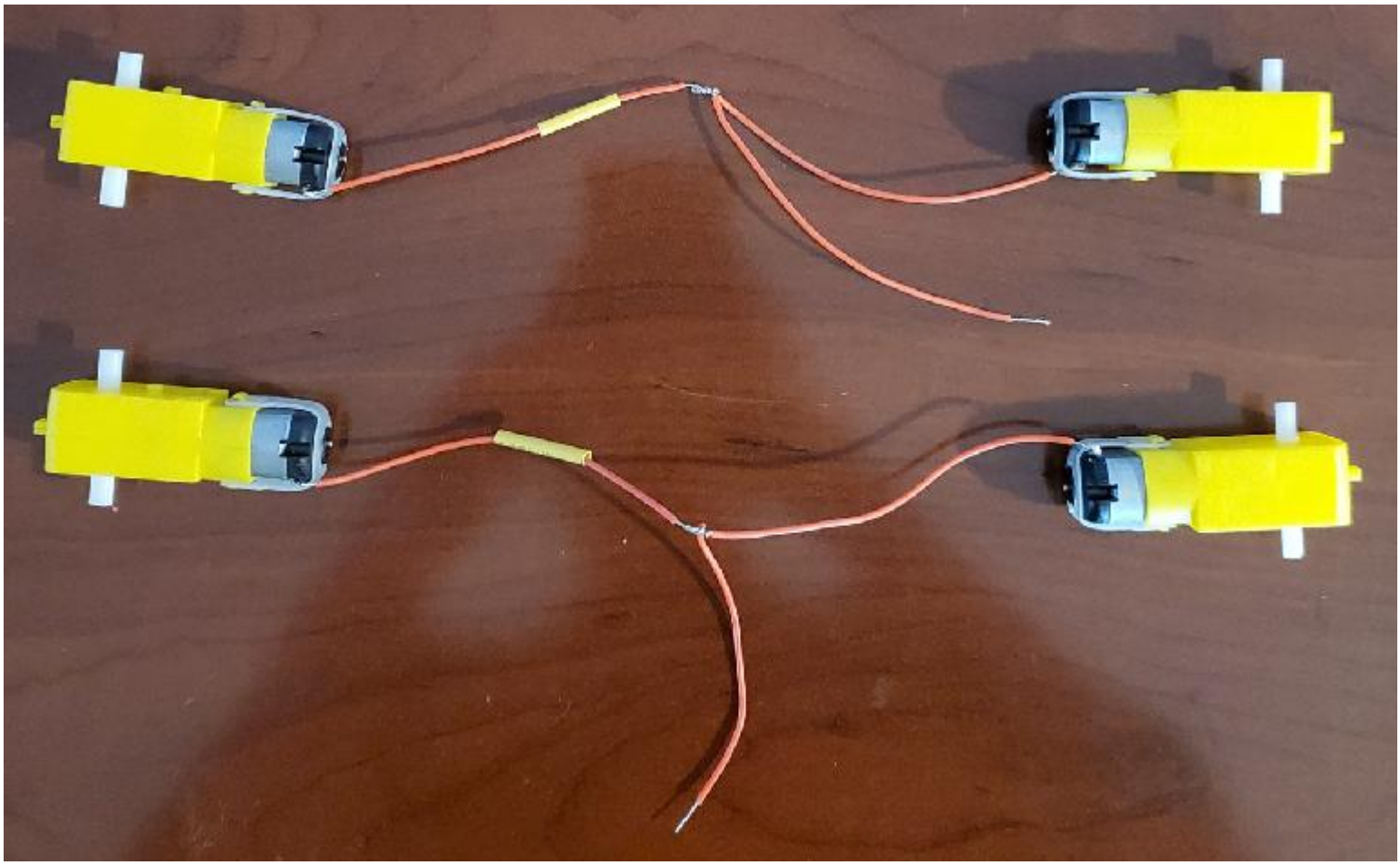
Step 20:

Route the cut heat shrink tubes through two red DAGU DC motor wires.



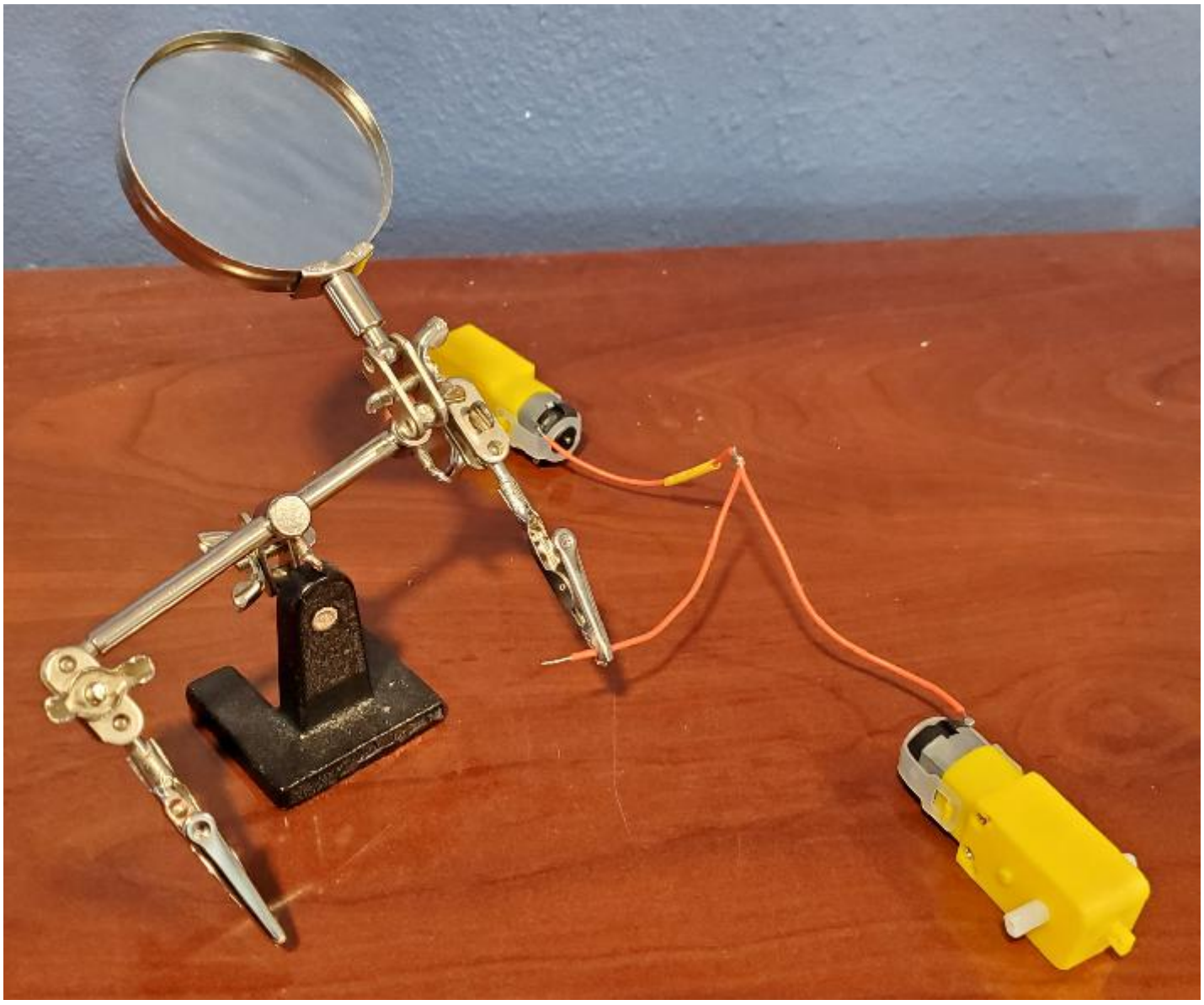
Step 21:

Create a daisy chain by coiling the free ends of the red DAGU DC Motor wires (one with and one without the heat shrink routed through) and one of the wires from steps 17-18 together and repeat this for the remaining motors.



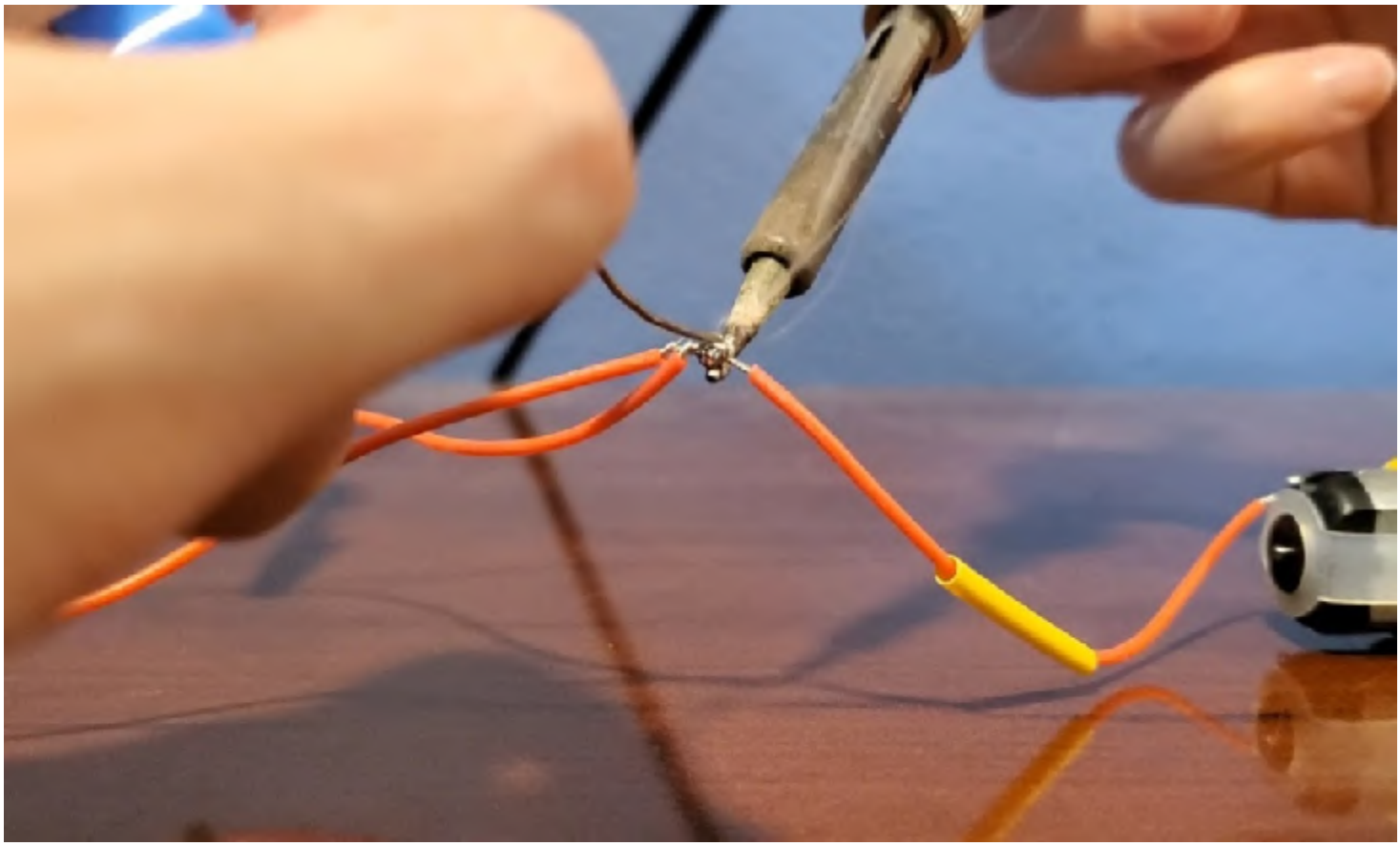
Step 22:

Obtain the free wire of the daisy chained wires and mount it on one of the clips of the soldering jig.



Step 23:

Carefully place the tip of the soldering iron on the coiled joint and quickly apply solder.

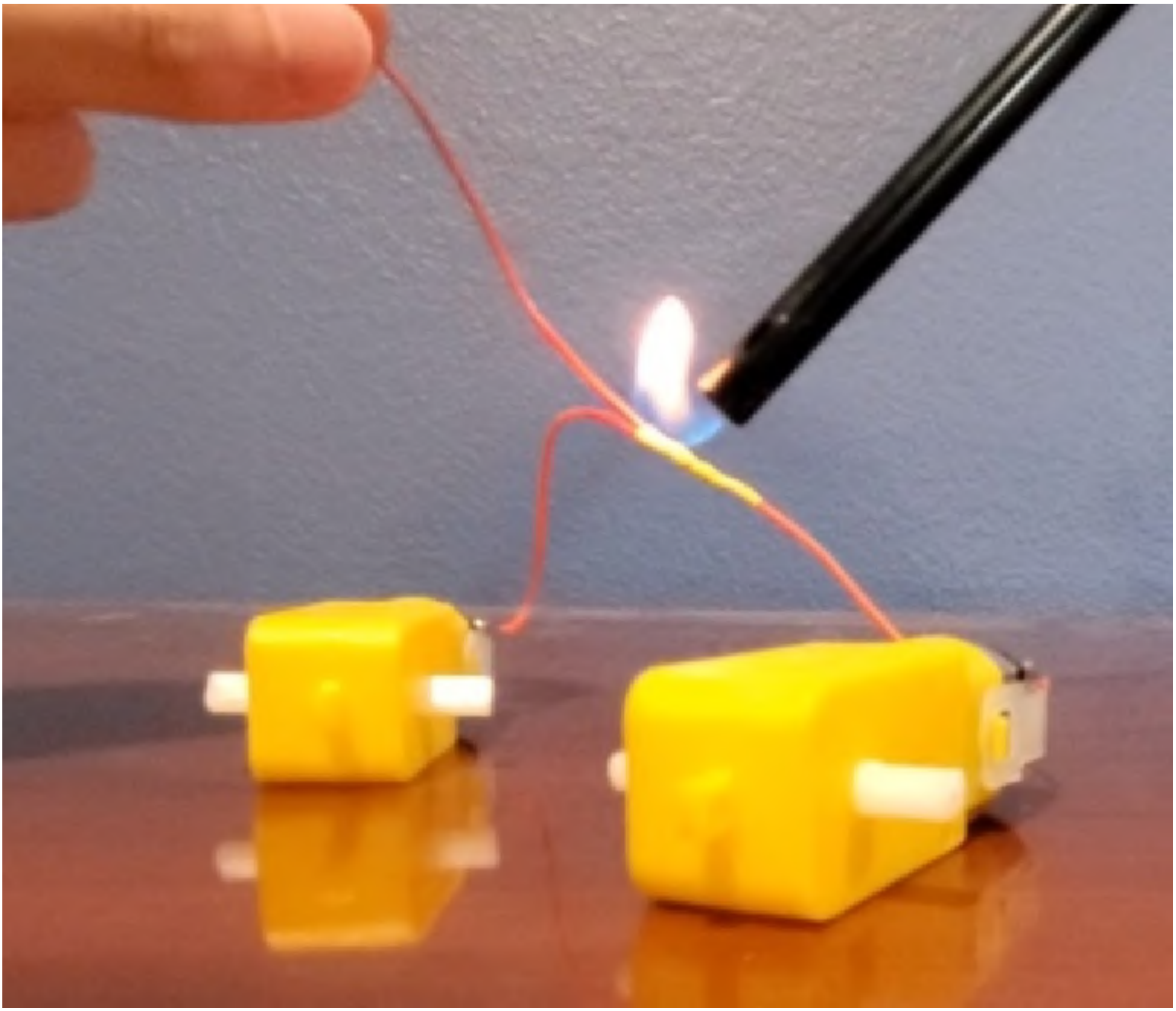


Step 24:

After the joint and its surrounding wires cool down, position the cut heat shrink to cover the joint.

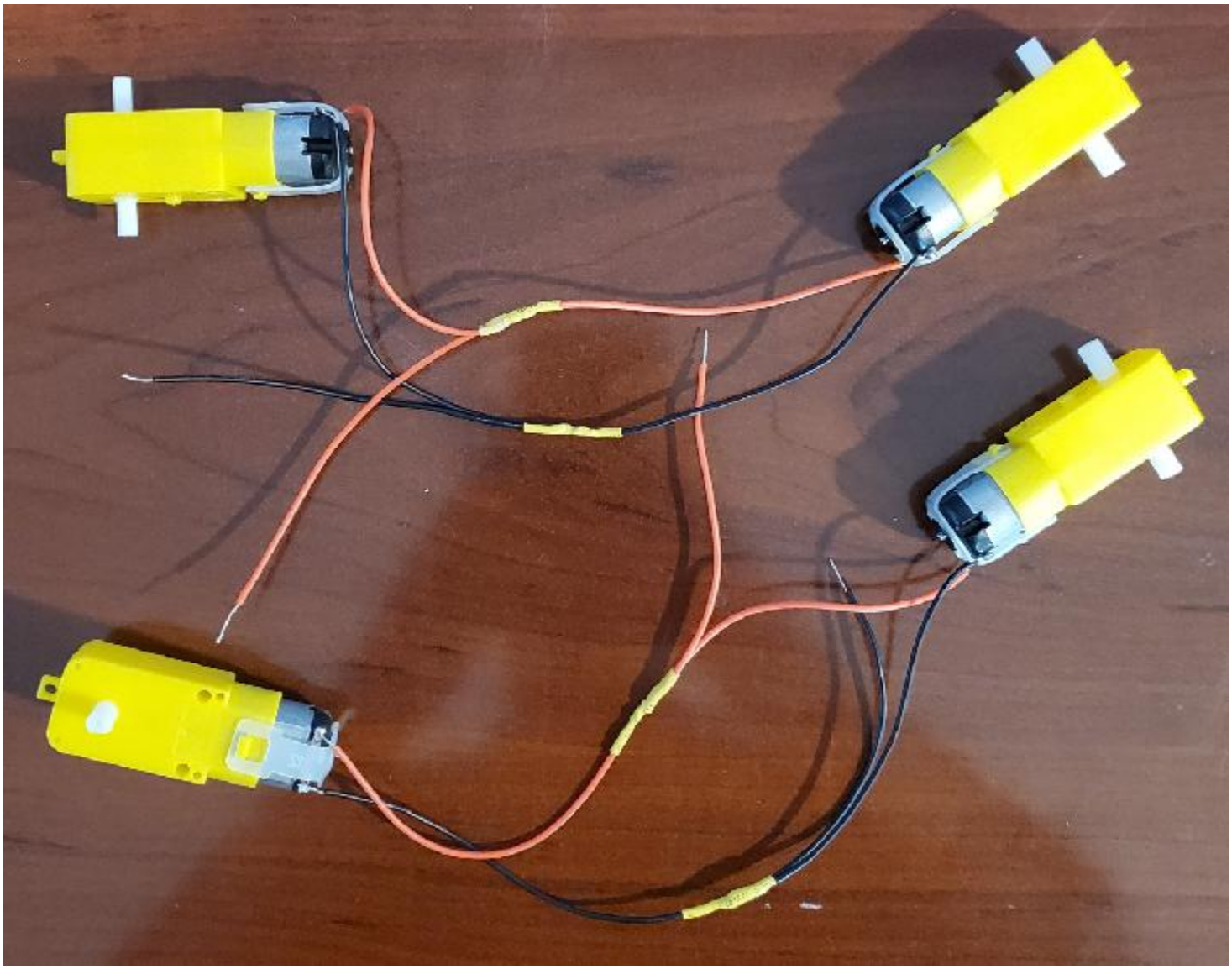
Step 25:

While holding the daisy-chained wires by its free end upward, obtain a BBQ lighter and apply heat onto the cut heat shrink until it has shrunk to capacity.



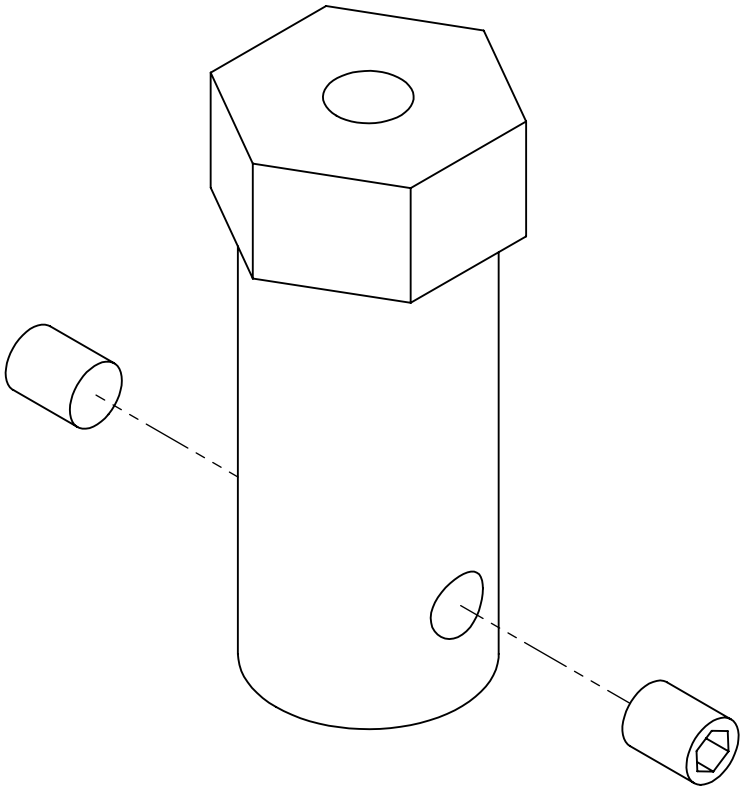
Step 26:

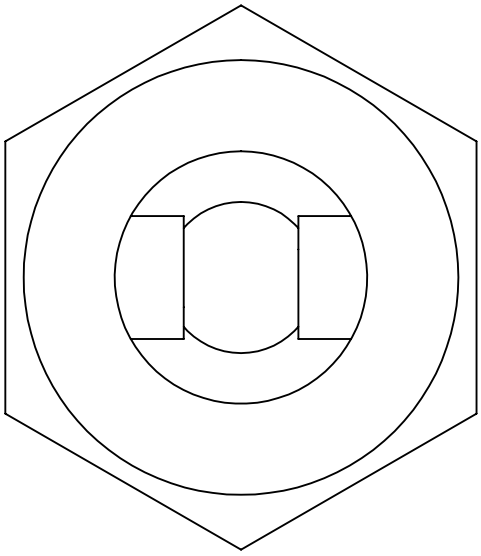
Repeat steps 22-25 for the remaining daisy chained motors and repeat steps 5-26 for black 22 AWG wire.



Step 27:

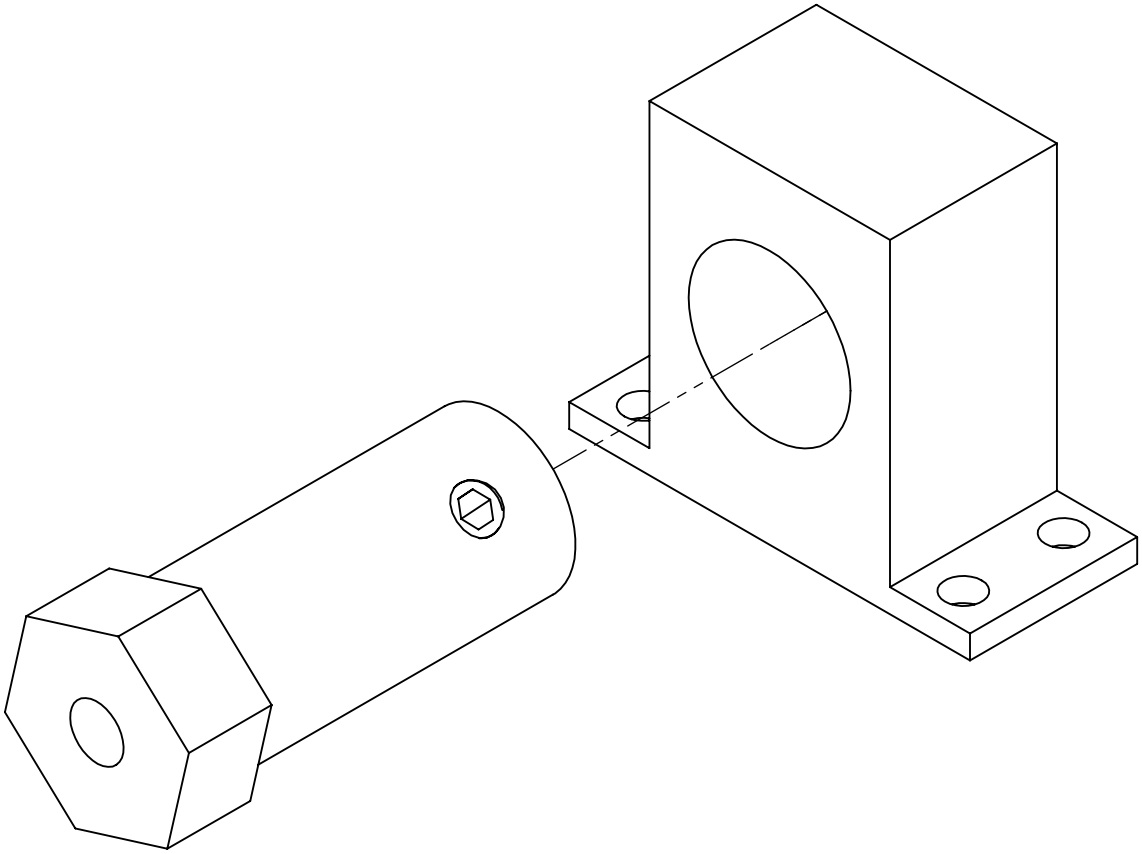
Inspect coupling and fasten the black set screws so that it doesn't go past the outer cylindrical face of the coupling.





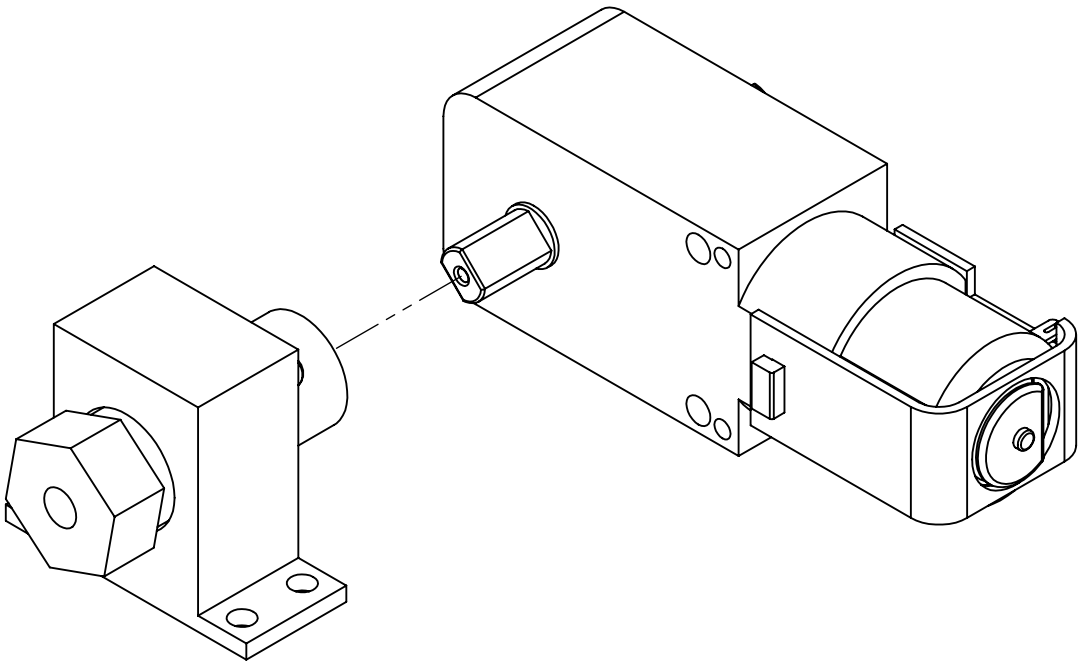
Step 28:

Insert the couplingCollarBracket part through the coupling.



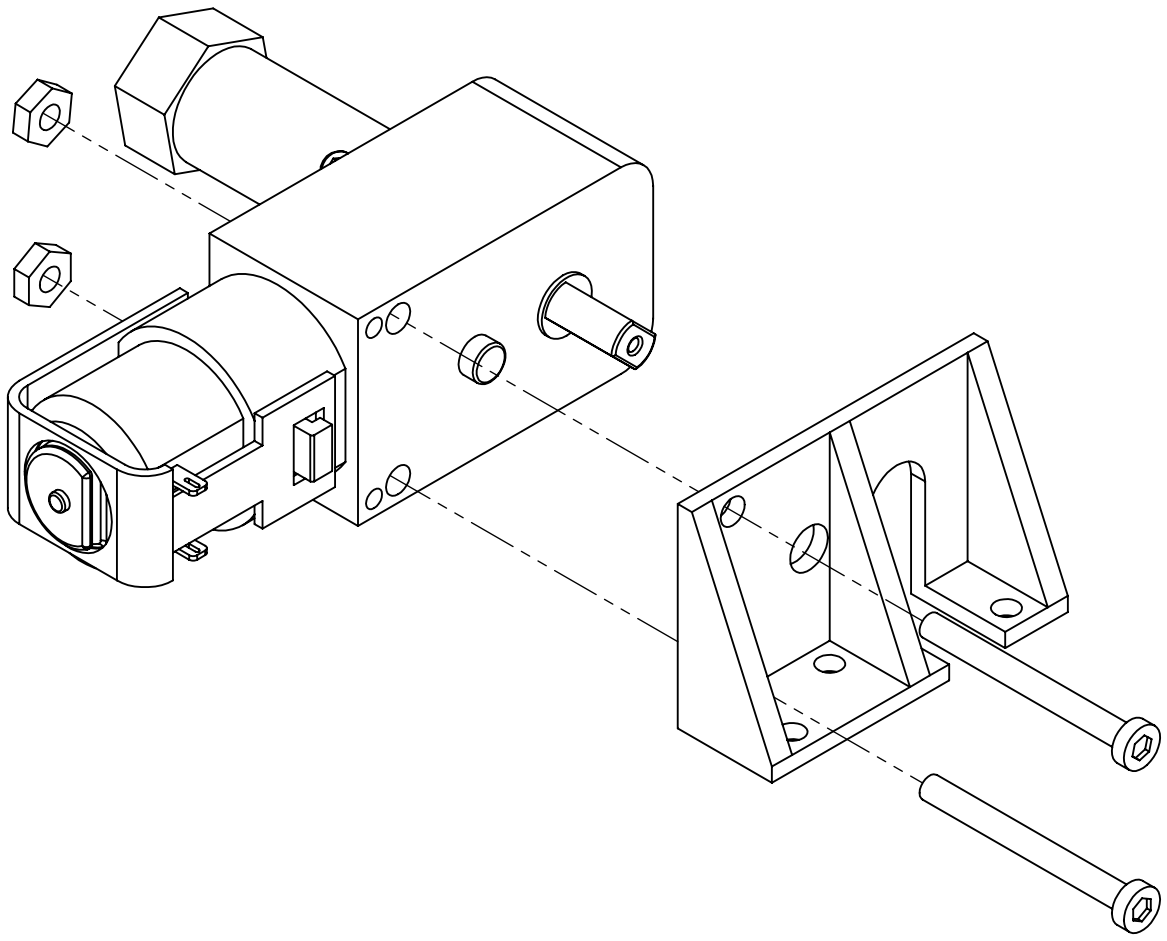
Step 29:

Mount the coupling-couplingCollarBracket assembly onto the plastic noncircular shaft of the DAGU DC motor and fasten the black set screws to secure it.



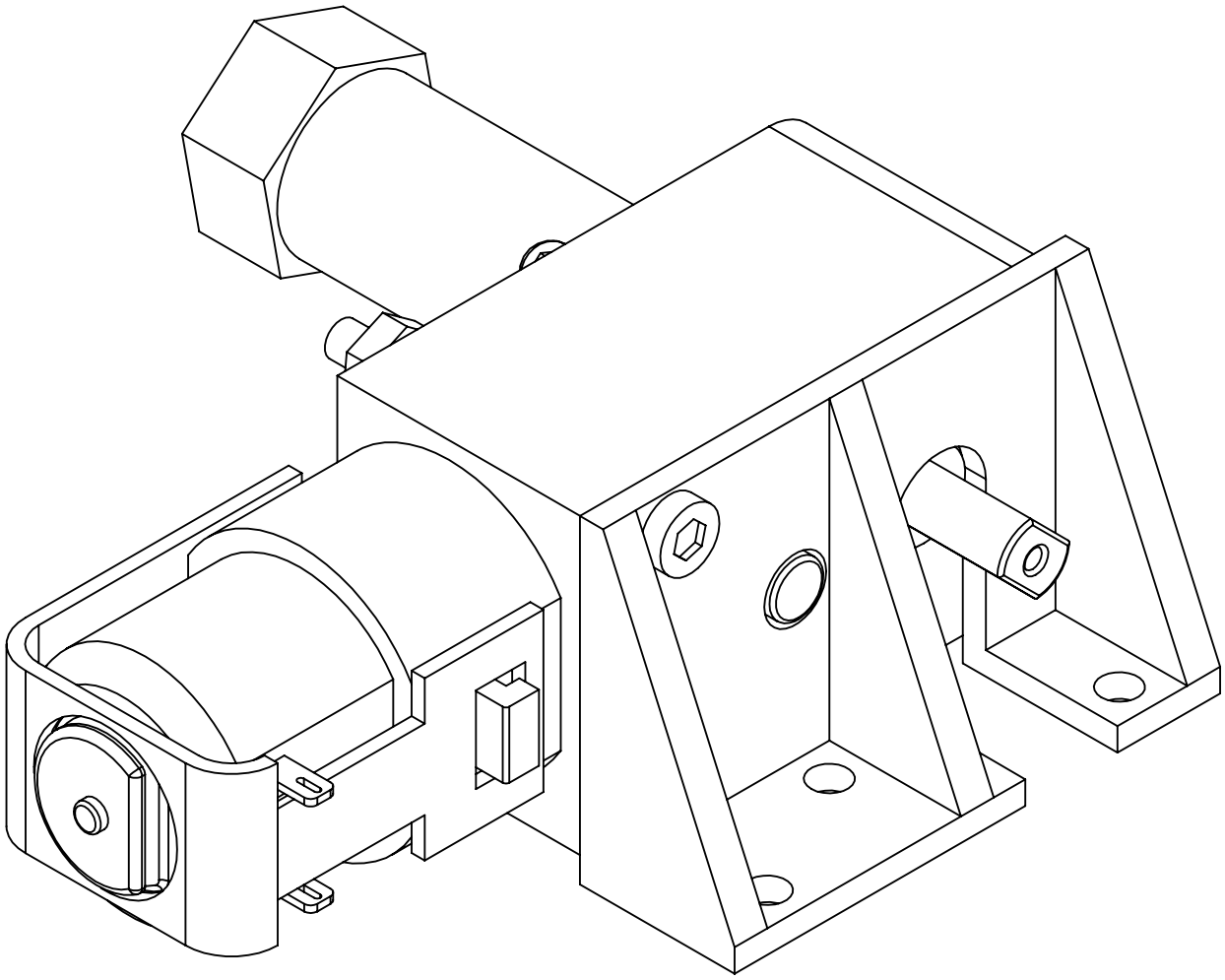
Step 30:

Fasten the daguDCmotorBracketPiece1 part onto the coupling-couplingCollarBracket assembly using two M2.5 x 25 mm hex socket cap screws and M2.5 nuts.



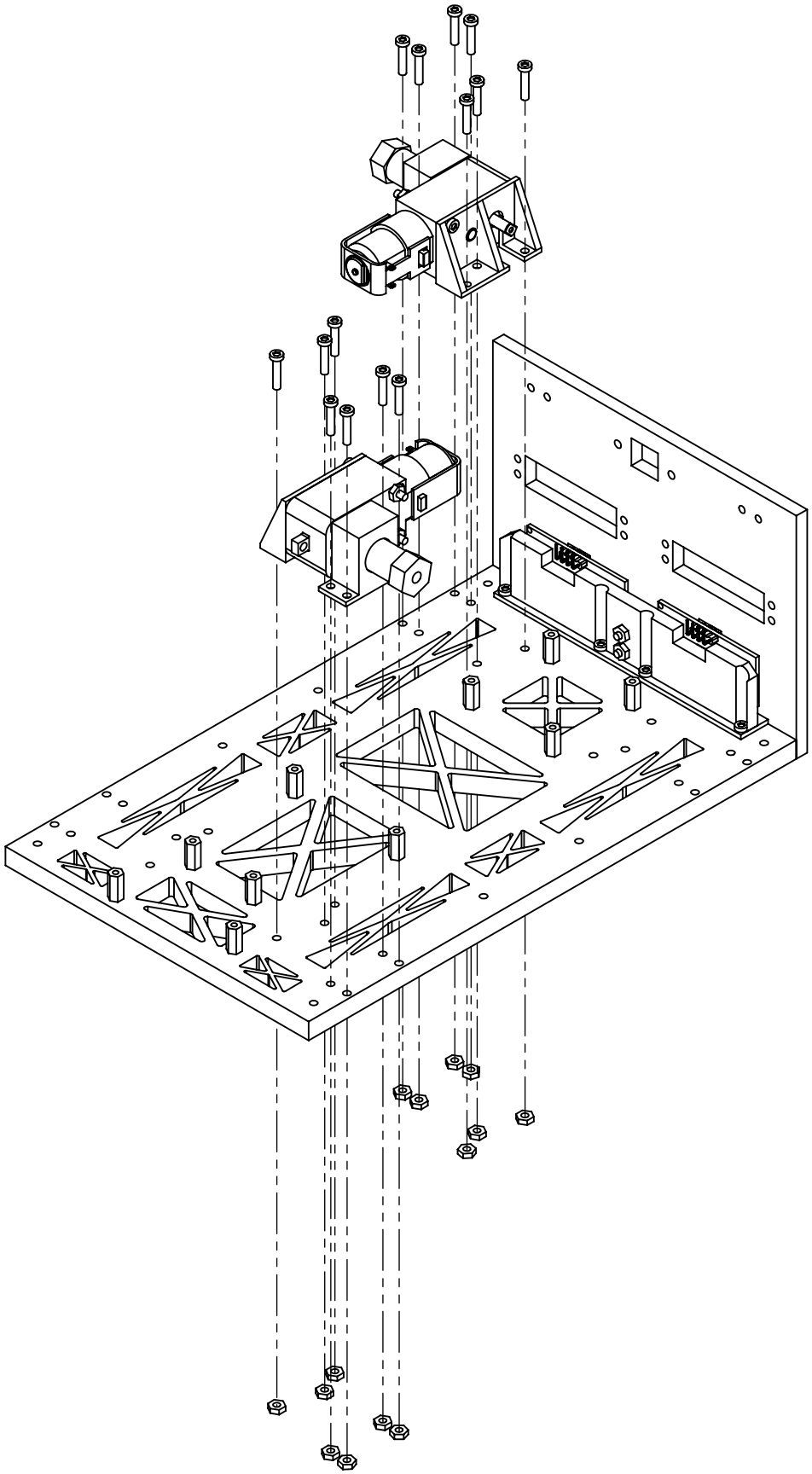
Step 31:

Repeat steps 27-30 for a second DAGU DC motor.



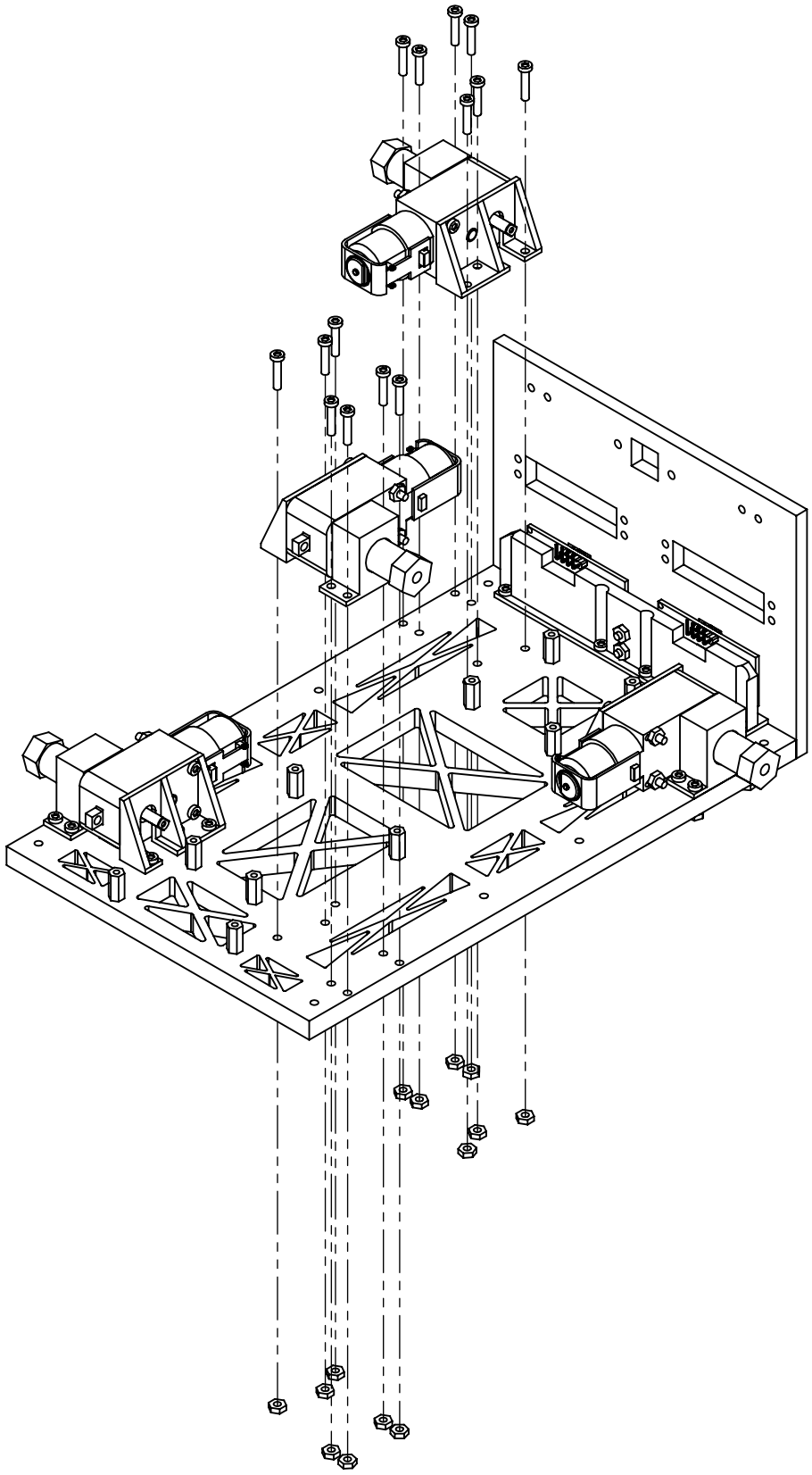
Step 32:

Fasten the daguDCmotorBracketPiece1- coupling-couplingCollarBracket assemblies onto the bottomChassis part using fourteen (14) M2.5 x 12 mm hex socket cap screws and M2.5 nuts.



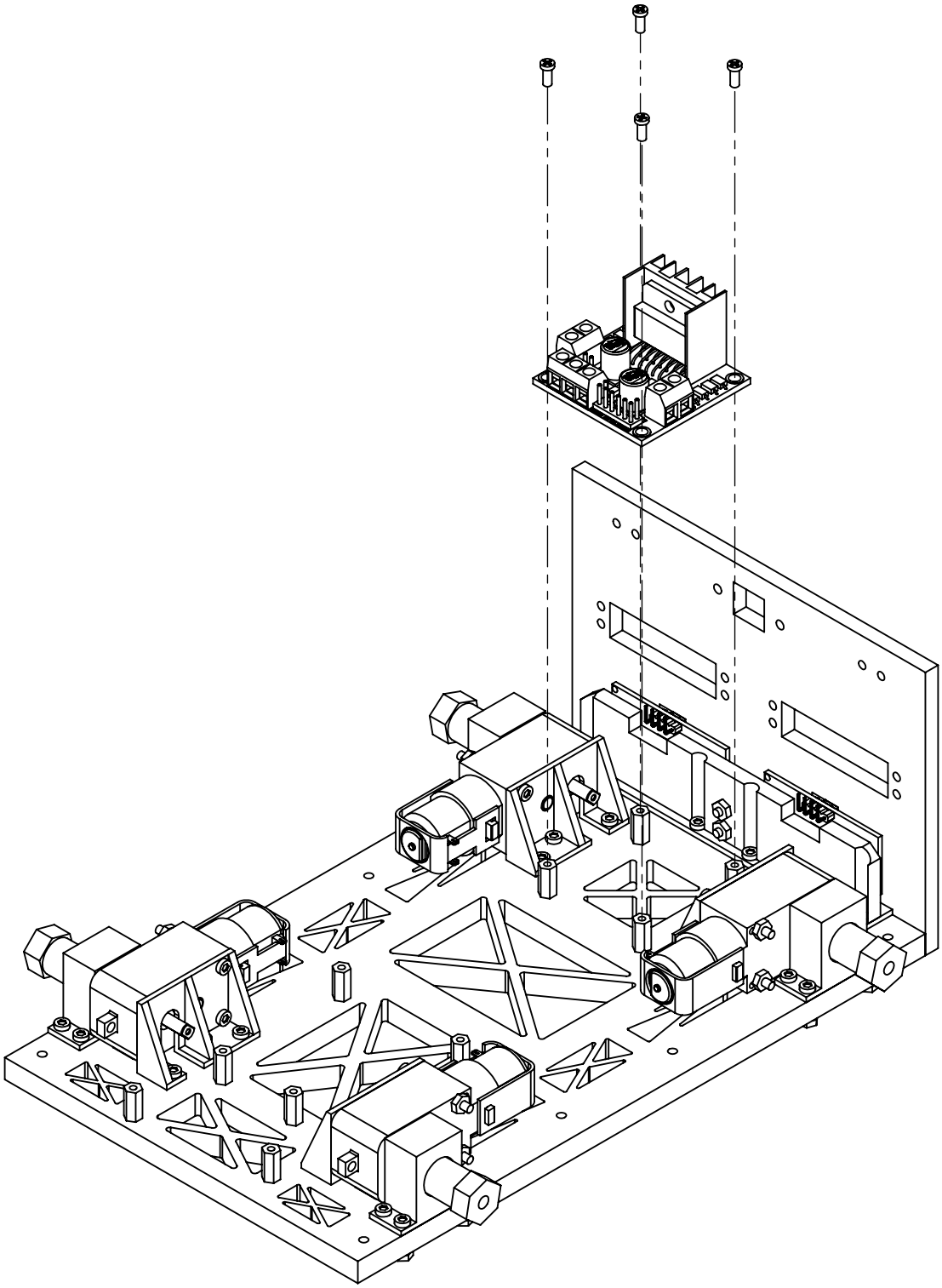
Step 33:

Repeat steps 27-32 using daguDCmotorBracketPiece2 for the remaining DAGU DC motors.



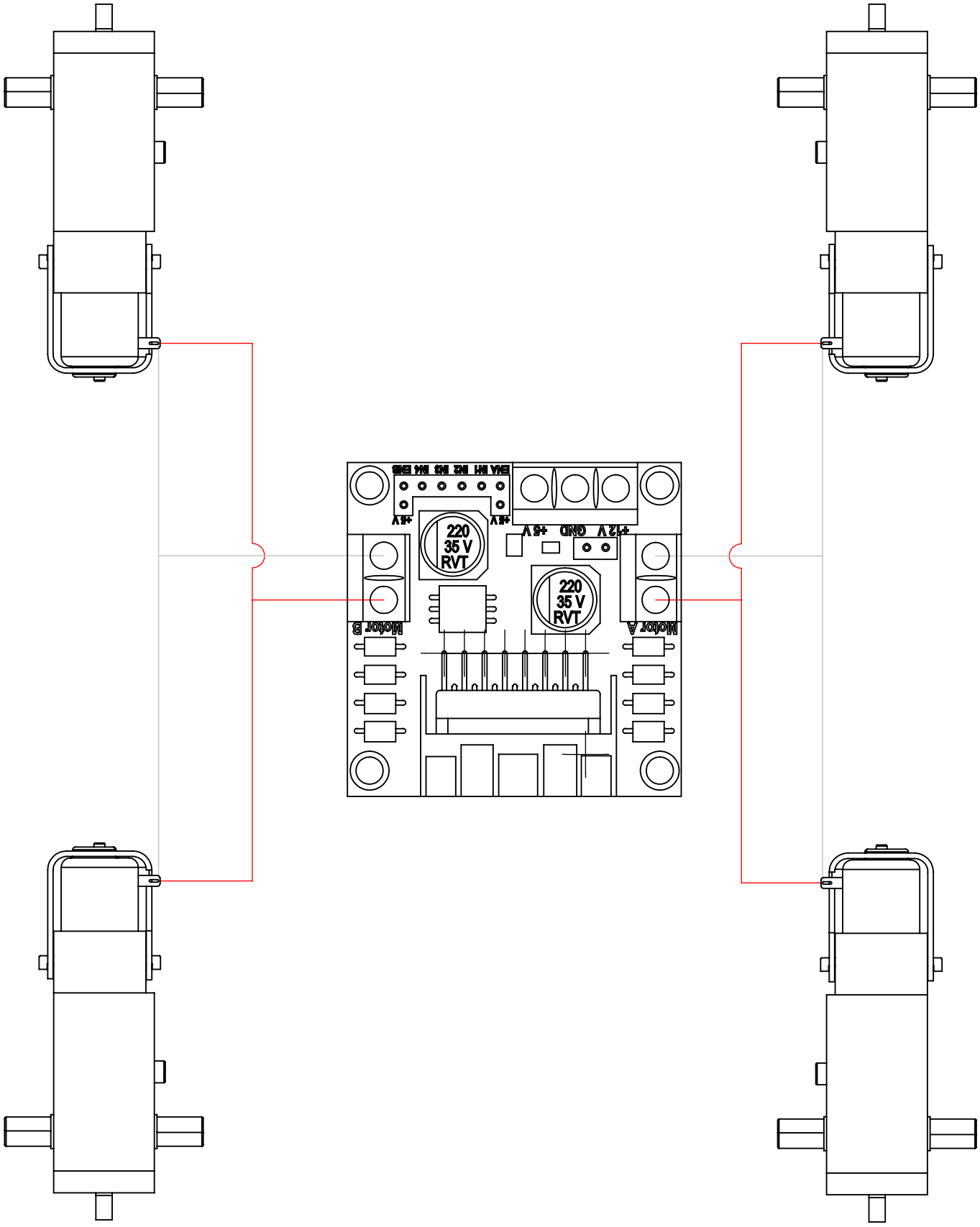
Step 34:

Fasten the L298N motor driver onto the bottomChassis part using four (4) M2.5 x 6 mm cross head screws.



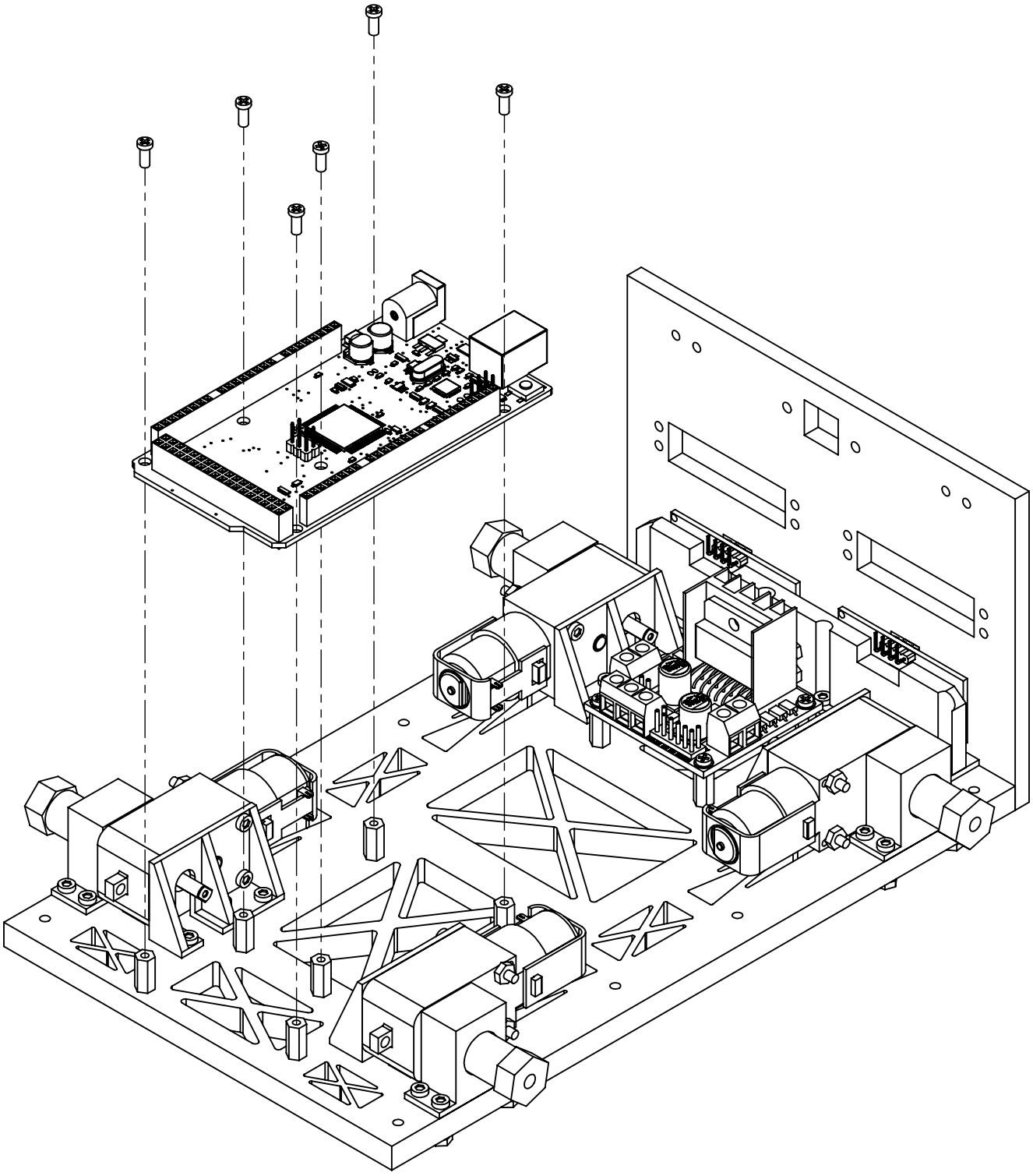
Step 35:

Connect the motors's wires to the L298N motor driver.



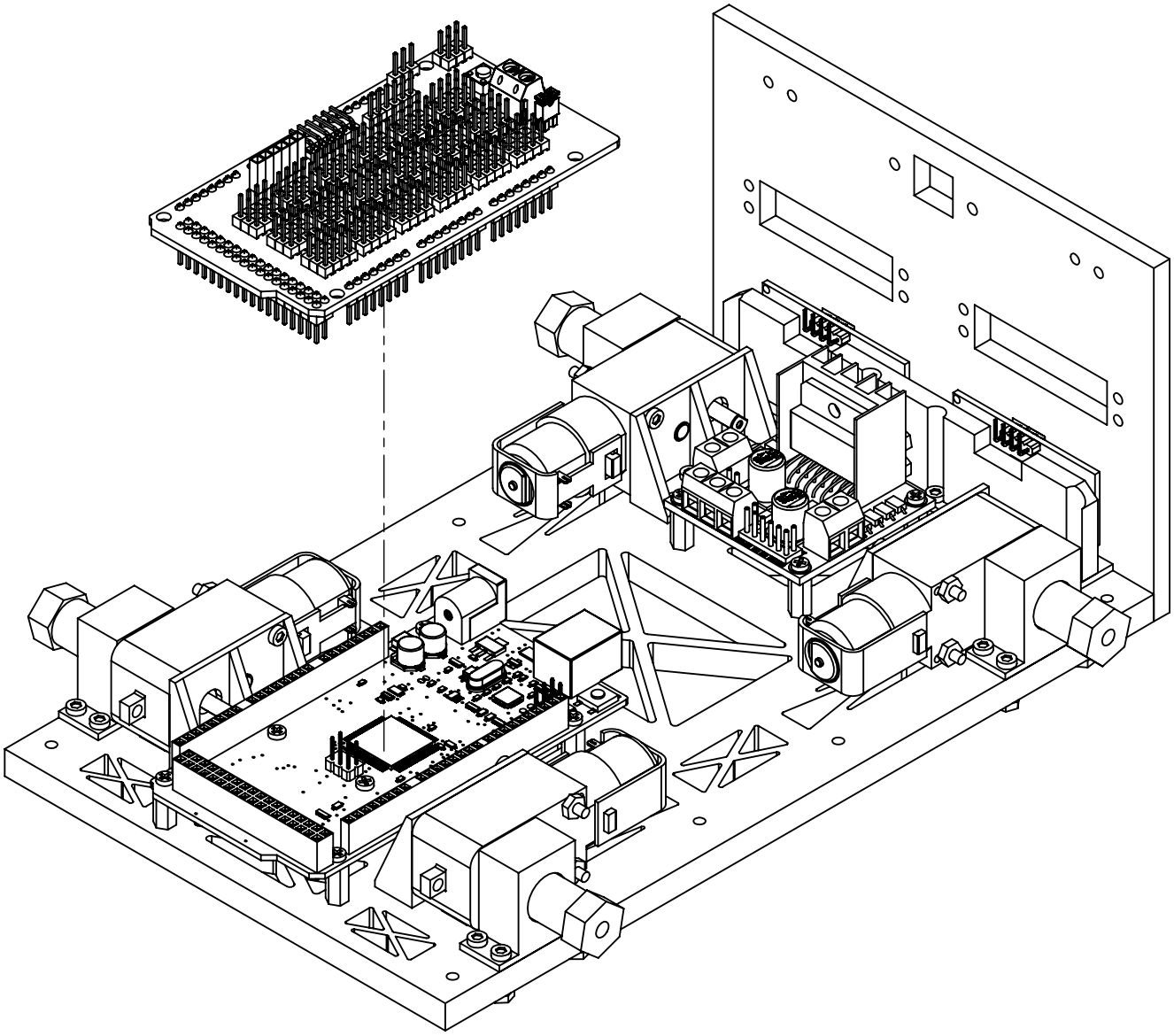
Step 36:

Fasten the Arduino Mega onto the bottomChassis part using six (6) M2.5 x 6 mm cross head screws.



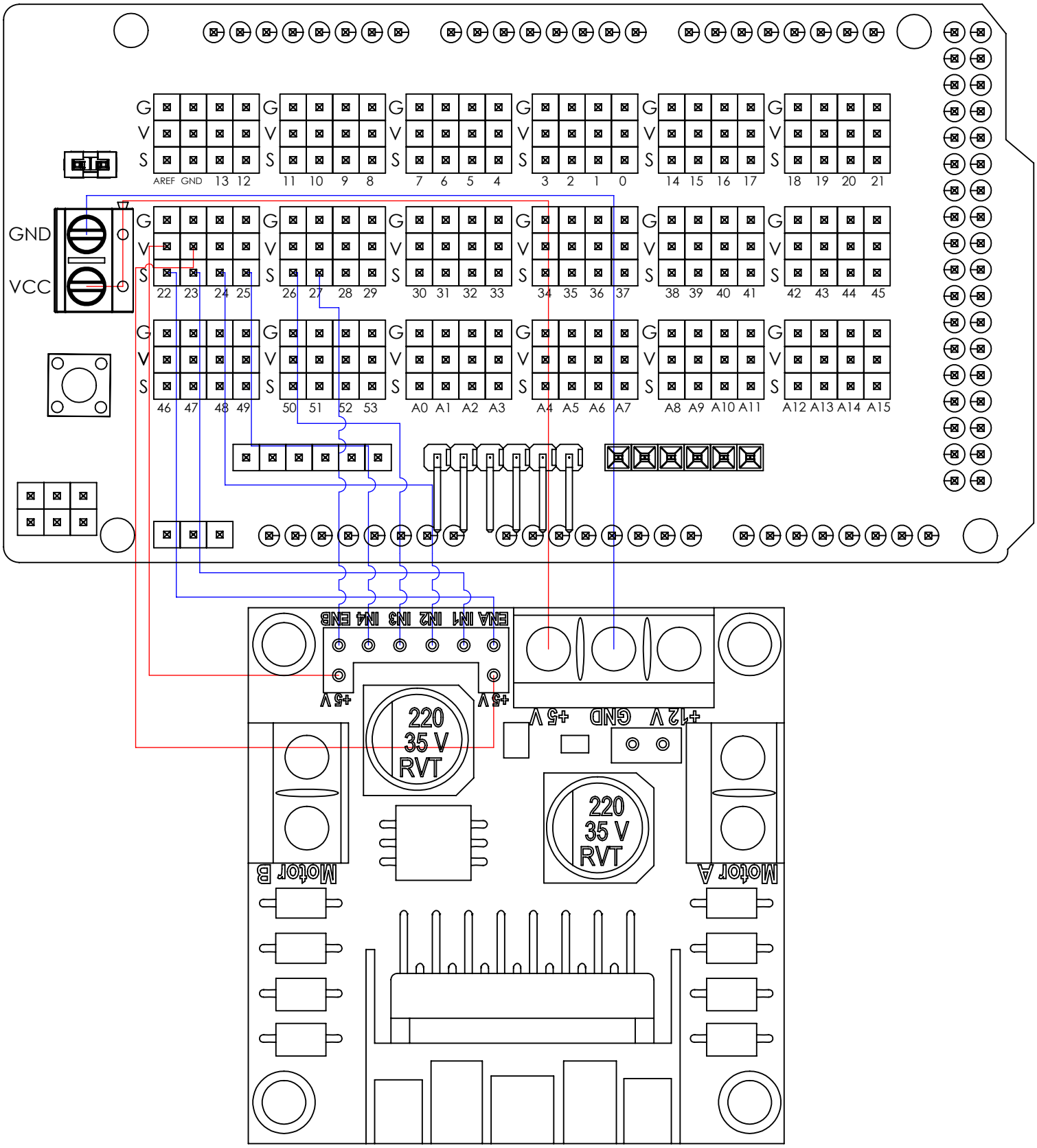
Step 37:

Install the Arduino Mega Sensor Shield onto the Arduino Mega.



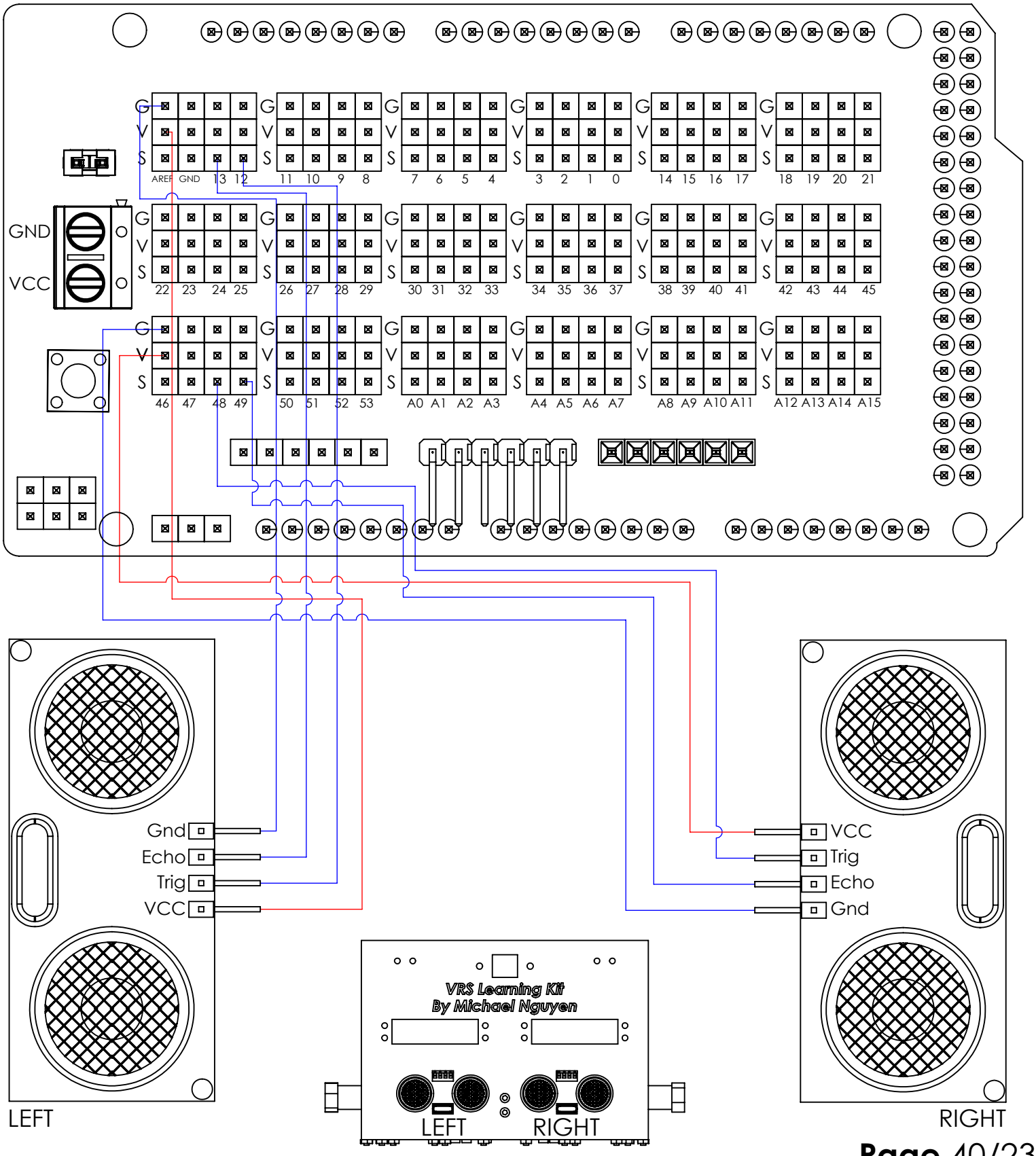
Step 38:

Using male-male and female-female jumper wires provided, connect the Adruino Mega Sensor Shield to the L298N motor driver as shown below.



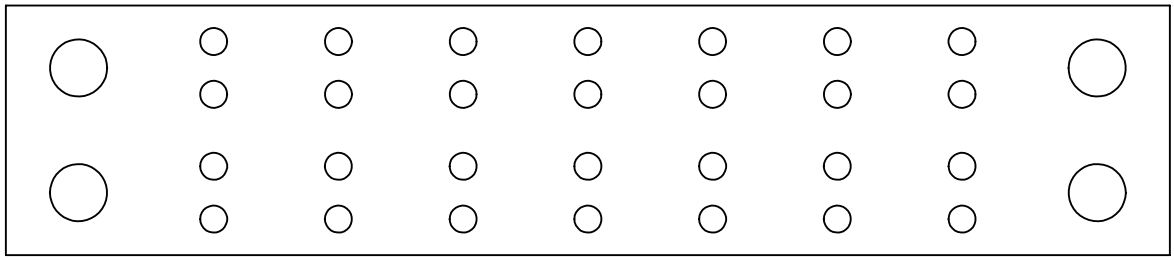
Step 39:

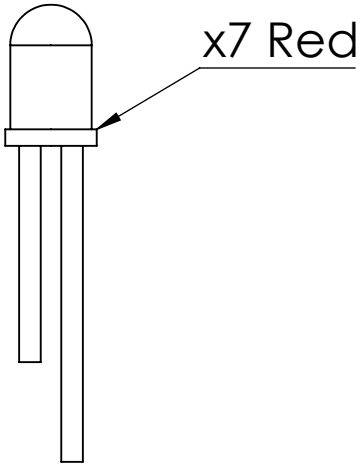
Using the female-female jumper wires provided, connect the HC-SR04 Ultrasonic Distance Sensors mounted to the rearShell to the Adruino Mega Sensor Shield as shown below.

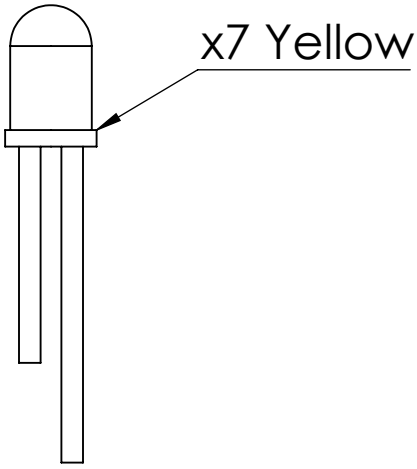


Step 40:

Obtain one tailLightsRearBracket part, seven red LEDs, and seven yellow LEDs.

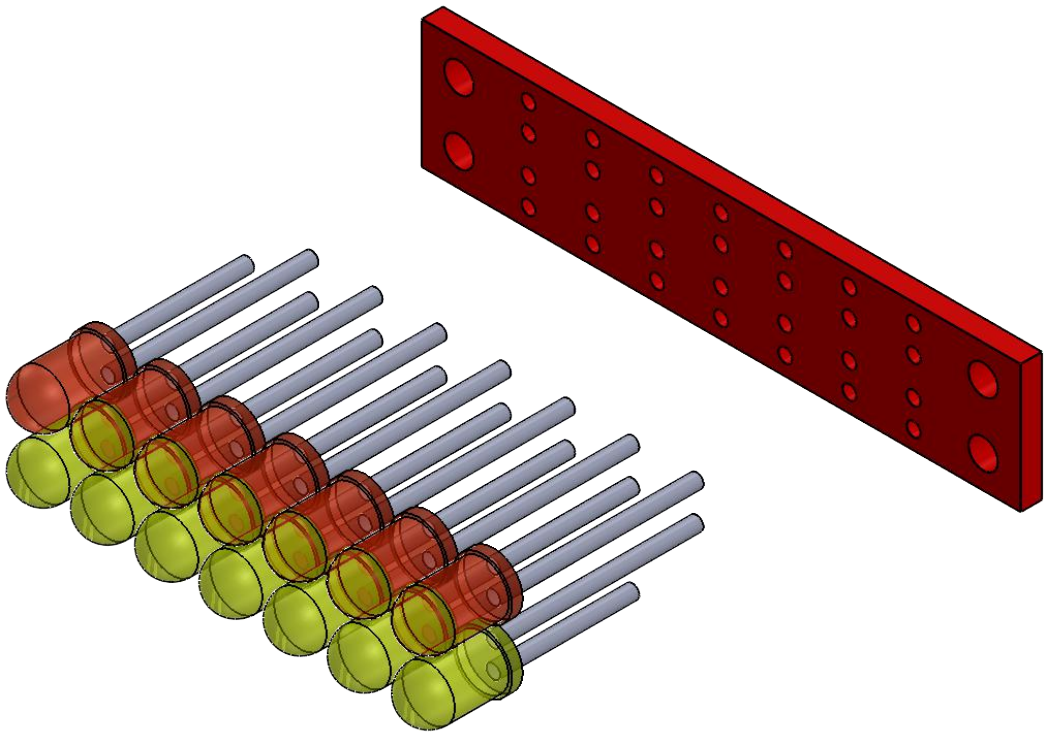


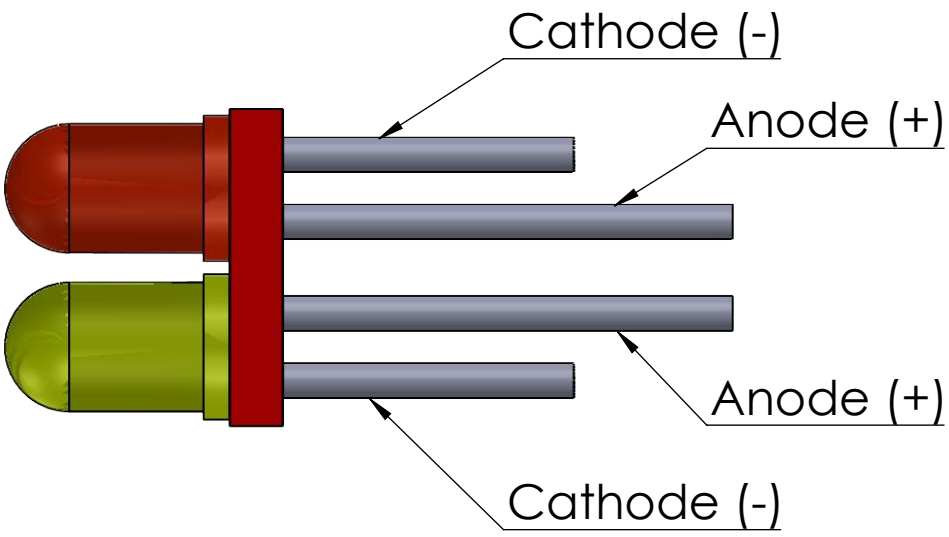




Step 41:

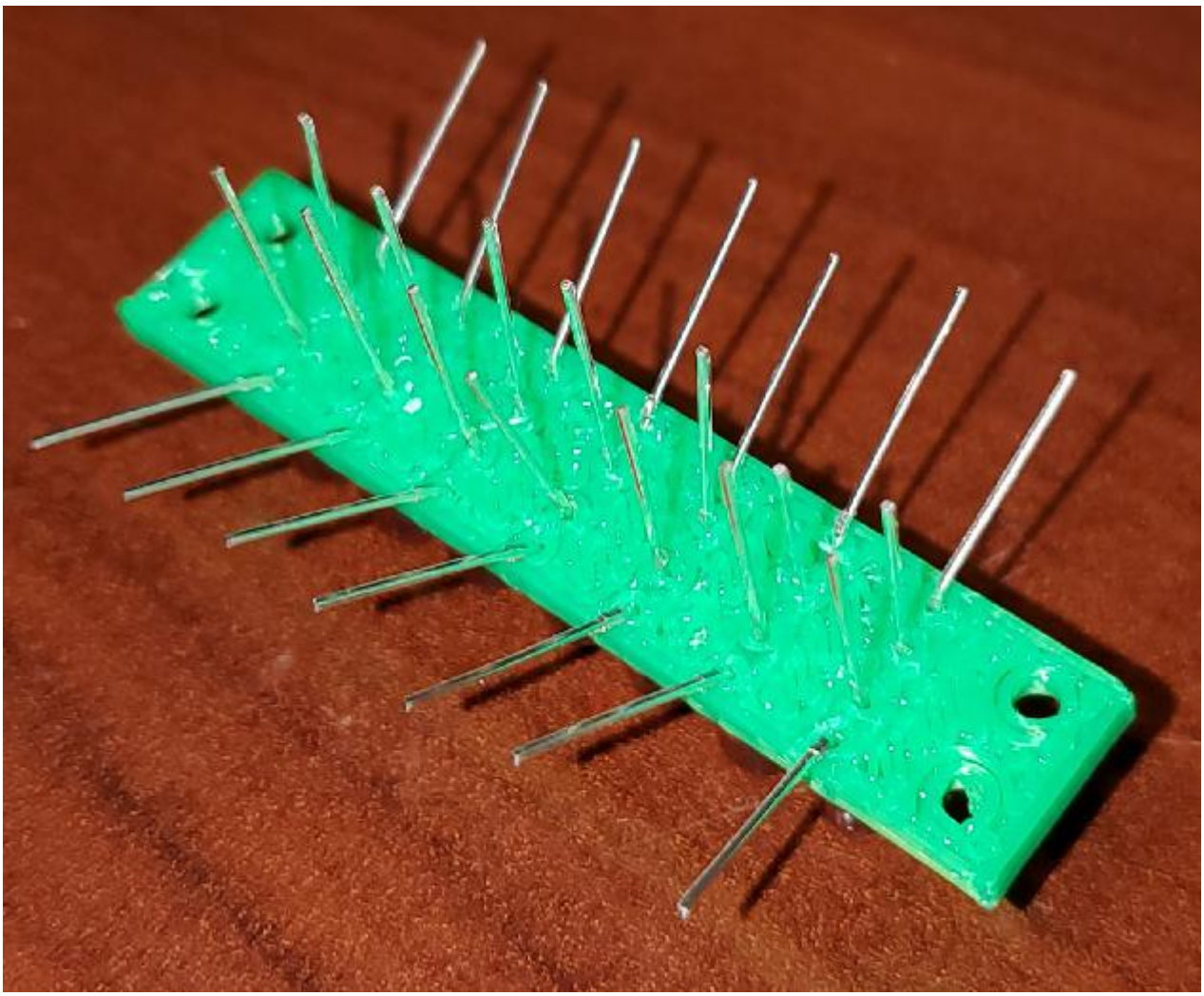
Insert the red and yellow LEDs through the holes of the tailLightsRearBracket with the anode leads inserted through the inner holes and the cathode leads inserted through the outer holes as shown below.





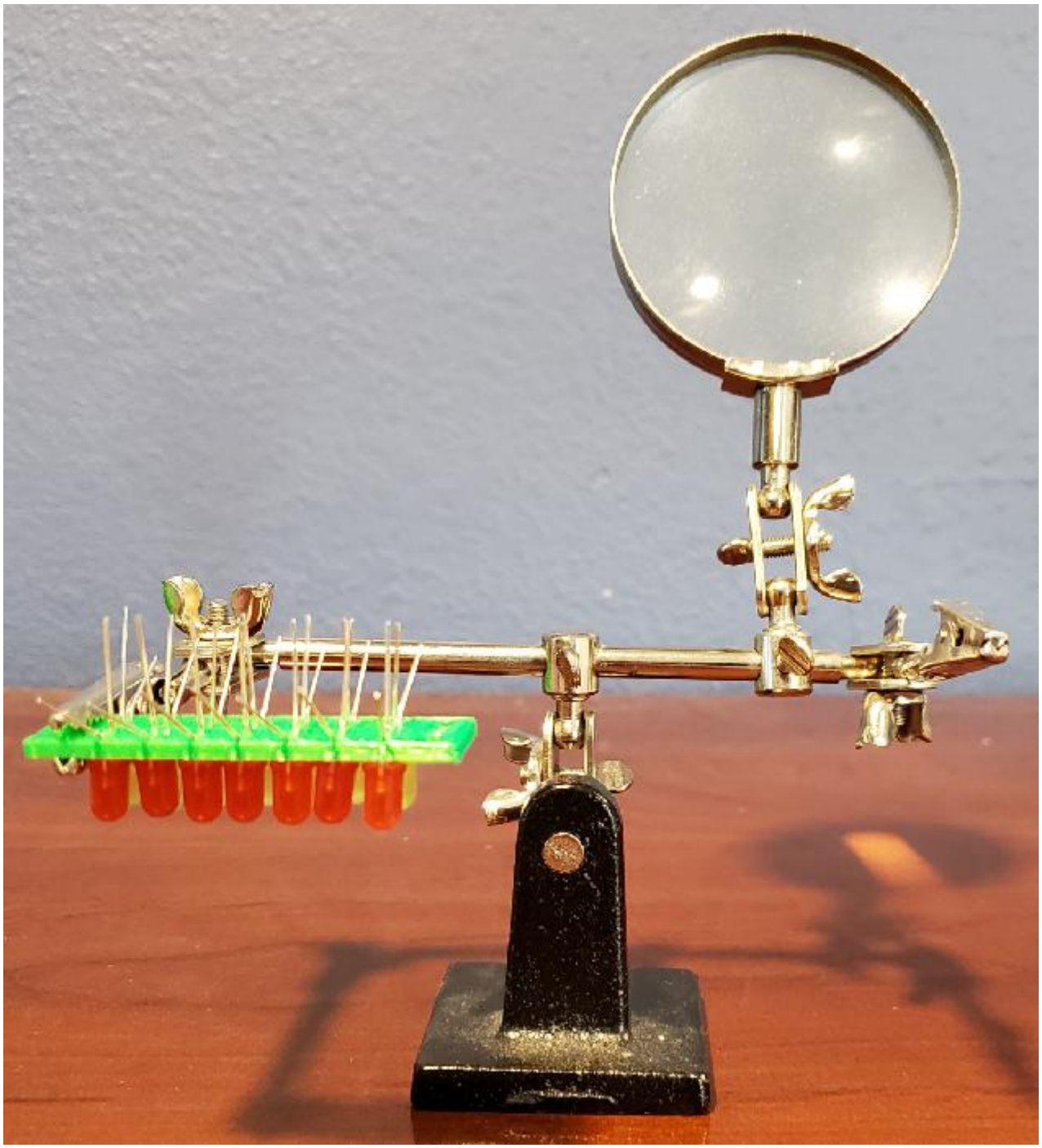
Step 42:

Bend the cathode leads away from the anode leads as shown in the figure.



Step 43:

Obtain a soldering jig and mount the tailLightsRearBracket-LED assembly by its mounting tab using one of the clips where the LED heads are pointing towards the workspace.

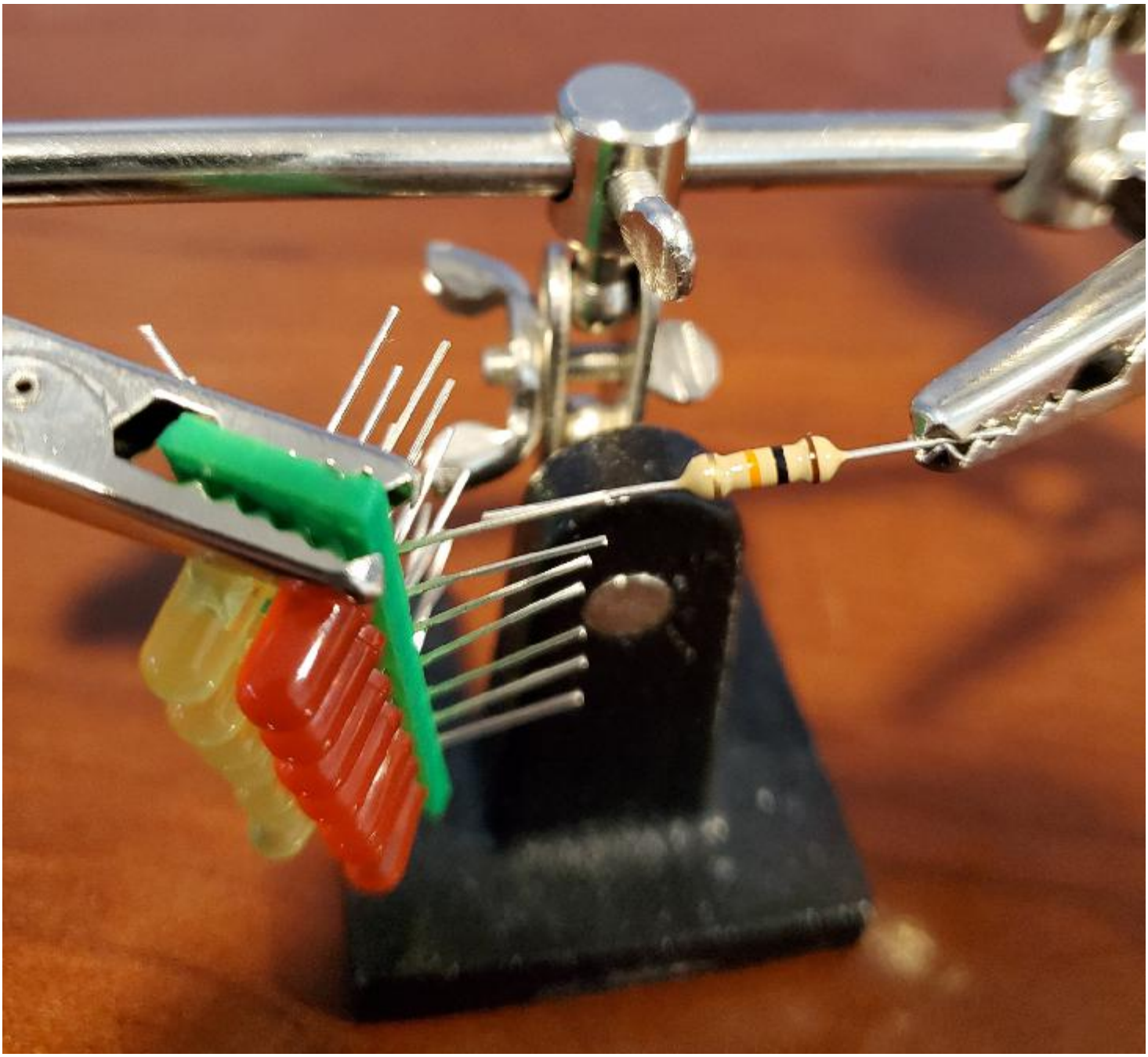


Step 44:

Obtain a 10k Ω resistor and mount it to the remaining clip.

Step 45:

Orient both clips so that the resistor lead contacts the lead of an LED that is part of one of the cathode rows.

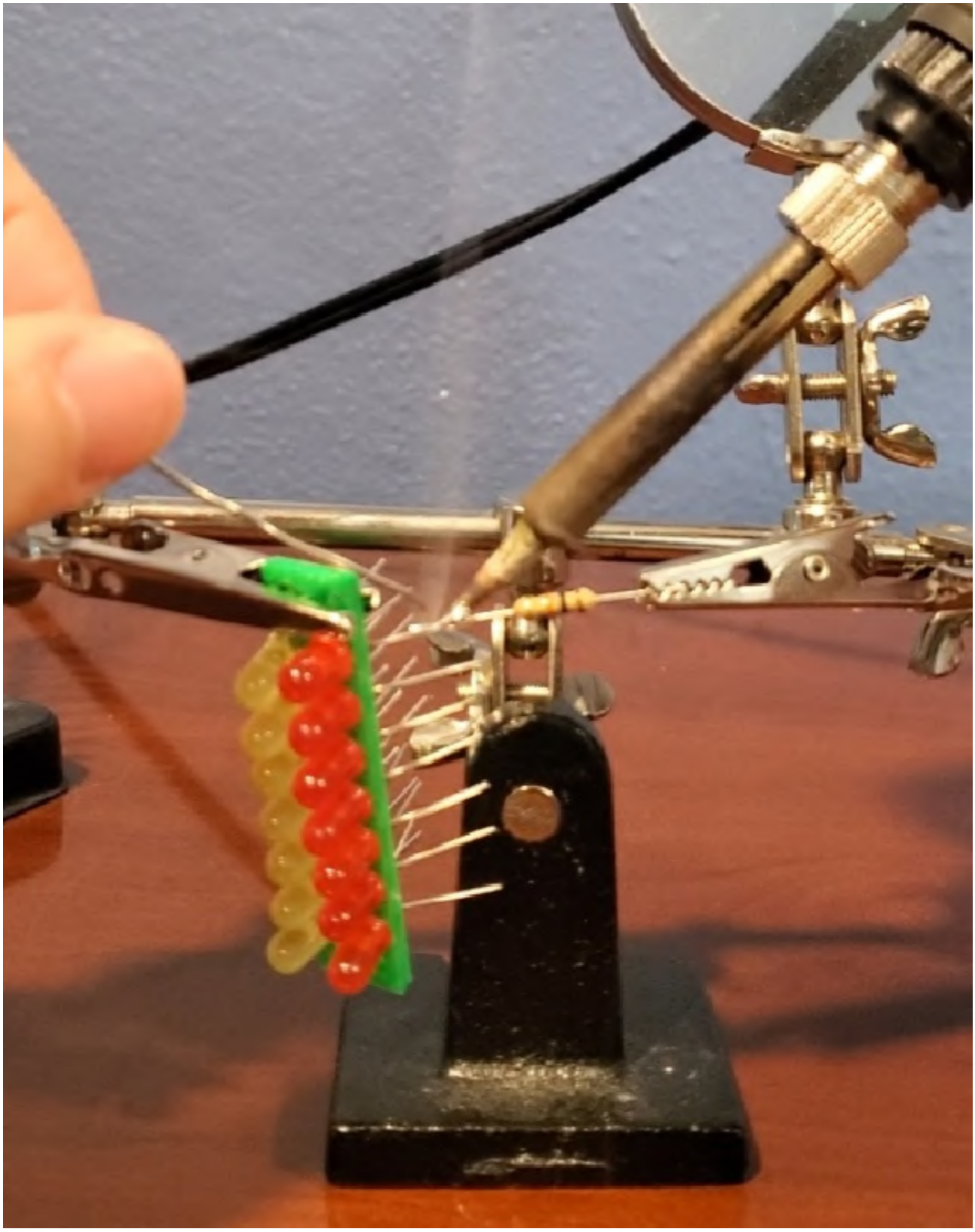


Step 46:

Obtain a soldering iron, turn it on and adjust its temperature settings to a temperature that is sufficient for the solder being used.

Step 47:

Carefully place the tip of the soldering iron on the resistor lead-LED anode lead contact point and quickly apply solder before its surrounding components begin to melt.

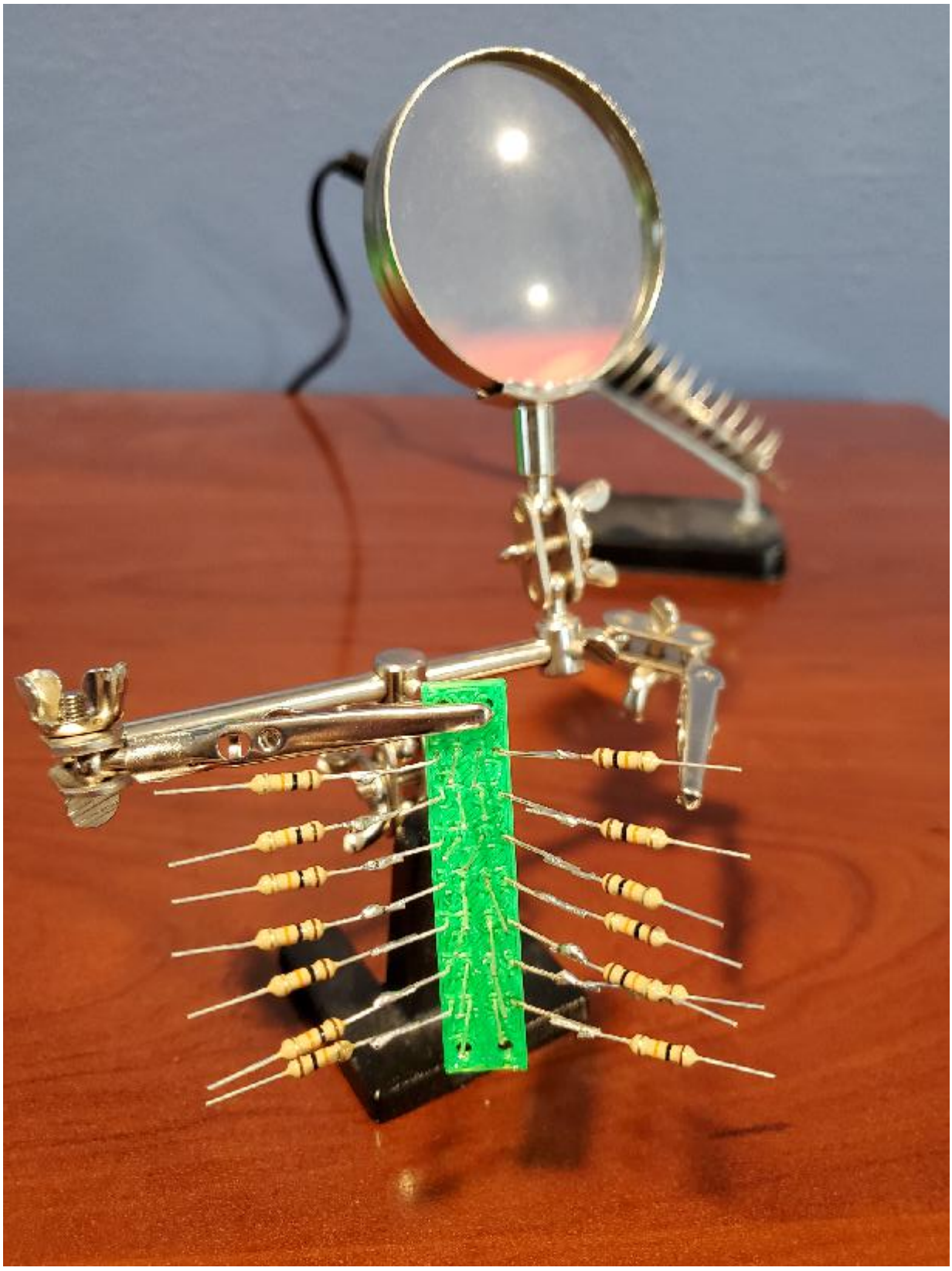


Step 48:

Repeat steps 44-47 for the remaining LEDs of the cathode row.

Step 49:

Repeat steps 44-48 for the remaining cathode row.

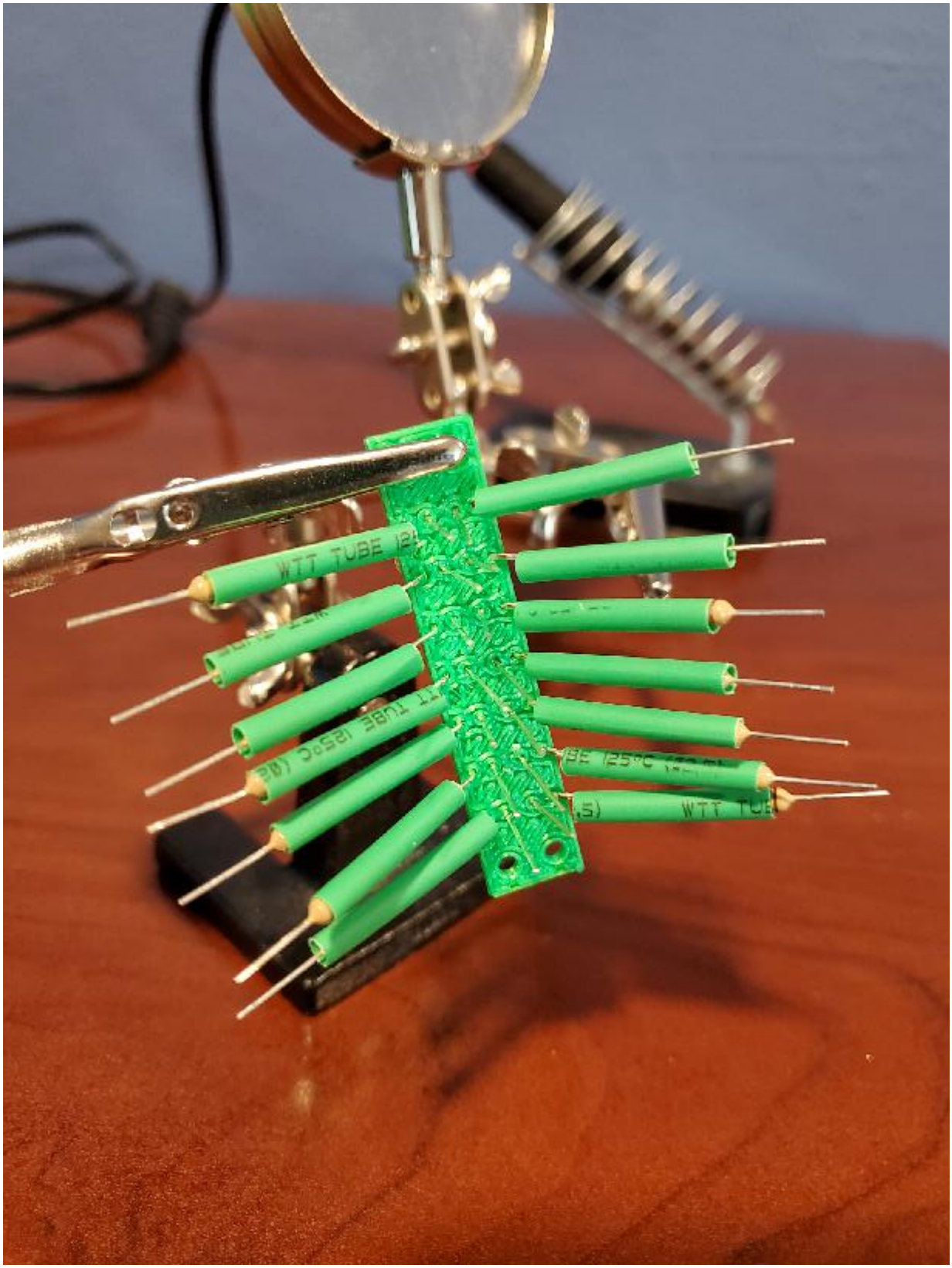


Step 50:

Obtain seven (7) 2.5x45mm heat shrink insulation and cut them in half using flush cutter pliers to obtain fourteen (14) halves.

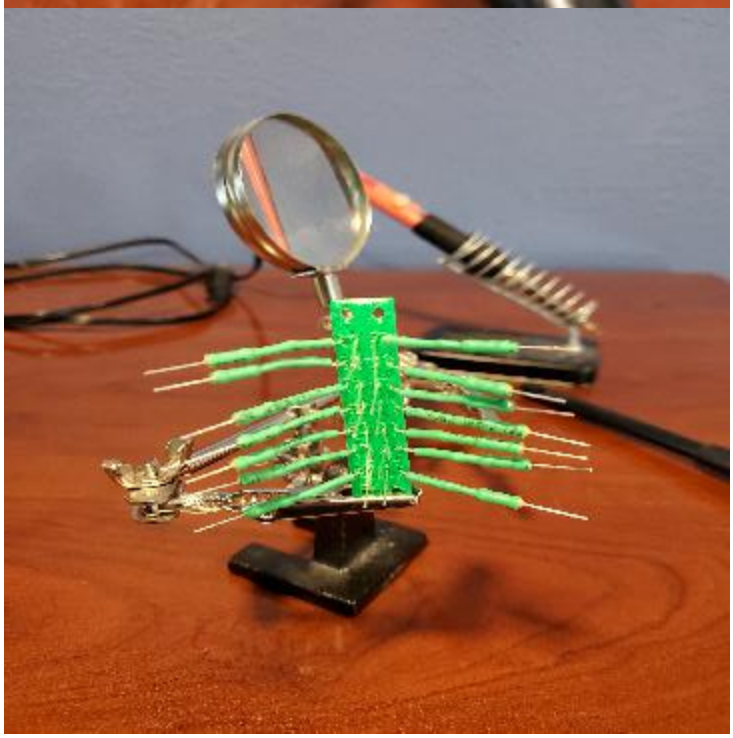
Step 51:

Route all fourteen (14) of the cut halves of the heat shrink insulation into the cathode leads.



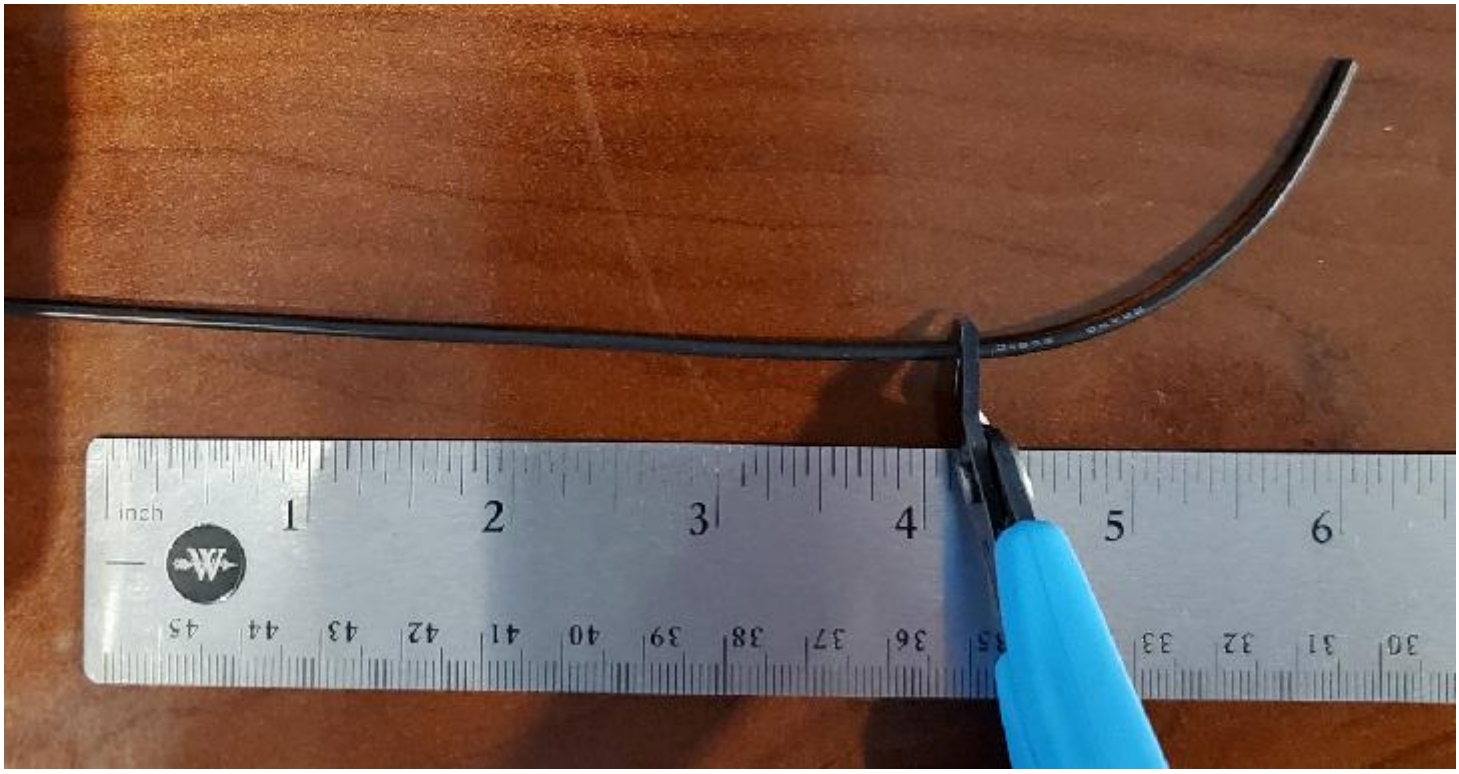
Step 52:

Obtain a BBQ lighter and apply heat to the heat shrink insulation until it has sufficiently shrunk.



Step 53:

Cut 4” of red or black 22 AWG wire from its spool.

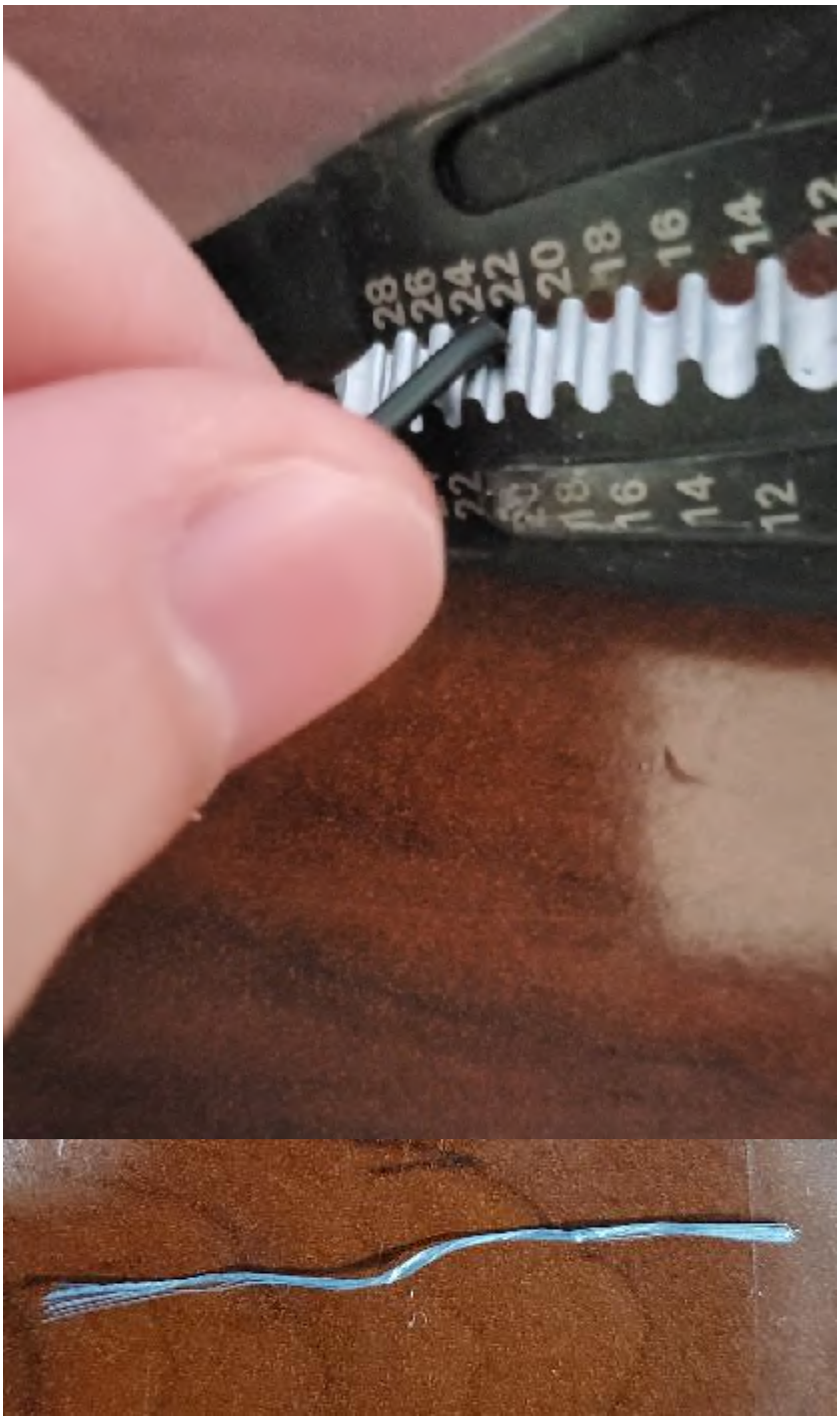


Step 54:

Obtain wire cutters and cut into the insulation of the wire in ½" increments starting from one of its free ends in preparation of stripping its insulation completely. There will be four (4) cut increments total.

Step 55:

Starting from any cut point nearest to the wire's free end, carefully pull out the insulation toward the free end using wire strippers and repeat this for every ½" cut increment until the wire is completely stripped of its insulation.

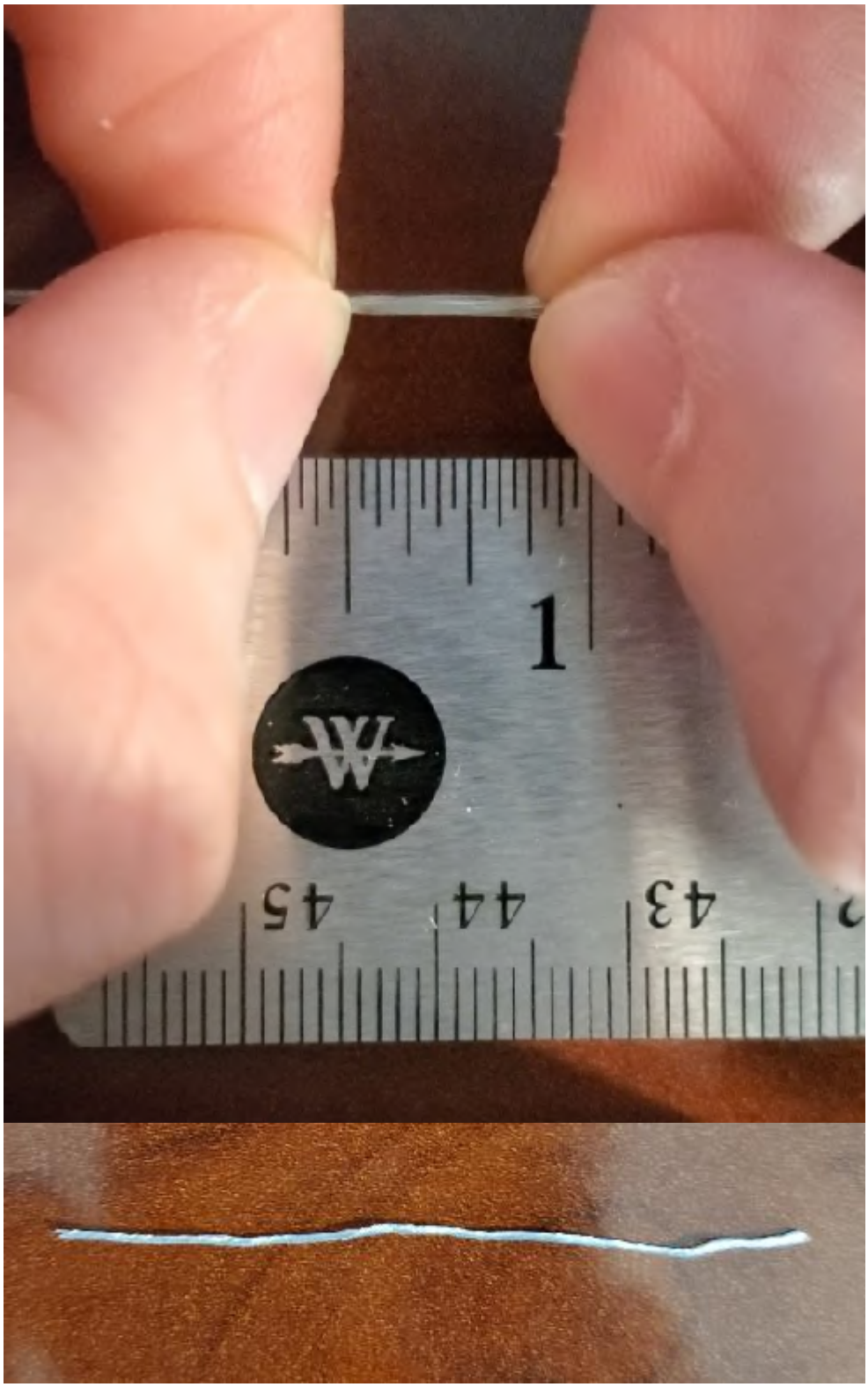


Step 56:

Grab the stripped wire ½" from the free end and twist the free end until the section between the free end and the grab point is no longer frayed.

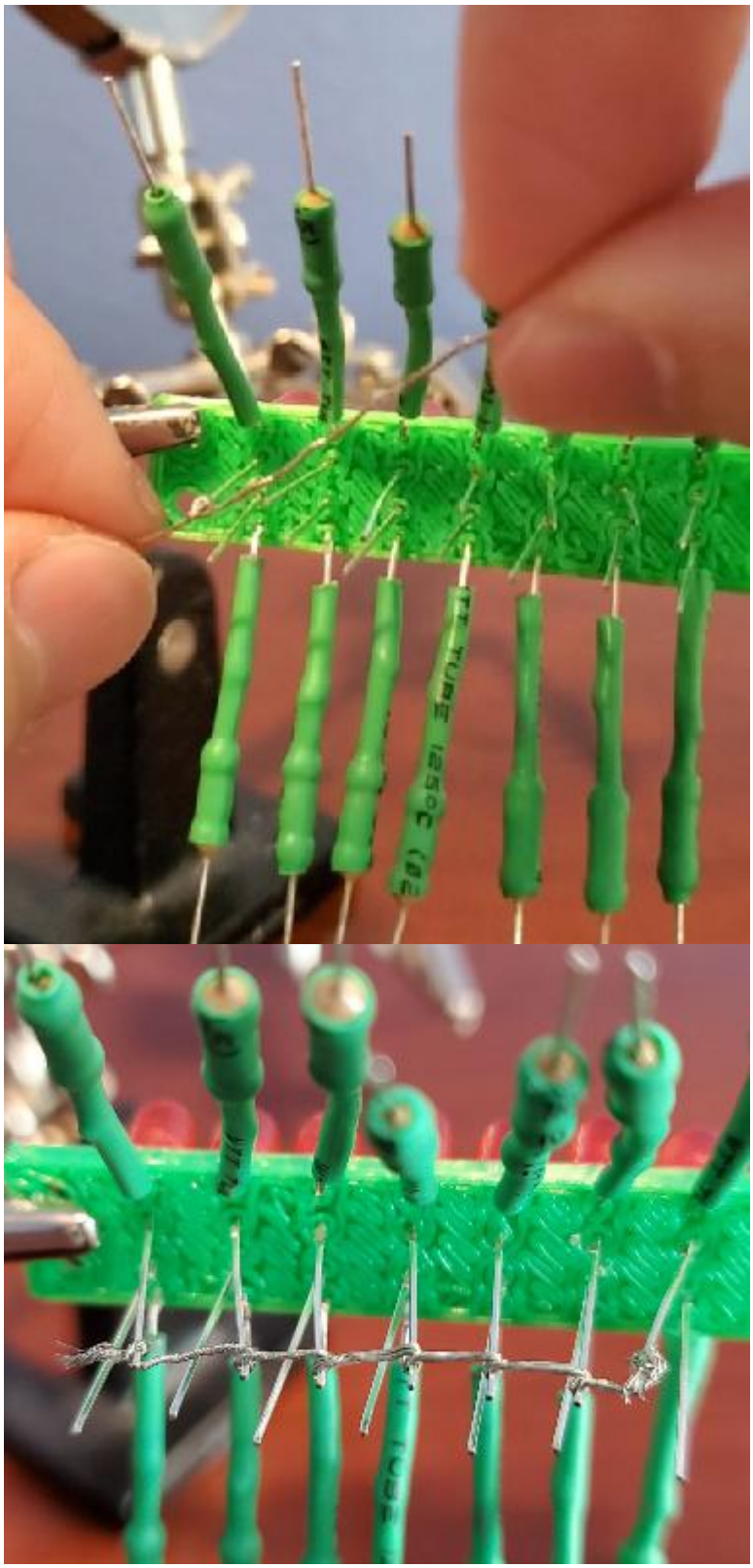
Step 57:

Grab the stripped wire ½" away from the previous grab point but toward the frayed end and use the other hand to twist the wire at the same point until this section is no longer frayed and repeat this process until the wire is no longer frayed.



Step 58:

Coil the stripped wire along each anode lead once in its respective row until it's daisy chained completely.

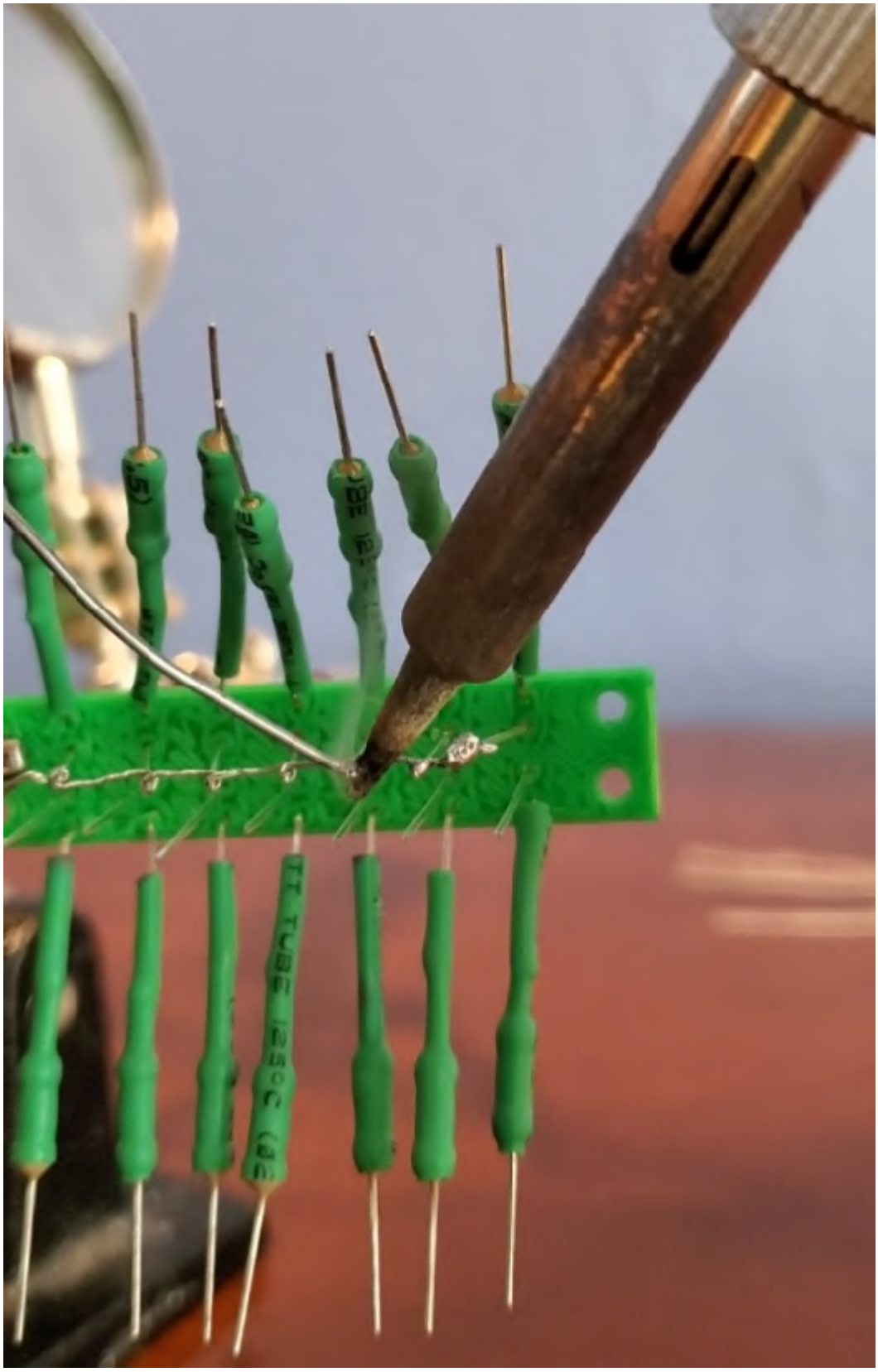


Step 59:

Obtain a soldering iron, turn it on and adjust its temperature settings to a temperature that is sufficient for the solder being used.

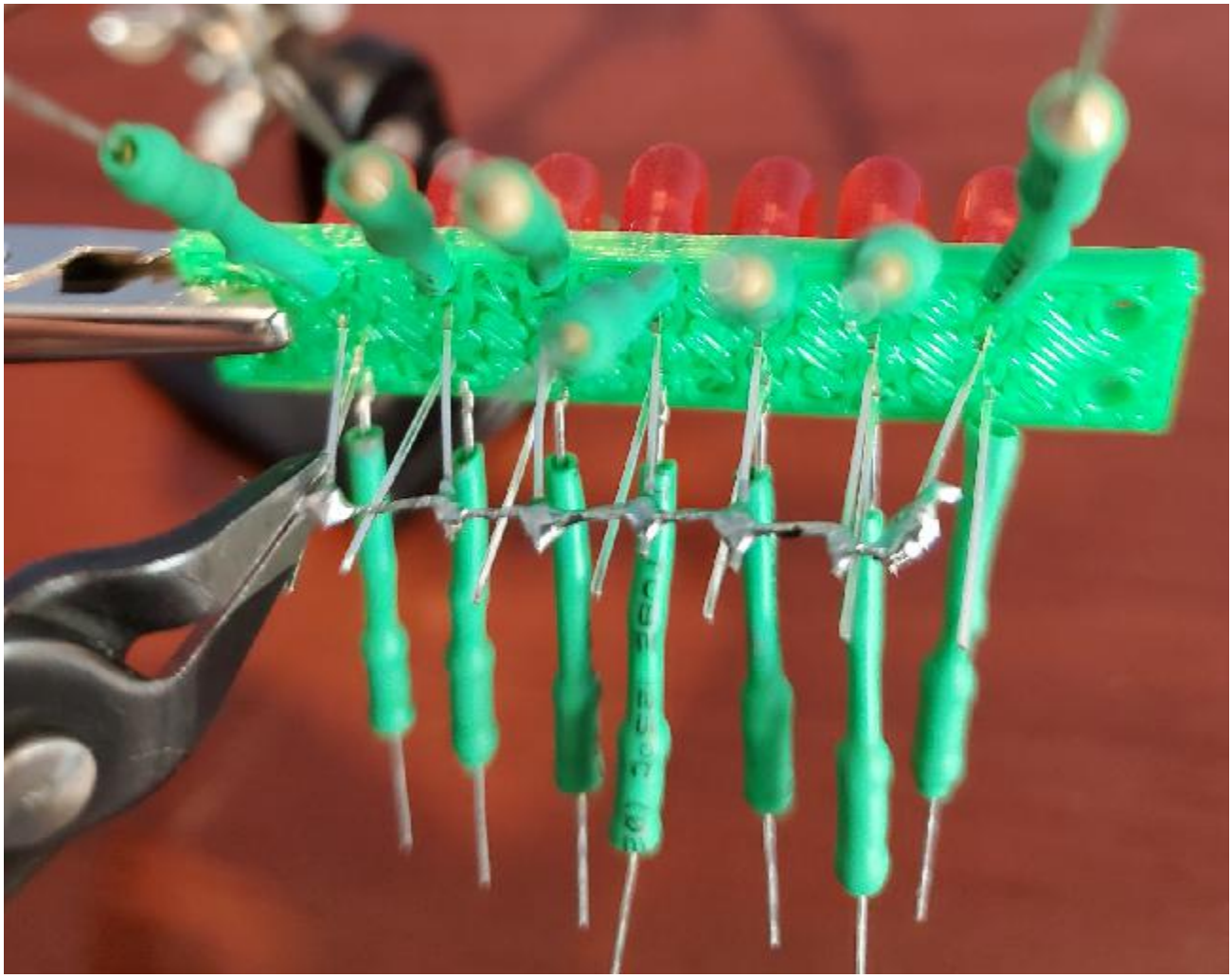
Step 60:

Carefully place the tip of the soldering iron on each coil-lead joint and quickly apply solder before its surrounding components begin to melt.



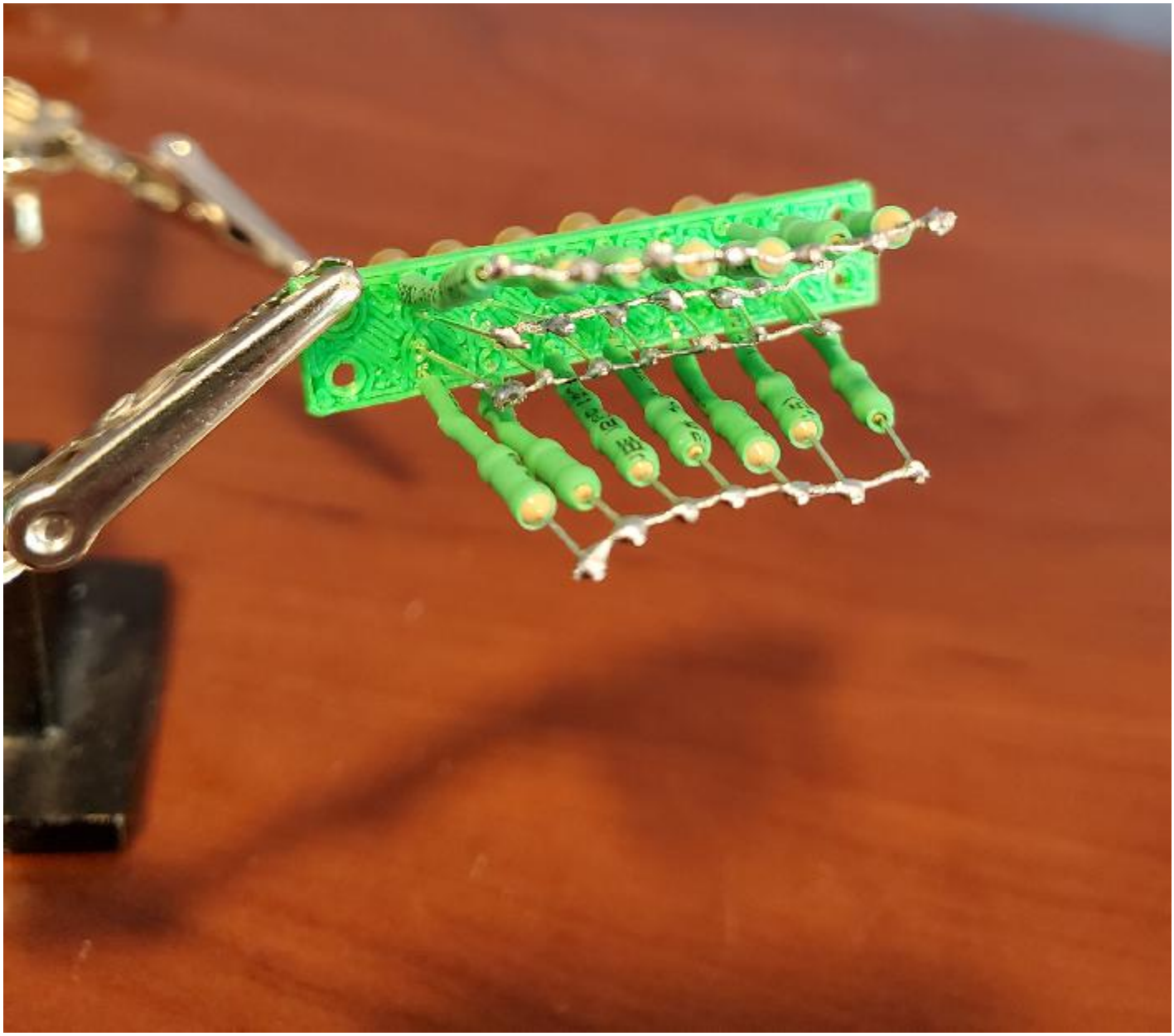
Step 61:

After the coil-lead joints and its surrounding components cool down, trim excess stripped wire from the ends of this assembly.



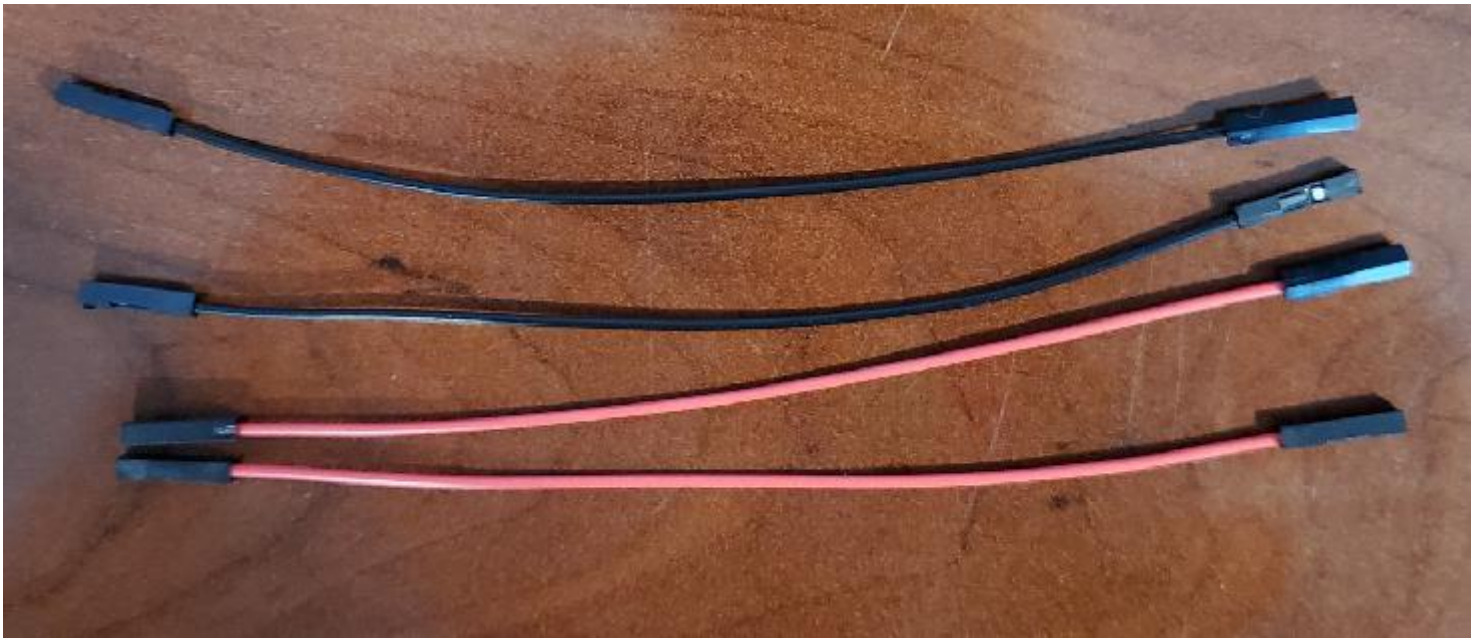
Step 62:

Repeat steps 53-61 for the two cathode lead rows and the remaining anode lead row.



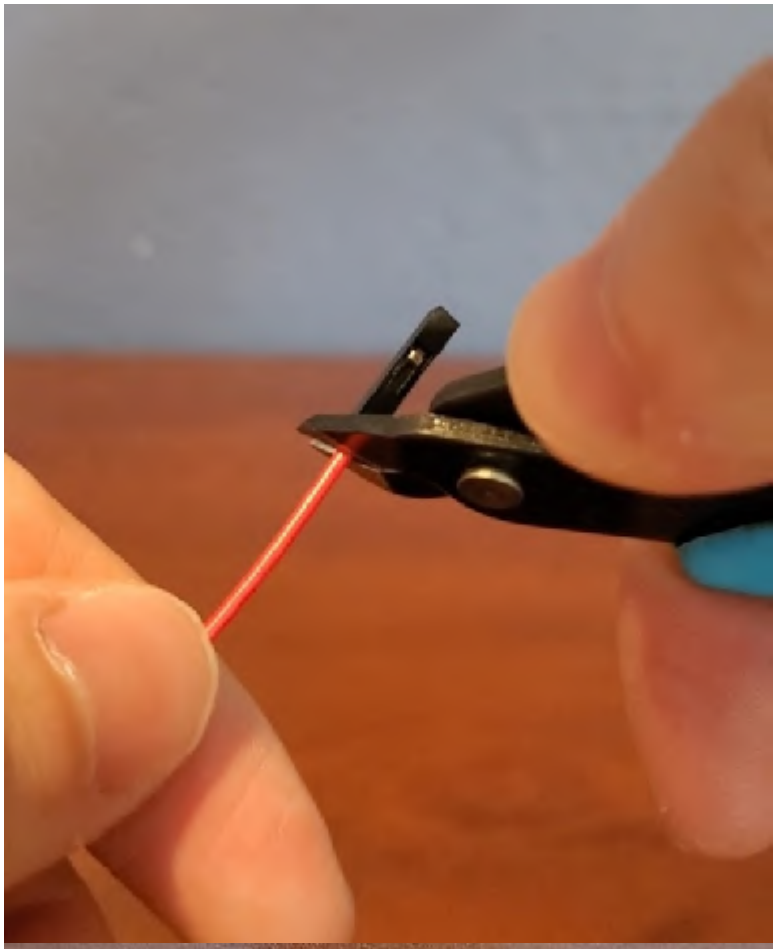
Step 63:

Obtain two (2) black female-female and two (2) red female-female jumper wires.



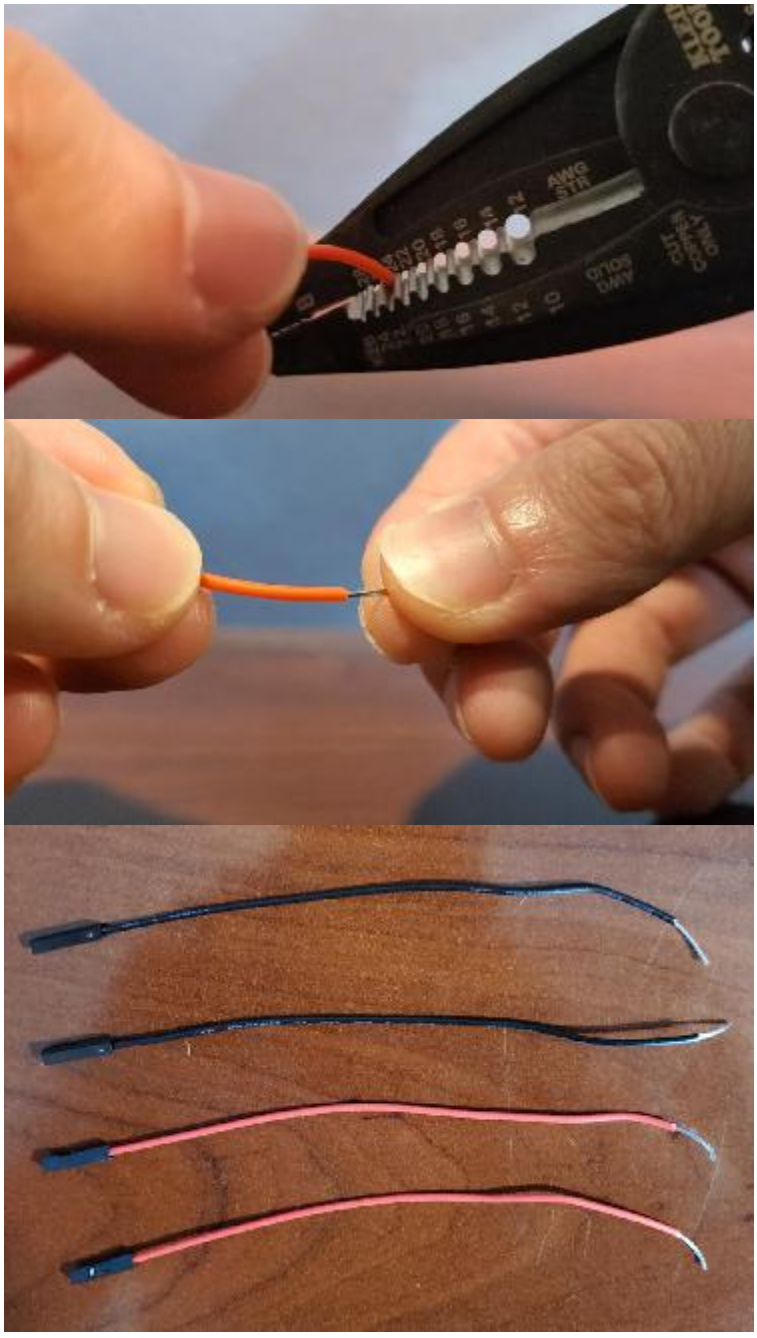
Step 64:

Using flush cutter pliers, cut the wires's ends while minimizing the shortening of their lengths.



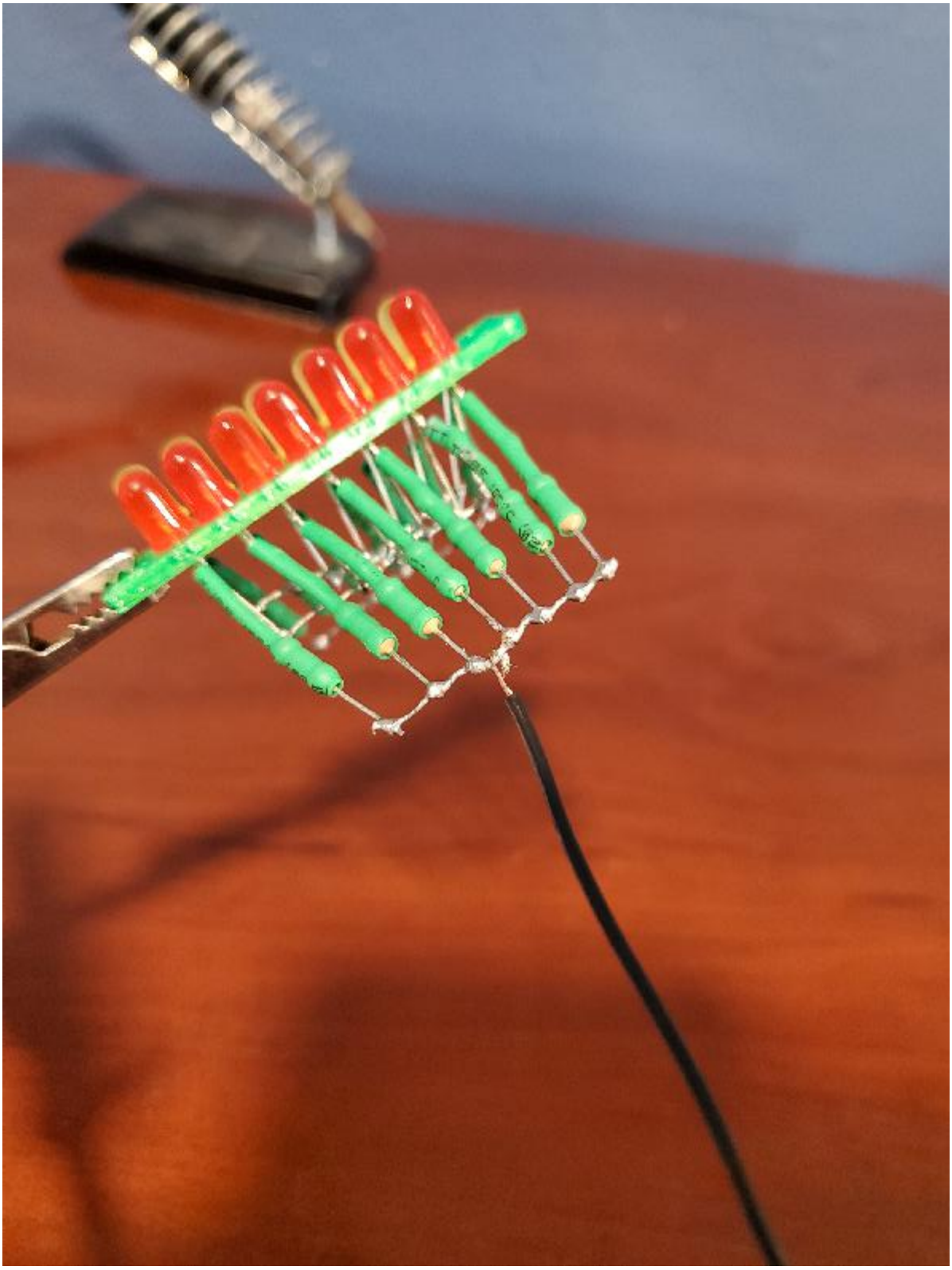
Step 65:

Obtain wire strippers and strip a ¼" of each wire's insulation on both sides and twist their ends until they are no longer frayed.



Step 66:

For one of the cathode rows, coil the end of a partially stripped black wire onto the completely stripped wire that is coiled onto the cathode leads of the LEDs closest to the center.

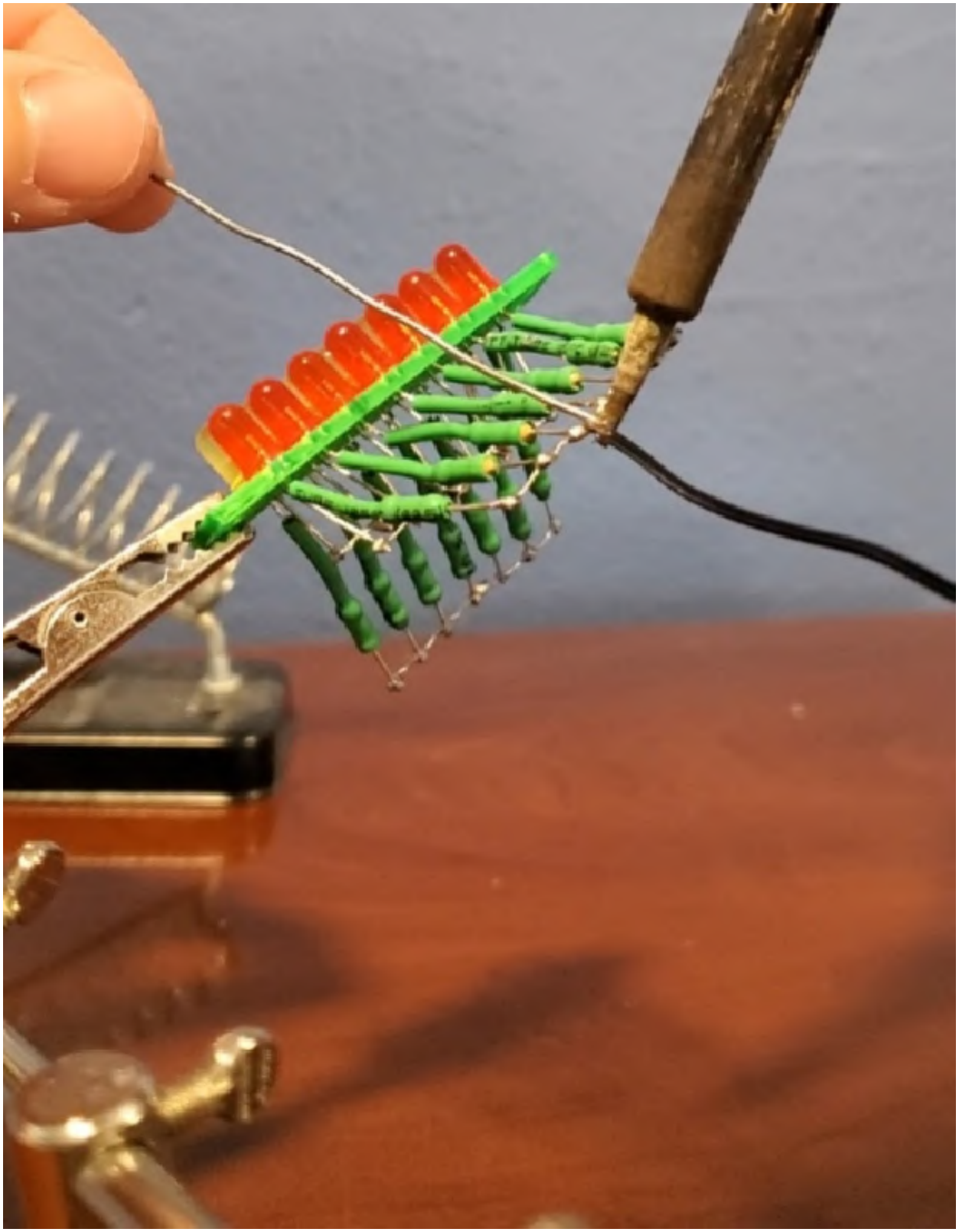


Step 67:

Obtain a soldering iron, turn it on and adjust its temperature settings to a temperature that is sufficient for the solder being used.

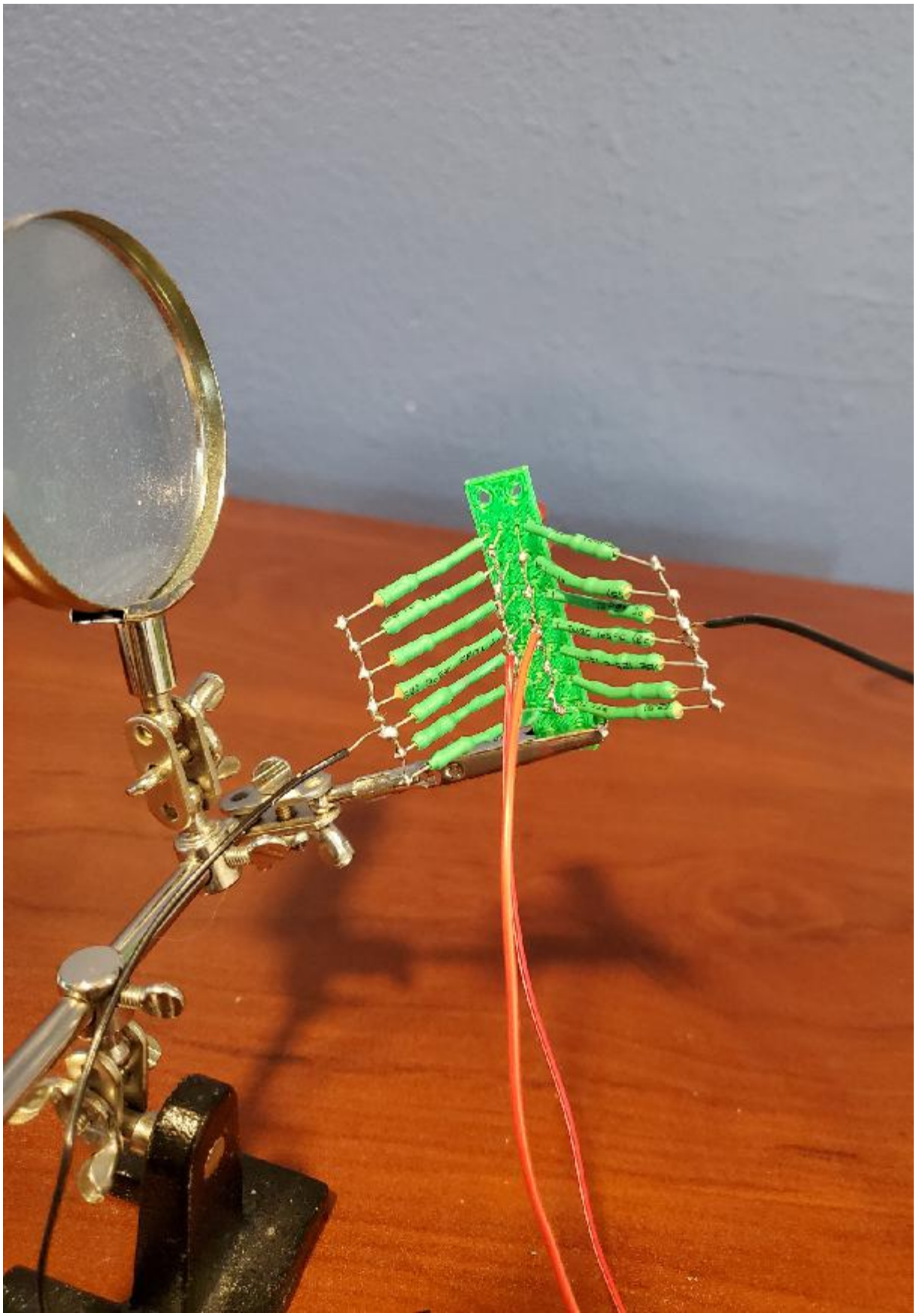
Step 68:

Carefully place the tip of the soldering iron on the coil joint and quickly apply solder before its surrounding components melt.



Step 69:

Repeat steps 66-68 for the two anode lead rows with the red wires and the remaining cathode lead row with the remaining black wire.

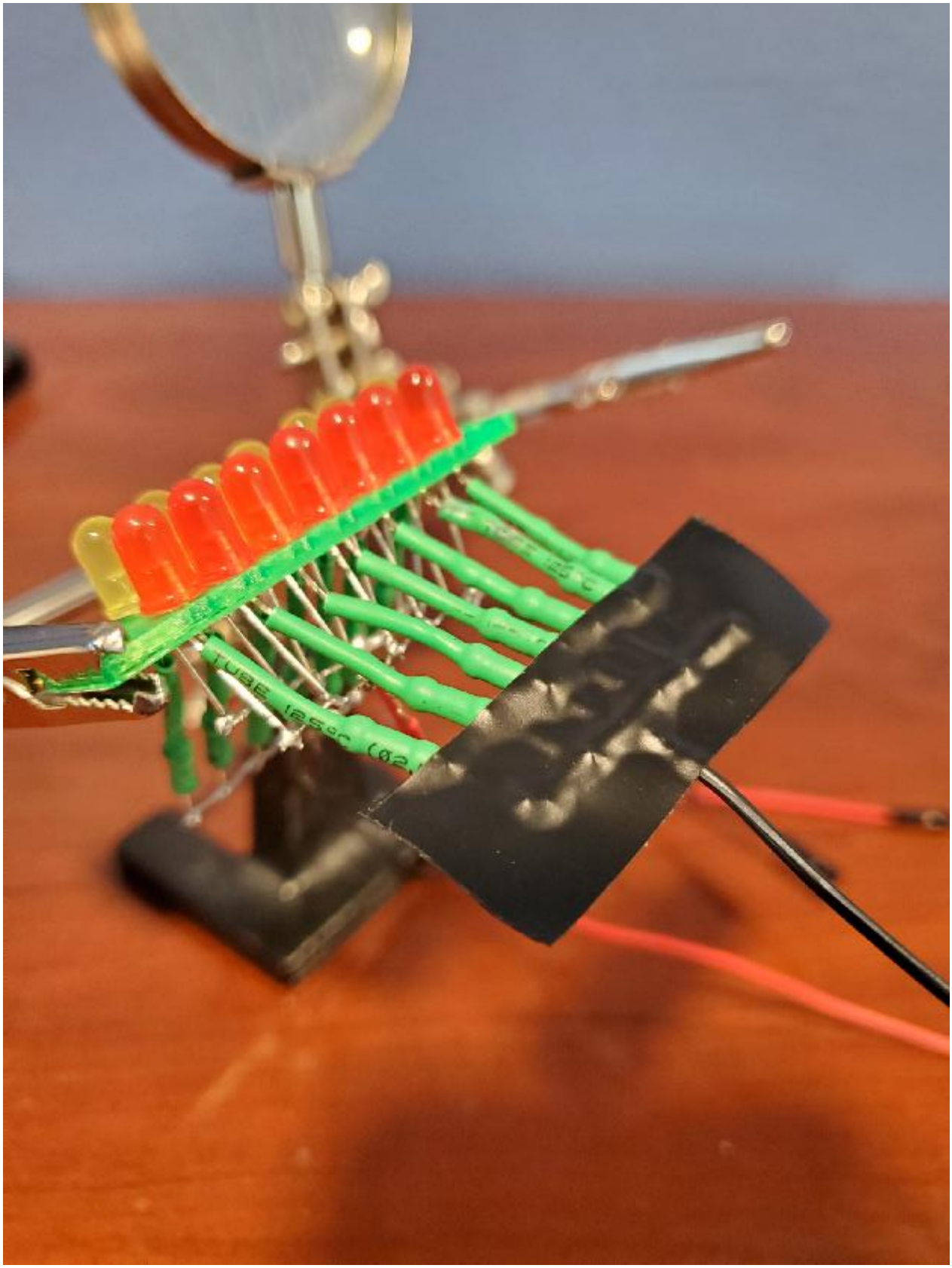


Step 70:

Obtain a roll of electrical tape with a width of 7/10 inches and cut two (2) pieces that are two (2) inches in length.

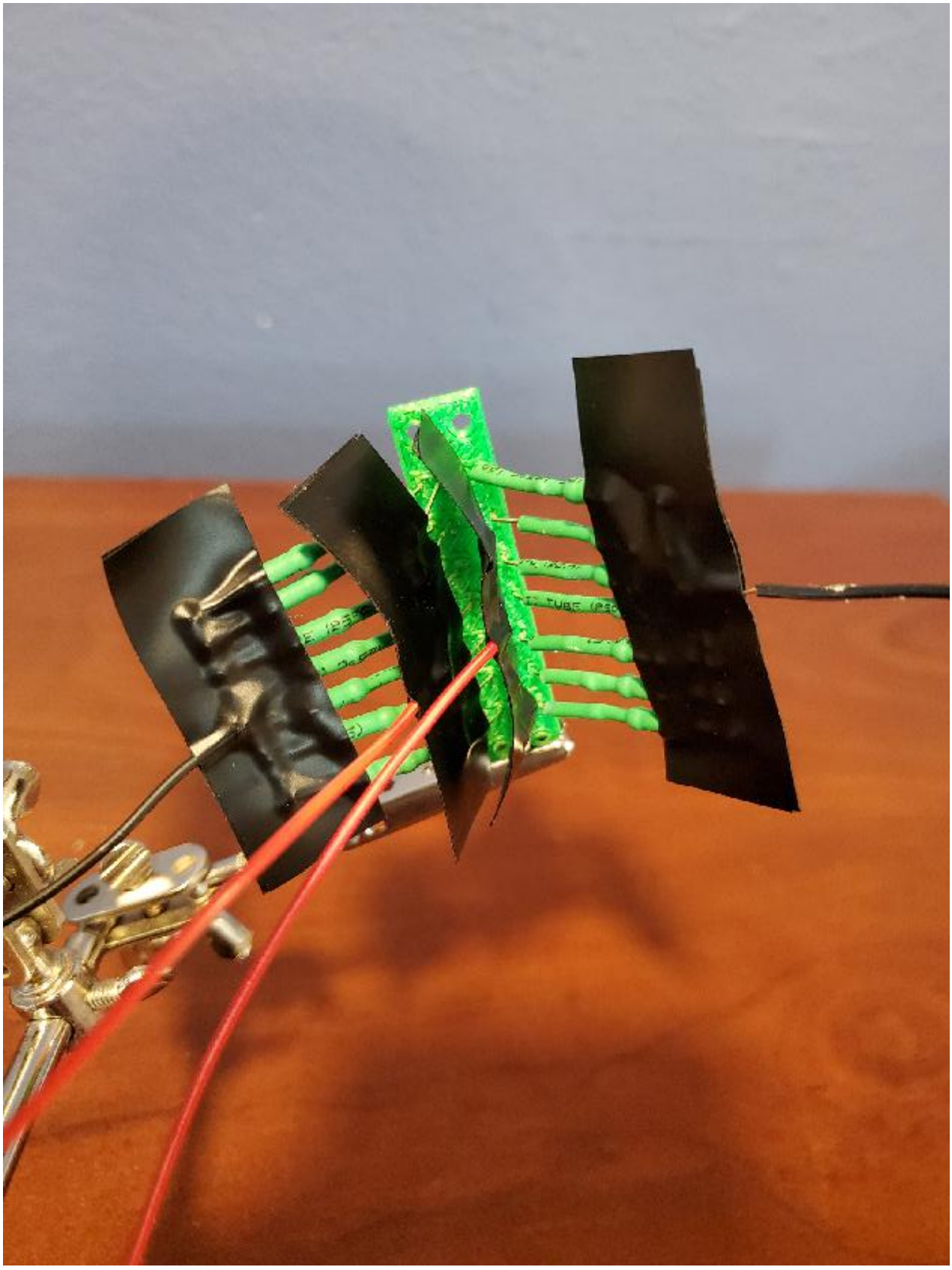
Step 71:

Sandwich these cut pieces of electrical tape onto one of the cathode rows so that the leads are completely covered.



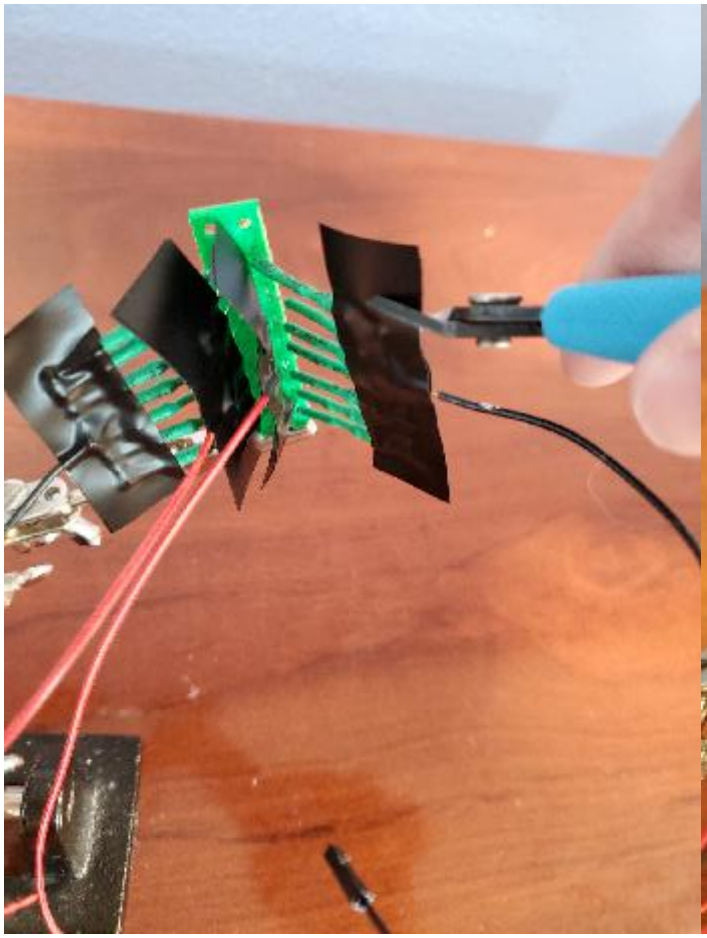
Step 72:

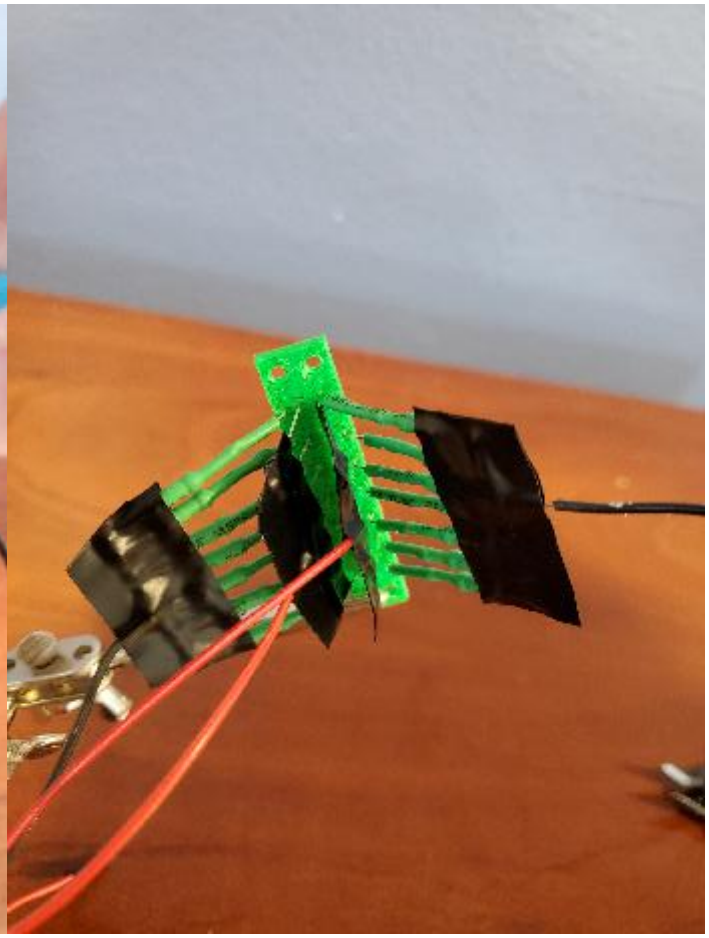
Repeat steps 70 and 71 for the two anode lead rows and the remaining cathode lead row.



Step 73:

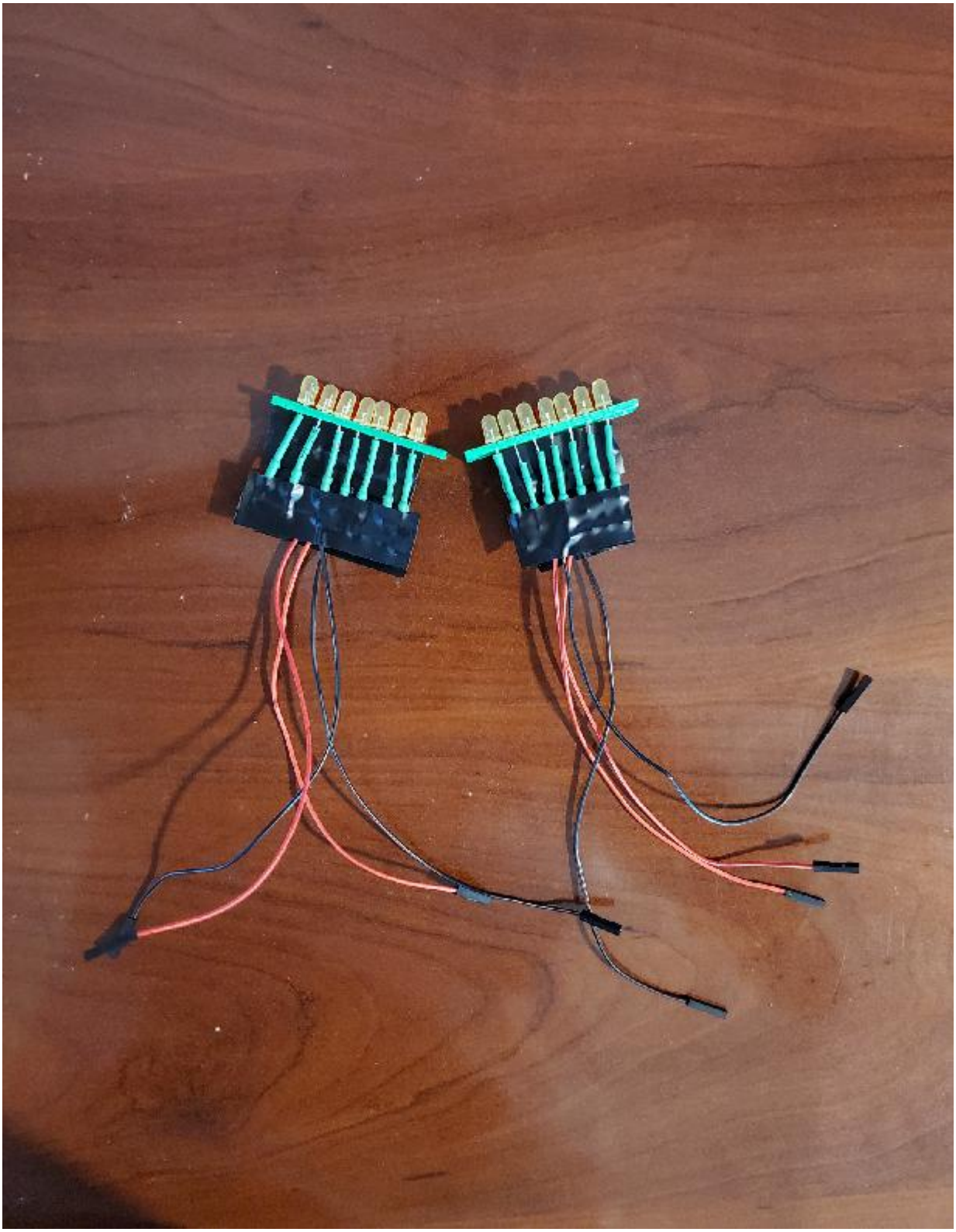
Prevent taillight installation interference by trimming the length of the electrical tape sandwiching the cathode and anode rows.





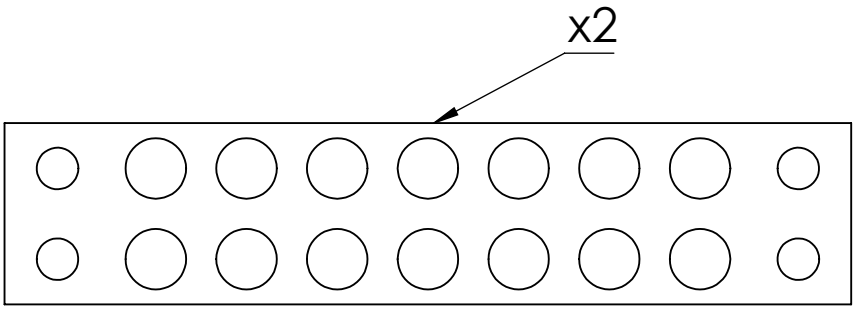
Step 74:

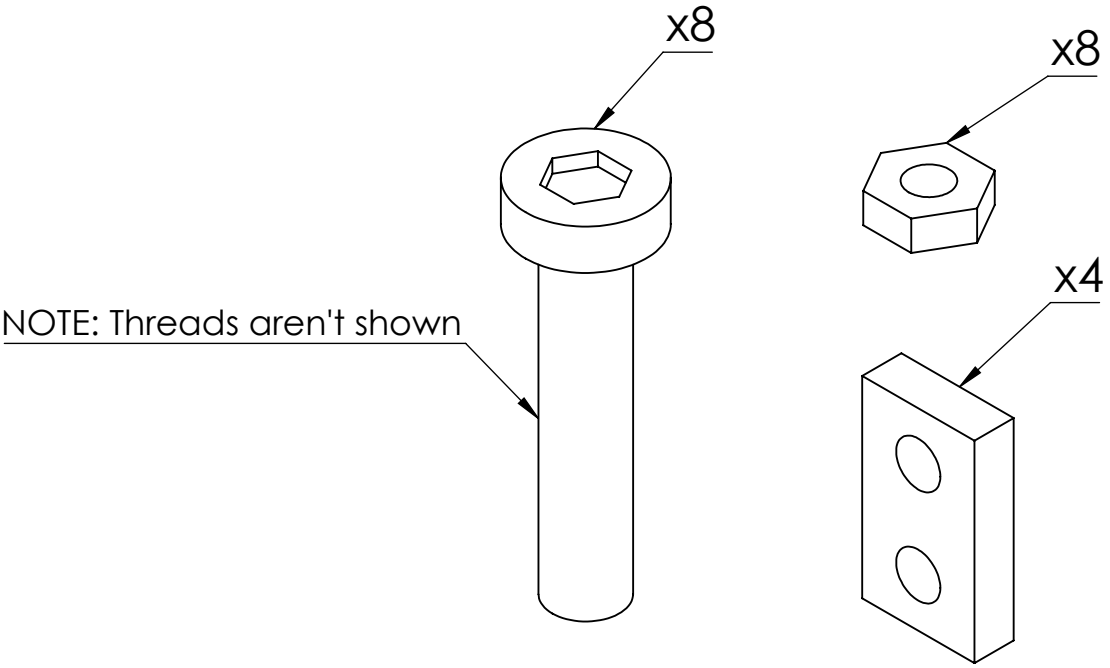
Repeat steps 40-73 to create a second set of taillights for the vehicle.

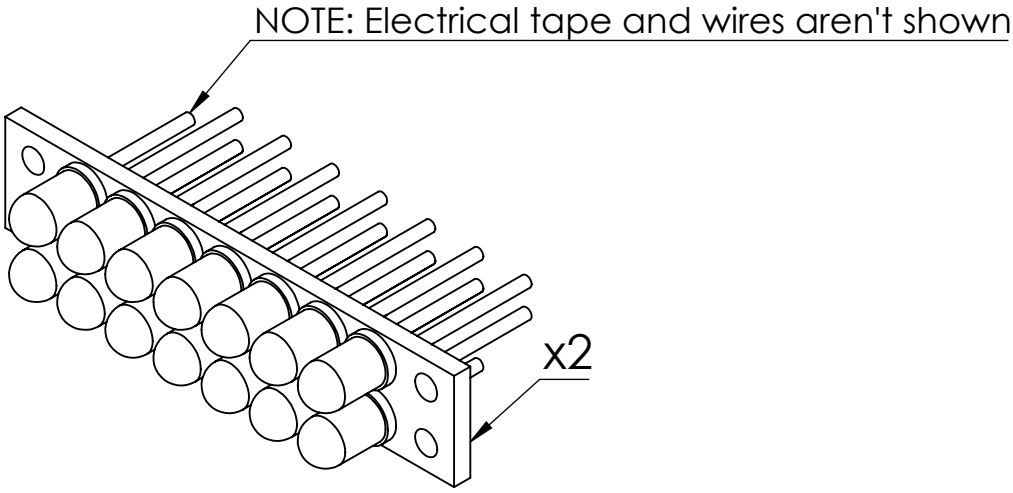


Step 75:

Obtain two tailLightFrontBracket parts, eight M2.5 x 12 mm hex socket cap screws, eight M2.5 nuts, four tailLightSpacer parts, and the two fabricated tail lights from step 74.

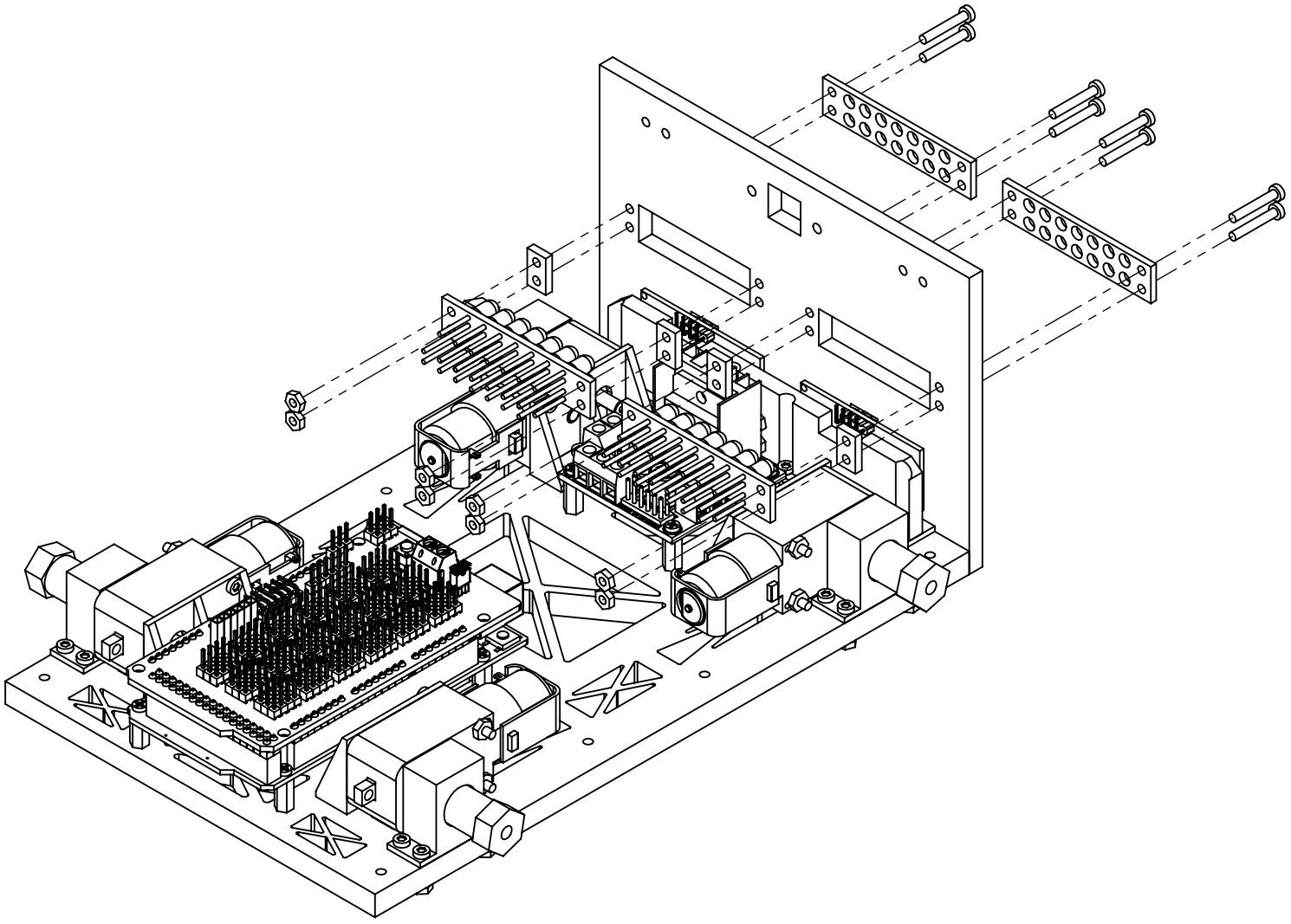






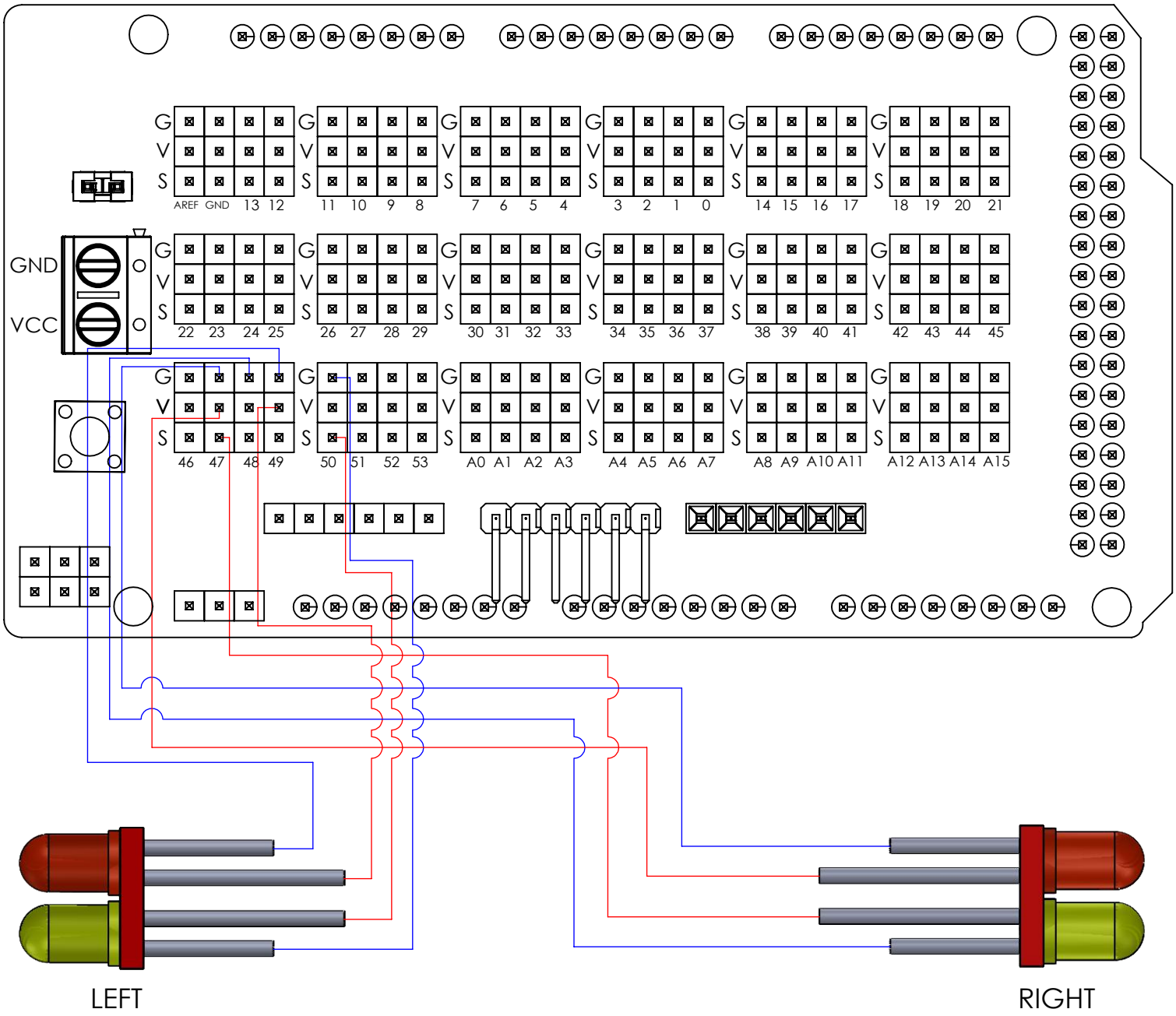
Step 76:

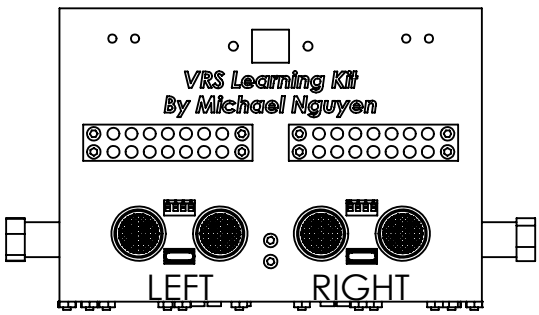
Fasten the two tailLightFrontBracket parts, eight M2.5 x 16 mm hex socket cap screws, eight M2.5 nuts, four tailLightSpacer parts, and the two fabricated tail lights from step 74 as shown in the figure below.



Step 77:

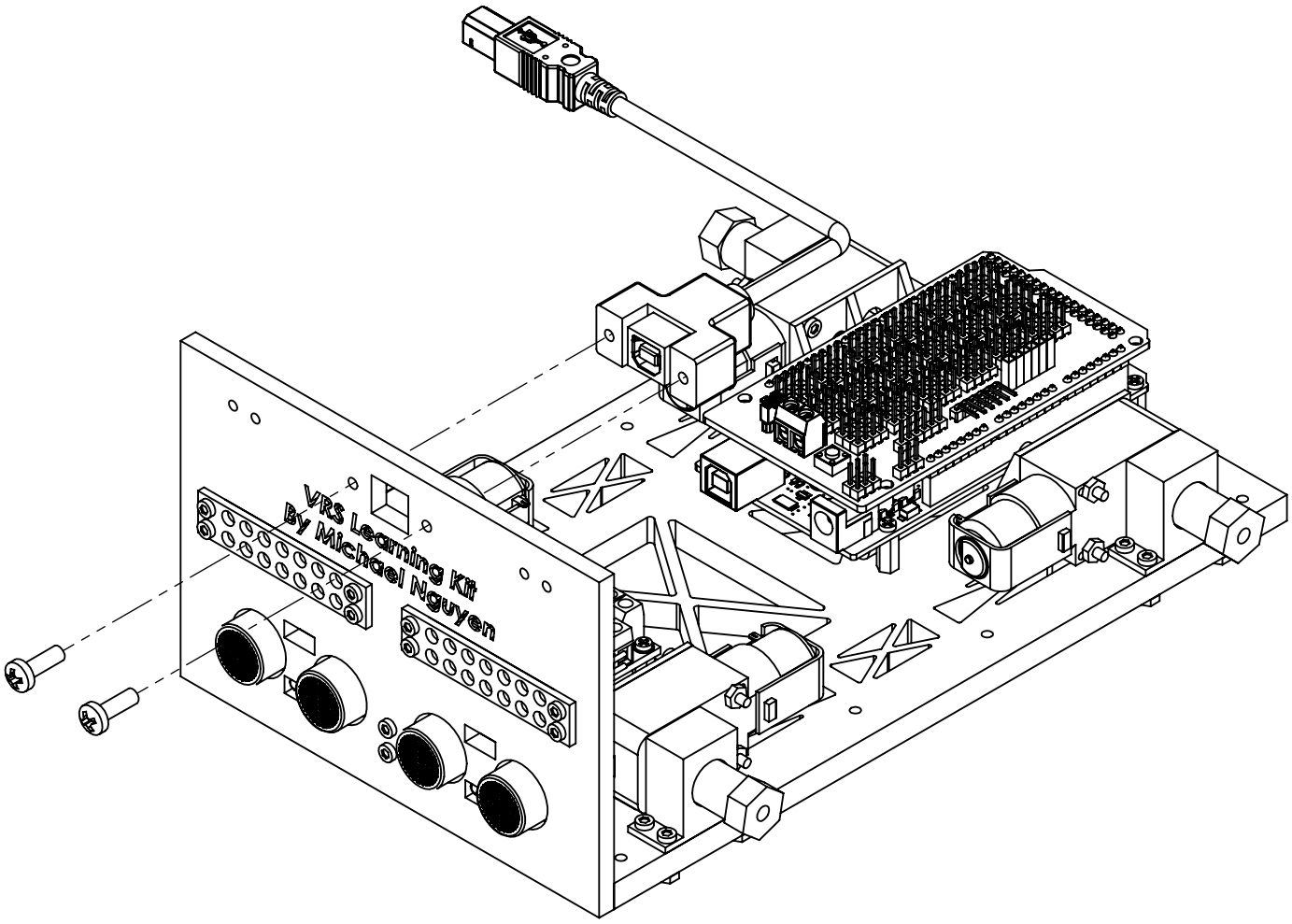
Connect the tail lights to the Arduino Mega Sensor Shield as shown below.





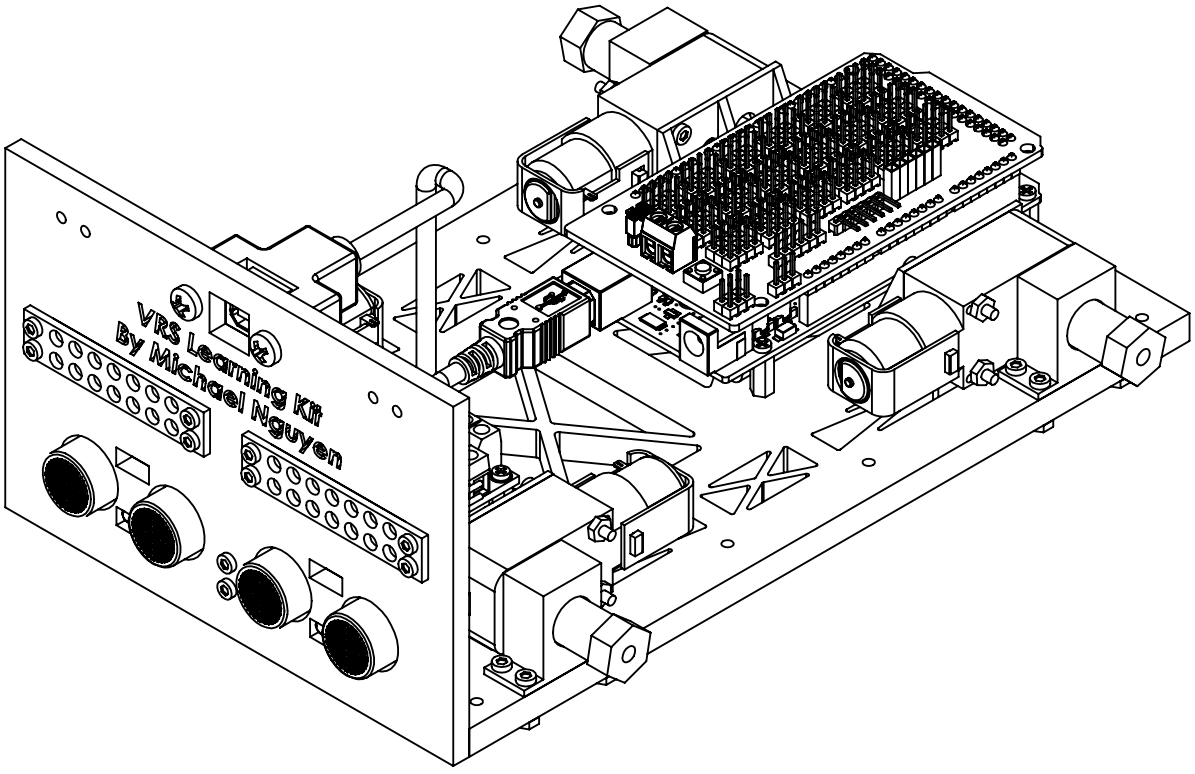
Step 78:

Obtain two M4 x 12 mm cross head screws and fasten the male-female USB Type B cable onto the rearShell part.



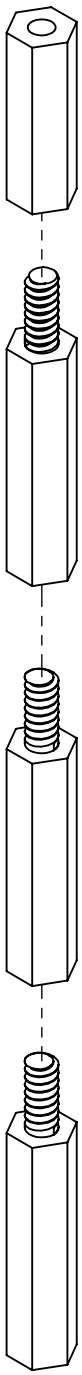
Step 79:

Connect the male-female USB Type B cable into the USB Type B port of the Arduino Mega.



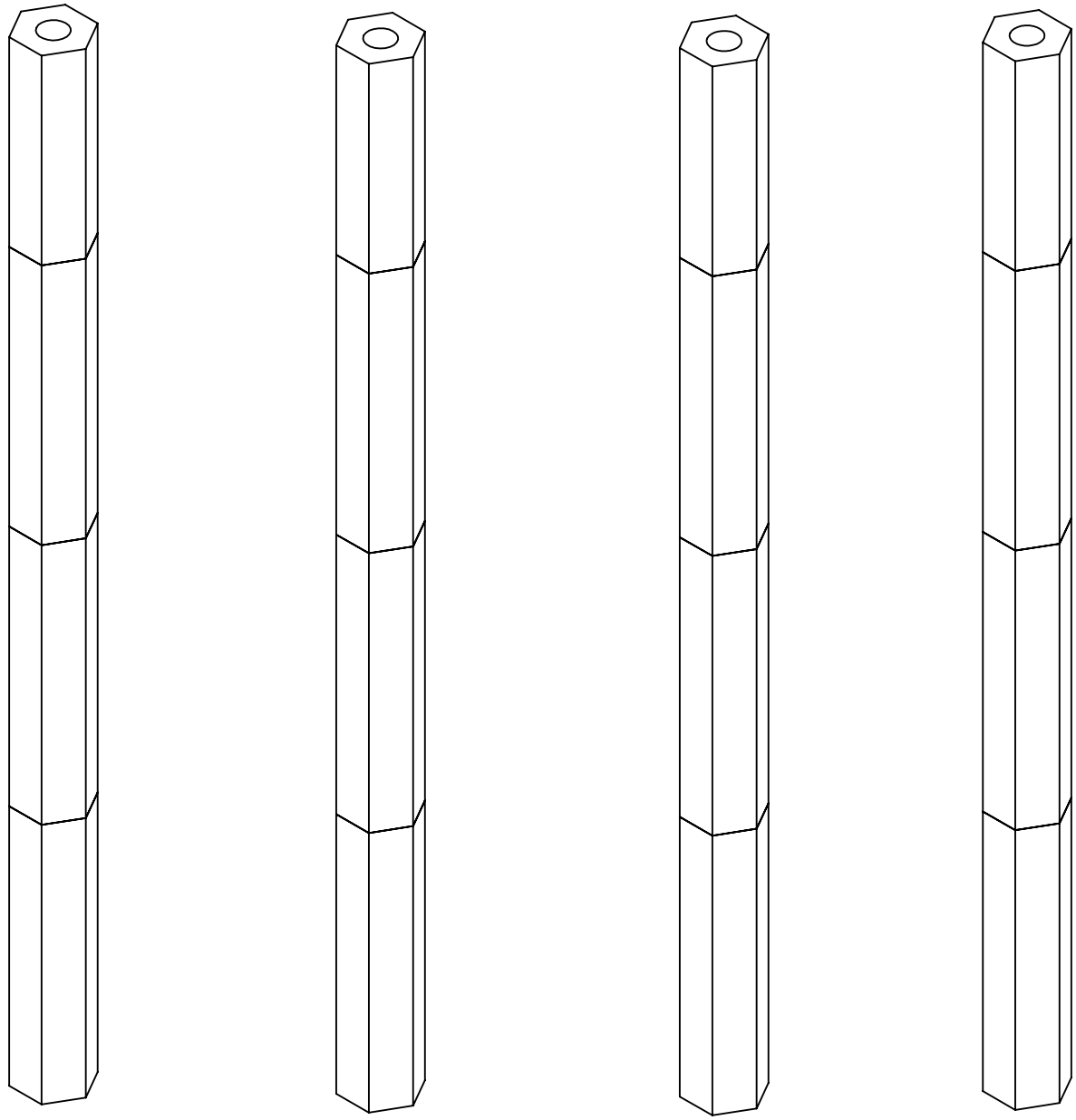
Step 80:

Obtain three M2.5x20mm male-female standoff screws and one M2.5x15mm female-female standoff screws and one M2.5x15mm female-female standoff screw and fasten them together in any order.



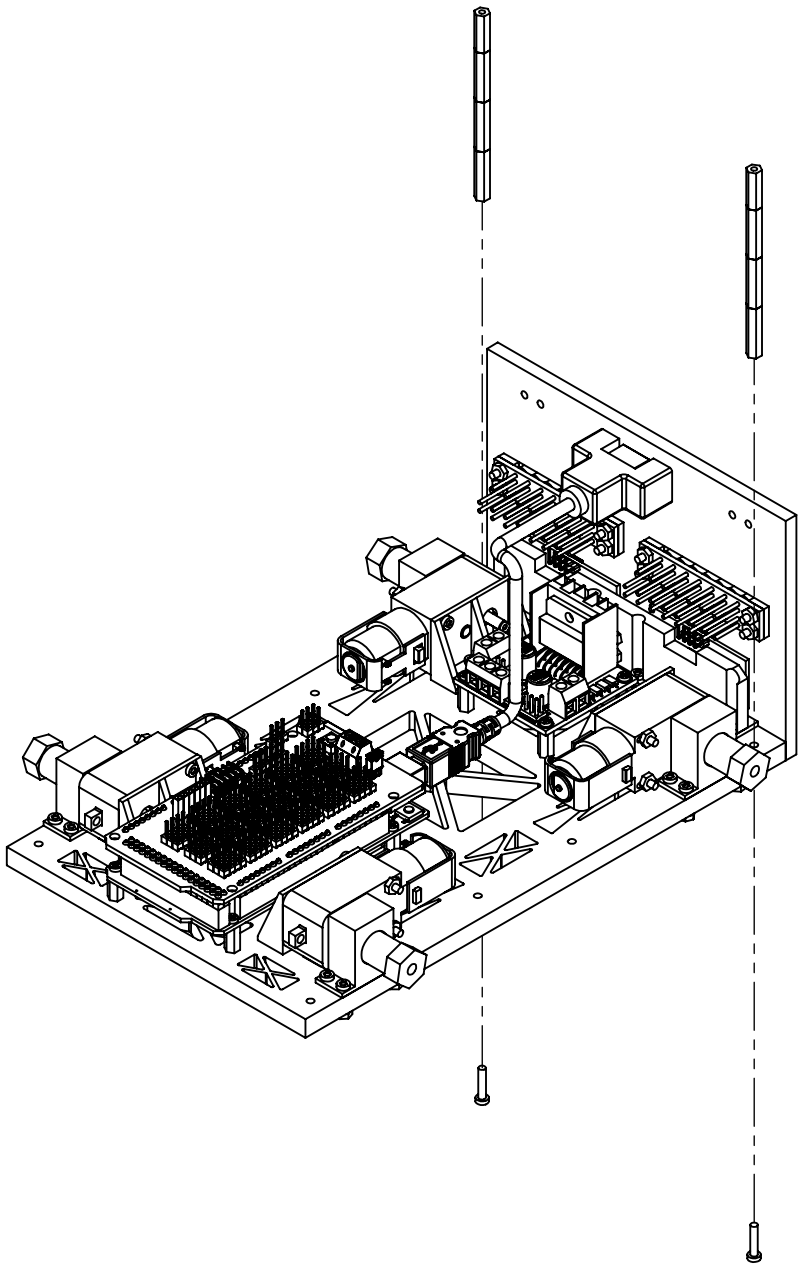
Step 81:

Repeat step 80 until there are four standoff assemblies consisting of three M2.5x20mm male-female standoff screws and one M2.5x15mm female-female standoff screw.



Step 82:

Obtain two standoff assemblies and two M2.5 x 12 mm hex socket cap screws and fasten them to the bottomChassis part using the mounting holes near the rear of the vehicle shown below.

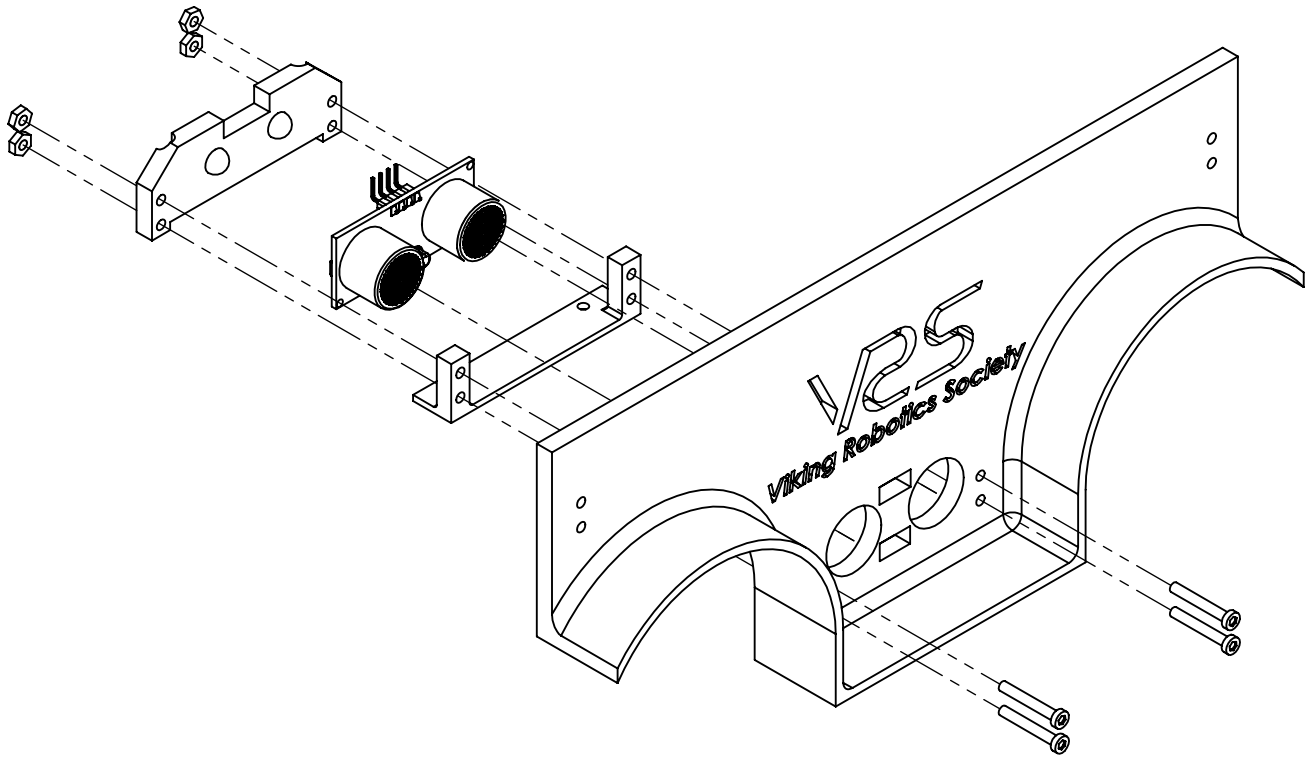


Step 83:

Obtain one HC-SR04 ultrasonic distance sensor and four (4) female-female jumper wires and insert them into the four pins of the sensor.

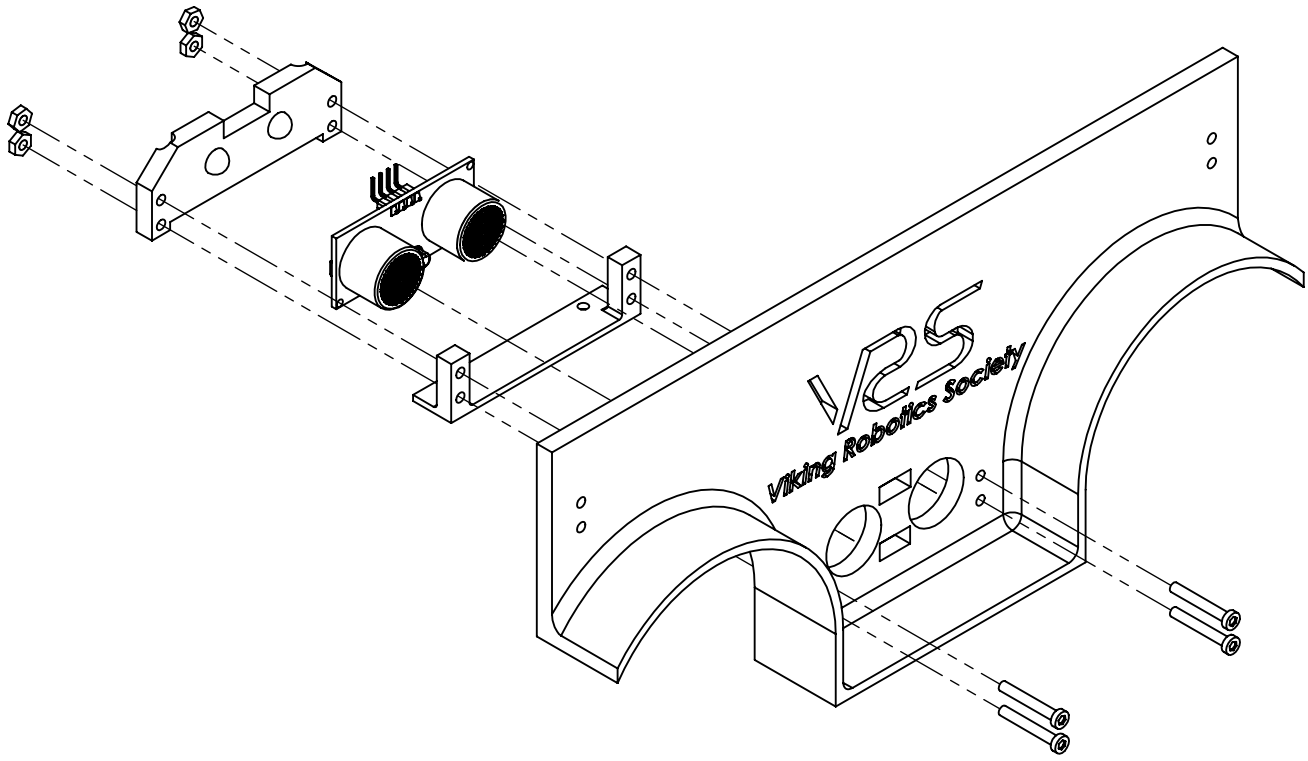
Step 84:

Fasten the sensor-wire assembly from step 83, sideShellToBottomChassisBracket, and sideDistanceSensorBracket using four (4) M2.5 x 18 mm hex socket cap screws and M2.5 nuts.



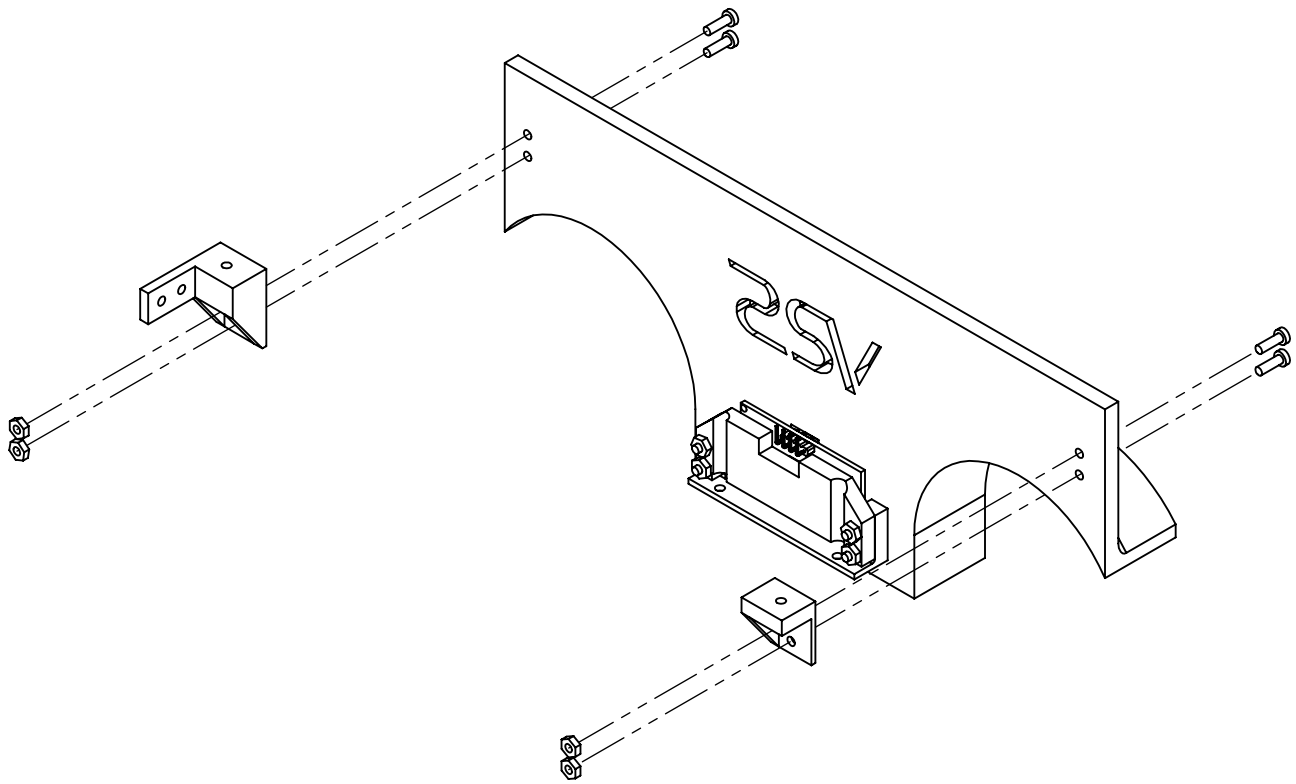
Step 85:

Repeat step 84 with the sideShellRight part.



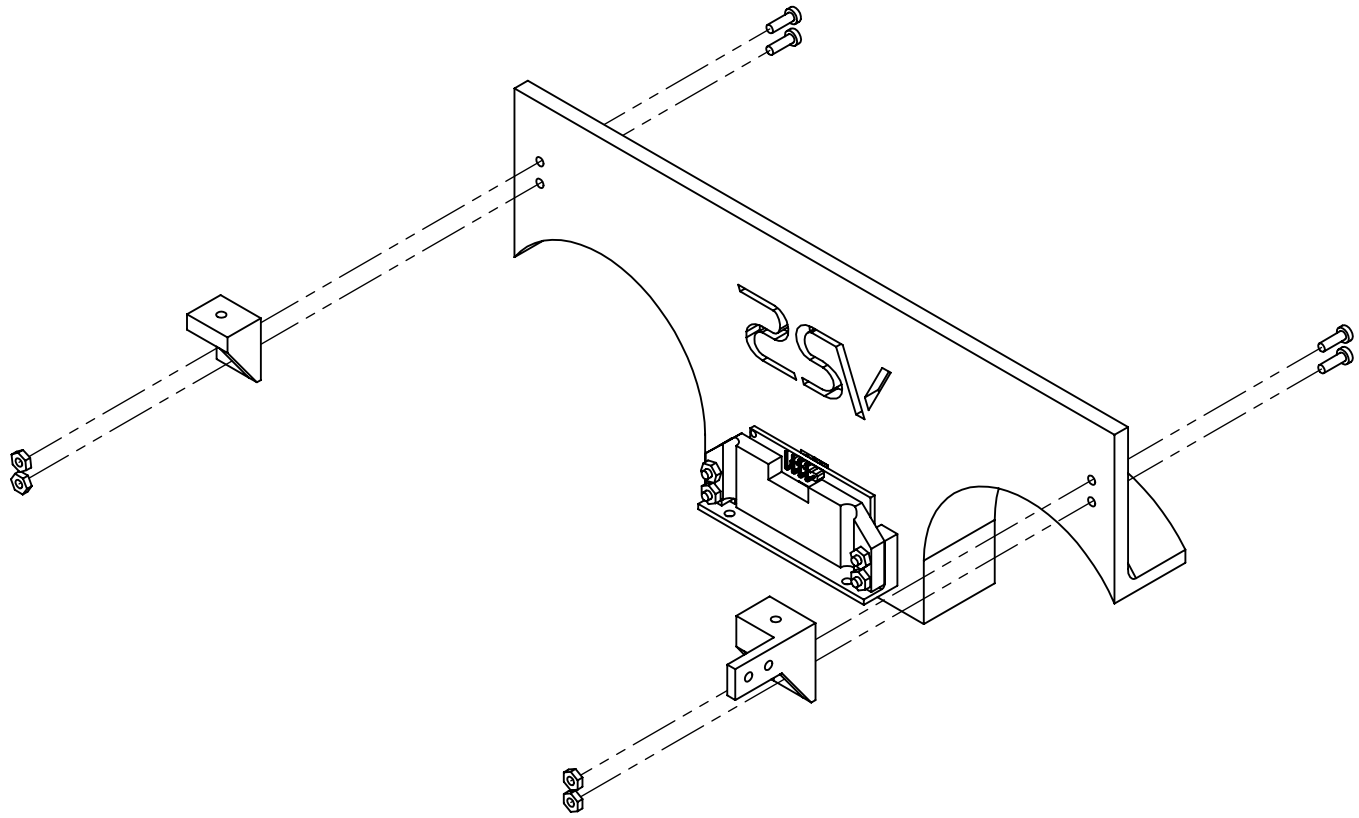
Step 86:

Obtain four (4) M2.5 x 8 mm hex socket cap screws and M2.5 nuts, rearToTopChassisLeftBracket, and frontToTopChassisLeftBracket and fasten them onto the sideShellLeft assembly.



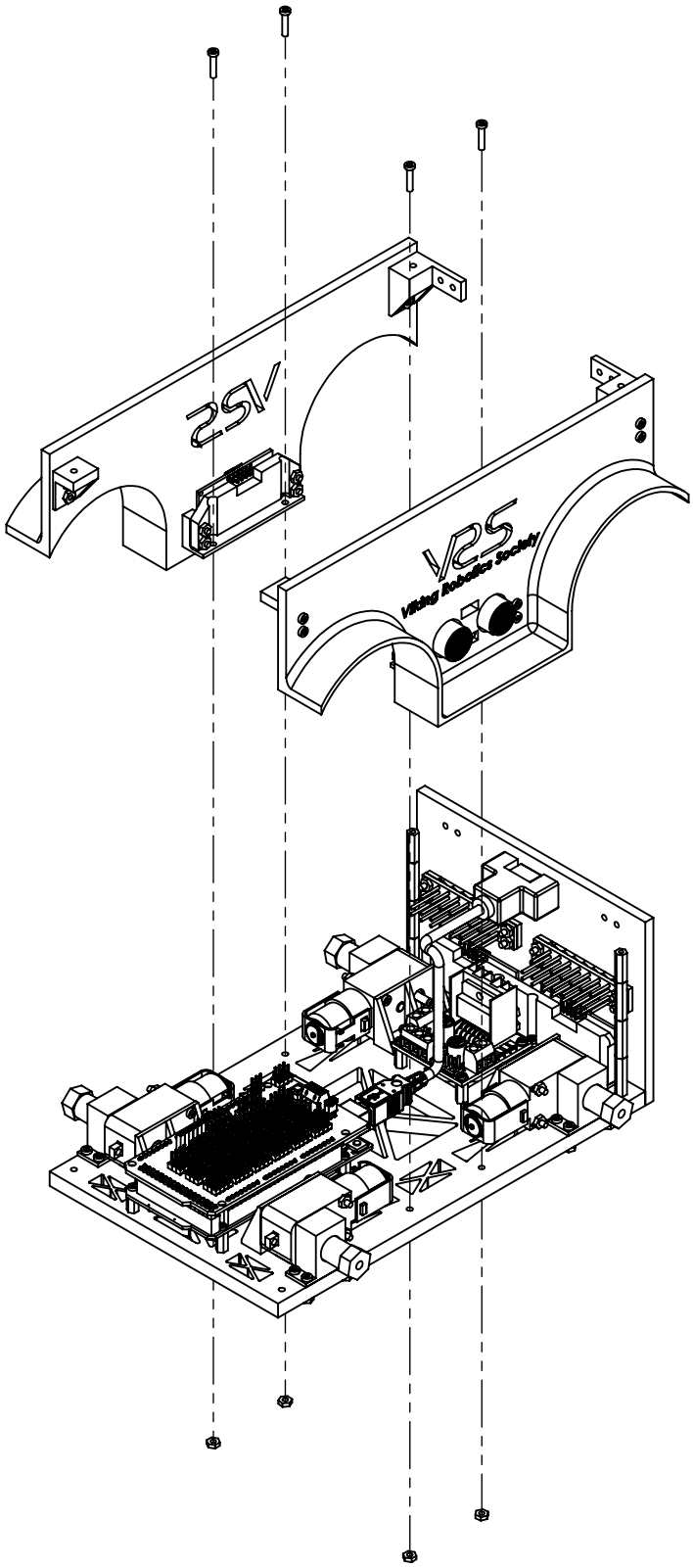
Step 87:

Obtain four (4) M2.5 x 8 mm hex socket cap screws and nuts, rearToTopChassisRightBracket, and frontToTopChassisRightBracket and fasten them onto the sideShellRight assembly.



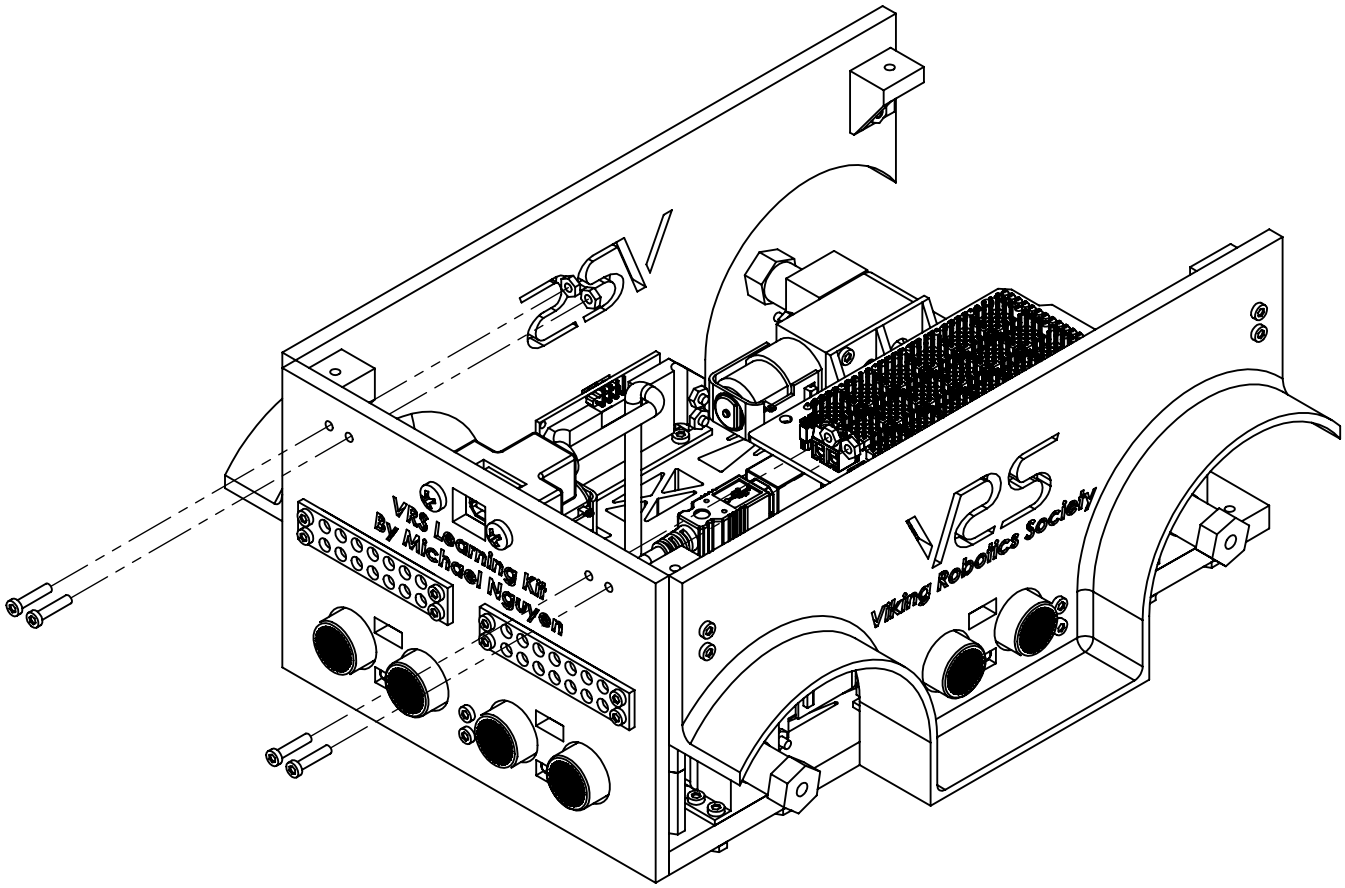
Step 88:

Using four (4) M2.5 x 12 mm hex socket cap screws and M2.5 nuts, fasten the sideShellLeft and sideShellRight assemblies onto the bottomChassis part.



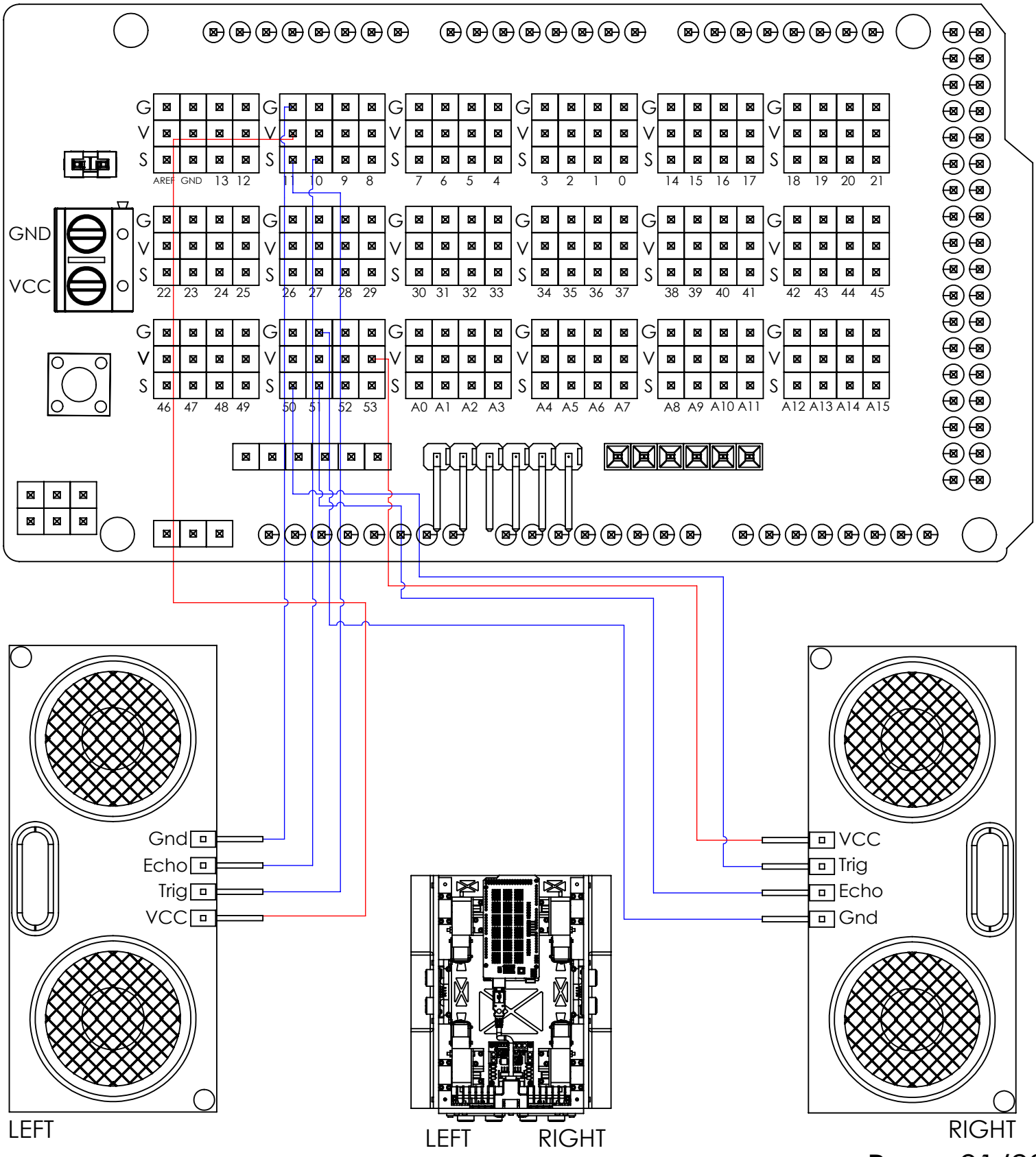
Step 89:

Using four (4) M2.5 x 12 mm hex socket cap screws and M2.5 nuts, fasten the sideShellLeft and sideShellRight assemblies onto the rearShell.



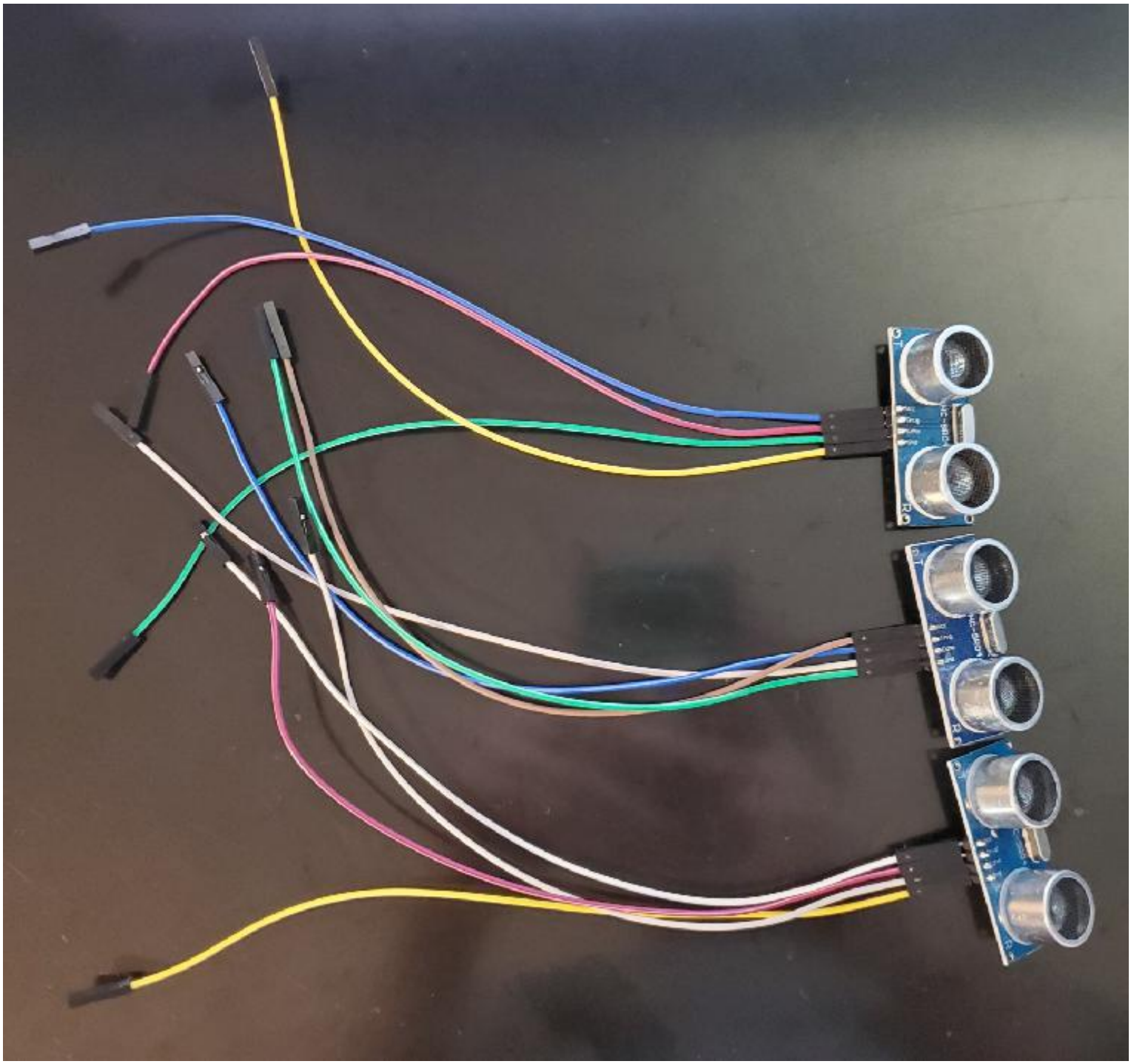
Step 90:

Connect the HC-SR04 Ultrasonic Distance Sensors mounted to the rearShell to the Arduino Mega Sensor Shield.



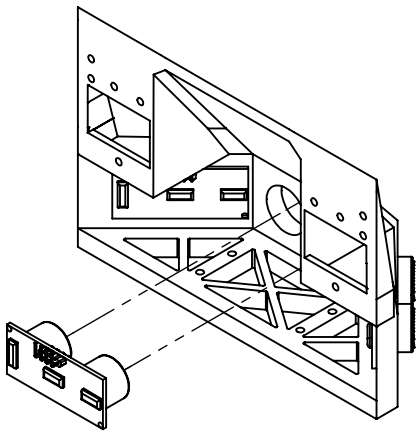
Step 91:

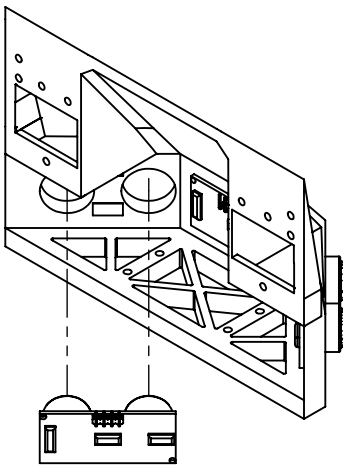
Obtain three (3) HC-SR04 ultrasonic distance sensors and twelve (12) female-female jumper wires and connect each wire to the Vcc, Trig, Echo, and Gnd pins of each sensor.

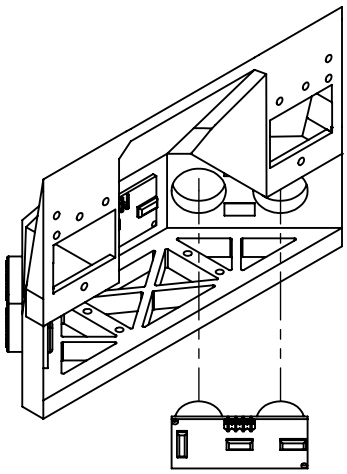


Step 92:

Obtain the frontShell part and insert the three sensor-jumper wire assemblies through the holes.

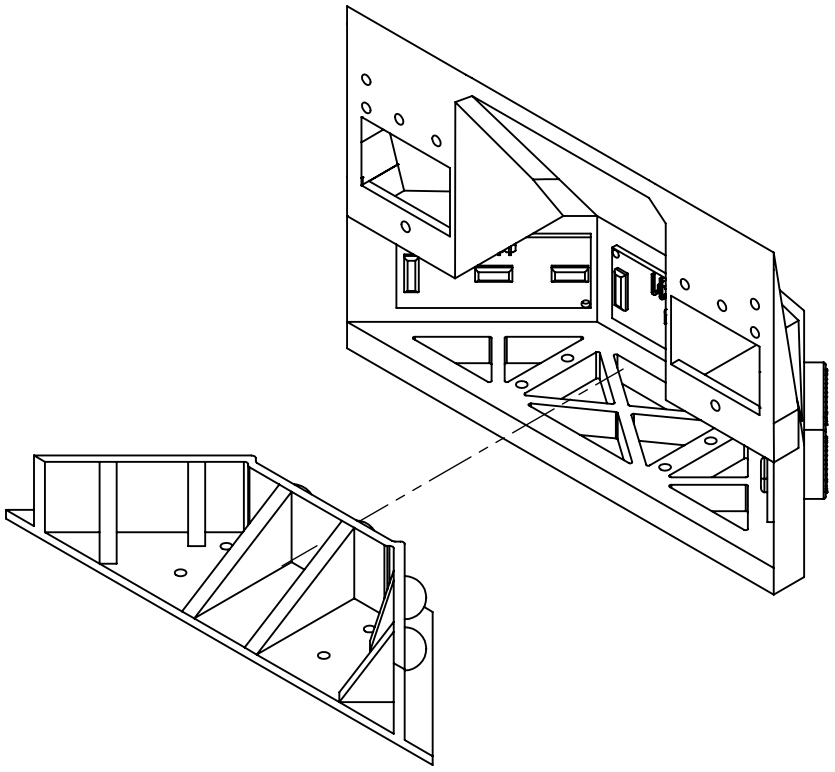


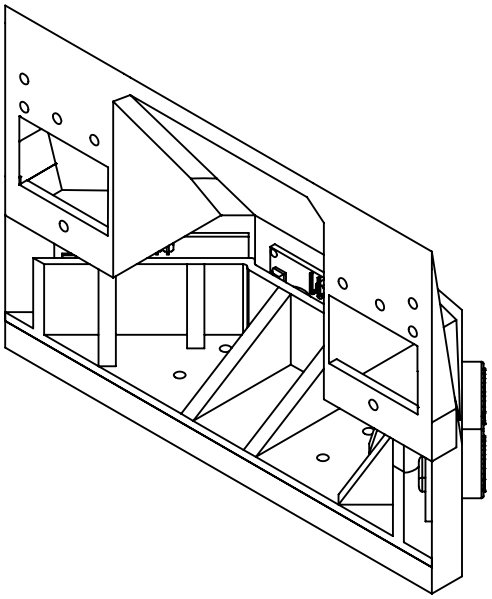




Step 93:

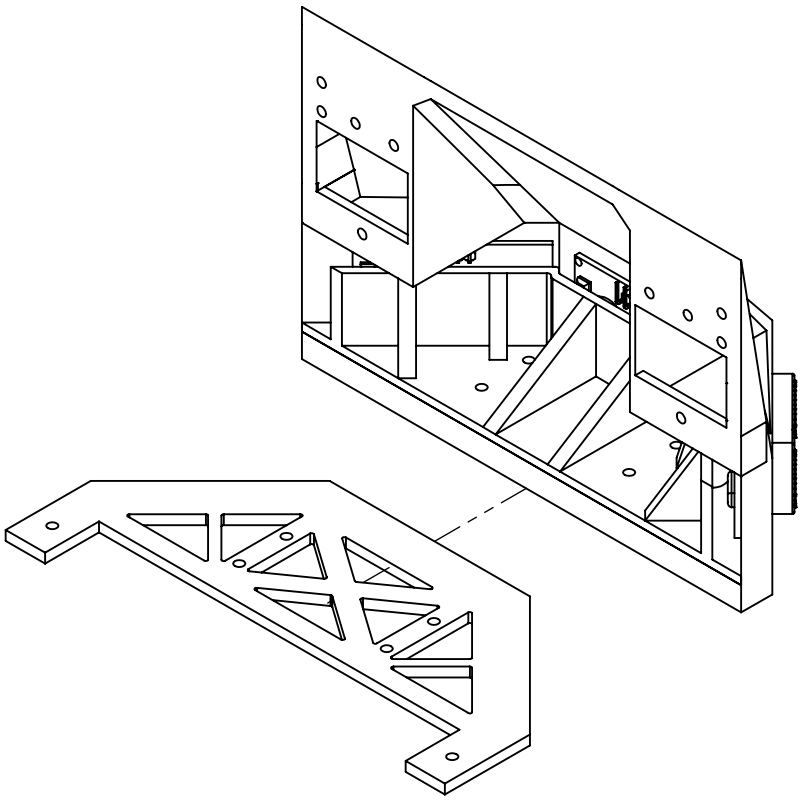
Obtain and insert the frontDistanceSensorBracket into the interior of the frontShell part until its mounting holes are aligned with the corresponding mounting holes of the frontShell part. The part should be flush with the frontShell part and firmly pressed against the sensors.

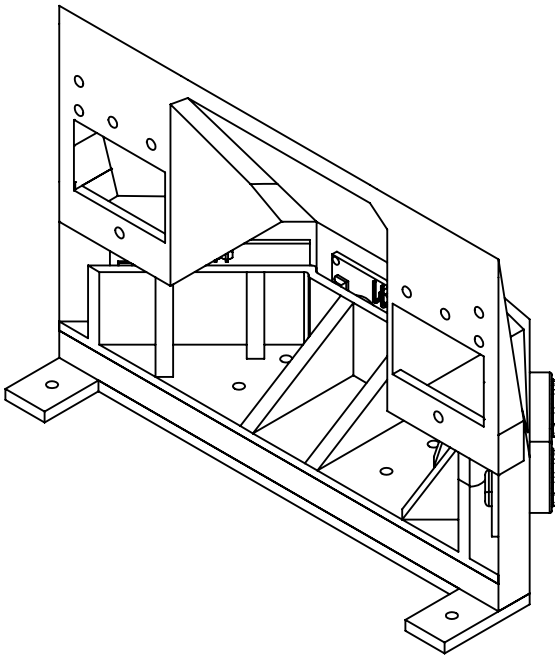




Step 94:

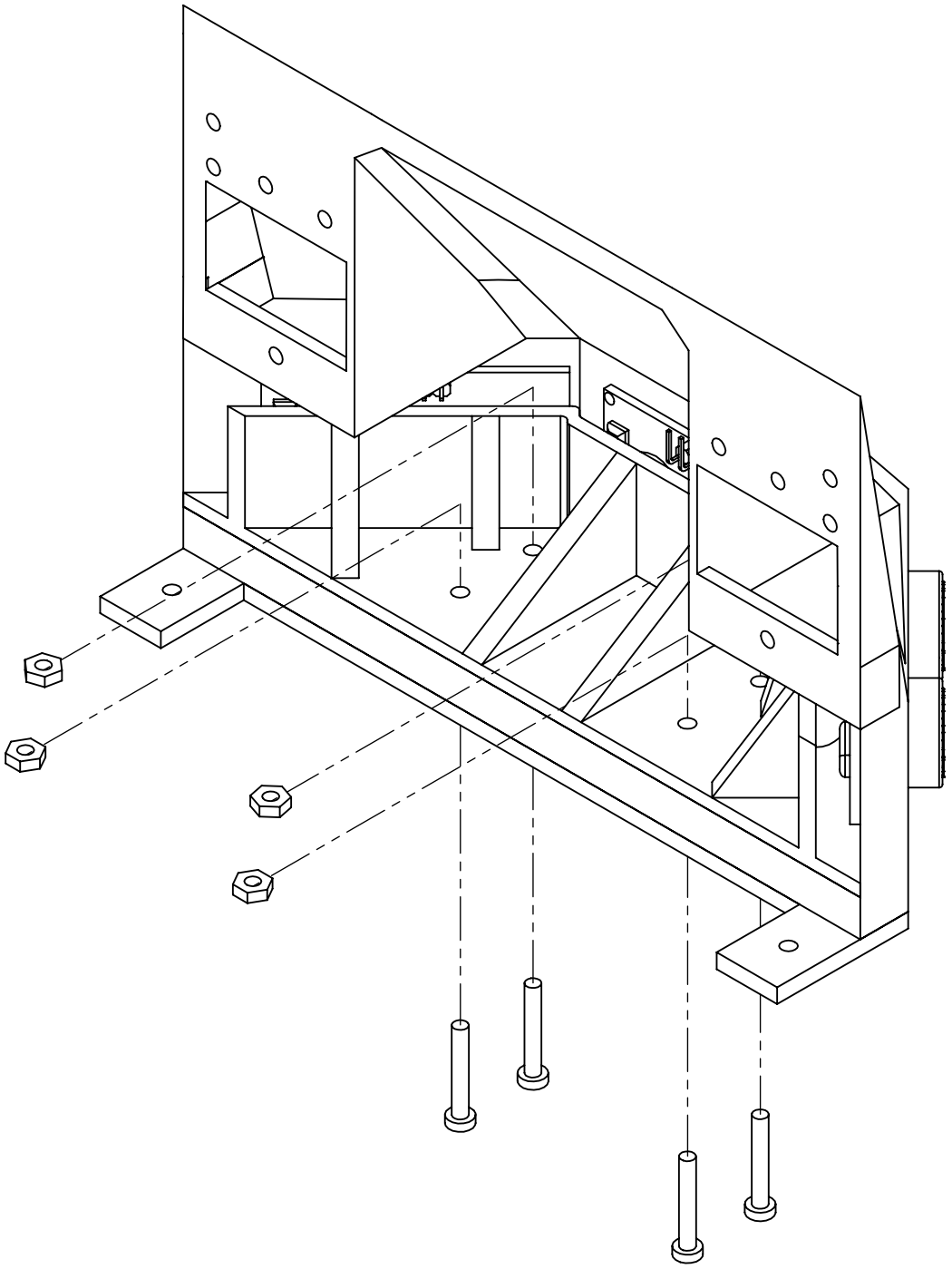
Obtain the frontShellToBottomChassisBracket part and place it under the frontShell part and align its mounting holes to the corresponding mounting holes of the frontShell part.





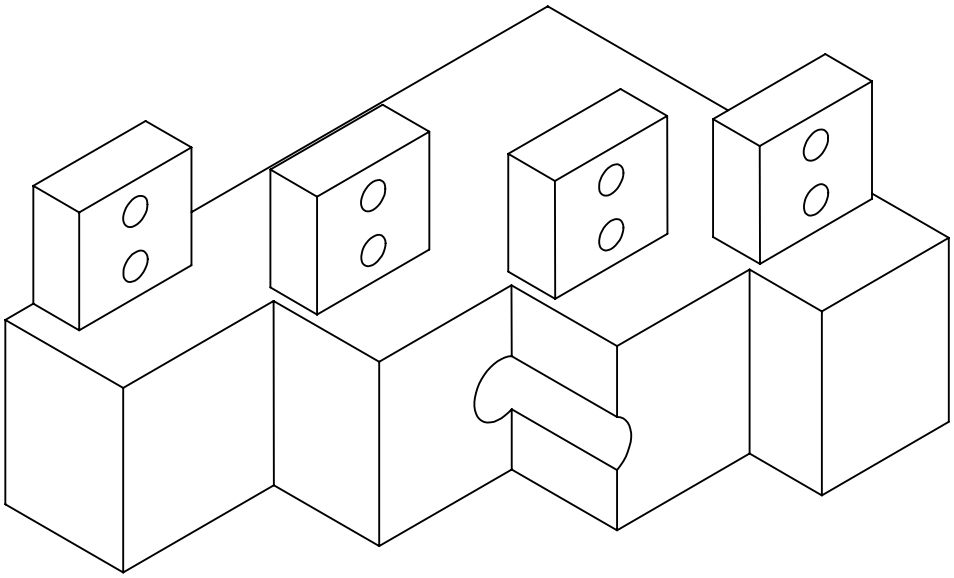
Step 95:

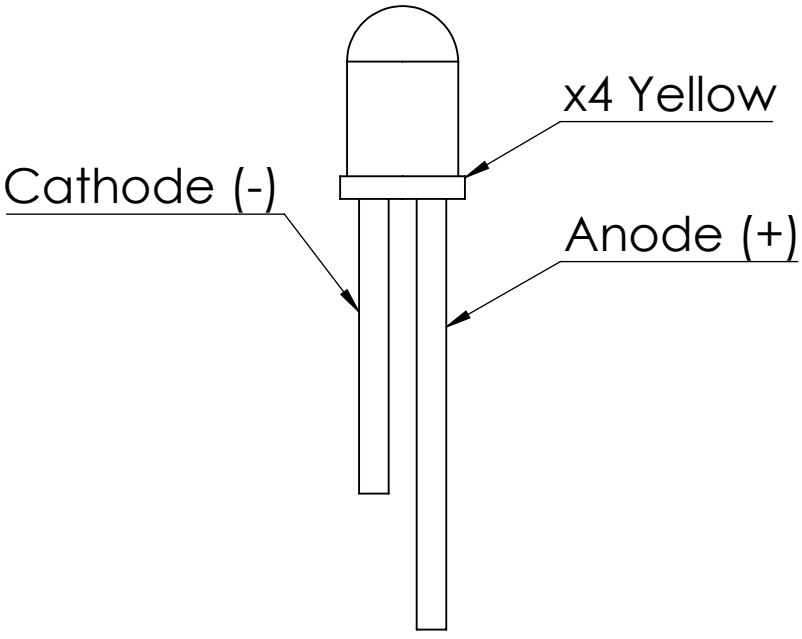
Using four (4) M2.5 x 16 mm hex socket cap screws and M2.5 nuts, fasten the frontShellToBottomChassisBracket part onto the frontShell assembly.



Step 96:

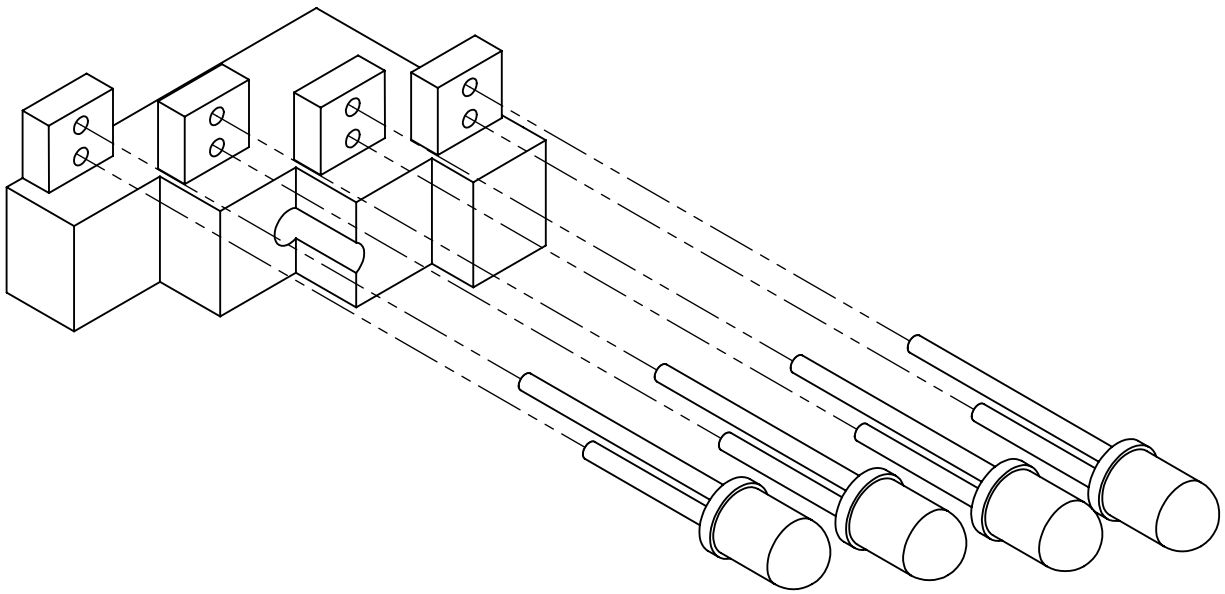
Obtain the bottomHeadLightRightRear part and four yellow LEDs.





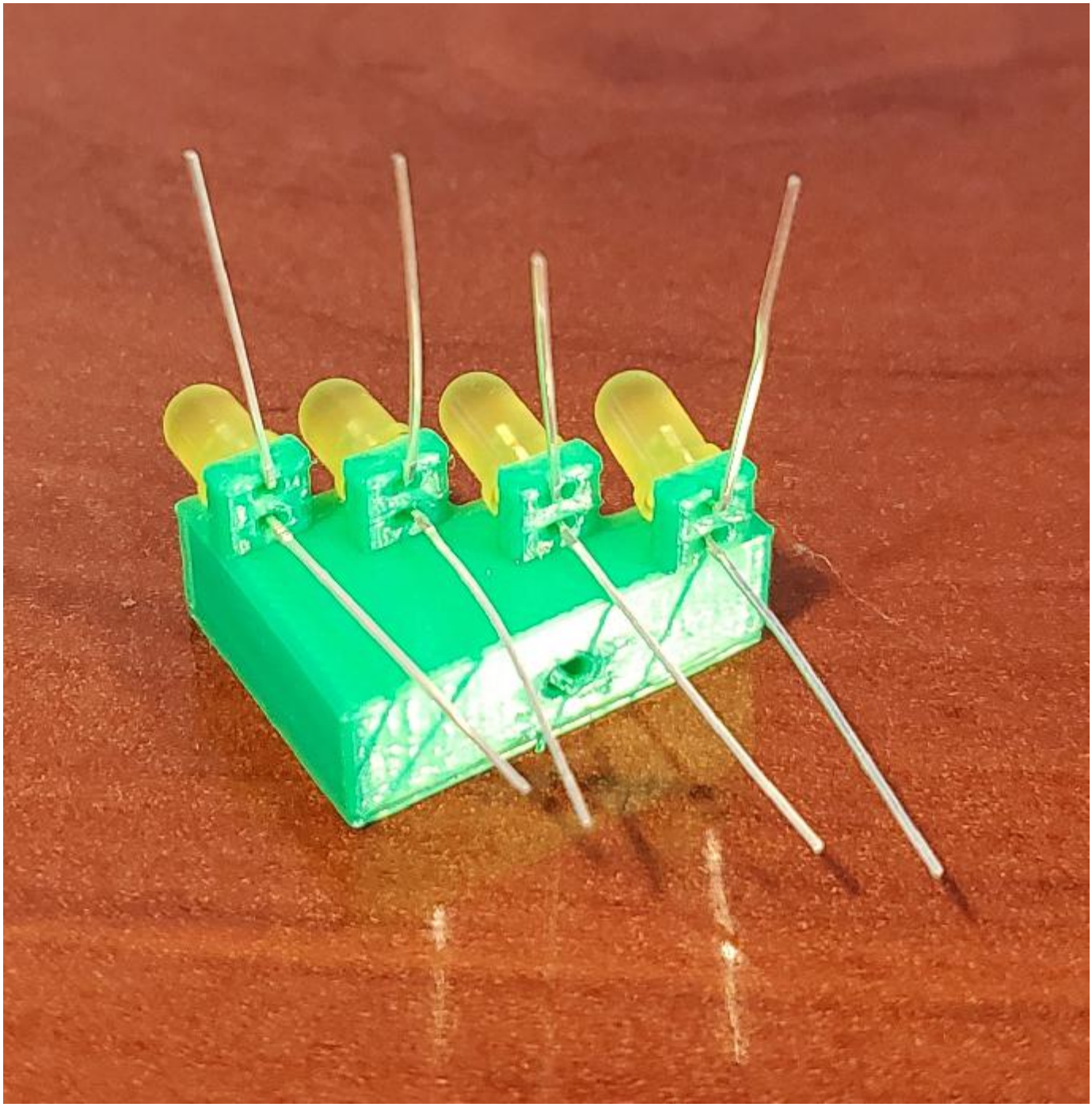
Step 97:

Insert the leads of the LEDs through the tab mounting holes of the bottomHeadLightRightRear part.



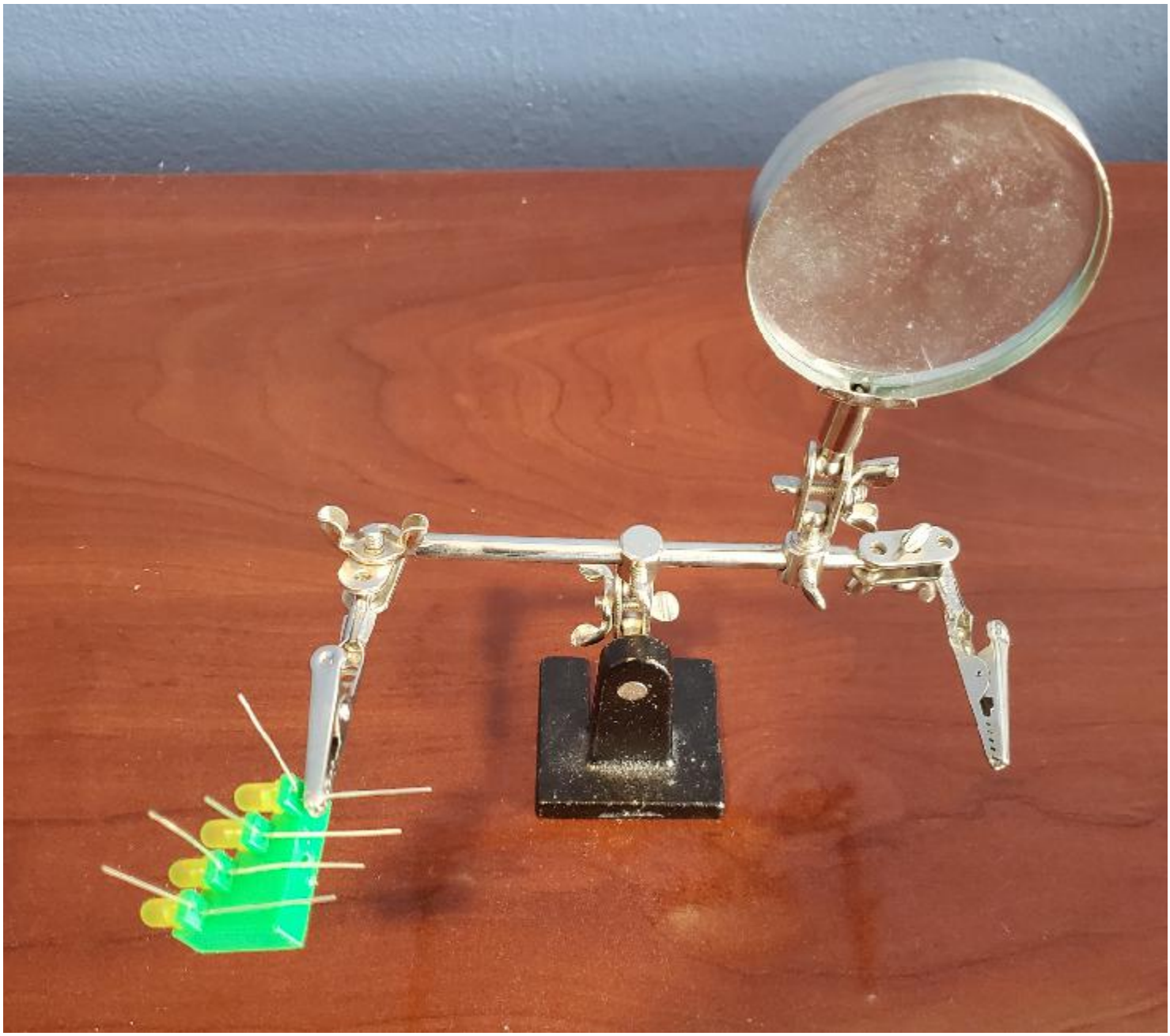
Step 98:

Make room for heat shrink installation of the cathode leads by bending the anode leads upwards.



Step 99:

Obtain a soldering jig and mount the bottomHeadLightRightRear-LED assembly by the cathode lead of the LED that has both of its leads protruding the most towards the flat surface of the bottomHeadLightRightRear part using one of the clips.

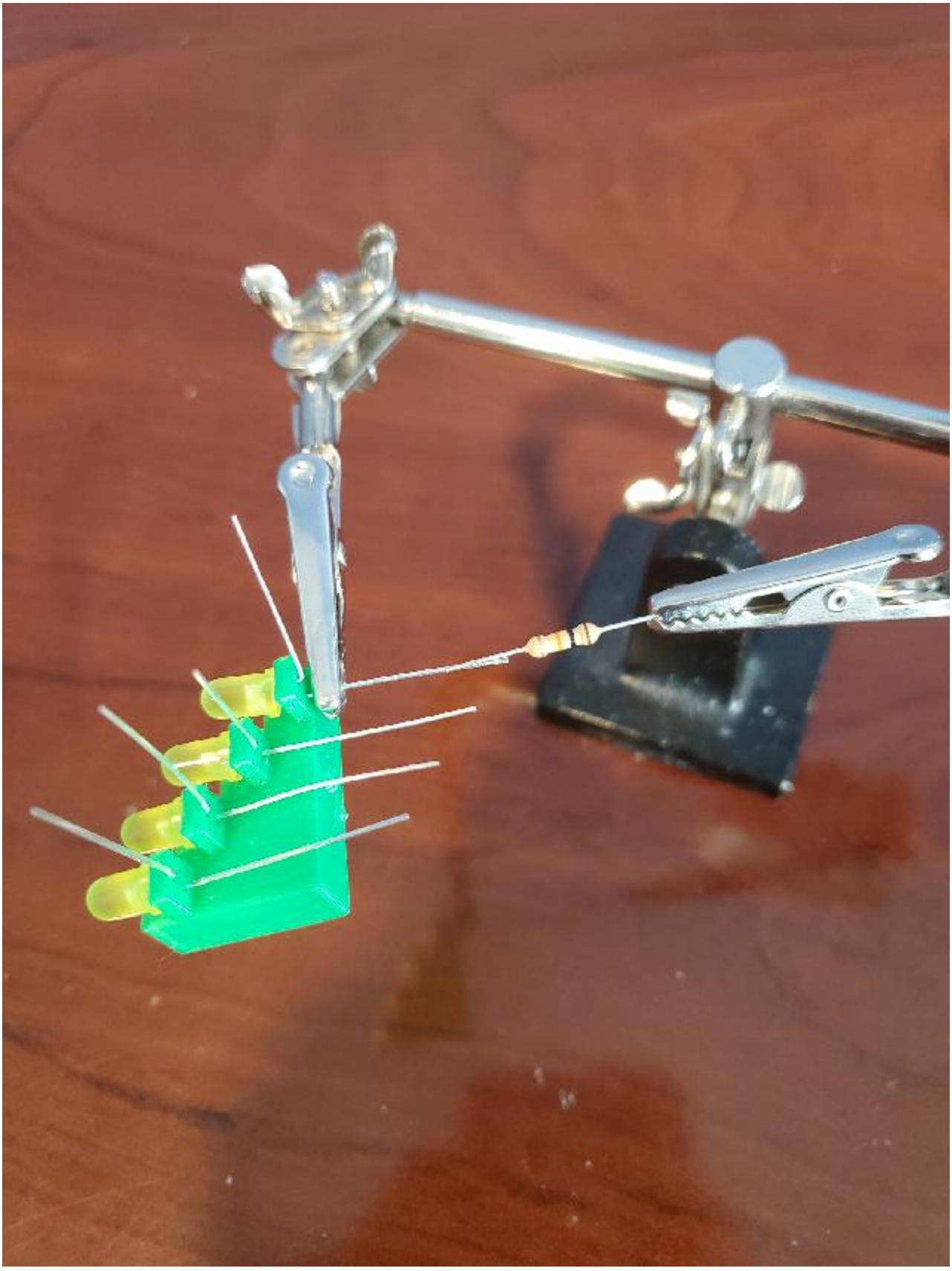


Step 100:

Obtain a 10k Ω resistor and mount it to the remaining clip.

Step 101:

Orient both clips so that a resistor lead contacts the mounted cathode lead.

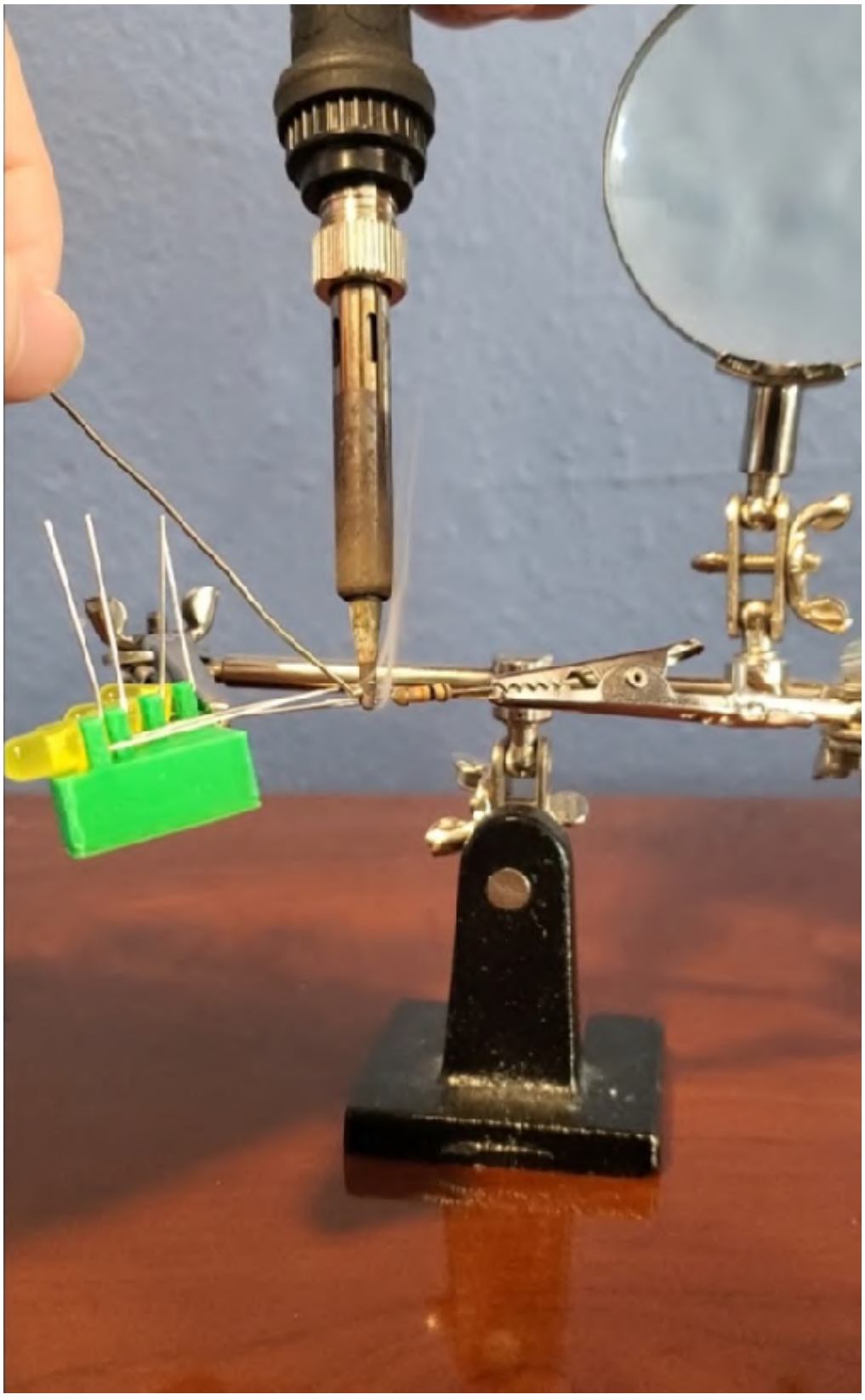


Step 102:

Obtain a soldering iron, turn it on and adjust its temperature settings to a temperature that is sufficient for the solder being used.

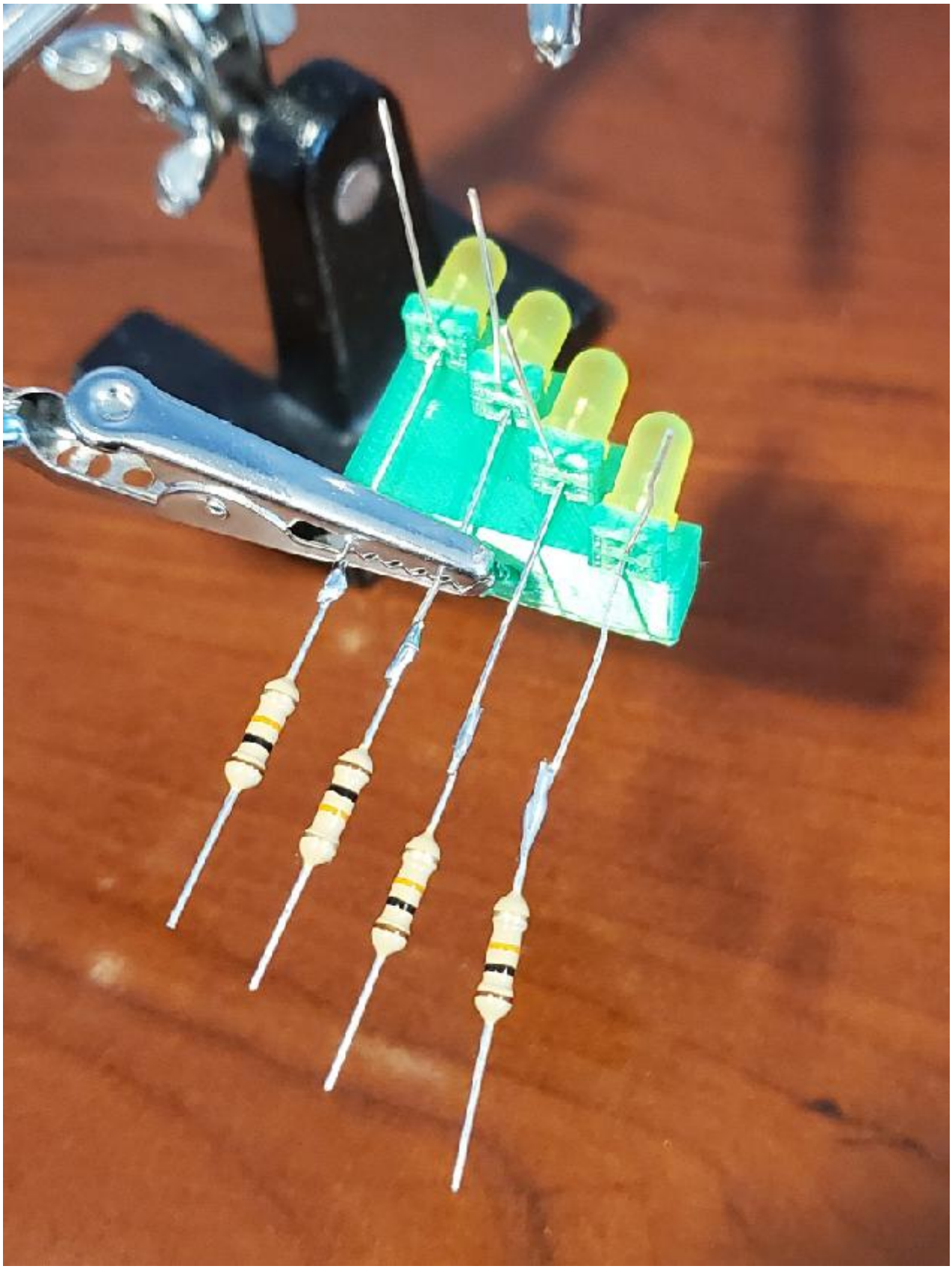
Step 103:

Carefully place the tip of the soldering iron on the resistor lead-mounted cathode lead interface point and quickly apply solder before its surrounding components begin to melt.



Step 104:

Repeat steps 100-103 in a decrements of decreasing lead protrusion length toward the flat surface of the bottomHeadLightRightRear part.

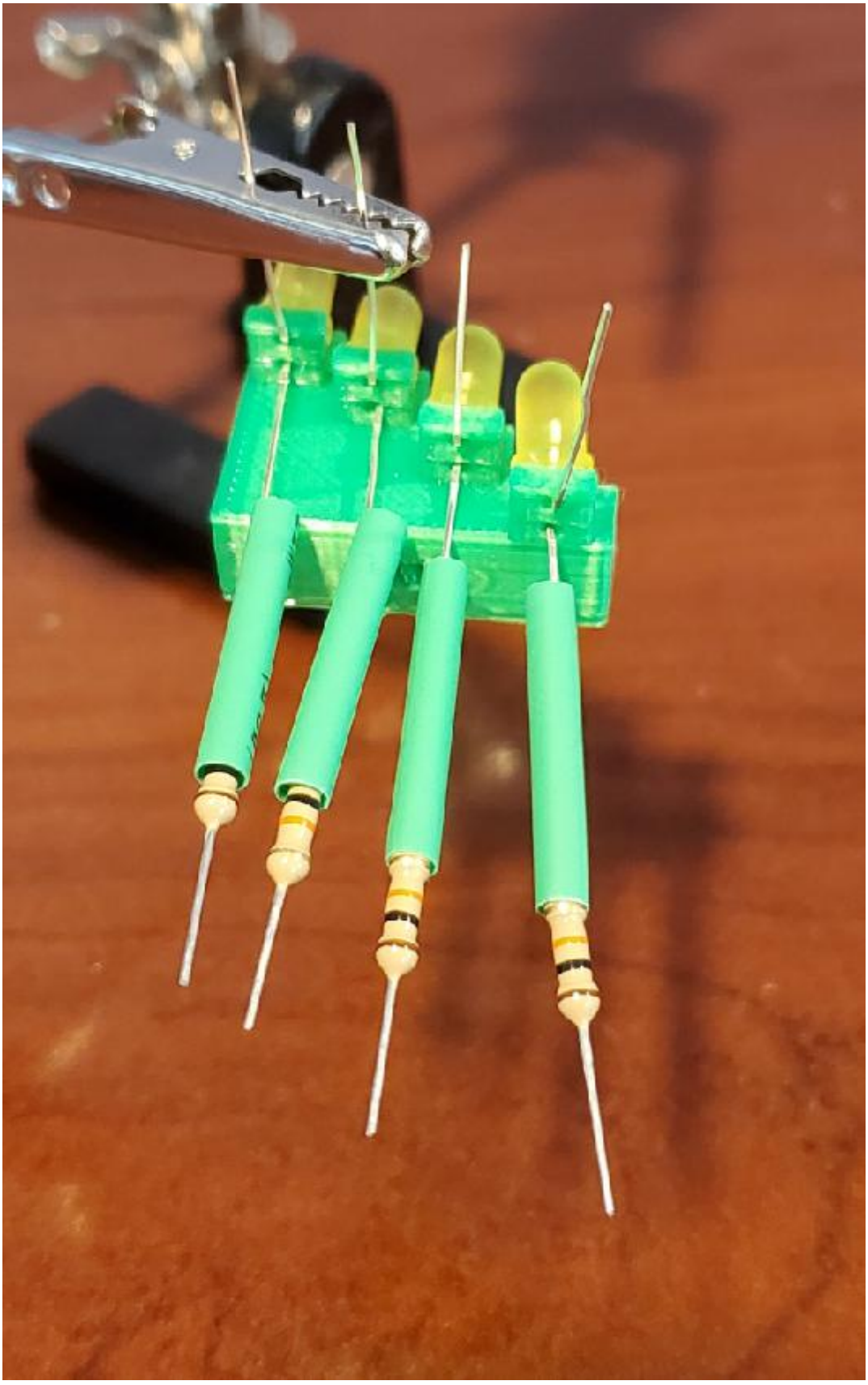


Step 105:

Obtain two (2) 2.5x45mm heat shrink insulation and cut them in half using flush cutter pliers.

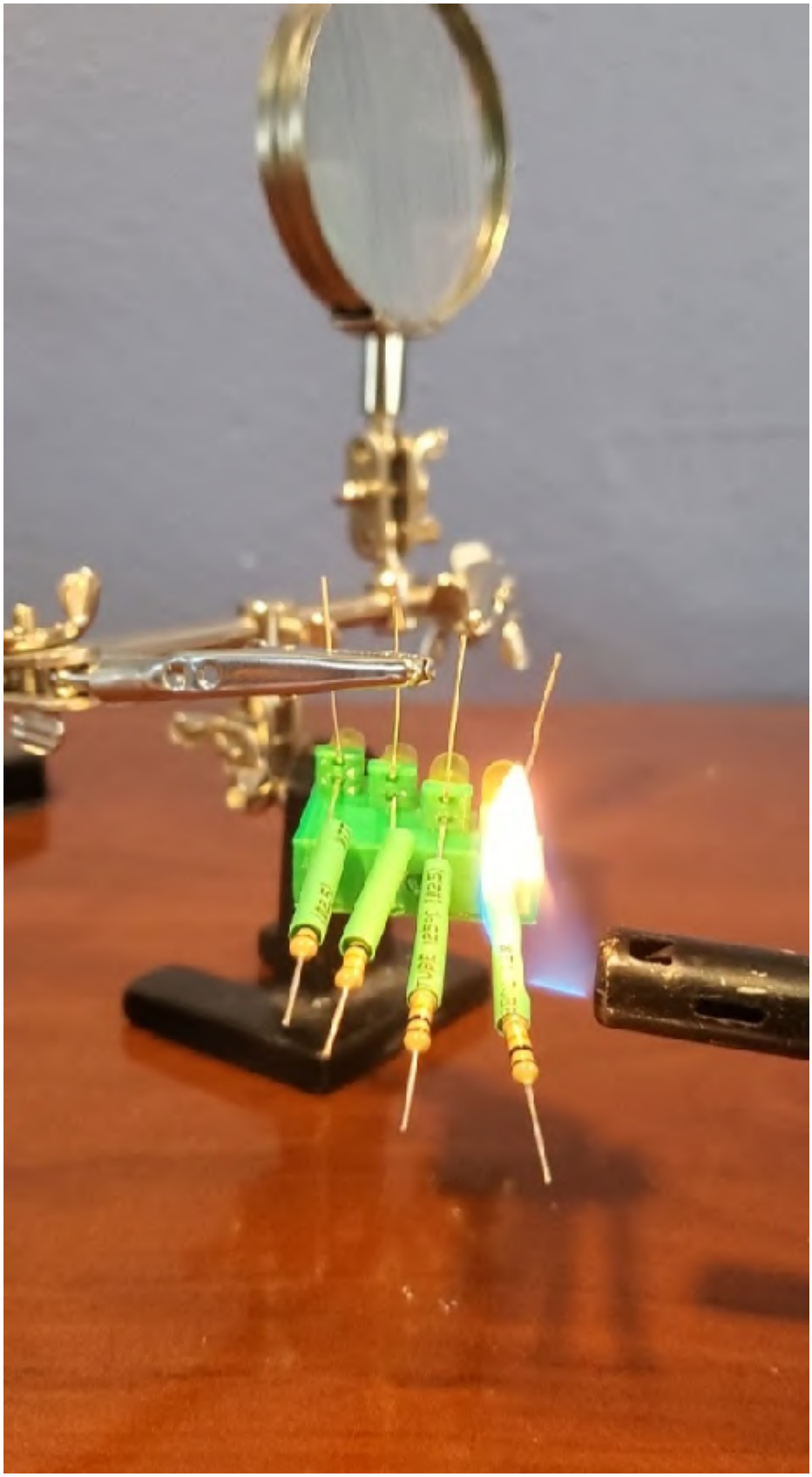
Step 106:

Route four (4) of the cut halves of the heat shrink insulation into the cathode leads.



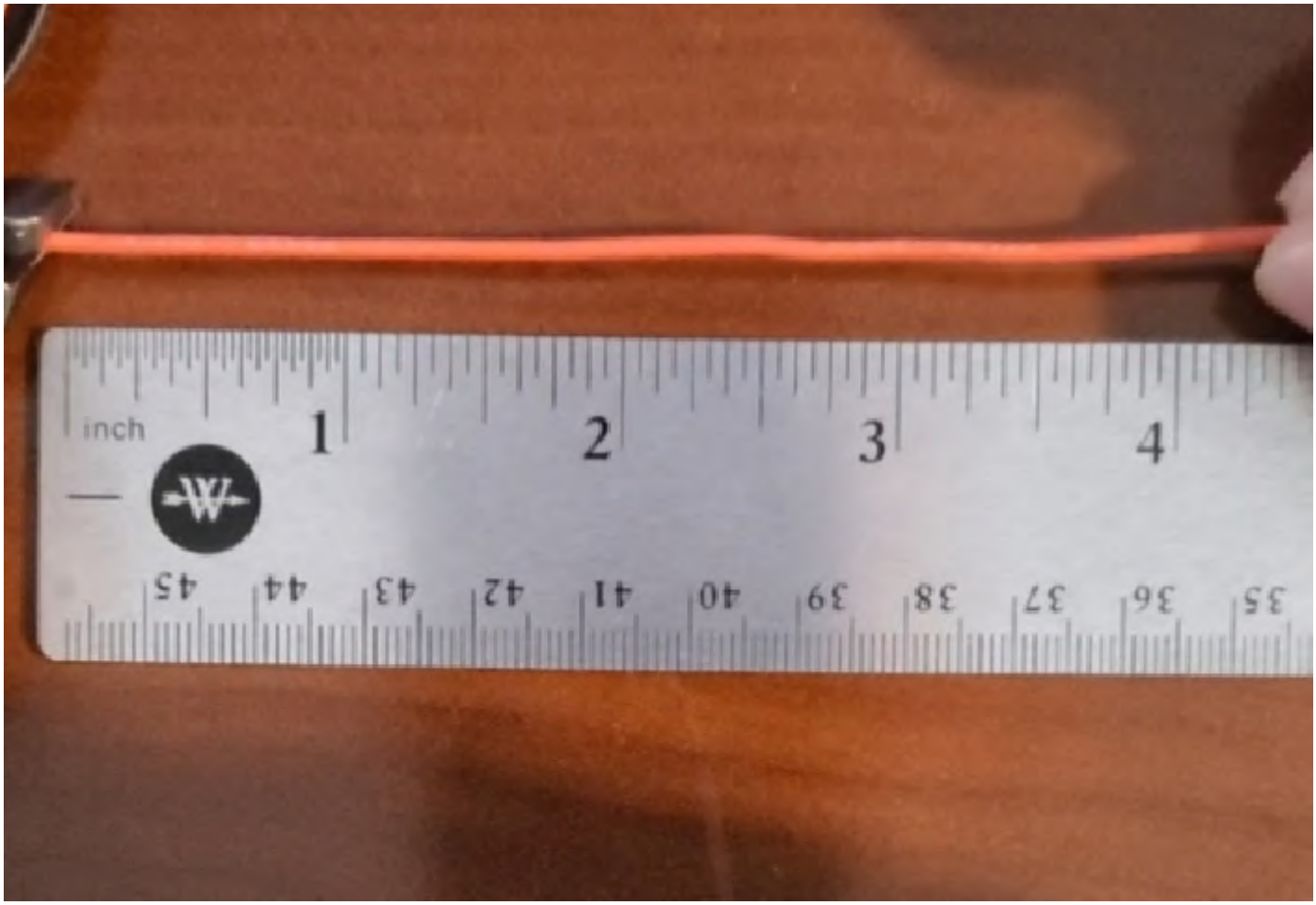
Step 107:

Obtain a BBQ lighter and apply heat to the heat shrink insulation until it has sufficiently shrunk.



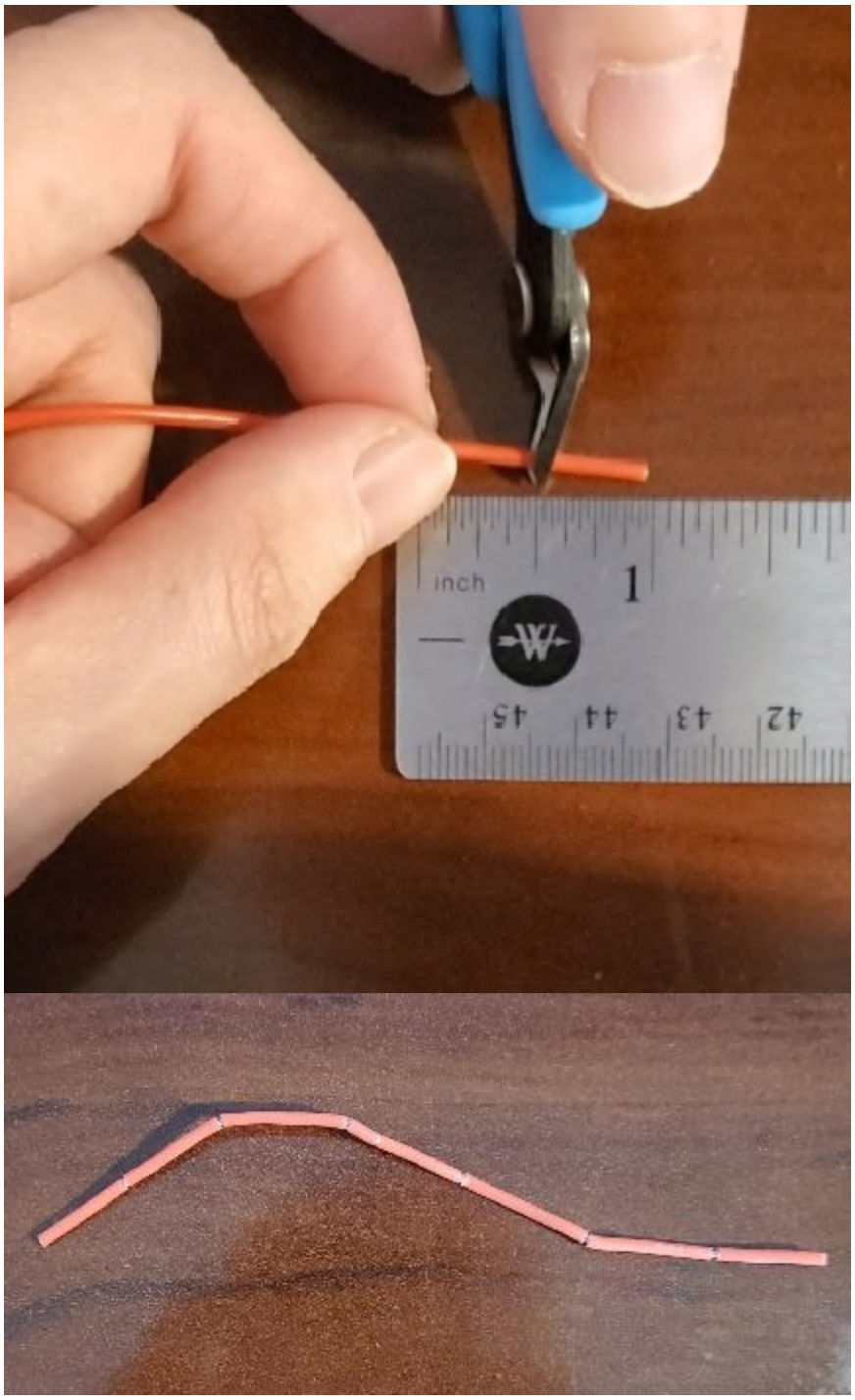
Step 108:

Cut 4" of red or black 22 AWG wire from its spool.



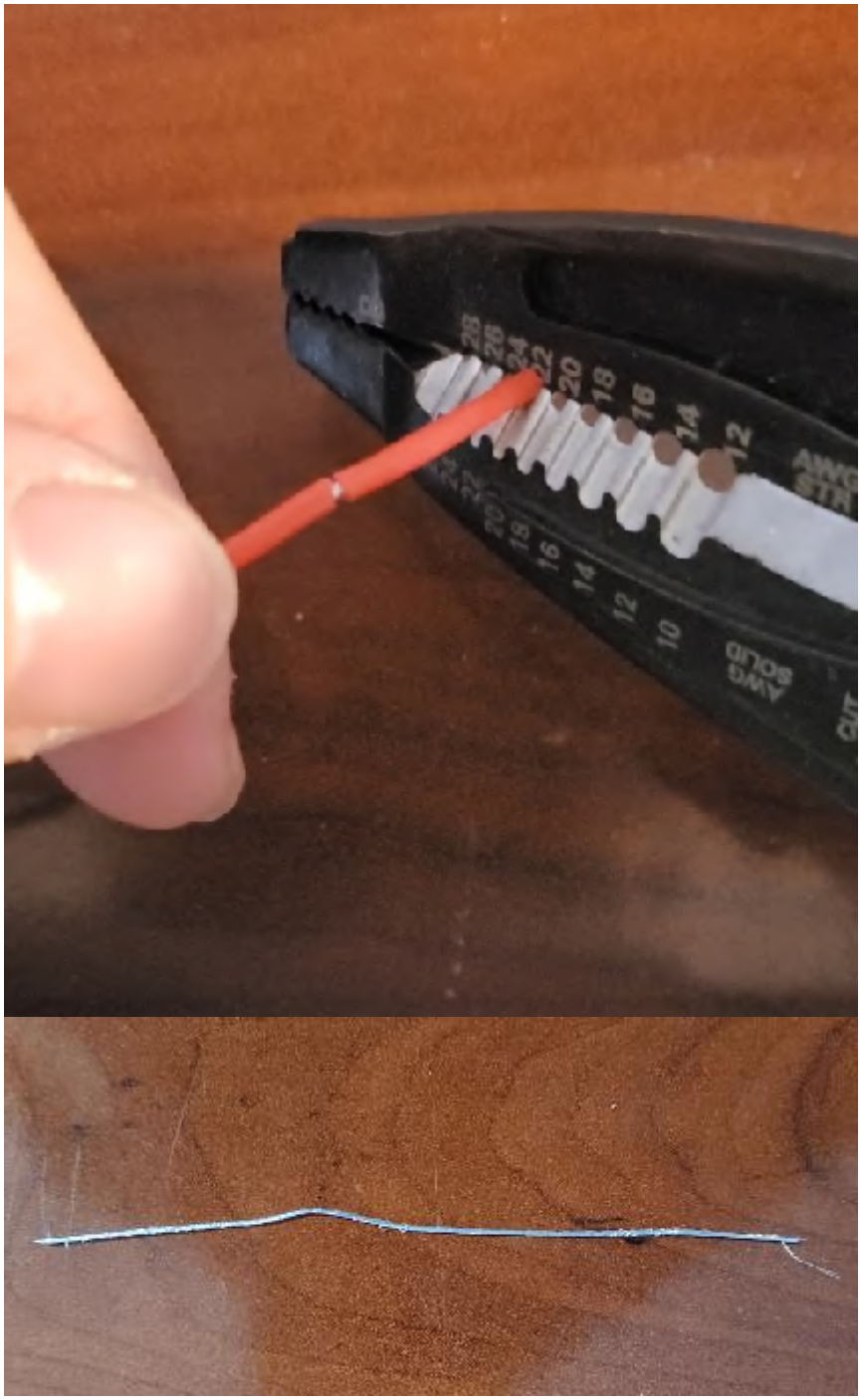
Step 109:

Obtain wire cutters and cut into the insulation of the wire in ½" increments starting from one of its free ends in preparation of stripping its insulation completely.



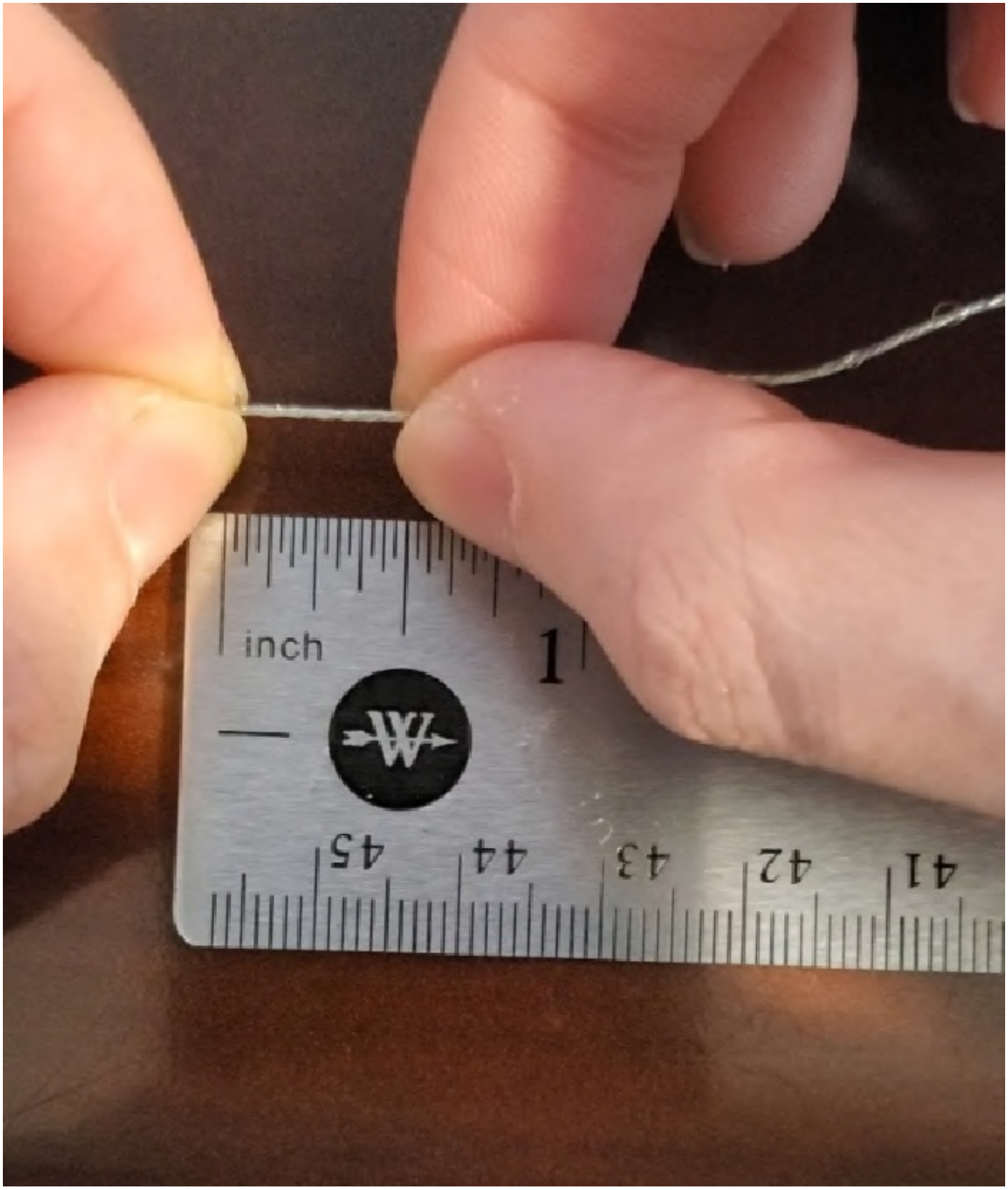
Step 110:

Starting from any cut point nearest to the wire's free end, carefully pull out the insulation toward the free end and repeat this for every ½" cut increment until the wire is completely stripped of its insulation.



Step 111:

Grab the stripped wire ½" from the free end and twist the free end until the section between the free end and the grab point until it is no longer frayed.



Step 112:

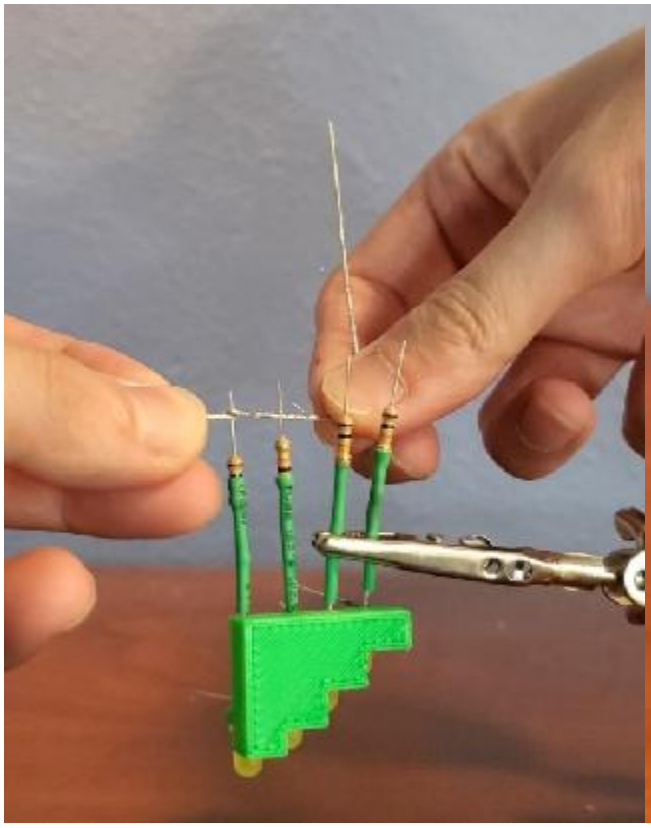
Grab the stripped wire ½" away from the previous grab point but toward the frayed end and use the other hand to twist the wire at the same point until this section is no longer frayed and repeat this process until the wire is no longer frayed.

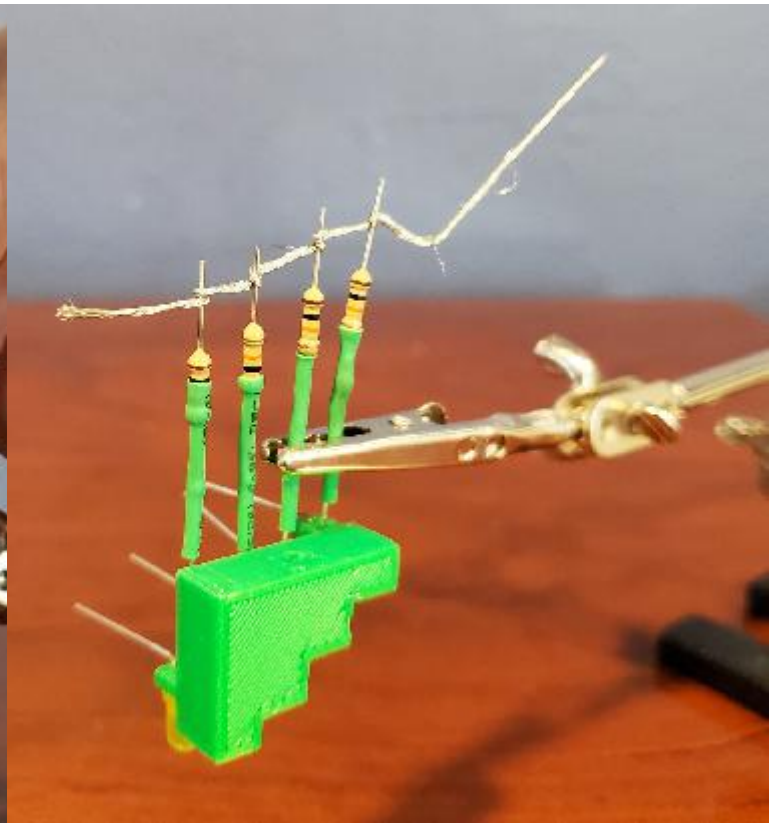
Step 113:

Repeat steps 108-112 for an additional wire.

Step 114:

Coil the stripped wire along each cathode lead once in its respective row until it's daisy chained completely.



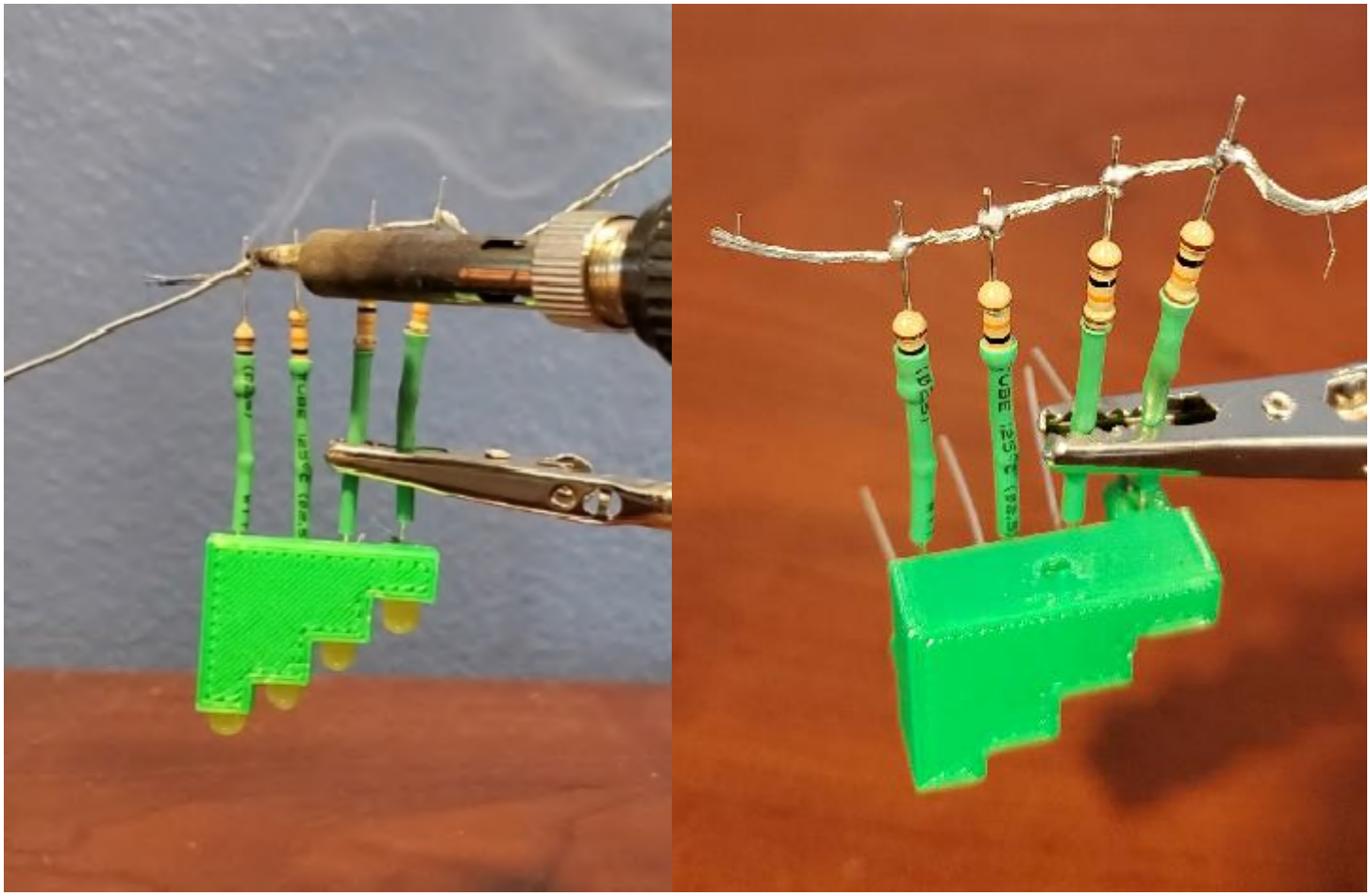


Step 115:

Obtain a soldering iron, turn it on and adjust its temperature settings to a temperature that is sufficient for the solder being used.

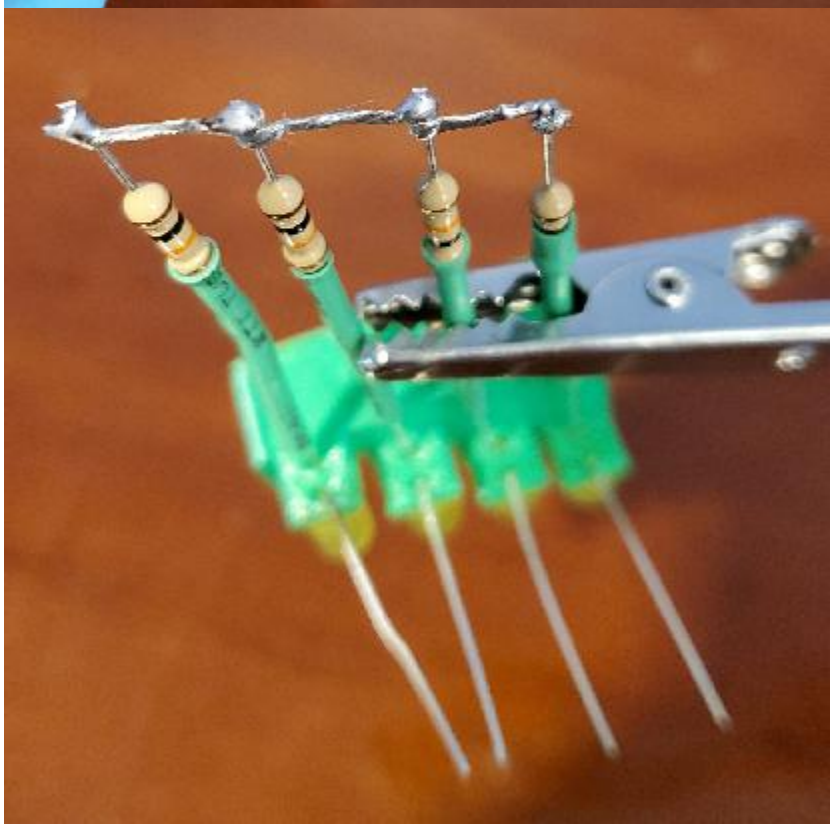
Step 116:

Carefully place the tip of the soldering iron on each coil-lead joint and quickly apply solder before its surrounding components begin to melt.



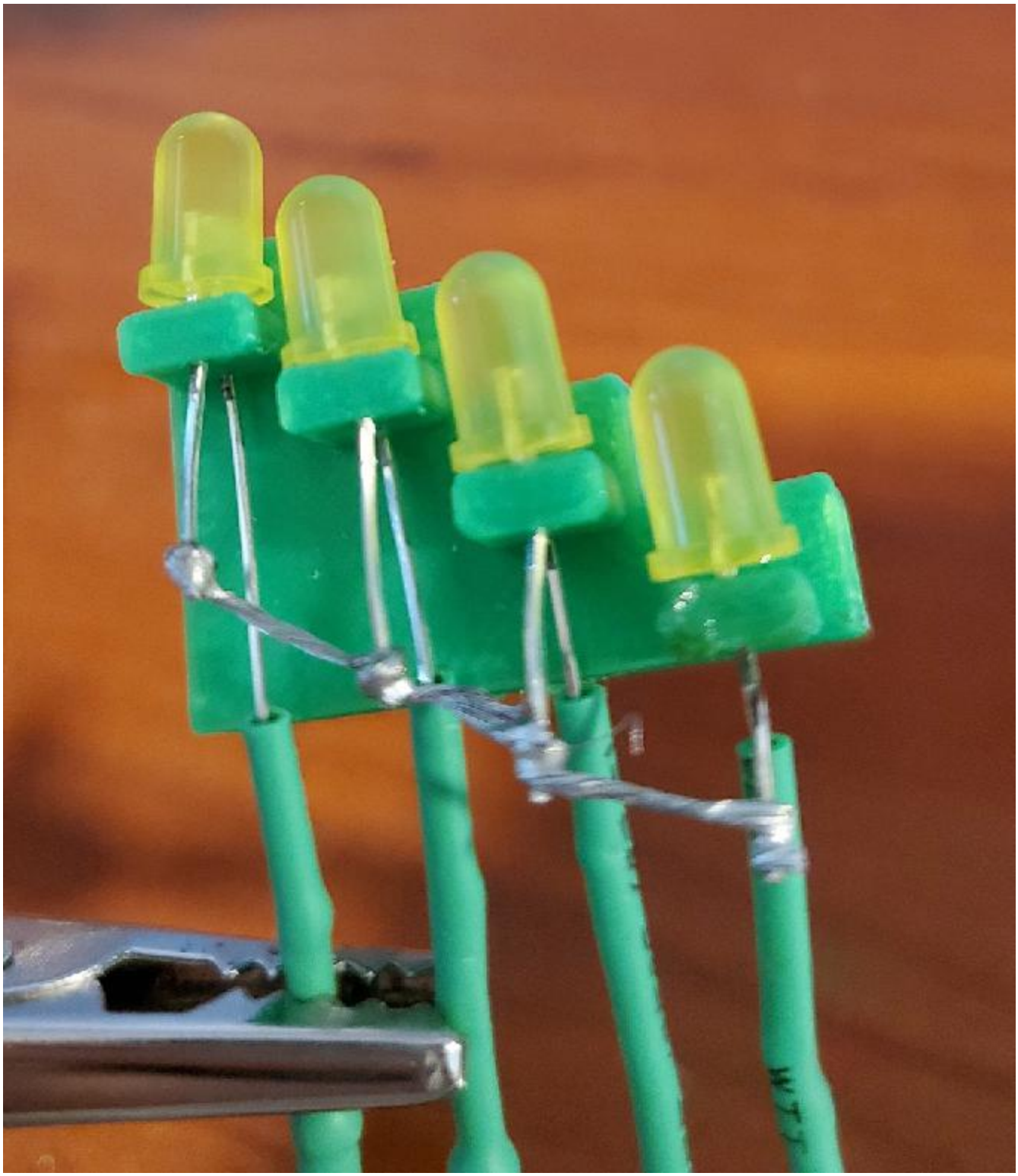
Step 117:

After the coil-lead joints and its surrounding components cool down, trim excess stripped wire and lead length from the ends of this assembly.



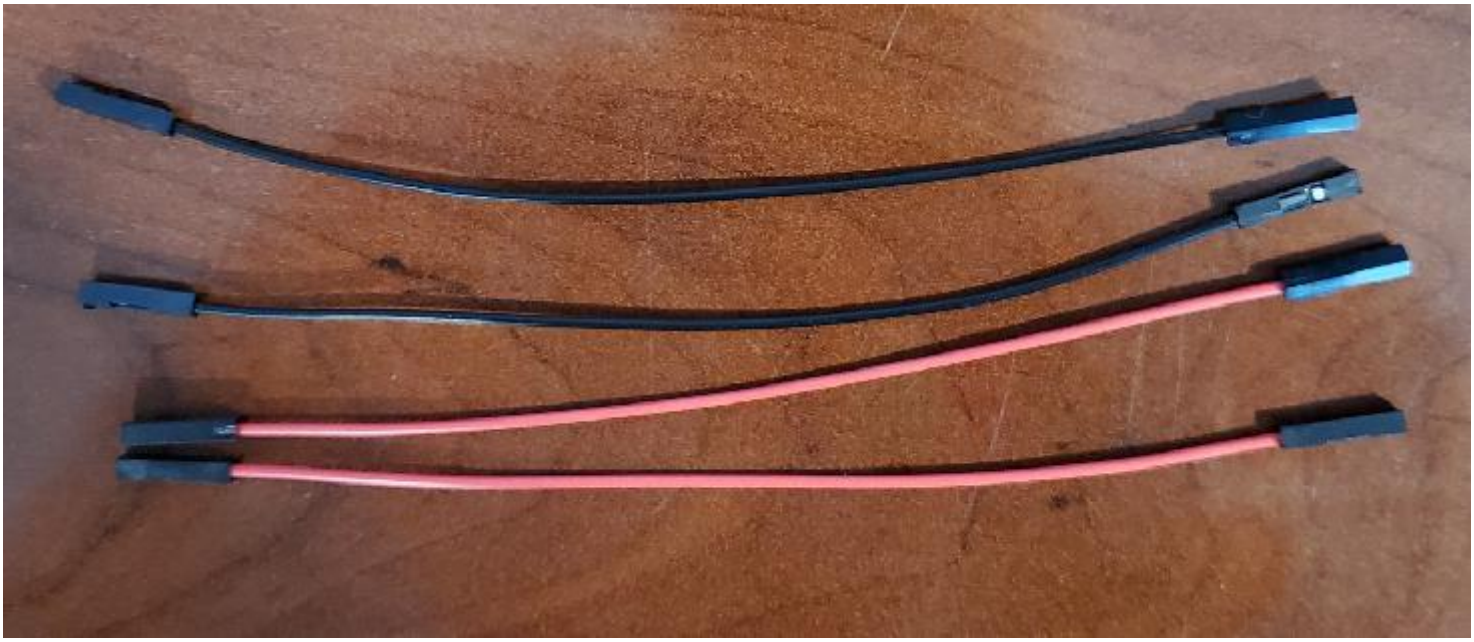
Step 118:

Repeat steps 114-117 for the anode lead row.



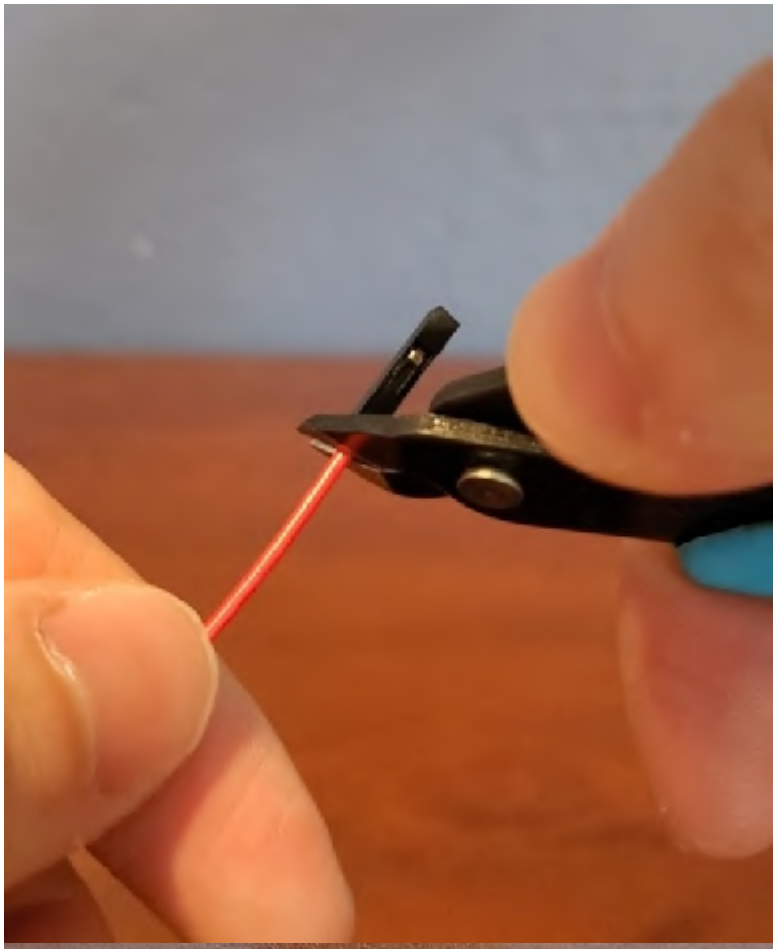
Step 119:

Obtain two (2) black female-female and two (2) red female-female jumper wires.



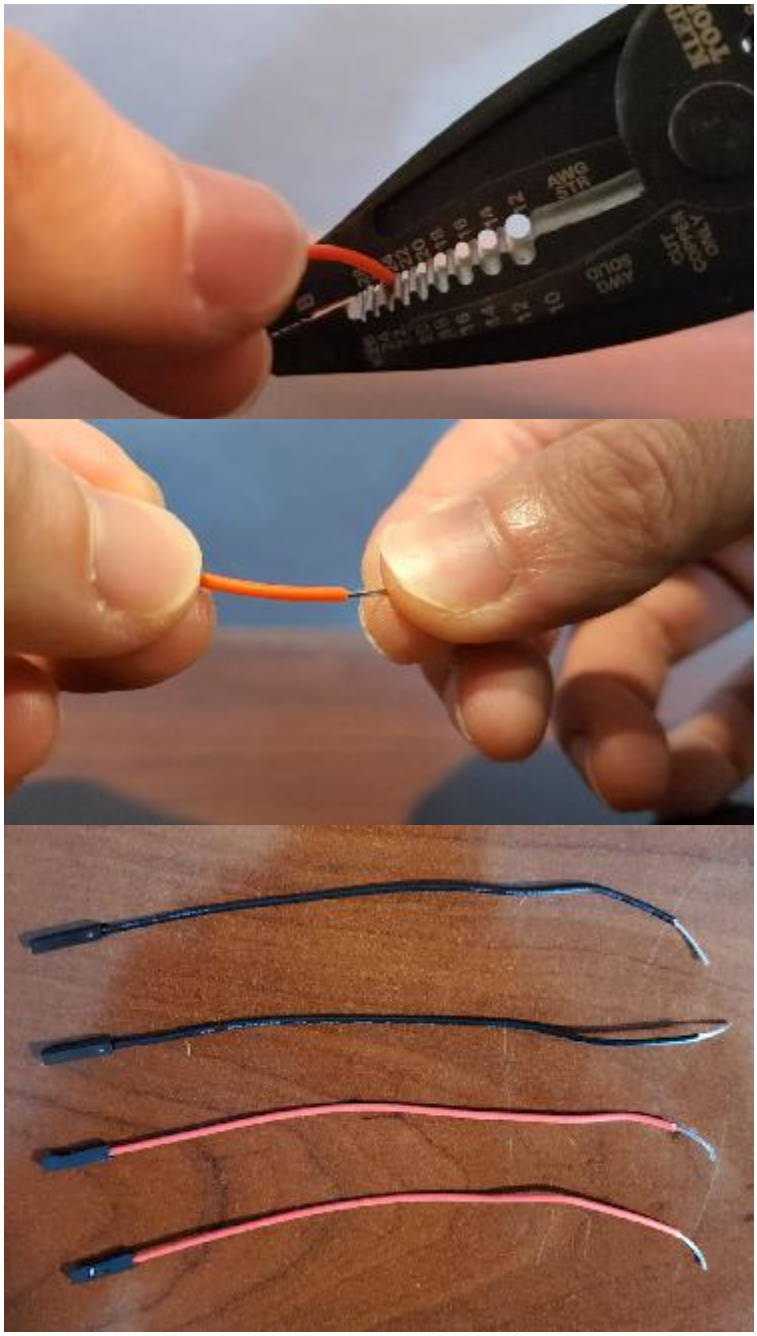
Step 120:

Using flush cutter pliers, cut the wires's ends while minimizing the shortening of their lengths.



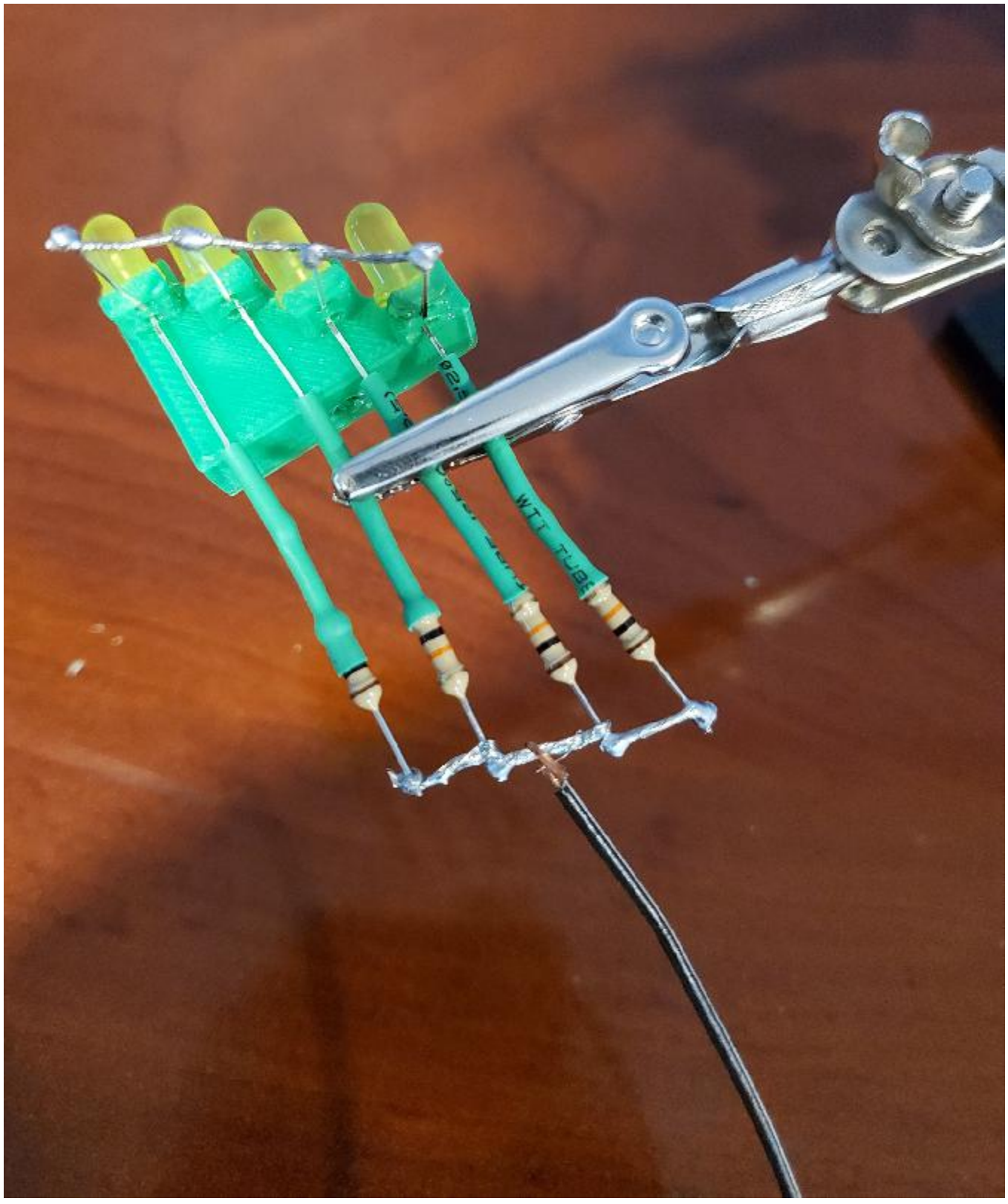
Step 121:

Obtain wire strippers and strip a ¼" of each wire's insulation on both sides and twist their ends until they are no longer frayed.



Step 122:

For the cathode row, coil the end of the partially stripped black wires onto the completely stripped wire that is coiled onto the cathode leads of the LEDs closest to the center.

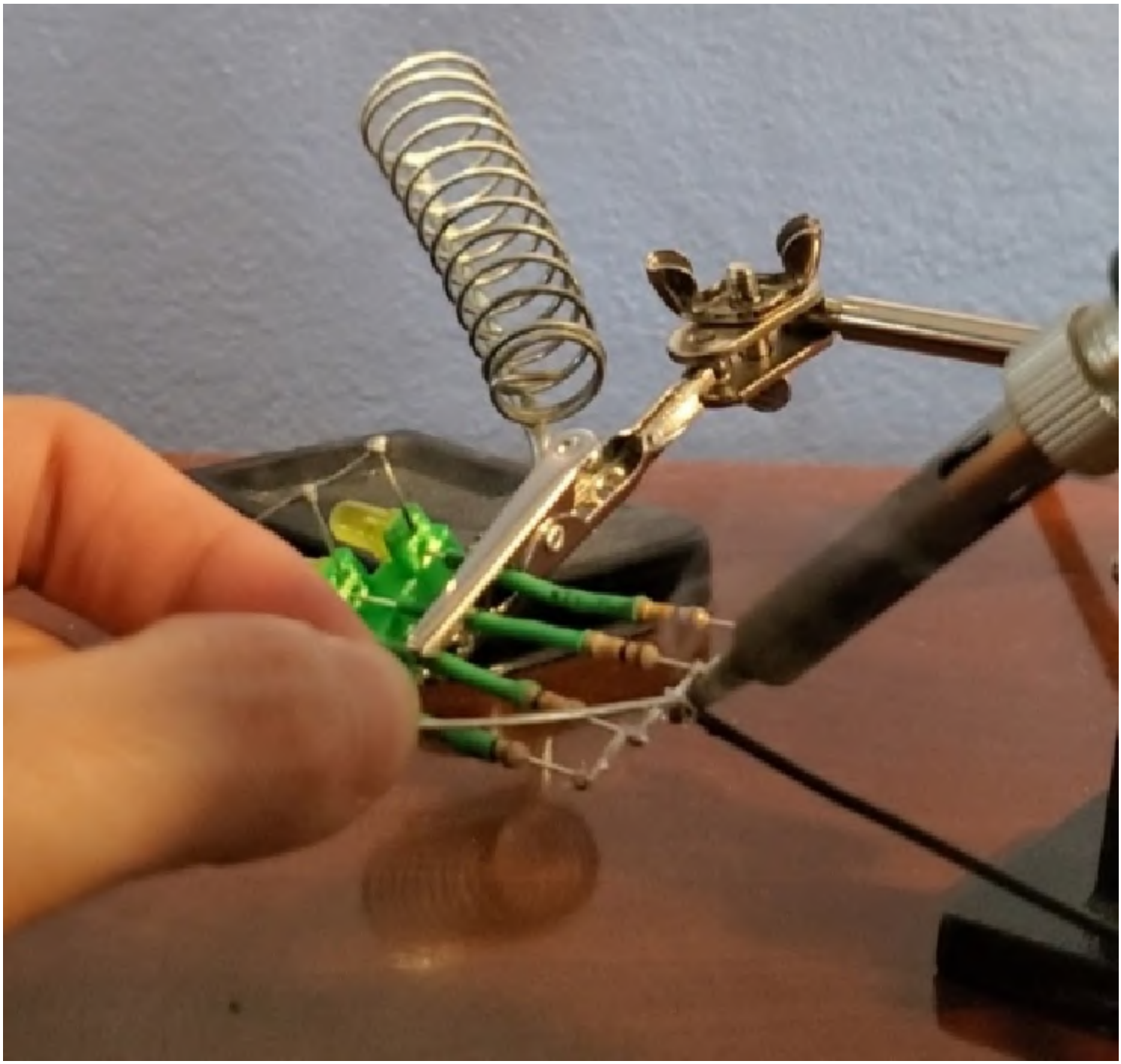


Step 123:

Obtain a soldering iron, turn it on and adjust its temperature settings to a temperature that is sufficient for the solder being used.

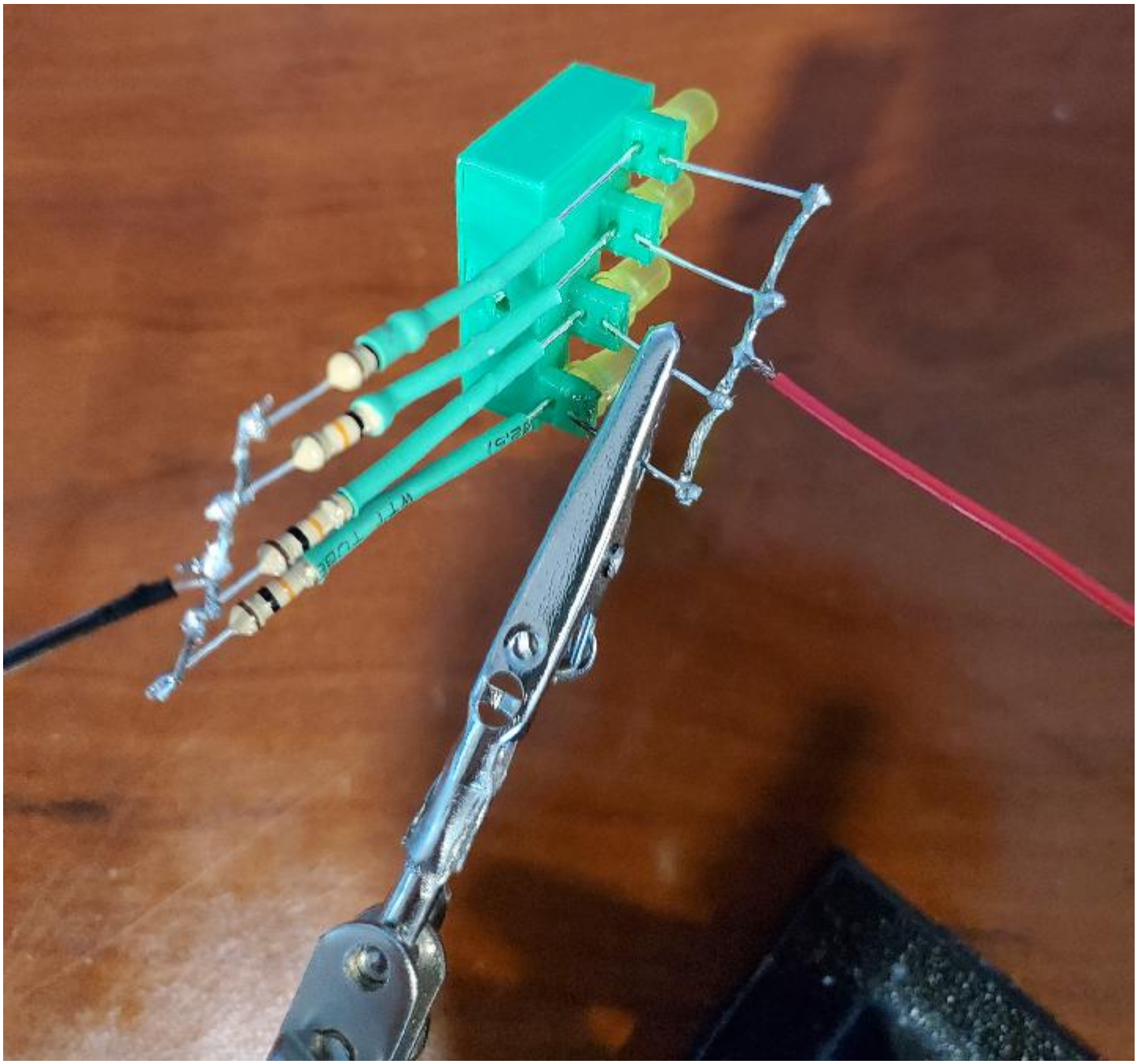
Step 124:

Carefully place the tip of the soldering iron on the coil joint and quickly apply solder before its surrounding components melt.



Step 125:

Repeat steps 122-124 for the anode lead row with the red wire.

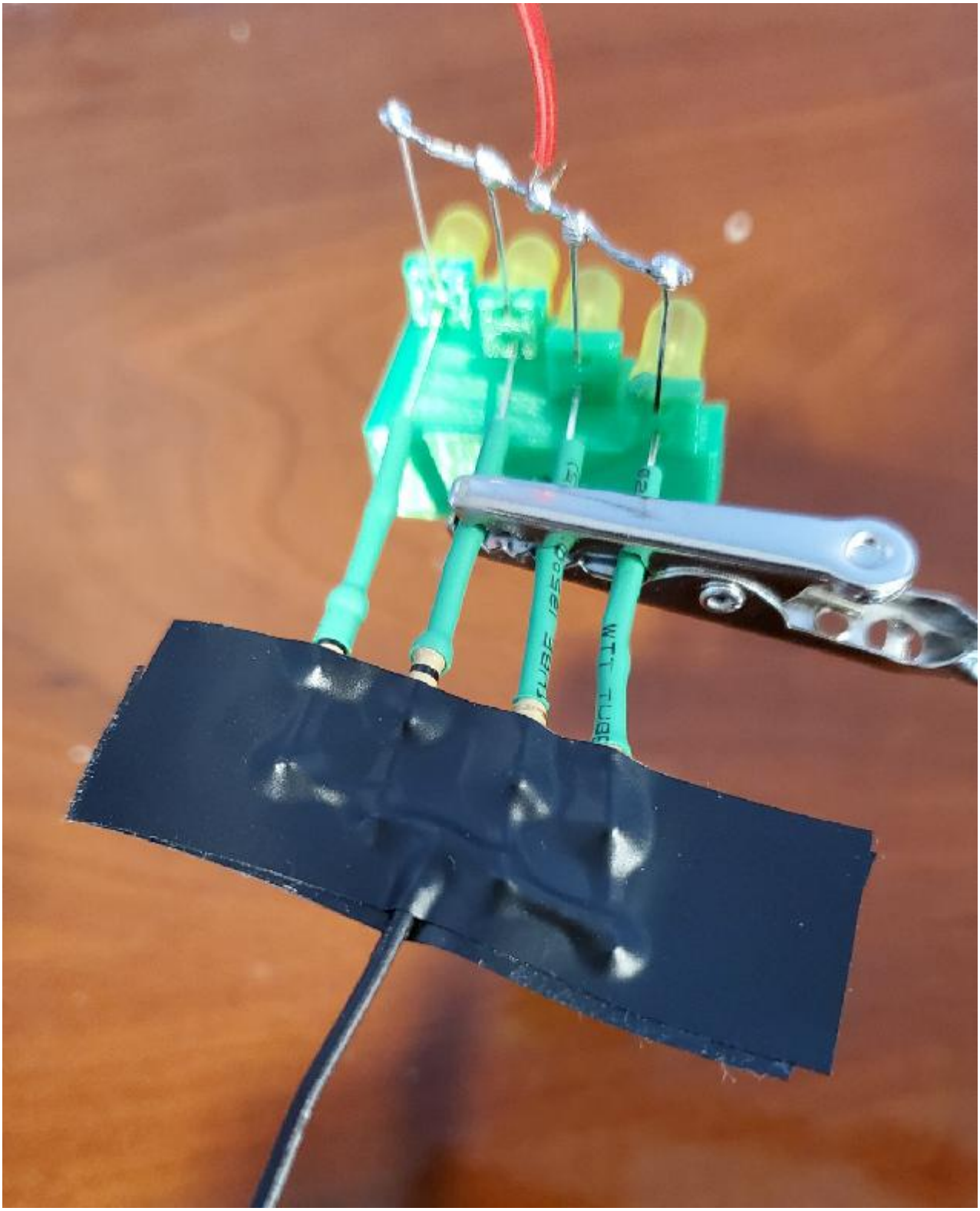


Step 126:

Obtain a roll of electrical tape with a width of 7/10 inches and cut two (2) pieces that are two (2) inches in length.

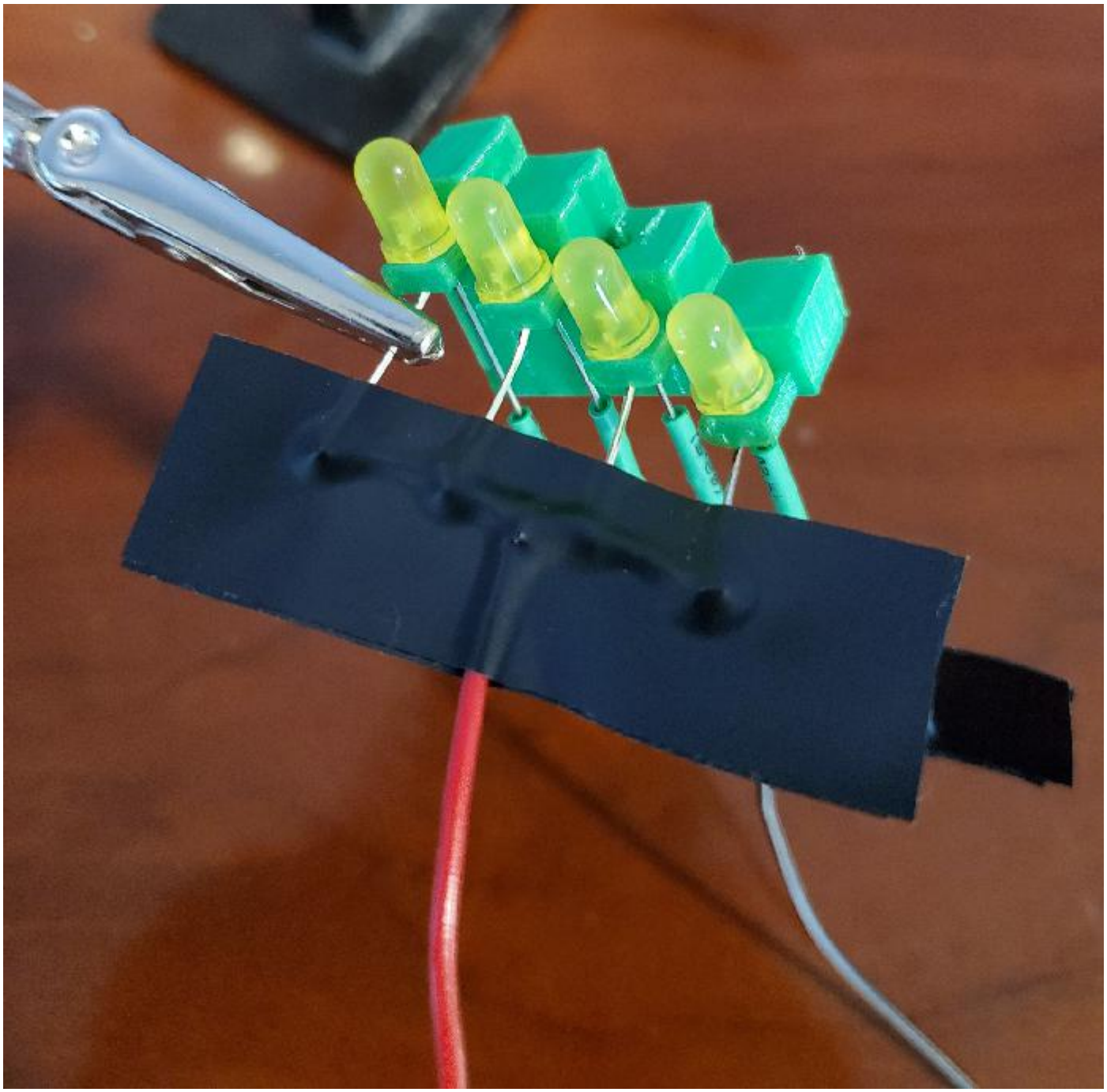
Step 127:

Sandwich these cut pieces of electrical tape onto the cathode row so that its leads are completely covered.



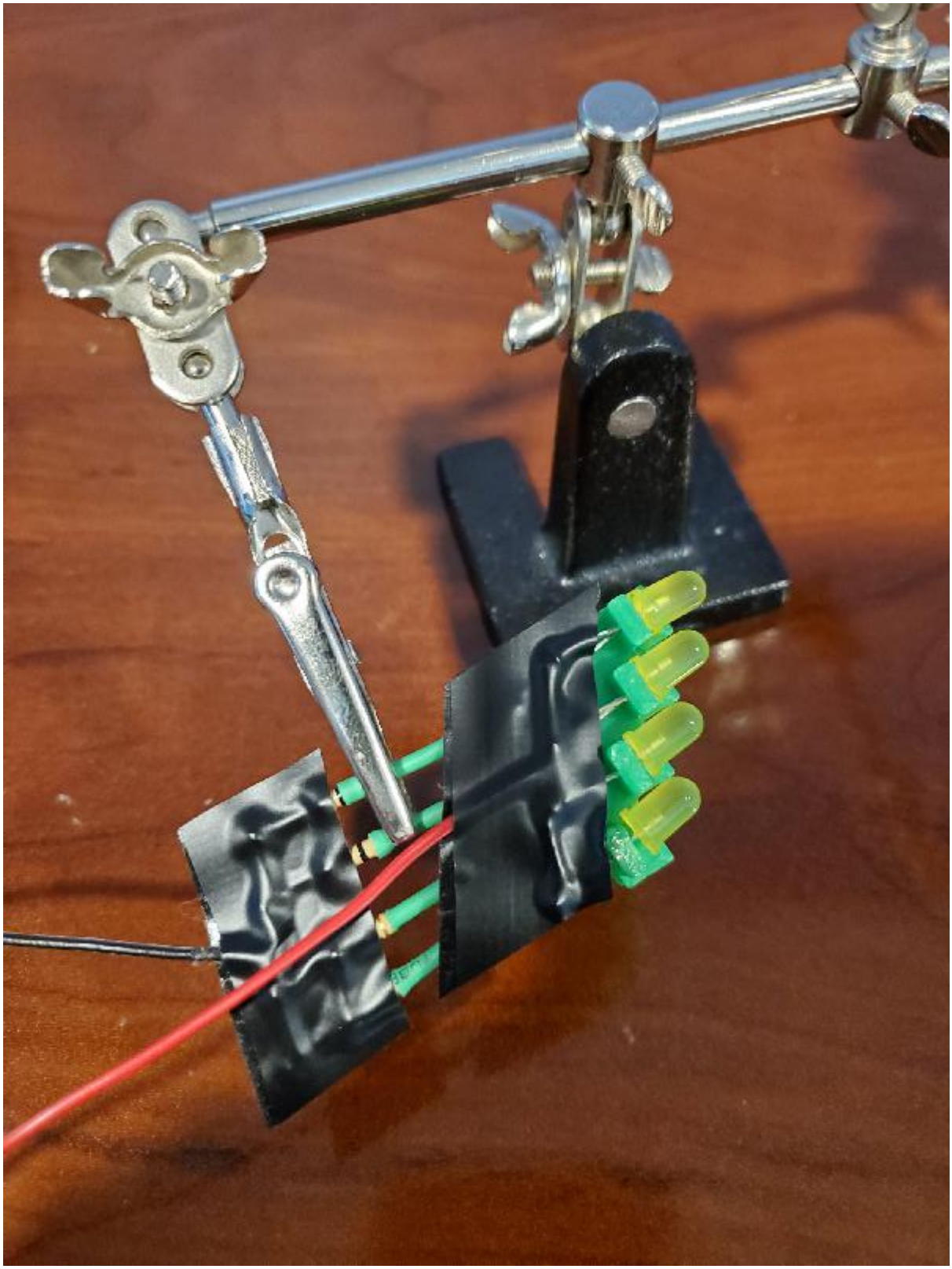
Step 128:

Repeat steps 126 and 127 for the anode lead row.



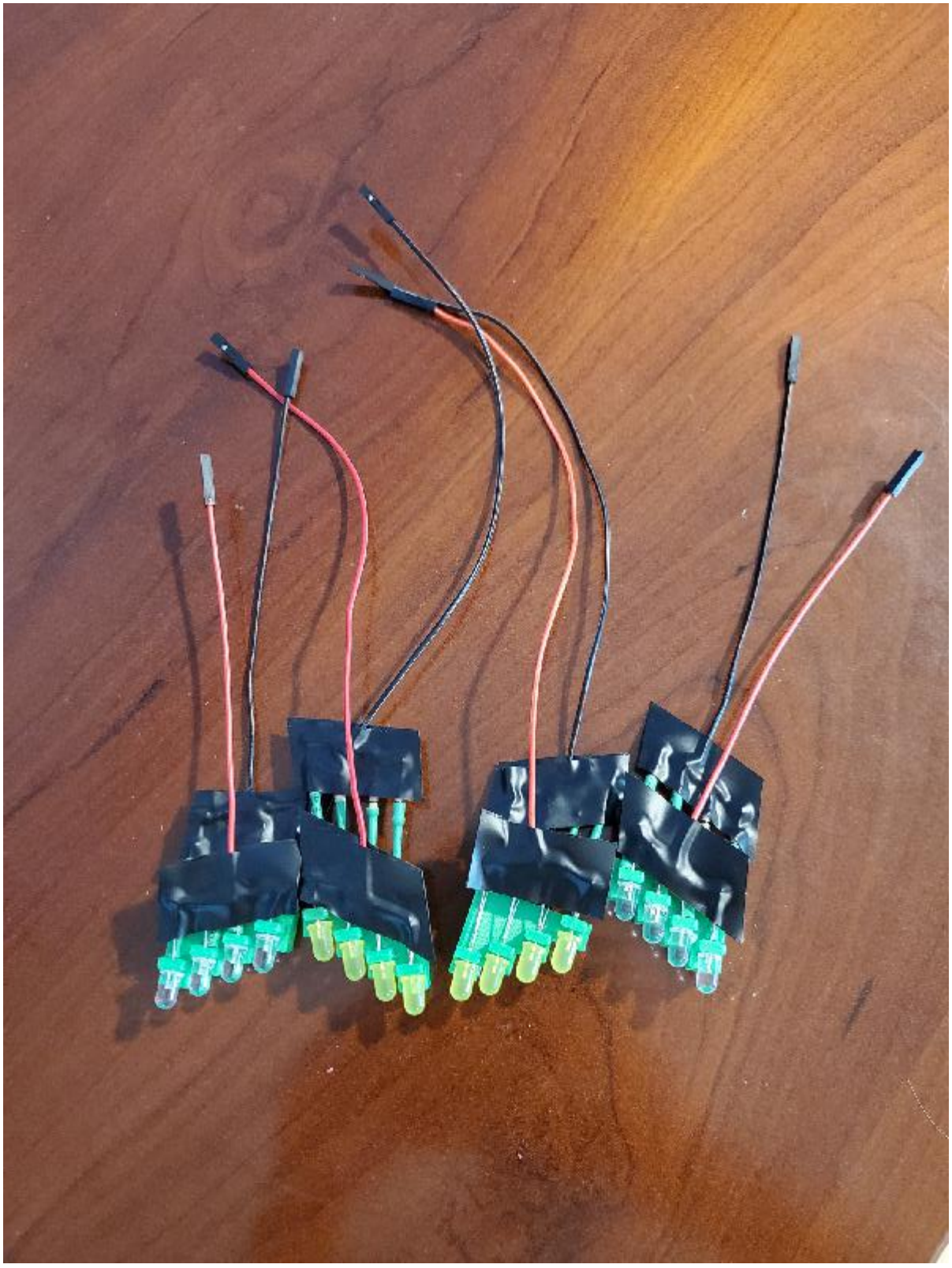
Step 129:

Prevent headlight installation interference by trimming the length of the electrical tape sandwiching the cathode and anode lead rows.



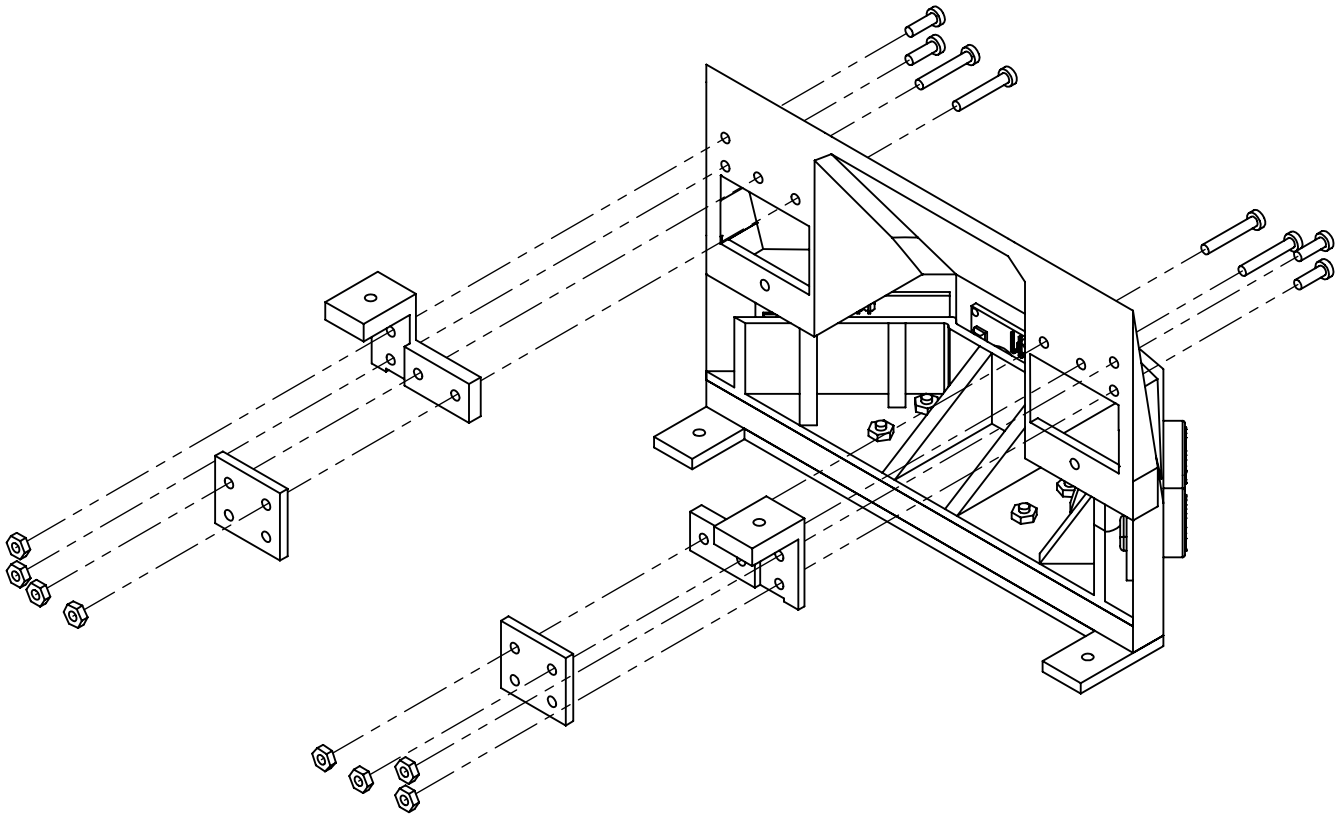
Step 130:

Repeat steps 96-129 using the topHeadLightRightRear part and four clear LEDs; the bottomHeadLightLeftRear part with four yellow LEDs; and the topHeadLightLeftRear part using four clear LEDs.



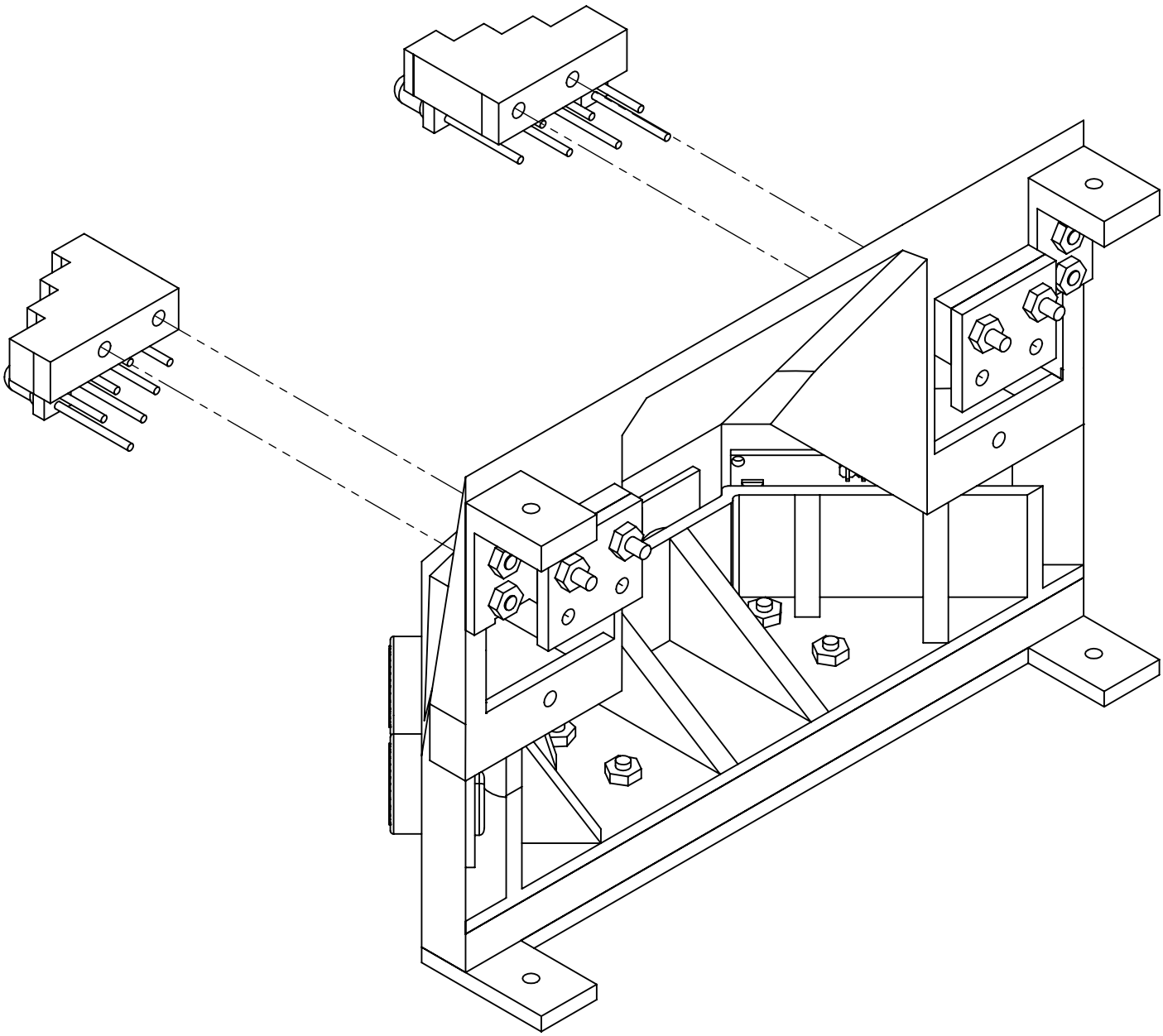
Step 131:

Using eight (8) M2.5 nuts, four (4) M2.5 x 8 mm and M2.5 x 16 mm hex socket cap screws, fasten two (2) topHeadLightToFrontBumpers, two (2) topHeadLightSpacers, the frontShellToTopChassisBracketRight, and the frontShellToTopChassisBracketLeft parts onto the frontShell subassembly.



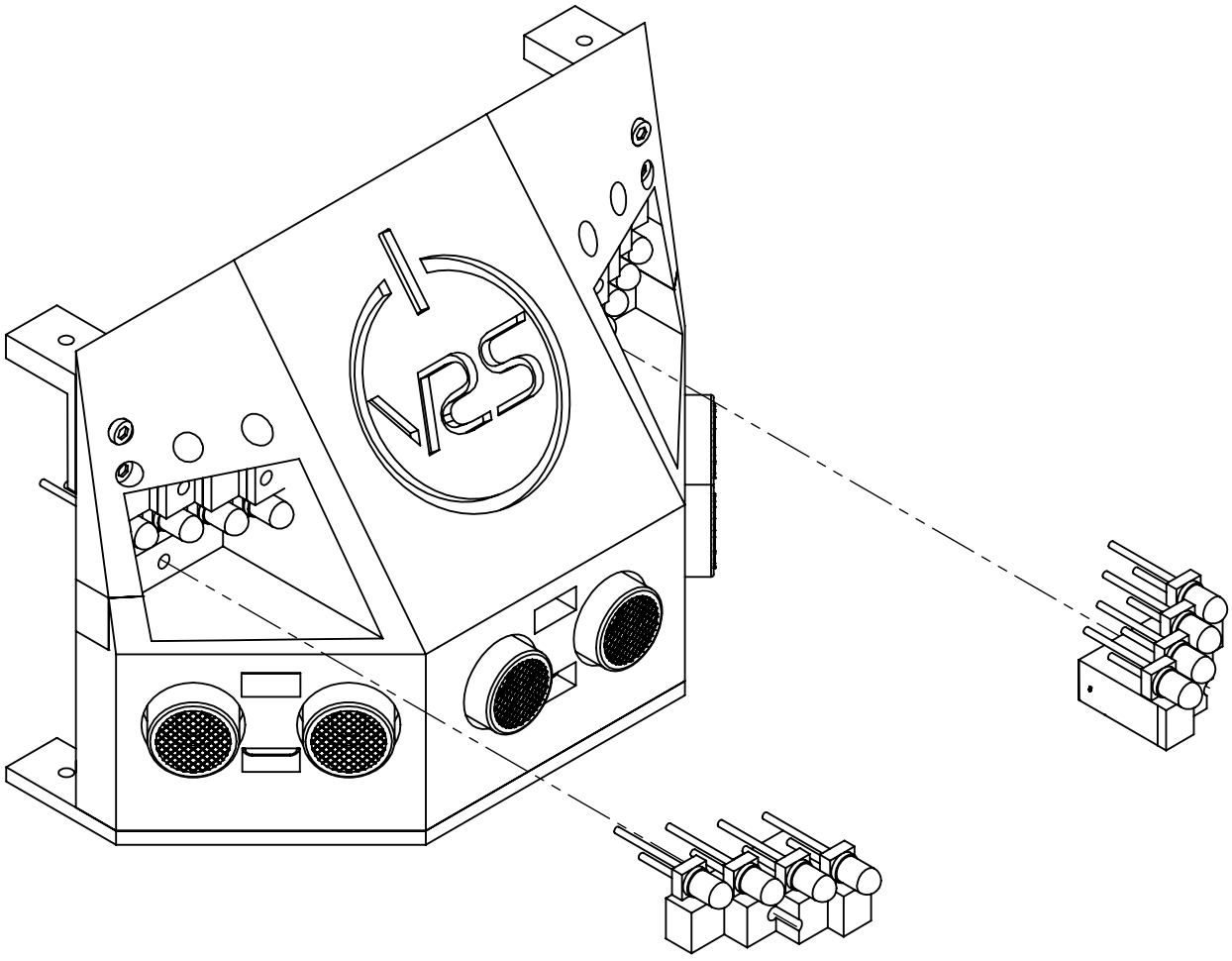
Step 132:

Press fit the topHeadLightRightRear and topHeadLightLeftRear headlight subassemblies onto the frontShell subassembly so that they are coincident with the topHeadLightToFrontBumper parts.



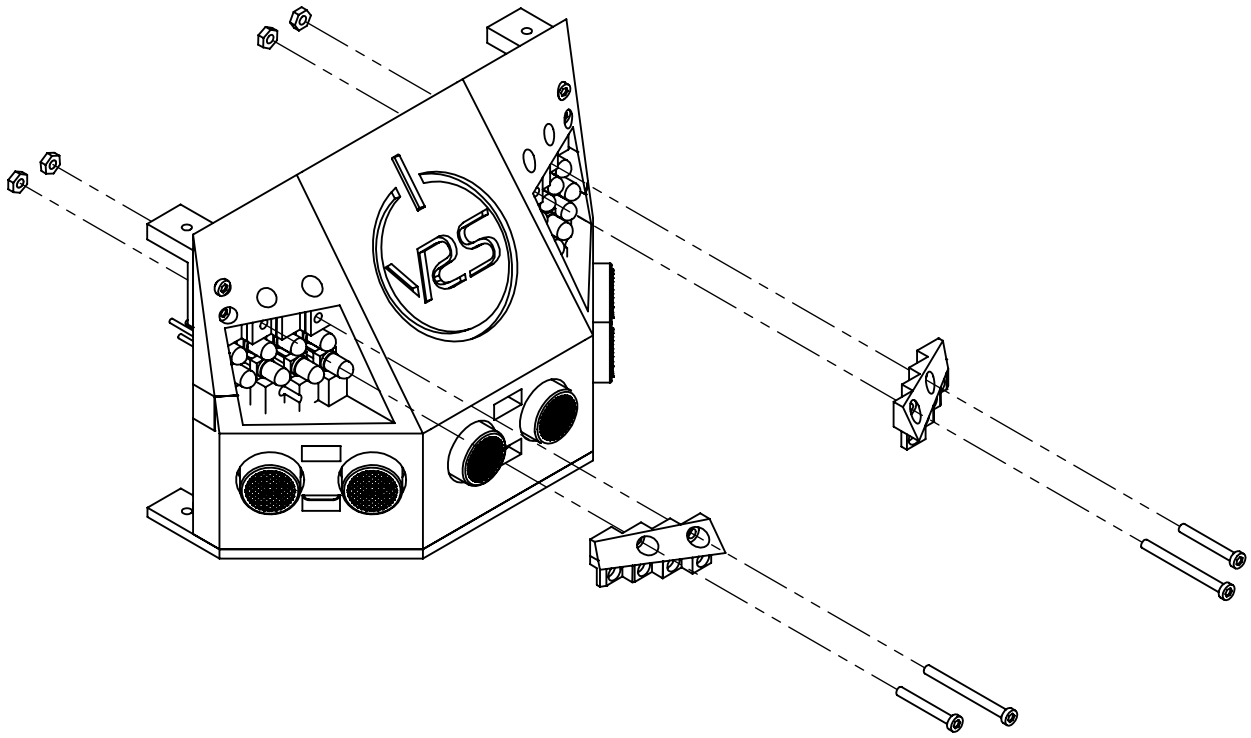
Step 133:

Press fit the bottomHeadLightRightRear and bottomHeadLightLeftRear headlight subassemblies onto the frontShell subassembly so that they are coincident with the frontShell part.



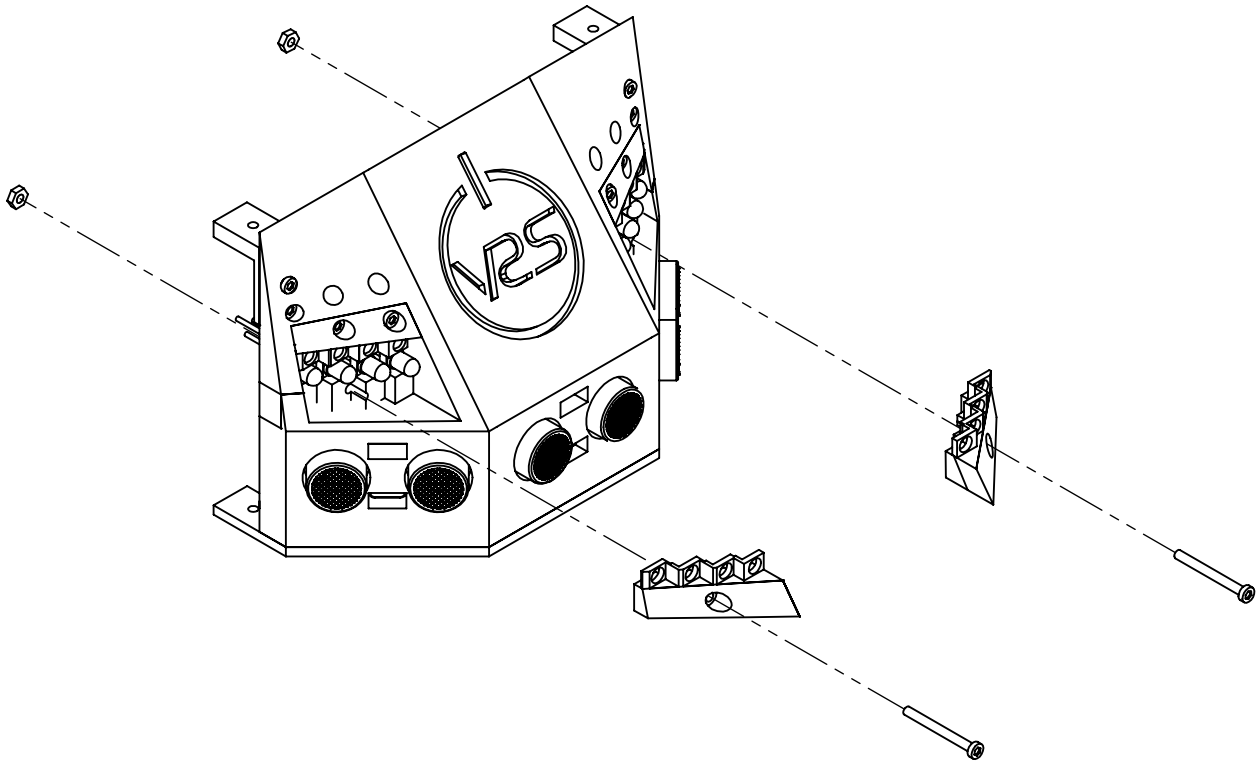
Step 134:

Using one (1) M2.5 x 30 mm and M2.5 x 20 mm hex socket cap screws and two (2) M2.5 nuts, fasten the topHeadLightRightFront and topHeadLightLeftFront parts onto the frontShell subassembly.



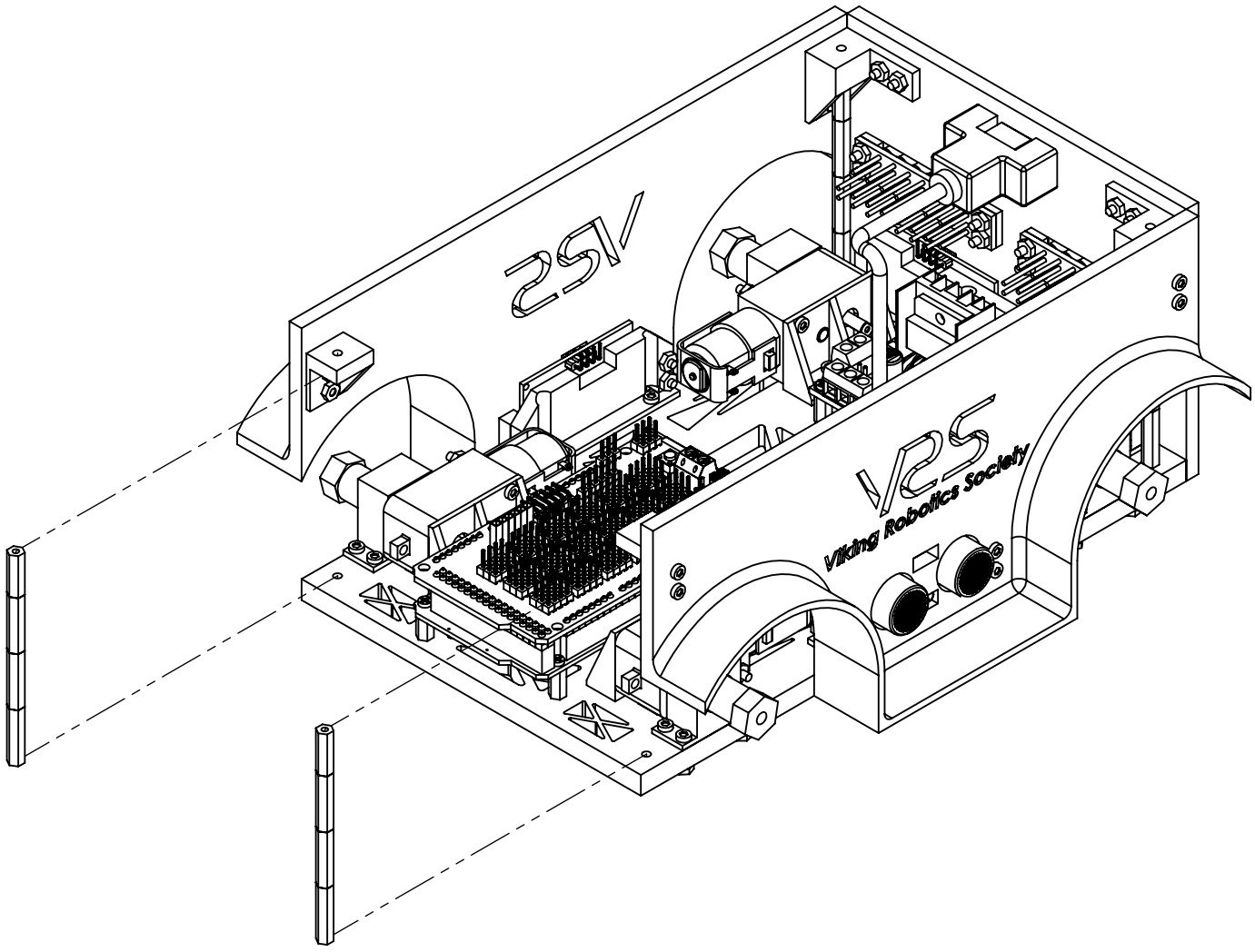
Step 135:

Using two (2) M2.5 x 25 mm hex socket cap screws and M2.5 nuts, fasten the bottomHeadLightRightFront and bottomHeadLightLeftFront parts onto the frontShell subassembly.



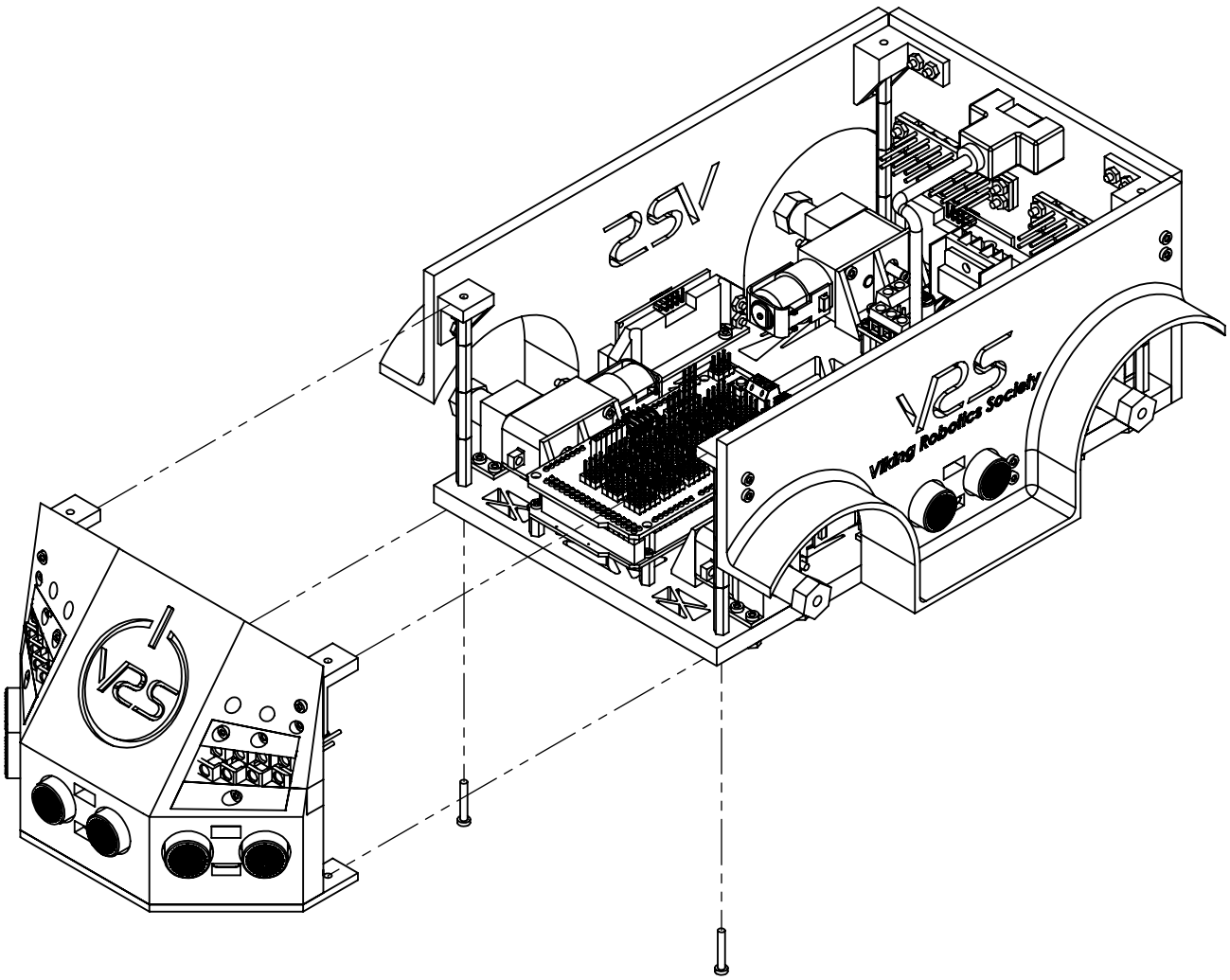
Step 136:

Obtain the two (2) remaining standoff assemblies from step 81 and align their threads with the mounting holes of the bottomChassis, frontToTopChassisRightBracket, and frontToTopChassisLeftBracket parts.



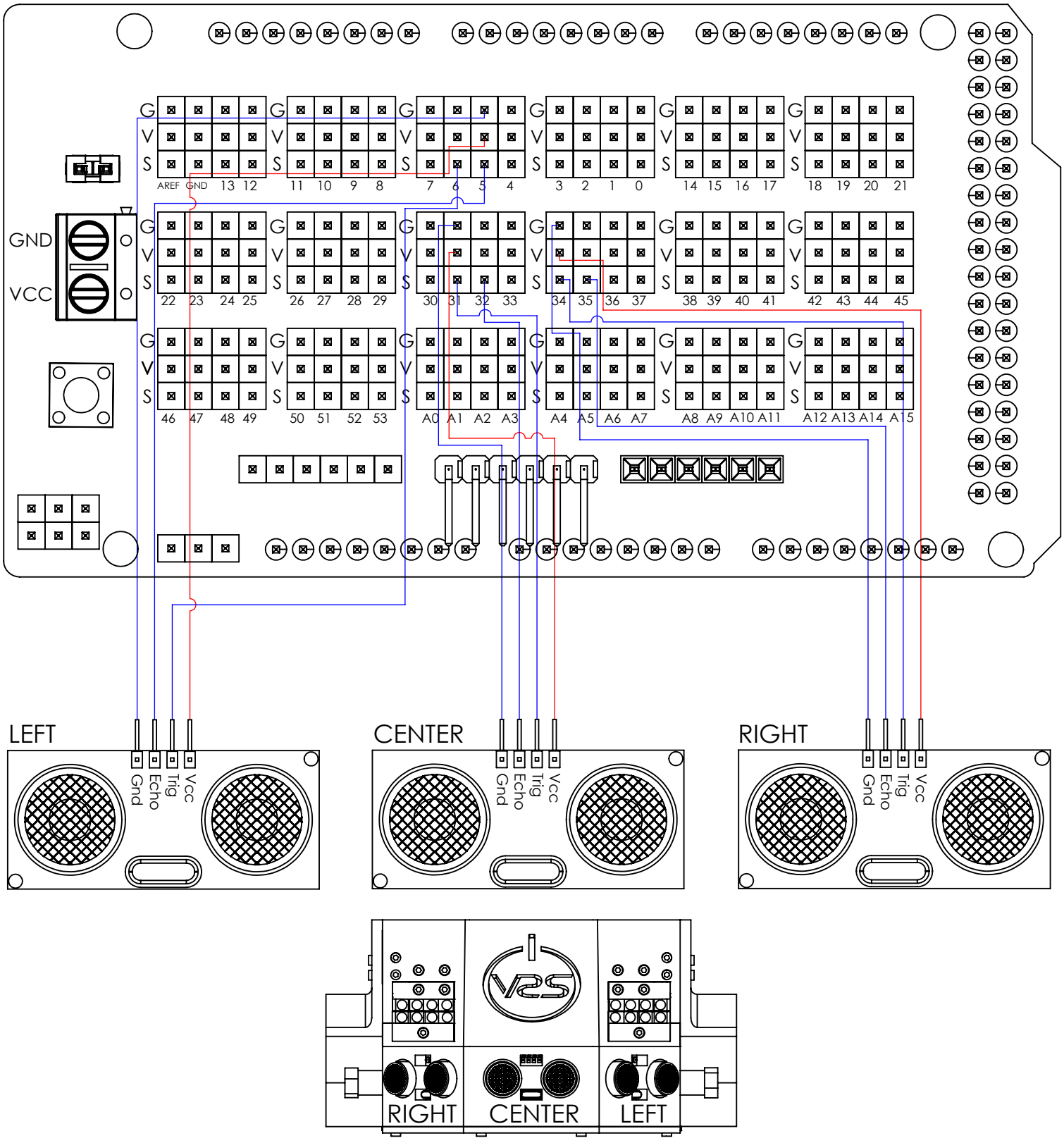
Step 137:

Using two (2) M2.5 x 16 mm hex socket cap screws, fasten the frontShell sub assembly onto the vrsLearningKit while keeping the standoff assemblies aligned with the mounting holes of the bottomChassis, frontToTopChassisRightBracket, and frontToTopChassisLeftBracket parts.



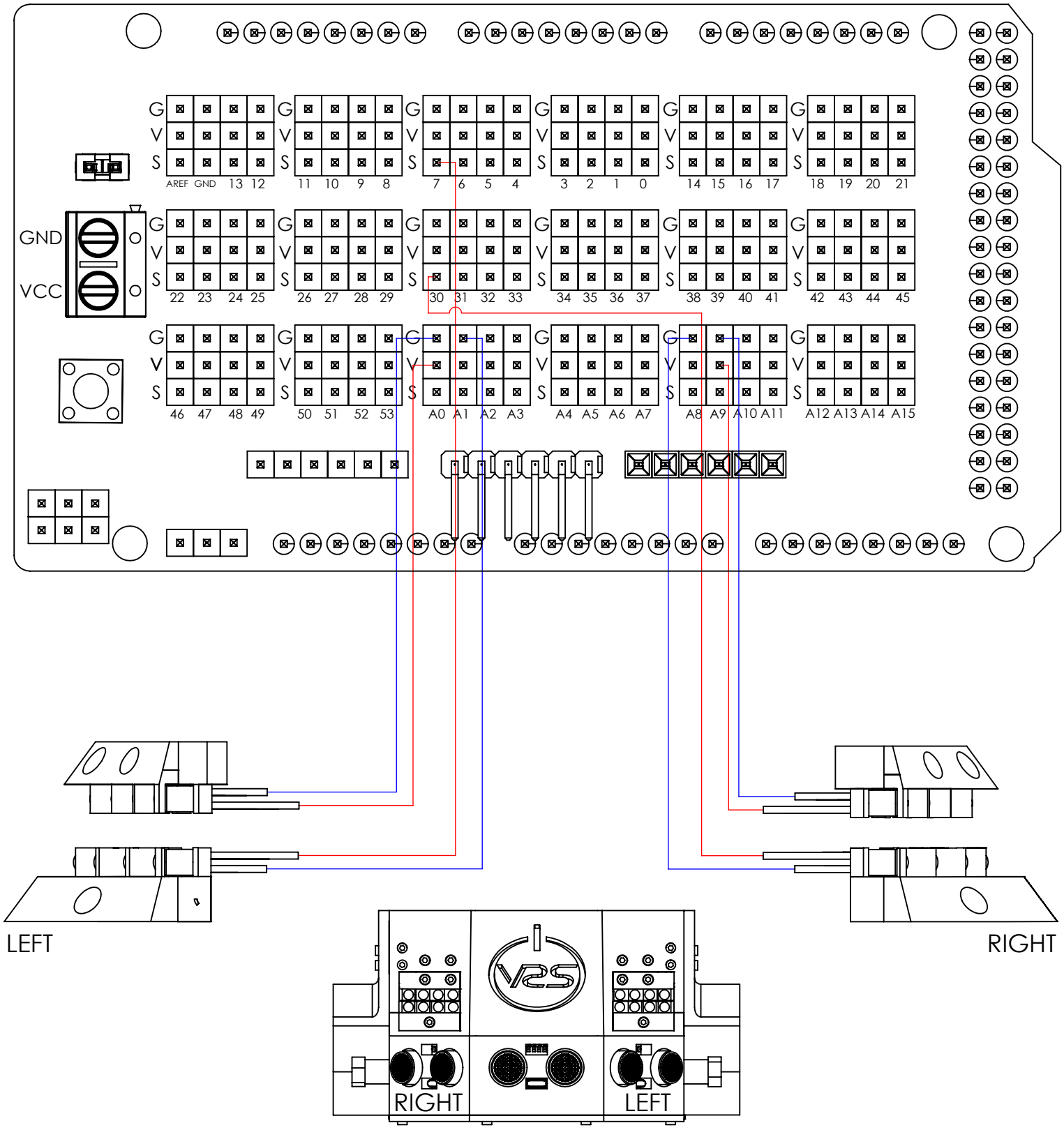
Step 138:

Connect the HC-SR04 Ultrasonic Distance Sensors mounted to the frontShell to the Arduino Mega Sensor Shield as shown below.



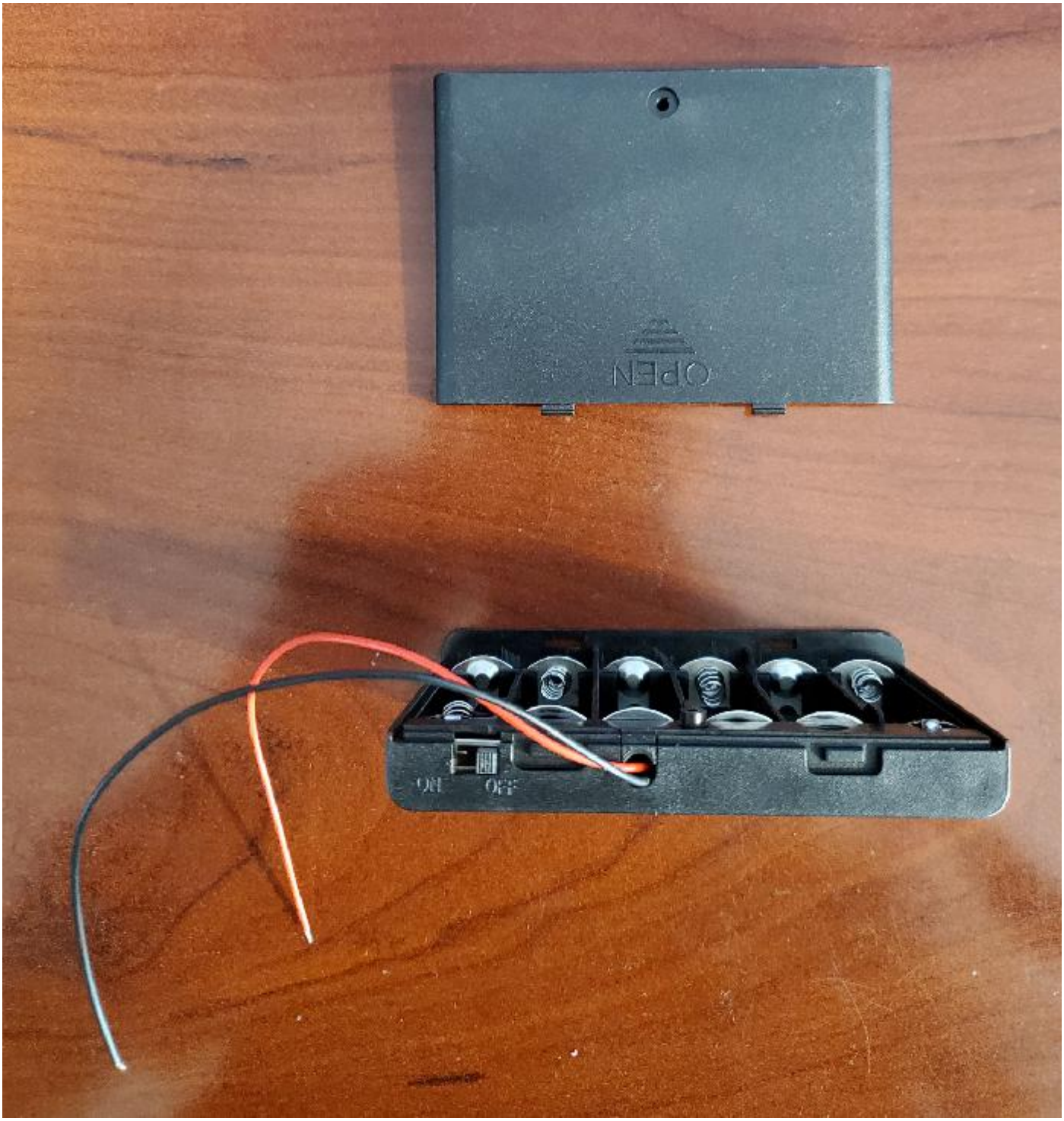
Step 139:

Connect the headlights to the Arduino Mega Sensor Shield.



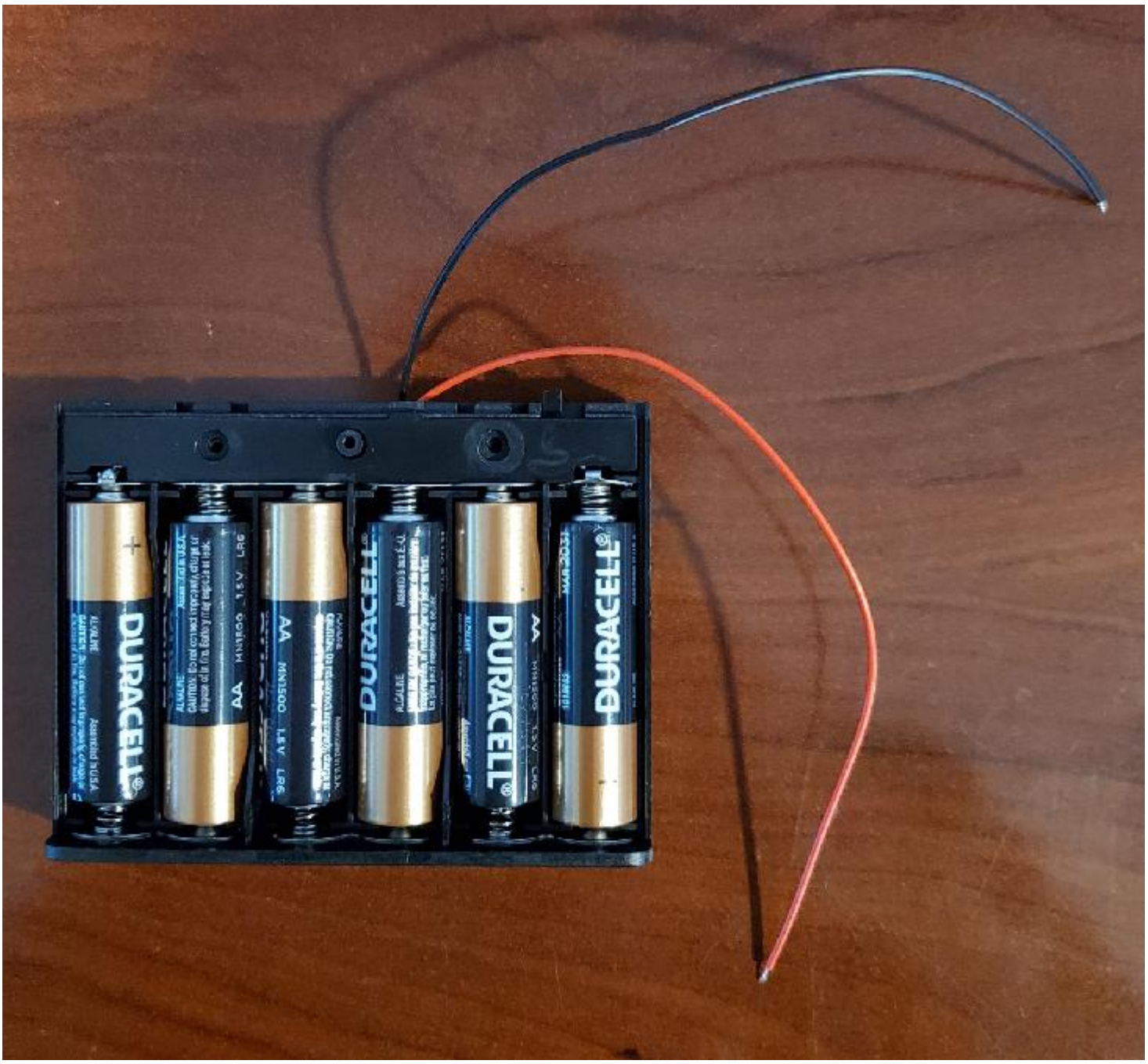
Step 140:

Obtain the 6X 1.5V AA Battery Storage Case, inspect to see that the toggle switch is set to ‘OFF’, and remove its compartment cover.



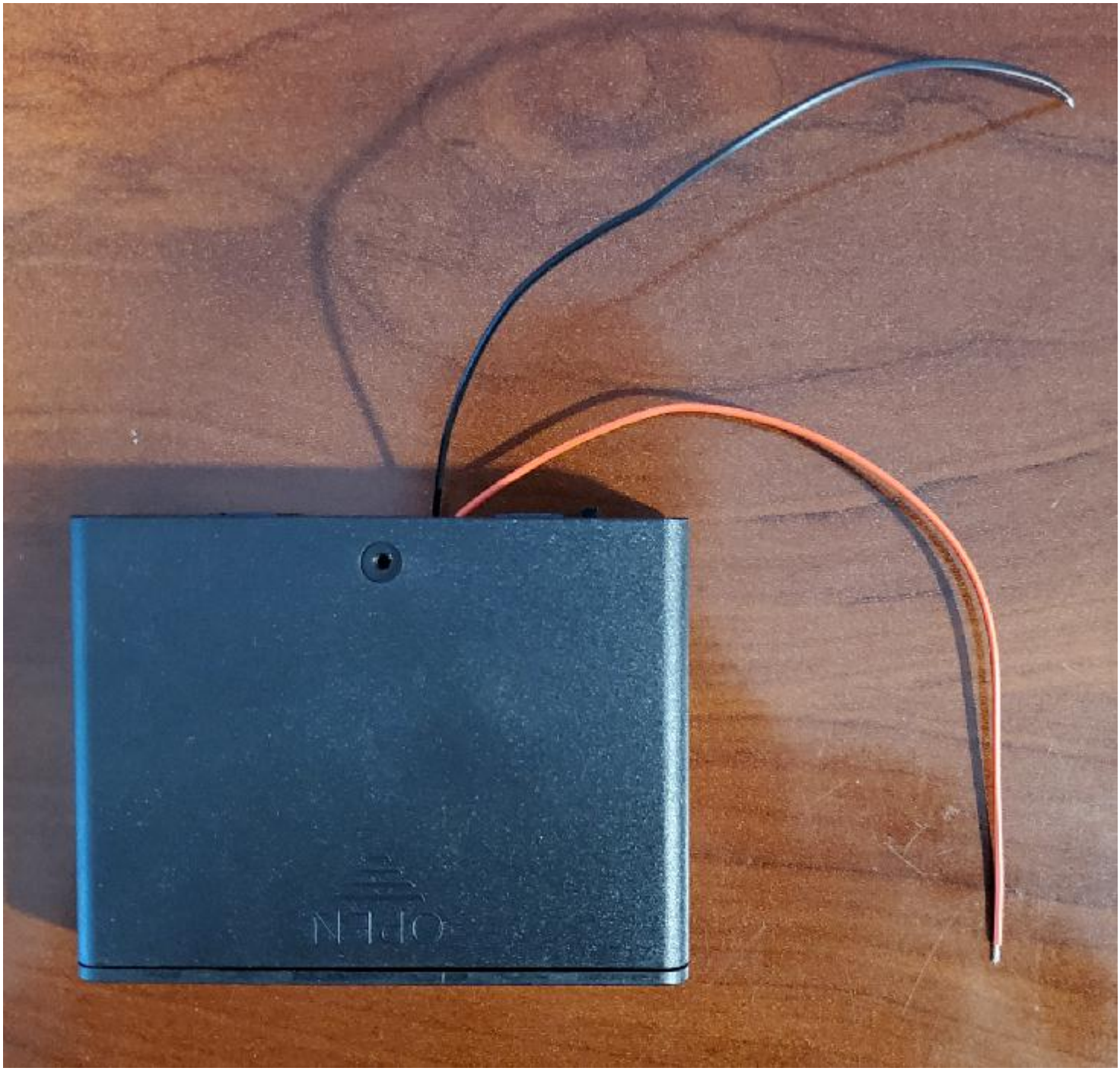
Step 141:

Obtain the 6X 1.5V AA Battery Storage Case, inspect to see that the toggle switch is set to ‘OFF’, and remove its compartment cover.



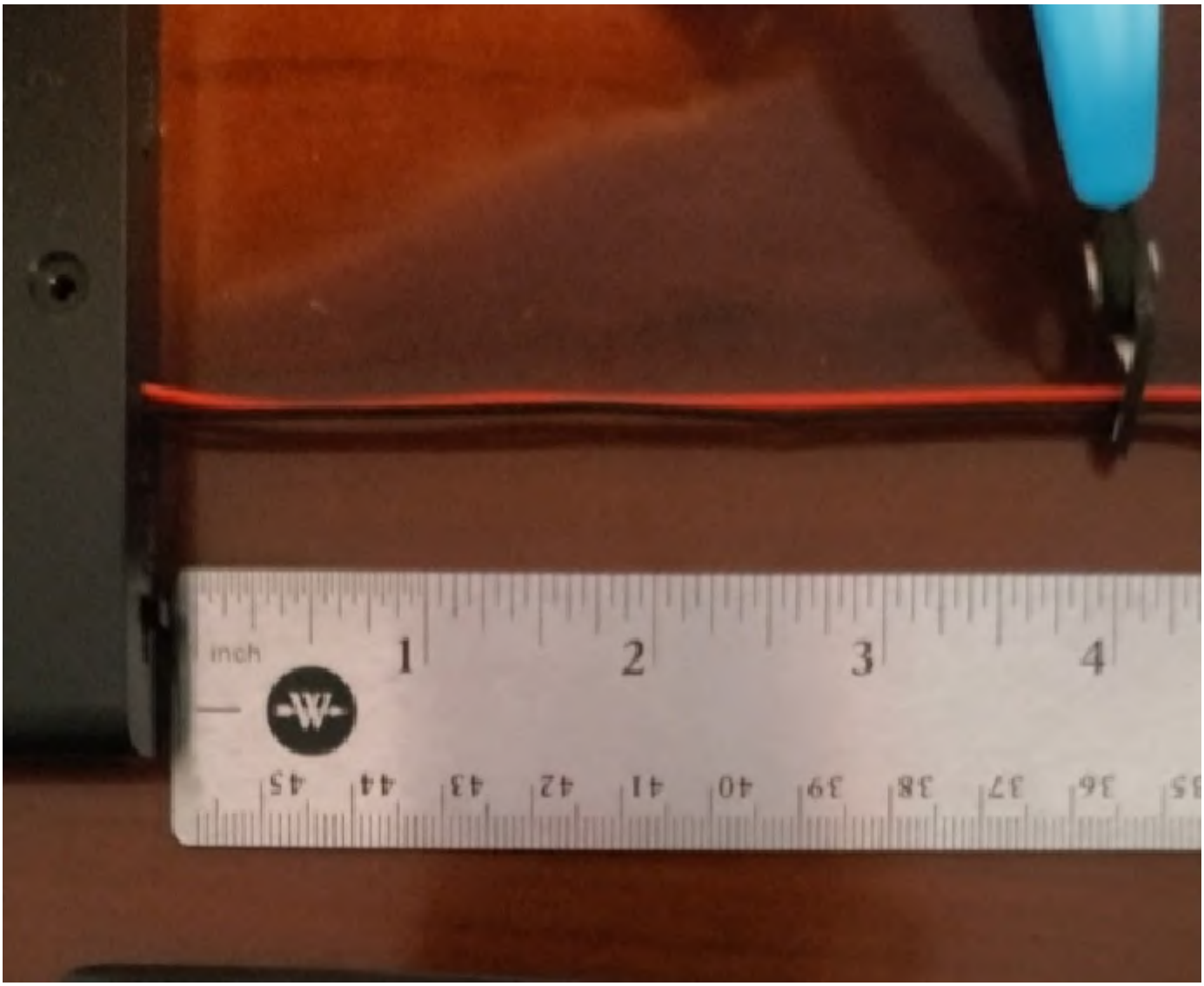
Step 142:

Reinstall the 6X 1.5V AA Battery Storage Case compartment cover.



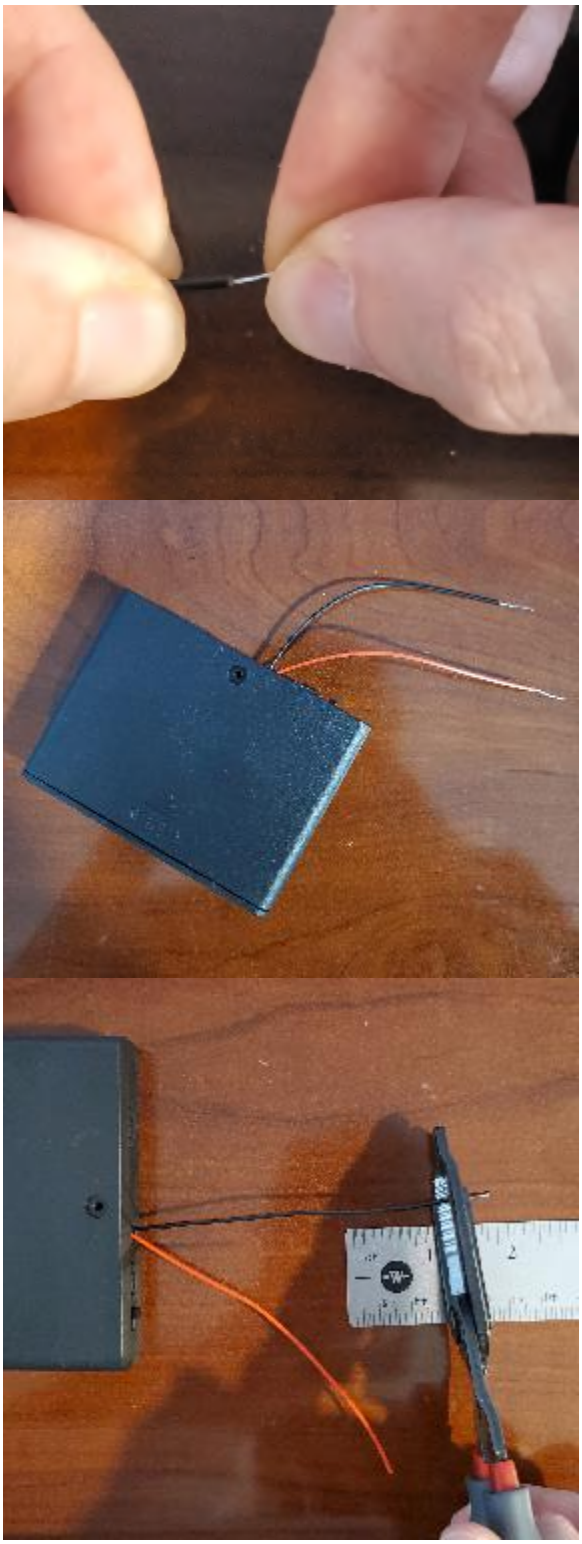
Step 143:

Trim the length of the red and black wires so that they are 4” in length.



Step 144:

Obtain wire strippers and strip a ½" of each wire's insulation on both sides and twist their ends until they are no longer frayed.

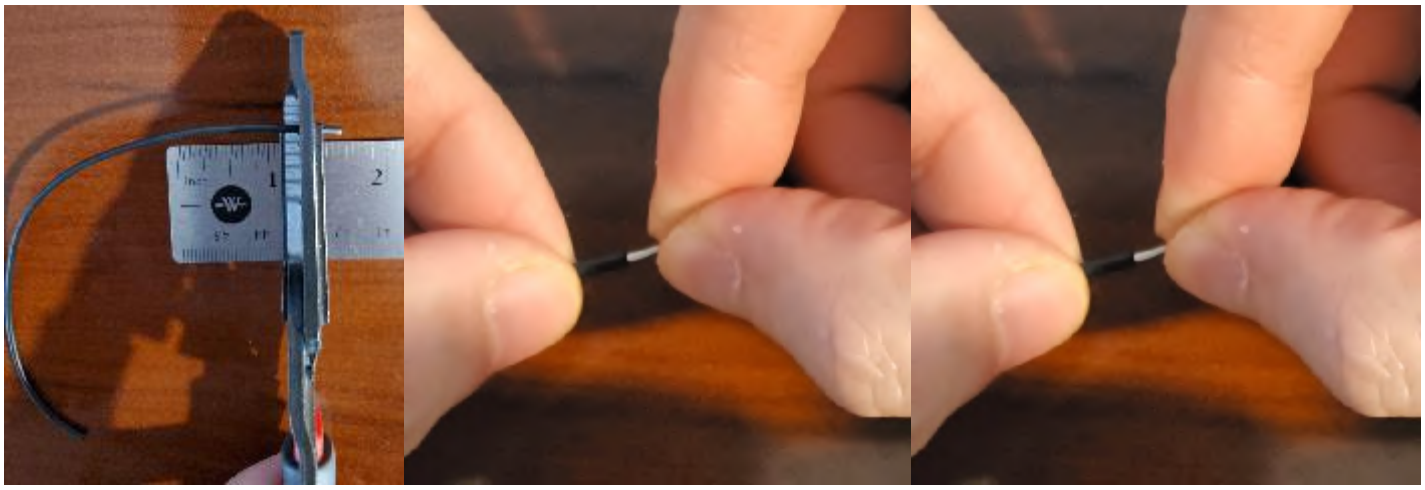


Step 145:

Cut 6” of black 22 AWG wire from its spool.

Step 146:

Obtain wire strippers and strip a ½" of the wire's insulation on both sides and twist their ends until they are no longer frayed.



Step 147:

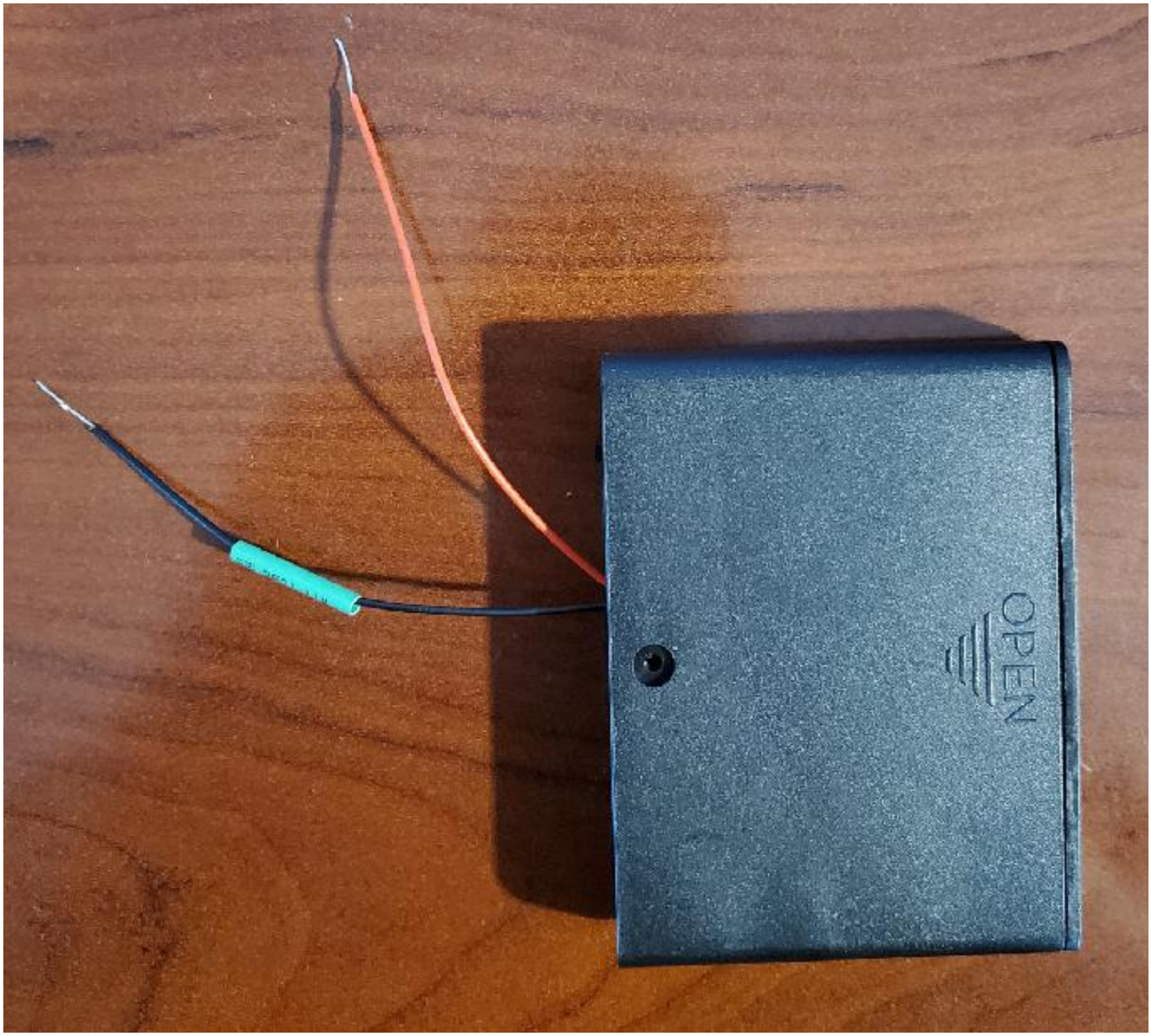
Obtain a soldering jig and mount the 6" black wire on one of the clips by its insulation 3" from one of the stripped ends.

Step 148:

Obtain one 2.5x45mm heat shrink insulation tube and cut it in half using flush cutter pliers.

Step 149:

Route one of the halves of the cut 2.5x45mm heat shrink insulation tube and route it through the black wire of the 6X 1.5V AA Battery Storage Case.



Step 150:

Obtain the black wire of the 6X 1.5V AA Battery Storage Case and mount it to the remaining soldering jig clip by its insulation 2" from its stripped end with the cut heat shrink insulation tube being able to readily be removed.

Step 151:

Coil the stripped end of the 6” black wire onto the stripped end of the 6X 1.5V AA Battery Storage Case black wire.

Step 152:

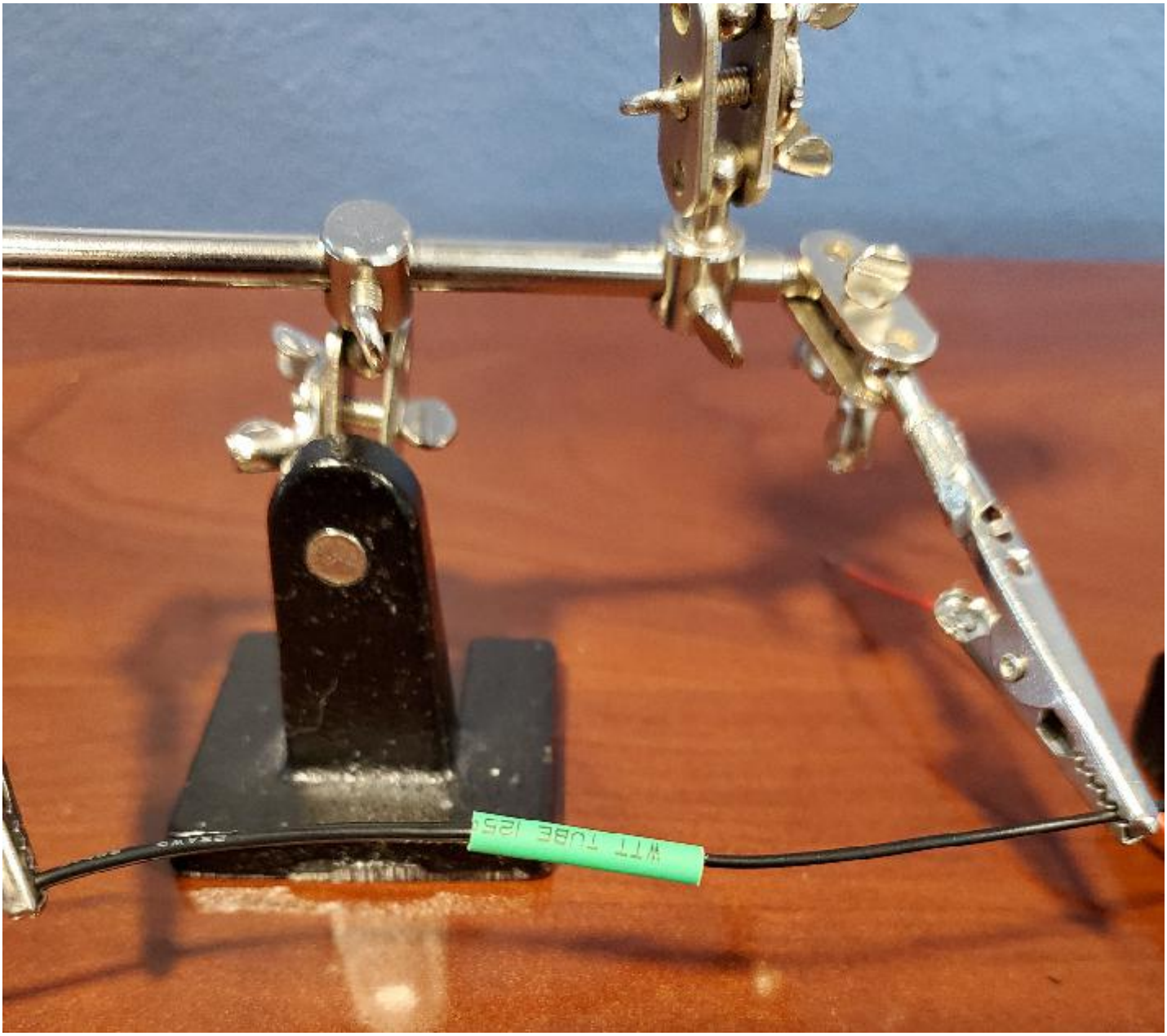
Obtain a soldering iron, turn it on and adjust its temperature settings to a temperature that is sufficient for the solder being used.

Step 153:

Carefully place the tip of the soldering iron on the coiled joint and quickly apply solder before its components begin to melt.

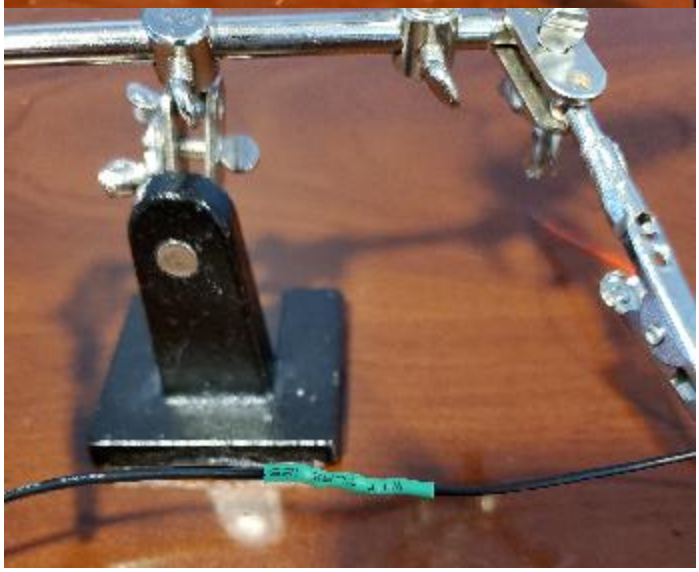
Step 154:

Move the cut heat shrink insulation tube and cover the soldered coiled joint.



Step 155:

Obtain a BBQ lighter and apply heat onto the cut heat shrink until it has shrunk to capacity.



Step 156:

Unmount the newly extended black wire of the 6X 1.5V AA Battery Storage Case from the clip closest to the stripped end.

Step 157:

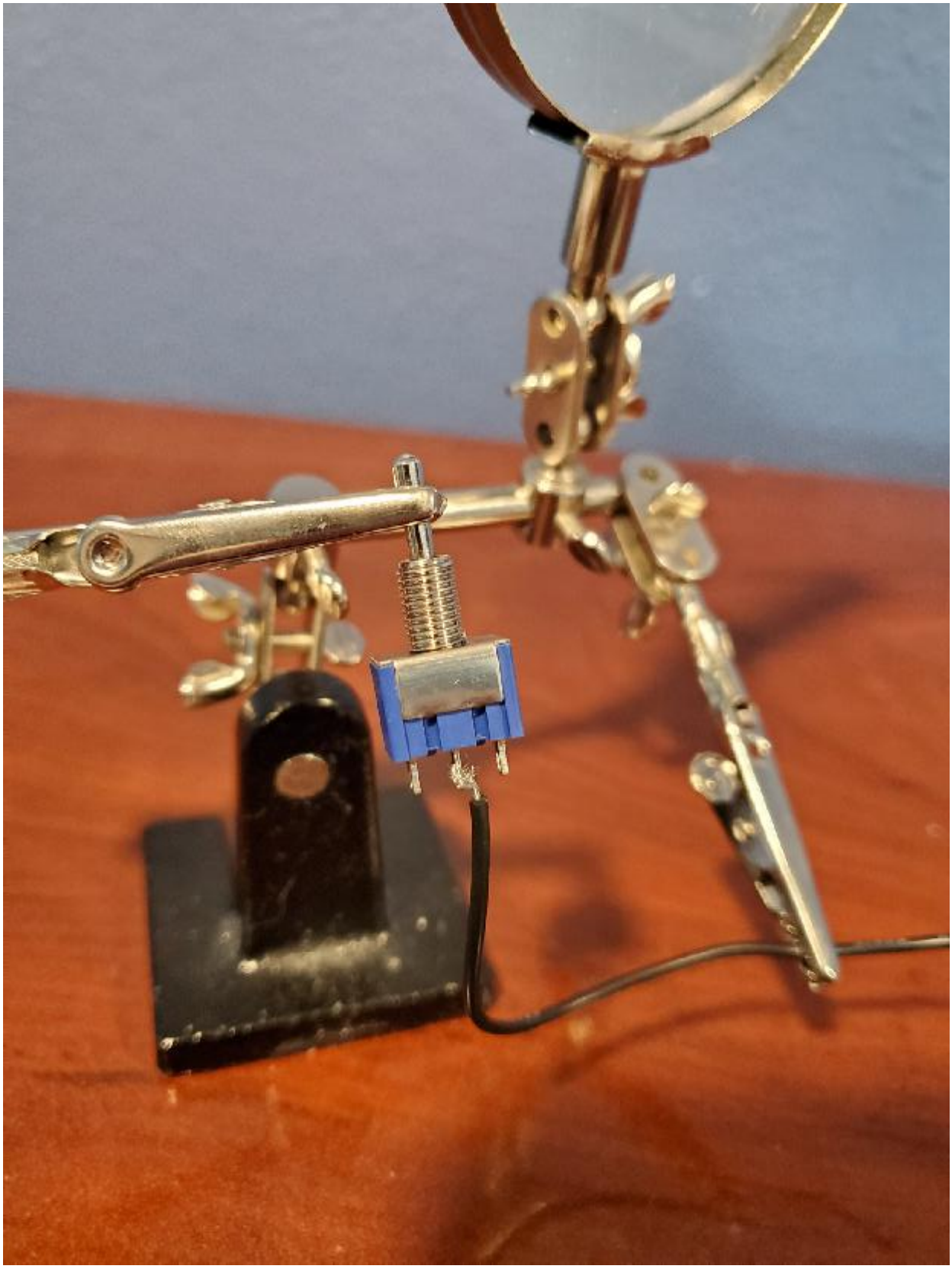
Adjust the grab position of the extended black wire of the 6X 1.5V AA Battery Storage Case so that its respective clip mounts it 3” away from its stripped end.

Step 158:

Obtain one on-off-on toggle switch and mount it to the remaining soldering jig clip by its handle.

Step 159:

Route the stripped end through the common terminal of the on-off-on toggle switch and coil it.

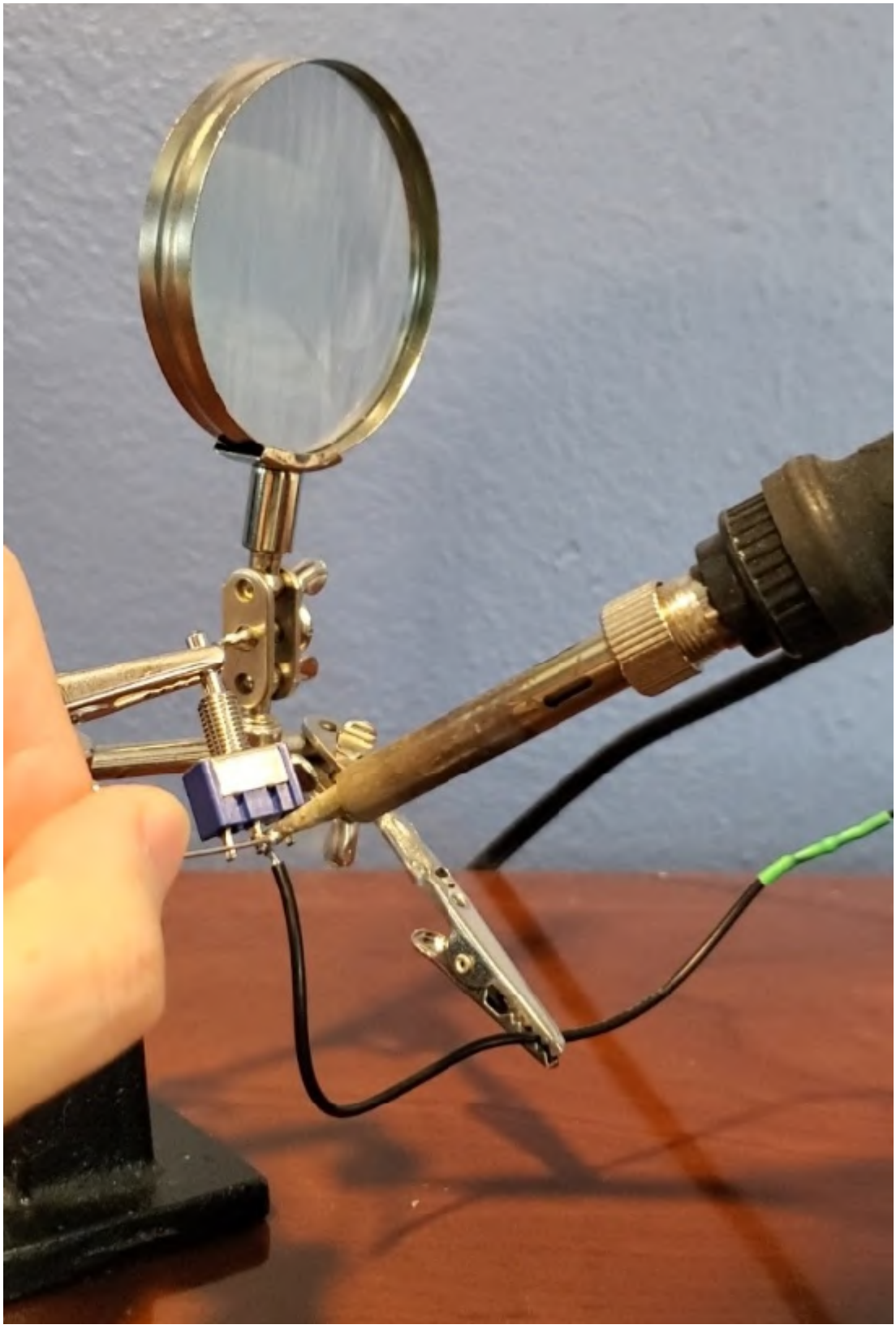


Step 160:

Obtain a soldering iron, turn it on and adjust its temperature settings to a temperature that is sufficient for the solder being used.

Step 161:

Carefully place the tip of the soldering iron on the common terminal wire joint and quickly apply solder before its components begin to melt.



Step 162:

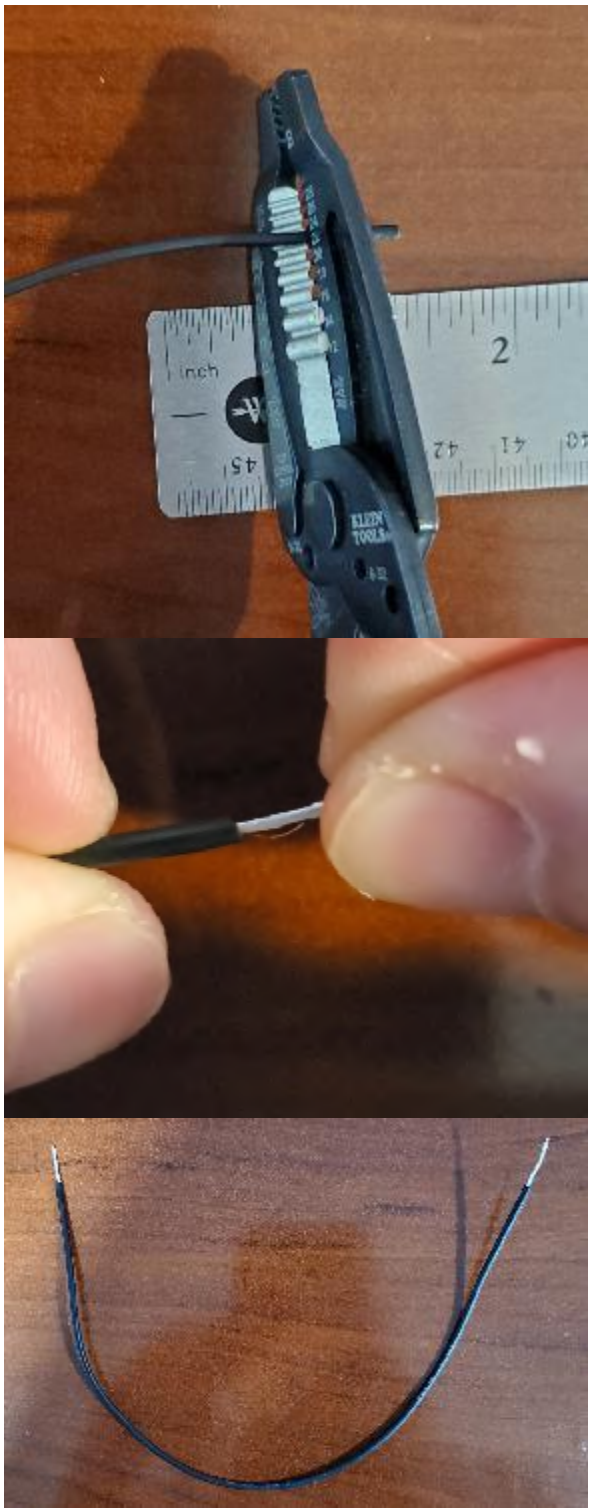
After the joint has cooled down, release the extended black wire of the 6X 1.5V AA Battery Storage Case from its respective clip.

Step 163:

Cut 10" of black 22 AWG wire from its spool.

Step 164:

Obtain wire strippers and strip a ½" of the wire's insulation on both sides and twist their ends until they are no longer frayed.

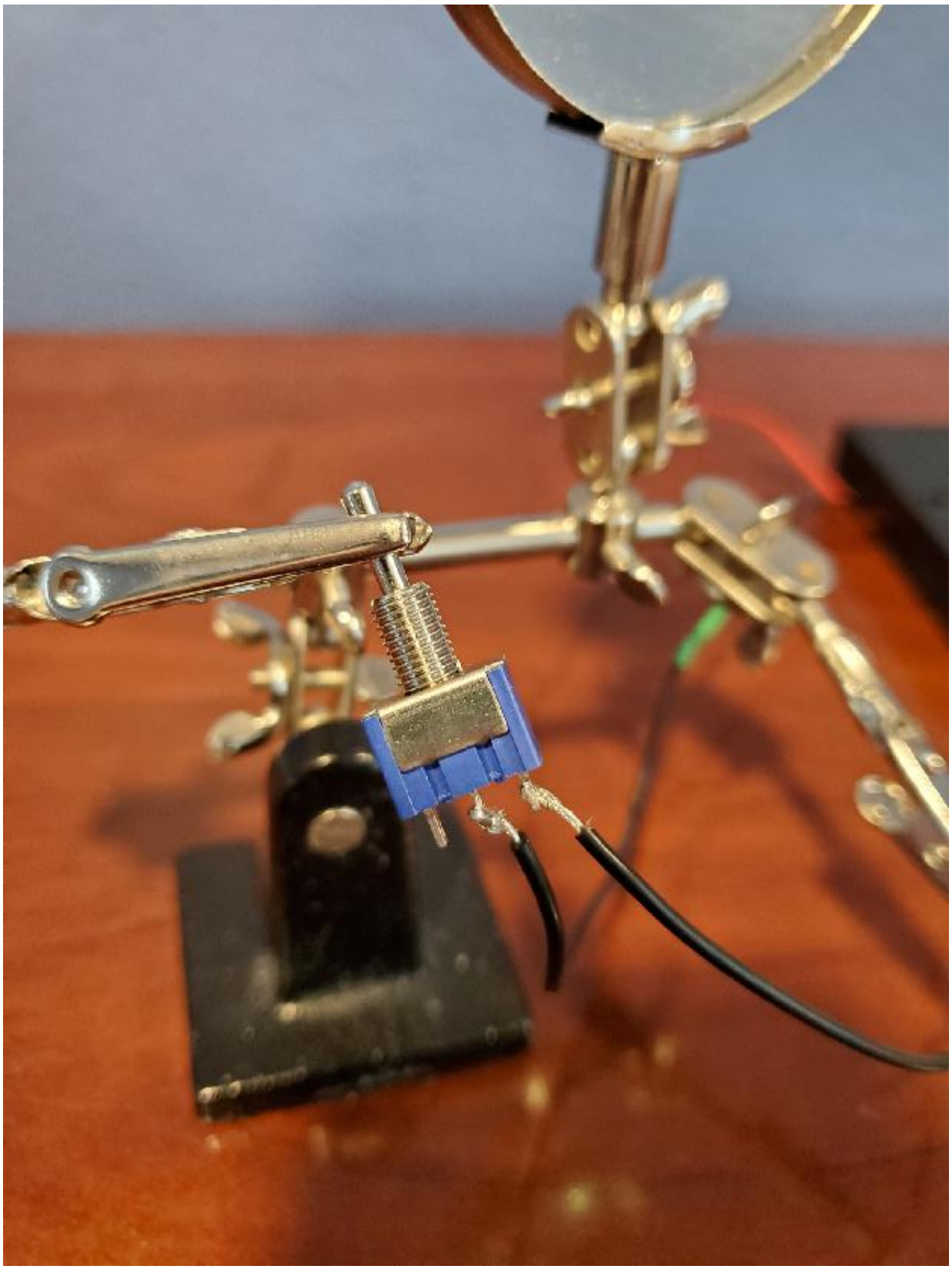


Step 165:

Obtain a soldering jig with the on-off-on toggle switch already mounted and mount the 10" black wire on one of the clips by its insulation 3" from one of the stripped ends.

Step 166:

Route the stripped end through the on terminal of the on-off-on toggle switch and coil it.



Step 167:

Obtain a soldering iron, turn it on and adjust its temperature settings to a temperature that is sufficient for the solder being used.

Step 168:

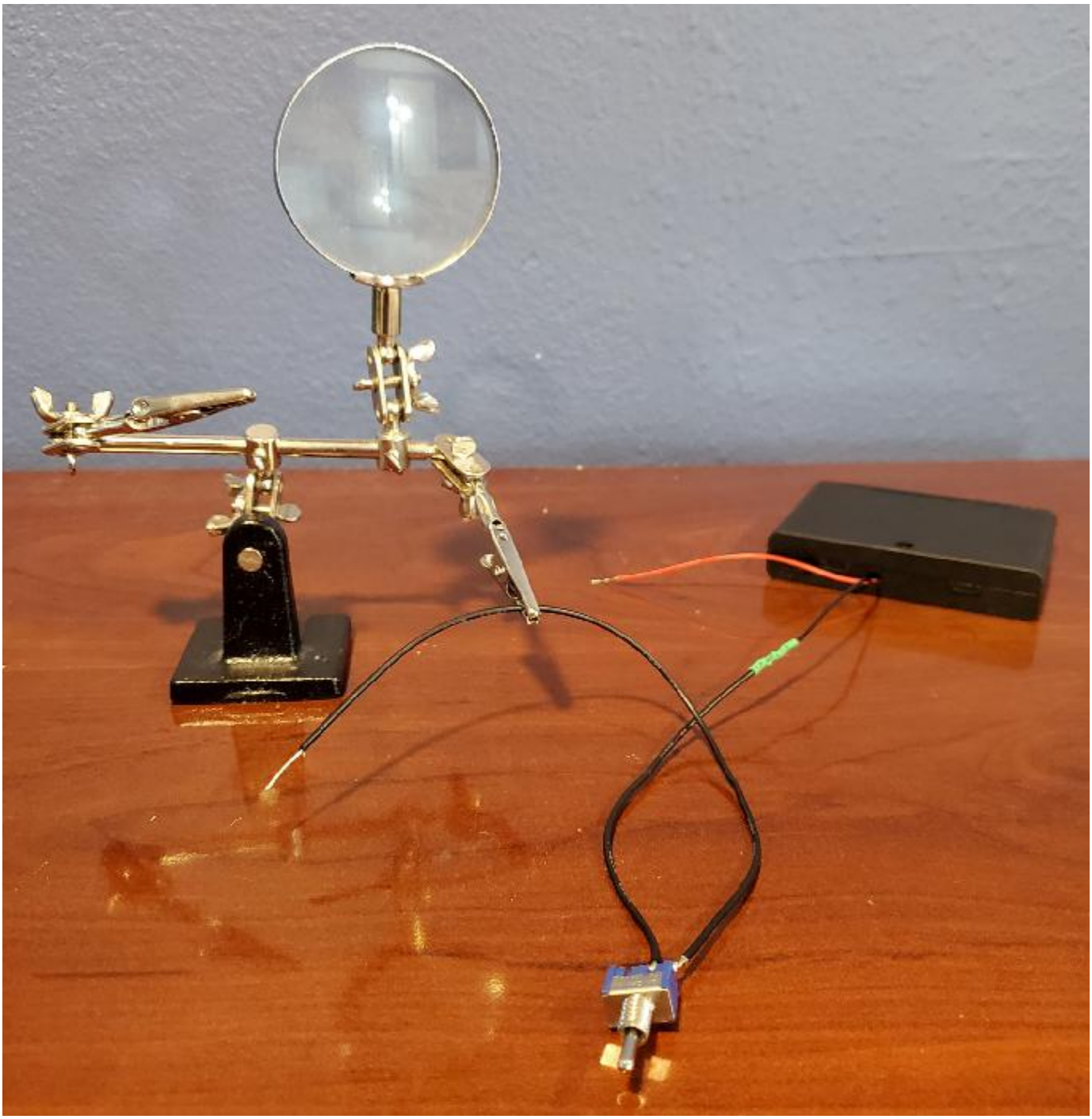
Carefully place the tip of the soldering iron on the on-terminal wire joint and quickly apply solder before its components begin to melt.

Step 169:

After the joint cools, unmount the on-off-on toggle switch.

Step 170:

Adjust the grab position of the black wire soldered to the on-terminal of the on-off-on toggle switch so that it is mounted 3" from its stripped end.



Step 171:

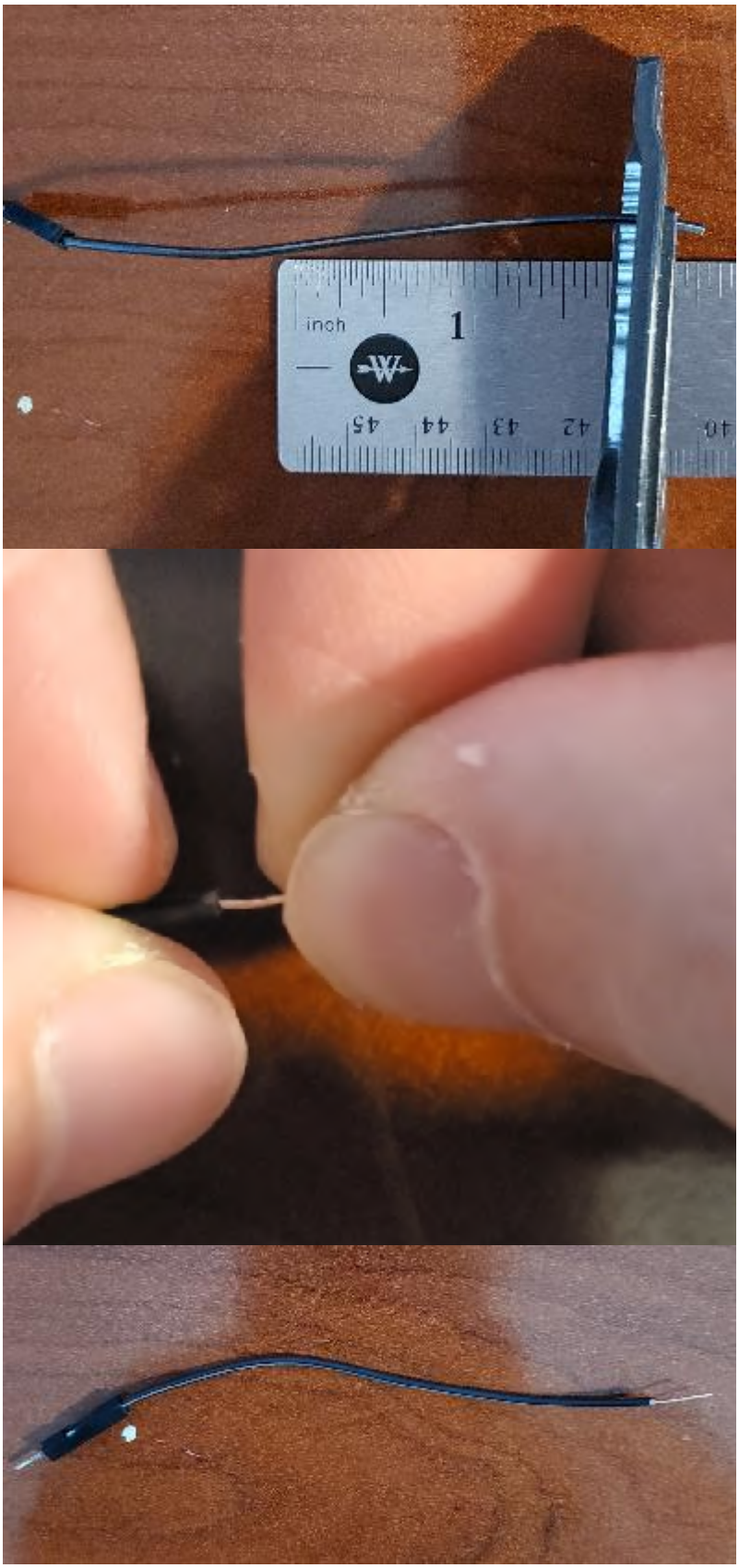
Obtain the remaining half of the 2.5x45mm heat shrink insulation tube and route it through the stripped end of the black wire soldered to the on-terminal of the on-off-on toggle switch.

Step 172:

Obtain a male-male or male-female black jumper wire, cut it in half using flush cutter pliers, and discard the female portion.

Step 173:

Obtain wire strippers and strip a ¼" of the wire's insulation from its cut end and twist its end until it is no longer frayed.

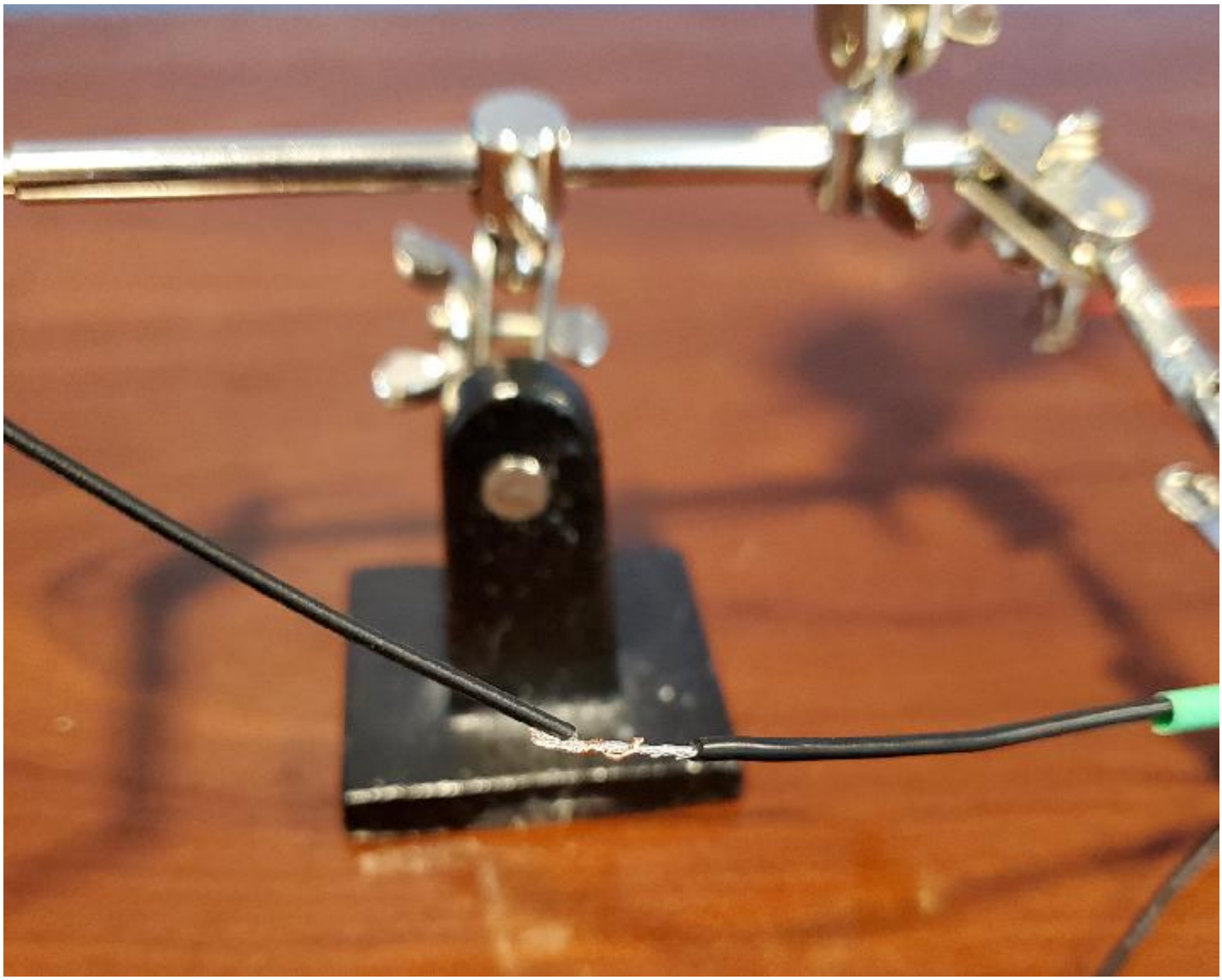


Step 174:

Using the remaining soldering jig clip, mount the cut male-male or male-female black jumper wire 3" away from its stripped end.

Step 175:

Coil the stripped end of the 10" black wire onto the stripped end of the cut male-male or male-female black jumper wire.

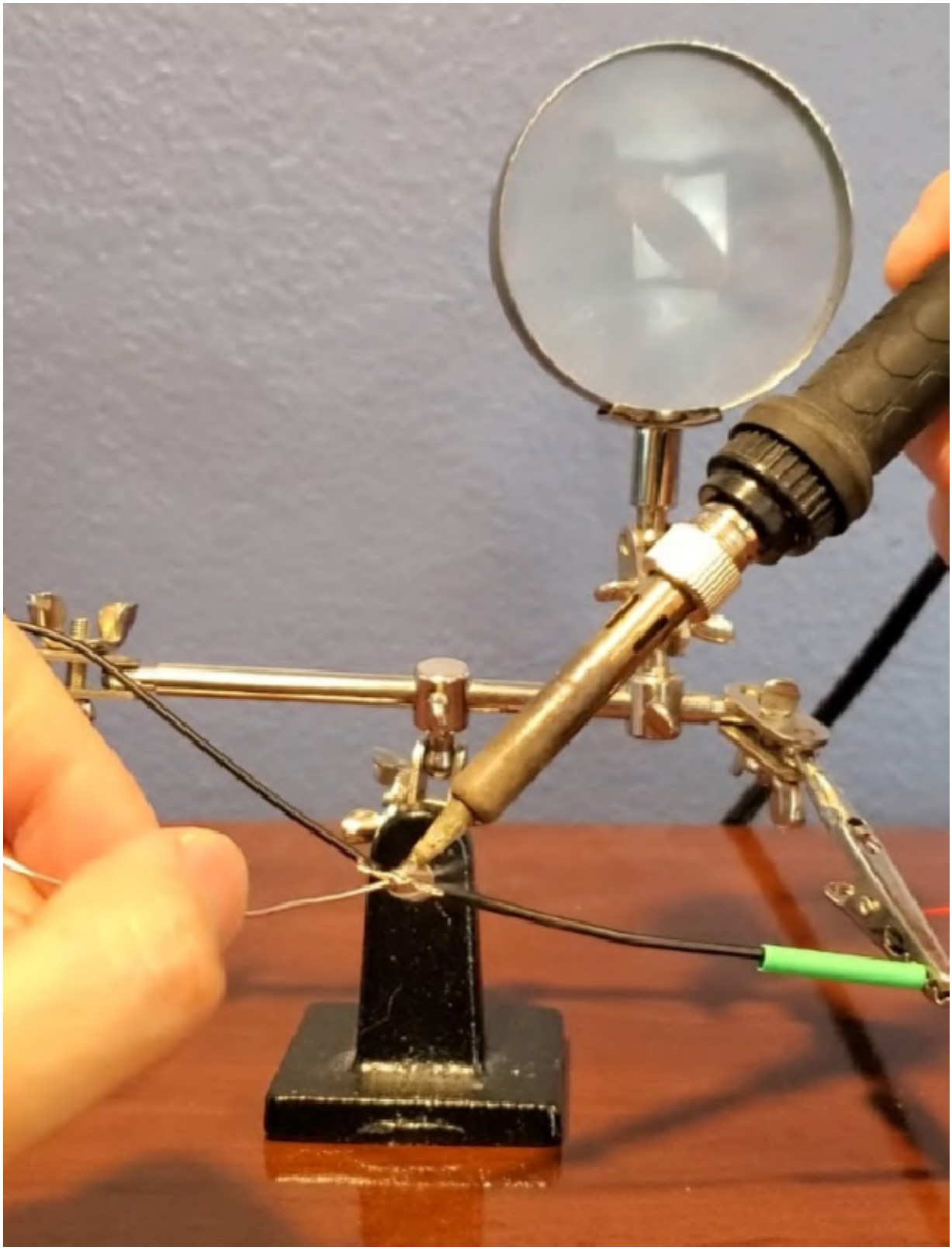


Step 176:

Obtain a soldering iron, turn it on and adjust its temperature settings to a temperature that is sufficient for the solder being used.

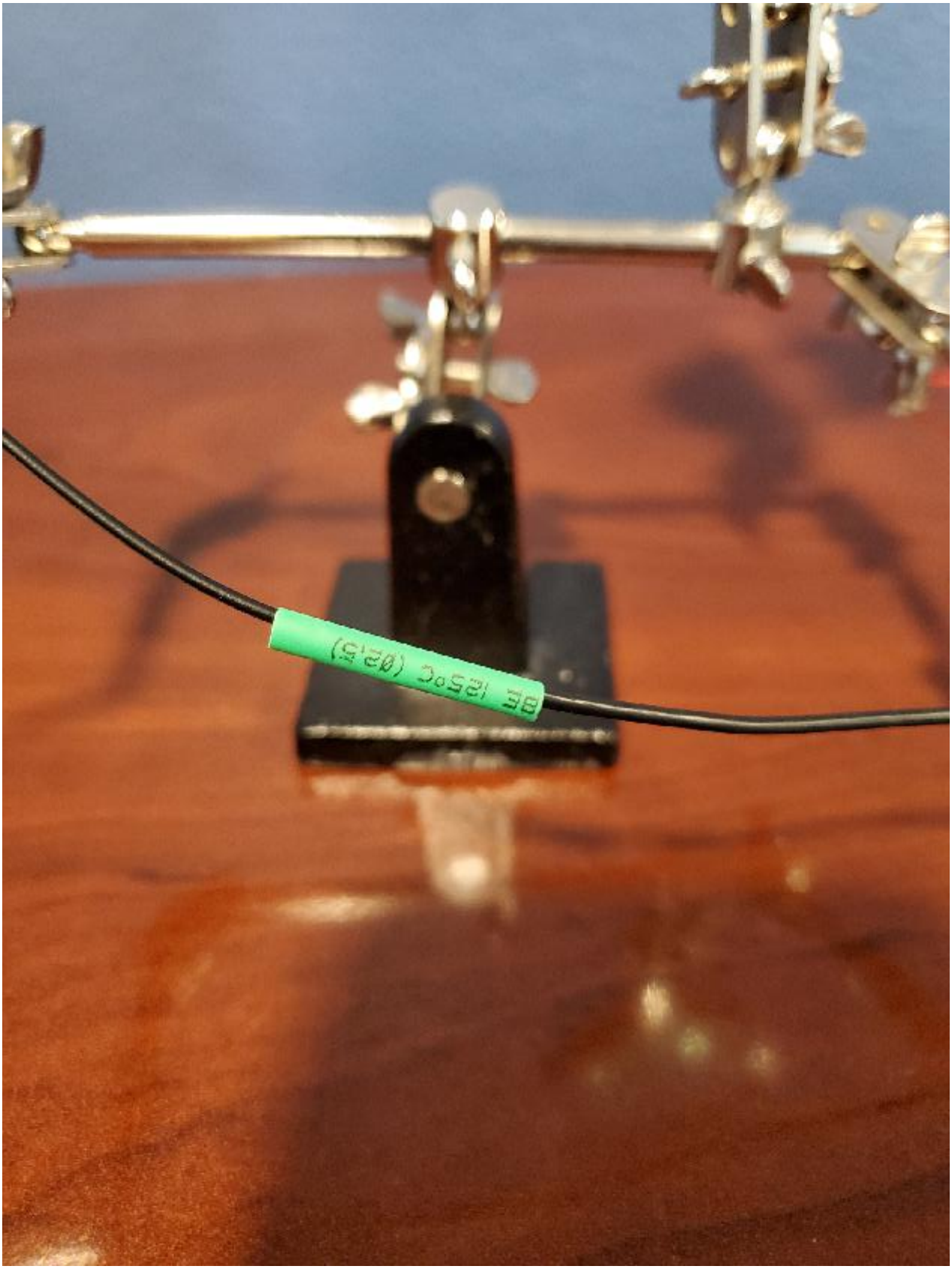
Step 177:

Carefully place the tip of the soldering iron on the coiled joint and quickly apply solder before its components begin to melt.



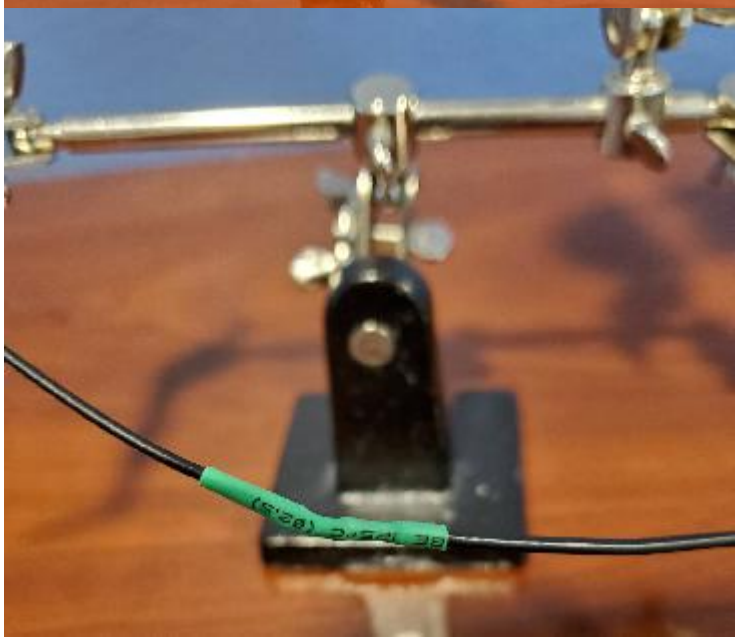
Step 178:

Move the cut heat shrink insulation tube and cover the soldered coiled joint.



Step 179:

Obtain a BBQ lighter and apply heat onto the cut heat shrink until it has shrunk to capacity.



Step 180:

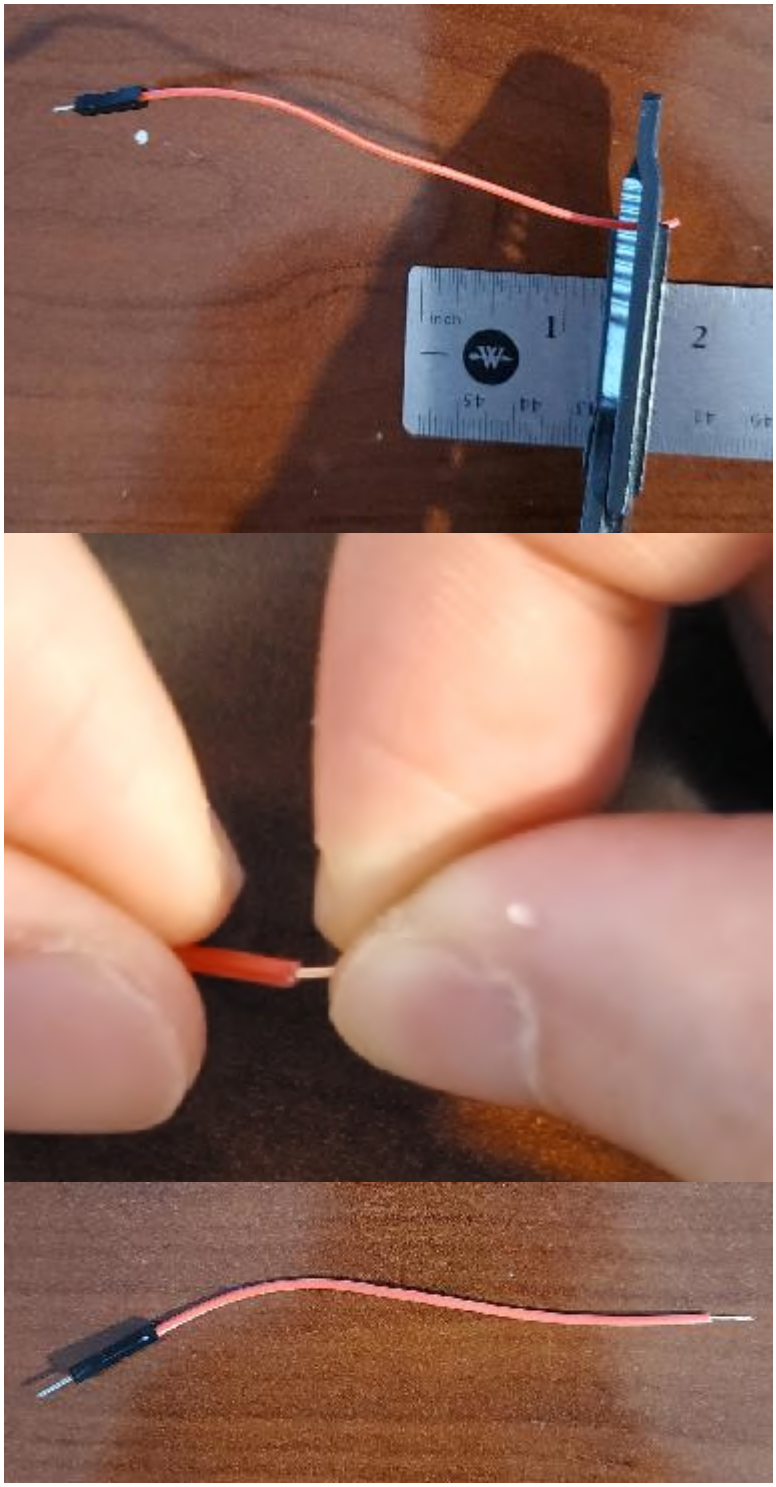
Release all components mounted on the clips of the soldering jig.

Step 181:

Obtain a male-male or male-female red jumper wire, cut it in half using flush cutter pliers, and discard the female portion.

Step 182:

Obtain wire strippers and strip a ¼" of the wire's insulation from its cut end and twist its end until it is no longer frayed.



Step 183:

Obtain a soldering jig and mount the red wire of the 6X 1.5V AA Battery Storage Case 2" away from its stripped end using one of the clips.

Step 184:

Obtain one 2.5x45mm heat shrink insulation tube and cut it in half using flush cutter pliers.

Step 185:

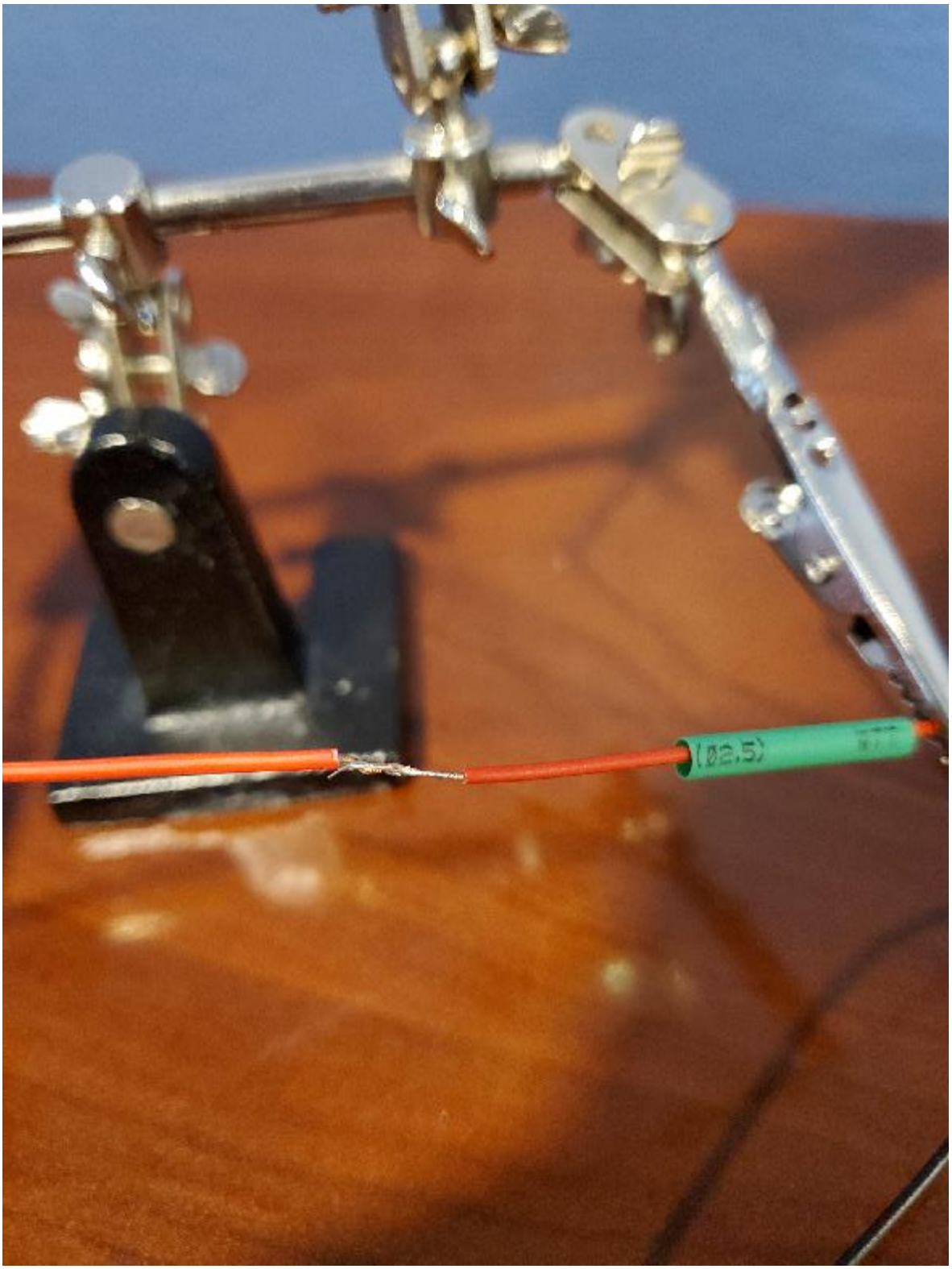
Route one of the halves of the cut 2.5x45mm heat shrink insulation tube and route it through the stripped end of the red wire of the 6X 1.5V AA Battery Storage Case.

Step 186:

Mount the cut male-male or male-female red jumper wire by its insulation 3" away from its stripped end using the soldering jig's remaining clip.

Step 187:

Coil the stripped end of the red wire of the 6X 1.5V AA Battery Storage Case onto the stripped end of the cut male-male or male-female red jumper wire.



Step 188:

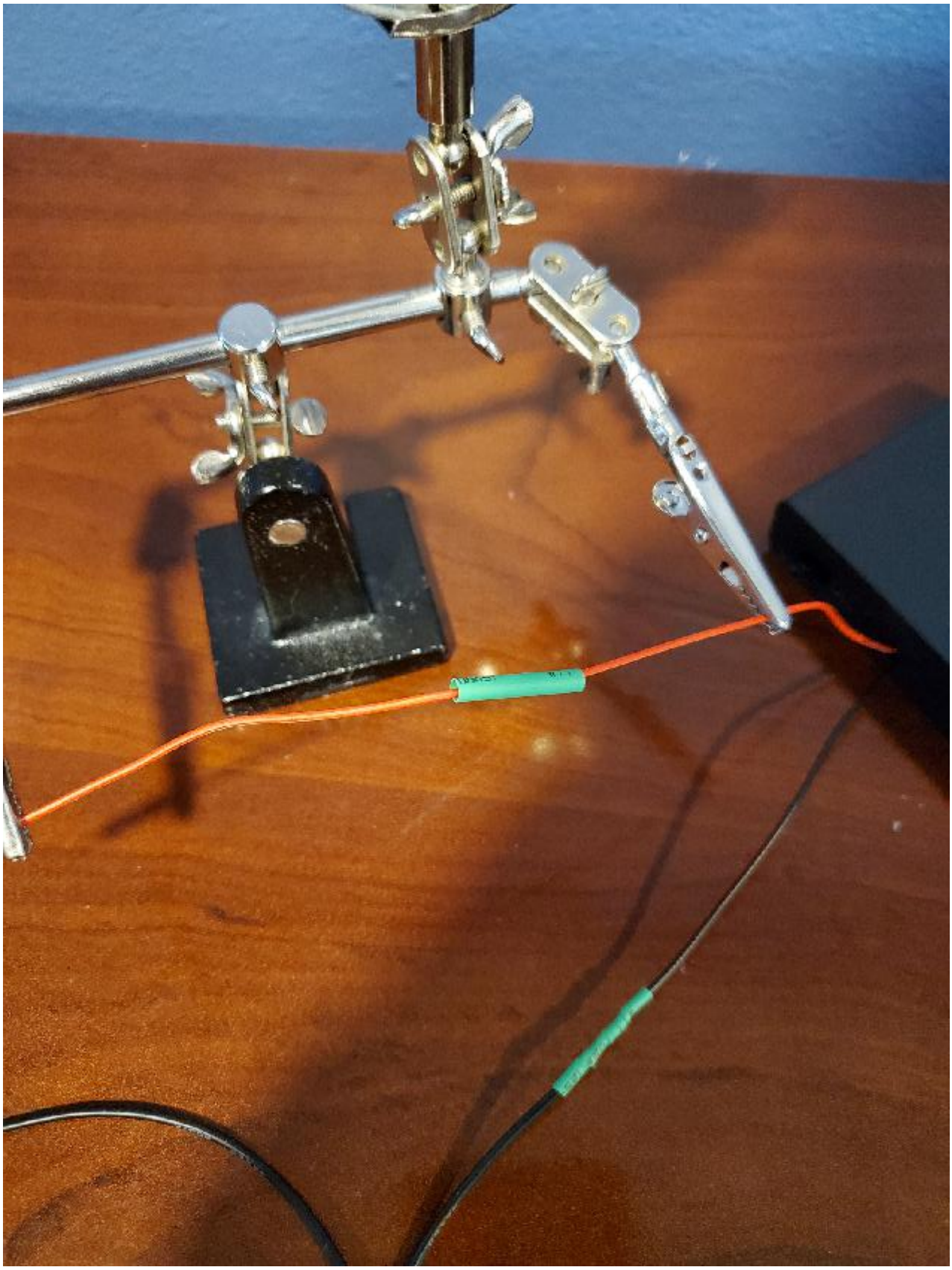
Obtain a soldering iron, turn it on and adjust its temperature settings to a temperature that is sufficient for the solder being used.

Step 189:

Carefully place the tip of the soldering iron on the coiled wire joint and quickly apply solder before its components begin to melt.

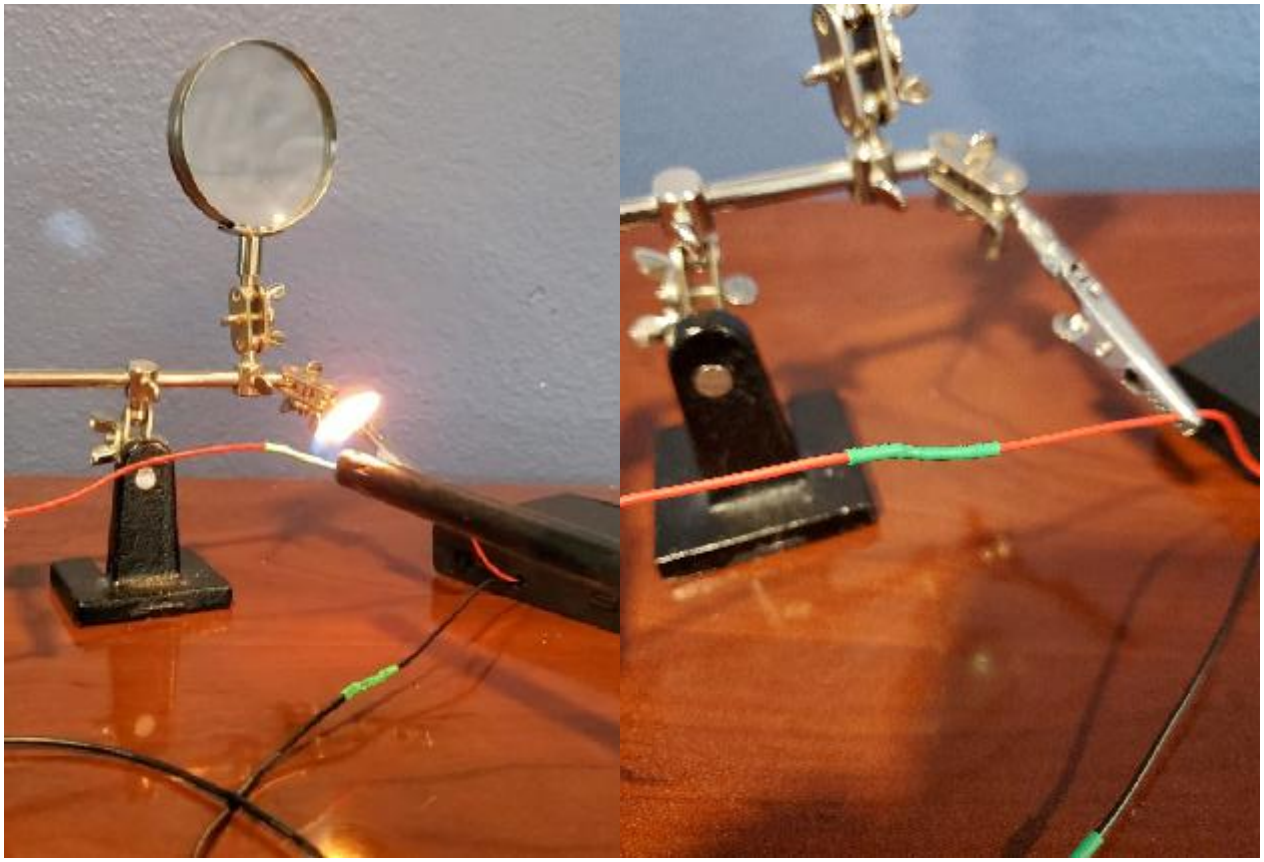
Step 190:

Move the cut heat shrink insulation tube and cover the soldered coiled joint.



Step 191:

Obtain a BBQ lighter and apply heat onto the cut heat shrink until it has shrunk to capacity.

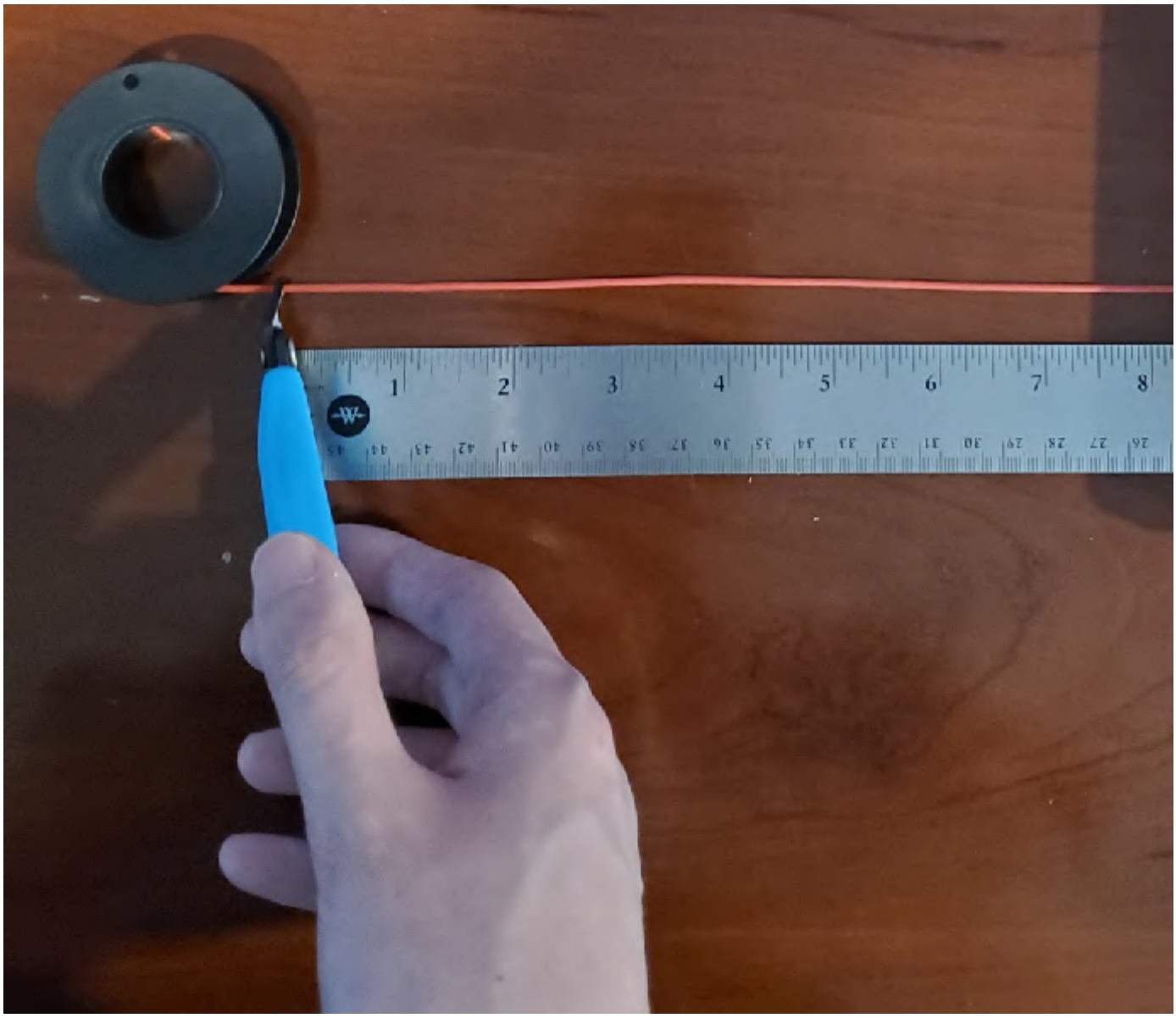


Step 192:

Release all components mounted on the clips of the soldering jig.

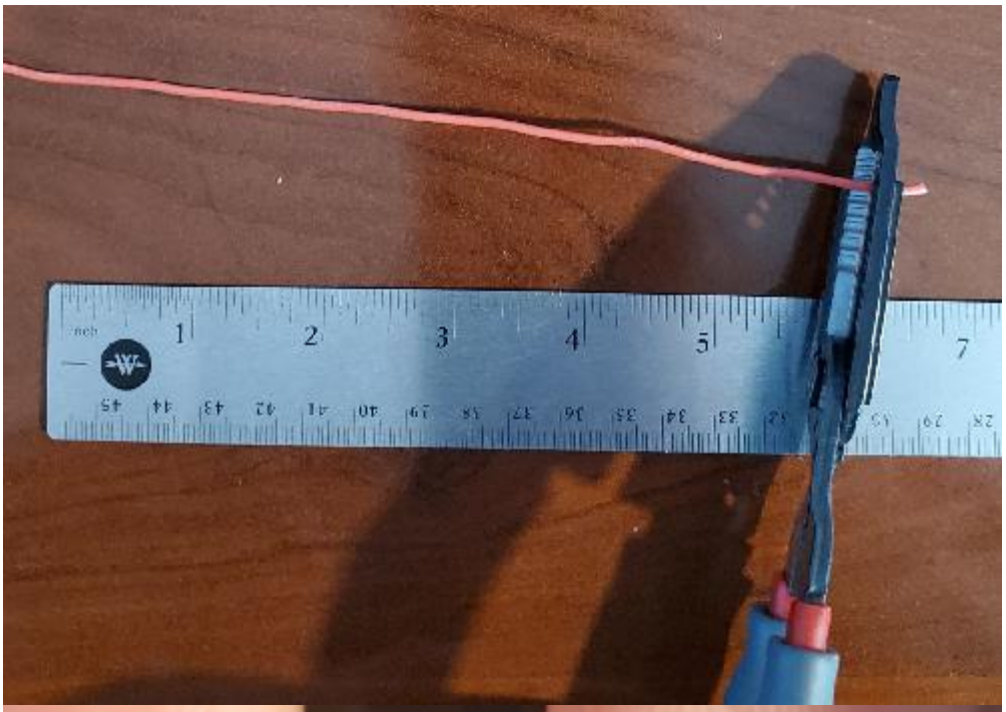
Step 193:

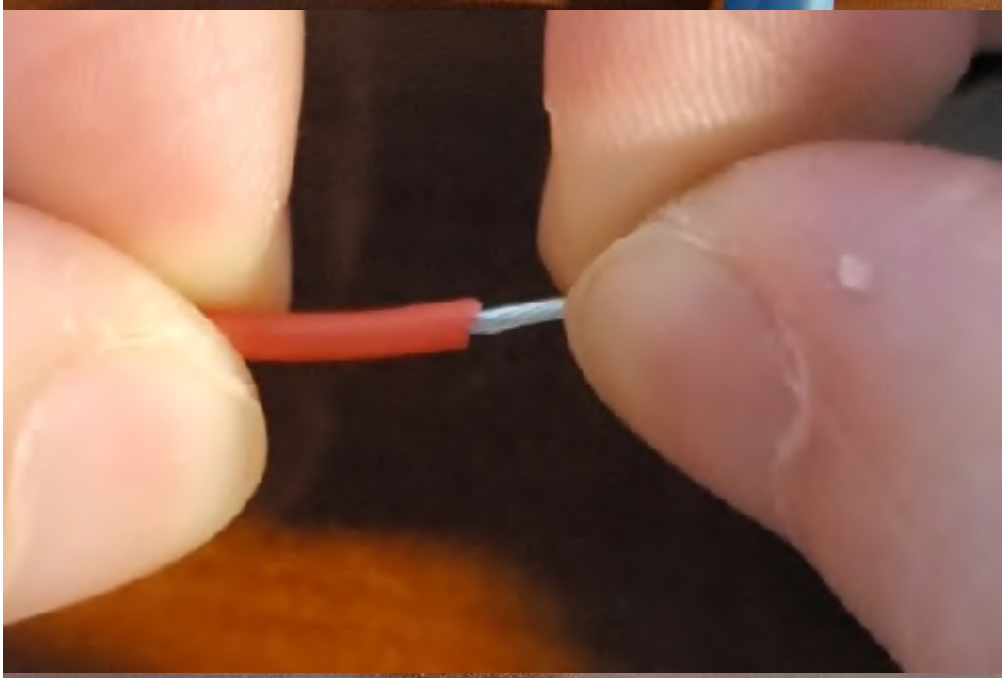
Cut 8" of red 22 AWG wire from its spool using flush cutter pliers.



Step 194:

Obtain wire strippers and strip a ½" of the wire's insulation on both sides and twist their ends until they are no longer frayed.





Step 195:

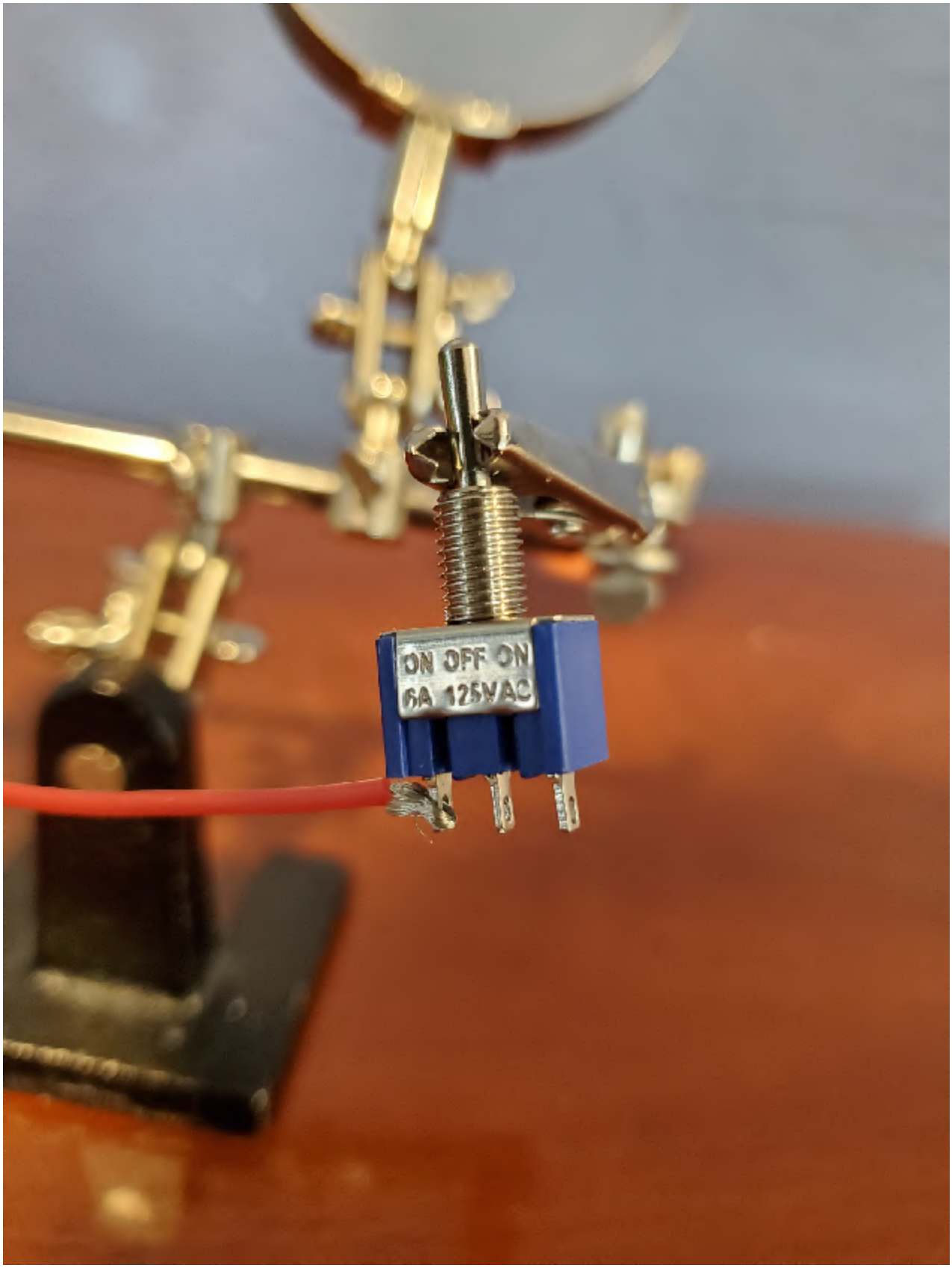
Obtain a soldering jig and mount the 8" red wire on one of the clips by its insulation 3" from one of the stripped ends.

Step 196:

Obtain one on-off-on toggle switch and mount it to the remaining soldering jig clip by its handle.

Step 197:

Route the stripped end through the on-terminal of the on-off-on toggle switch and coil it.

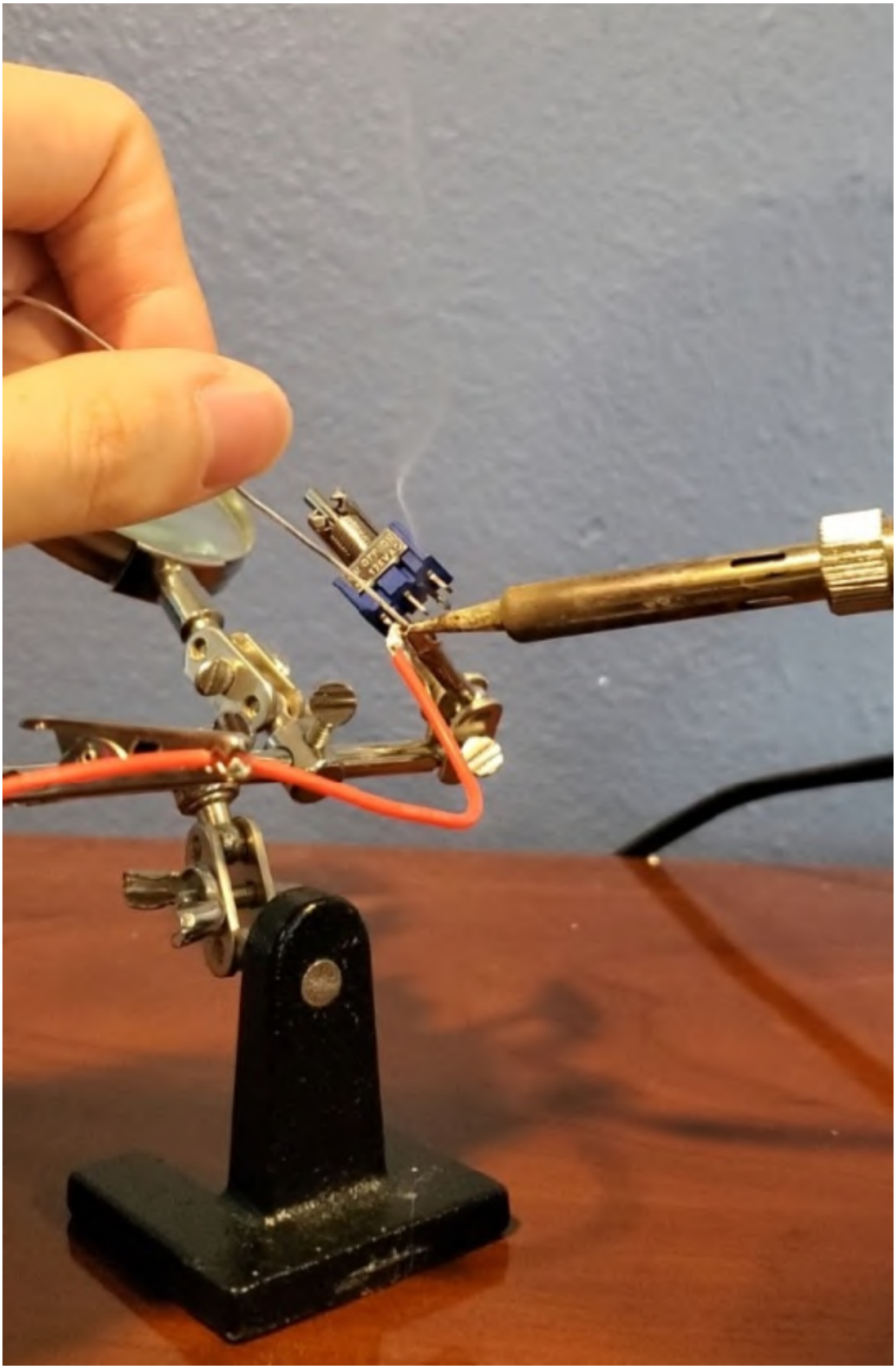


Step 198:

Obtain a soldering iron, turn it on and adjust its temperature settings to a temperature that is sufficient for the solder being used.

Step 199:

Carefully place the tip of the soldering iron on the on-terminal wire joint and quickly apply solder before its surrounding components begin to melt.

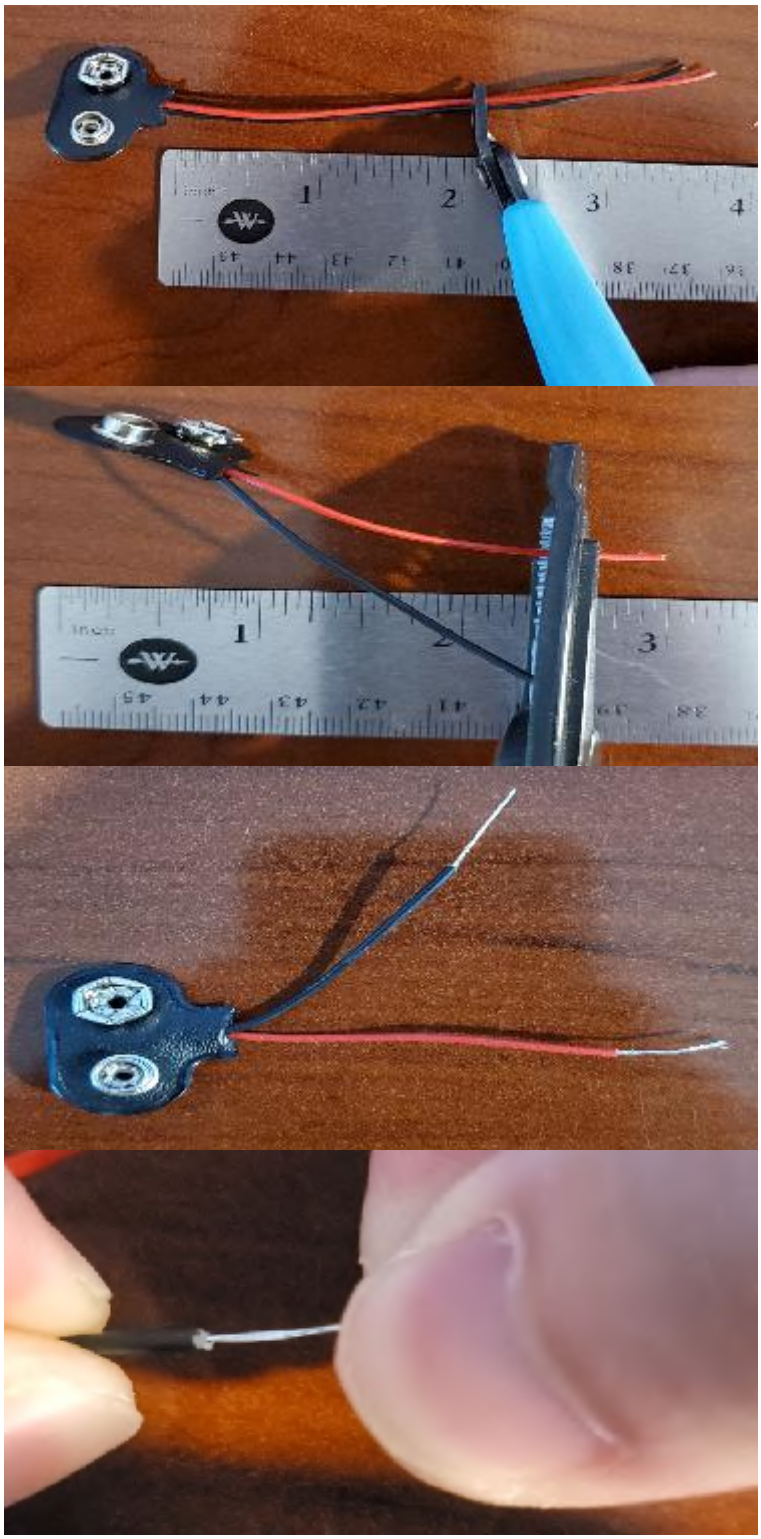


Step 200:

After the joint cools, unmount all components.

Step 201:

Obtain the T Type 9V Battery Clip, trim both wires to a length of 2" using flush cutter pliers, strip ½" of insulation from both wires' ends using wire strippers, and grab and twist the stripped ends until they're no longer frayed.

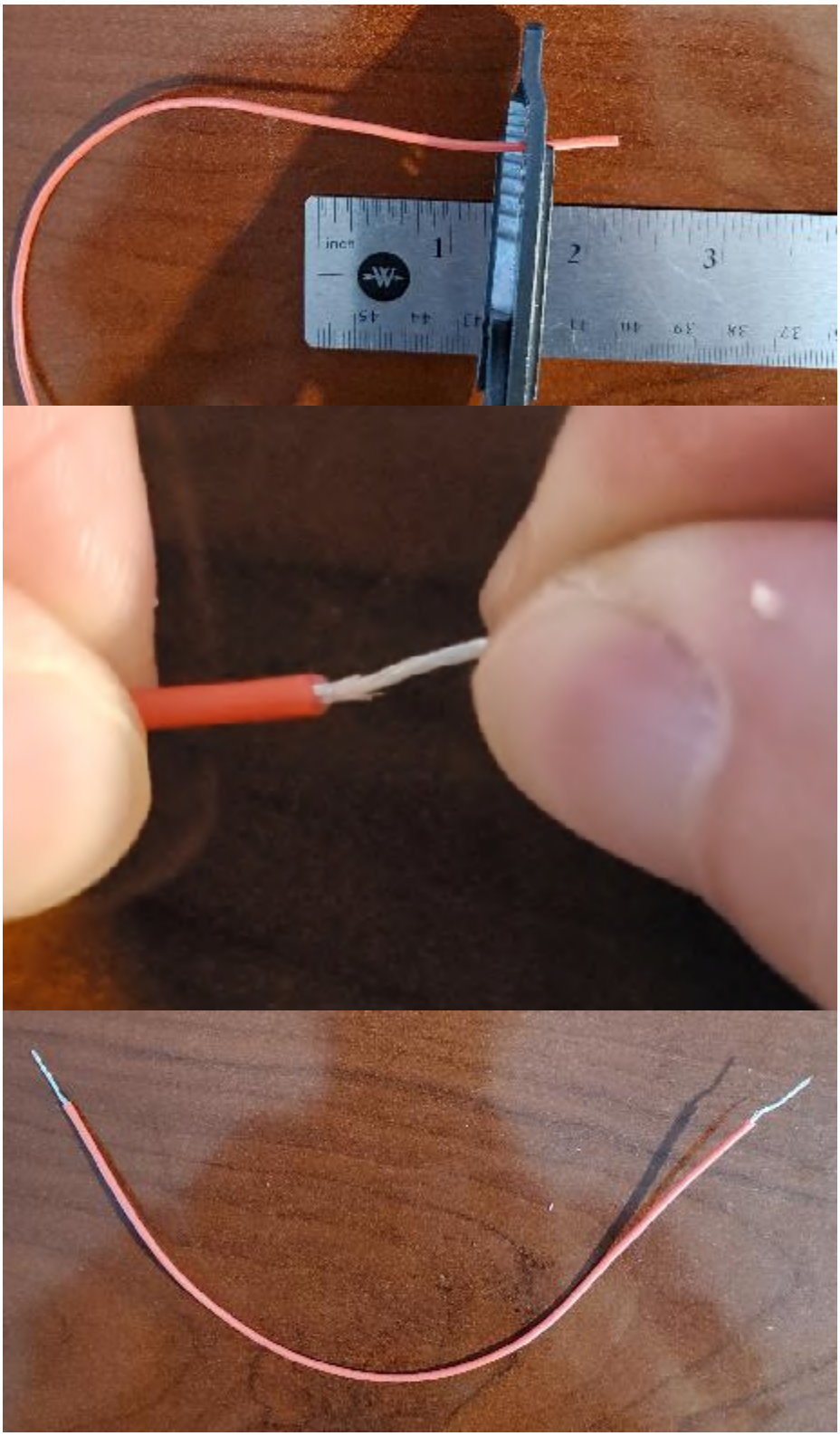


Step 202:

Cut 7" of red 22 AWG wire from its spool using flush cutter pliers.

Step 203:

Obtain wire strippers and strip a ½" of the wire's insulation on both sides and twist their ends until they are no longer frayed.

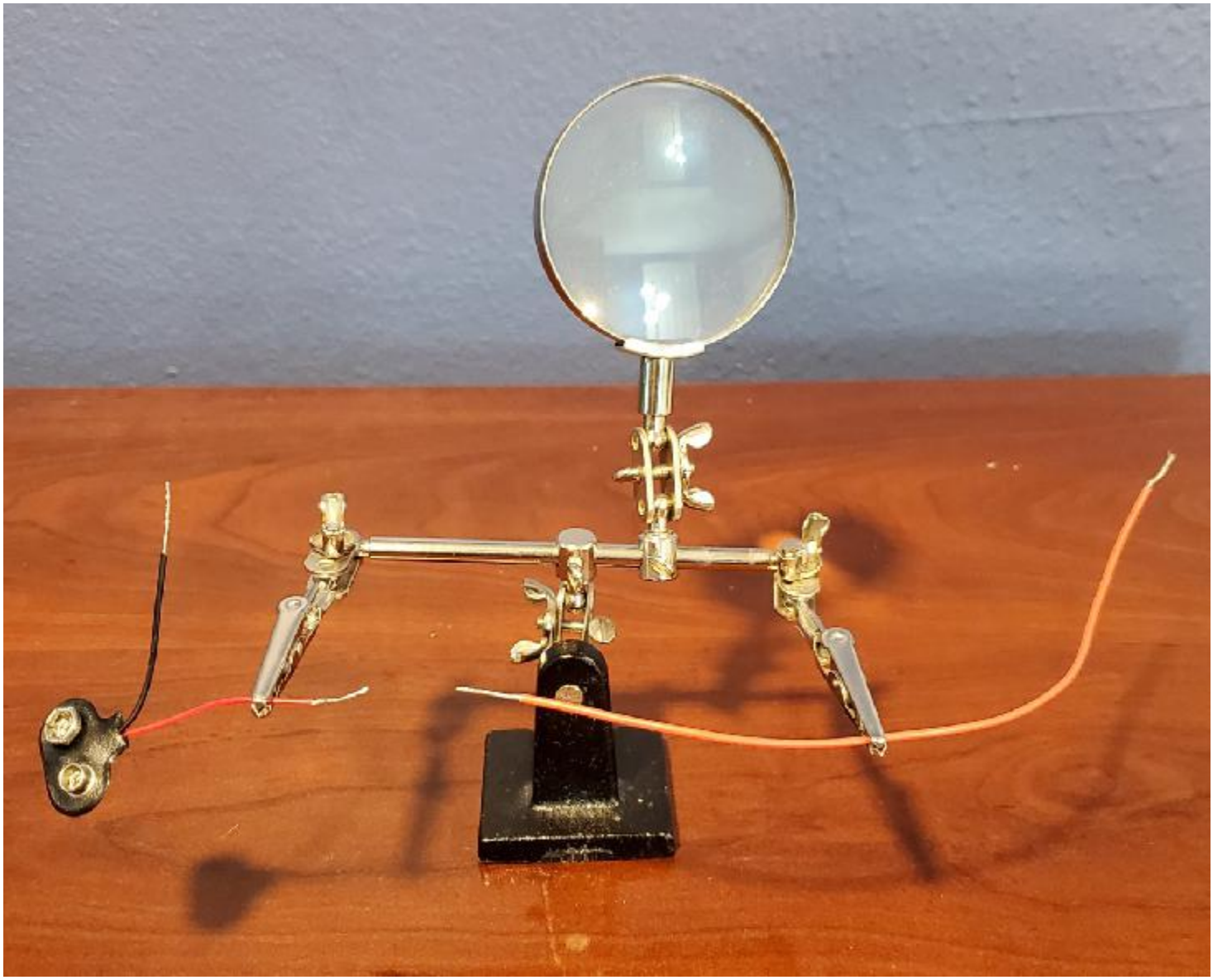


Step 204:

Obtain a soldering jig and mount the T Type 9V Battery Clip's red wire on one of the clips by its insulation ½" from one of the stripped ends.

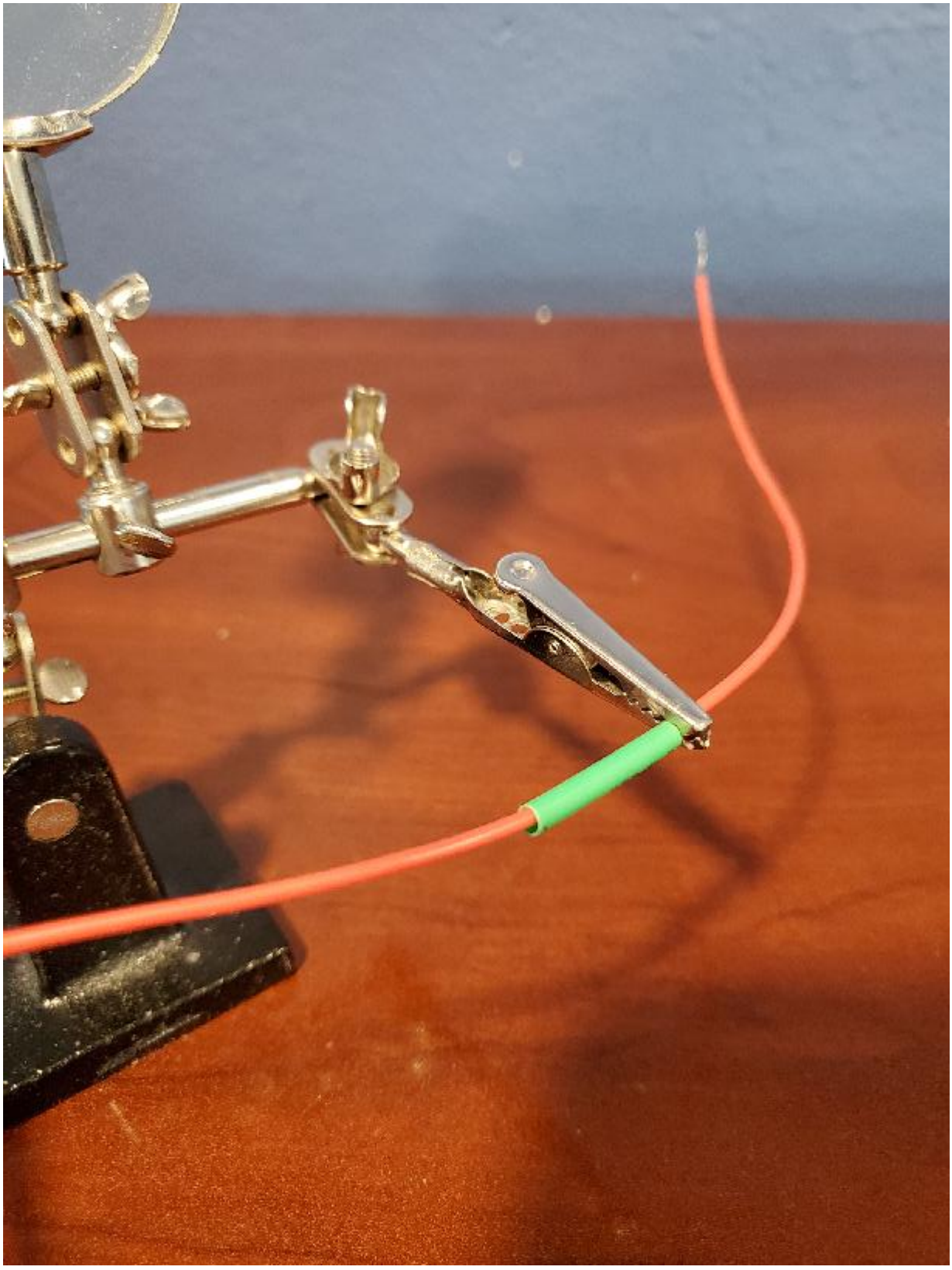
Step 205:

Using the remaining soldering jig clip, mount the 7" red wire 3" away from one of its stripped ends.



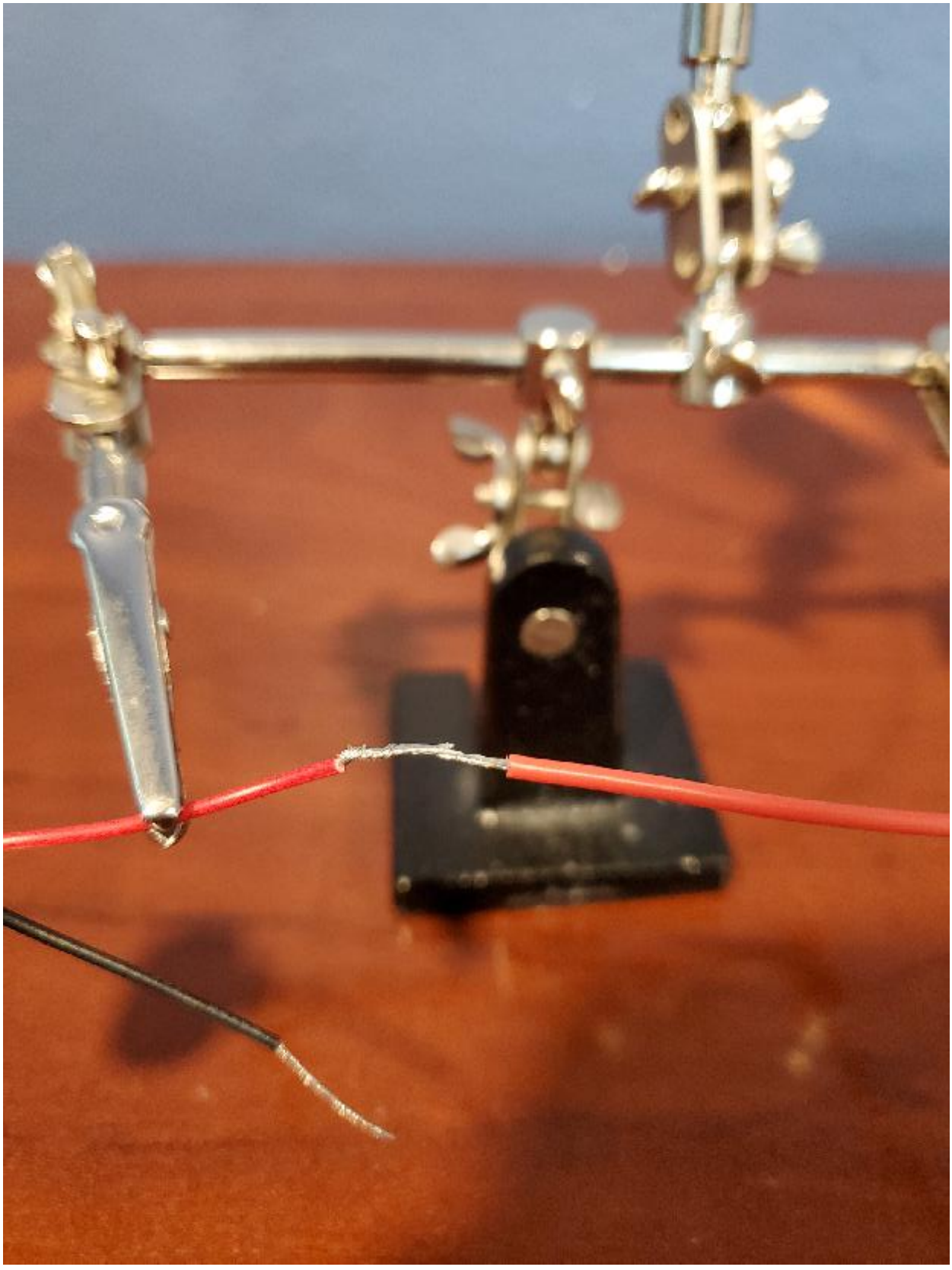
Step 206:

Obtain the remaining half of the 2.5x45mm heat shrink tube from step 184 and route it through the mounted 7" red wire.



Step 207:

Coil the stripped end of the red wire of the T Type 9V Battery Clip onto the stripped end of the 7" red wire.



Step 208:

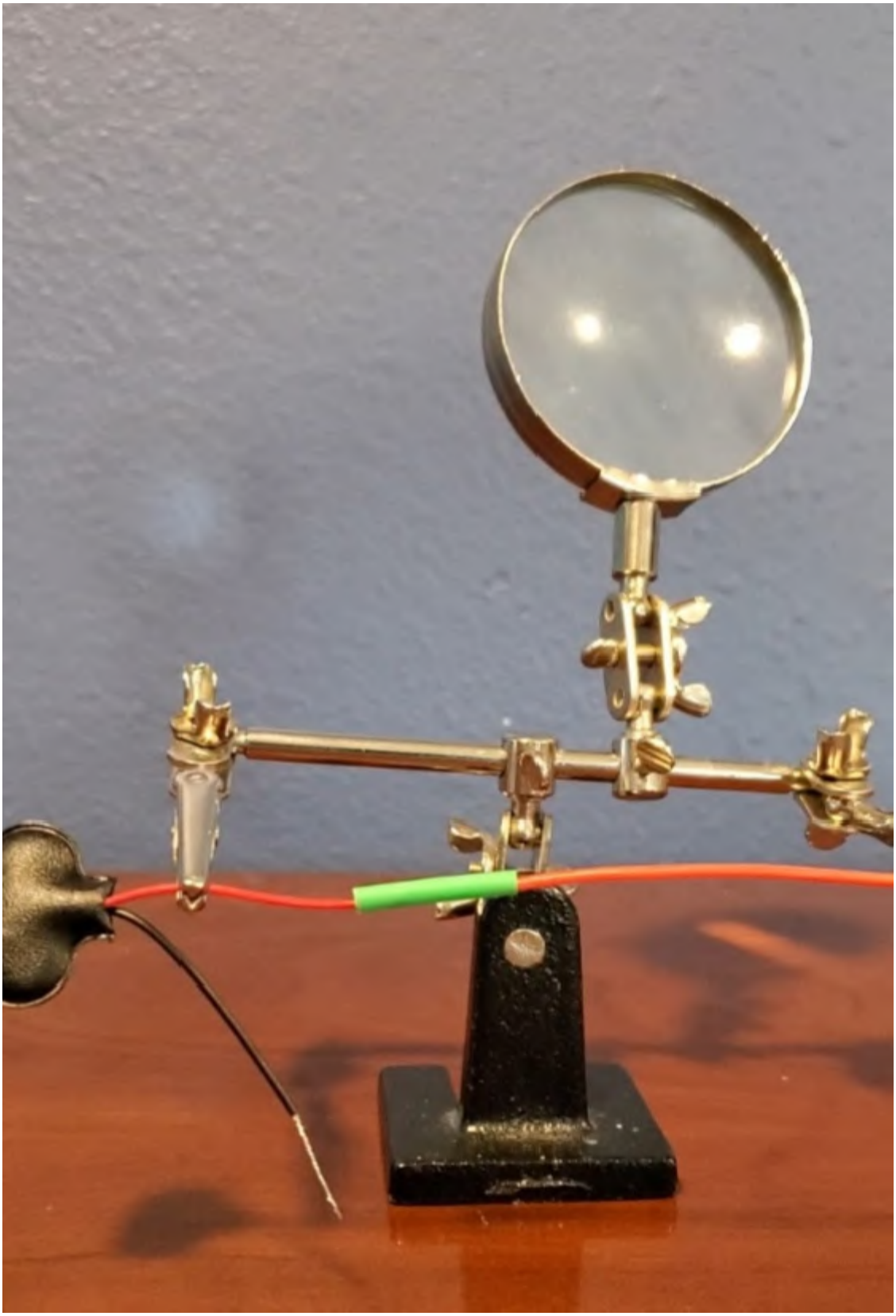
Obtain a soldering iron, turn it on and adjust its temperature settings to a temperature that is sufficient for the solder being used.

Step 209:

Carefully place the tip of the soldering iron on the coiled joint and quickly apply solder before its surrounding components begin to melt.

Step 210:

Move the cut heat shrink insulation tube and cover the soldered coiled joint.



Step 211:

Obtain a BBQ lighter and apply heat onto the cut heat shrink until it has shrunk to capacity.

Step 212:

Repeat steps 202-211 using black 22 AWG wire and the T Type 9V Battery Clip's black wire.

Step 213:

Release all components mounted on the clips of the soldering jig.

Step 214:

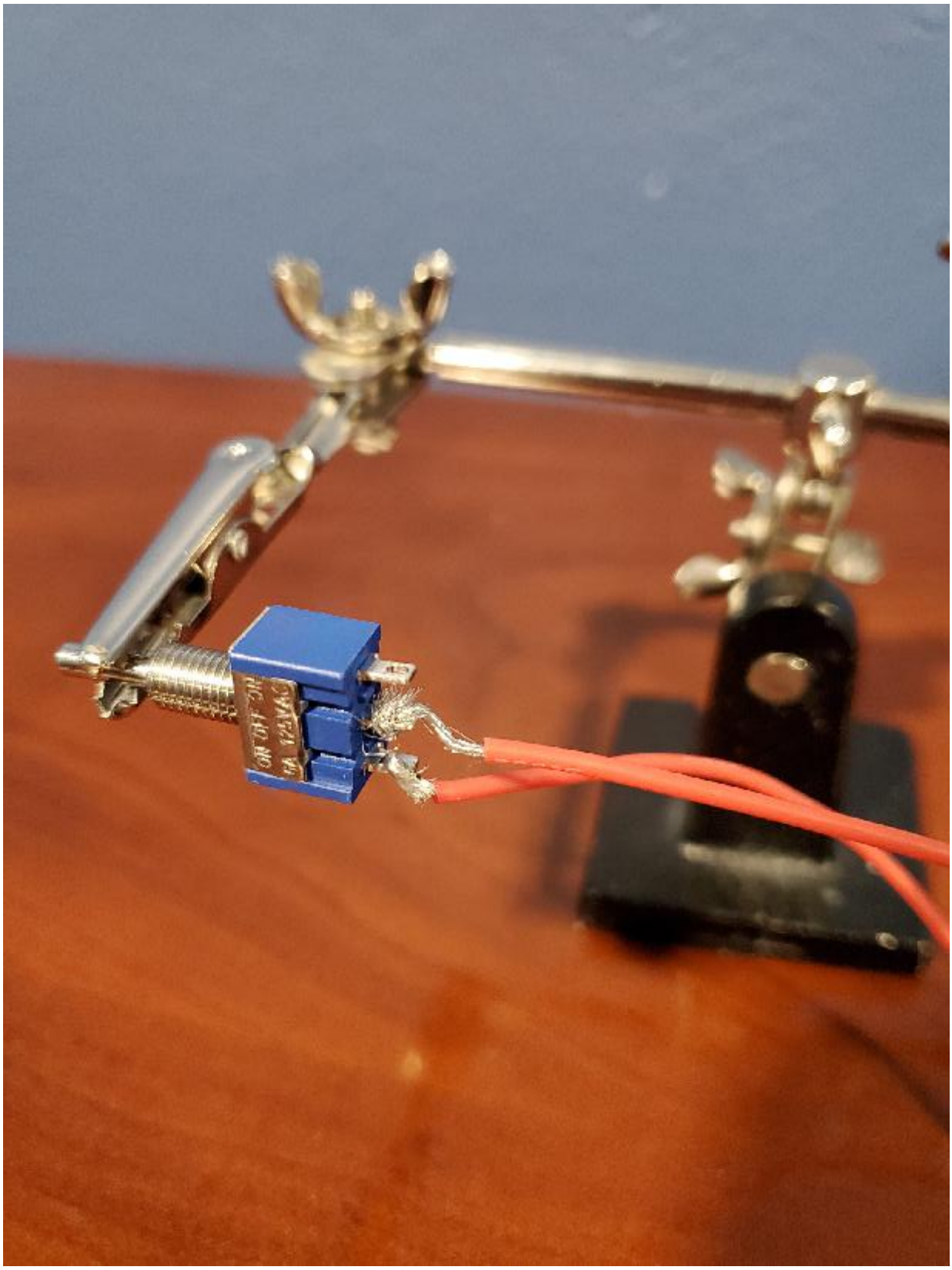
Obtain a soldering jig and mount the extended red wire of the T Type 9V Battery Clip on one of the clips by its insulation 3" from one of the stripped ends.

Step 215:

Obtain the on-off-on toggle switch with the 8" red wire soldered on and mount it to the remaining soldering jig clip by its handle.

Step 216:

Route the stripped end of the T Type 9V Battery Clip's red wire through the common terminal of the on-off-on toggle switch and coil it.

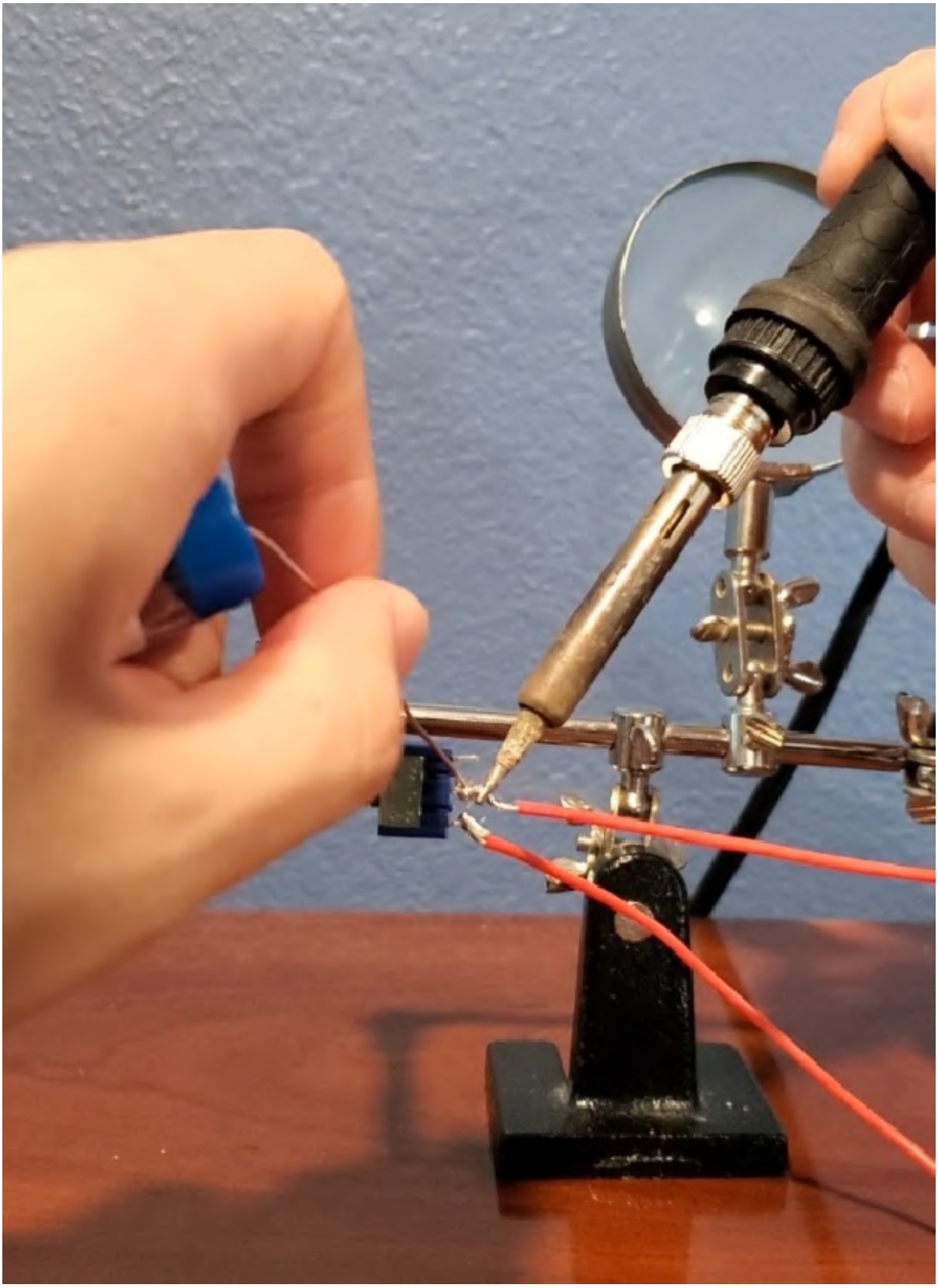


Step 217:

Obtain a soldering iron, turn it on and adjust its temperature settings to a temperature that is sufficient for the solder being used.

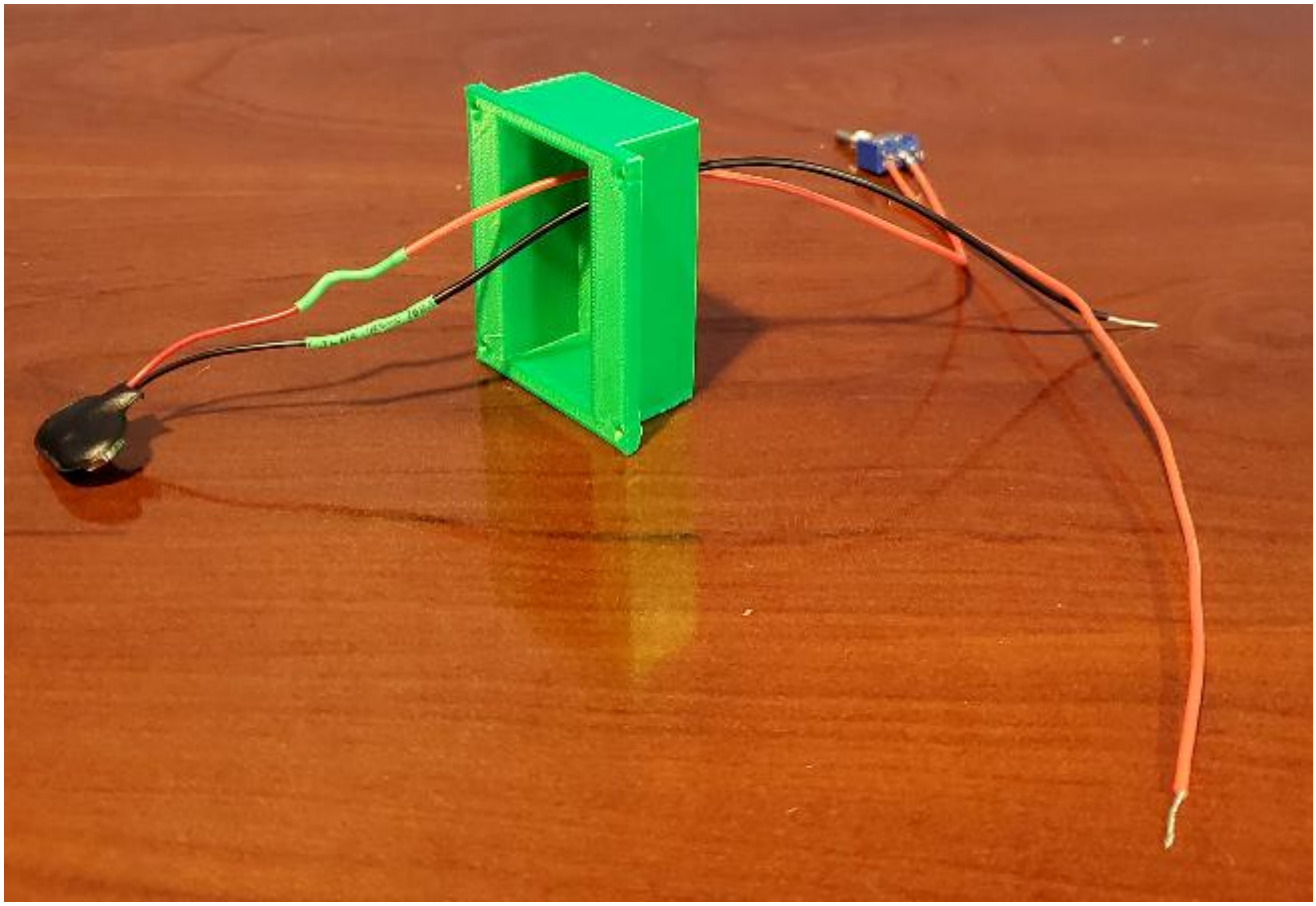
Step 218:

Carefully place the tip of the soldering iron on the coiled joint and quickly apply solder before its surrounding components begin to melt.



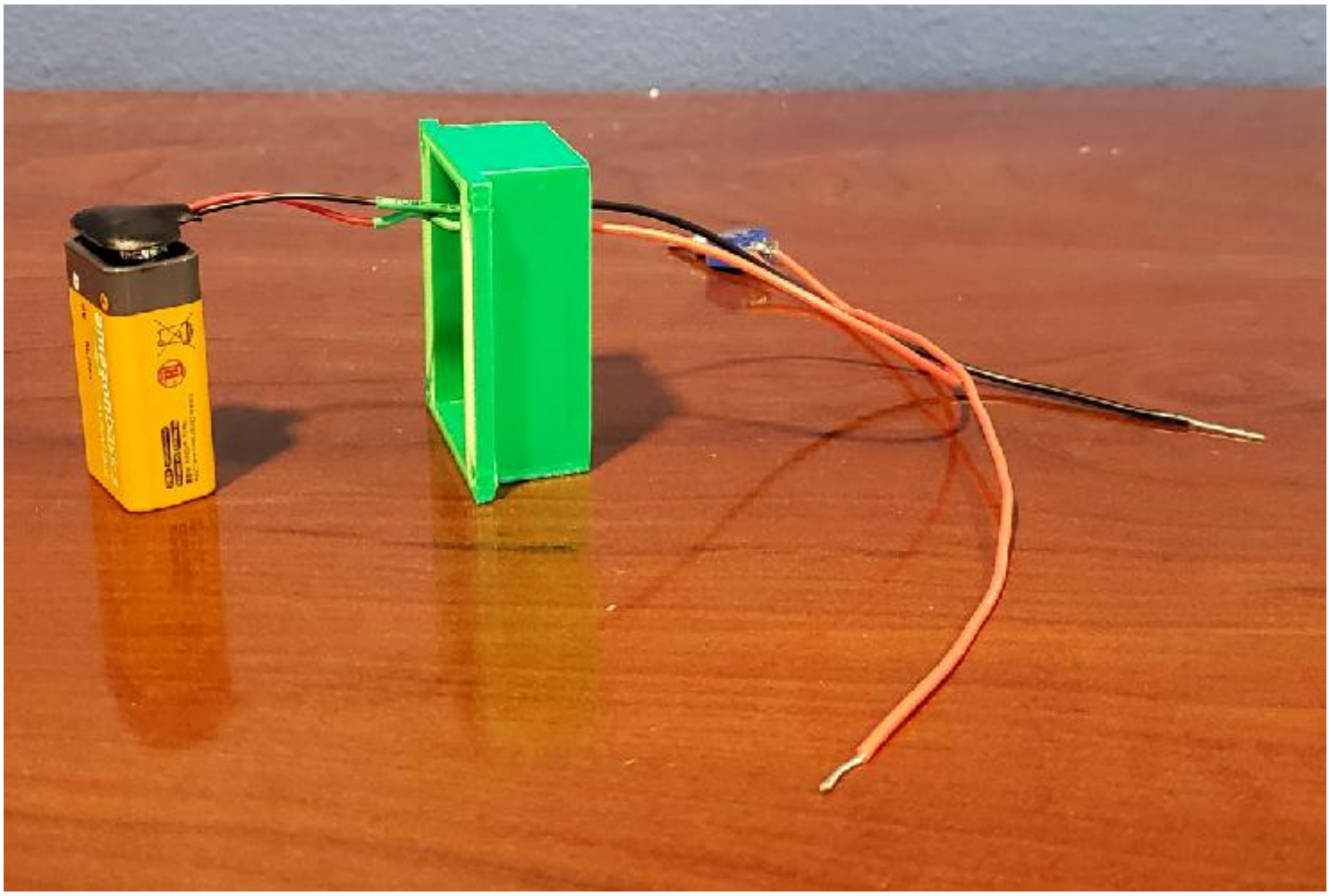
Step 219:

Obtain the 9VbatteryBracket part and the T Type 9V Battery Clip with the toggle switch attached and loop its clip through the rectangular hole like the figure below.



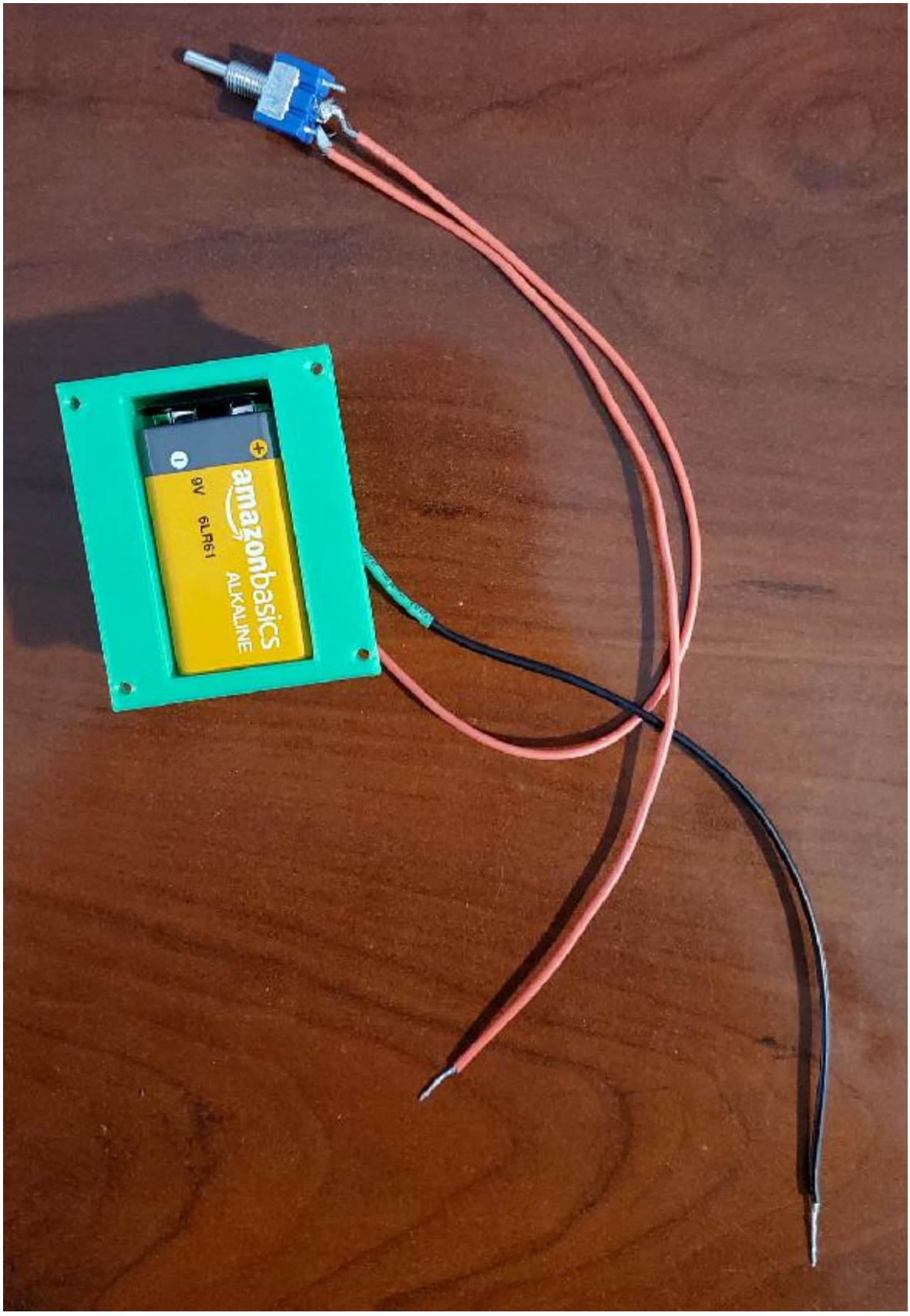
Step 220:

Obtain a 9 V Battery and attach the T Type 9V Battery Clip with the toggle switch attached to its terminals.



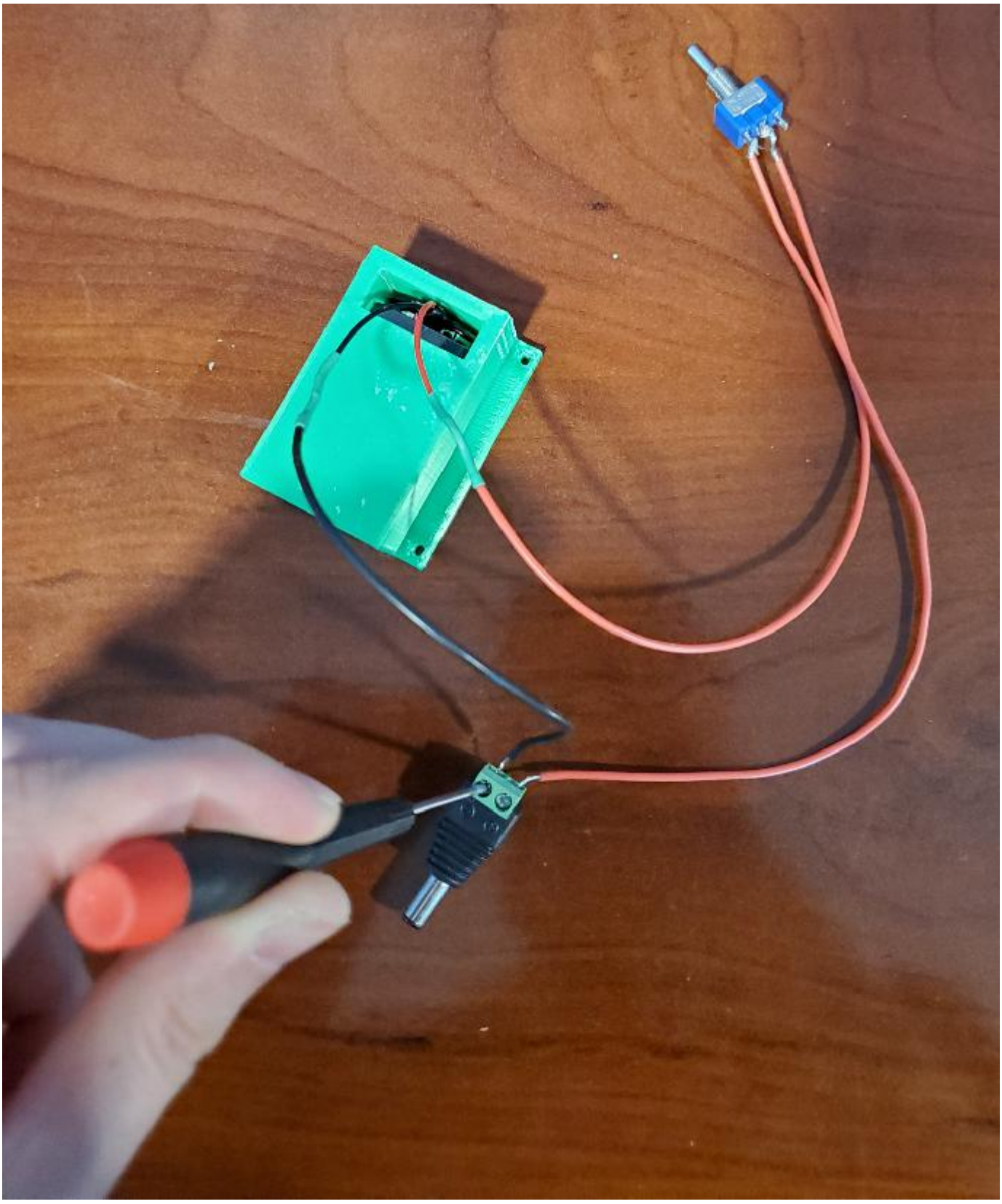
Step 221:

Mate the 9 V Battery coincident with the inner face containing the rectangular hole.



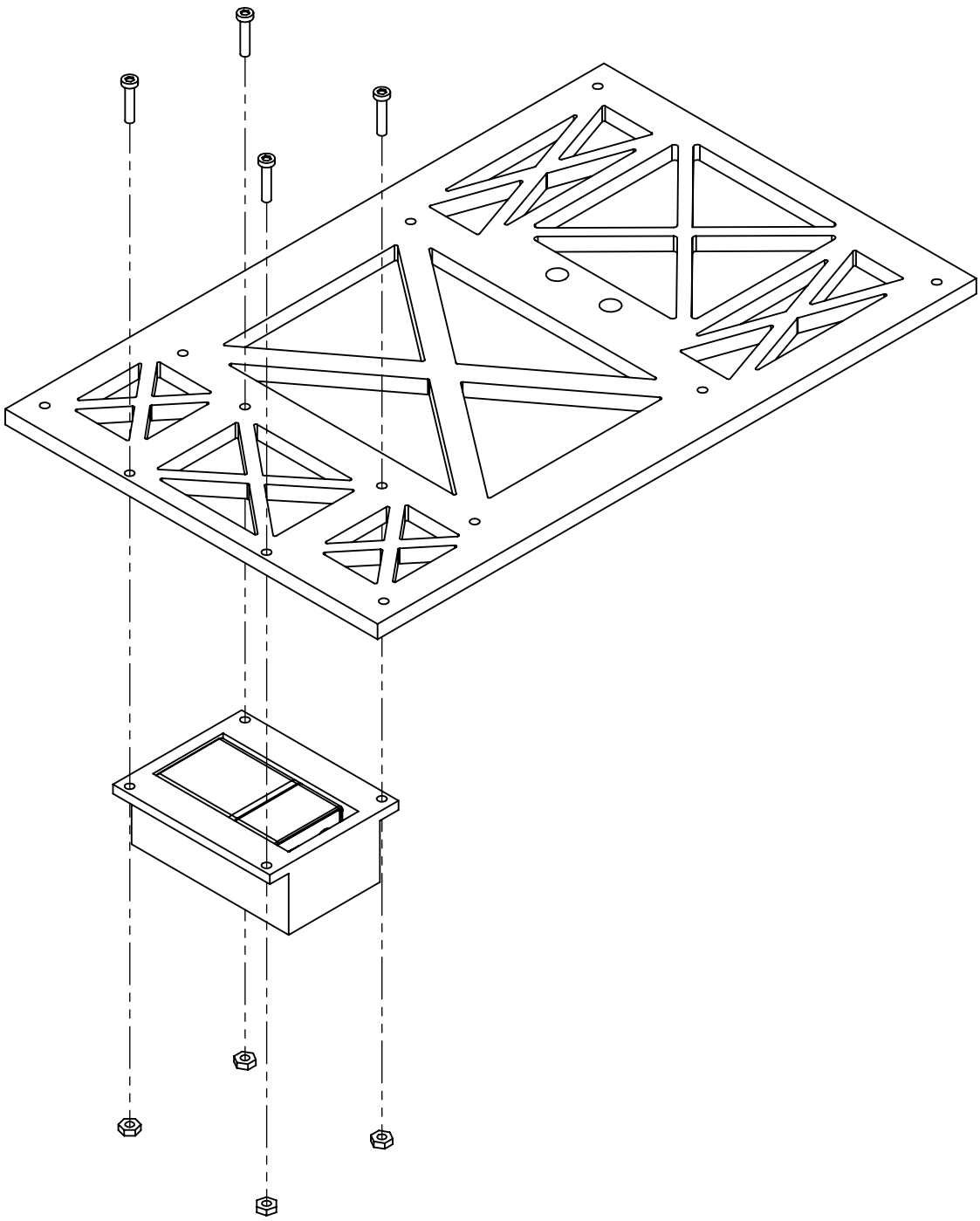
Step 222:

Obtain the male DC barrel jack with screw terminals, insert the stripped ends of the red and black wires into the '+' and '-' terminal blocks, respectively, and fasten the terminals.



Step 223:

Using four (4) M2.5 x 12 mm hex socket cap screws and M2.5 nuts, fasten the 9VbatteryBracket containing the 9 V battery onto the topChassis part.

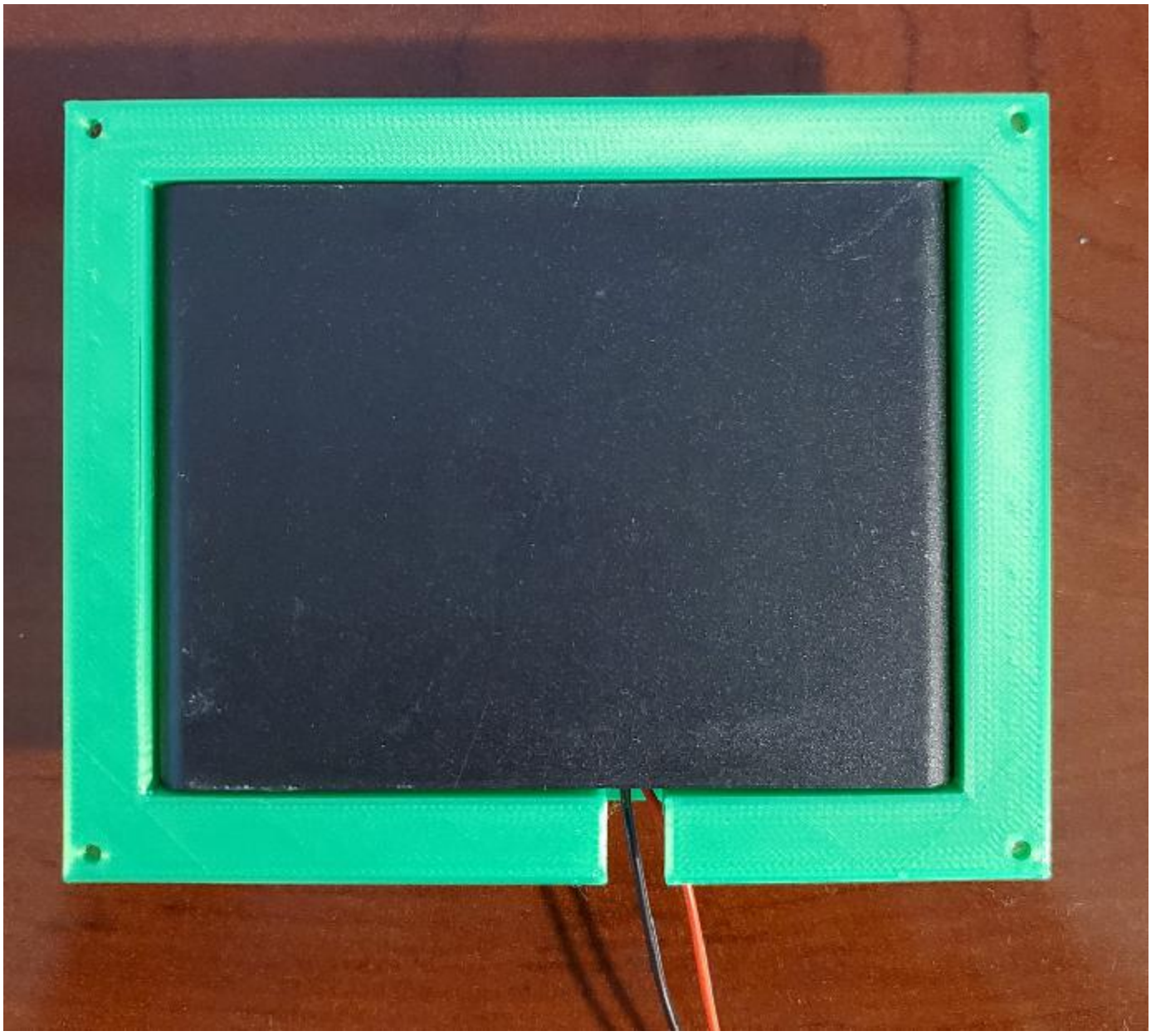


Step 224:

Slide the toggle switch of the 6X 1.5V AA Battery Storage Case to ‘ON’.

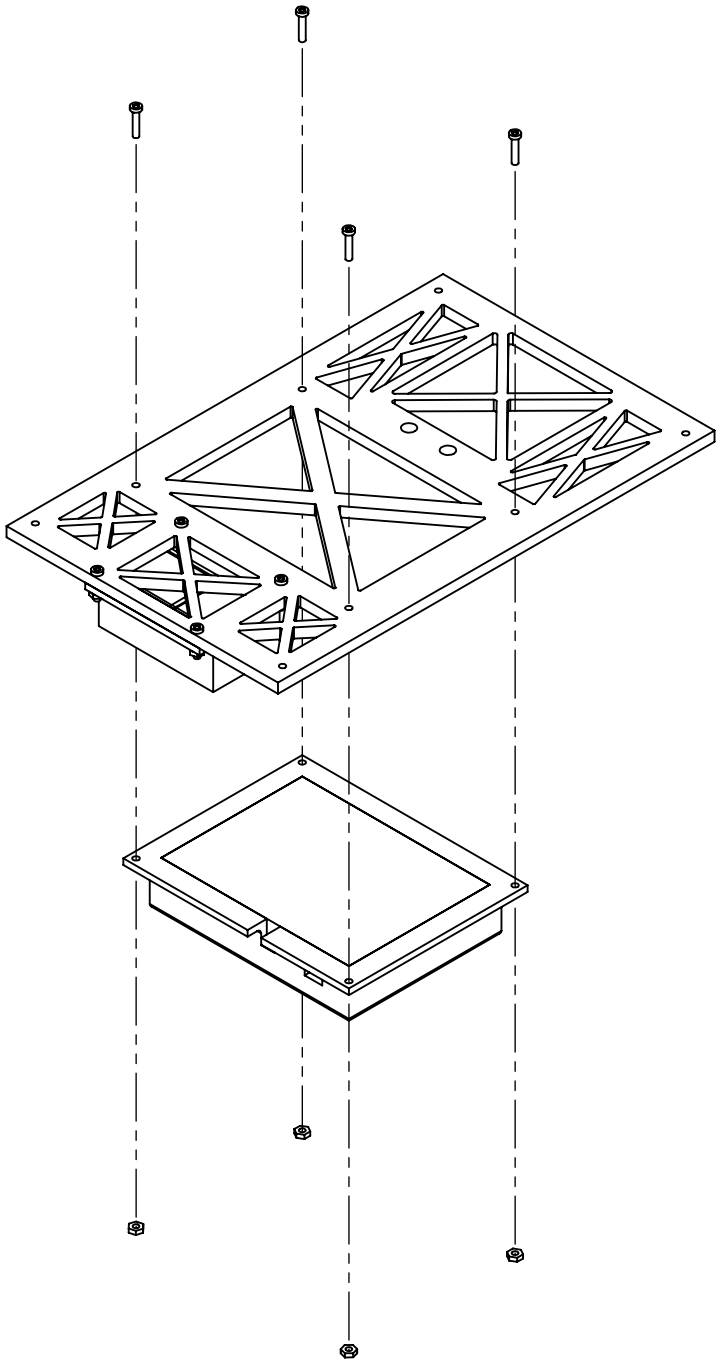
Step 225:

Insert the 6X 1.5V AA Battery Storage Case into the AAbatteryPackBracket's cavity.



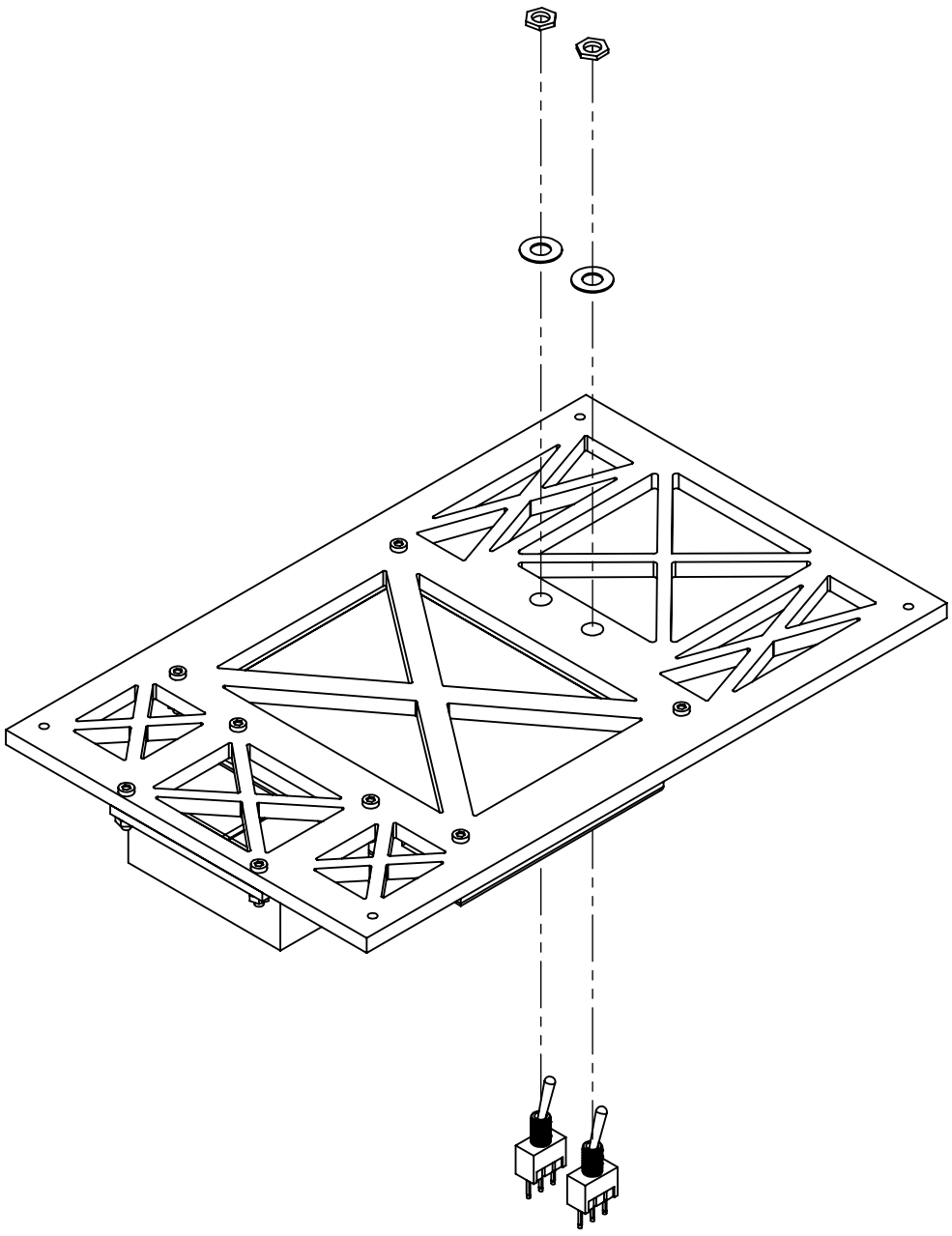
Step 226:

Using four (4) M2.5 x 12 mm hex socket cap screws and M2.5 nuts, fasten the AAbatteryPackBracket containing the 6X 1.5V AA Battery Storage Case onto the topChassis part.



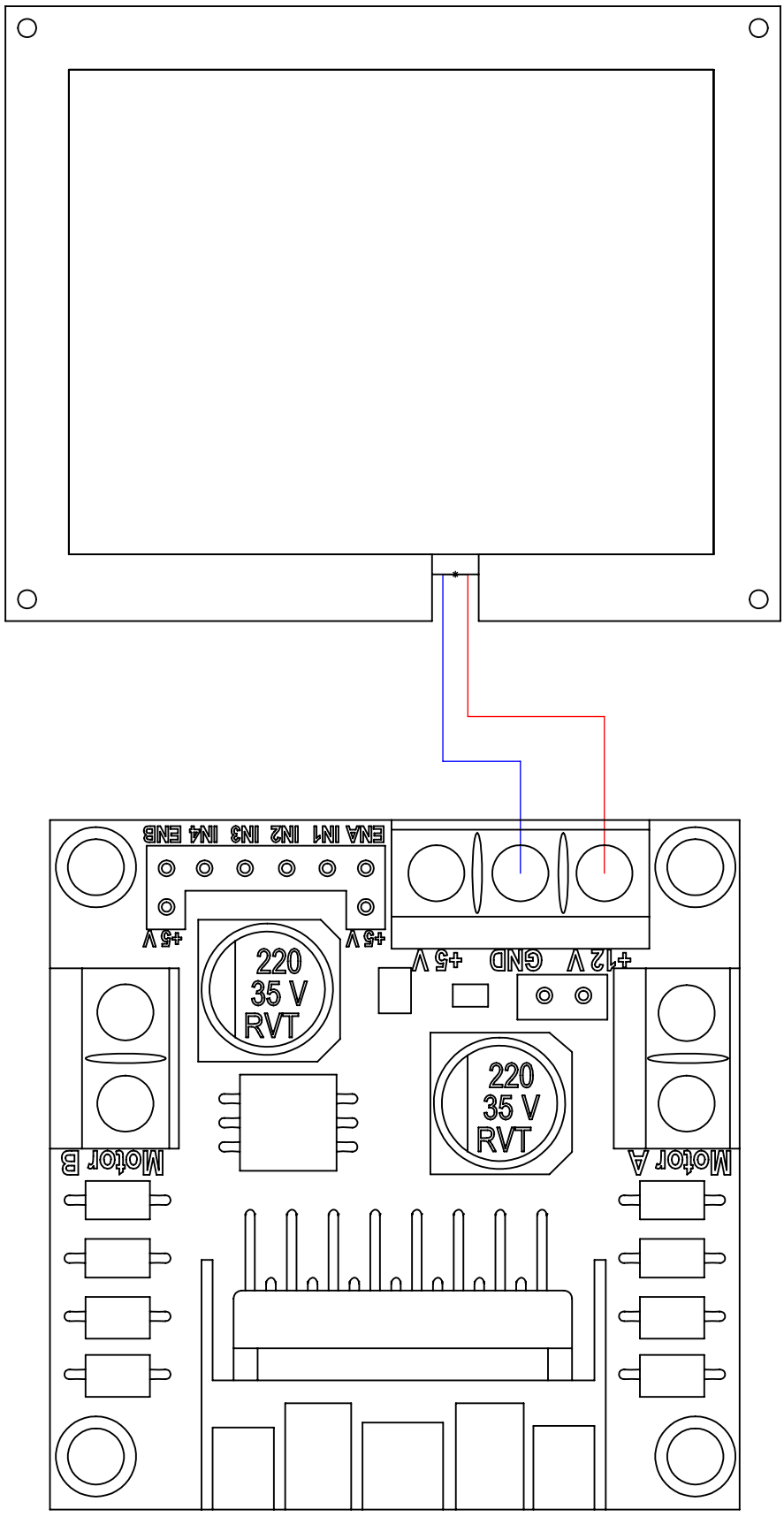
Step 227:

Fasten the two on-off-on toggle switches to the topChassis part using their included hex nut.



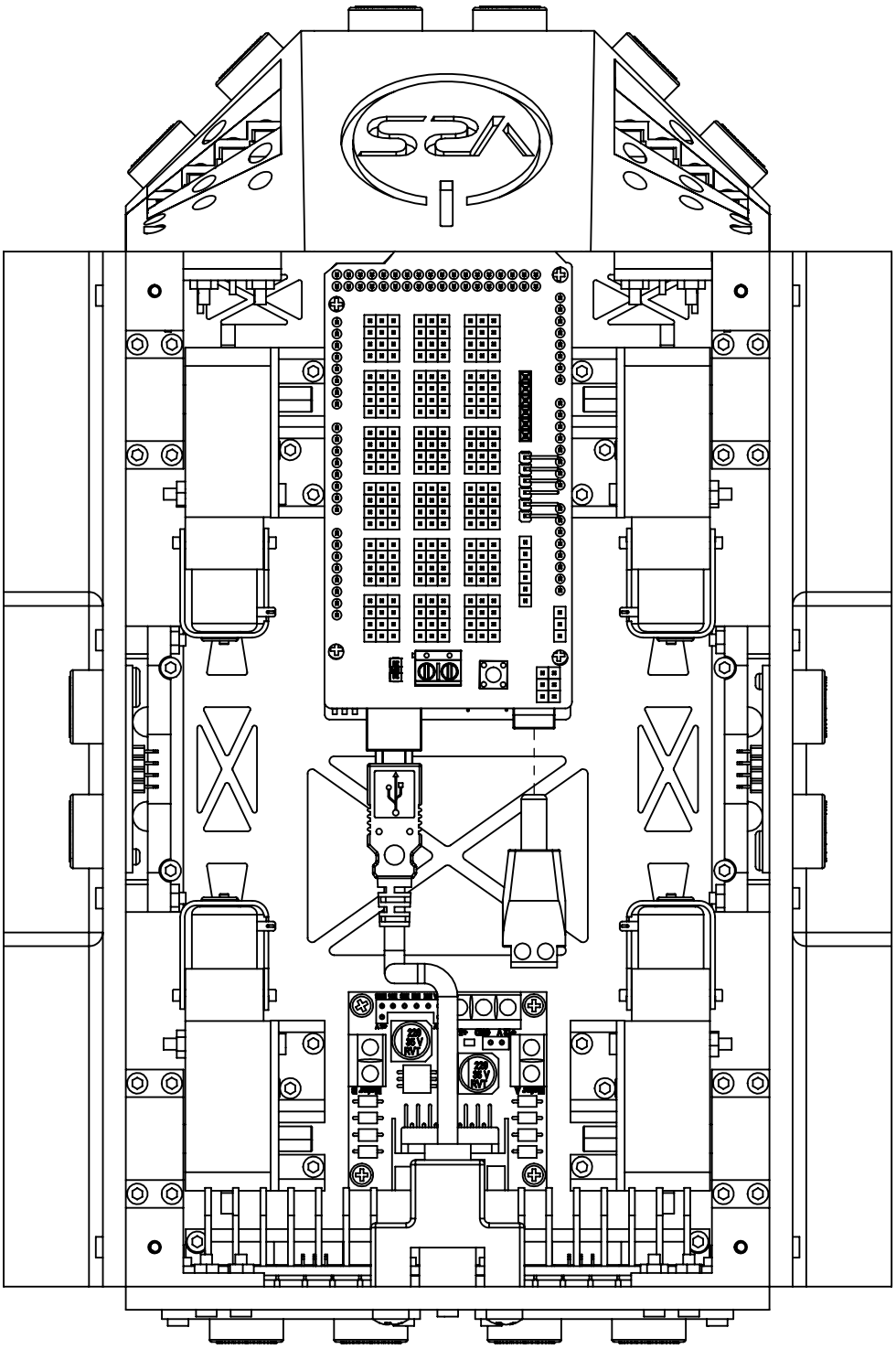
Step 228:

Using male-male and female-female jumper wires provided, connect the Adruino Mega Sensor Shield to the L298N motor driver as shown below.



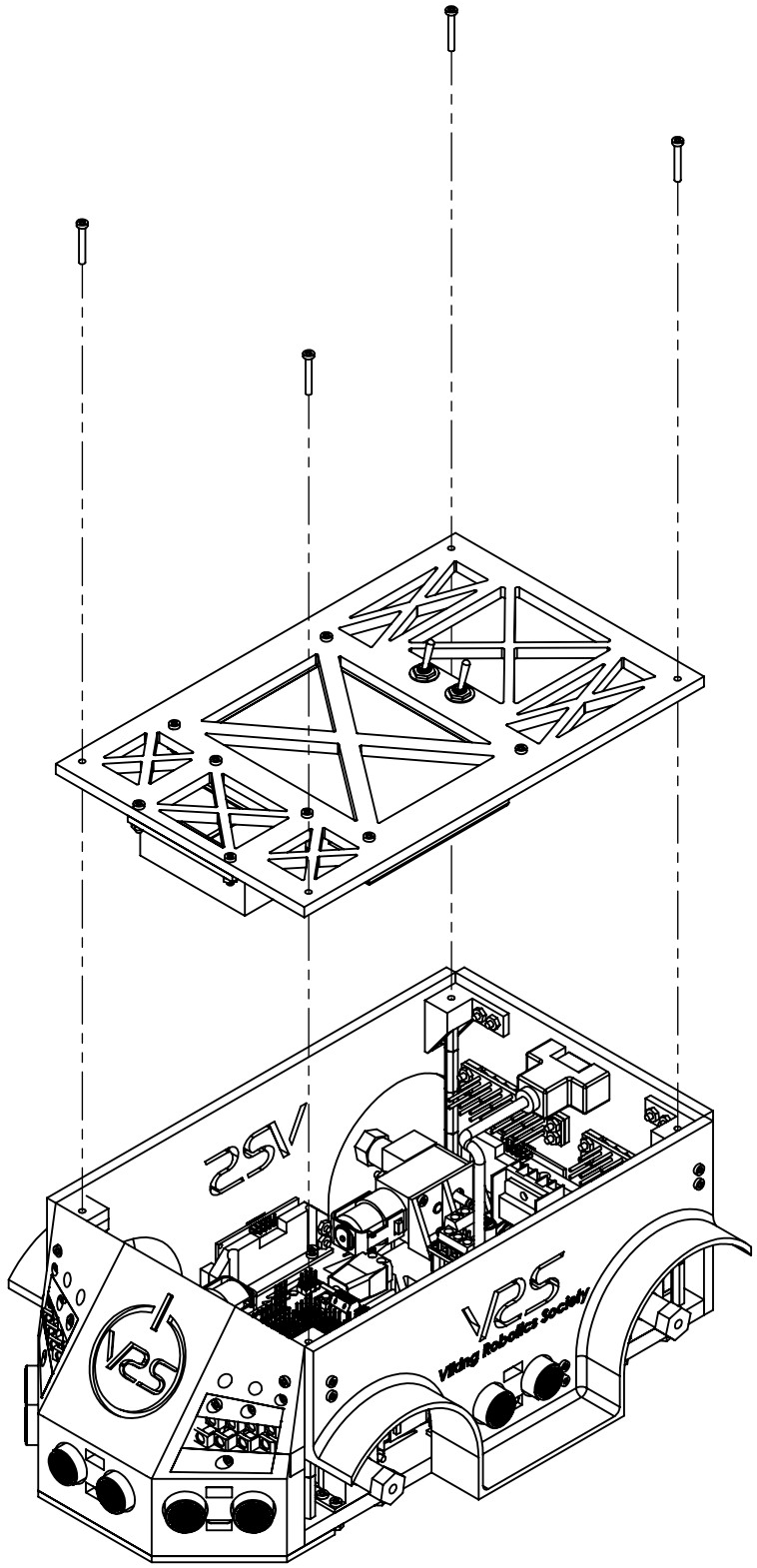
Step 229:

Plug in the male DC barrel jack from the topChassis assembly and plug it into the female DC barrel jack of the Arduino Mega.



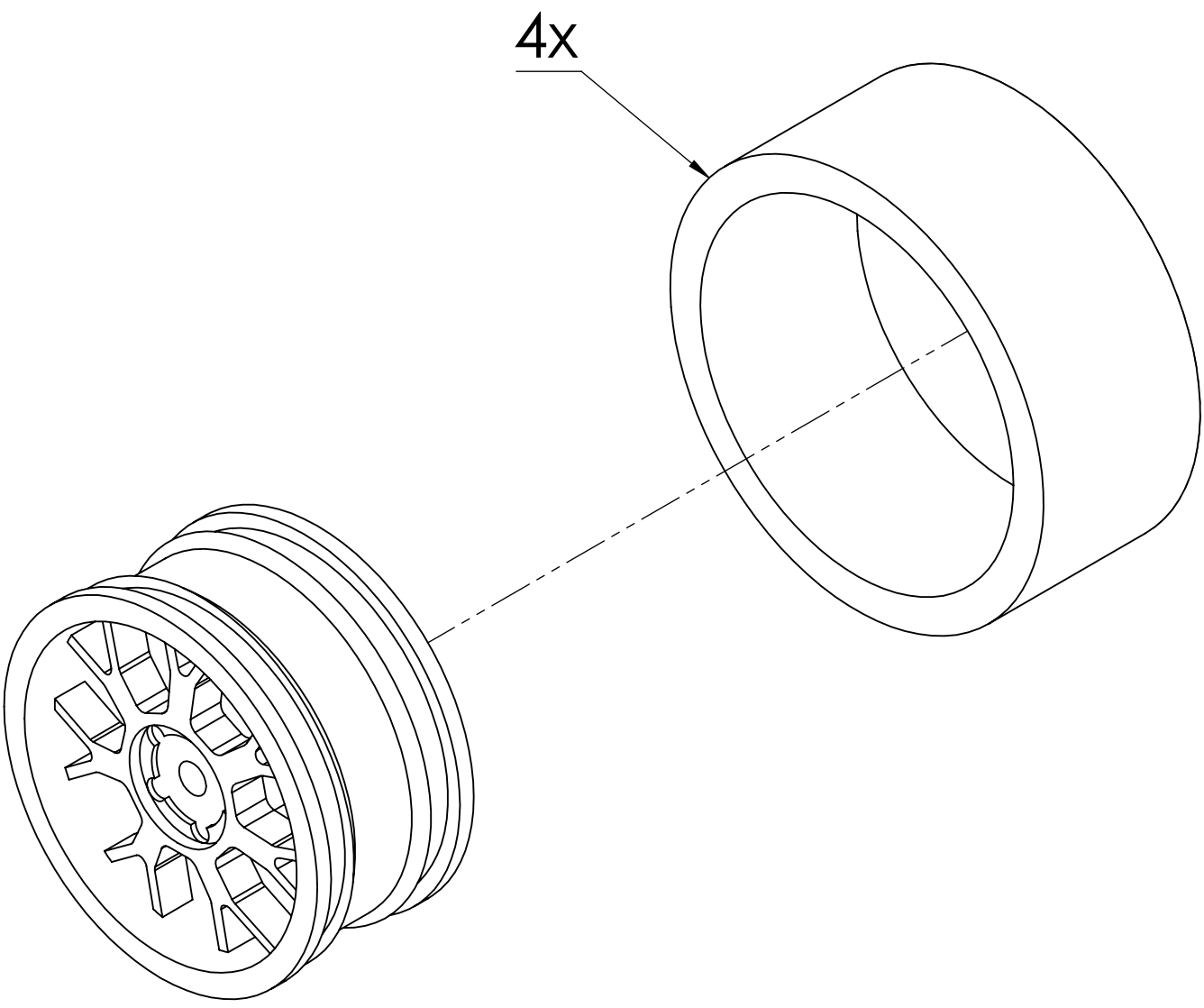
Step 230:

Using four (4) M2.5 x 18 mm hex socket cap screws, fasten the topChassis subassembly onto the vrsLearningKit.



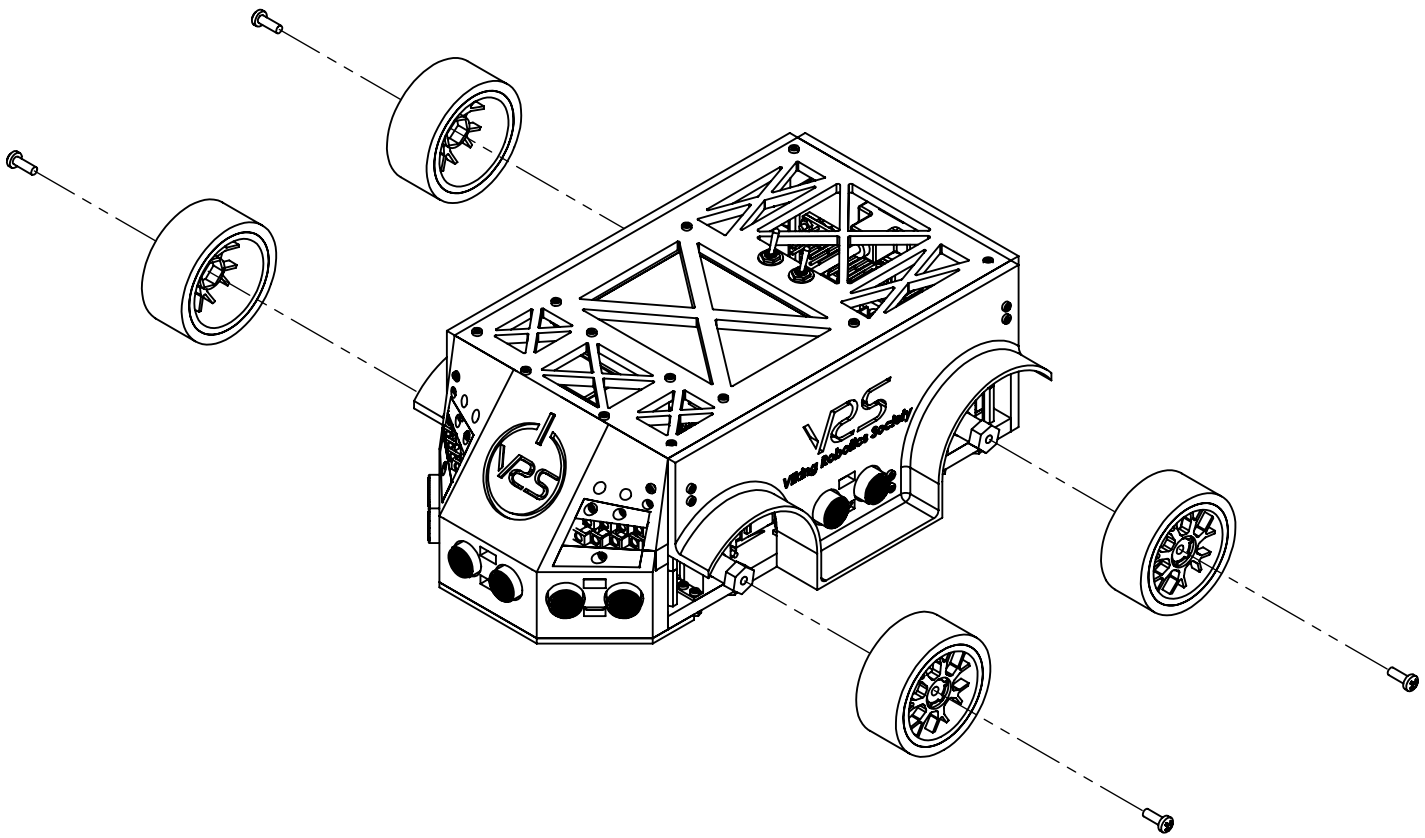
Step 231:

Using four (4) M2.5 x 18 mm hex socket cap screws, fasten the topChassis subassembly onto the vrsLearningKit.



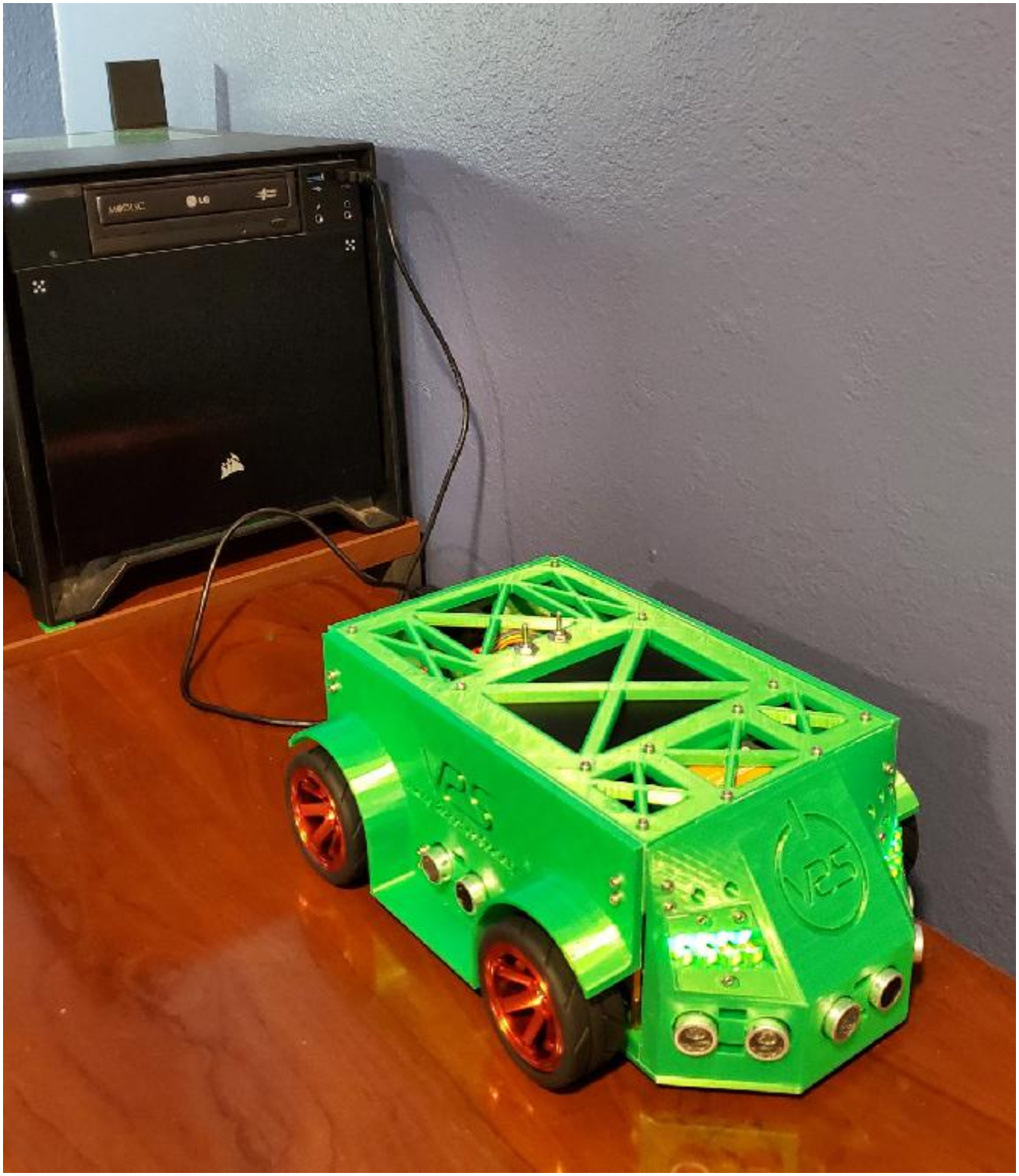
Step 232:

Using four (4) M4 x 12 mm cross head screws, fasten the wheels onto the vrsLearningKit.



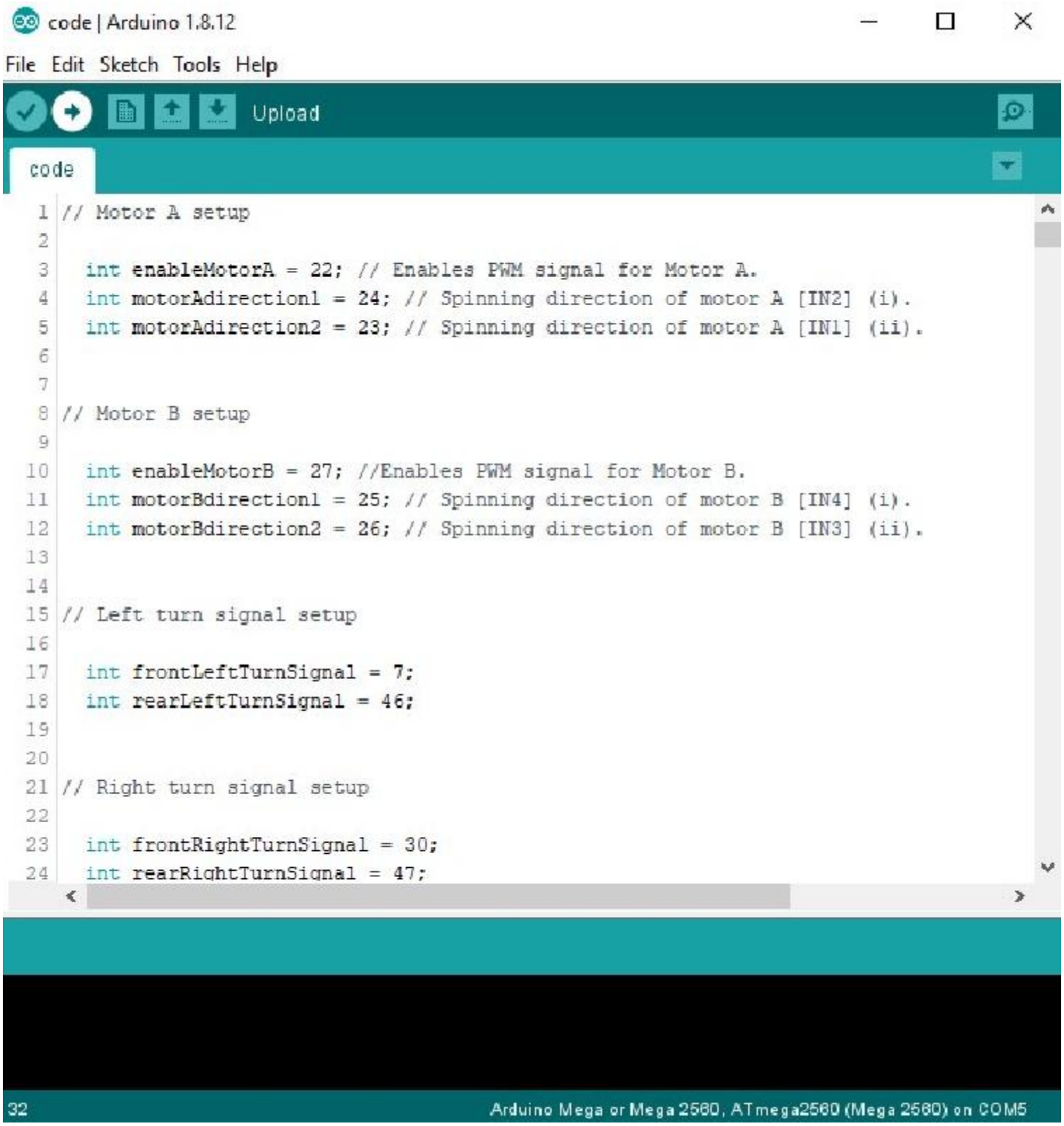
Step 233:

Plug in a USB type A to USB type B cable from a USB type A port on your computer to the USB type B port on the vrsLearningKit.



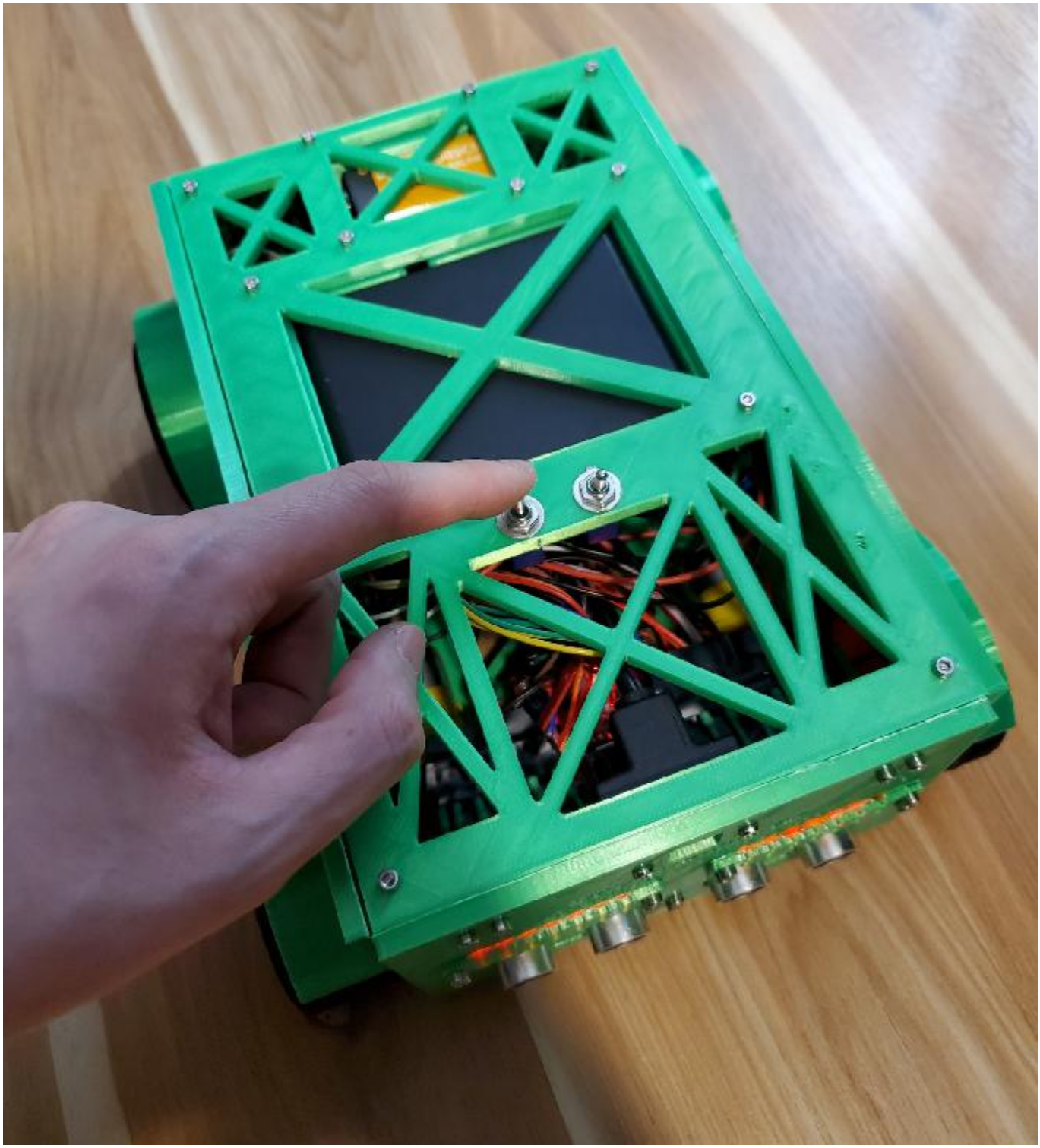
Step 234:

Open the code.ino file located in the code folder within the VRS-Learning-Kit folder and upload the code to the vrsLearningKit.

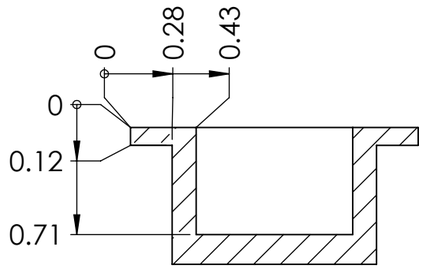


Step 235:

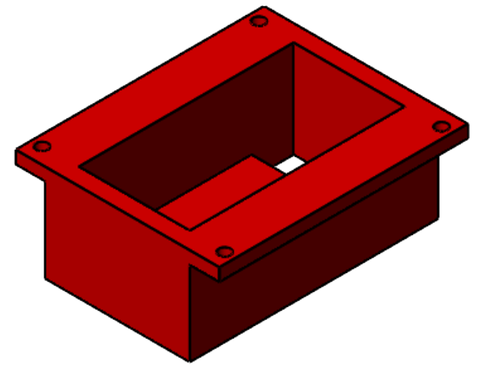
Unplug the USB type A to USB type B cable from the vrsLearningKit, flip the toggle switches mounted on the topChassis part and enjoy!

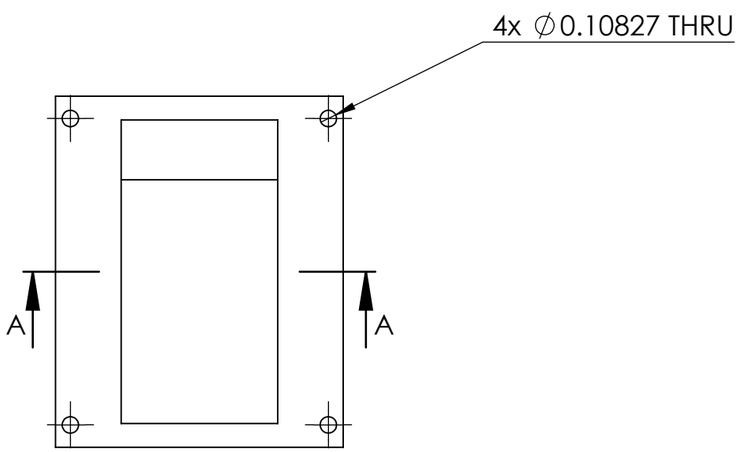


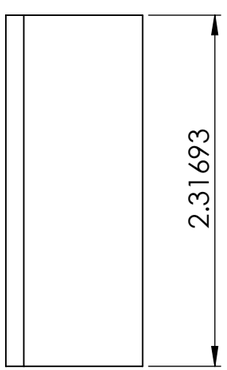
9VbatteryBracket

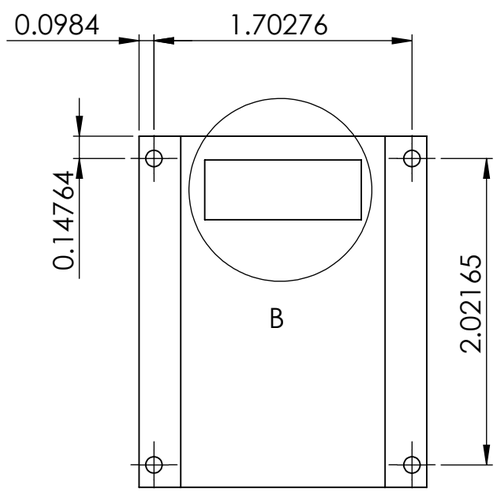


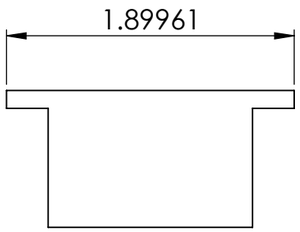
SECTION A-A

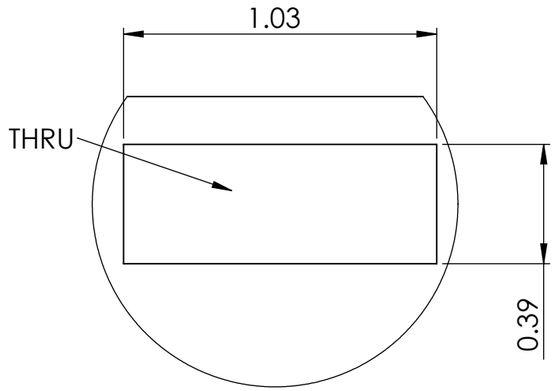










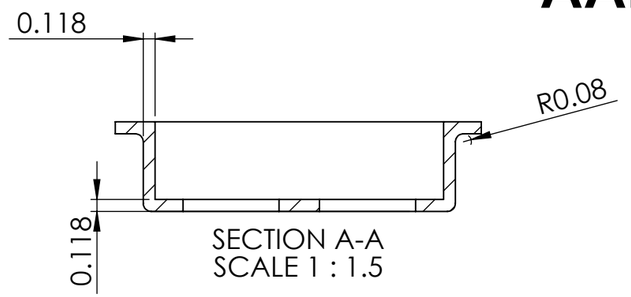


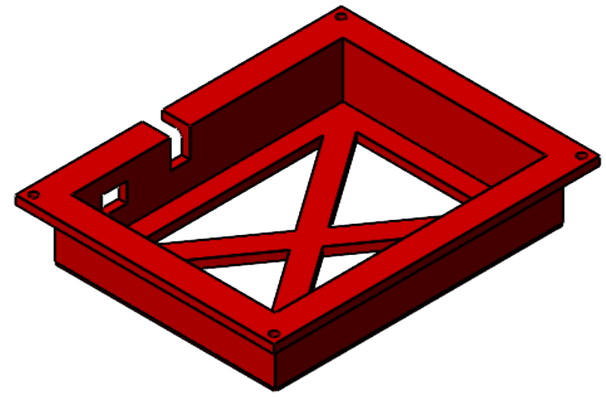
DETAIL B
SCALE 2 : 1

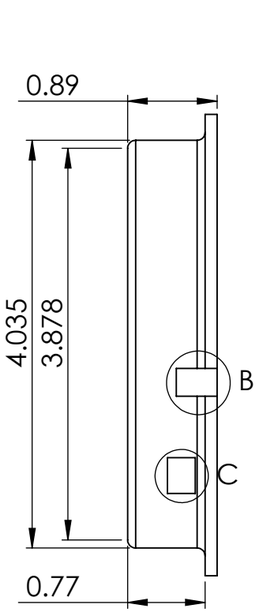
Viking Robotics Society

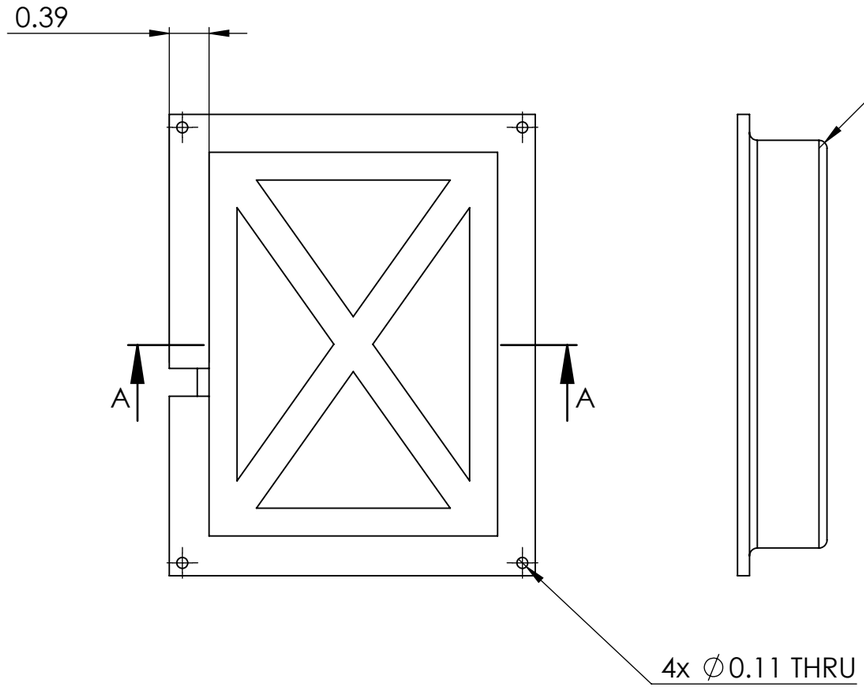
9VbatteryBracket	
PROJECT	vrsLearningKit
AUTHOR	Michael Nguyen
DATE	10/12/2021
REVISION	0
UNITS	Imperial

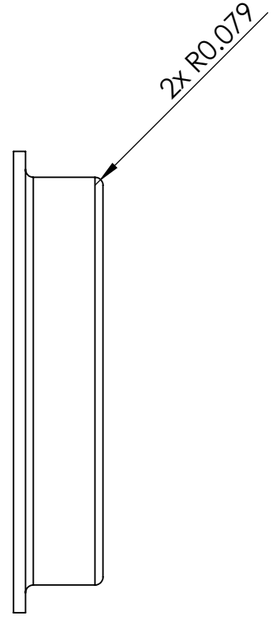
AAbatteryPackBracket

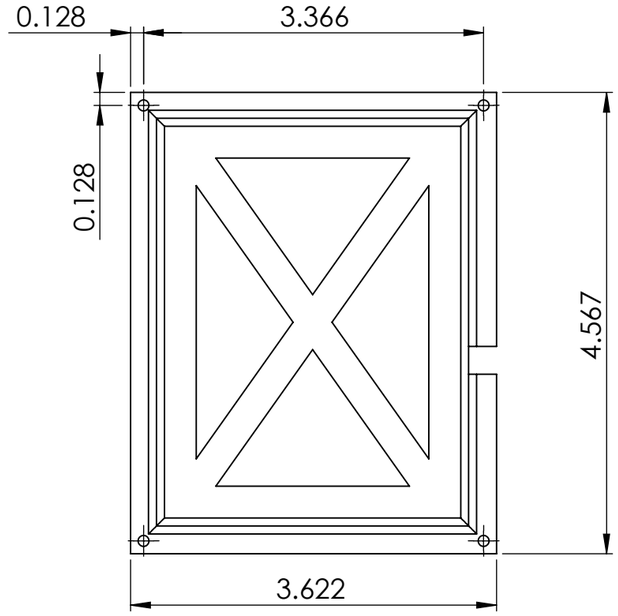


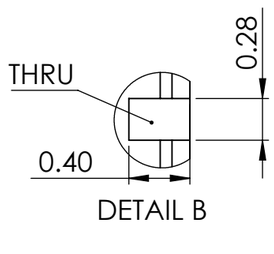


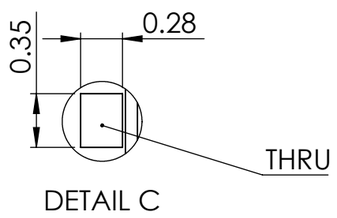








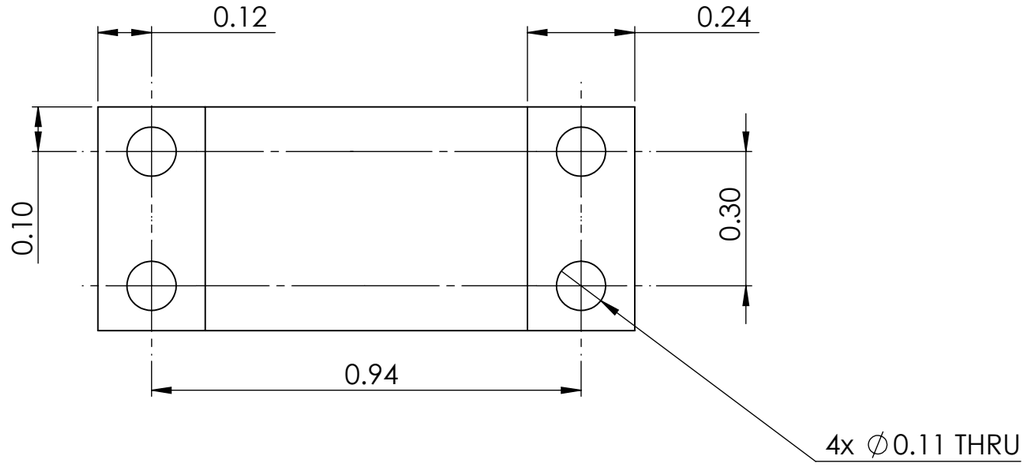


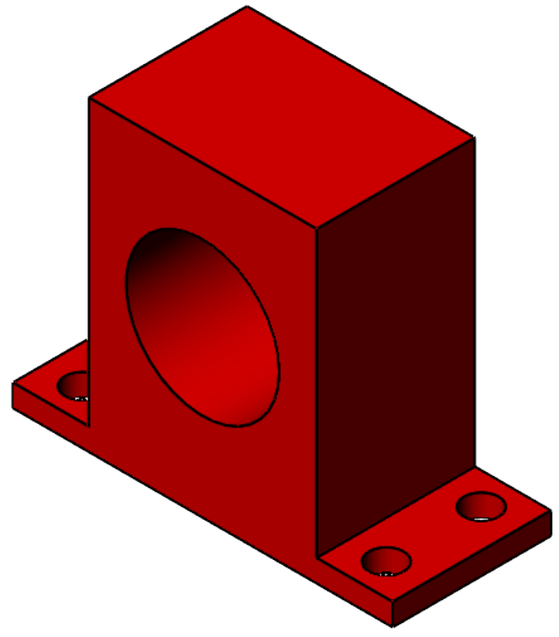


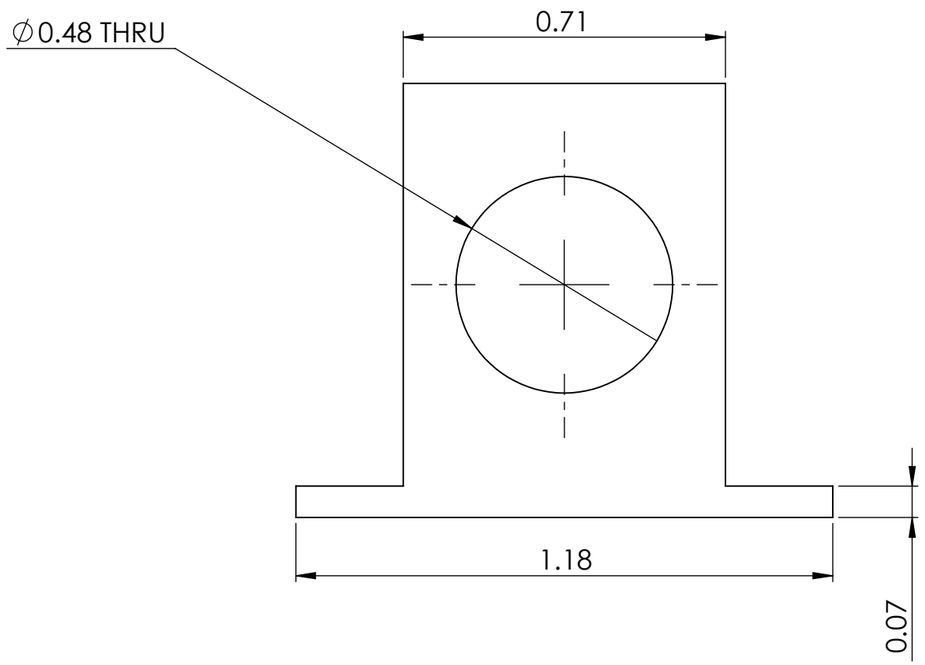
Viking Robotics Society

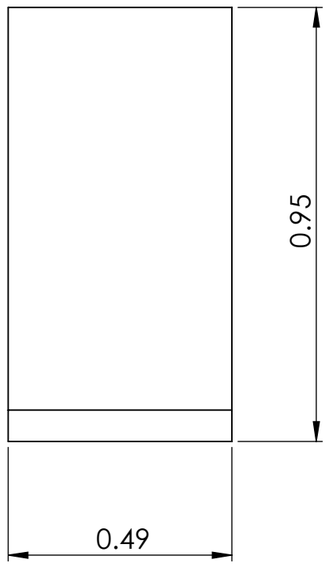
AAbatteryPackBracket	
PROJECT	vrsLearningKit
AUTHOR	Michael Nguyen
DATE	10/12/2021
REVISION	0
UNITS	Imperial

couplingCollarBracket





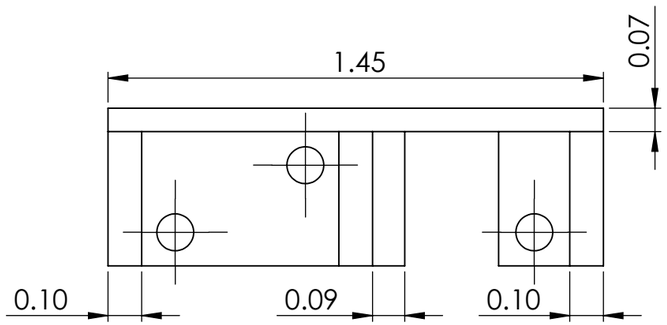


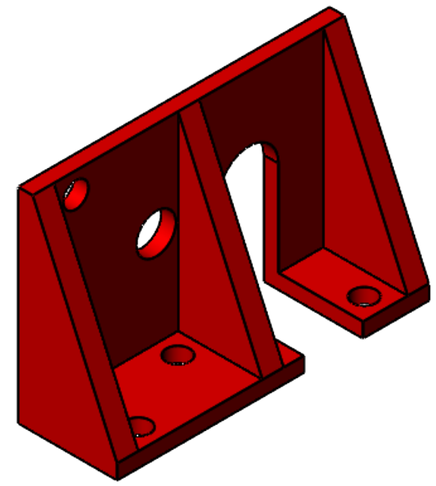


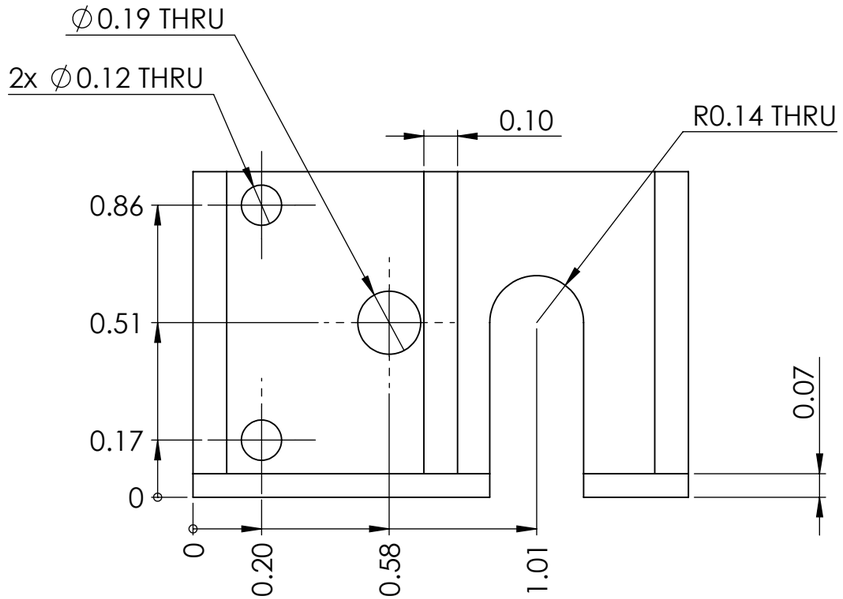
Viking Robotics Society

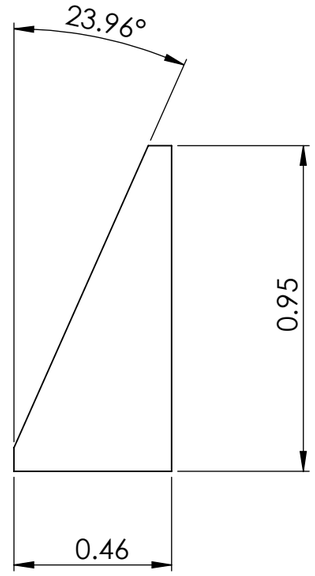
couplingCollarBracket	
PROJECT	vrsLearningKit
AUTHOR	Michael Nguyen
DATE	10/14/2021
REVISION	0
UNITS	Imperial

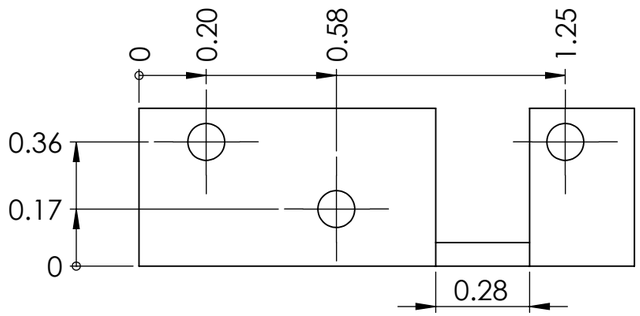
daguDCmotorBracketPiece1





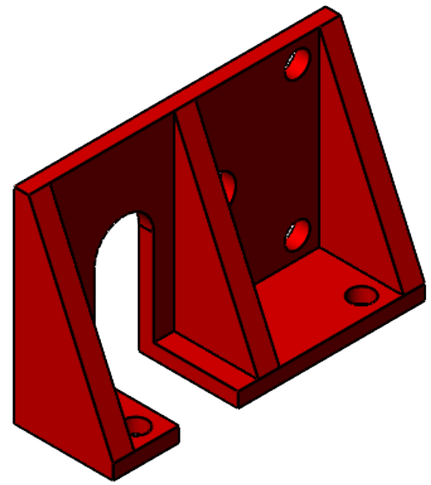


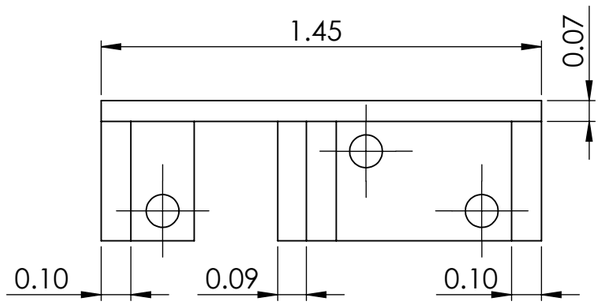


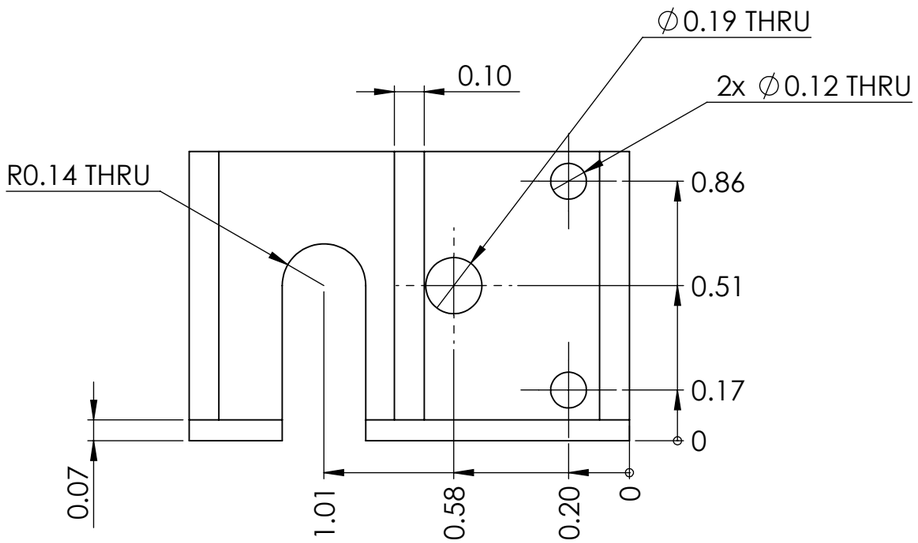


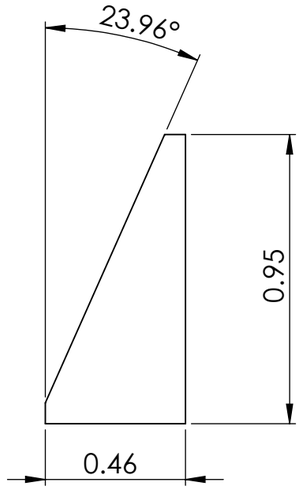
Viking Robotics Society	daguDCmotorBracketPiece1
PROJECT	vrsLearningKit
AUTHOR	Michael Nguyen
DATE	10/14/2021
REVISION	0
UNITS	Imperial

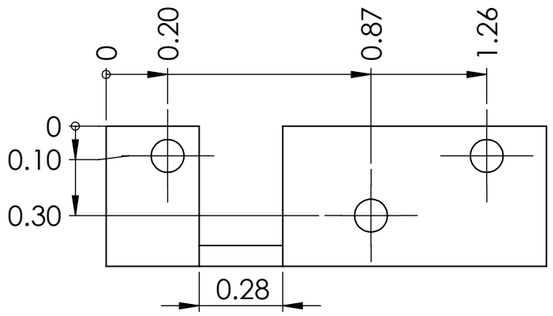
daguDCmotorBracketPiece2







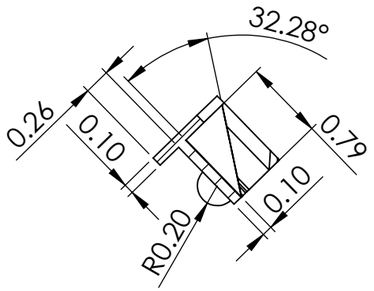




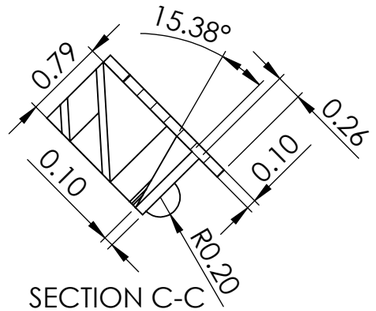
Viking Robotics Society

daguDCmotorBracketPiece2	
PROJECT	vrsLearningKit
AUTHOR	Michael Nguyen
DATE	10/15/2021
REVISION	0
UNITS	Imperial

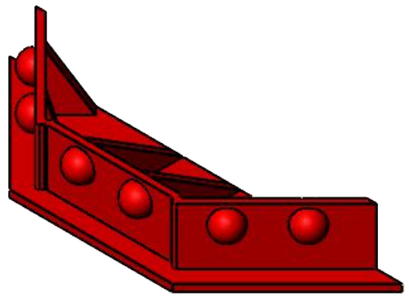
frontDistanceSensorBracket

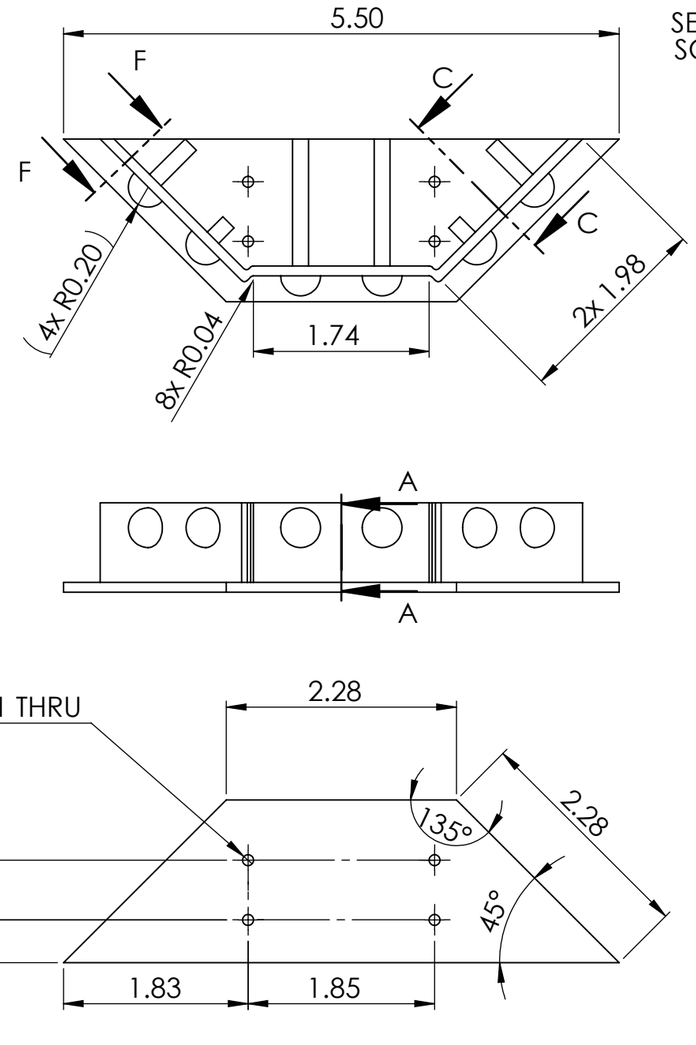


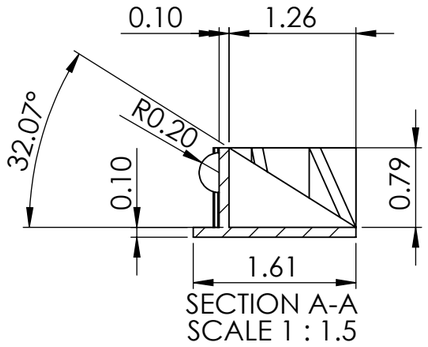
SECTION F-F
SCALE 1 : 1.5



SECTION C-C
SCALE 1 : 1.5





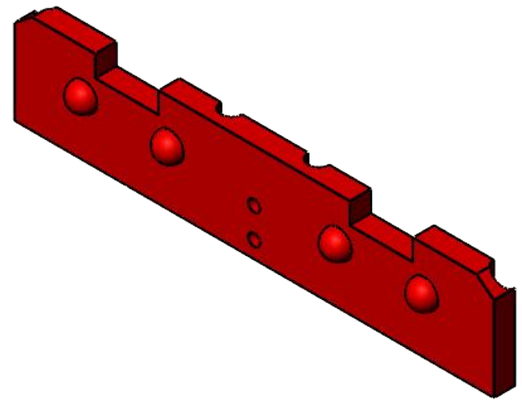


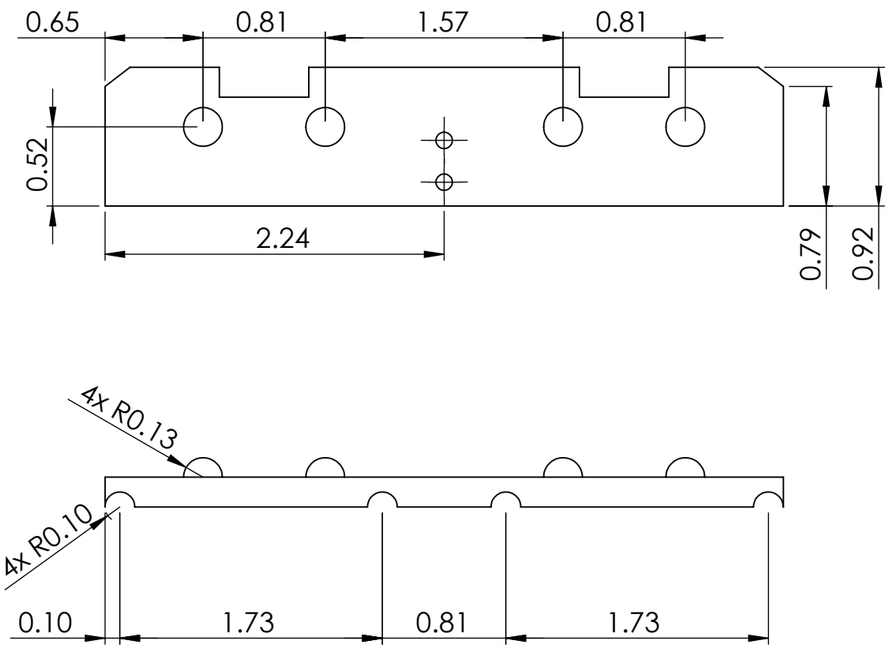
SECTION A-A
SCALE 1 : 1.5

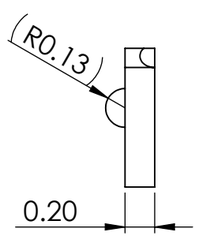
Viking Robotics Society

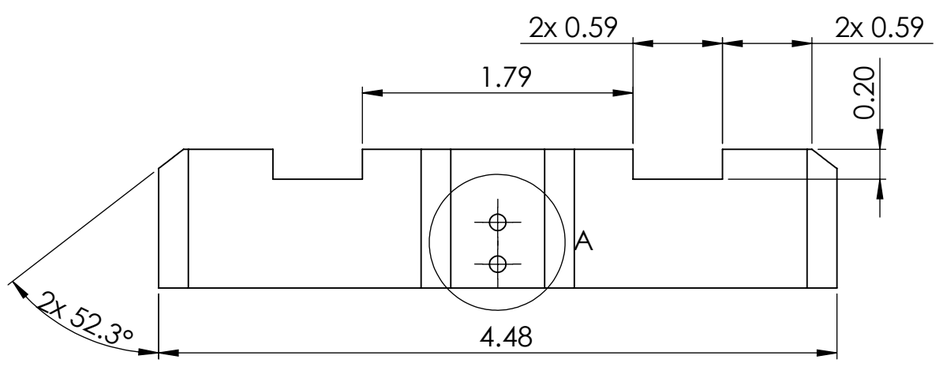
frontDistanceSensorBracket	
PROJECT	vrsLearningKit
AUTHOR	Michael Nguyen
DATE	10/15/2021
REVISION	0
UNITS	Imperial

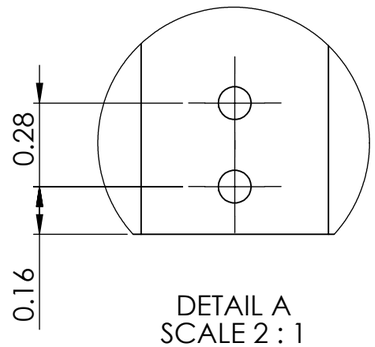
rearDistanceSensorBracket









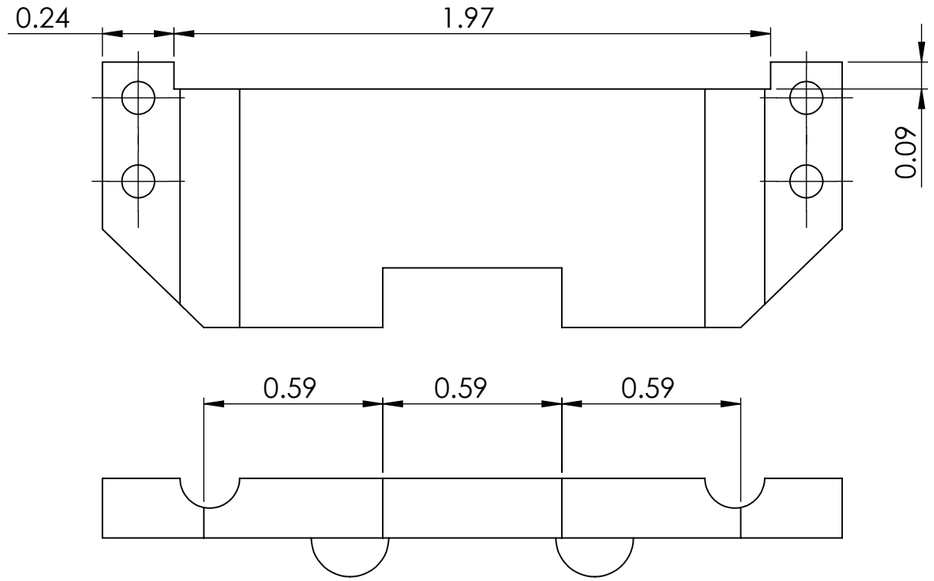


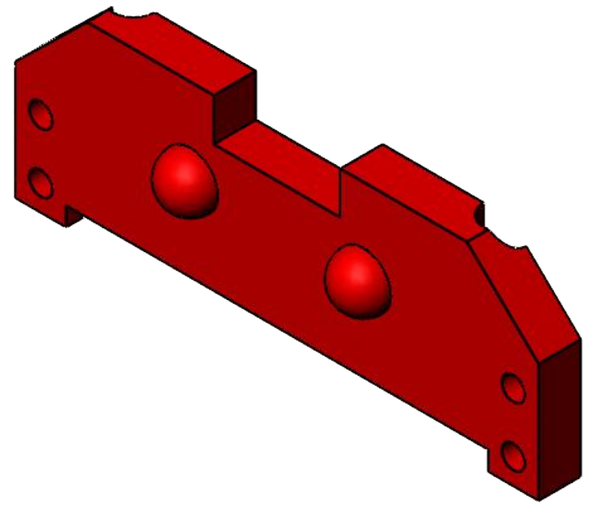
DETAIL A
SCALE 2 : 1

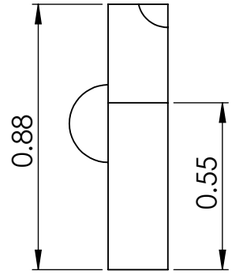
Viking Robotics Society

rearDistanceSensorBracket	
PROJECT	vrsLearningKit
AUTHOR	Michael Nguyen
DATE	10/18/2021
REVISION	0
UNITS	Imperial

sideDistanceSensorBracket



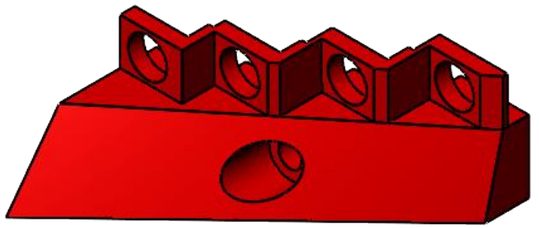


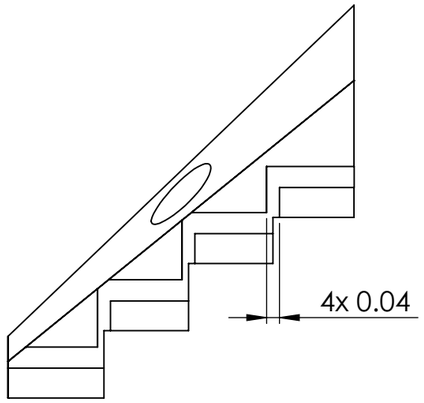


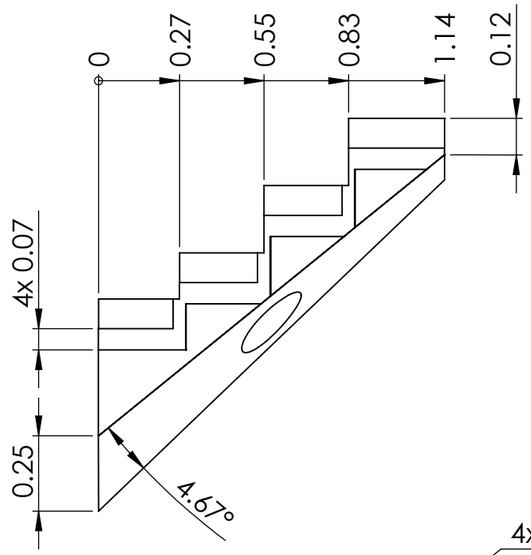
Viking Robotics Society

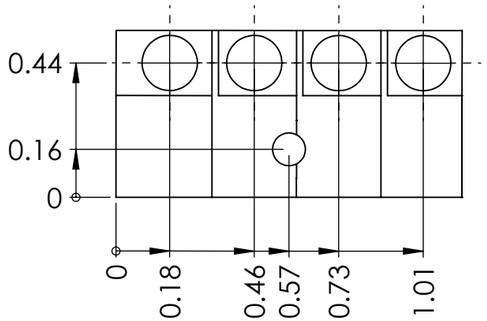
sideDistanceSensorBracket	
PROJECT	vrsLearningKit
AUTHOR	Michael Nguyen
DATE	10/23/2021
REVISION	0
UNITS	Imperial

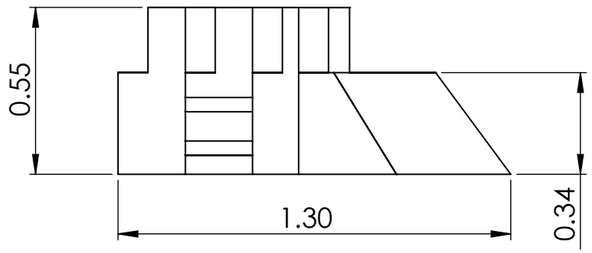
bottomHeadLightLeftFront

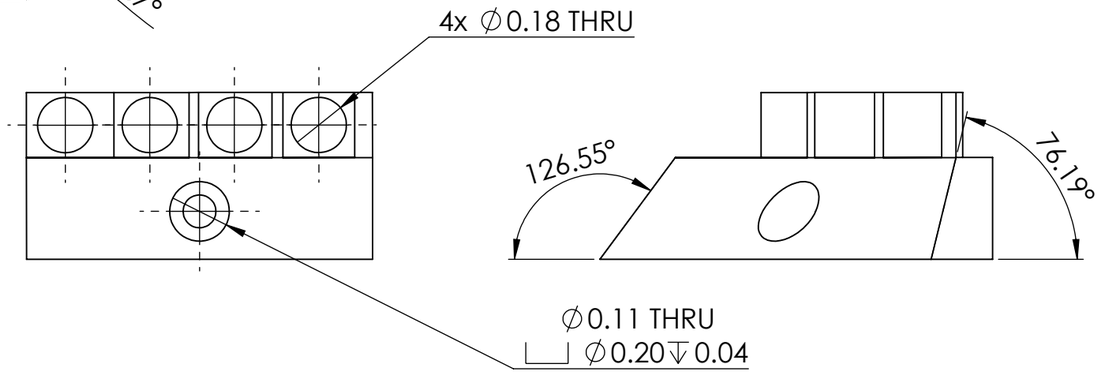


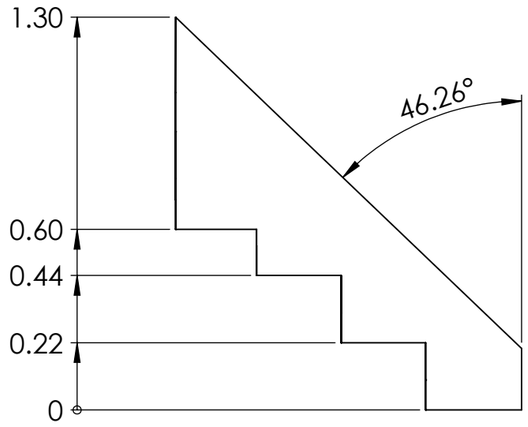








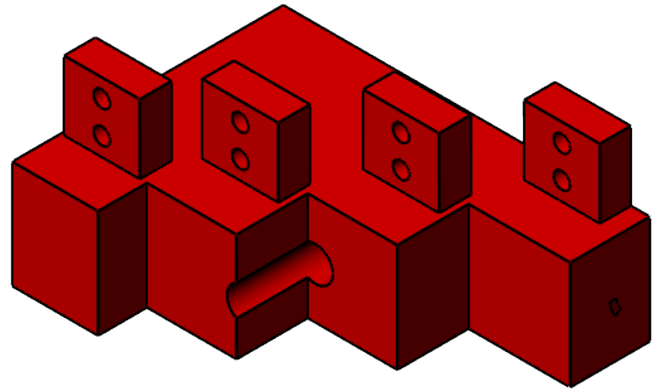


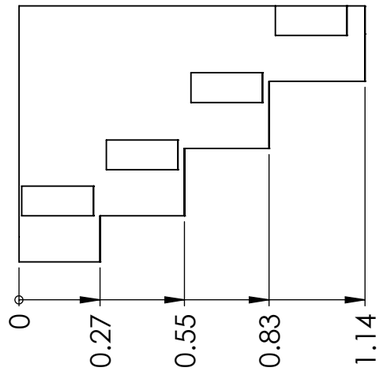


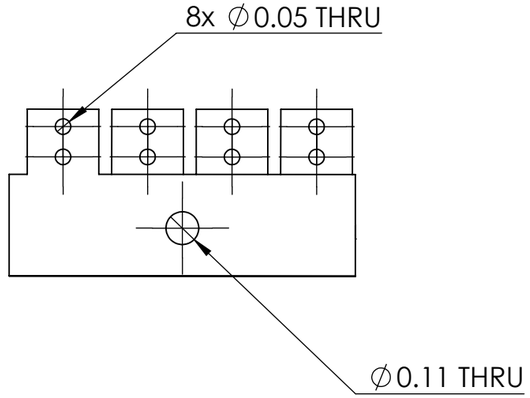
Viking Robotics Society

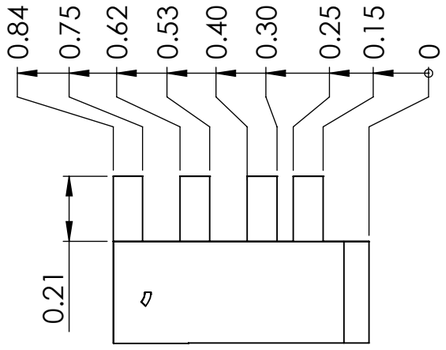
bottomHeadLightLeftFront	
PROJECT	vrsLearningKit
AUTHOR	Michael Nguyen
DATE	10/23/2021
REVISION	0
UNITS	Imperial

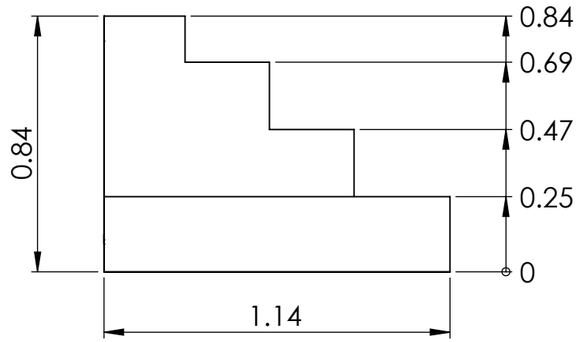
bottomHeadLightLeftRear







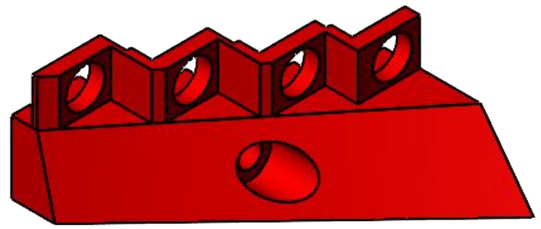


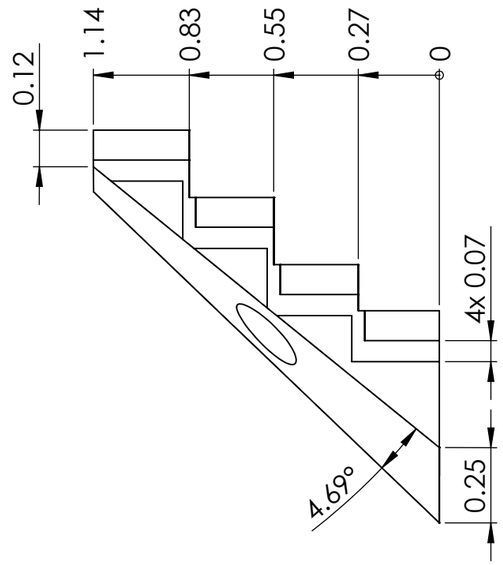


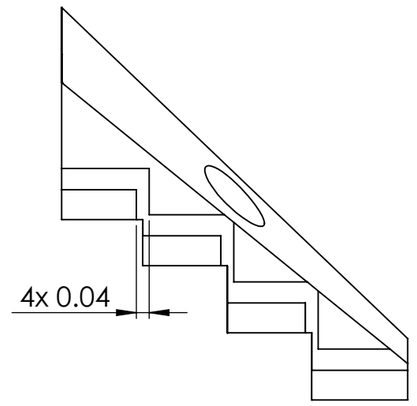
Viking Robotics Society

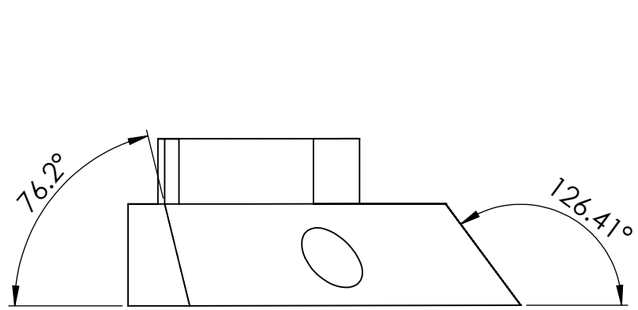
bottomHeadLightLeftRear	
PROJECT	vrsLearningKit
AUTHOR	Michael Nguyen
DATE	10/23/2021
REVISION	0
UNITS	Imperial

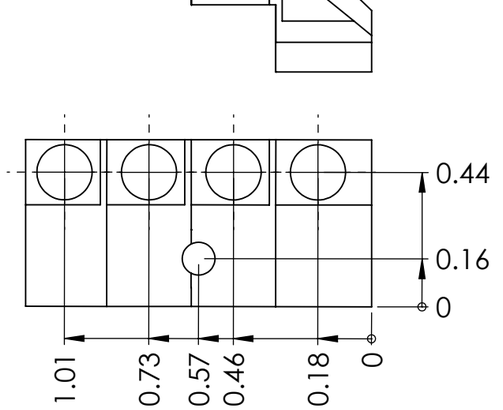
bottomHeadLightRightFront

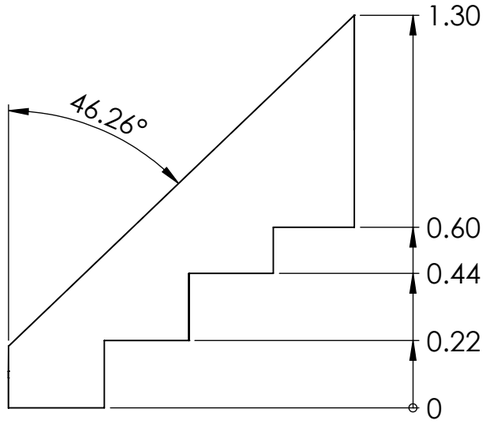








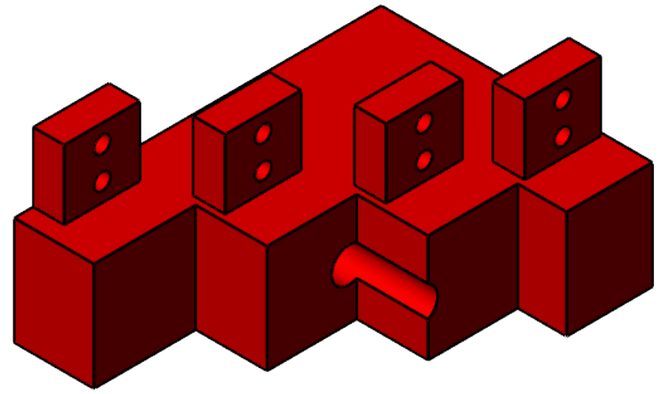


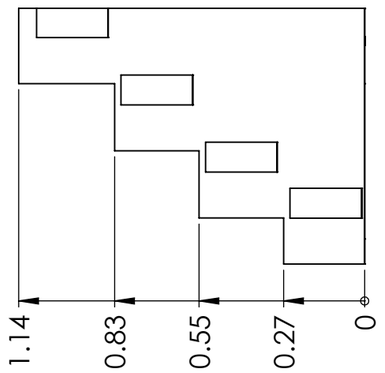


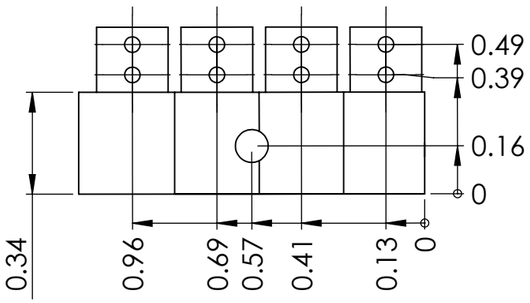
Viking Robotics Society

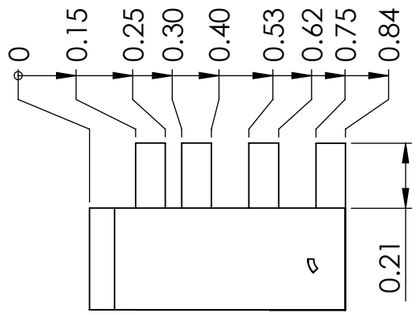
bottomHeadLightRightFront	
PROJECT	vrsLearningKit
AUTHOR	Michael Nguyen
DATE	10/26/2021
REVISION	0
UNITS	Imperial

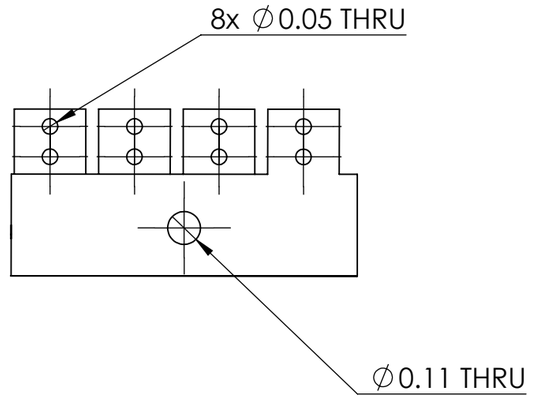
bottomHeadLightRightRear

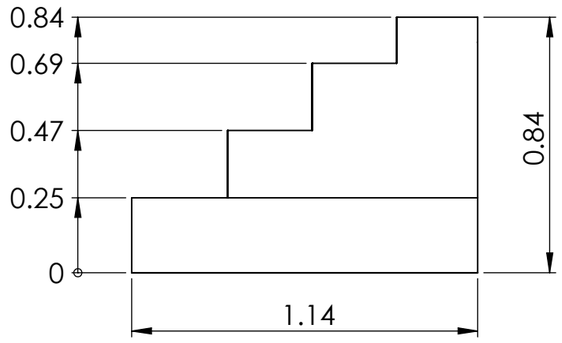








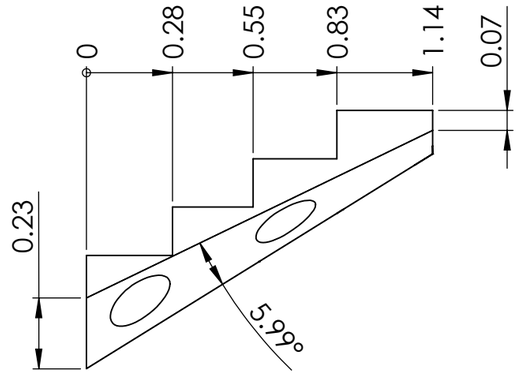


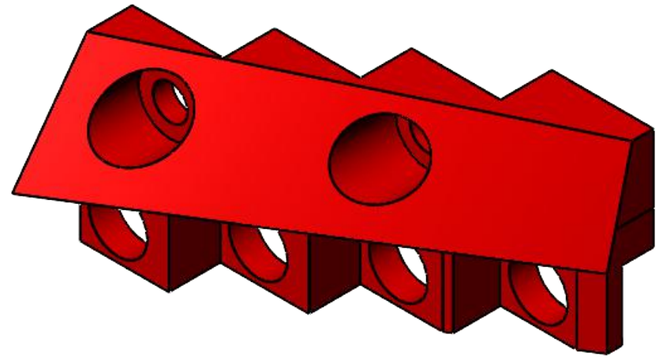


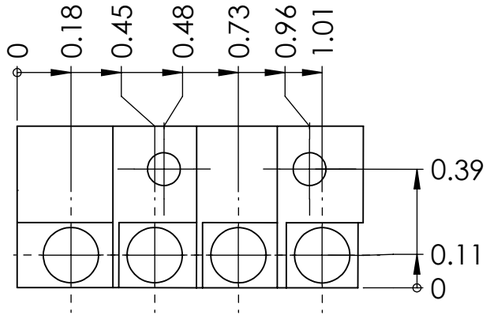
Viking Robotics Society

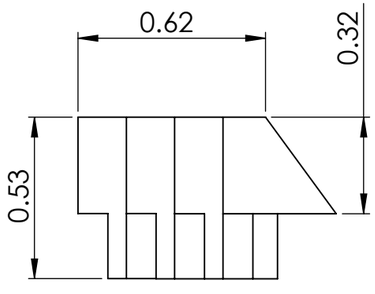
bottomHeadLightRightRear	
PROJECT	vrsLearningKit
AUTHOR	Michael Nguyen
DATE	10/26/2021
REVISION	0
UNITS	Imperial

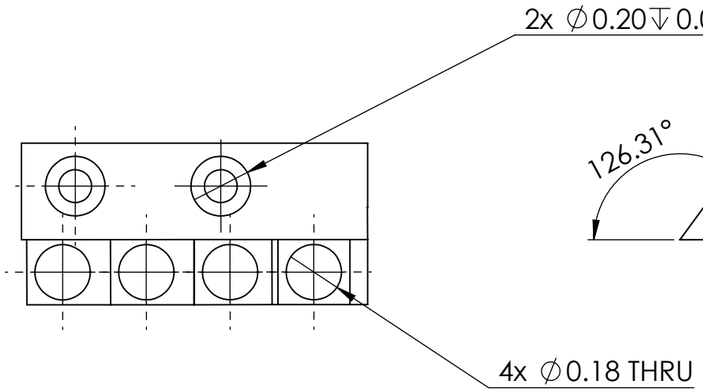
topHeadLightLeftFront

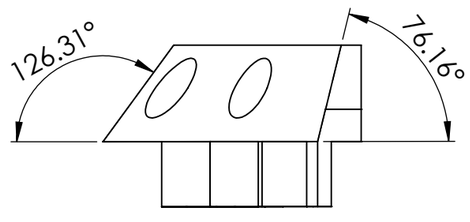


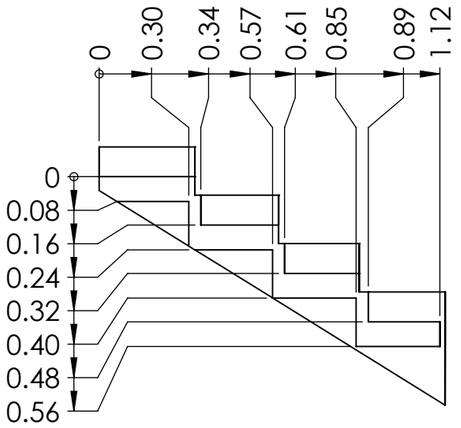


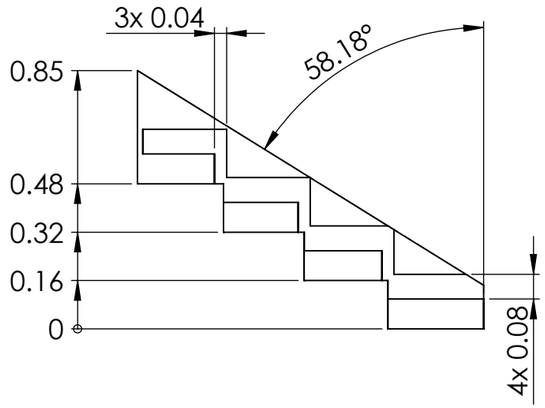








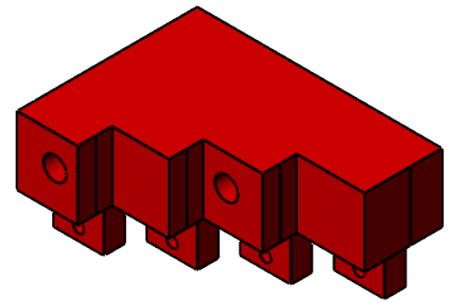


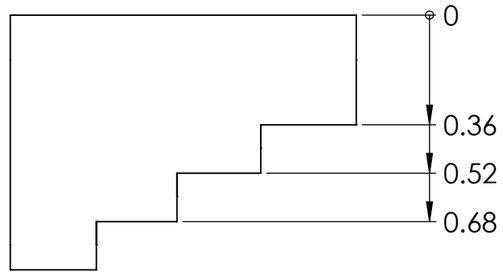


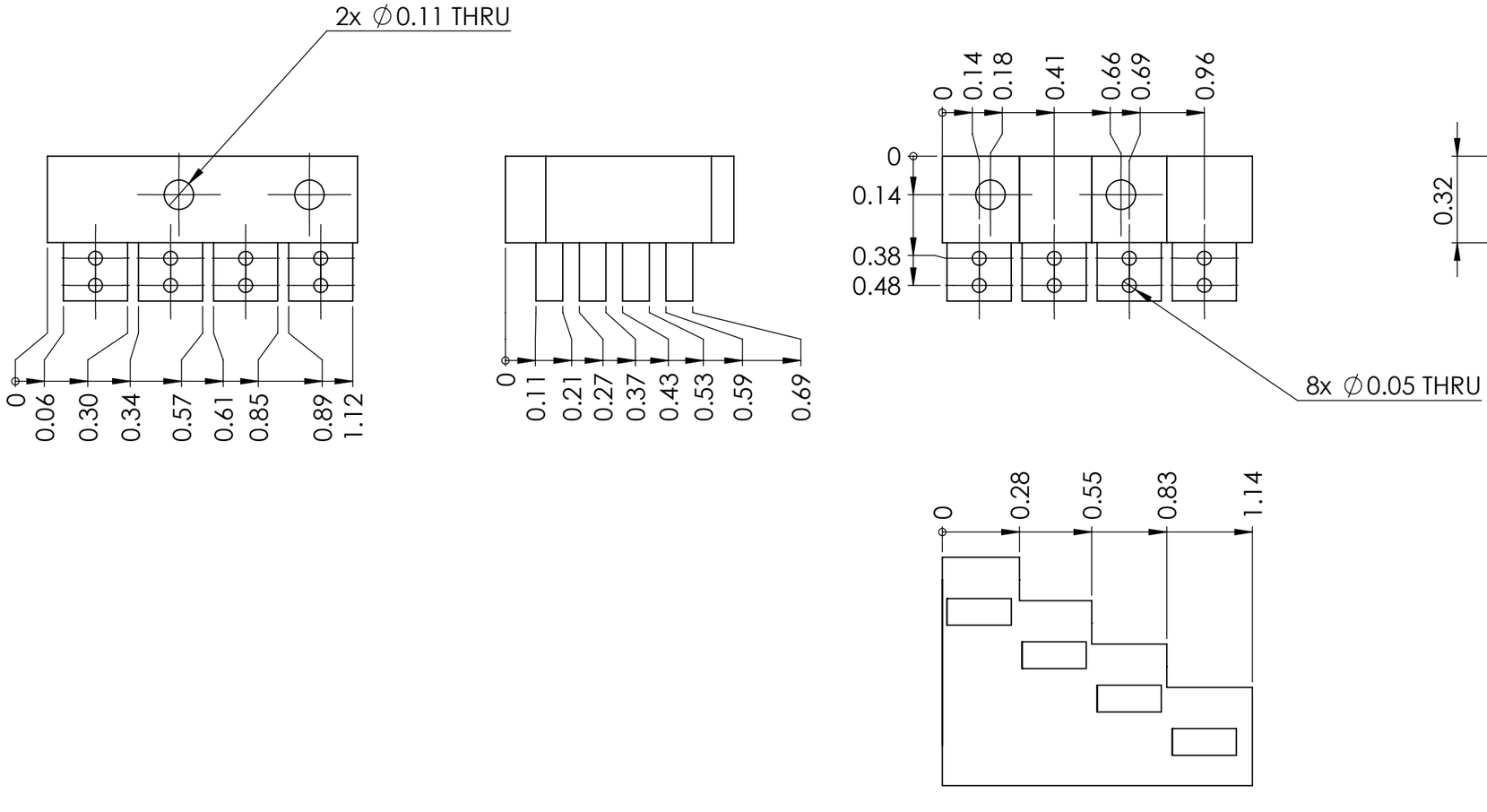
Viking Robotics Society

topHeadLightLeftFront	
PROJECT	vrsLearningKit
AUTHOR	Michael Nguyen
DATE	10/26/2021
REVISION	0
UNITS	Imperial

topHeadLightLeftRear



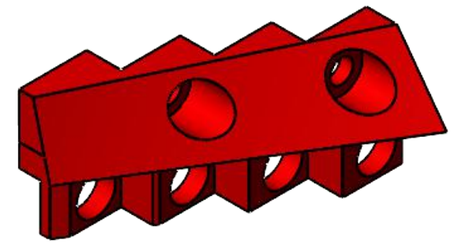


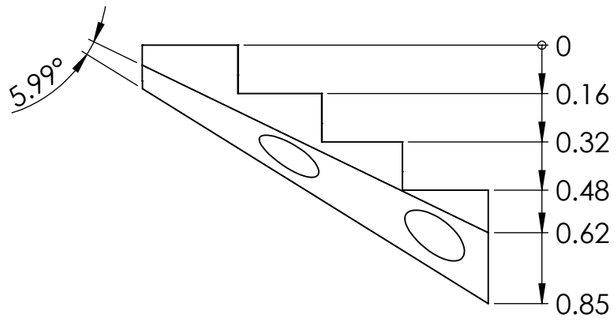


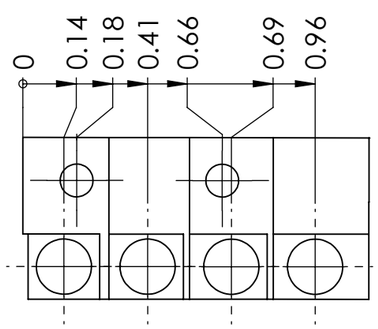
Viking Robotics Society

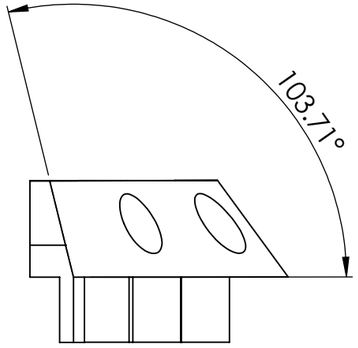
topHeadLightLeftRear	
PROJECT	vrsLearningKit
AUTHOR	Michael Nguyen
DATE	11/02/2021
REVISION	0
UNITS	Imperial

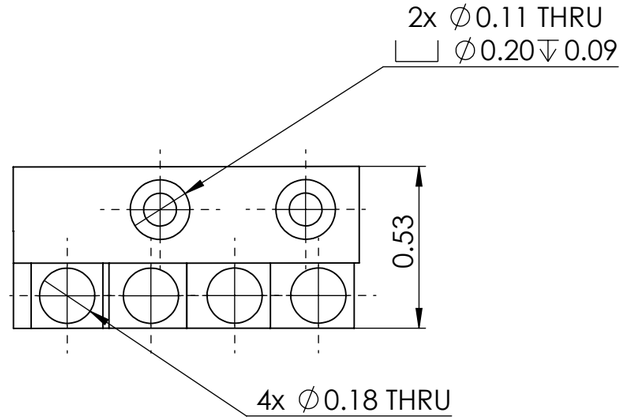
topHeadLightRightFront

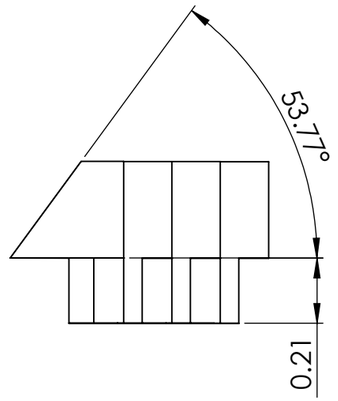


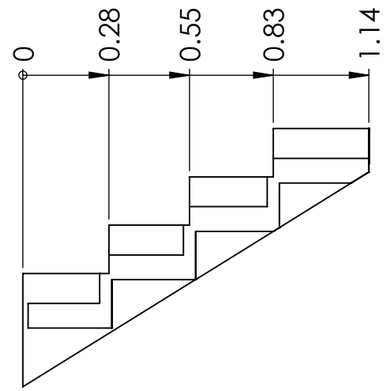


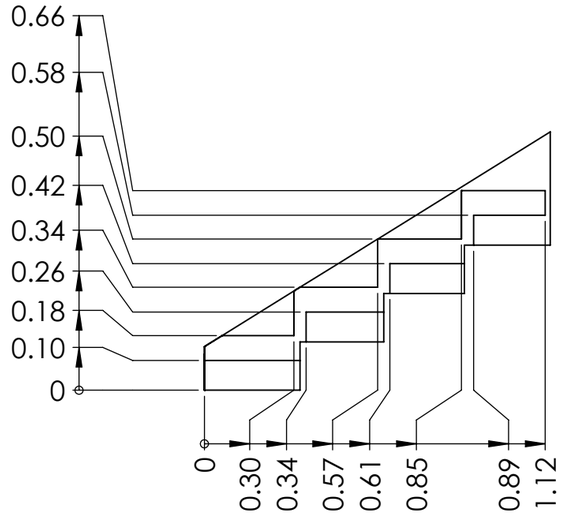








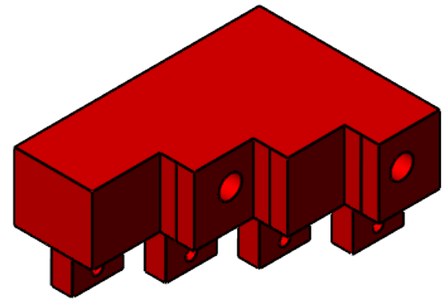


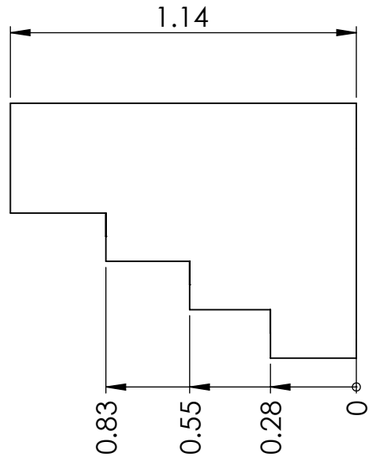


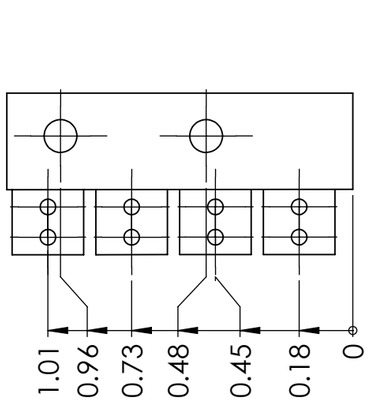
Viking Robotics Society

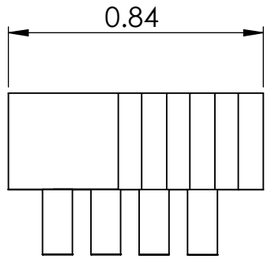
topHeadLightRightFront	
PROJECT	vrsLearningKit
AUTHOR	Michael Nguyen
DATE	11/02/2021
REVISION	0
UNITS	Imperial

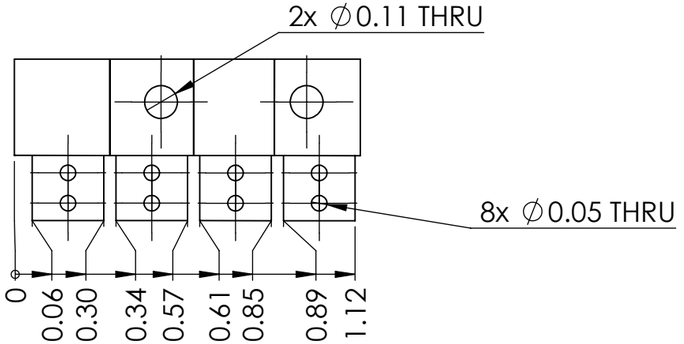
topHeadLightRightRear

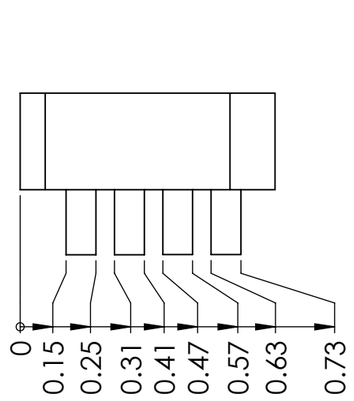


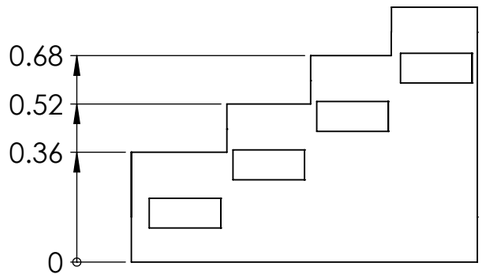








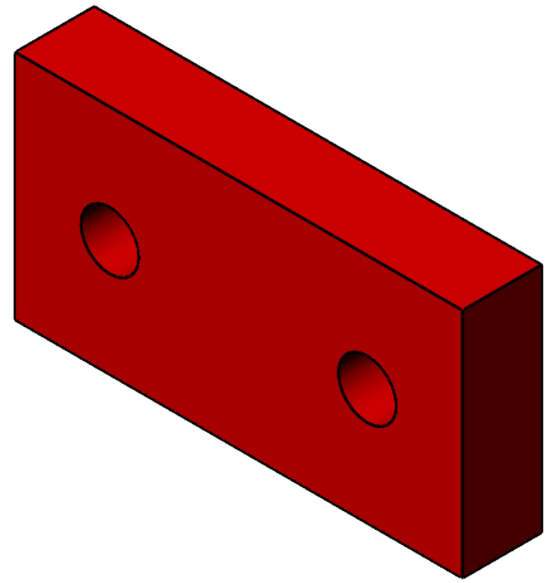


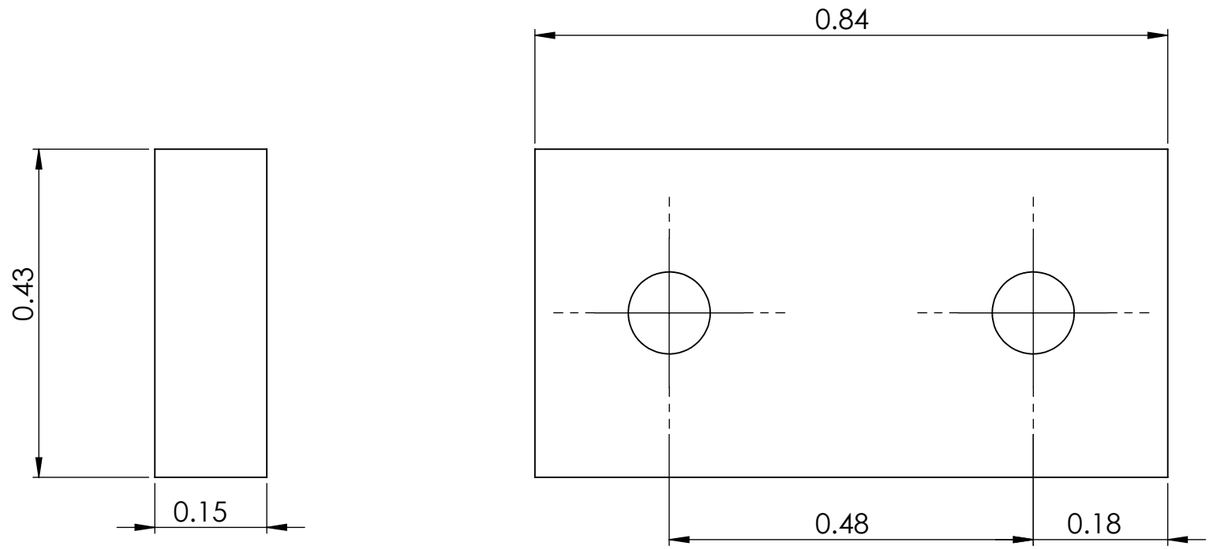


Viking Robotics Society

topHeadLightRightRear	
PROJECT	vrsLearningKit
AUTHOR	Michael Nguyen
DATE	11/02/2021
REVISION	0
UNITS	Imperial

topHeadLightSpacer

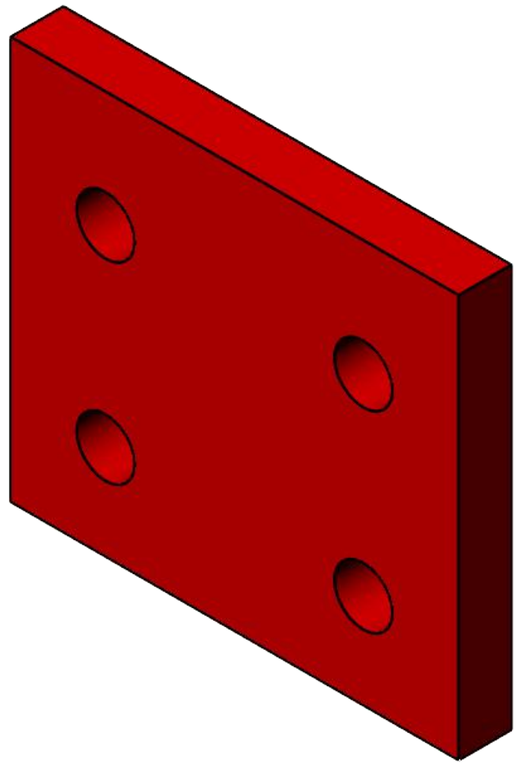


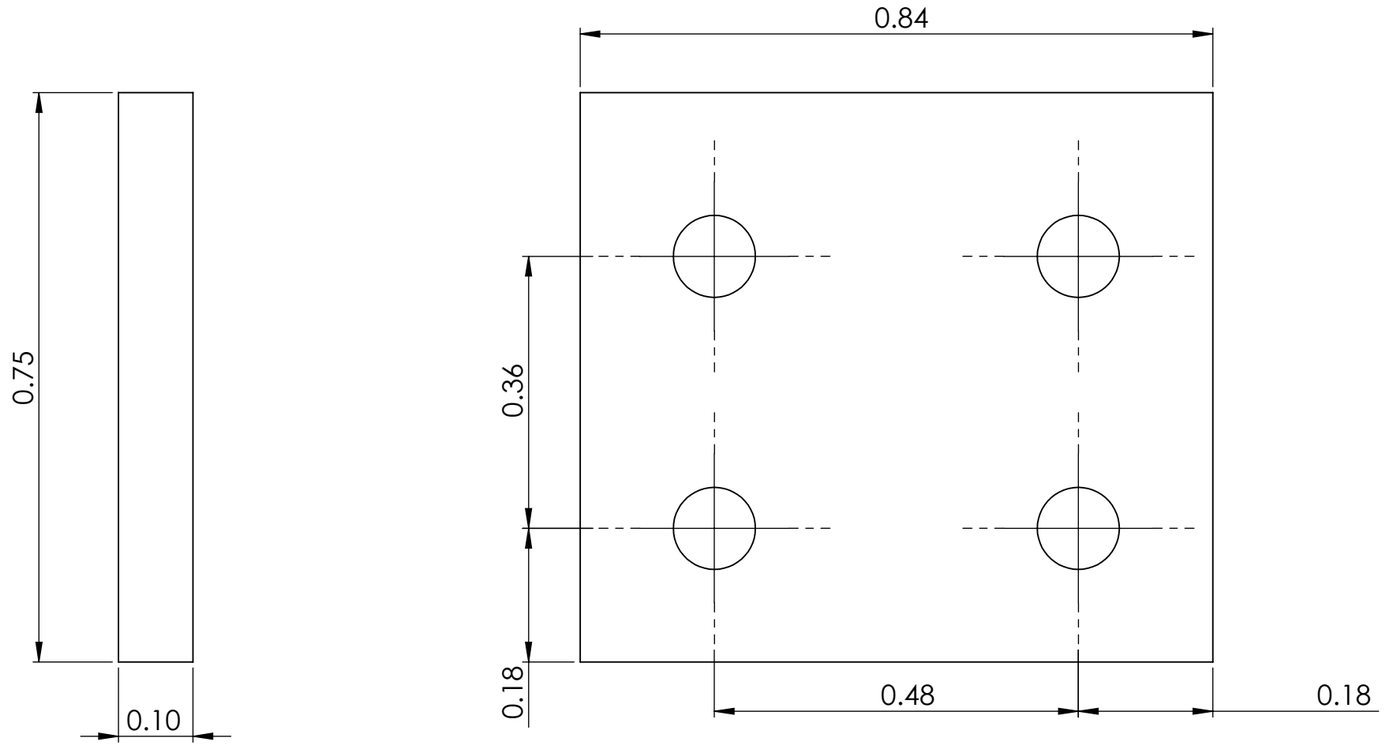


Viking Robotics Society

topHeadLightSpacer	
PROJECT	vrsLearningKit
AUTHOR	Michael Nguyen
DATE	11/02/2021
REVISION	0
UNITS	Imperial

topHeadLightToFrontBumper

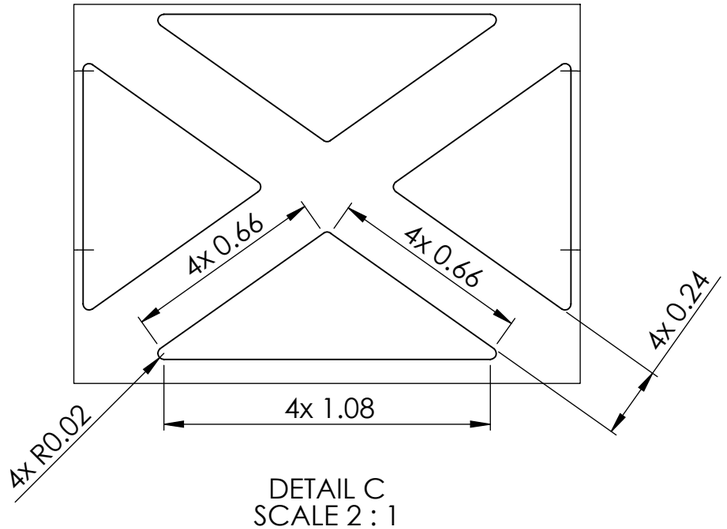




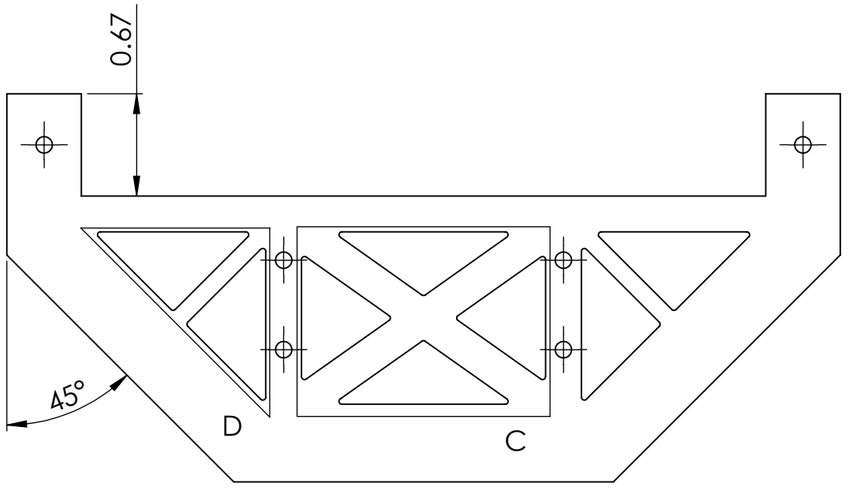
Viking Robotics Society

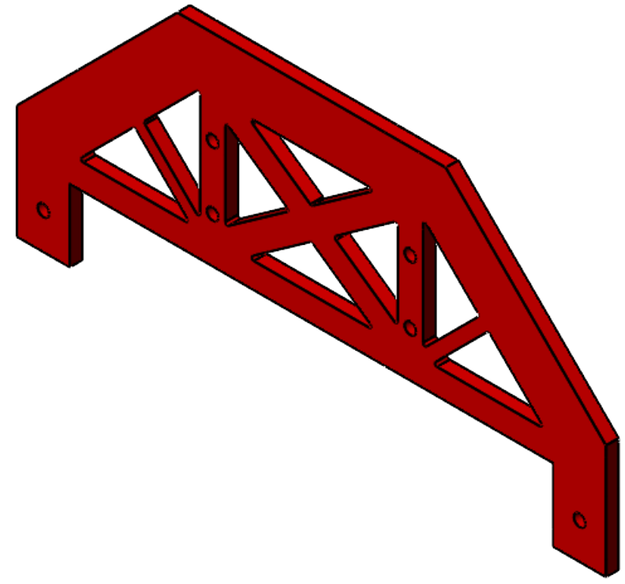
topHeadLightToFrontBumper	
PROJECT	vrsLearningKit
AUTHOR	Michael Nguyen
DATE	11/03/2021
REVISION	0
UNITS	Imperial

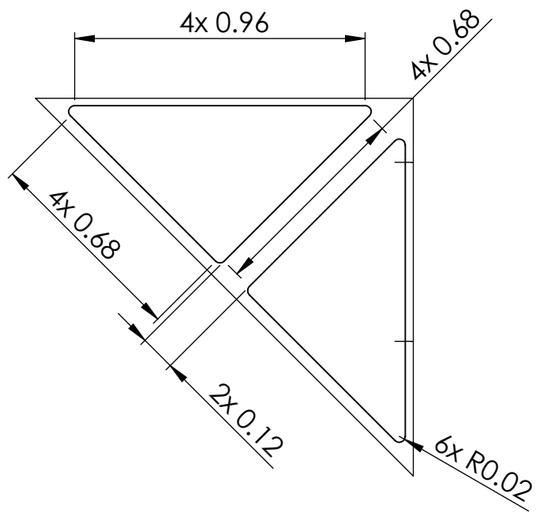
frontShellToBottomChassisBracket



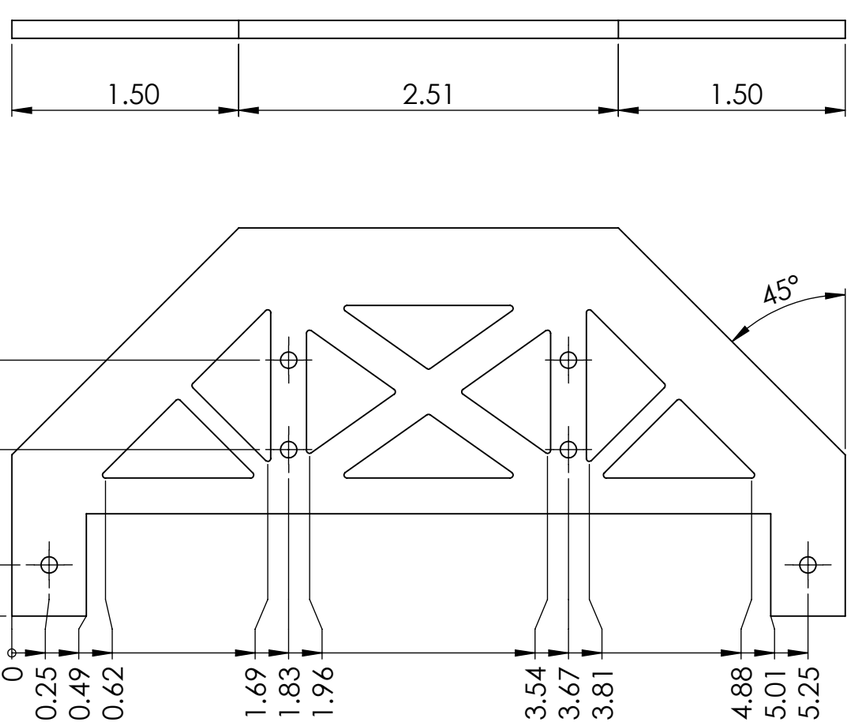
DETAIL C
SCALE 2 : 1

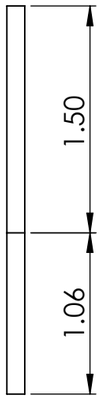






DETAIL D
SCALE 2 : 1

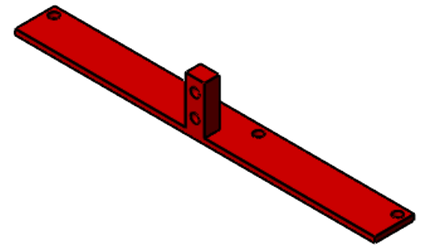


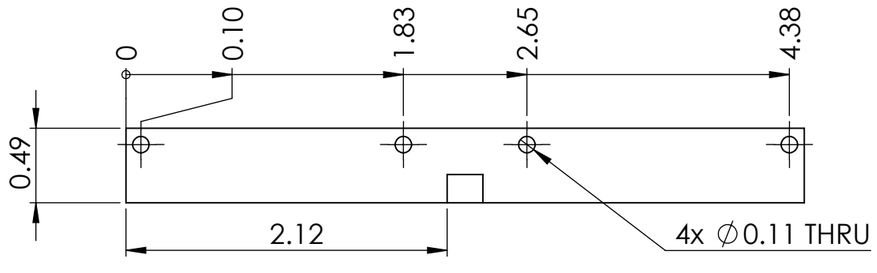


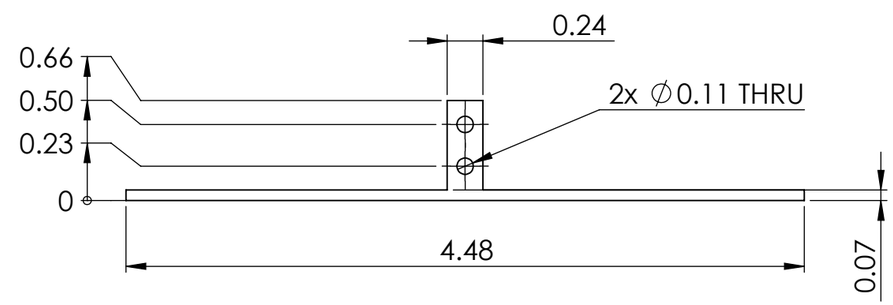
Viking Robotics Society

frontShellToBottomChassisBracket	
PROJECT	vrsLearningKit
AUTHOR	Michael Nguyen
DATE	11/03/2021
REVISION	0
UNITS	Imperial

rearShellToBottomChassisBracket



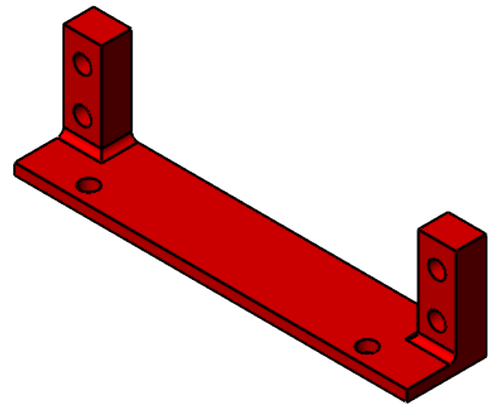


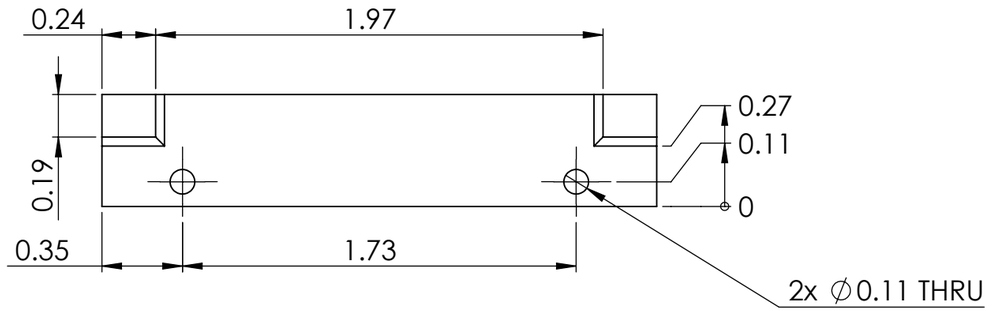


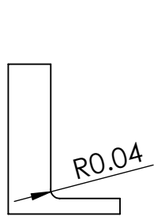
Viking Robotics Society

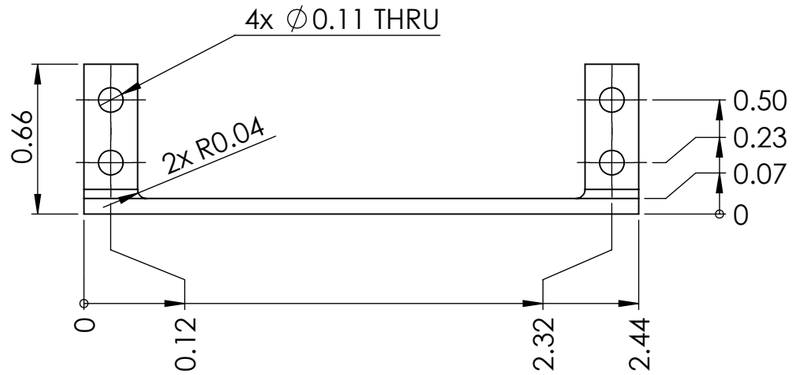
rearShellToBottomChassisBracket	
PROJECT	vrsLearningKit
AUTHOR	Michael Nguyen
DATE	11/03/2021
REVISION	0
UNITS	Imperial

sideShellToBottomChassisBracket





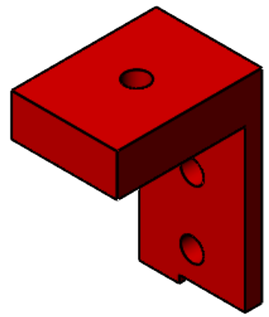


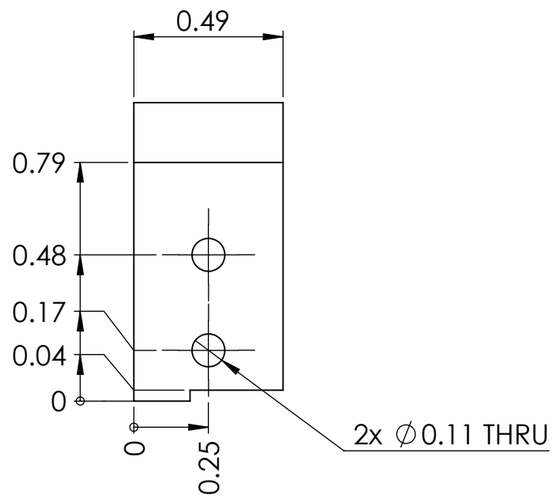


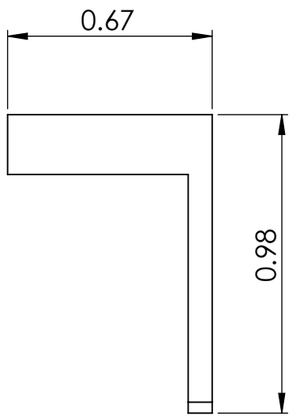
Viking Robotics Society

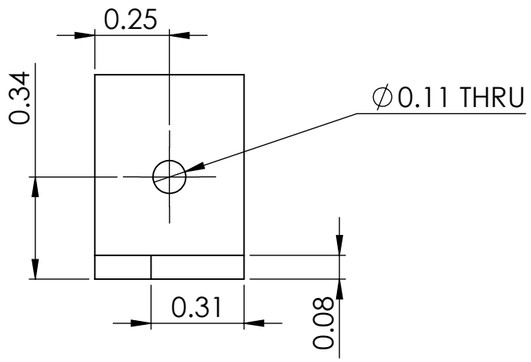
sideShellToBottomChassisBracket	
PROJECT	vrsLearningKit
AUTHOR	Michael Nguyen
DATE	11/03/2021
REVISION	0
UNITS	Imperial

frontShellToTopChassisBracketLeft





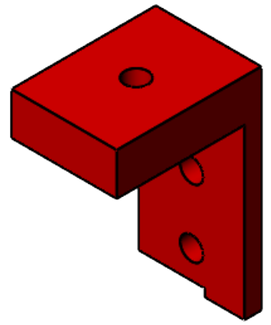


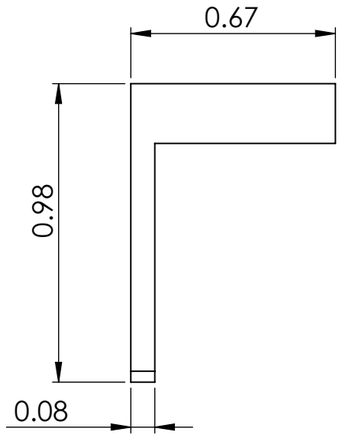


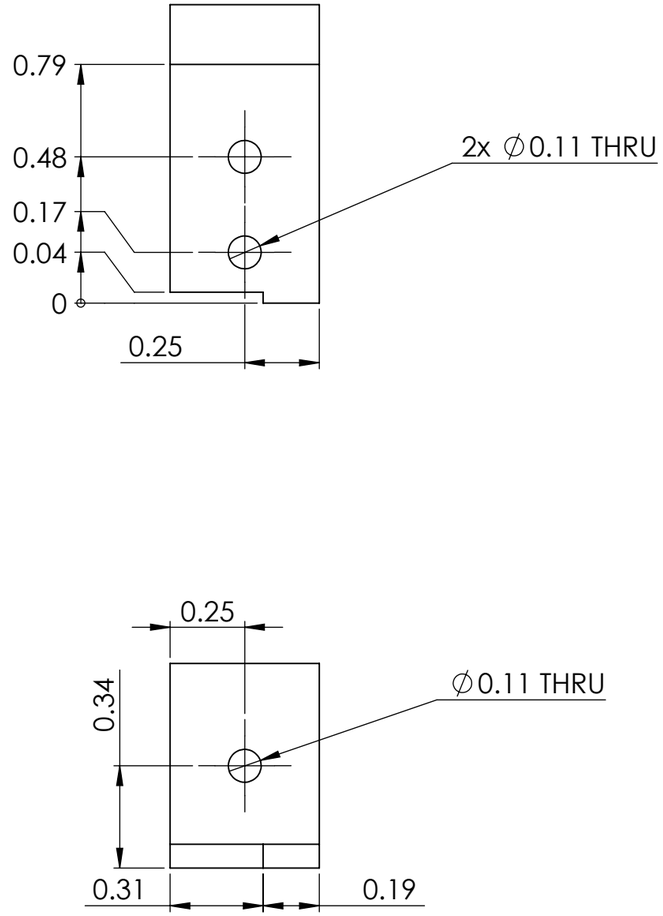
Viking Robotics Society

frontShellToTopChassisBracketLeft	
PROJECT	vrsLearningKit
AUTHOR	Michael Nguyen
DATE	11/03/2021
REVISION	0
UNITS	Imperial

frontShellToTopChassisBracketRight



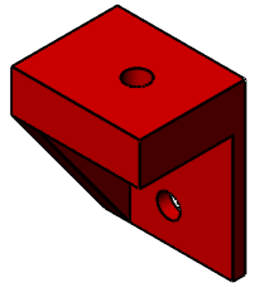


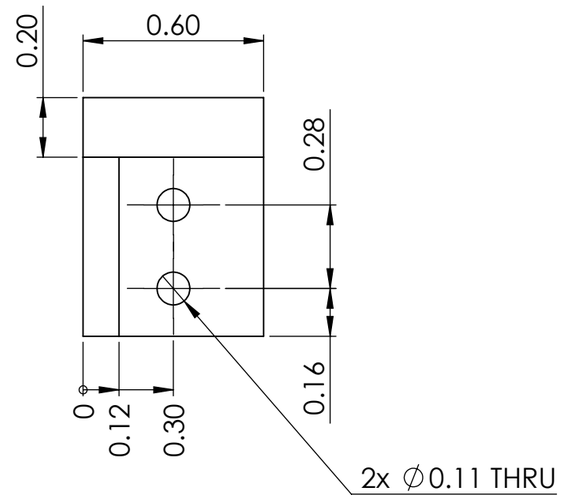


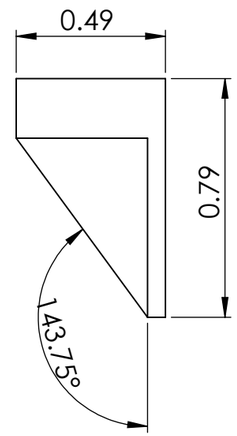
Viking Robotics Society

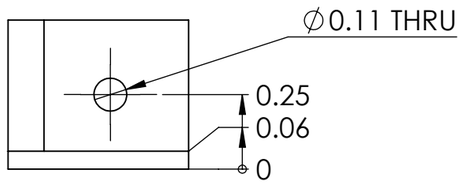
frontShellToTopChassisBracketRight	
PROJECT	vrsLearningKit
AUTHOR	Michael Nguyen
DATE	11/03/2021
REVISION	0
UNITS	Imperial

frontToTopChassisLeftBracket





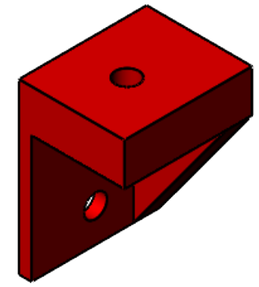


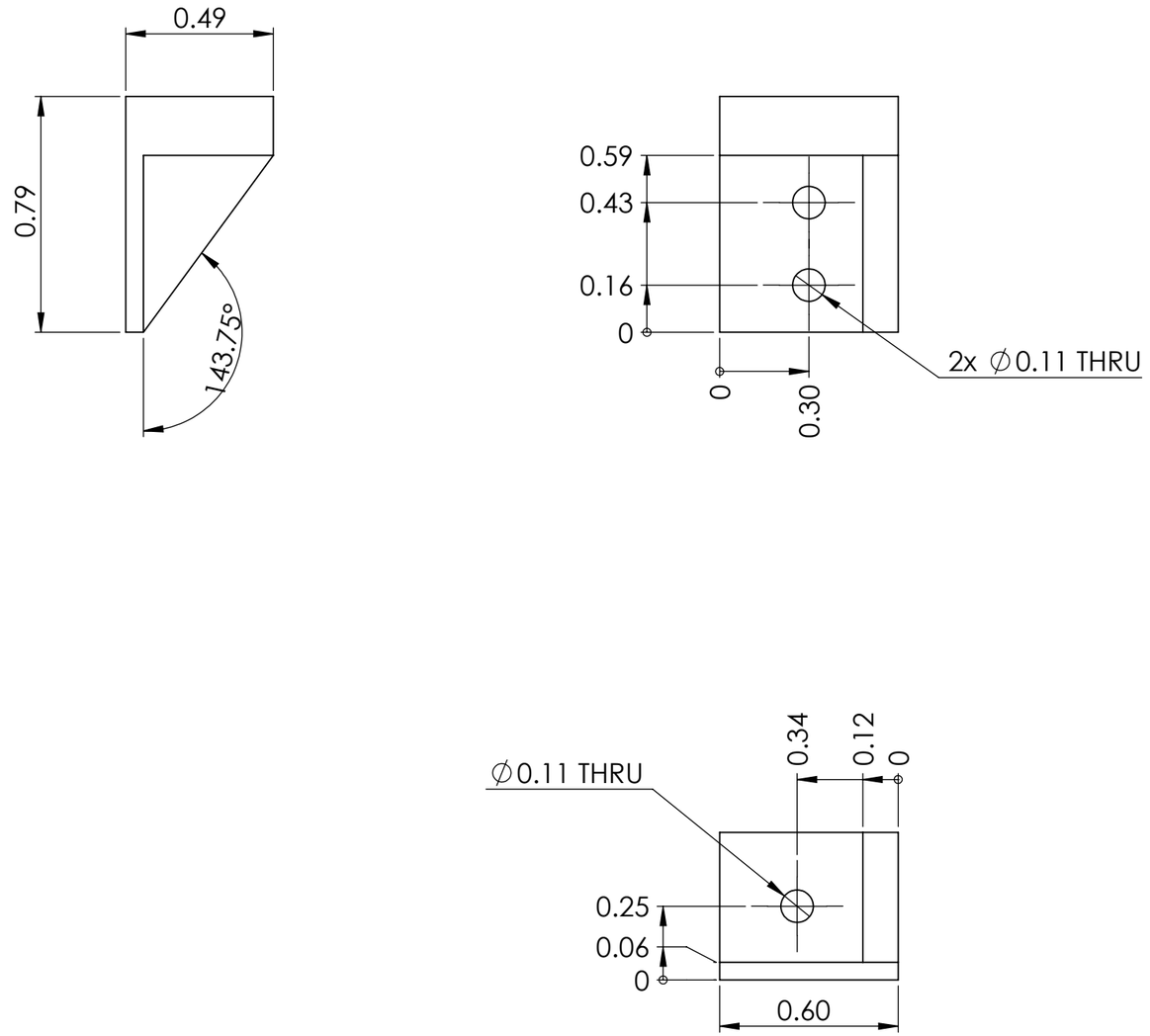


Viking Robotics Society

frontToTopChassisLeftBracket	
PROJECT	vrsLearningKit
AUTHOR	Michael Nguyen
DATE	11/03/2021
REVISION	0
UNITS	Imperial

frontToTopChassisRightBracket

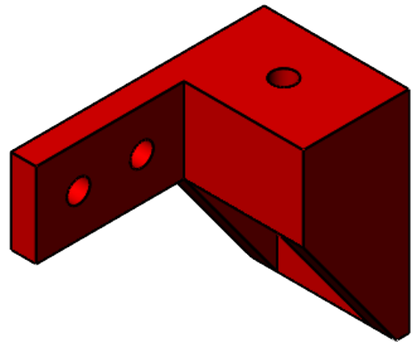


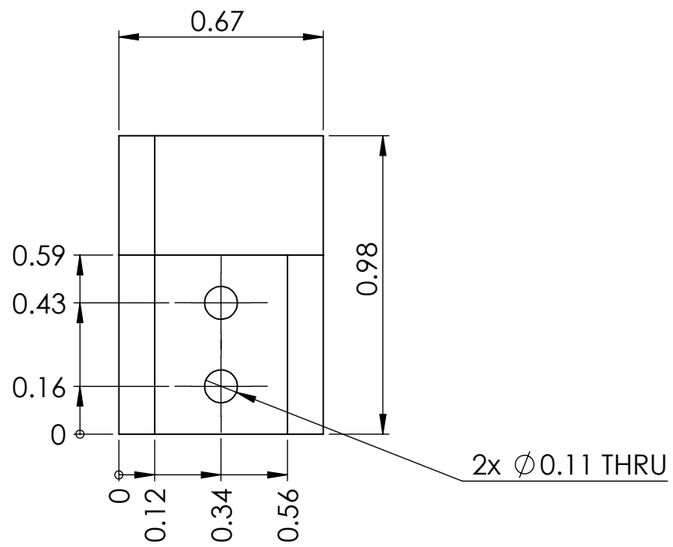


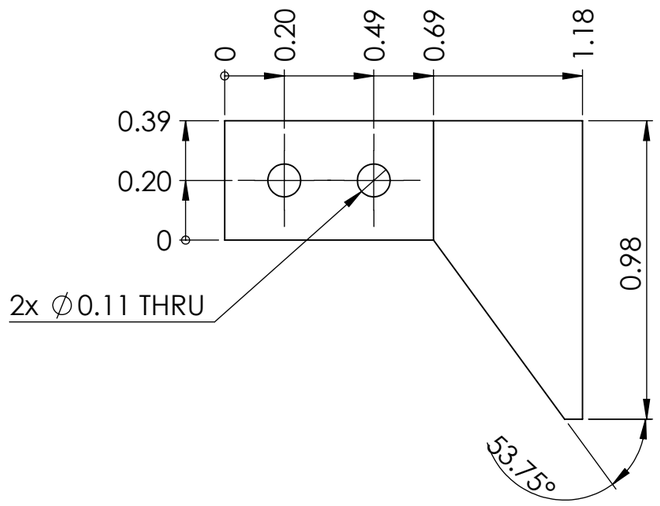
Viking Robotics Society

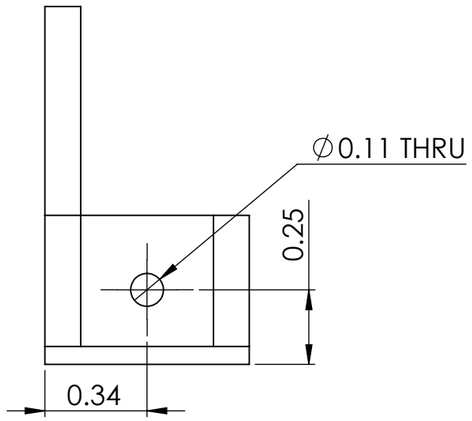
frontToTopChassisRightBracket	
PROJECT	vrsLearningKit
AUTHOR	Michael Nguyen
DATE	11/03/2021
REVISION	0
UNITS	Imperial

rearToTopChassisLeftBracket





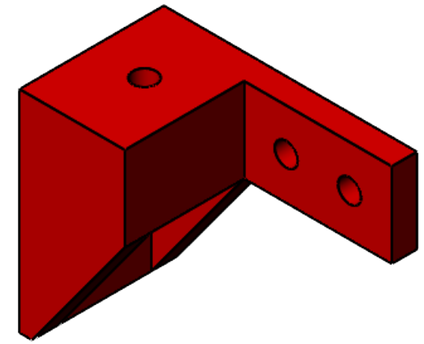


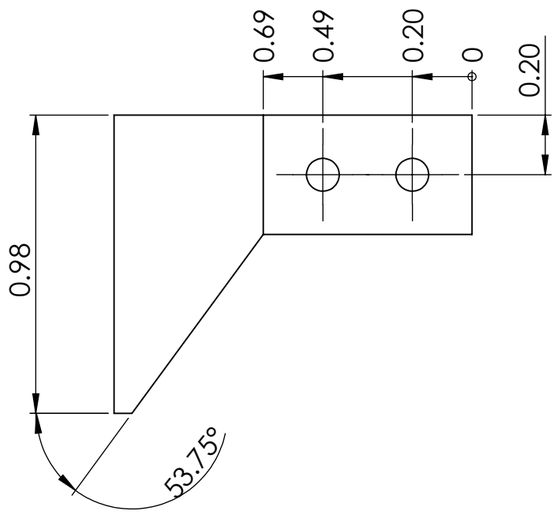


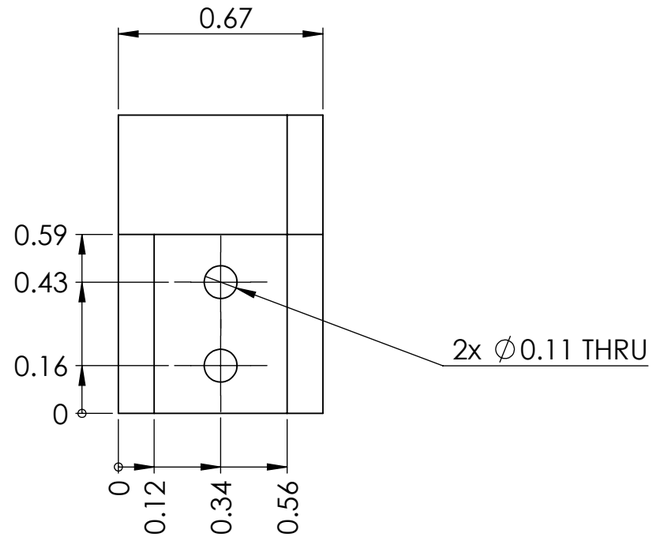
Viking Robotics Society

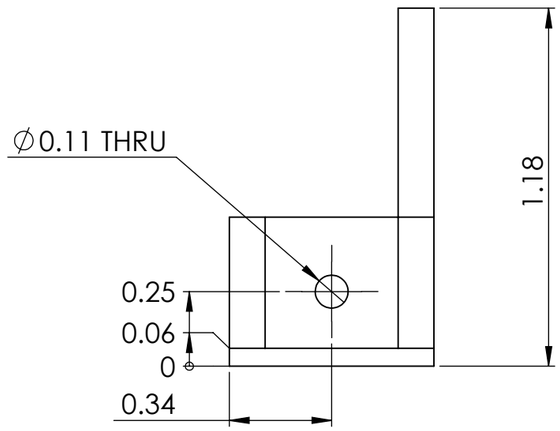
rearToTopChassisLeftBracket	
PROJECT	vrsLearningKit
AUTHOR	Michael Nguyen
DATE	11/03/2021
REVISION	0
UNITS	Imperial

rearToTopChassisRightBracket





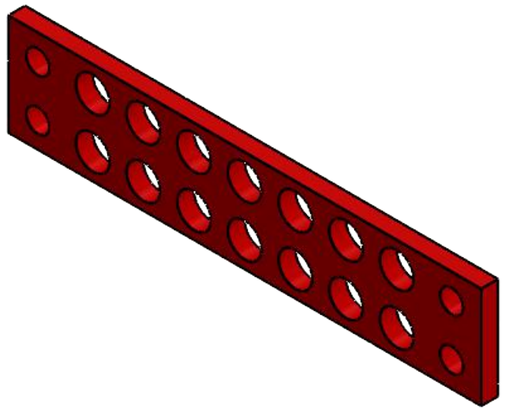


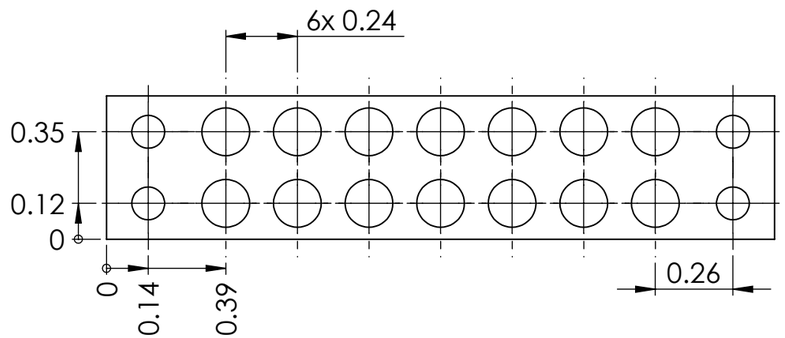


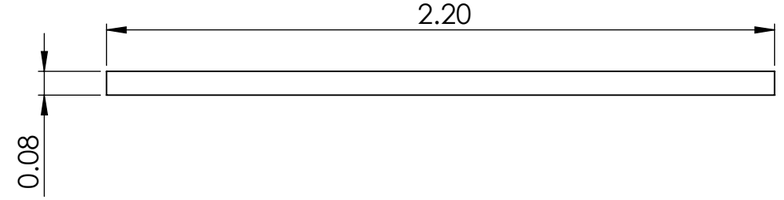
Viking Robotics Society

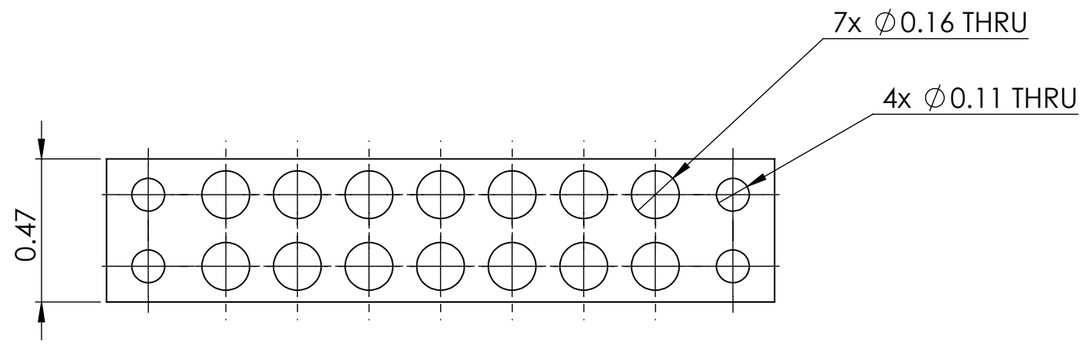
rearToTopChassisRightBracket	
PROJECT	vrsLearningKit
AUTHOR	Michael Nguyen
DATE	11/03/2021
REVISION	0
UNITS	Imperial

tailLightsFrontBracket





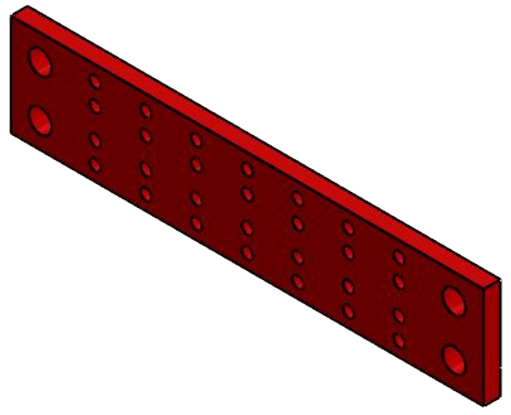


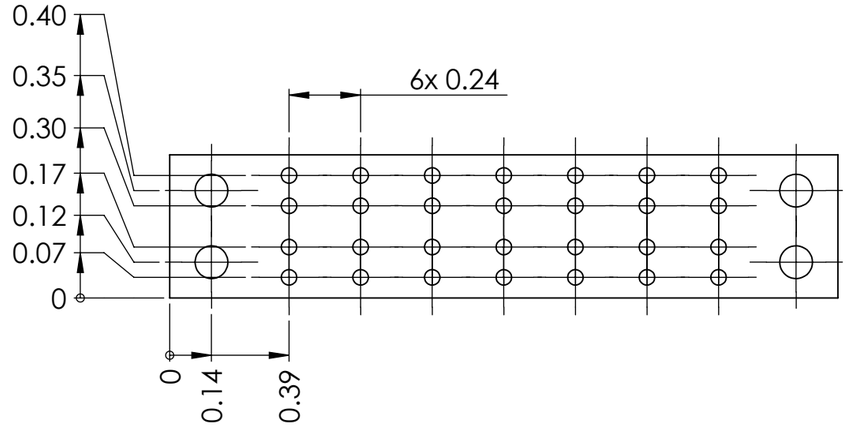


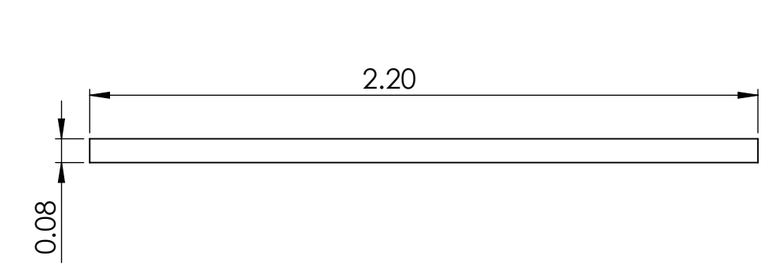
Viking Robotics Society

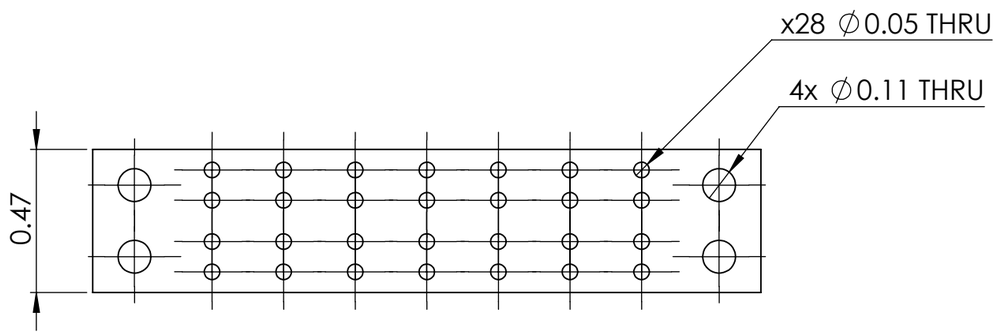
tailLightsFrontBracket	
PROJECT	vrsLearningKit
AUTHOR	Michael Nguyen
DATE	11/03/2021
REVISION	0
UNITS	Imperial

tailLightsRearBracket





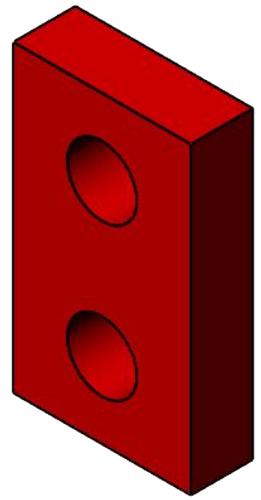


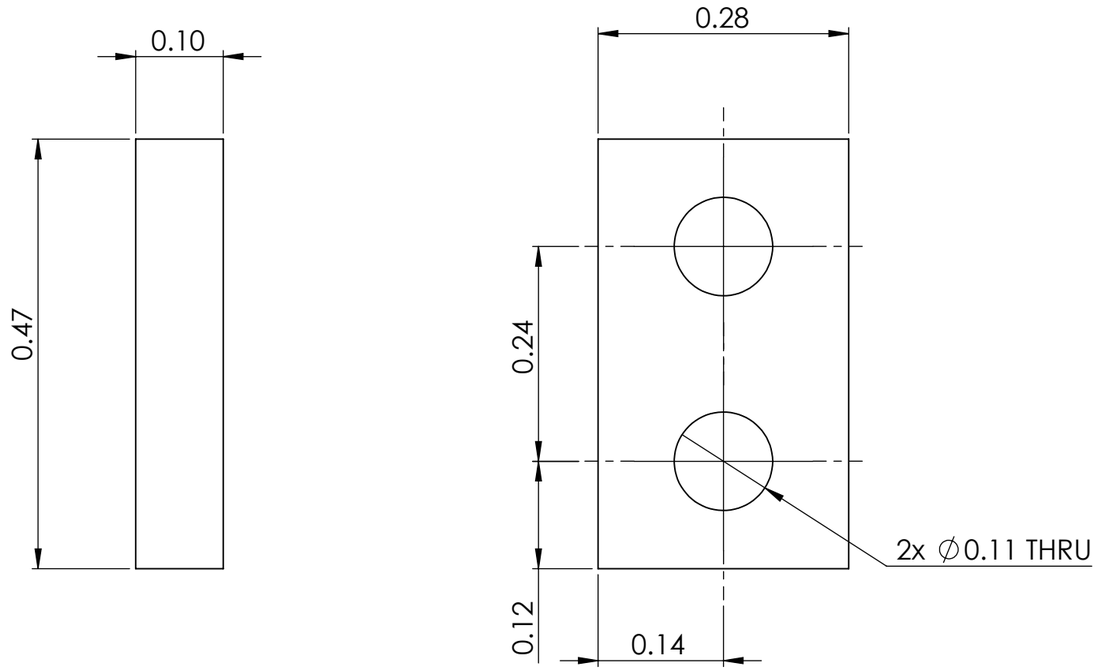


Viking Robotics Society

tailLightsFrontBracket	
PROJECT	vrsLearningKit
AUTHOR	Michael Nguyen
DATE	11/03/2021
REVISION	0
UNITS	Imperial

tailLightSpacer

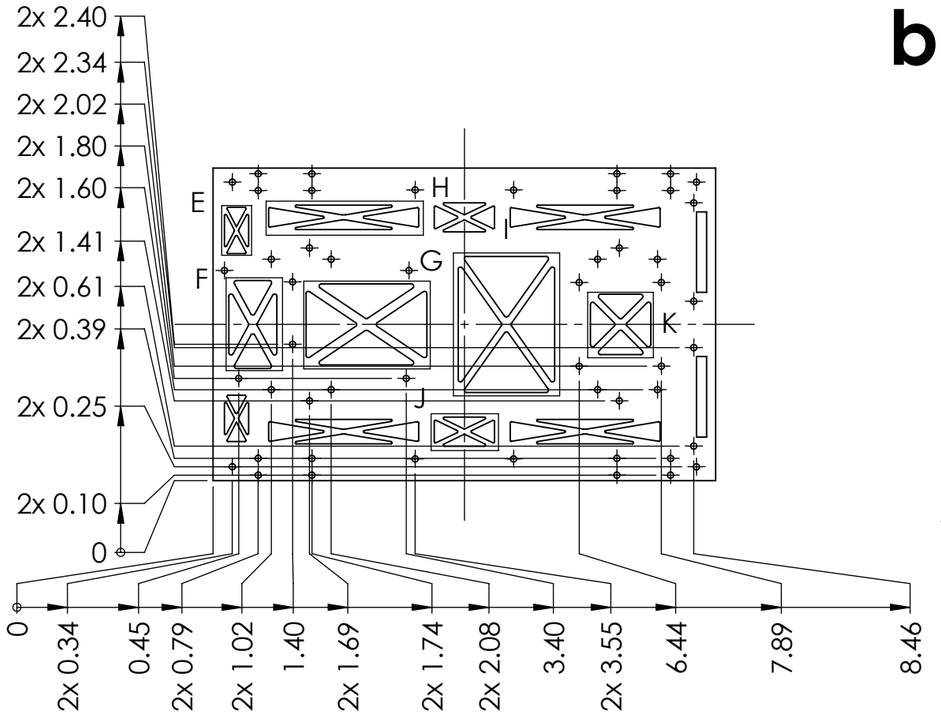


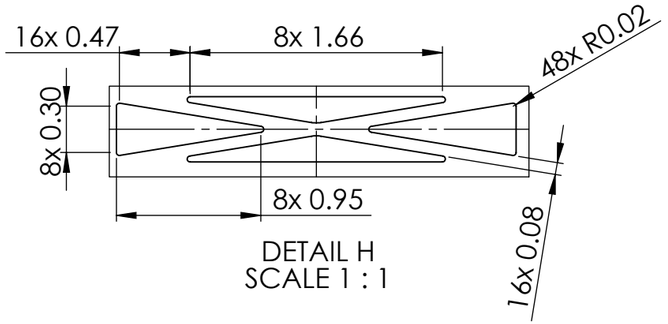


Viking Robotics Society

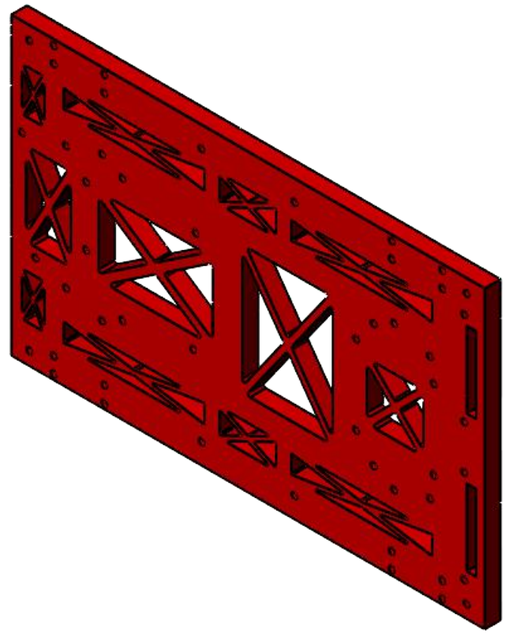
tailLightSpacer	
PROJECT	vrsLearningKit
AUTHOR	Michael Nguyen
DATE	11/03/2021
REVISION	0
UNITS	Imperial

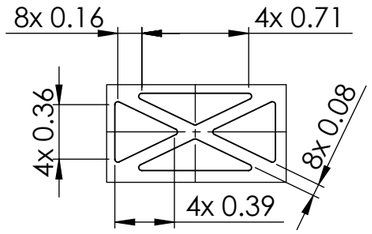
bottomChassis



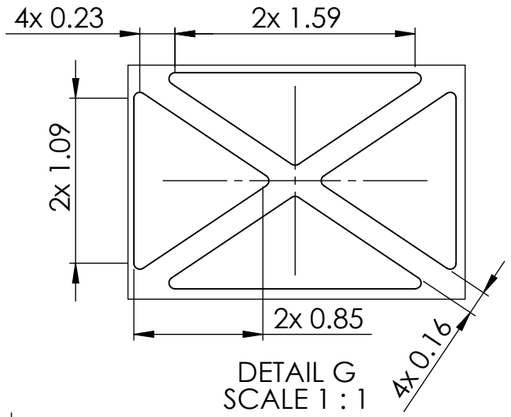


DETAIL H
SCALE 1 : 1

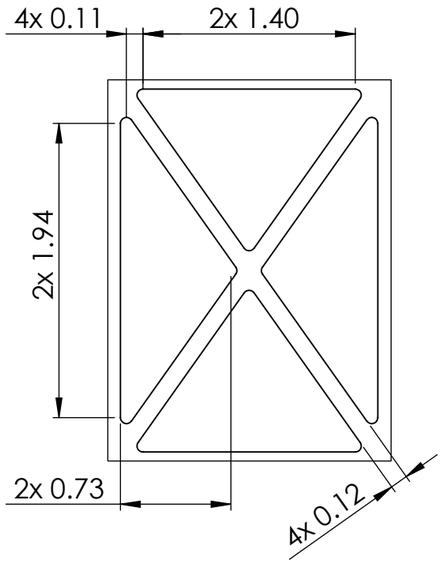




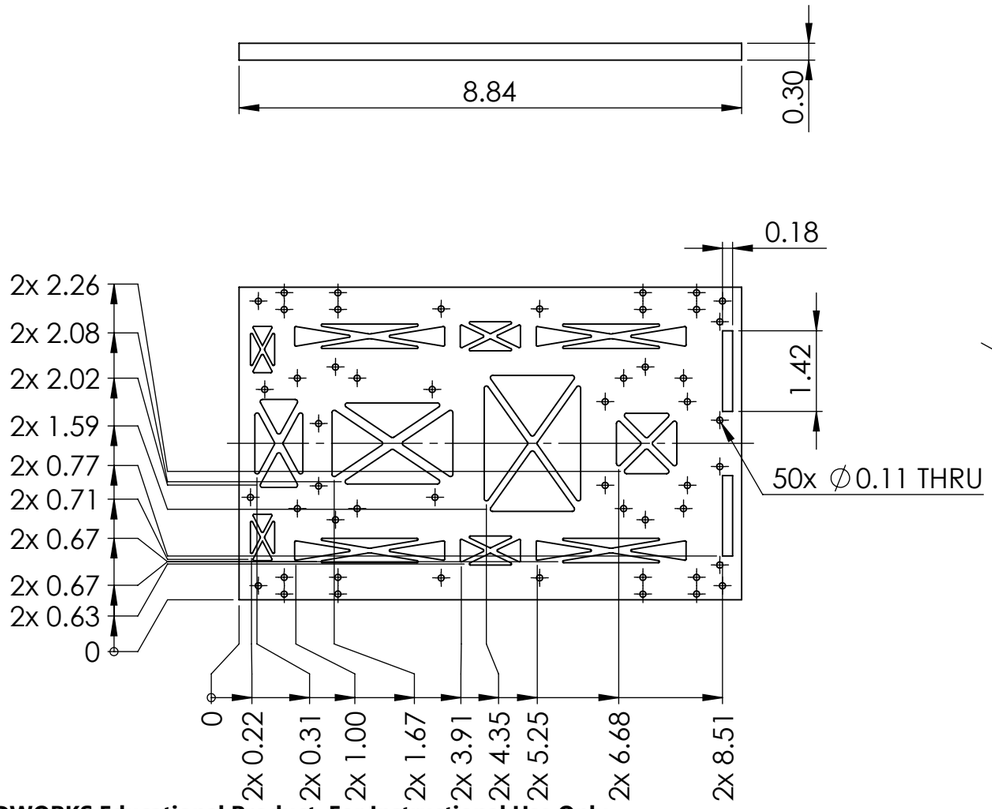
DETAIL J
SCALE 1 : 1

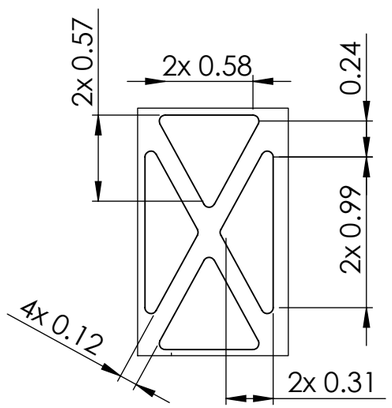


DETAIL G
SCALE 1 : 1

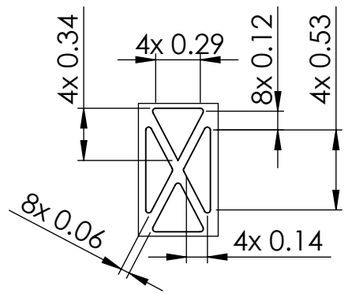


DETAIL I
SCALE 1 : 1

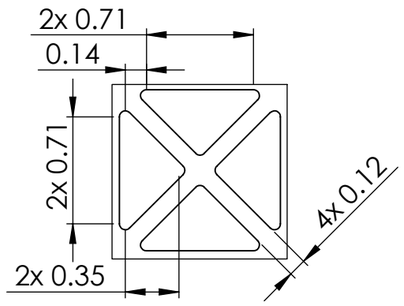




DETAIL F
SCALE 1 : 1



DETAIL E
SCALE 1 : 1

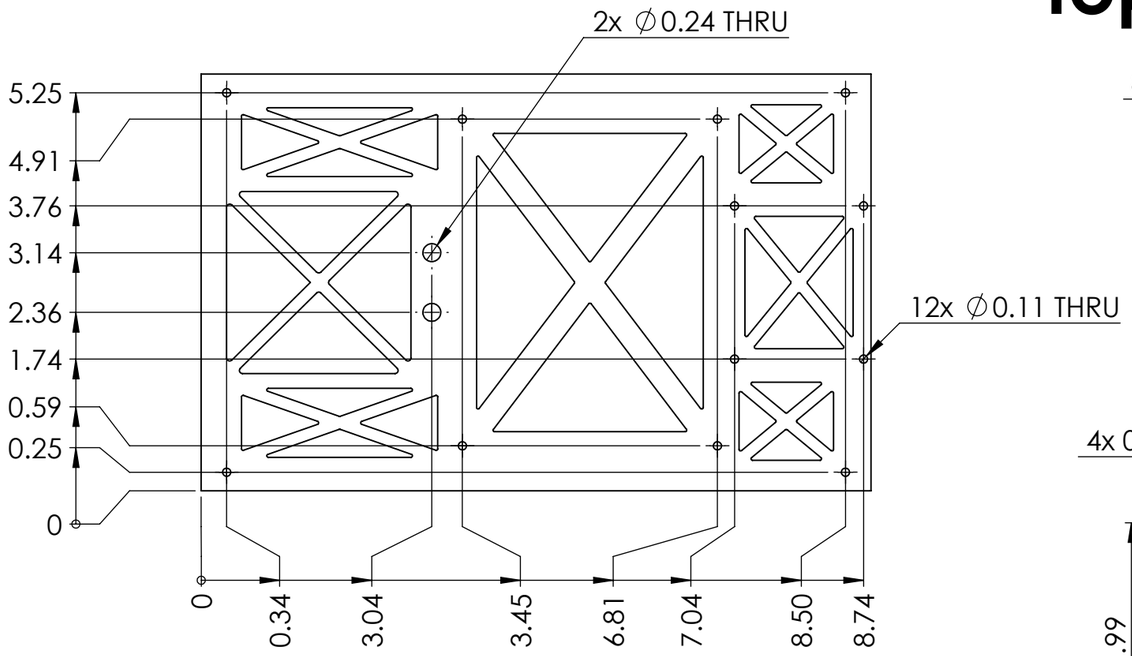


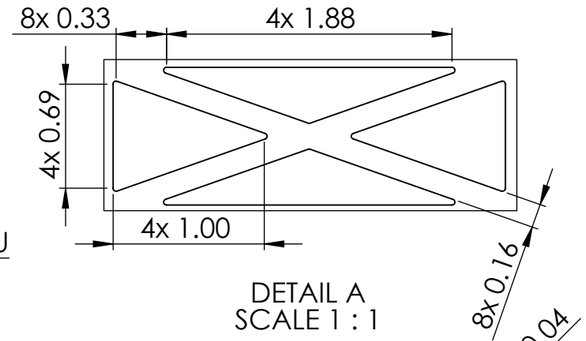
DETAIL K
SCALE 1 : 1

	bottomChassis
PROJECT	vrsLearningKit
AUTHOR	Michael Nguyen
DATE	11/03/2021
REVISION	0
UNITS	Imperial

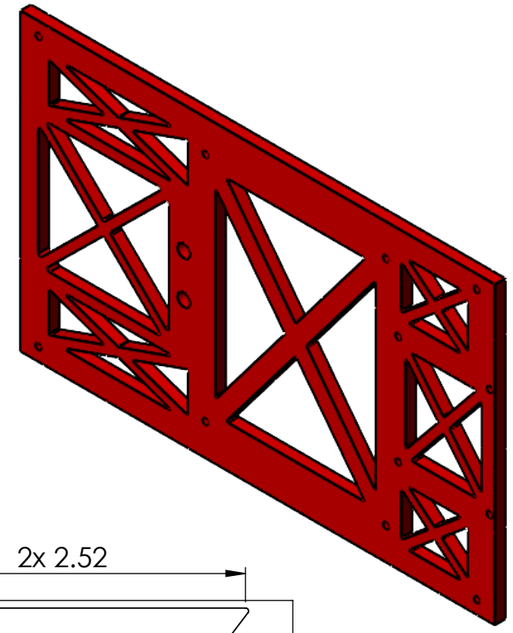
Viking Robotics Society

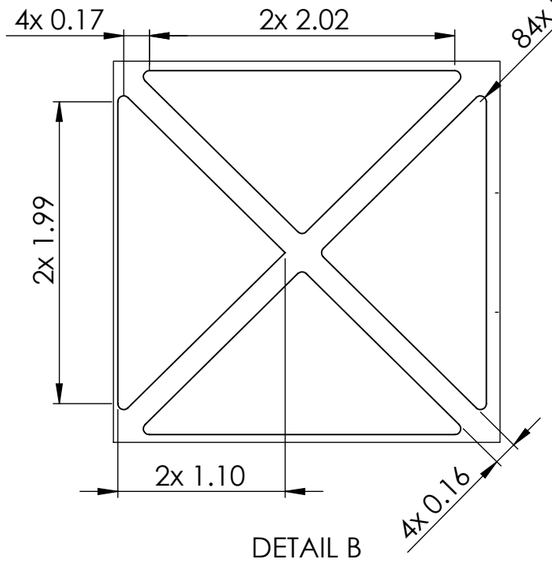
topChassis



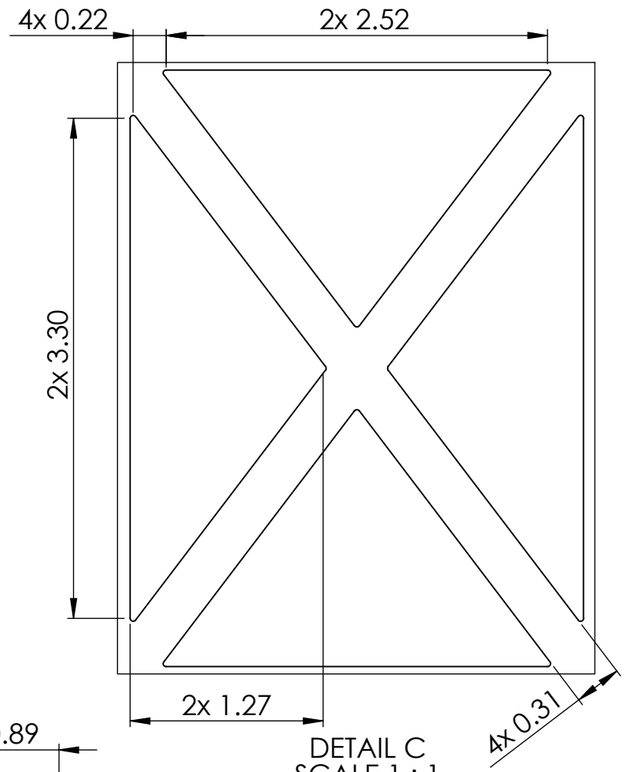


DETAIL A
SCALE 1 : 1

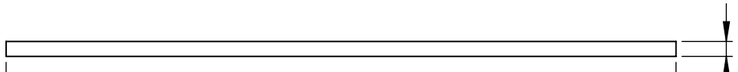


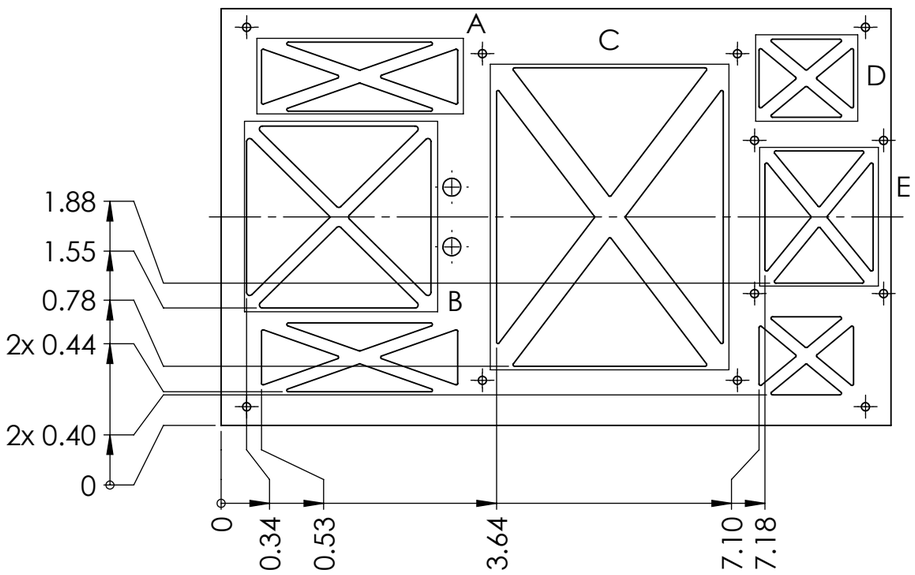


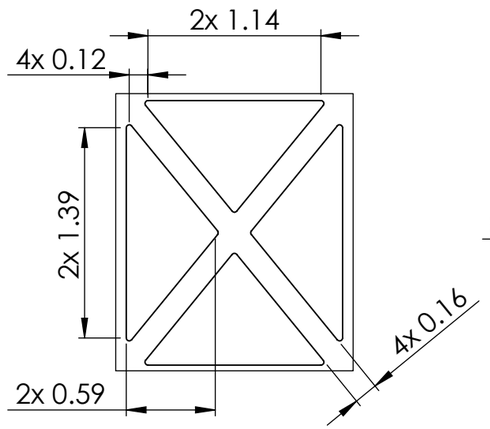
DETAIL B
SCALE 1 : 1



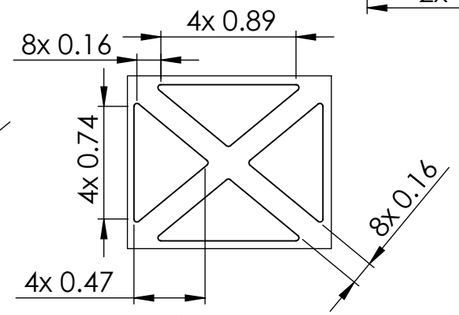
DETAIL C
SCALE 1 : 1







DETAIL E
SCALE 1 : 1

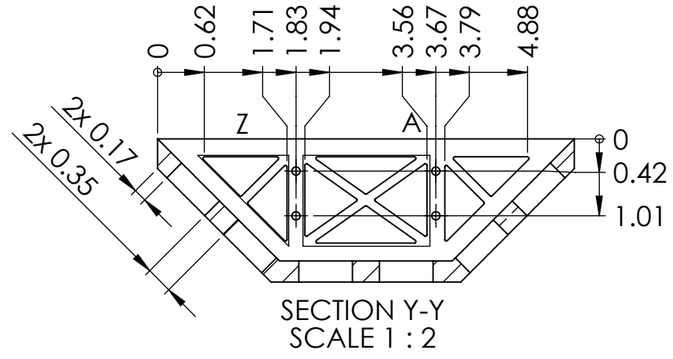


DETAIL D
SCALE 1 : 1

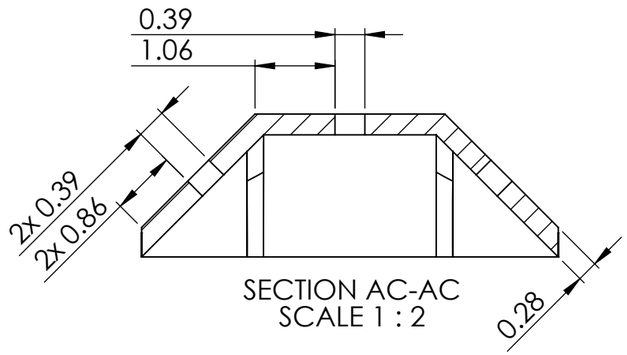
Viking Robotics Society

topChassis	
PROJECT	vrsLearningKit
AUTHOR	Michael Nguyen
DATE	11/07/2021
REVISION	0
UNITS	Imperial

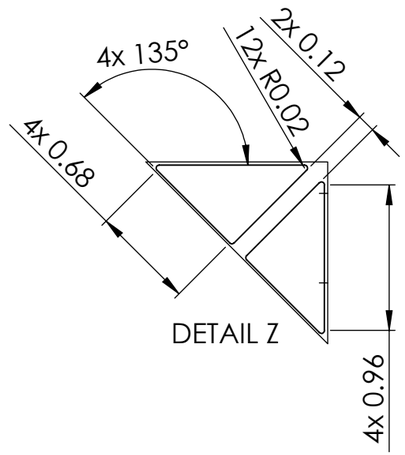
frontShell



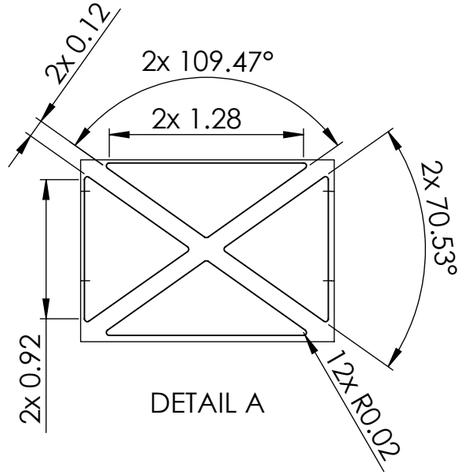
SECTION Y-Y
SCALE 1 : 2



SECTION AC-AC
SCALE 1 : 2



DETAIL Z



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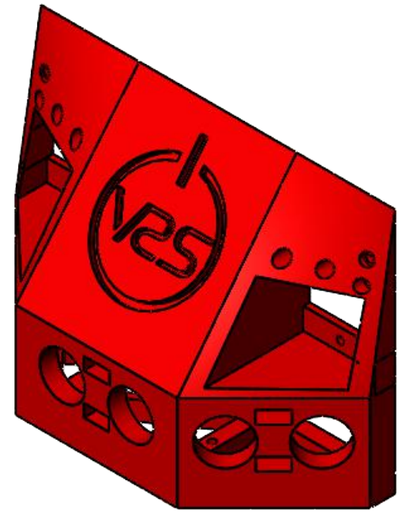

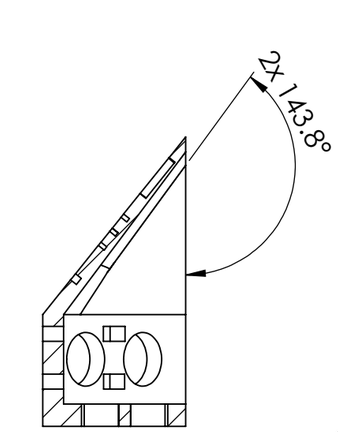

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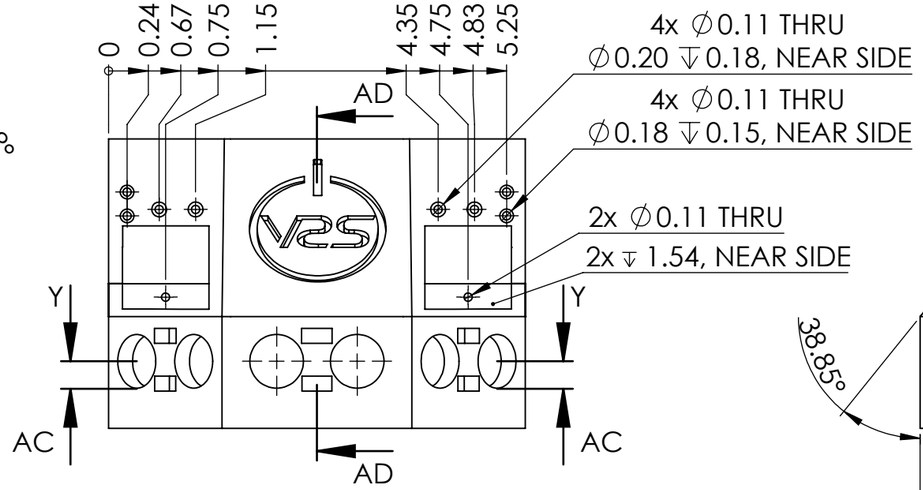
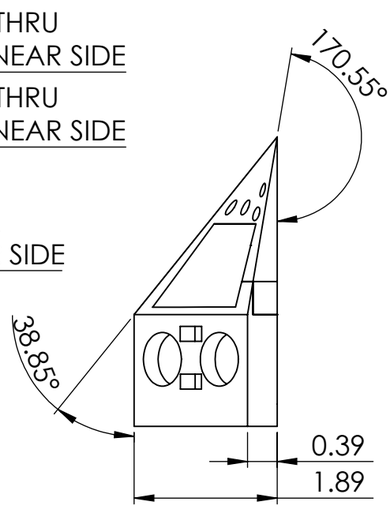
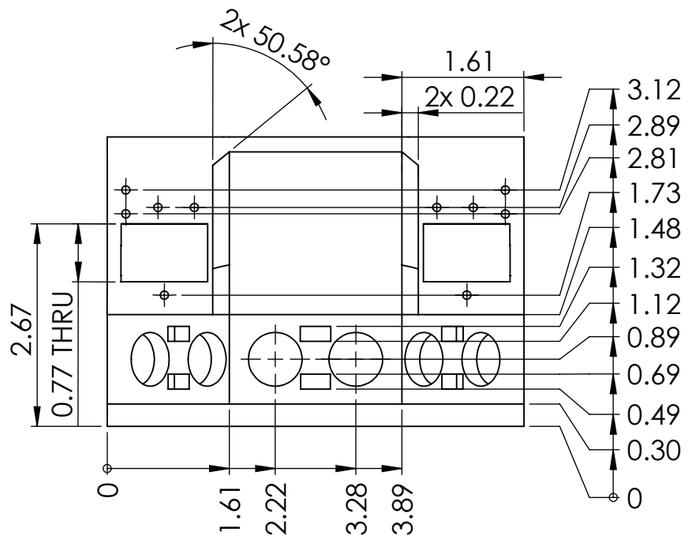
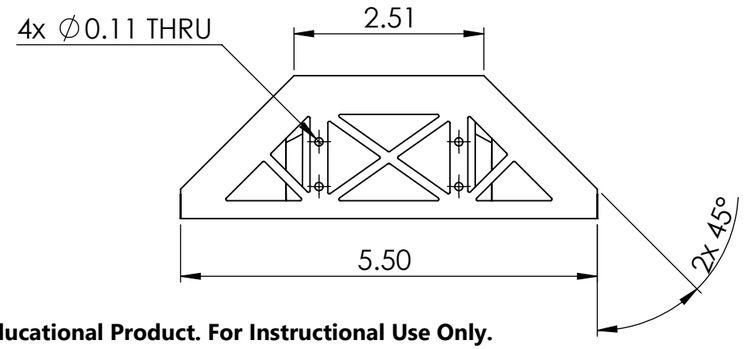
SCALE 1 : 2









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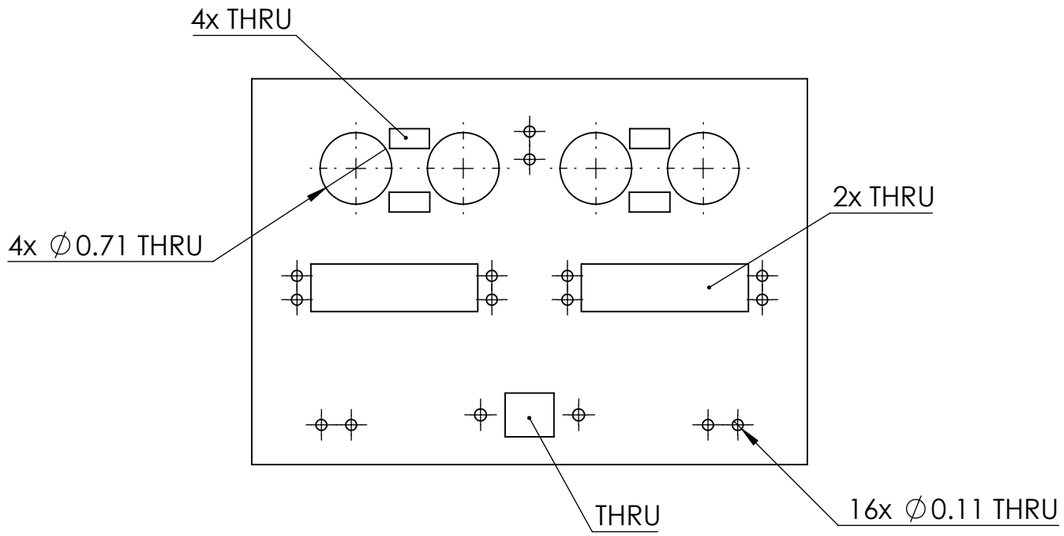

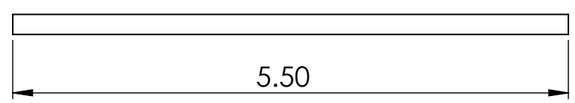

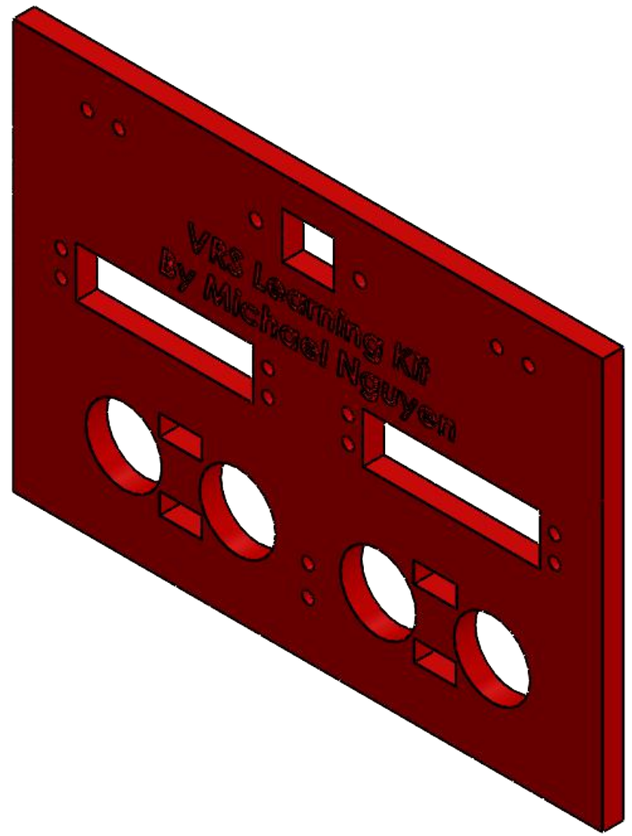

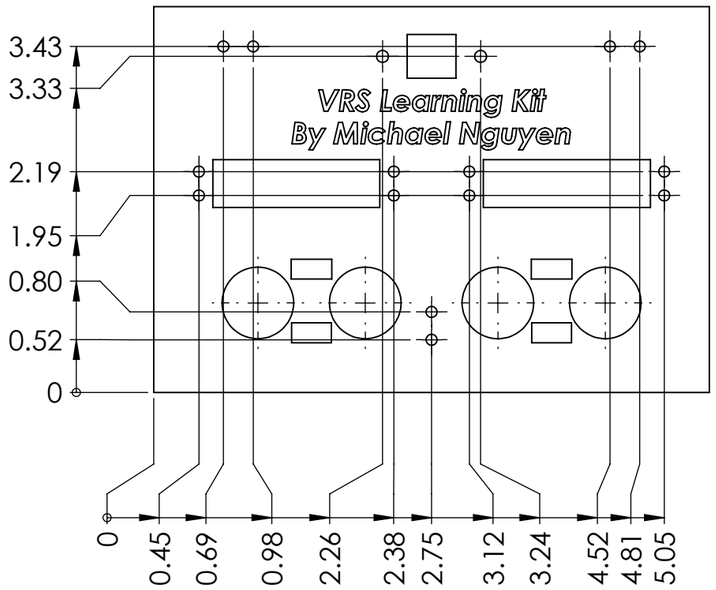

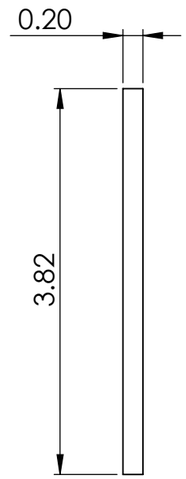

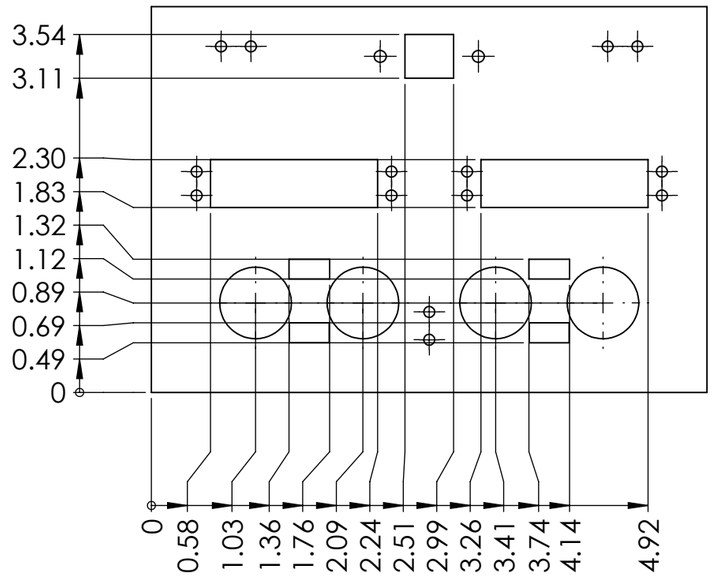

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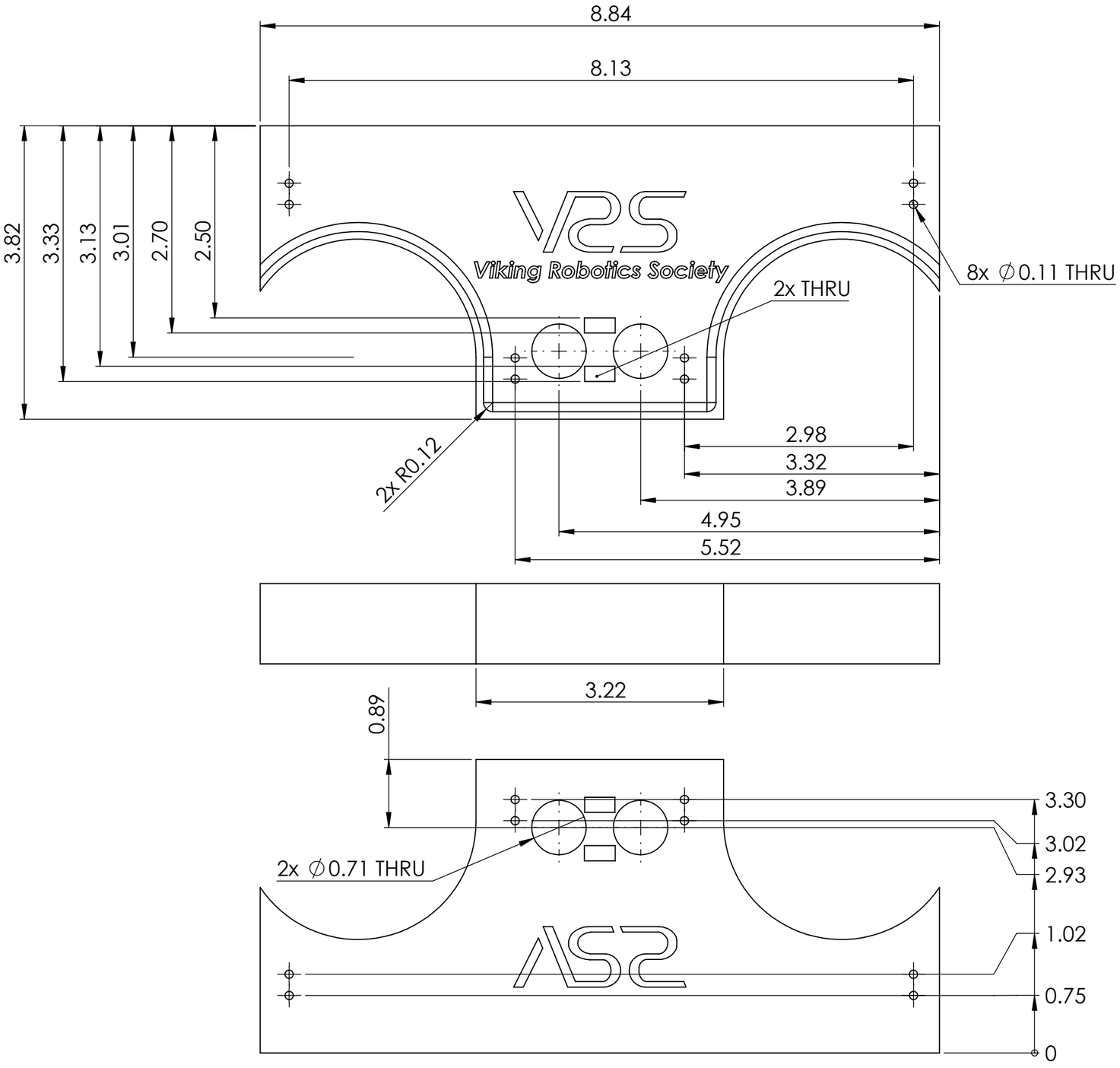

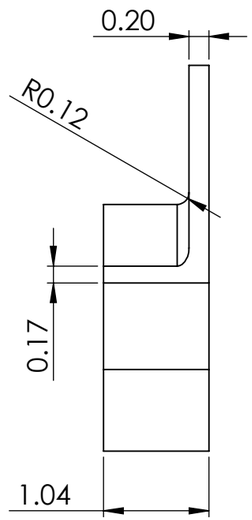

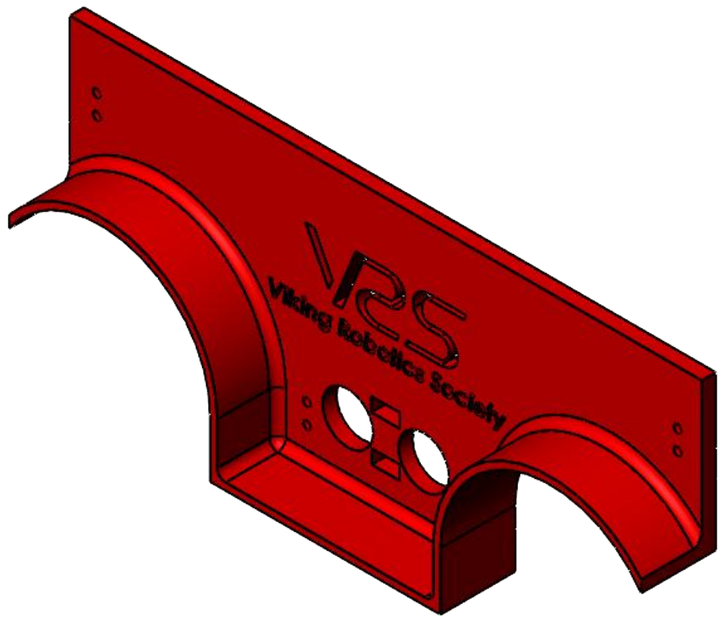

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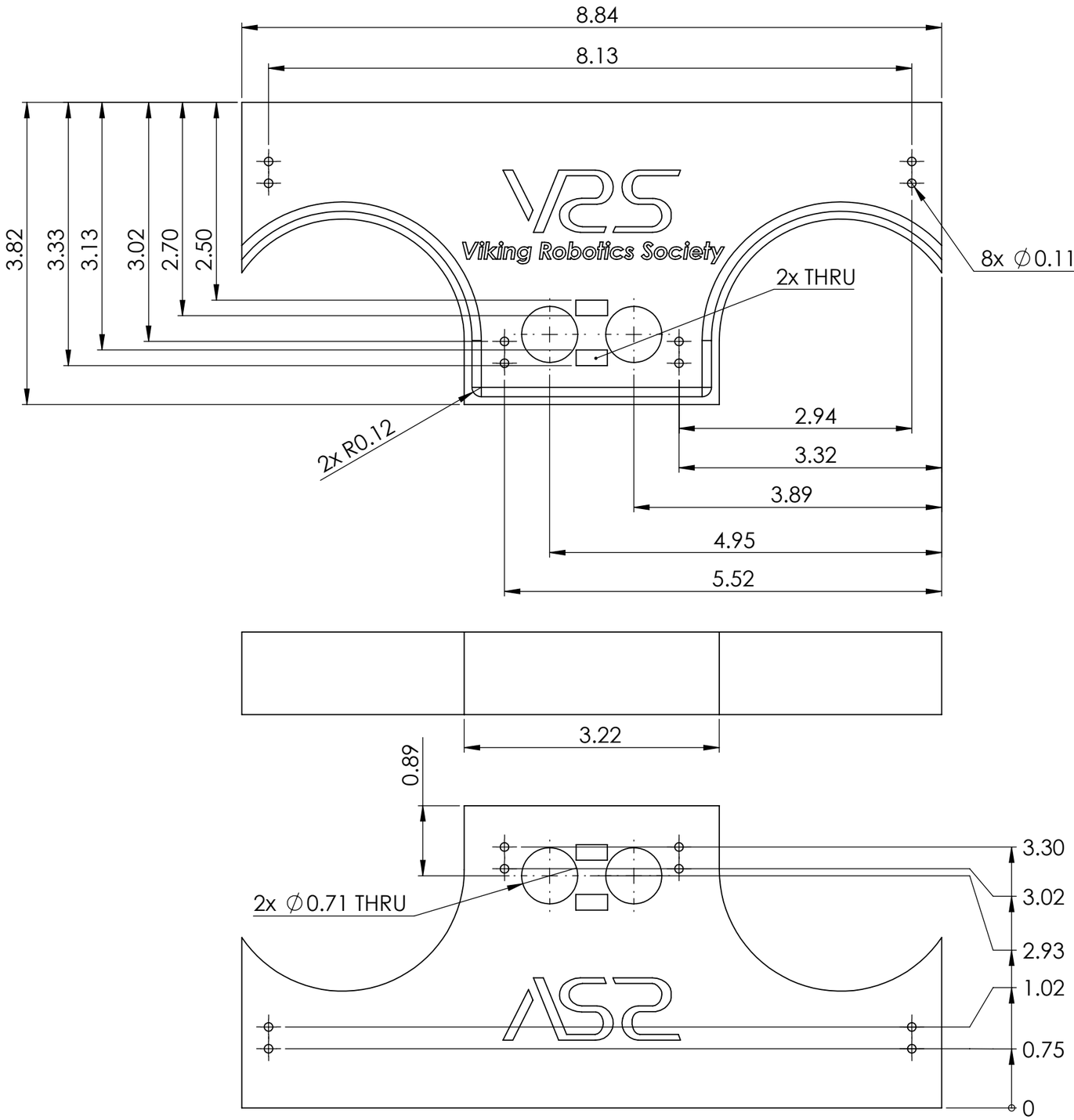

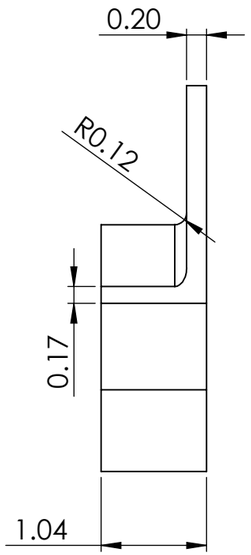

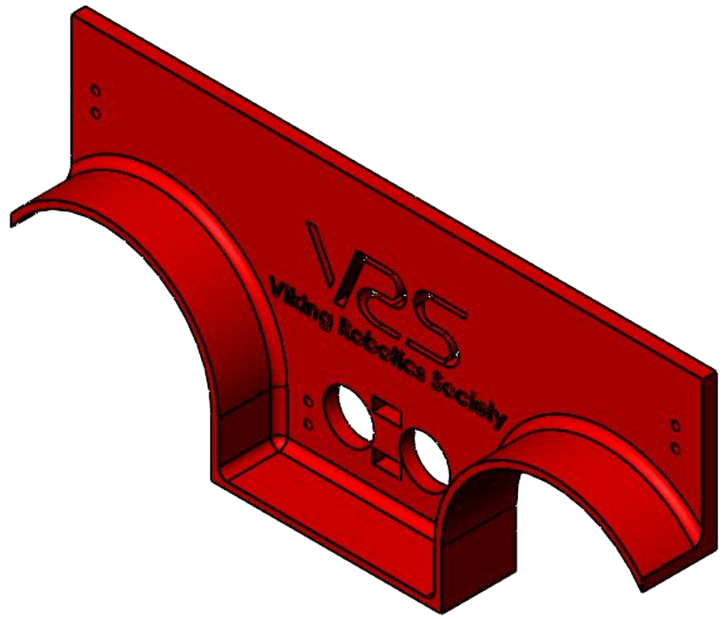

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About The Author

Michael Nguyen is currently attending Portland State University studying Mechanical Engineering with a concentration in mechatronics, controls, and robotics. Despite having this focus, he is also passionate about mechanical design engineering and computer-aided engineering where he plans on starting a solo consulting practice that focuses on semiconductor test equipment structural component design and electronics cooling solutions, both of which involve those two fields of engineering. On top of being a consultant part-time, he is also hoping to become a full-time engineer with a concentration in mechatronics, controls, and robotics. Michael is the current vice president of the Viking Robotics Society where he created and led the SFFF-TP, SDV-TP, and Autonomous Biped projects, the latter of which he also made direct technical contributions on top of his assigned leadership duties. Prior to this role, he was a mechanical design associate for the organization's robot arm designed to recreate a picture drawn by a user on a smartphone or tablet. In this project he designed an end effector capable of cycling through three different colored pens using a single motor. Michael is passionate about learning where he often spends his free time taking online courses covering subjects such as finite element analysis, geometric dimensioning and tolerancing, programming, mathematics, and physics.