

Assembly & Usage Guide



Alpha Clock Five

Alphanumeric LED Alarm Clock Soldering Kits

An open-source hardware+software project. For design files, source code, & additional documentation, please visit: <http://wiki.evilmadscience.com/alpha>

Support: <http://www.evilmadscientist.com/forum/>

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Kit version 1.0
Manual v. 1.0b

Assembly Step I – Tool Checklist

Four Essential tools: Needed to build the kit:

1. Soldering iron

A basic soldering iron meant for electronics, with a reasonably fine point tip. We recommend one of this design-- a "pencil shape" soldering iron (not gun!) with a base that holds the iron and a wet sponge.

While you don't need an *expensive* one, the iron can make a big difference in the time needed to build the kit. (Seriously. If you use one that is old and busted, or an ultra-low-end \$10 iron, expect to spend at least twice as long soldering!)

Our recommendation for a low-cost iron:
WLC100 by Weller, about \$40.



2. Solder

Thin rosin core solder.

60/40 solder is easy to use; diameter of .025" or so is typical for work like this.

Either standard (lead-bearing) or newer "lead free" solder types will both work just fine.



3. Angle Flush Cutters

For clipping loose wire ends.

e.g., Sears Craftsman



4. Screwdriver

Phillips-head screwdriver, medium size. (#1 is ideal.)



Suggested, but not required

Resistor lead forming tool

Allows fast, neat bending of resistor leads. Not that many parts like this in the Bulbdial kit, but if you like it extra nice....



And for the adventurous...

1. USB-TTL Cable

FTDI model TTL-232R or equivalent. A "smart" converter cable with a USB interface chip inside. One end hooks up to your USB port, the other to the clock. This allows you to program the Clock through a modified version of the Arduino development environment (<http://arduino.cc/>).

Besides programming, the cable can also be used to sync the time or display data on the clock through a serial program.



2. Computer, Internet access, USB port....

All of the software and source code that you'll need to reprogram the clock is available online for free. You'll need a reasonably recent vintage computer (Mac, Windows, or Linux) and internet access.

Additional information is available at the project page:
<http://wiki.evilmadscience.com/alpha>

Alpha Clock Five is a soldering kit. You'll need certain tools and supplies to build it.

Assembly Step 2 – Line numbers and the BOM

Your kit comes with a *bill of materials*, the authoritative, up-to-date list of what's included with your kit.

In the instructions, we refer to components by their line item number on the bill of materials. For example, #11 is the clock's DC power jack.

Alpha Clock Five

by **Evil Mad Science**

This document lists everything that comes with the kit. If you find that anything is missing or broken, please let us know right away and we'll get you squared away. >>> contact@evilmadscience.com <<<

To put your kit together, you'll need the build instructions. Please visit: <http://wiki.evilmadscience.com/alpha>

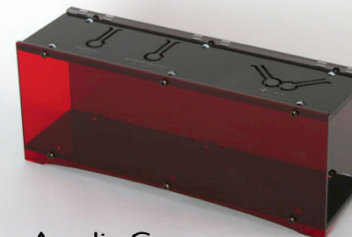
Line	Ref Des	Description	Mant/Vendor	Part number	Qty
1	n/a	Alpha Clock PCB	Evil Mad Science	60-0031	1
2	R6, R9	Resistor, 1/4 W Axial, 100 ohm	Digi-Key	100QBK-ND	2
3	R3, R4	Resistor, 1/8 W Axial, 10K	Digi-Key	10KKBK-ND	2
4	R2, RB1-RB6	Resistor, 1/4 W Axial, 681 ohm 1%	Digi-Key	681XBK-ND	8
5	R1	Resistor, 1/4 W Axial, 340 ohm 1%	Digi-Key	340XBK-ND	2
6	U1	Socket, DIP, 0.5" wide, 40 pin	Digi-Key	3M6471-ND	1
7	U2	Socket, DIP, 0.3" wide, 24 pin	Digi-Key	3M6466-ND	1
8	U3	Socket, DIP, 0.3" wide, 16 pin	Digi-Key	3M6463-ND	1
9	J4	Header, 0.1", 6 pin, DIL (extra long)	Digi-Key	609-0370-ND	1
10	M1	Header, female, 4 pin	Digi-Key	37037-ND	2
11	J1	Power Jack, 2.5 mm x 5.5 mm	Digi-Key	CP-002B	1
12	C5, C6	Capacitor, ceramic, 18 pF	Digi-Key	BC1004CT-ND	2
13	C1-C3, C7, C8, C10	Capacitor, ceramic, 0.1 uF	Digi-Key	BC1148TR-ND	6
14	XTL	Crystal: 16 MHz, 20 ppm	Digi-Key	605-9041-ND	1
15	J2	Header, 0.1", 6 pin, SIL, RA	Digi-Key	WM6106-ND	1
16	D2	LED, 5 mm, White Diffused	Berlux	BL-L312-UWW	1
17	Q1-Q6	PNP transistor, type 2STX2220	Digi-Key	497-7067-ND	6
18	C4-C9	Capacitor, aluminum, 100 uF, 16 V	Digi-Key	493-1040-ND	2
19	S1-S6	Switch, tactile RA, tall button	Digi-Key	P10880S-ND	6
20	L1	Buzzer, Magnetic	Digi-Key	102-1153-ND	1
21	U1	IC, microcontroller, ATmega644A	Digi-Key	ATMEGA644A-PU-ND	1
22	U2	IC, LED Driver, type MB16026	Macroblock	MB16026GN	1
23	U3	IC, LED Driver, type MB16168	Macroblock	MB16168GN	1
24	n/a	Bracket, right angle, 6-32 threaded	Digi-Key	4334K-ND	2
25	n/a	6-32 x 3/8" Phillips Screw	McMaster-Carr	91772A146	4
26	LD1-LD6	Machine Pin Socket, 10 pin SIL	Jameco	102201	10
27	LD1-LD6	LED, Alphanumeric Red 2.3" (each)	Berlux	BL-S230B-13UHR-12	6
28	n/a	Power Supply 5 V 1 A (2.5 mm plug)	Generic	--	1
29	n/a	Chronodot Module	Macetech		

Case kit:

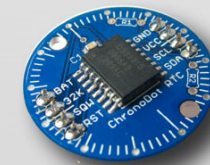
Line	Description	Mant/Vendor	Part number	Qty
30	Acrylic Case, front	Evil Mad Science	61-0035	1
31	Acrylic Case, back	Evil Mad Science	61-0036	1
32	Acrylic Case, top	Evil Mad Science	61-0037	1
33	Acrylic Case, bottom	Evil Mad Science	61-0038	1
34	Hex nut, zinc plated, 4-40	McMaster-Carr	90480A006	12
35	4-40 x 1/2" Phillips screw, black	McMaster-Carr	91249A111	12
36	#6 x .020" fender washer	McMaster-Carr	90313A101	2



Note that this guide covers both the full and "Basic" editions of Alpha Clock Five. (The difference between the two is that the Basic edition does not include the acrylic case or chronodot module.)



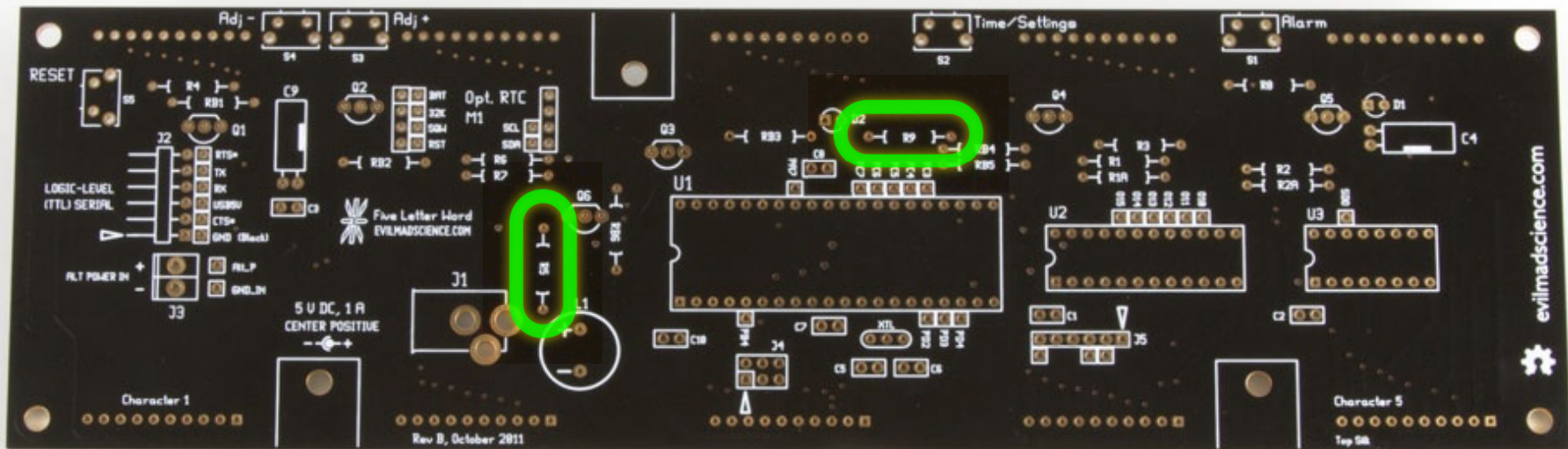
Acrylic Case



Chronodot Module

Assembly Step 3 – First components

Our first assembly step will be to add components in locations R5 and R9 on the circuit board. Locate these two locations on your circuit board, as shown highlighted here.



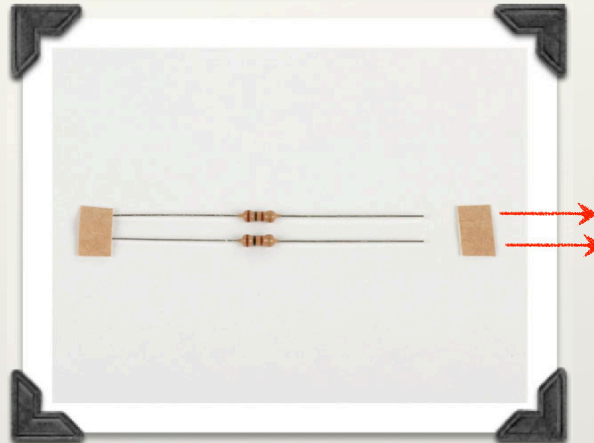
The Alpha Clock Five printed circuit board (PCB), the “Five Letter Word,” #1 on your bill of materials.

Assembly Step 4 – Place the first resistor

Our first component type is a 100 ohm resistor, part **#2**. For this first one, we'll take it slowly.



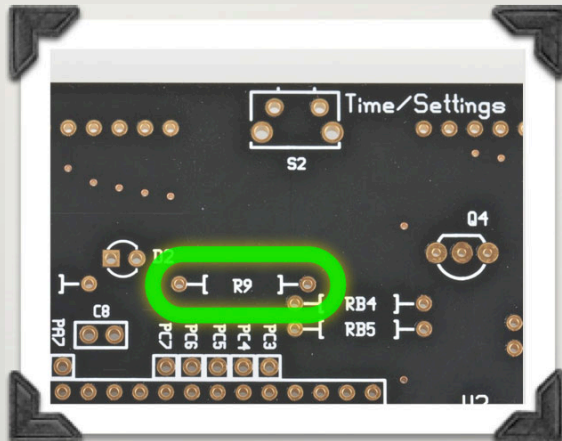
Parts **#2**. Our first components are 100 Ohm resistors. Identify them by their color code: Brown-Black-Brown-Gold



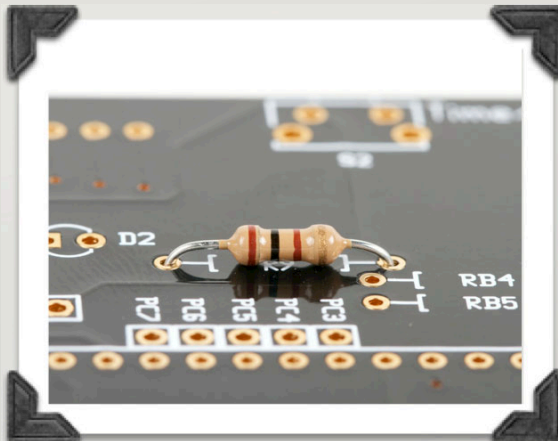
The resistors are normally taped together like the ones shown here. Pull the tape straight off to remove it.



Take one of the resistors, and bend it like so.



Insert it at location R9
(the orientation does not matter)



And press it flush to the board



Next up: Soldering tips!

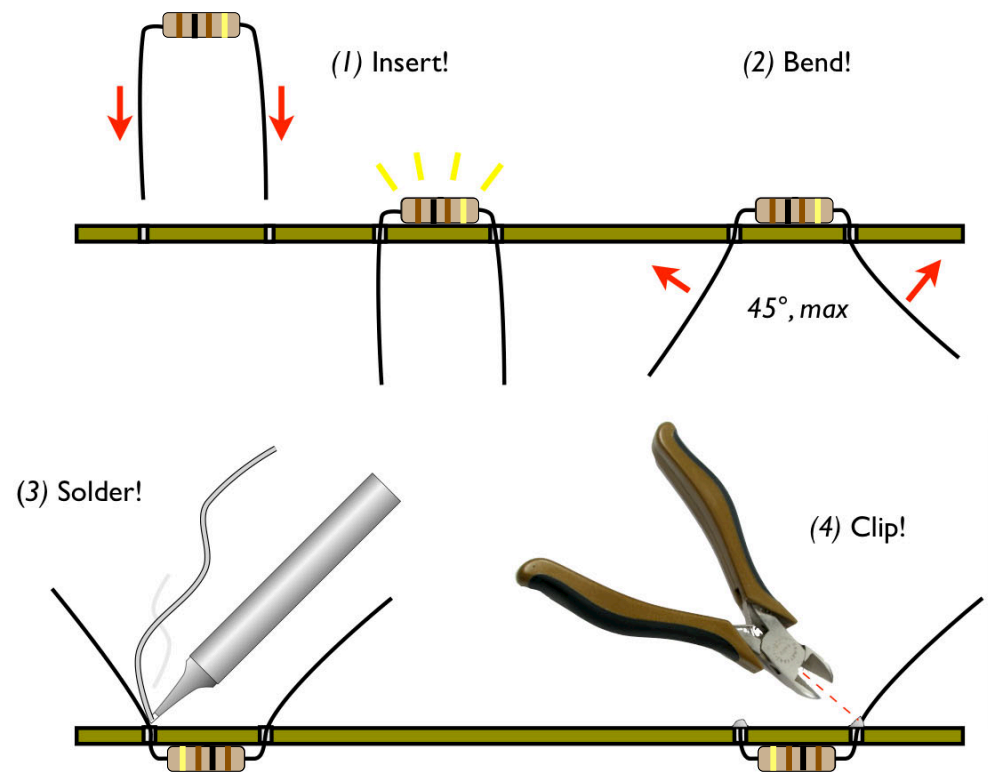
Assembly Step 5 – Some hints on soldering

As the old Heathkit manuals say, “it is interesting to note” that the vast majority of problems reported with soldering kits turn out to be due to unreliable solder connections.

Before we go further, here’s a quick refresher, with our suggested procedures for adding components to the circuit board. These procedures apply to most components in the kit.

Adding components to the circuit board

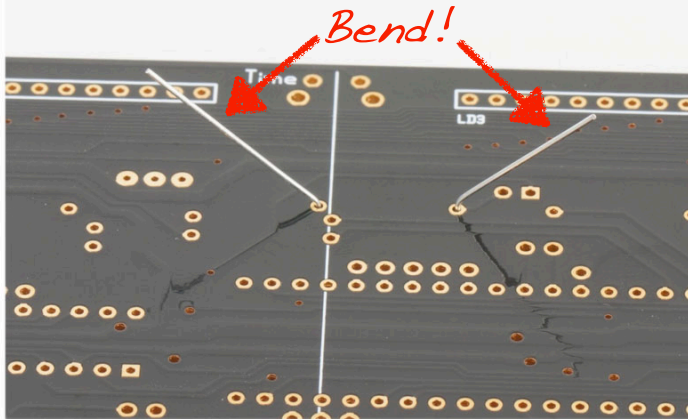
- (0). Pre-form the leads of components if needed.
(For example, like the resistor in the last step.)
- (1). Insert each component into the circuit board, from the top, at its given location. Push it flush to the board
(Note that some components, like the chips and LEDs, need to be inserted with a particular orientation.)
- (2). If your component has flexible leads, *gently* bend the leads out, up to 45°, to hold it in place while you solder.
- (3). One at a time, from the back side, solder the leads of the component to the circuit board.
 - Your tip *needs* to be *shiny* (tinned). If not, melt some fresh solder against it and *quickly* swipe clean on a wet sponge.
 - Place the solder against the joint that you wish to connect.
 - Touch the iron to the solder and joint for about one second. Count it out: “one thousand one.”
 - The solder should melt to the joint and leave a shiny wet-looking joint. If not, let it cool and try again.
- (4). If the component has long and/or flexible leads, clip off the extra length, close to the board. (But not so close that you’re clipping the board itself.)



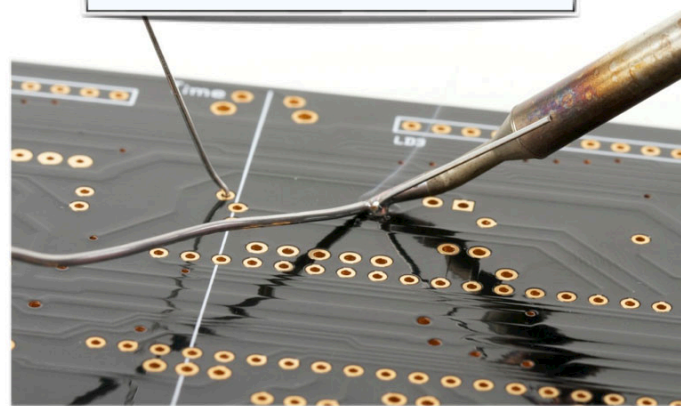
Assembly Step 6 – Solder that first resistor

(Where we perform those steps that we just described!)

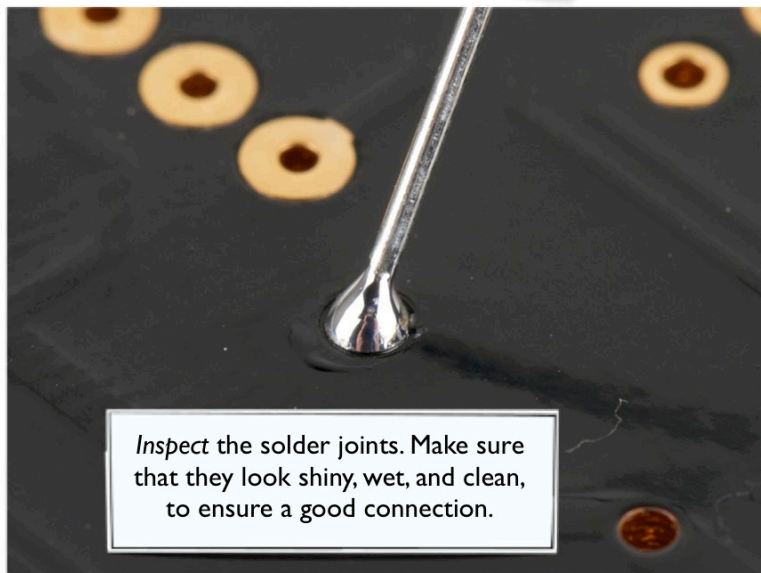
On the back side, *Bend* out the two leads of the resistor



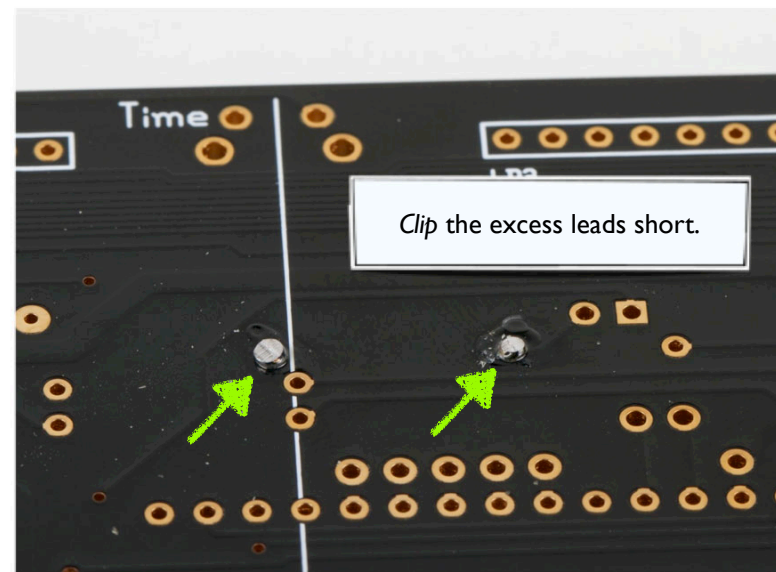
Solder both pins to the board.



Inspect the solder joints. Make sure that they look shiny, wet, and clean, to ensure a good connection.



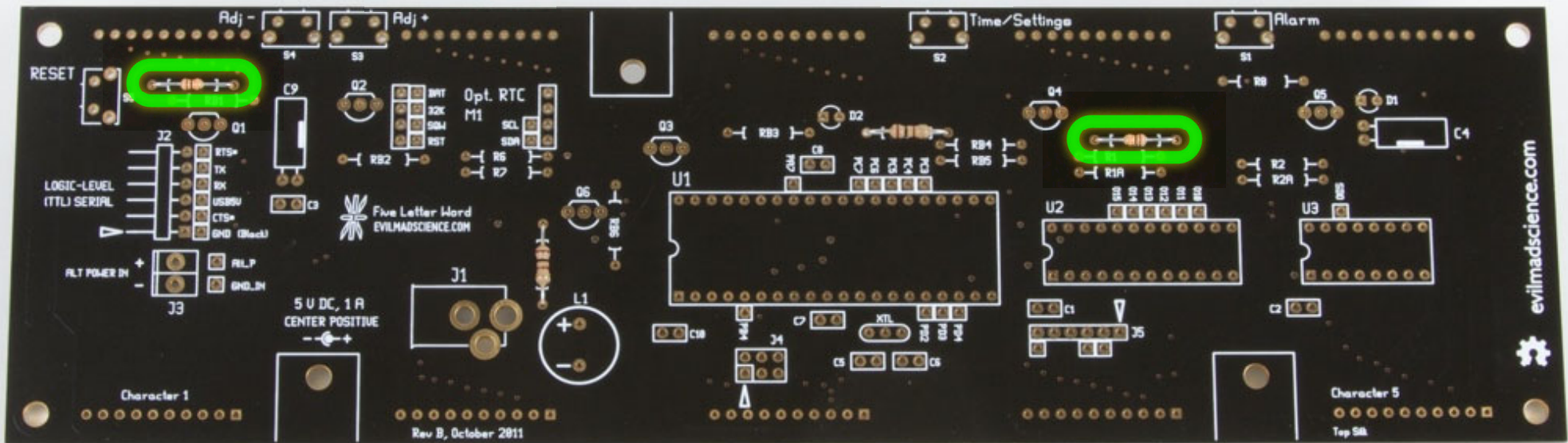
Clip the excess leads short.



And finally, repeat this procedure, to install the other #2 resistor at location R5.

Assembly Step 7 – Install Resistor #3

Next, solder parts **#3**, two 10 k resistors,
into locations R3 and R4.



Parts identification:



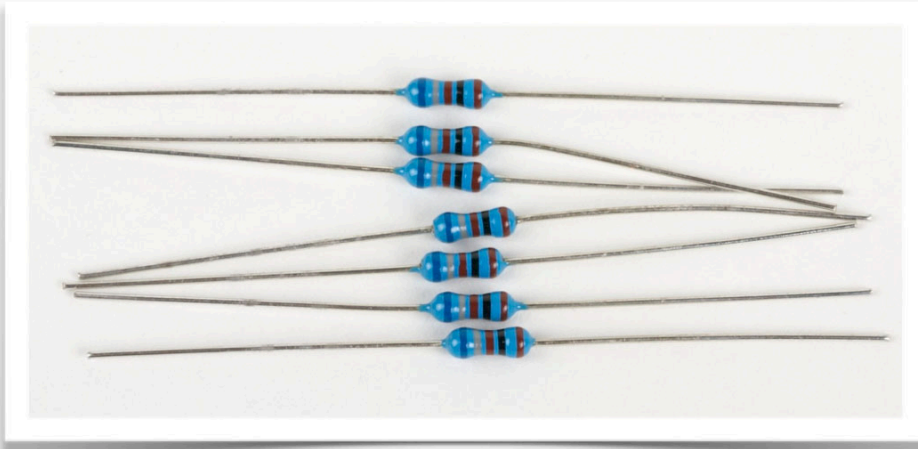
#3 is the one *smaller size* resistor.



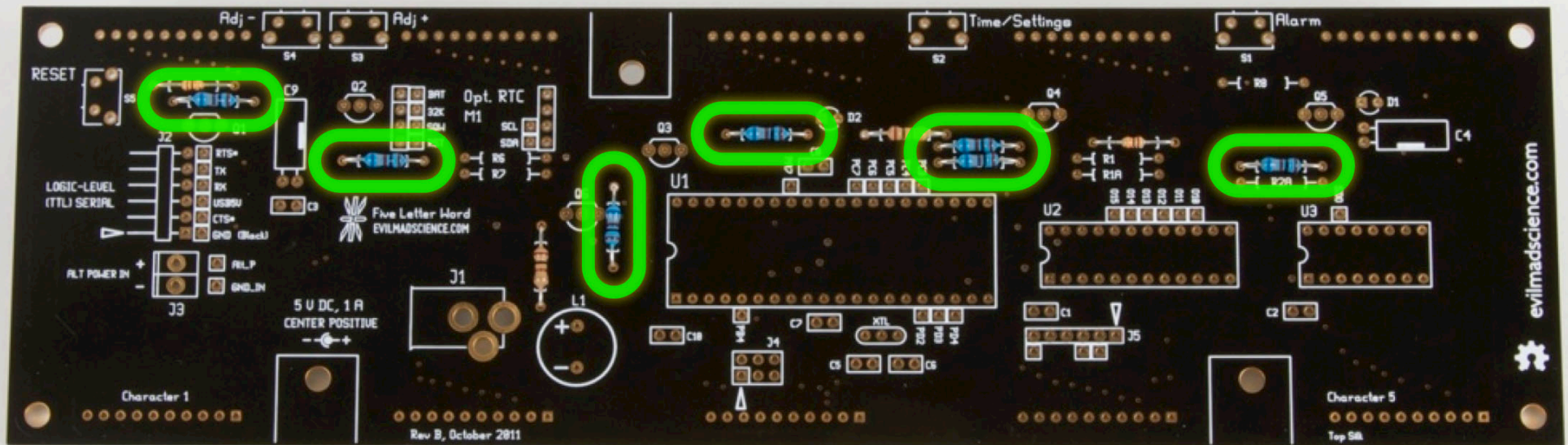
Up close, the color stripes are brown-black-orange-gold.

Assembly Step 8 – Install Resistors #4

Part #4 is a 681 ohm resistor. Solder seven of these, in locations R2 and RB1-RB6.



The color code on these resistors is blue-gray-brown-black-brown

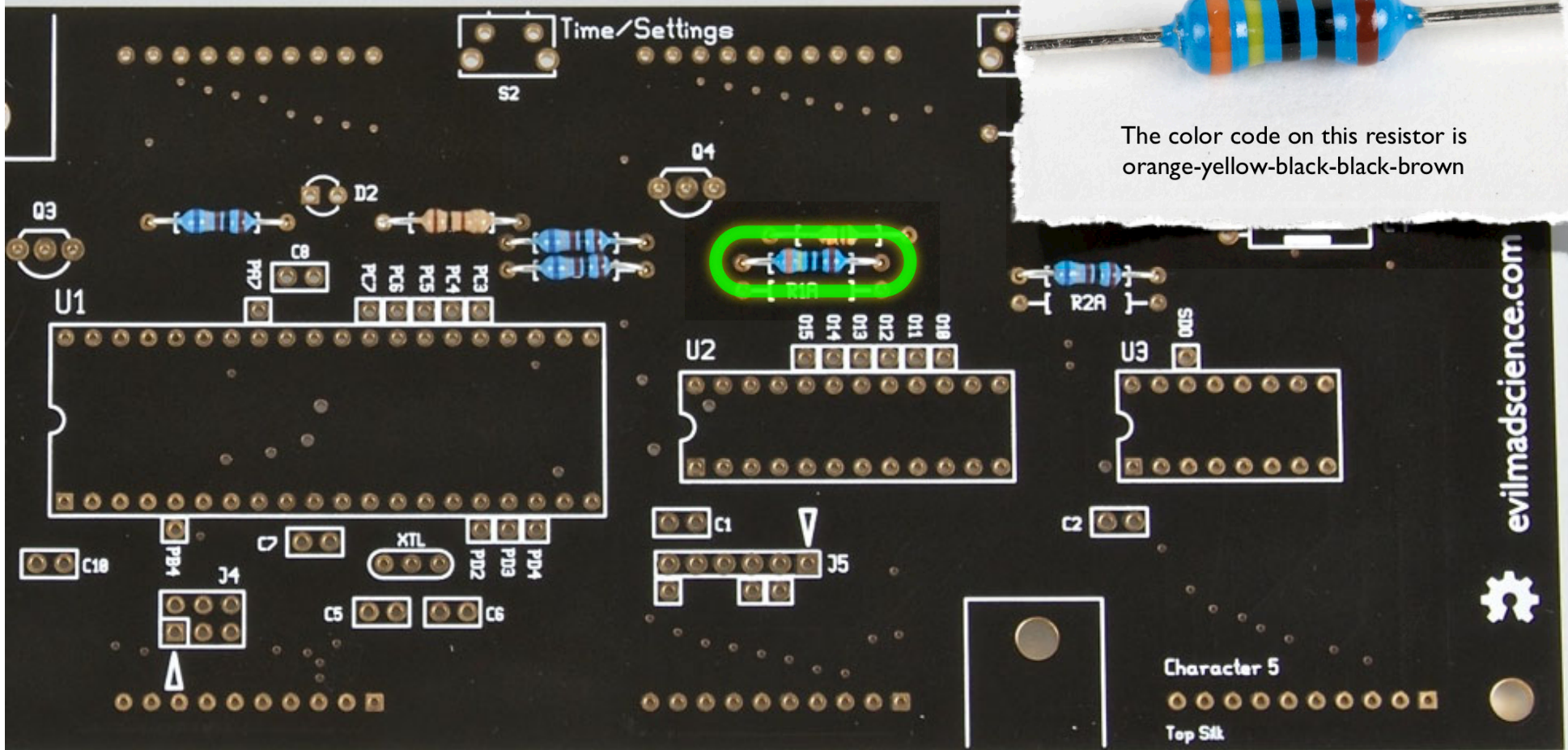


Assembly Step 9 – Install Resistor #5

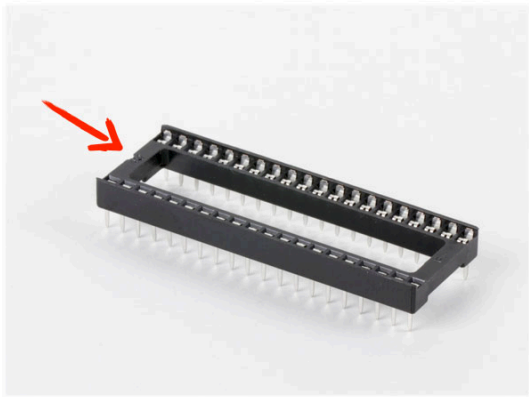
Part **#5** is a 340 ohm resistor. Install just one of these, at location R1.



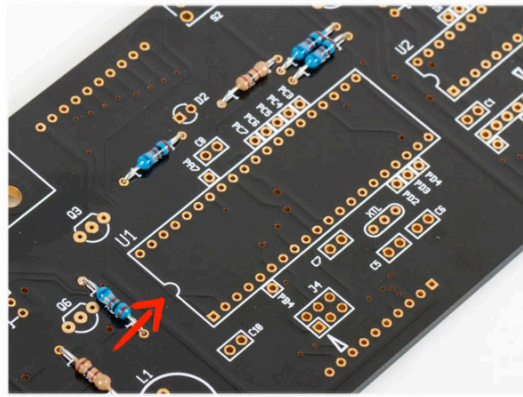
The color code on this resistor is orange-yellow-black-black-brown



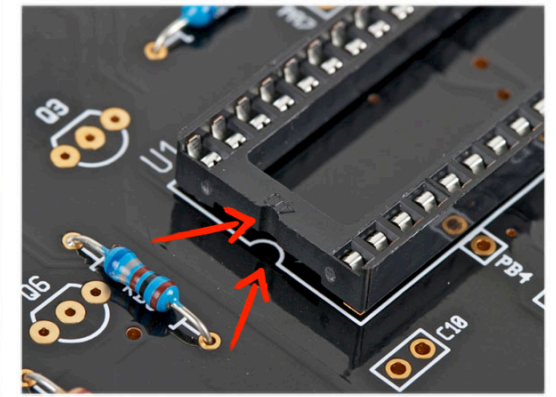
Assembly Step 10 – The 40-pin IC Socket



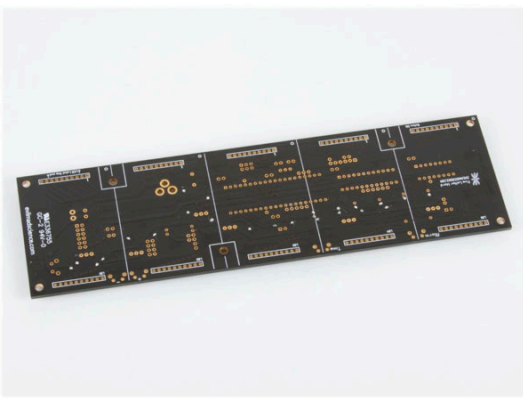
This is **#6**, the 40-position socket for the microcontroller. Locate the polarity marking notch at one end of the socket.



There is a corresponding footprint for the socket, at location U1 on the circuit board. It has a corresponding notch at one end.



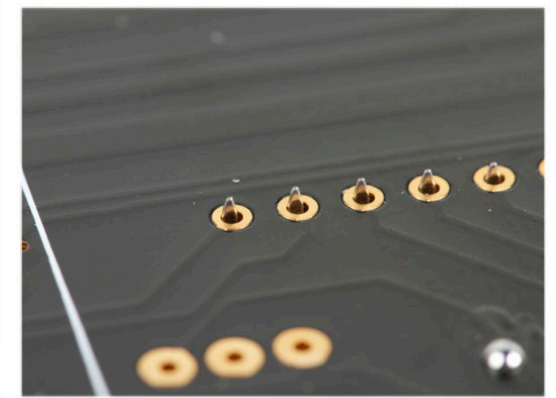
Insert the socket into the circuit board, matching the two ends with the notches.



Flip the circuit board over, while keeping the socket in place.

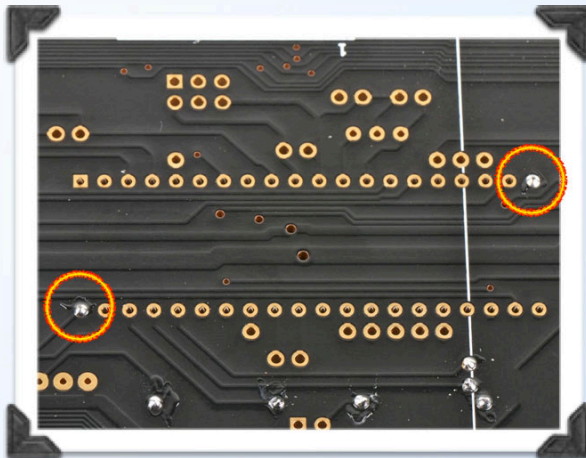


To ensure good positioning, rest the circuit board flat on top of the socket.



The socket pins will protrude (but only very slightly) through the circuit board

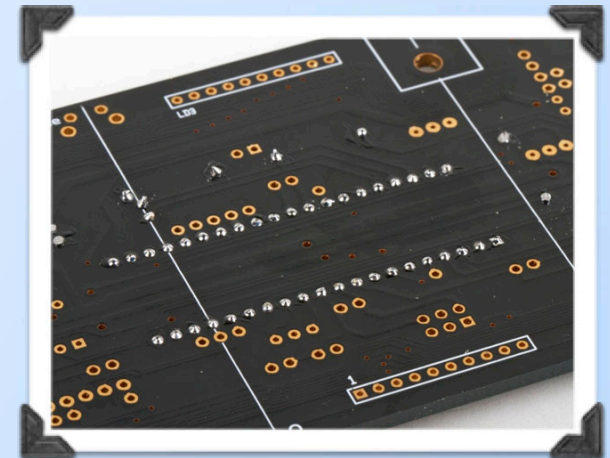
Assembly Step 11 – Sockets, continued



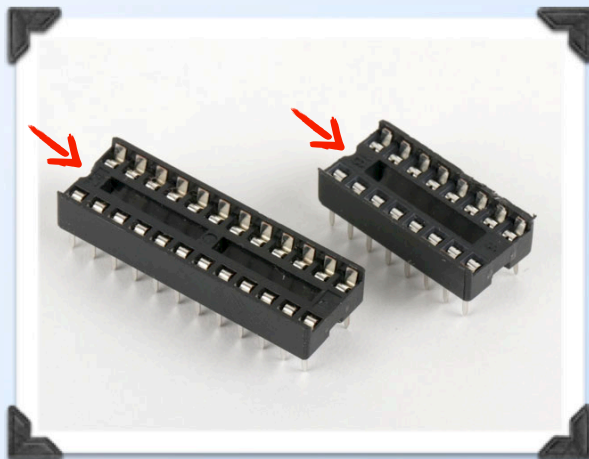
To begin with, solder just two opposite corner pins of the 40-pin socket.



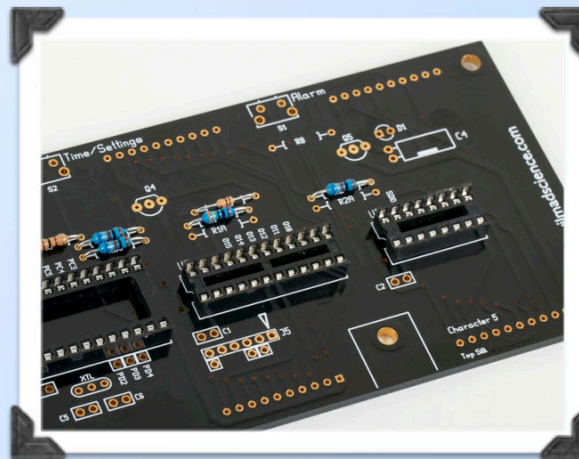
Then, on the top side, check that the socket is level and flush to the board.



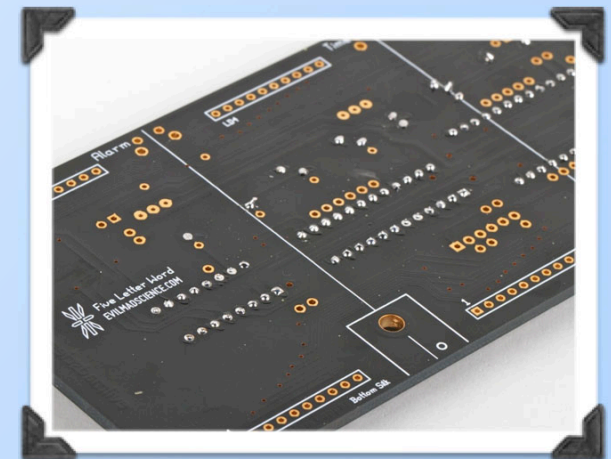
Then, solder the rest of the socket pins.



Parts **#7** and **#8** are the 24-pin and 16-pin DIP Sockets, respectively. Note that each has a notch at one end to mark the polarity.



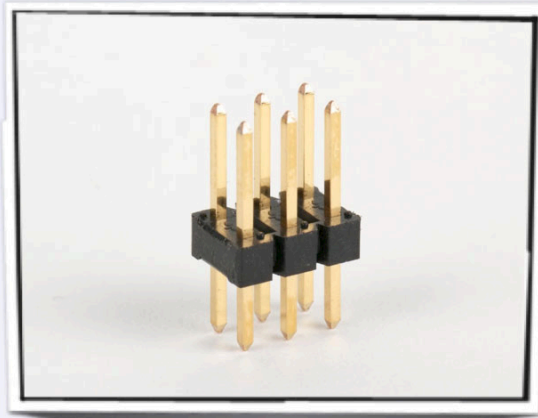
One at a time, install the sockets in locations U2 and U3, using the same method. Take care to match the notches to those on the circuit board.



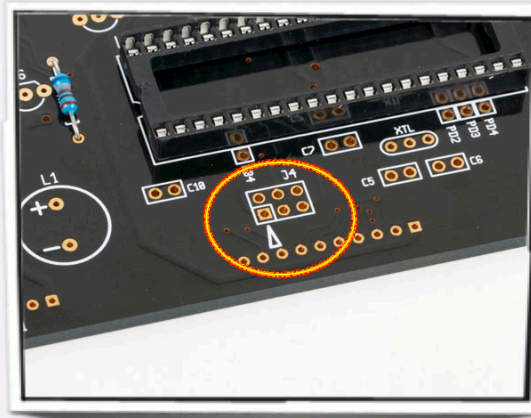
As before, solder all of the pins on the back side.

(And, do not insert any of the chips just yet– we'll do that later.)

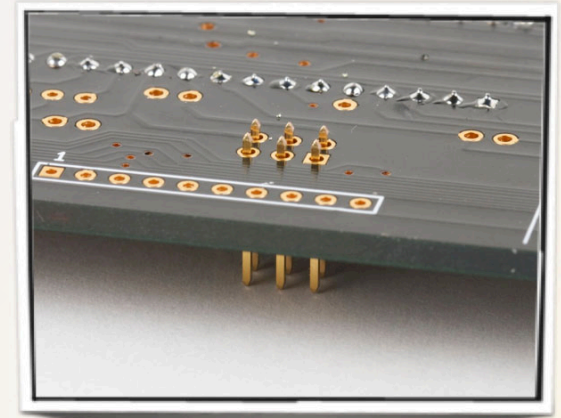
Assembly Step 12 – Six-pin DIL ISP Header



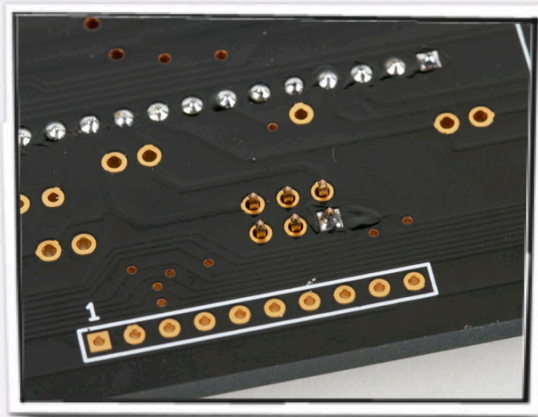
Part **#9** is a 6-pin DIL (dual inline) header.



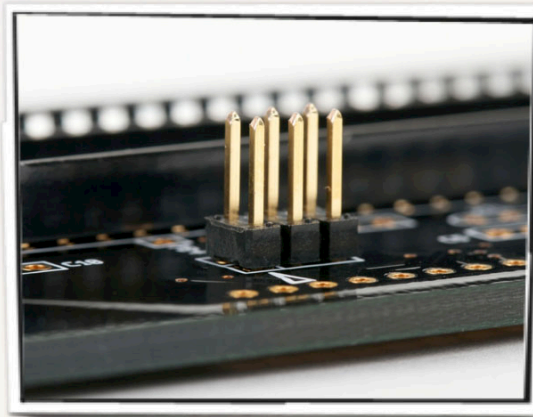
It goes in location J4.



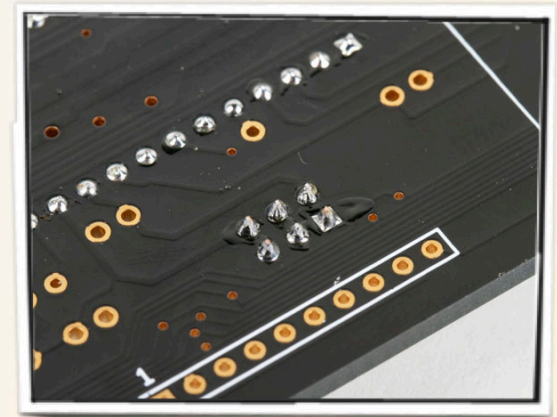
Flip the board over, so that you can rest it on the header, to hold it in place while soldering.



Solder just one pin to begin with.



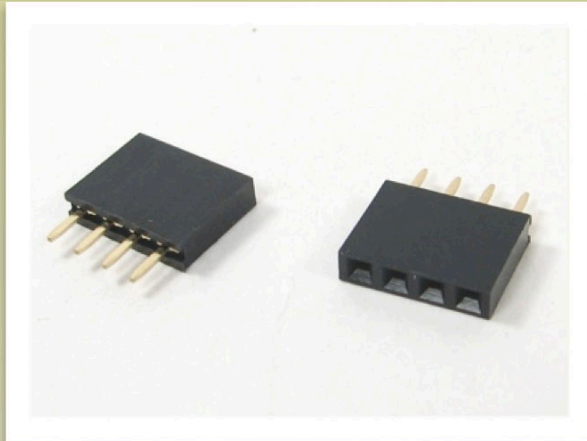
On the top side, make sure that the header sits flush to the circuit board. If not, flip it back over, and melt the joint while pressing down on the circuit board, to snap the header into place.



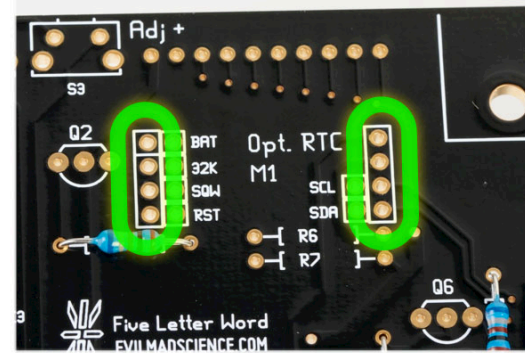
Then, solder the other five pins.

Assembly Step 13 – RTC Sockets

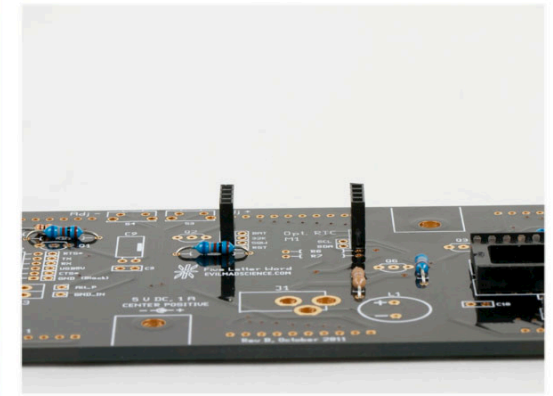
In this step, we add the sockets that allow Alpha Clock Five to be connected to a real-time clock module (e.g., Chronodot)



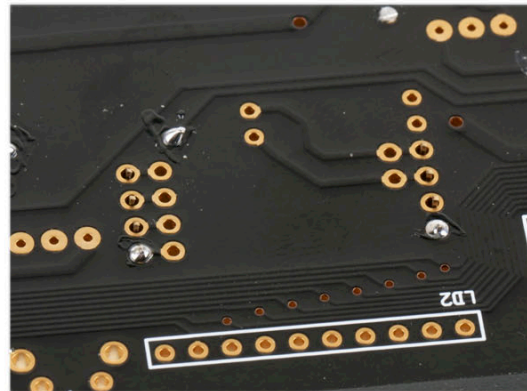
Parts **#10** are two 4-pin female headers that go at location M1.



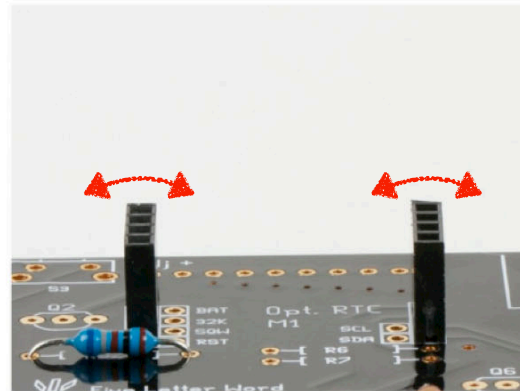
There are actually two locations at M1. Note that the headers go in the *outer* positions.



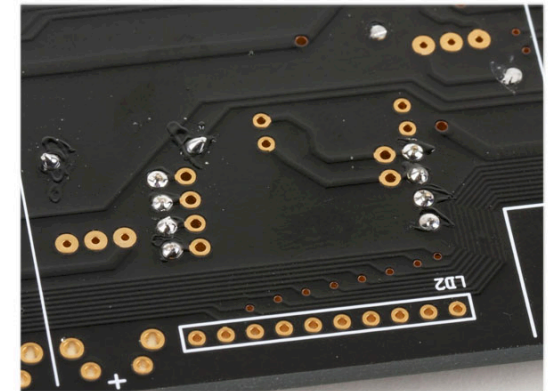
Insert the two headers...



...And flip the board over to rest on them, holding them in place for soldering. Solder one pin of each header.



On the top side, straighten the headers, and make sure that they are flush and square to the board.

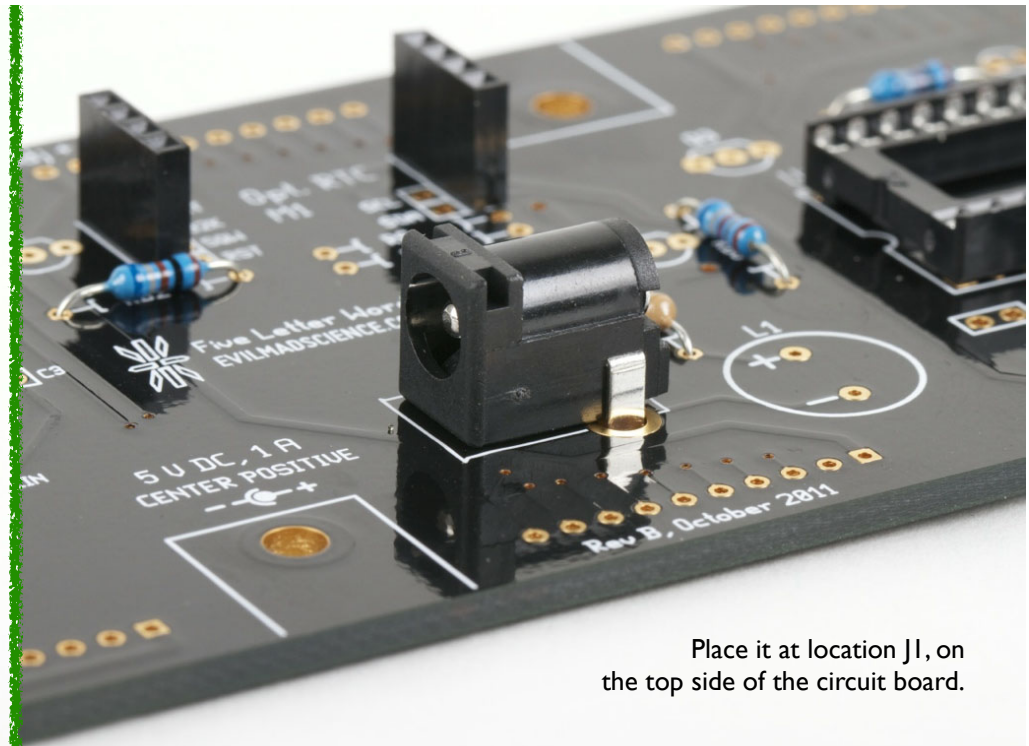


Finally, solder the other three pins of each header.

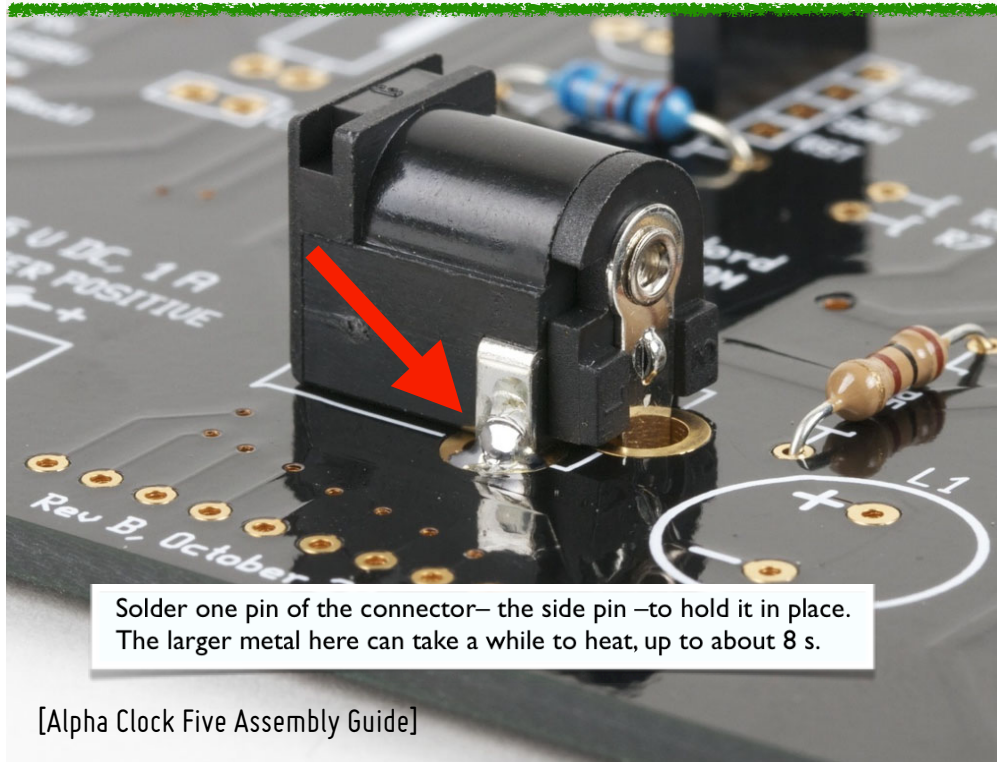
Assembly Step 14 – Power jack



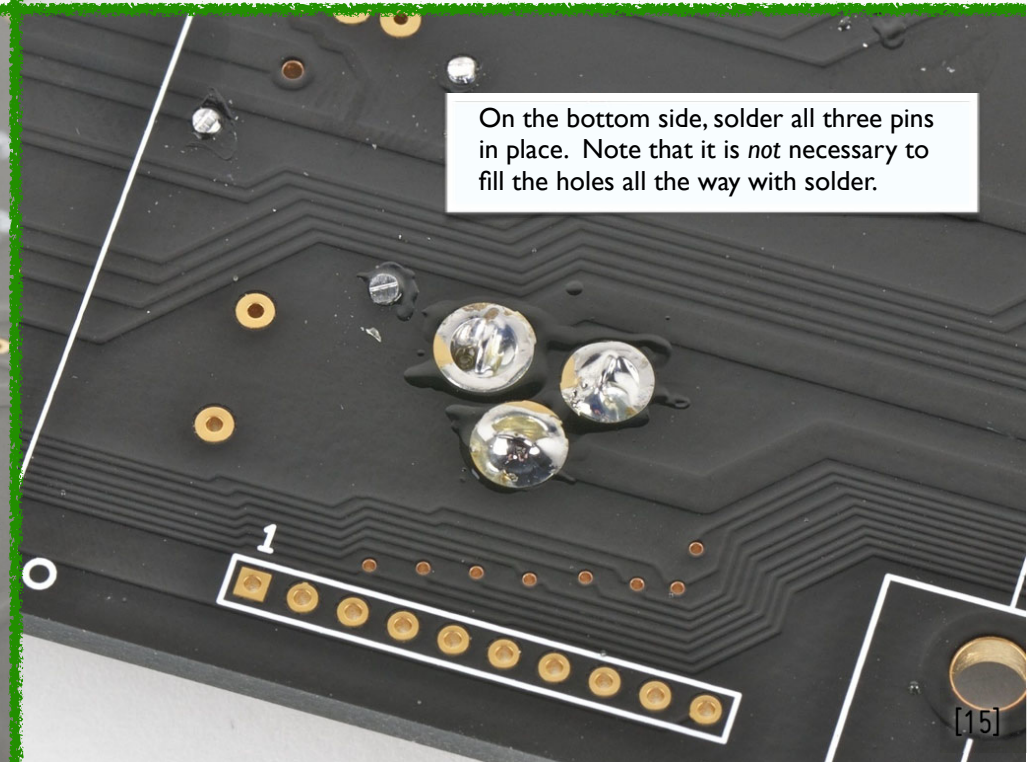
Part #11 is the dc power jack



Place it at location J1, on the top side of the circuit board.

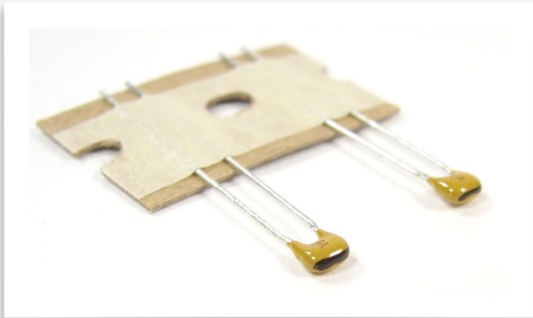


Solder one pin of the connector– the side pin –to hold it in place. The larger metal here can take a while to heat, up to about 8 s.



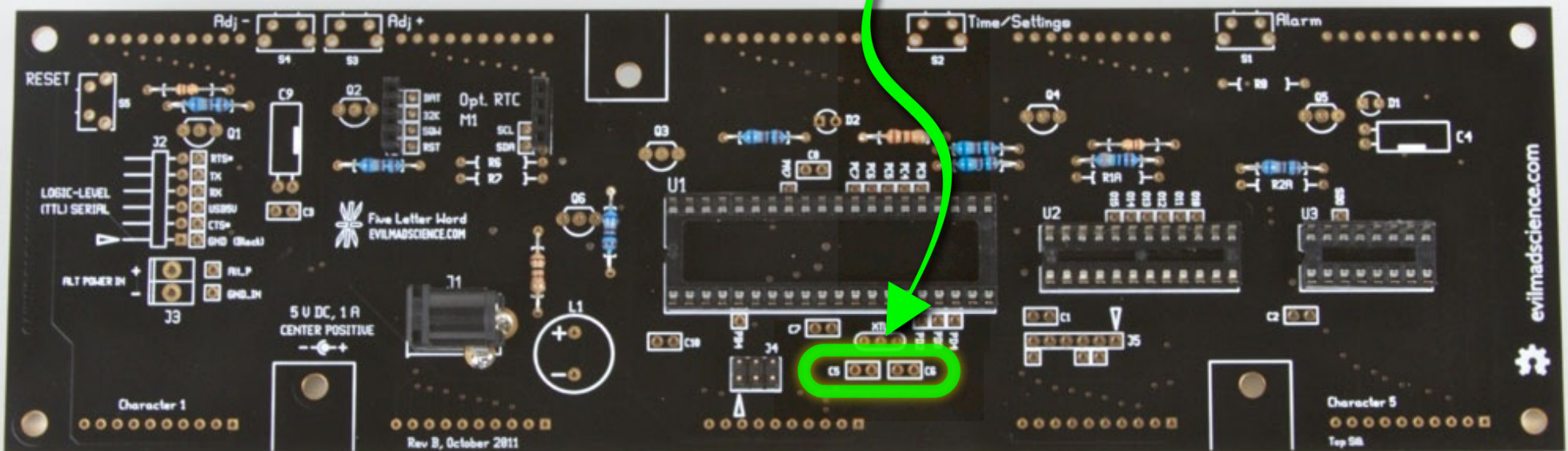
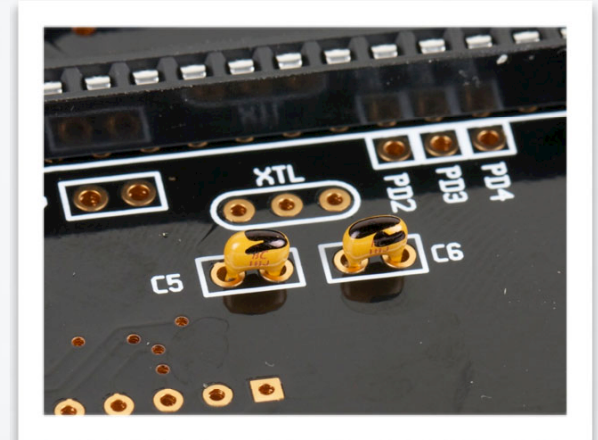
On the bottom side, solder all three pins in place. Note that it is *not* necessary to fill the holes all the way with solder.

Assembly Step 15 – 18 pF capacitors

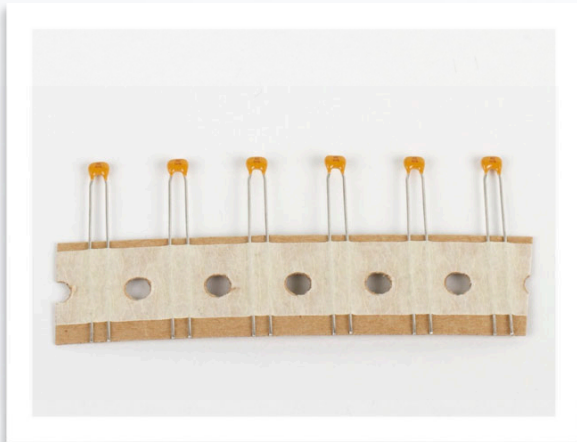


Parts **#12** are two little 18 pF ceramic capacitors-- little yellow beads with two pins. There are two similar types of ceramic capacitors in the kit, so these ones are marked with a *black stripe*.

Solder these two capacitors on the board at locations C5 and C6.

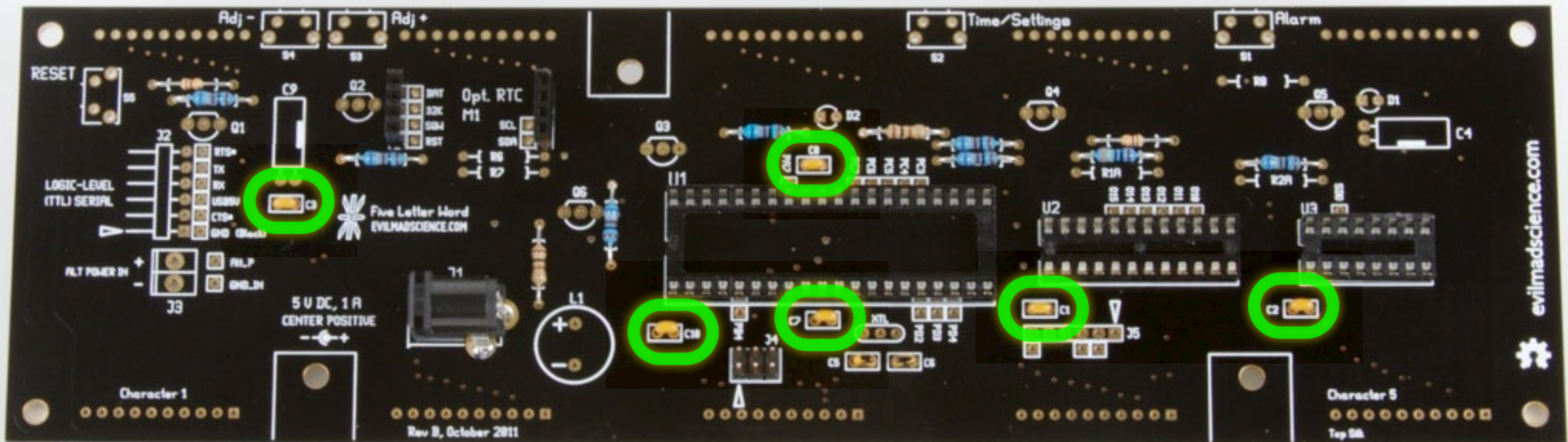
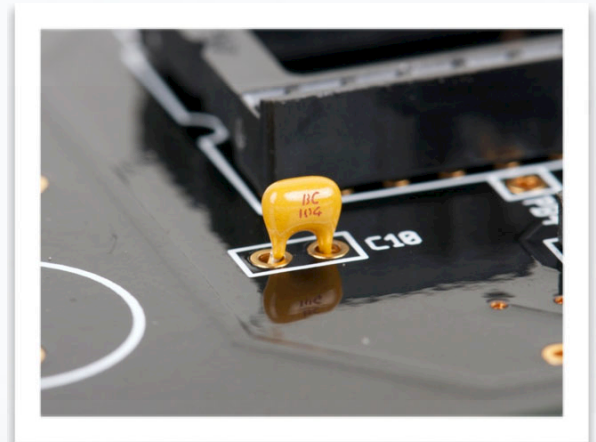


Assembly Step 16 – 0.1 uF capacitors

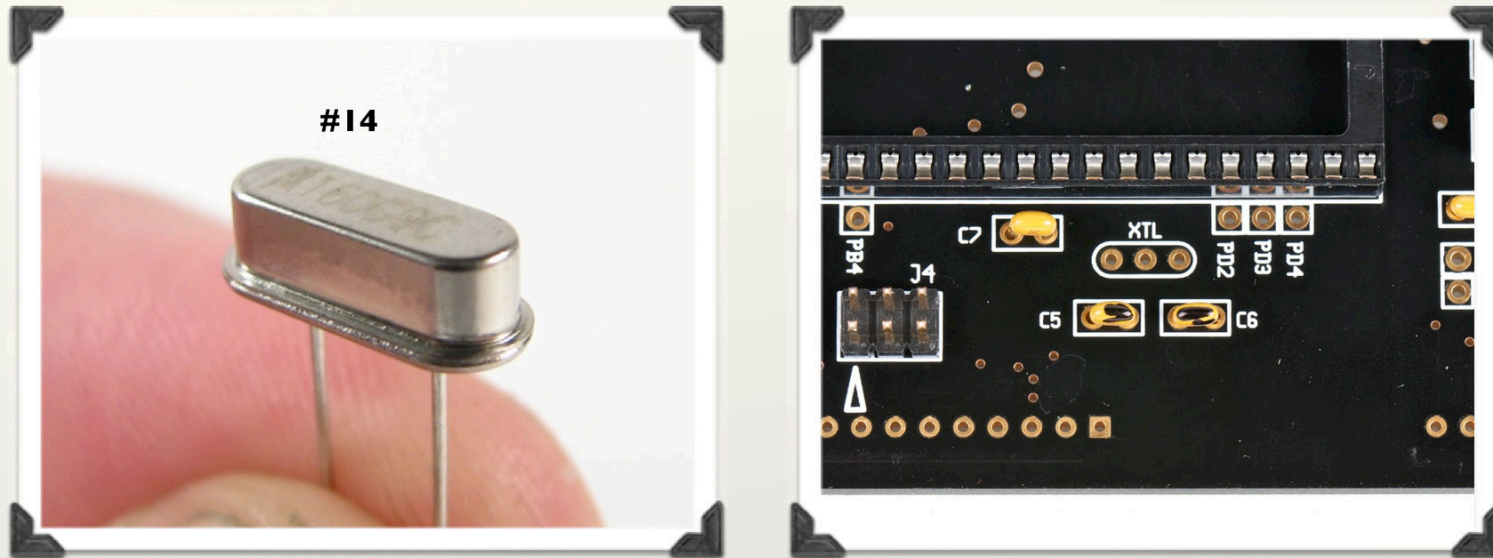


Parts **#13** are similar looking 0.1 uF ceramic capacitors, but there are six of them, and without the black stripe.

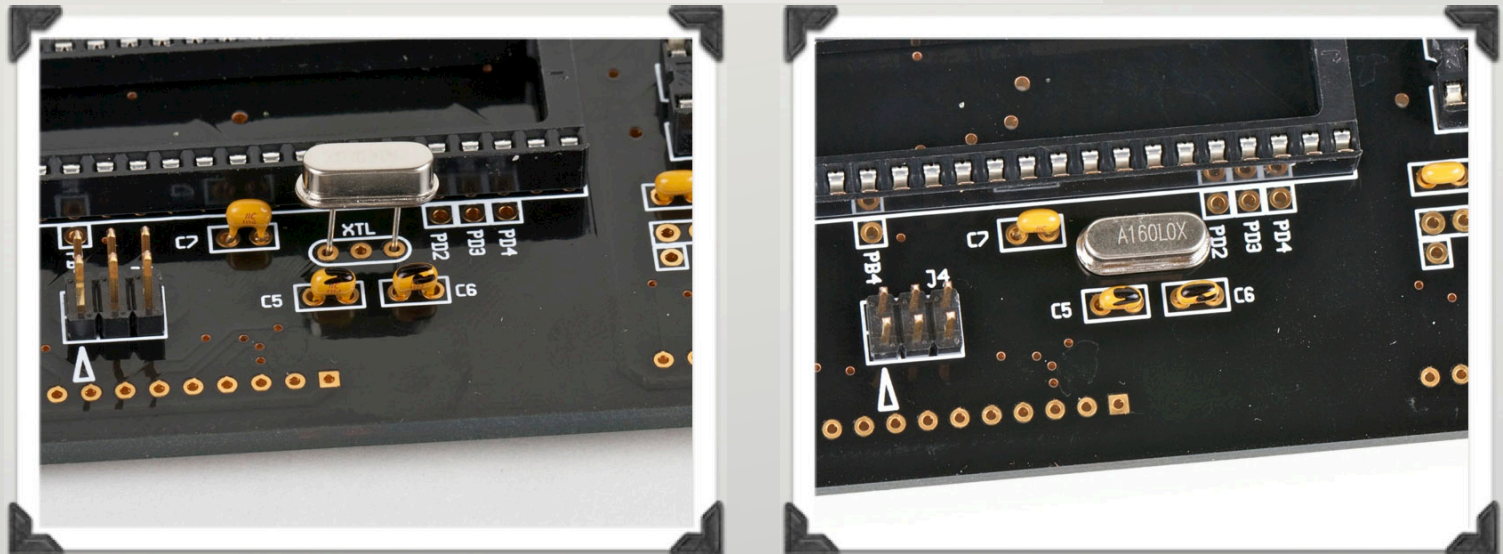
Install them in the following locations:
C1, C2, C3, C7, C8 and C10.



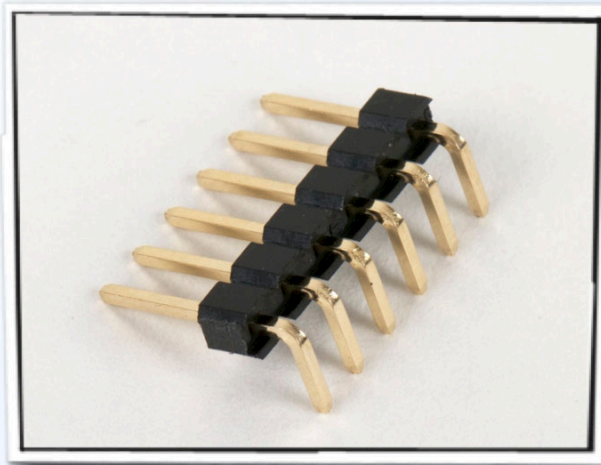
Assembly Step 17 – Quartz Crystal



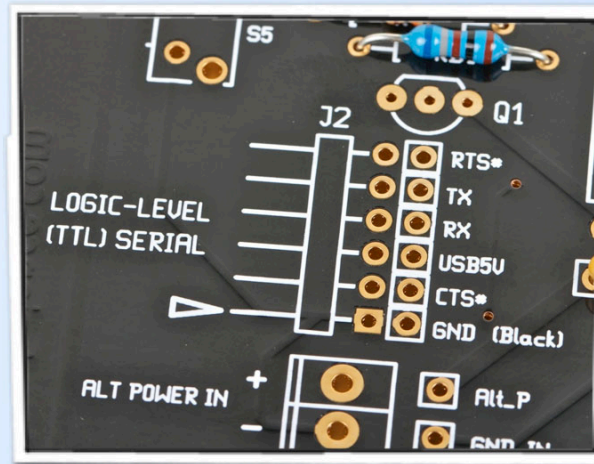
Install part #14, a 16 MHz quartz crystal.
Its two pins go in the outer two holes of the location marked "XTL." Solder both pins in place, much like a resistor.



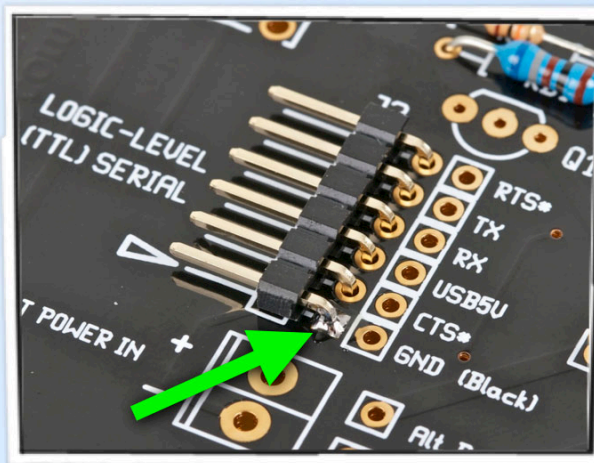
Assembly Step 18 – Six pin SIL RA Header



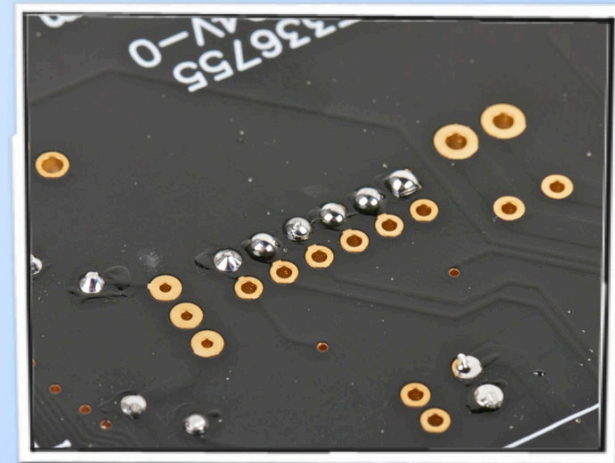
Part **#15** is a six-pin single-inline (SIL) right-angle (RA) header.



It goes in location J2 on the circuit board, oriented so as to match the drawing on the circuit board.



Set the header in place, and tack it there by soldering one of the pins on the top side of the board.

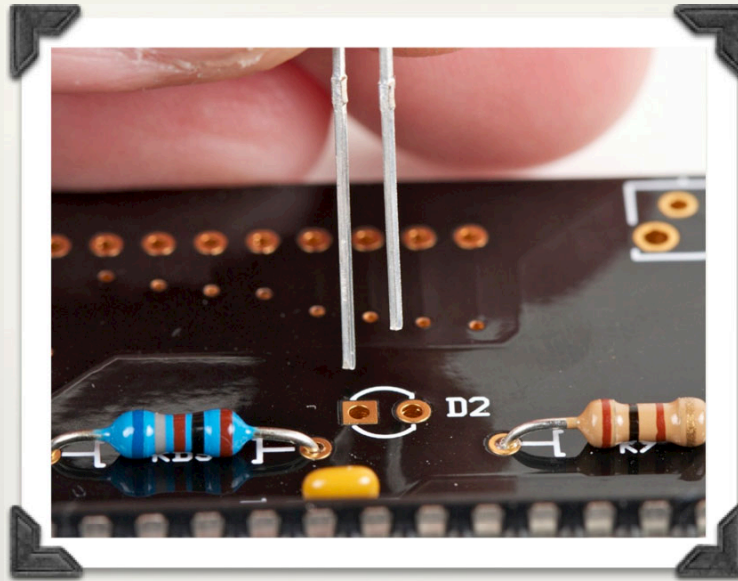


Then, on the bottom side, solder all six pins in place.

Assembly Step 19 – The Night Light

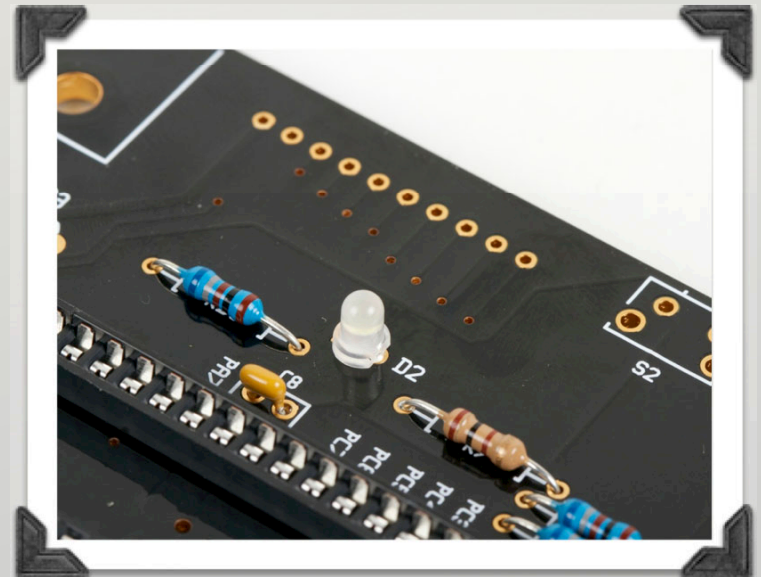


Part **#16** is a small white LED. Note that this component has one long lead and one short lead.

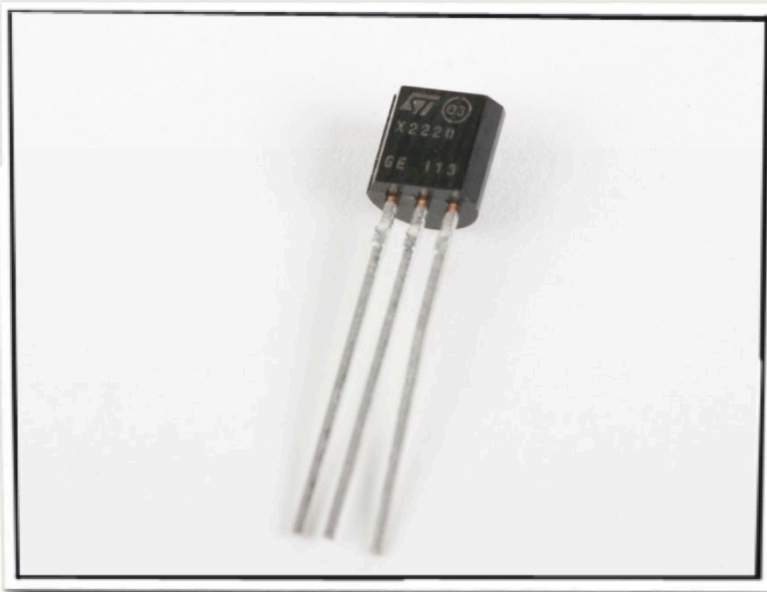


Install the LED in location D2, near the top-middle of the board.

Orientation matters: The long lead of the LED goes into the square hole of location D2.



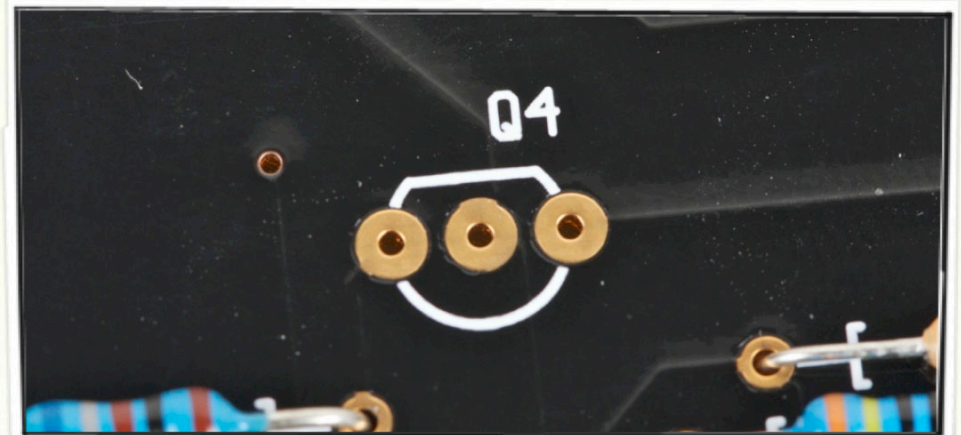
Assembly Step 20 – The Transistors



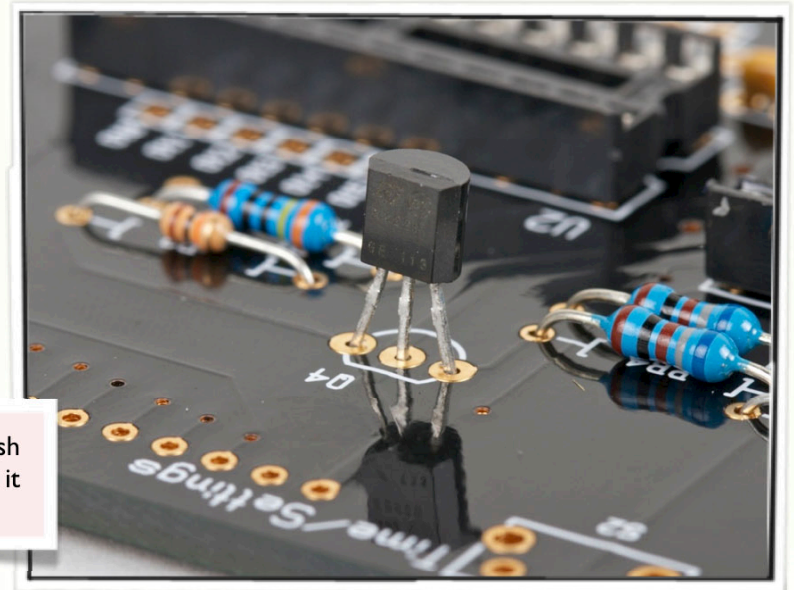
Parts **#17** are PNP transistors. There are six of these, that go in locations Q1-Q6.

Note that each transistor has one *flat face*.

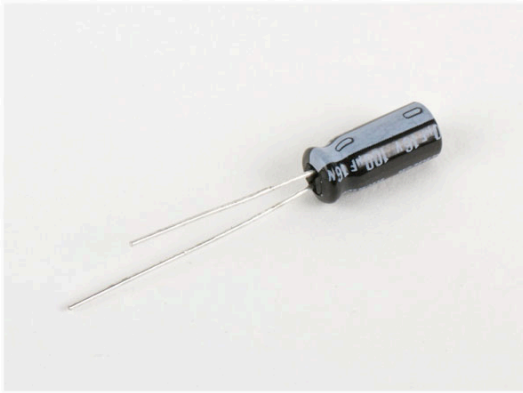
Install all six transistors, matching the orientation of that flat face to the outline on the circuit board.



Note that the transistors do not seat fully flush to the circuit board, but rather slightly above it like so. Do not force them down further.

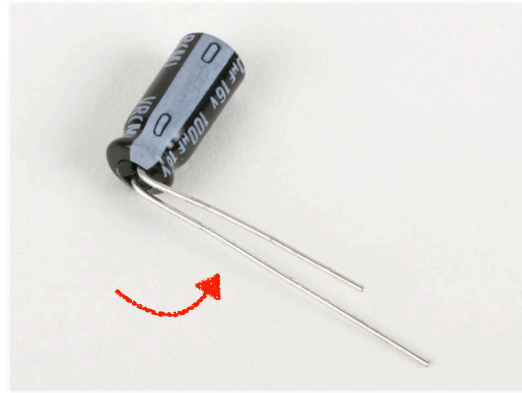


Assembly Step 21 – Electrolytic capacitors

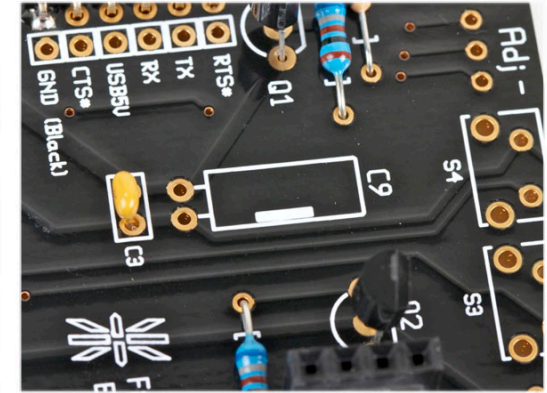


Parts **#18** are aluminum electrolytic capacitors; small cylinders with printed plastic wrappers.

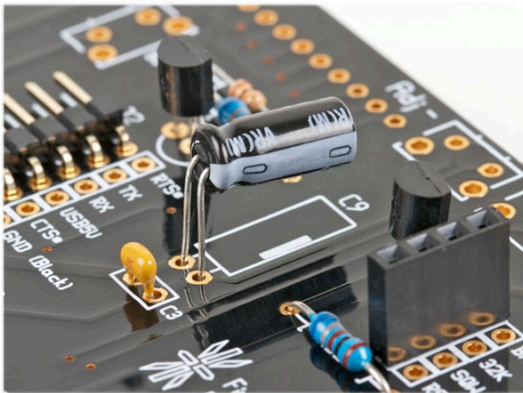
These go in locations C4 and C9.



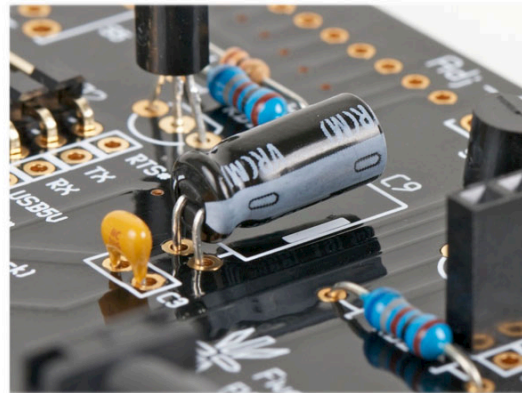
One side of each capacitor has a broad white stripe, marked “-”, as a polarity indicator. With the “-” side facing up, bend the leads down as shown.



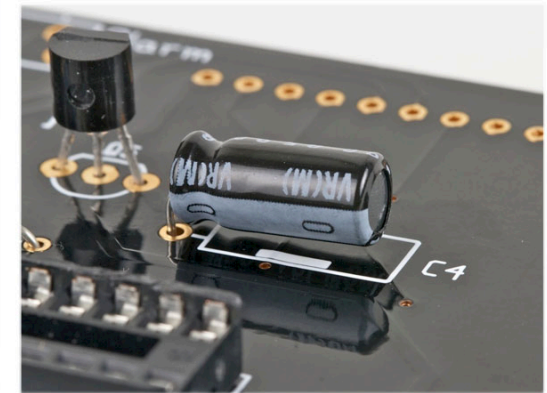
Note that the locations are each marked with a “-” stripe as well, to indicate the orientation.



Insert the first capacitor at location C9. Make sure that the “-” side of the capacitor faces the “-” stripe on the circuit board.



Slide it down into place and solder both pins. It is not important whether or not it sits all the way flush to the board.



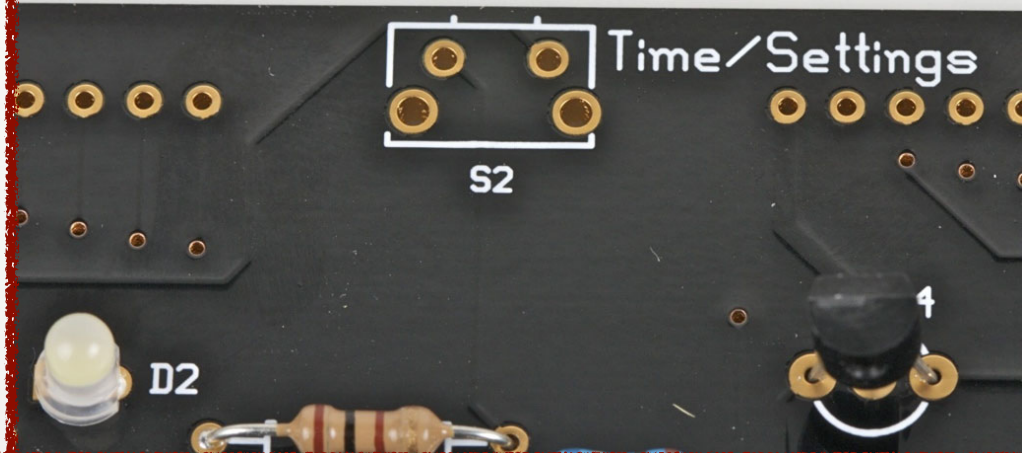
Solder the other capacitor at location C4.

Assembly Step 22 – Button switches

Parts #19 are right-angle tactile button switches.

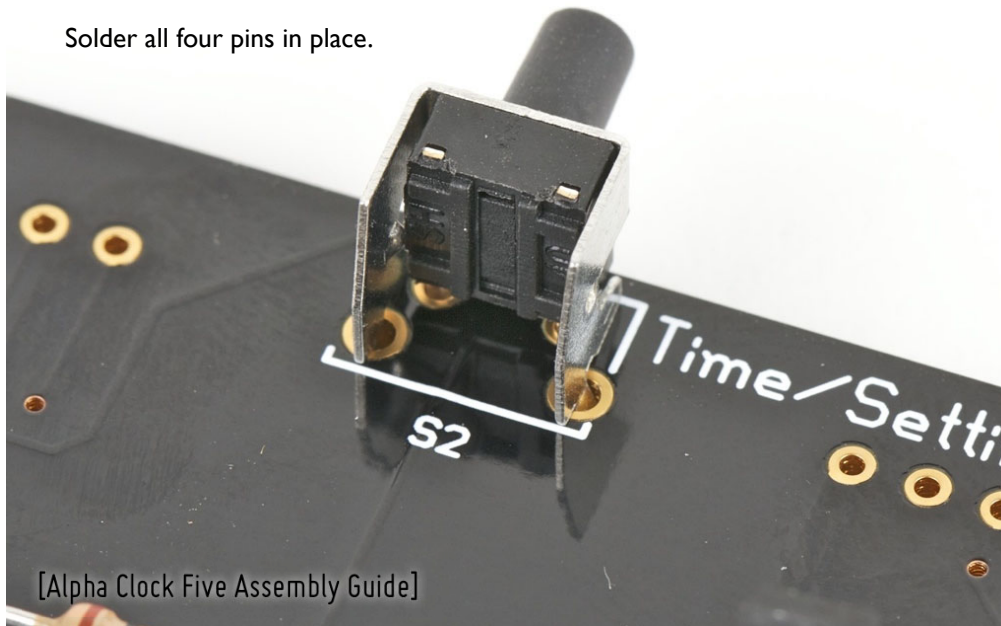


Here is what one of the button locations looks like:

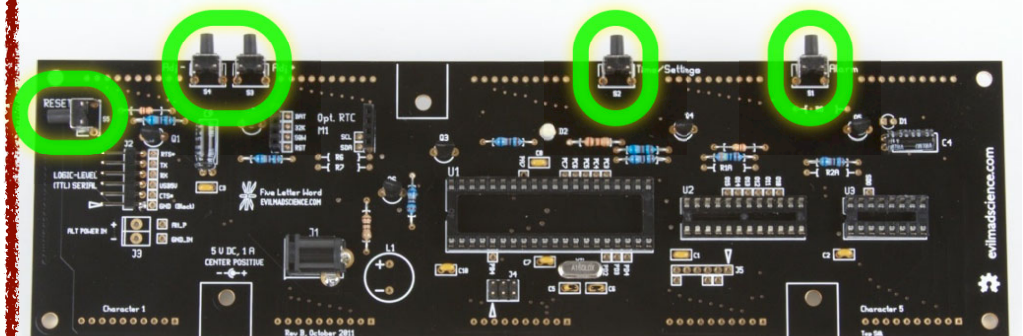


“Snap” the button into the location, and make sure that it sits fully flush to the board.

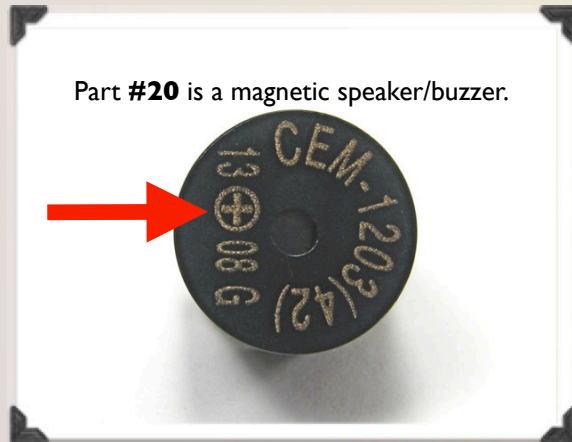
Solder all four pins in place.



Repeat for each of the switch locations, S1-S5.



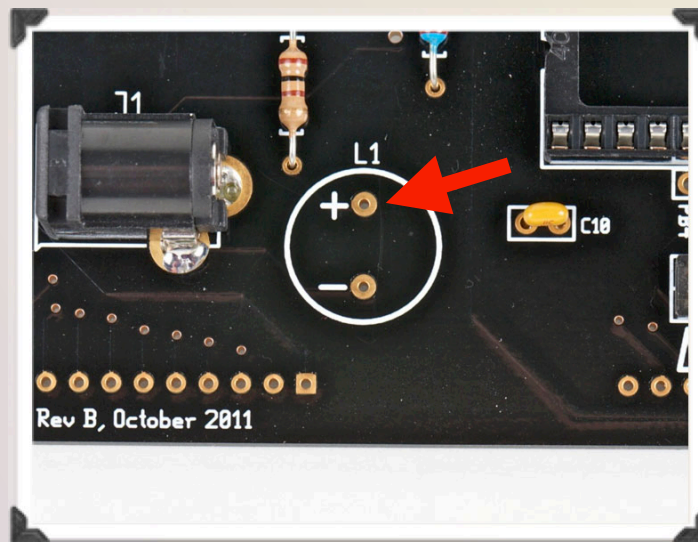
Assembly Step 23 – Noise Making Unit



The speaker has a marking on the top ("+") to indicate its orientation.



If that mark is not visible on the top, there are also corresponding marks on the bottom side for + and -.

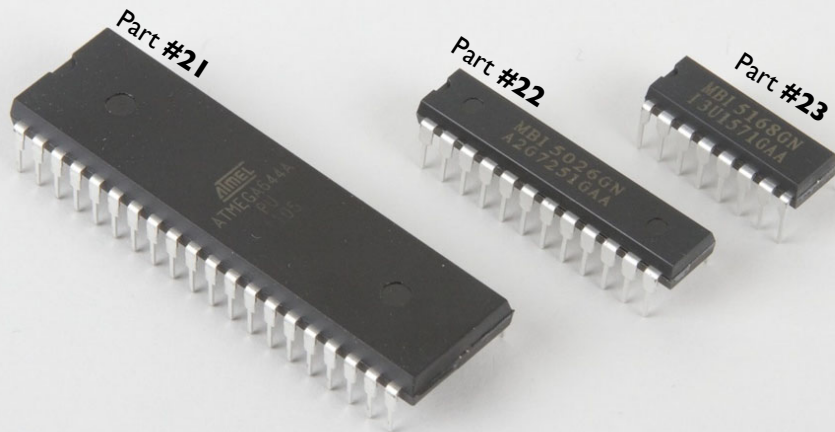


Install the speaker at location L1. Make sure that the "+" pin goes into the matching "+" hole on the circuit board.

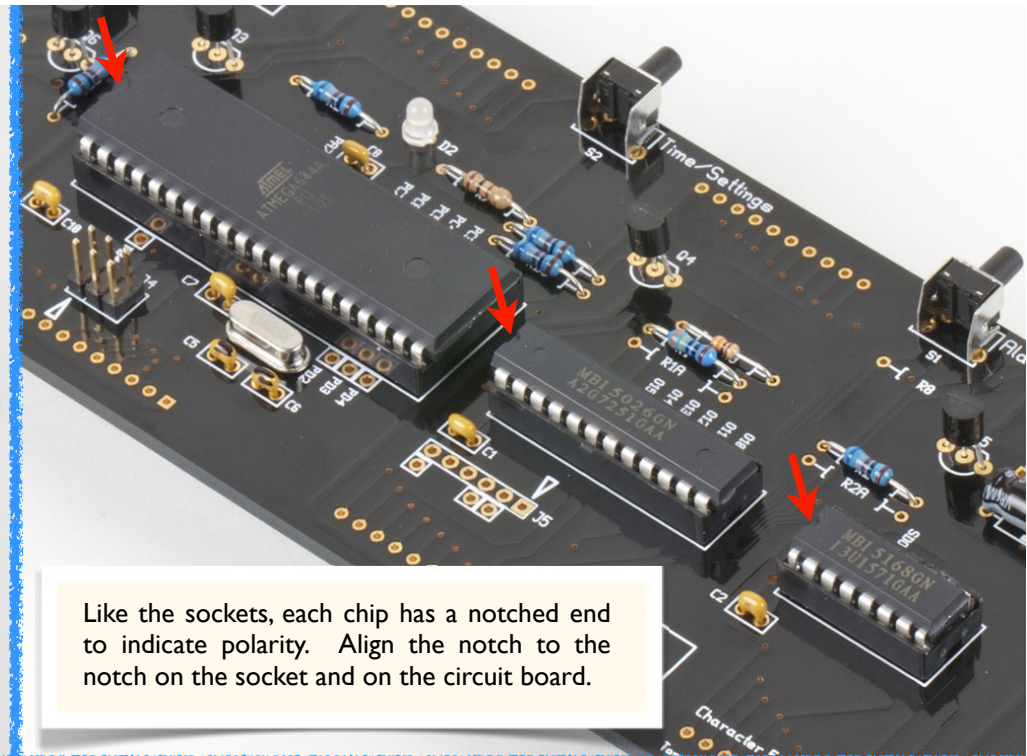


Press the speaker flush to the board and solder it in place.

Assembly Step 24 – Add the chips



Parts **#21-23** are the integrated circuits, which go in sockets U1-U3, respectively.

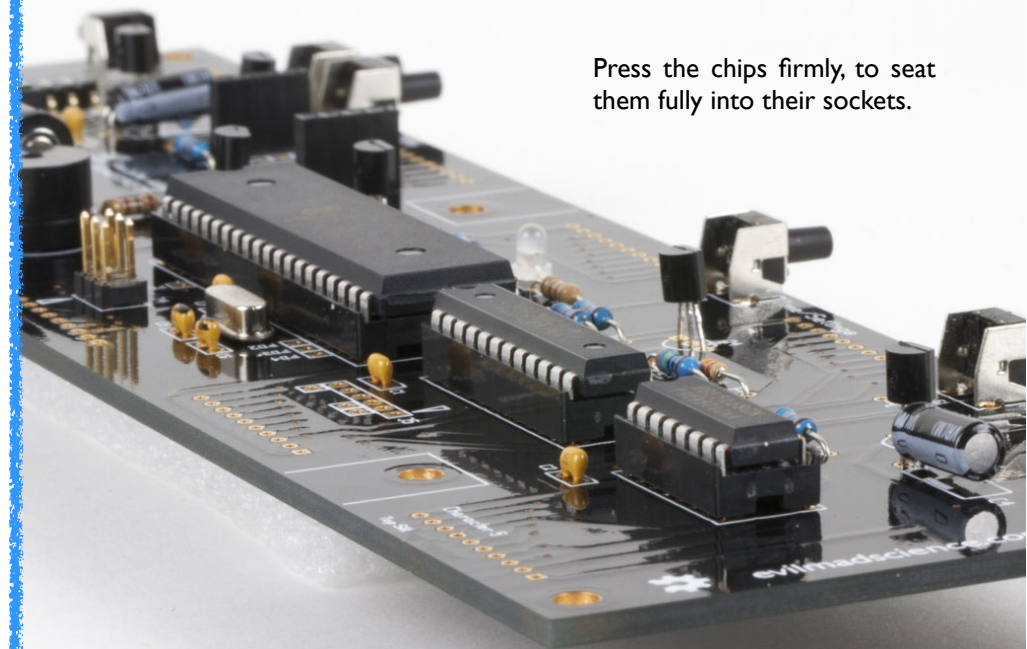
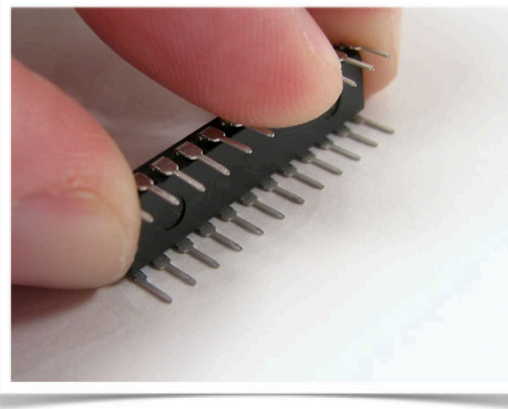


Like the sockets, each chip has a notched end to indicate polarity. Align the notch to the notch on the socket and on the circuit board.

The chips should easily fit into the sockets. If necessary, bend the leads of the chip to straight up and down before inserting the chip.

Do not bend them by hand; bend all pins on one side at the same time, by pushing them against a hard flat surface.

View from end of chip:

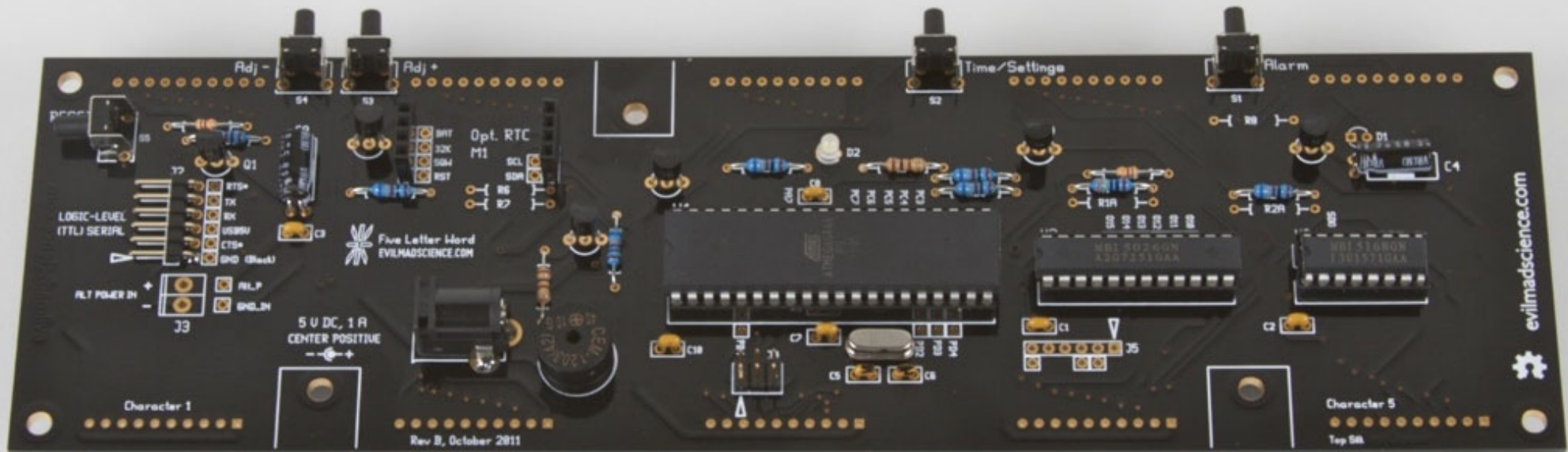


Press the chips firmly, to seat them fully into their sockets.

Assembly Step 25 – The board so far...

Parts **#1-23** should now be installed.

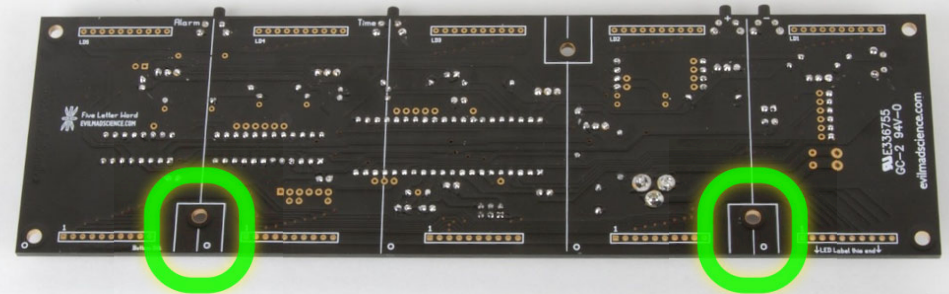
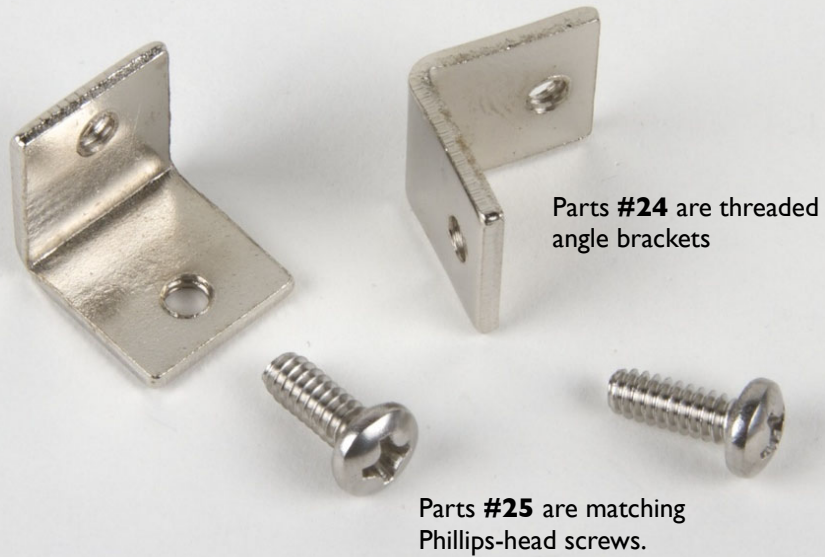
This includes all of the parts that get soldered to the top side of the circuit board.



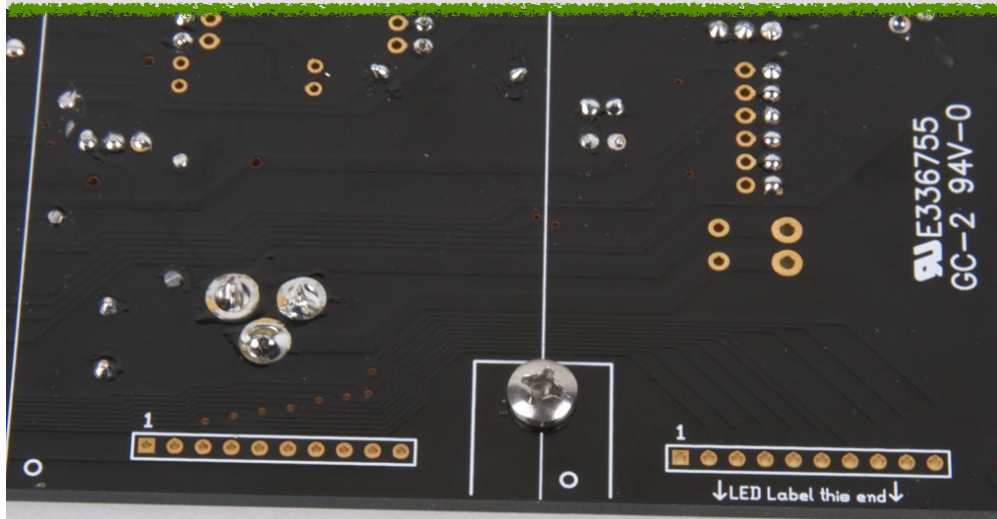
In what follows, we'll be adding the angle brackets that support the circuit board, and then adding the five alphanumeric LED displays.

The displays will block access to the back side of the circuit board, so this would be a great time to double check and make sure that you've got everything installed on the top side.

Assembly Step 26 – Brackets & Screws

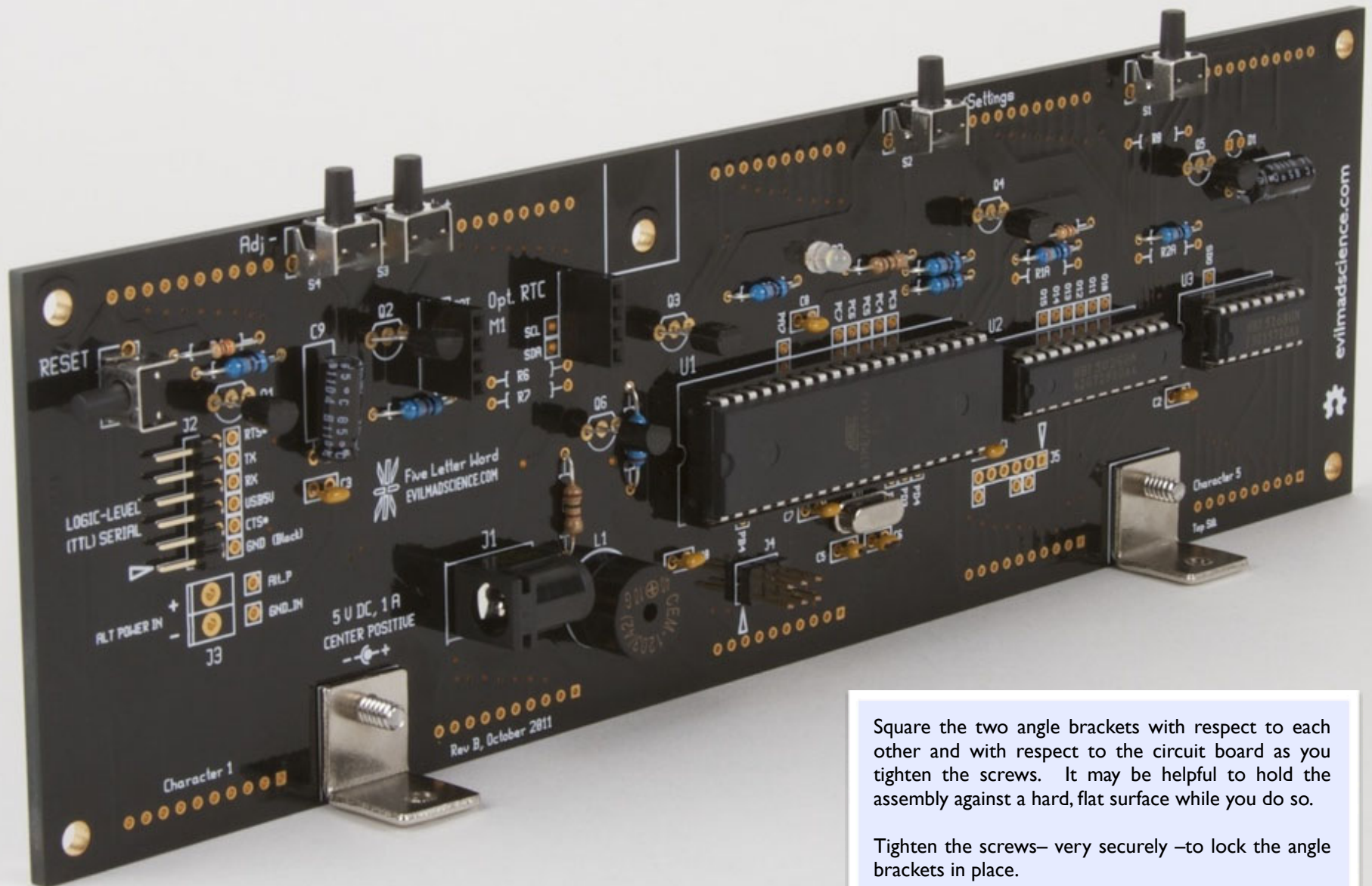


Put two of the screws through the clearance holes in the lower half of the bottom side of the circuit board.



Loosely thread each screw into an angle bracket on the other side of the board. (Do not tighten them yet.)

Assembly Step 27 – Level the brackets

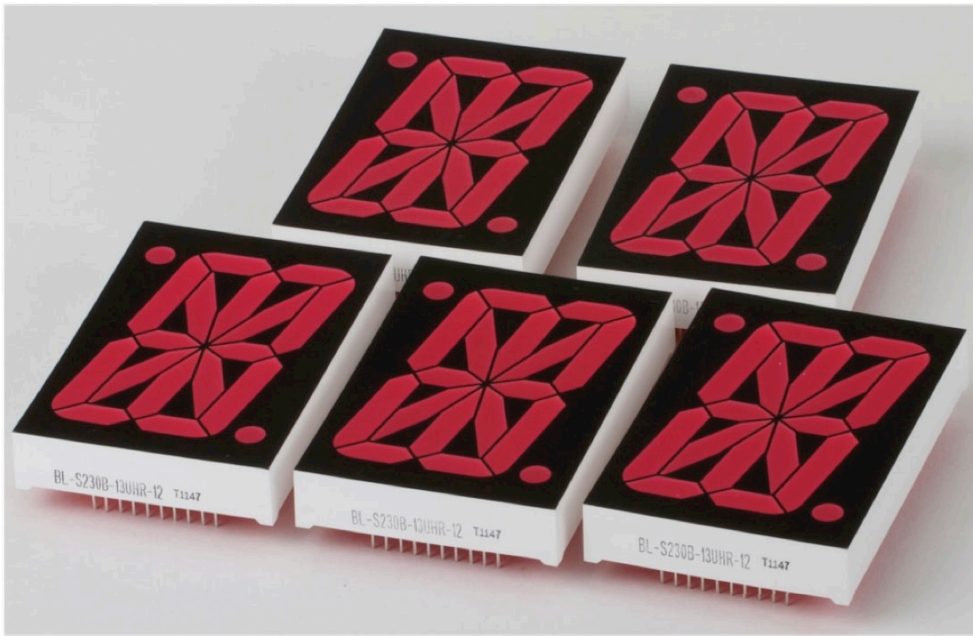


Square the two angle brackets with respect to each other and with respect to the circuit board as you tighten the screws. It may be helpful to hold the assembly against a hard, flat surface while you do so.

Tighten the screws— very securely —to lock the angle brackets in place.

Assembly Step 28 – Check pins of alphanumeric displays

Parts **#27** are the five alphanumeric LED displays.



Each display has two rows of ten pins each on the back side. Check these pins carefully, to make sure that they are straight, vertical, and parallel, on each display.

If necessary, gently bend them into place.



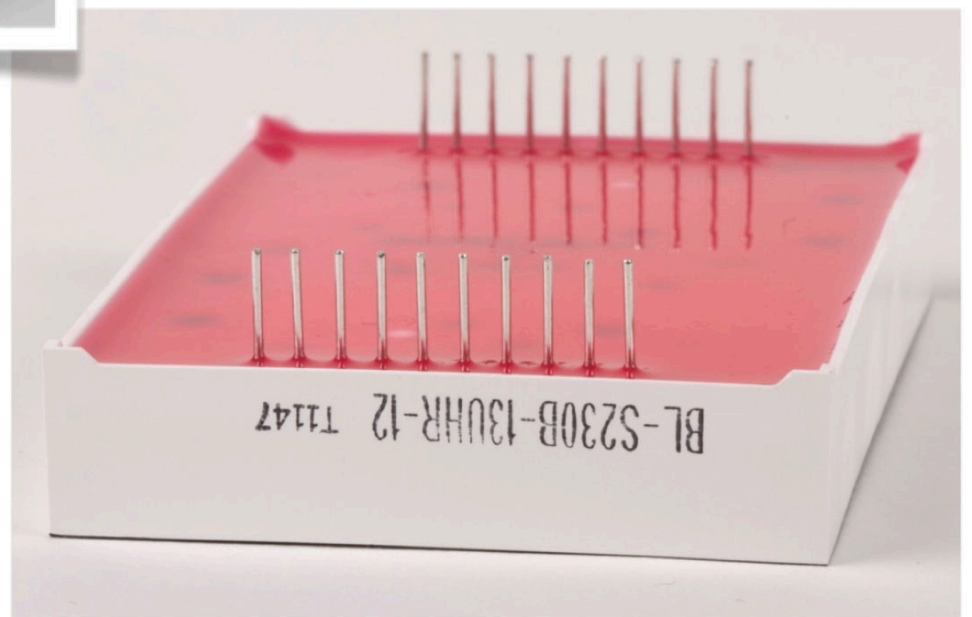
Good!



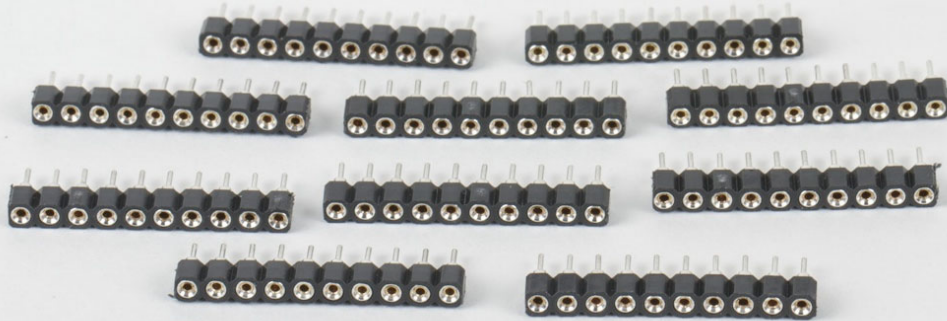
Bad!



Also bad!



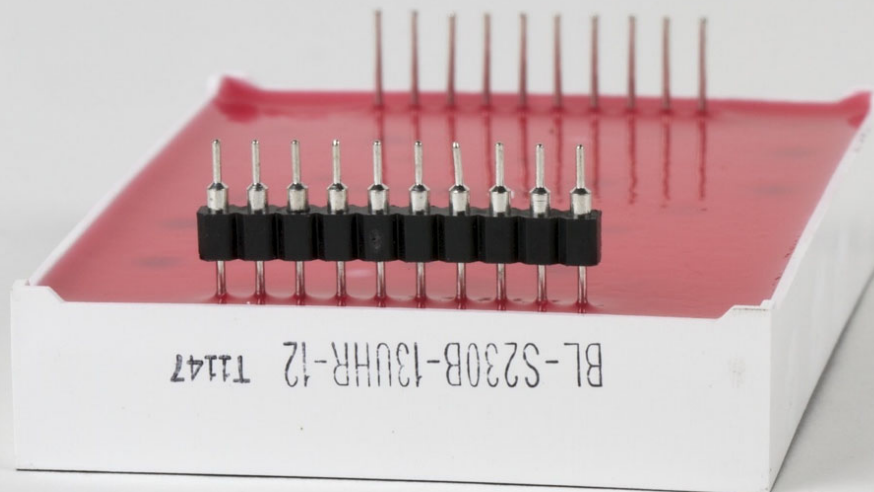
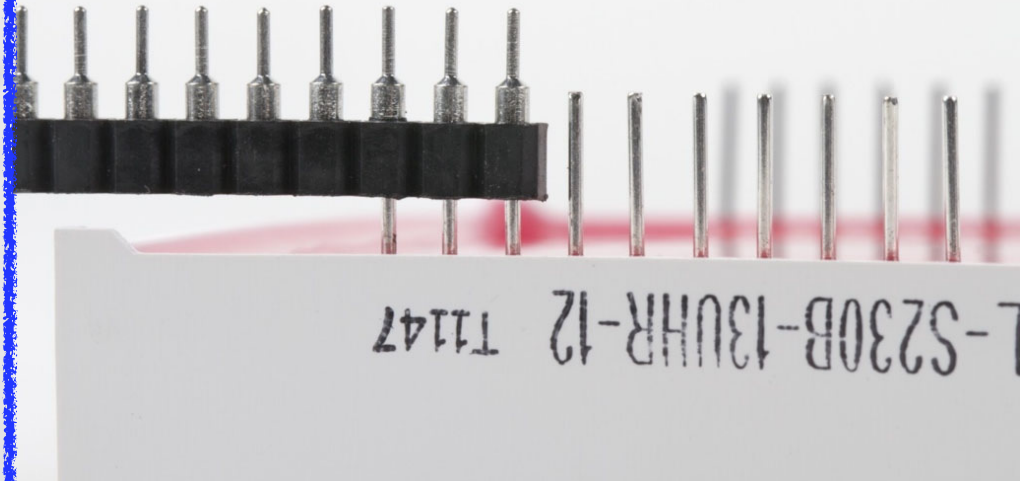
Assembly Step 29 – Alpha Sockets



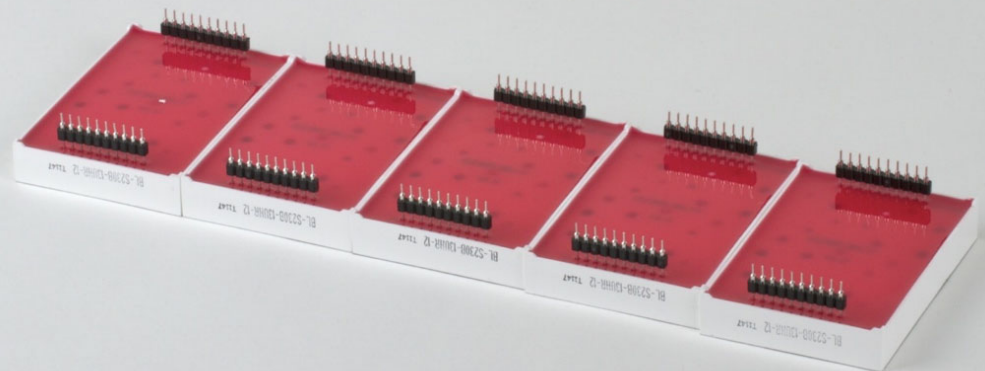
Parts **#26** are the 10-position machine-pin socket strips that hold the alphanumeric LED displays. There are ten socket strips in the kit.

The socket strips press onto the pins of the alphanumeric LED displays, with gentle pressure.

For reference, the socket strips should slide *very far* down onto the pins-- as far down as shown here:

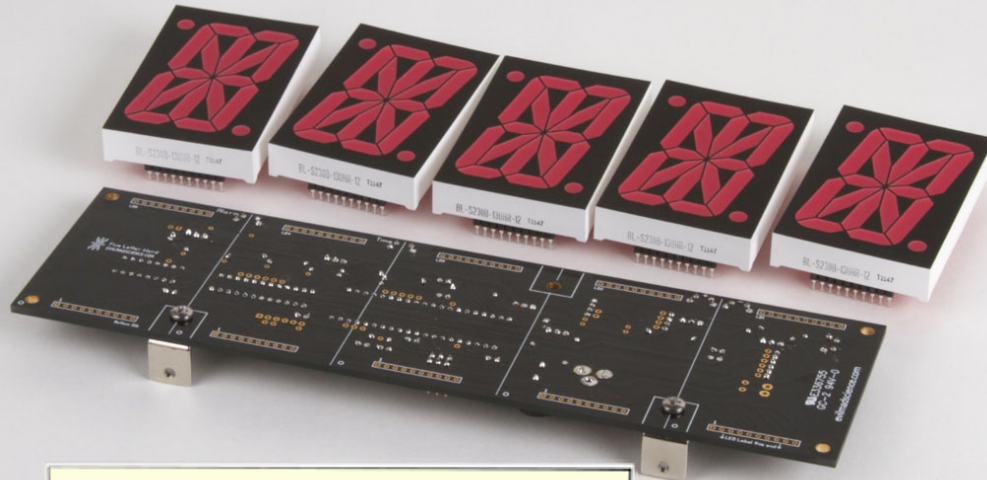


Slide one of the 10-position sockets onto the ten pins on one side of an LED display. Make sure that it seats *all the way down*, as shown previously.



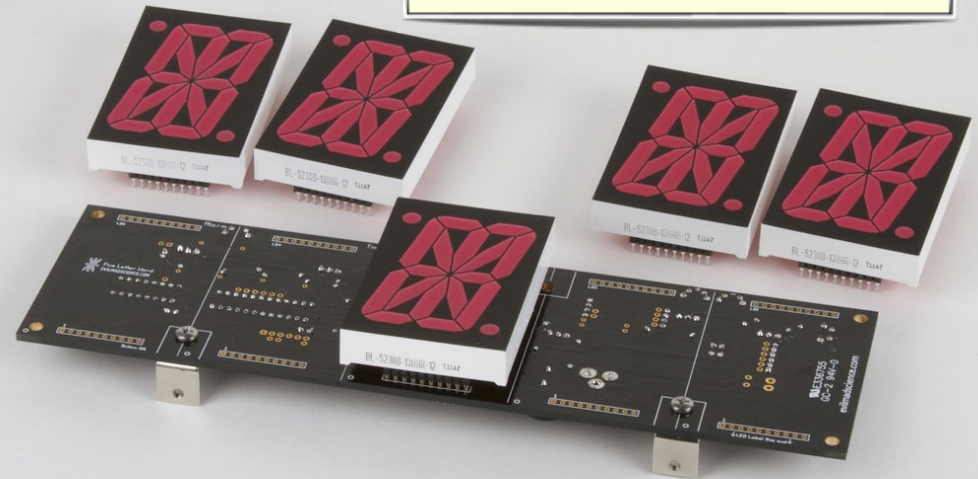
Repeat for both strips of each LED display.

Assembly Step 30 – Test fit displays



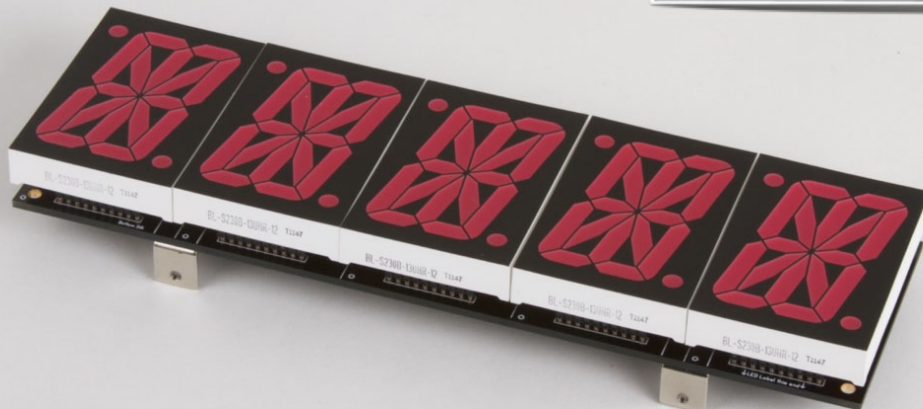
The socketed LED displays will go in locations LD1-LD5, on the back side of the circuit board.

Test fit the displays in place before soldering, to make sure that they fit together and that the pins are aligned nicely.



Note that the LED labels should be oriented as shown, towards the side with the angle brackets.

With all of the LED displays sitting in place, check that the front faces are reasonably level, and that the gaps between the displays are relatively uniform.



If the displays do not sit neatly, go back and make sure that
(1) The LED pins are straight and vertical (Step 28) and
(2) The sockets are fully seated (Step 29).

Assembly Step 31 – Solder first Alphanumeric display

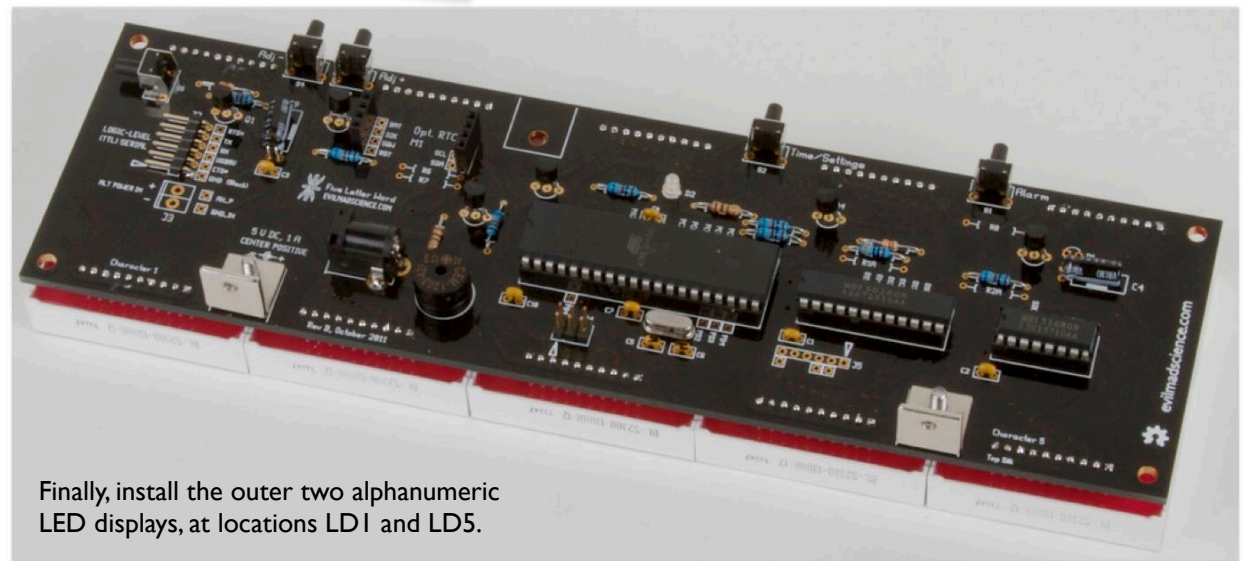
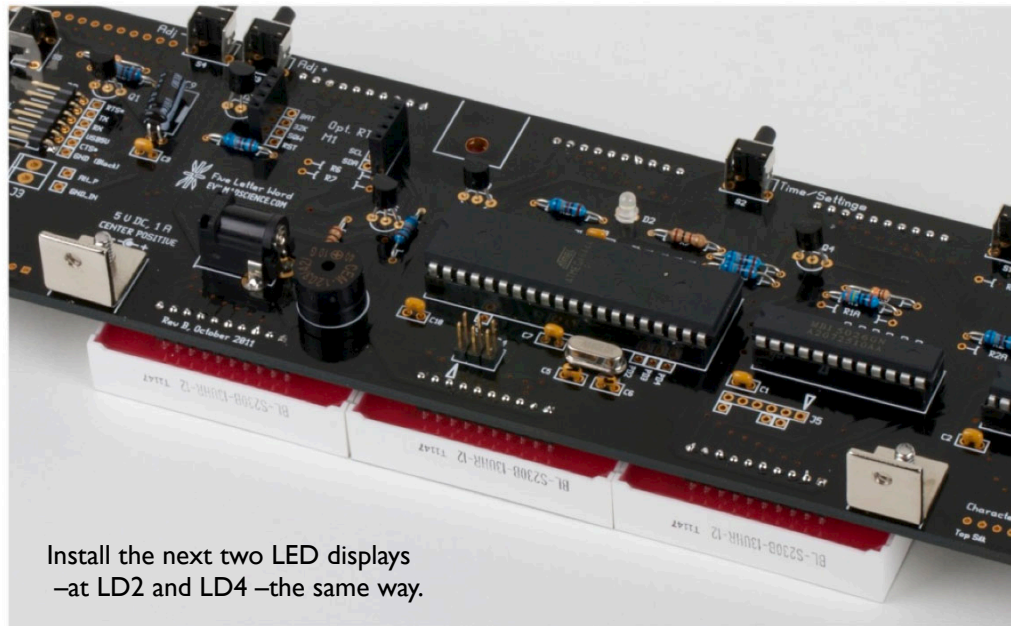
As with some of our earlier parts, the machine pin sockets only barely reach through the circuit board.

We'll add the displays sequentially. Start with the middle display.

As with earlier sockets, initially solder just the two opposite corner pins.

Double-check that the socket is properly seated, and then solder the remaining socket pins in place.

Assembly Step 32 – Add remaining alphanumeric displays



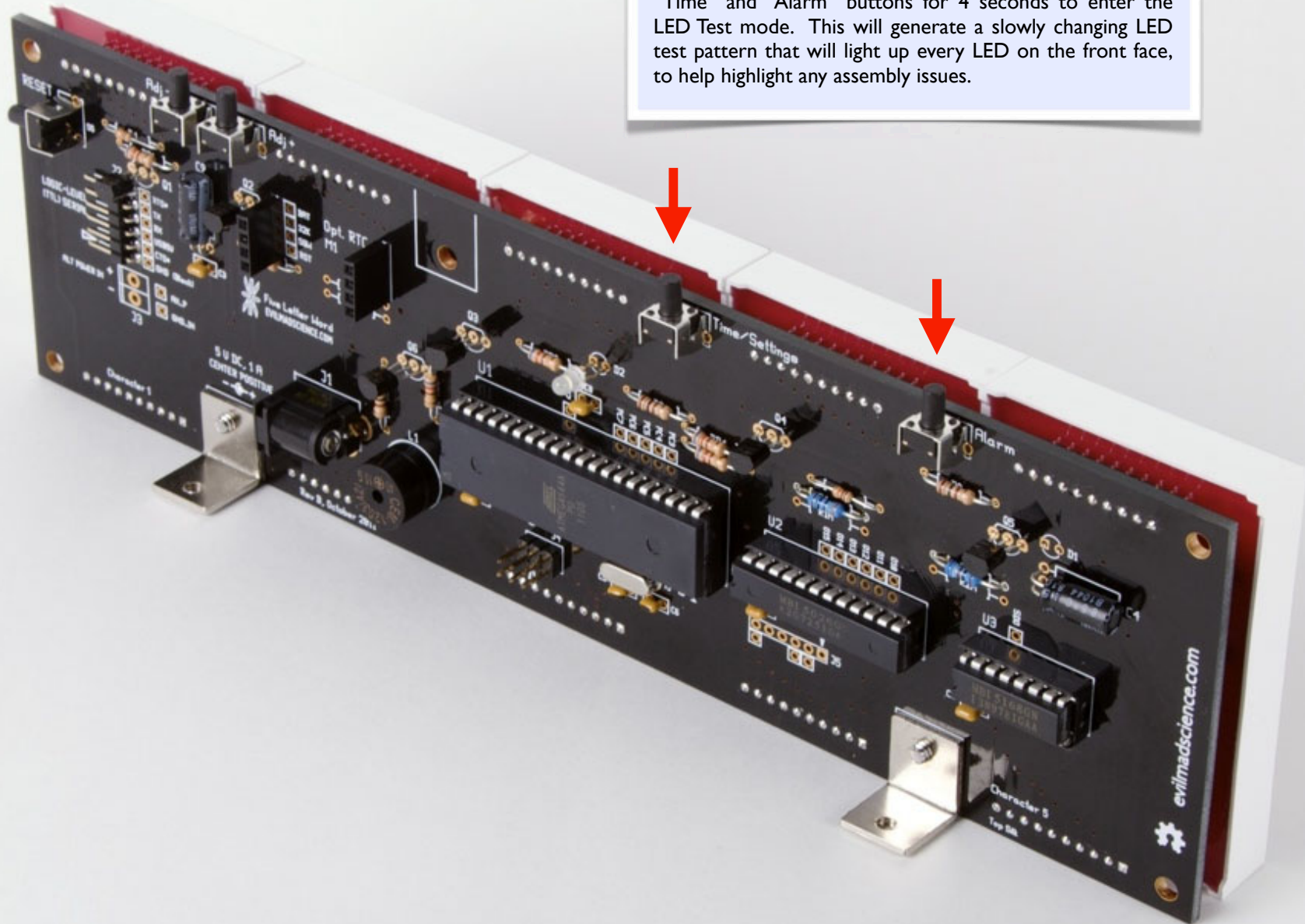
Assembly Step 33 – Light it up!

Connect the 5V power supply, and apply power to your clock.
If all goes well, it will say “HELLO WORLD” in a few seconds.



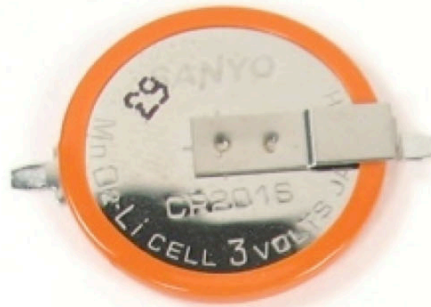
Assembly Step 34 – LED test mode

With the power supply plugged in, hold down both the “Time” and “Alarm” buttons for 4 seconds to enter the LED Test mode. This will generate a slowly changing LED test pattern that will light up every LED on the front face, to help highlight any assembly issues.

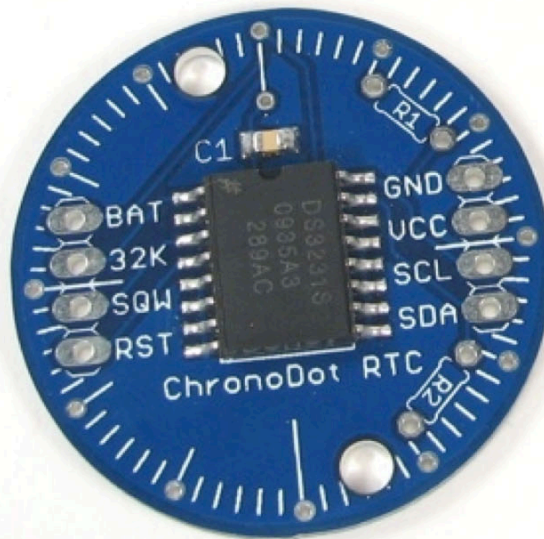


Assembly Step 35 – The Chronodot

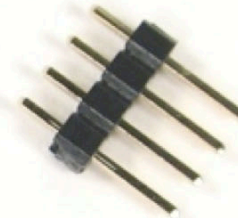
The Chronodot is a “real-time clock” (RTC) module with precision quartz timing and battery backup.



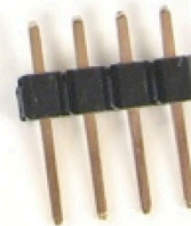
CR2016 tabbed battery



Chronodot RTC module



Two 4-pin SIL headers
(May be preinstalled.)



Important note: Do not set the battery on any conductive surface, or it will drain in a matter of minutes. (Examples: Black conductive foam, silver anti-static bags, steel countertop, etc.)

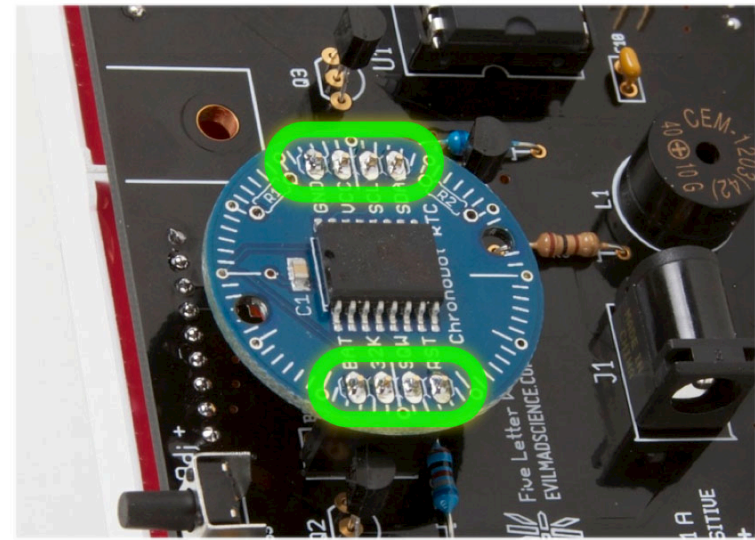
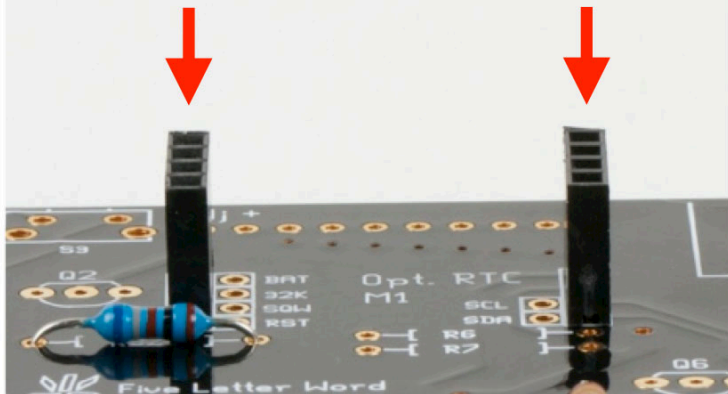
Similarly, once the battery is installed on the module, do not set the module on a conductive surface.

Assembly Step 36 – Add Chronodot headers

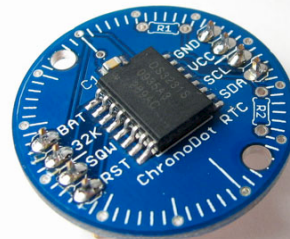
If your Chronodot came without the headers installed, follow this procedure to install them.

First: Unplug the clock from its power supply.

Then, insert the two 4-pin SIL headers— long end first – into the sockets at the RTC location, M1.

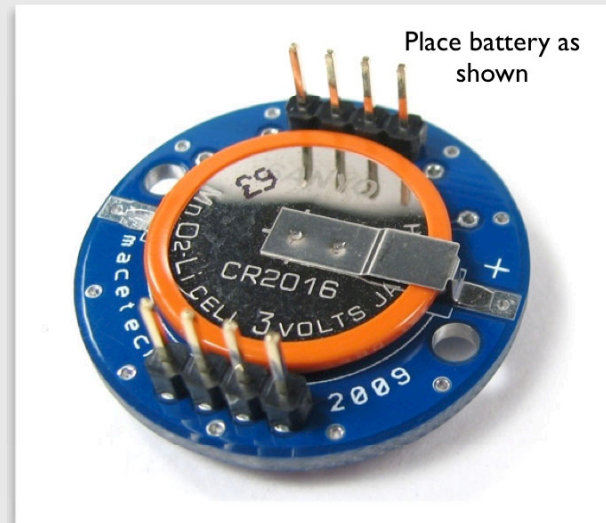
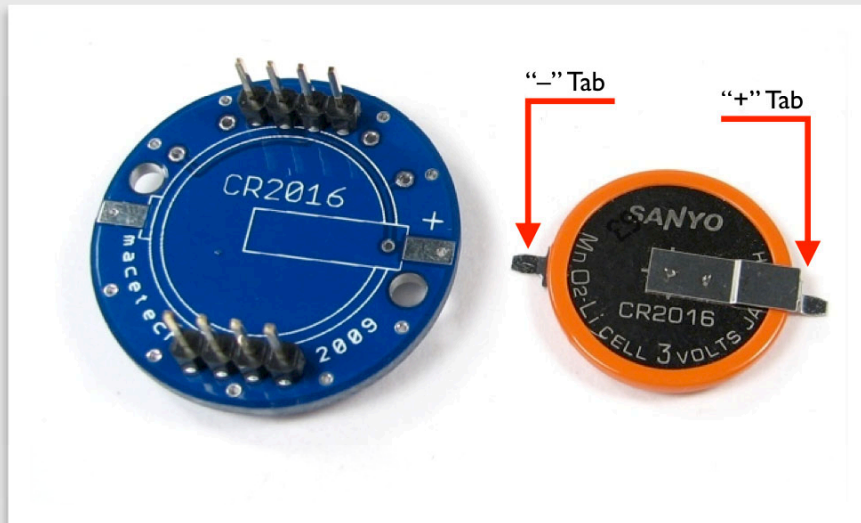


Seat the Chronodot on top of the headers, chip side up. The header pins should protrude through slightly through the top side of the Chronodot. Solder all eight pins in place.



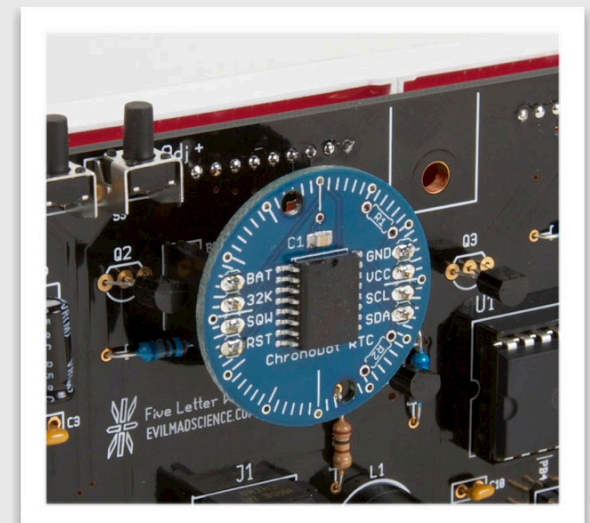
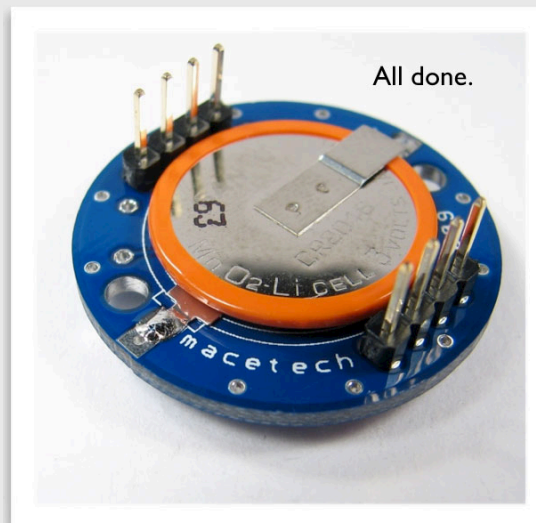
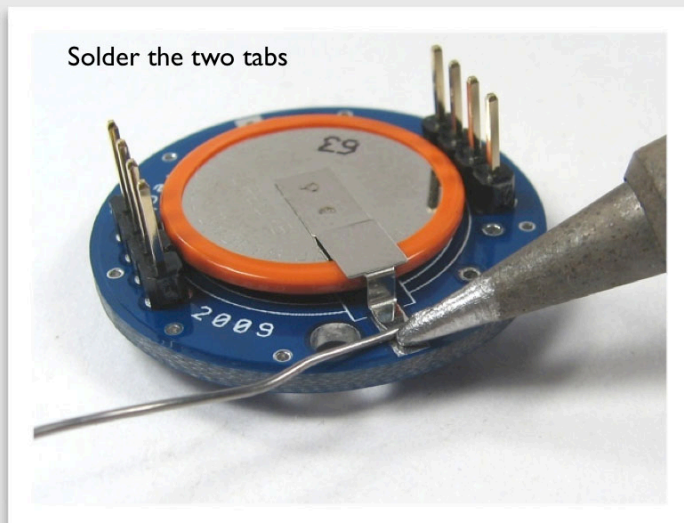
Then, (temporarily) remove the Chronodot to install the battery.

Assembly Step 37 – Add the Chronodot battery

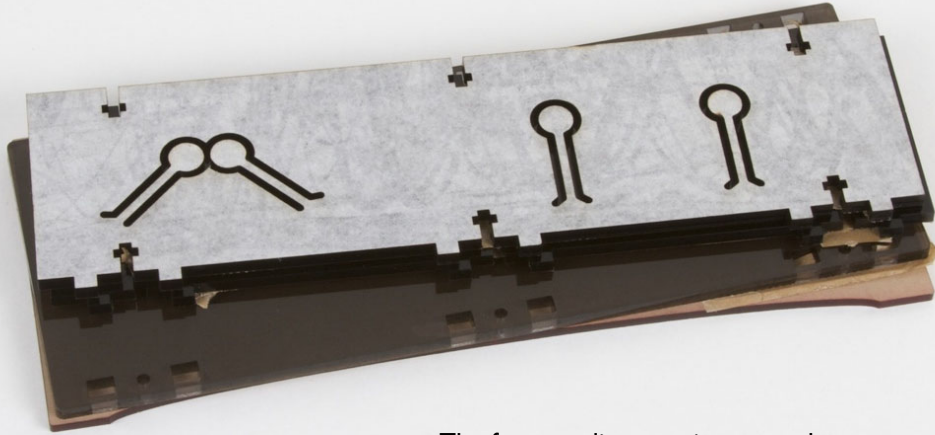


The Chronodot is active and powered as soon as the battery is added.

Again, be careful not to rest the pins on conductive surfaces-- that can short circuit the battery and drain it very quickly.



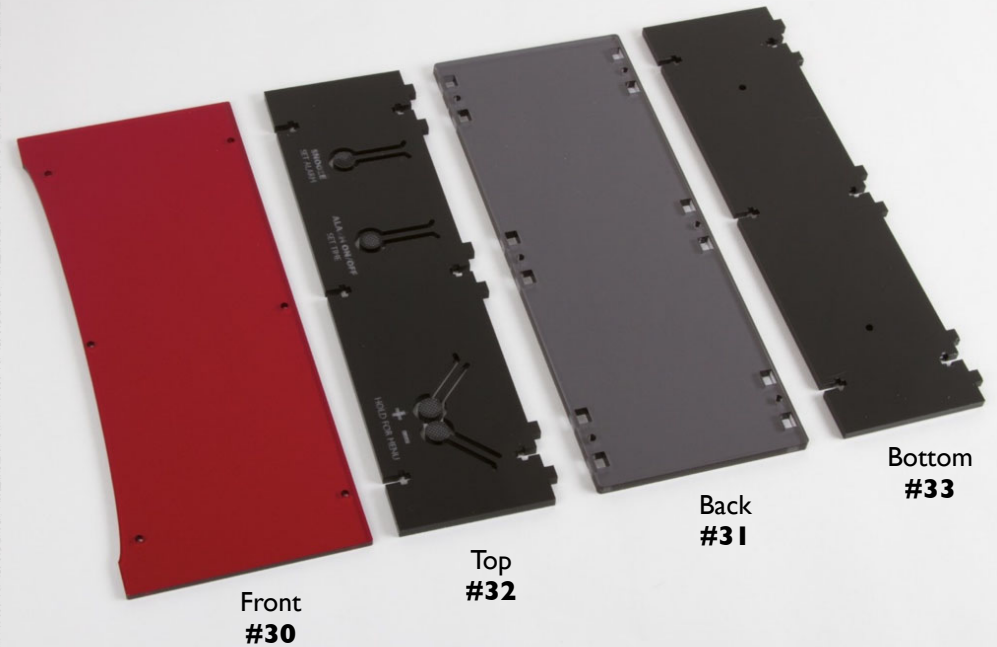
Assembly Step 38 – Clock Case Parts



The four acrylic case pieces may be wrapped in protective paper or plastic. Carefully peel off this wrapping material.

Next, we'll assemble the acrylic clock case.
The case consists of four laser-cut acrylic pieces.

Acrylic is brittle, so take care in the following steps not to over-tighten the fasteners that hold the case together.



Washers
#36

Black screws
(4-40) #35

Hex Nut
(4-40) #34

6-32 screws
#25

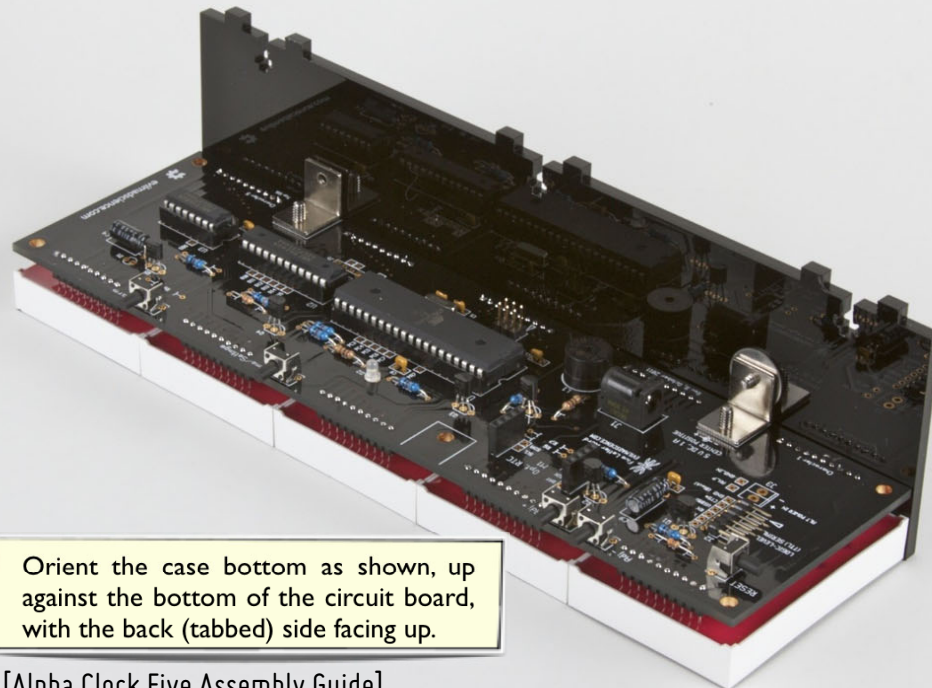
Assembly Step 39 – Begin Case Bottom

front side (note lack of tabs)

back side (note tabs)

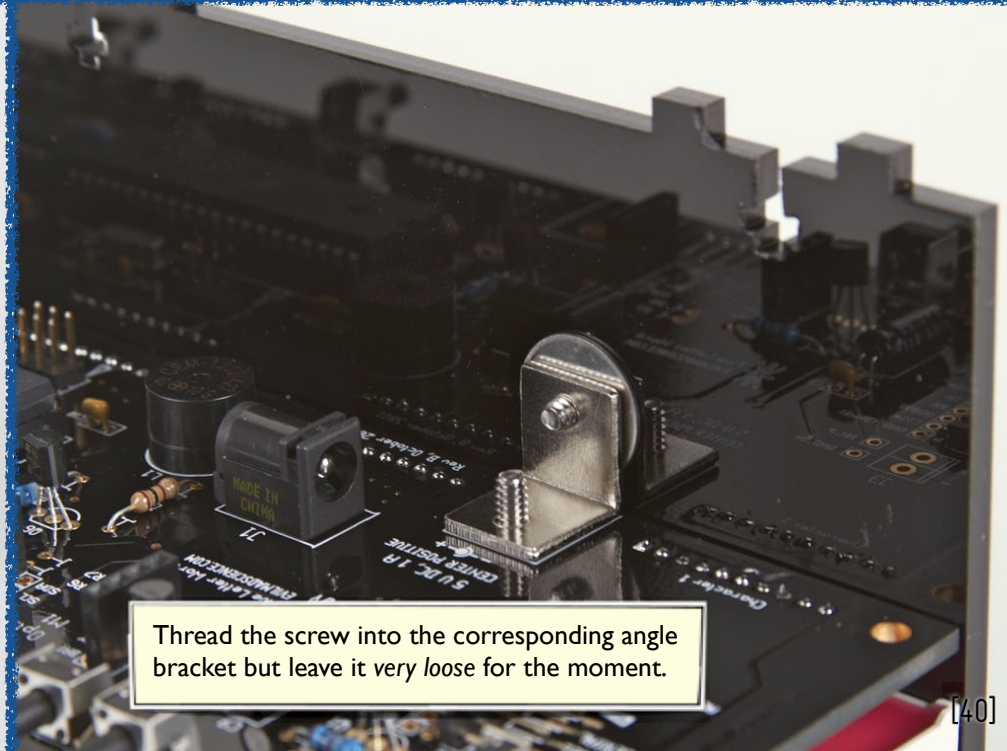
Begin with the case bottom, oriented like so.
There are two through-holes in the case bottom.

Insert one of the 6-32 screws up from the bottom side of the indicated hole. Then, add a washer to the top side.



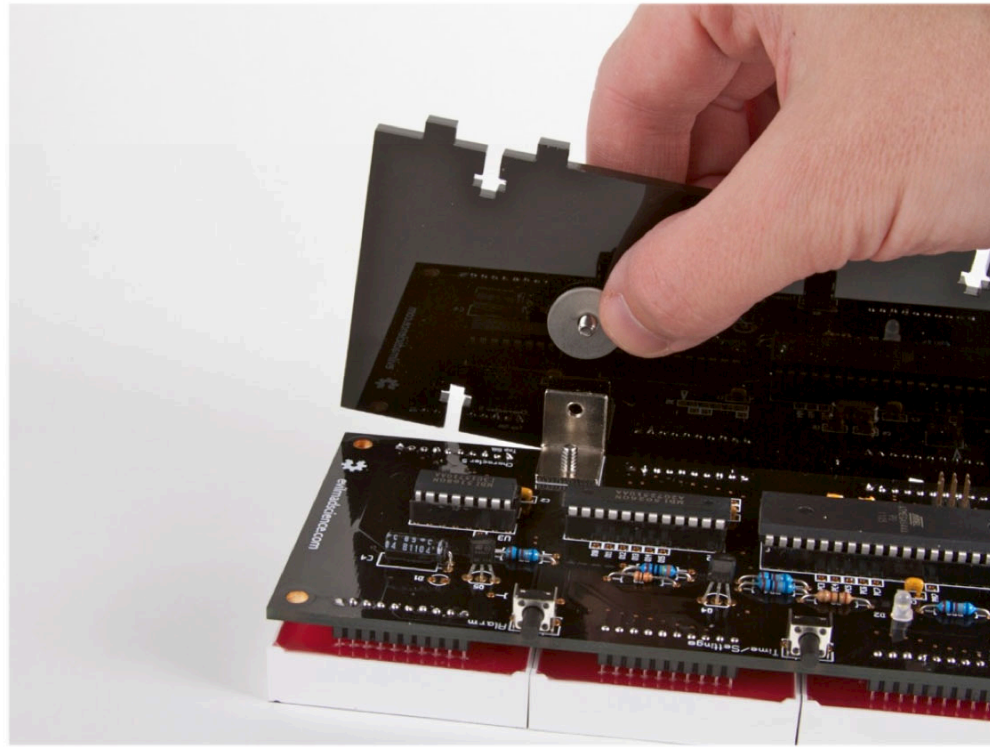
Orient the case bottom as shown, up against the bottom of the circuit board, with the back (tabbed) side facing up.

[Alpha Clock Five Assembly Guide]

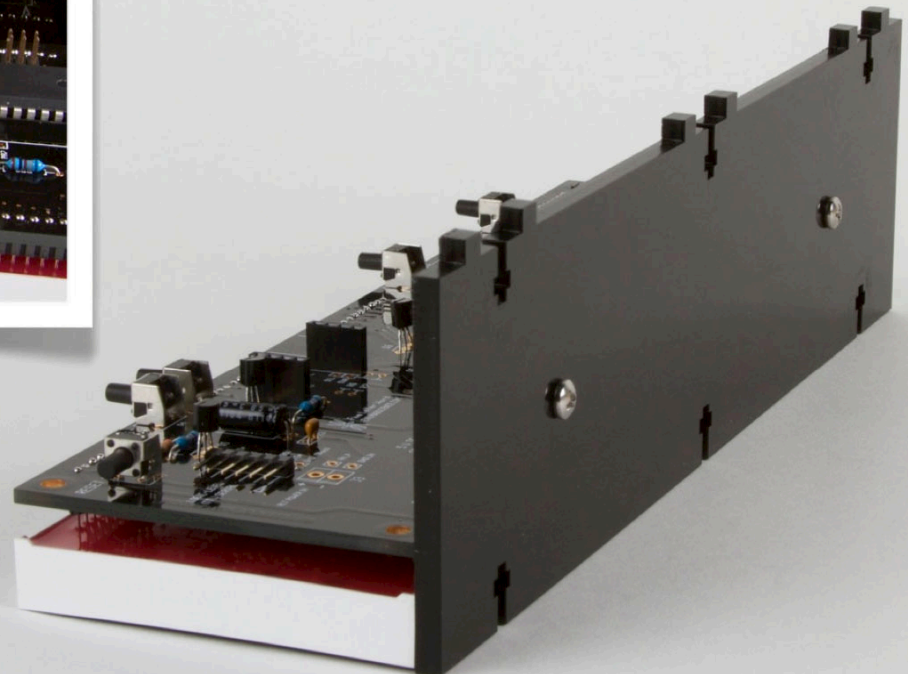


Thread the screw into the corresponding angle bracket but leave it very loose for the moment.

Assembly Step 40 – Finish Case Bottom

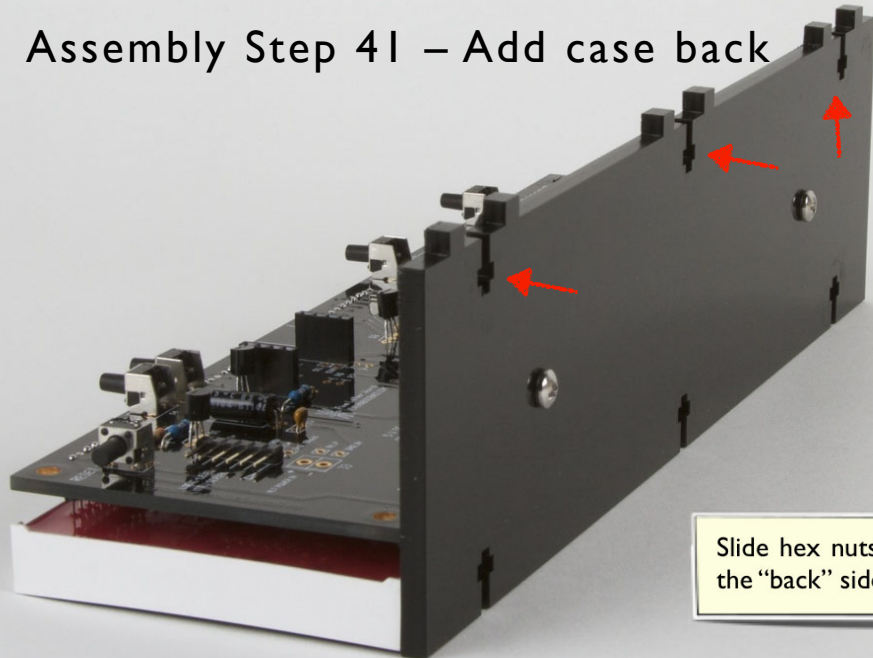


Add the second 6-32 screw through the bottom side. Add the washer, and then thread it into the second angle bracket.

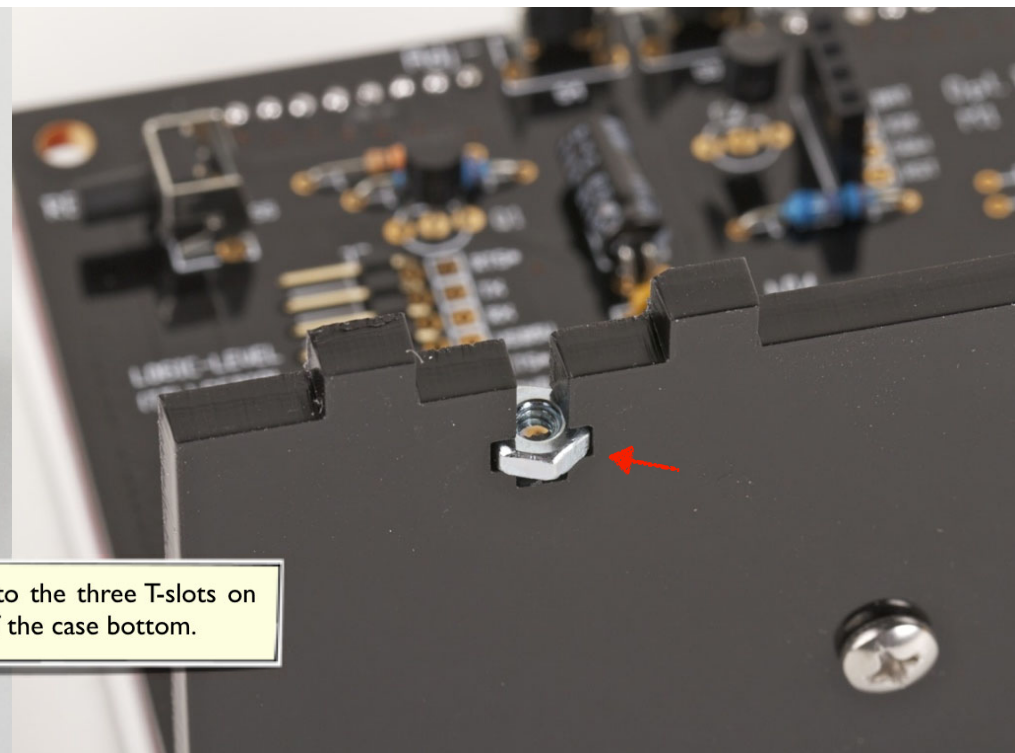


Then, tighten the two 6-32 screws from the bottom side, firmly, but not overly tight.

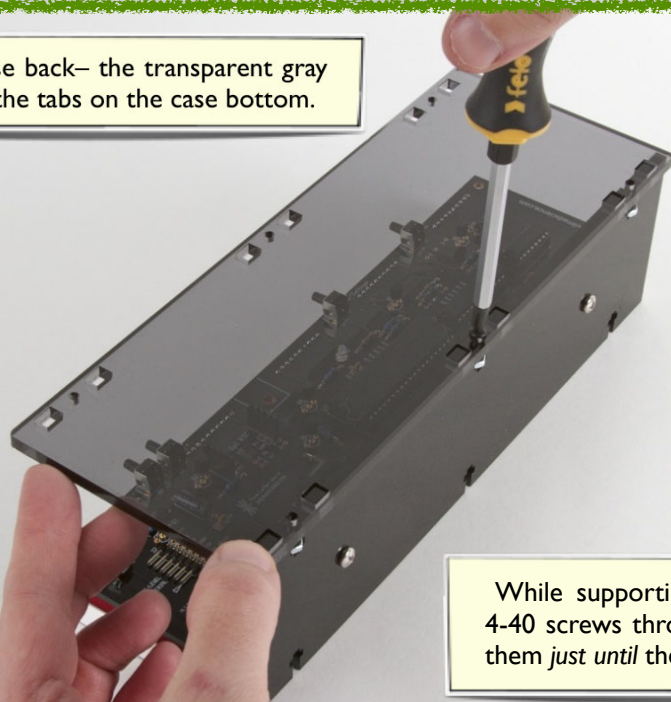
Assembly Step 41 – Add case back



Slide hex nuts into the three T-slots on the “back” side of the case bottom.



Place the case back— the transparent gray piece —over the tabs on the case bottom.



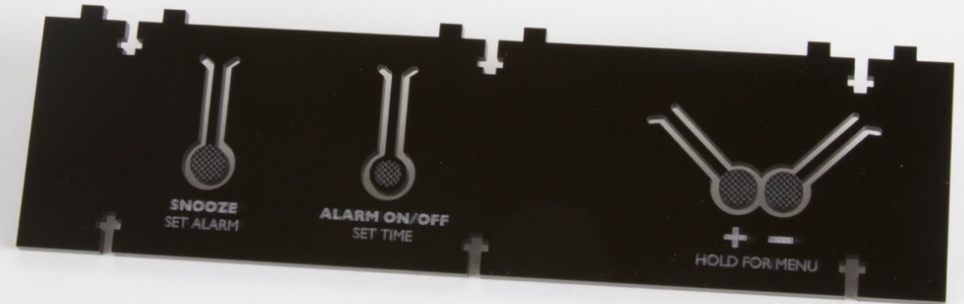
While supporting its weight, insert three of the black 4-40 screws through the top and into the nuts. Tighten them *just until* they support the weight of the case back.



Assembly Step 42 – Add case top

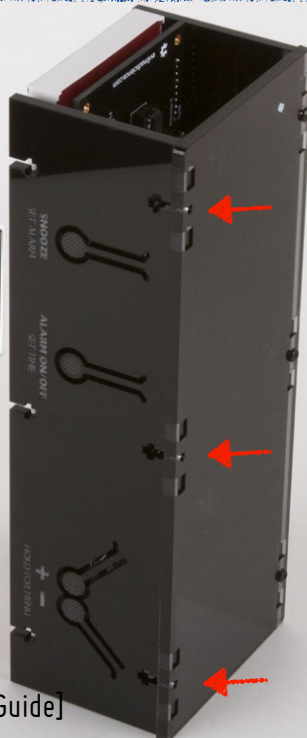


Here's what we've got thus far: the case bottom and back sides are attached.

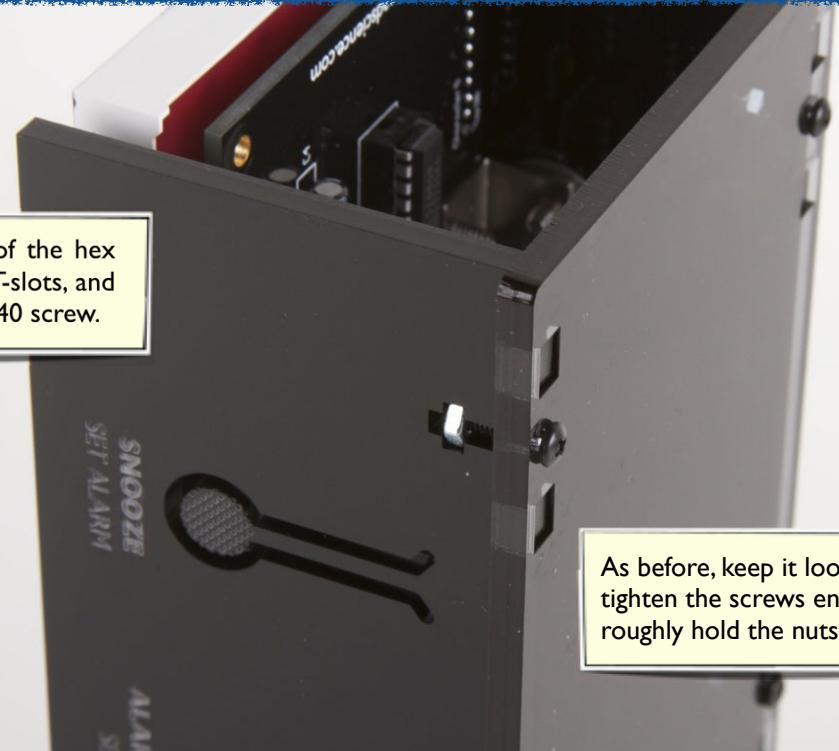


Next, we're going to add the case top.

Stand the case up on end, and slide the top into place.



One at a time, insert one of the hex nuts into one of the three T-slots, and fix it in place with a black 4-40 screw.



As before, keep it loose: Only tighten the screws enough to roughly hold the nuts in place.

Assembly Step 43 – Add case front



Add three hex nuts to the T-slots along the front-bottom of the clock.



Position the case front in place, with the curved, footed side towards the bottom of the clock.

Insert three more screws through the front plastic, to engage the hex nuts.

Hold the hex nuts flush against the LED displays while you tighten the screws.

And, on this side, tighten the three screws firmly.



Assembly Step 44 – Final screws

One at a time, add the final three hex nuts and screw each one into place with one of the black 4-40 screws.



If you have trouble getting the case front to reach the case top, the screws on the back side are probably too tight; try loosening them a bit.

Assembly Step 45 – Check button function

Try pressing the four top buttons at this time. If everything is in the right place, the buttons will respond with a friendly “click” to gentle pressure.

If not– if the top piece is too high or too low –you may need to slightly loosen one or more of the front-top screws to move the case top where it needs to go.



Assembly Step 46 – Tighten screws all around

1. Tighten the screws here, on the front-top.



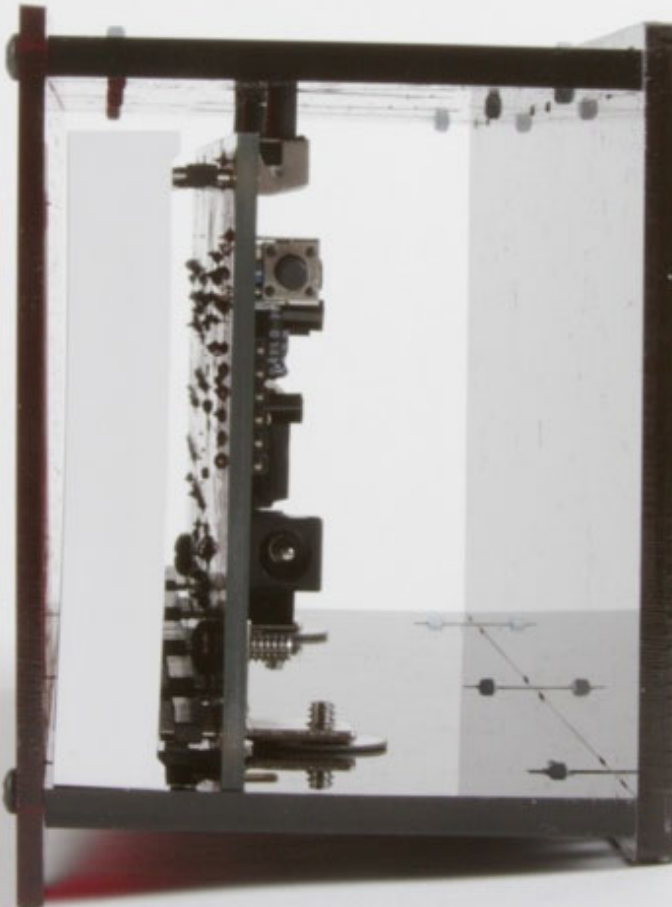
2. Tighten the screws here, on the rear-top



4. Tighten the screws here, on the front-bottom



3. Tighten the screws here, on the rear-bottom



Once you finish tightening the screws, double-check the buttons, to make sure that each is working correctly.

Also, you may notice that the circuit board and LED displays do not sit completely vertical in the case, but lean back at a slight angle. This is normal and expected.



This completes the assembly of Alpha Clock Five.

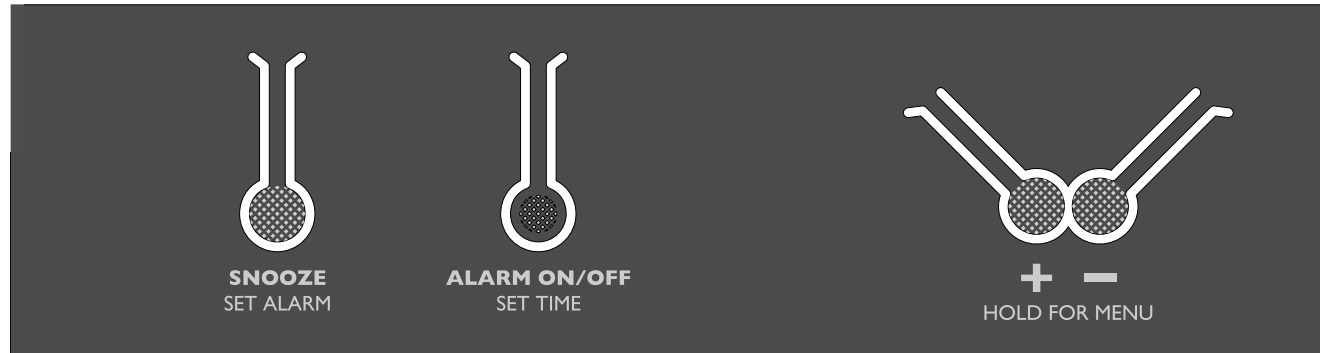
Please see the User Interface Guide (on the following page) to learn how to operate your clock.

Please visit our wiki site, <http://wiki.evilmadscience.com/alpha> for much more additional documentation

For technical support, please visit our Clock support forum, <http://www.evilmadscientist.com/forum/>

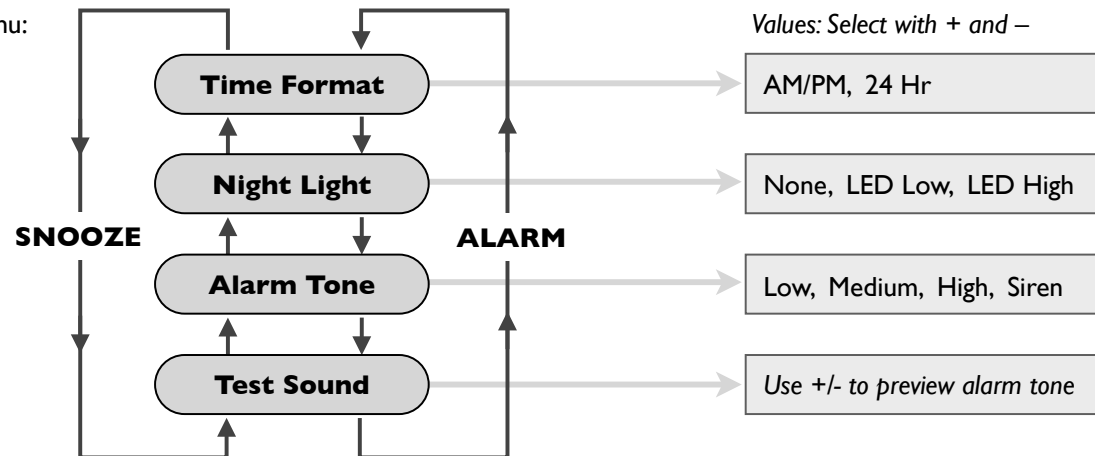
Alpha Clock Five

User Interface Guide



	SNOOZE SET ALARM	ALARM ON/OFF SET TIME		+	-
<i>Press</i>	Snooze	Alarm: On/Off		Brightness: Increase	Brightness: Decrease
<i>Hold</i>	Show alarm time Adjust alarm time, using +/-	Adjust time, using +/-		-	-
<i>Hold pair</i>	Hold these two buttons for 4 seconds: Show firmware version & Enter LED test mode			Hold these two buttons for 2 seconds: Enter (or leave) settings menu	

Settings Menu:



Hooking up to a computer

J2 is a 6-pin header for connecting to an FTDI model TTL-232R USB-serial interface cable, or any equivalent USB-TTL interface.

The end of the FTDI cable has six colored wires. The side with the black wire goes towards the location on the circuit board marked “(Black).”

Any time that you connect the computer to the clock, the clock is likely to restart. However, you can use the computer to set the time on Alpha Clock Five, or to display text on the alphanumeric display. See the Alpha Clock Five documentation wiki for more information about the serial protocol.