



BigTime

Kit Information & Instructions



The SparkFun BigTime kit is an entry-level kit that enables you to build your own watch. This kit, designed for beginner to intermediate electronics enthusiasts, contains all the parts you need to put together a functioning wristwatch.

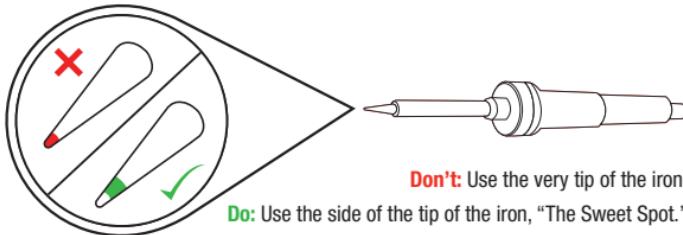
Kit Includes:

- ATmega328 (pre-programmed)
- 7-segment display
- 0.1 μ F capacitors (qty 2)
- 10k ohm resistor
- 32kHz crystal
- Button
- Strap
- Coin Cell battery
- Battery holder
- Enclosure
- Screws (qty 4)
- Threaded inserts (qty 4)

Suggested Tools:

- Soldering Iron
- Solder
- Wick
- #2 Phillips screwdriver
- Flux
- Tweezers
- Eye Protection

! SOLDERING TIPS



Don't: Use the very tip of the iron.

Do: Use the side of the tip of the iron, "The Sweet Spot."



Do: Touch the iron to the component leg and metal ring at the same time.



Do: While continuing to hold the iron in contact with the leg and metal ring, feed solder into the joint.



Don't: Glob the solder straight onto the iron and try to apply the solder with the iron.



Do: Use a wet sponge to clean your iron whenever black oxidation builds up on the tip.

! SOLDERING TIPS



A

Solder flows around the leg and fills the hole - forming a volcano-shaped mound of solder.



B

Error: Solder balls up on the leg, not connecting the leg to the metal ring.
Solution: Add flux, then touch up with iron.



C

Error: Bad Connection (i.e. it doesn't look like a volcano)
Solution: Flux then add solder.



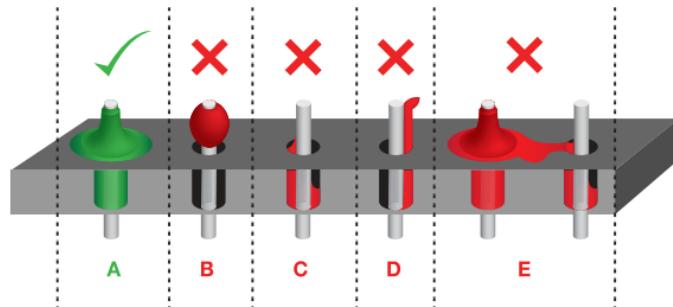
D

Error: Bad Connection...and ugly...oh so ugly.
Solution: Flux then add solder.

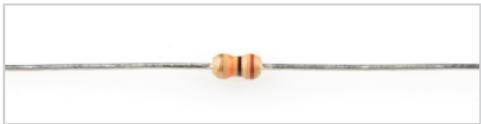


E

Error: Too much solder connecting adjacent legs (aka a solder jumper).
Solution: Wick off excess solder.



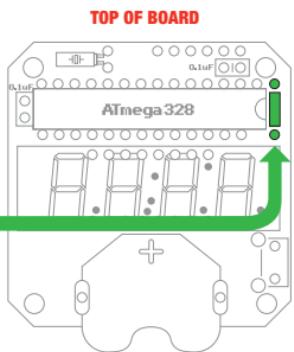
- ① Locate the **10K Resistor**.



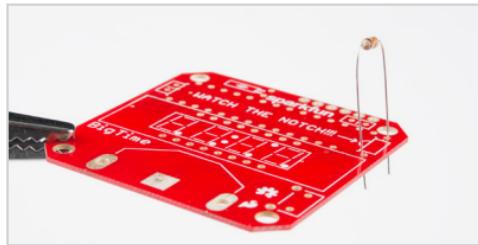
- ② Bend the legs downward.



- ③ Locate the **10K Resistor** position on the board.



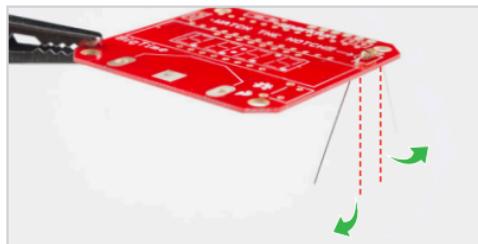
- ④ Insert the resistor into the PCB.



- ⑤ Push the resistor in so it is nearly flush with the board.



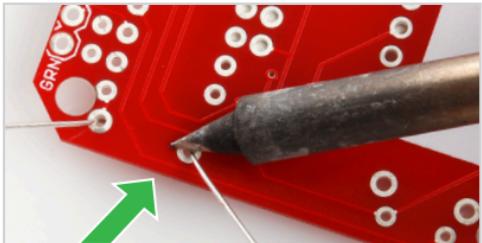
- ⑥ Slightly bend the legs outward to hold it in place.



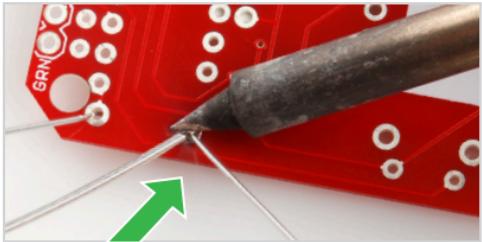
QUICKSTART - YOUR FIRST COMPONENT

[STEPS 1 TO 11]

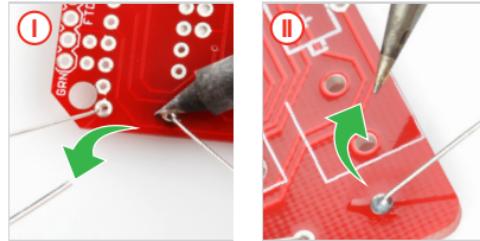
- ⑦ Flip the board over. Hold the soldering iron's "sweet spot" so it touches both the leg and the metal ring. Hold for two seconds.



- ⑧ Feed solder into the joints.



- ⑨ First, pull away the solder. Second, pull away the iron.



- ⑩ Your solder joints should look like this - a tiny volcano.



- ⑪ Add solder to second leg, and then clip away excess leg.





Now that you've successfully soldered in the resistor, use the same method to place and solder the rest of the components.

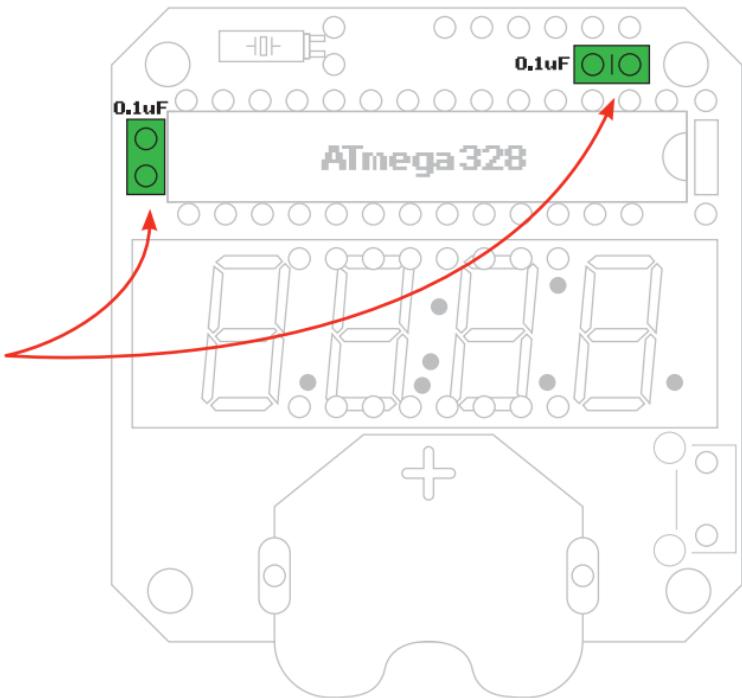
! EACH STEP HAS TWO PARTS

- ↑ START BY PLACING THE COMPONENT THROUGH THE TOP SIDE OF THE BOARD.
- ↓ TURN THE BOARD OVER TO SOLDER ON THE BOTTOM SIDE OF THE BOARD.



0.1 μ F caps x 2: Insert the capacitors on the top side, solder on the bottom. After soldering, clip the excess metal legs.

TOP OF BOARD

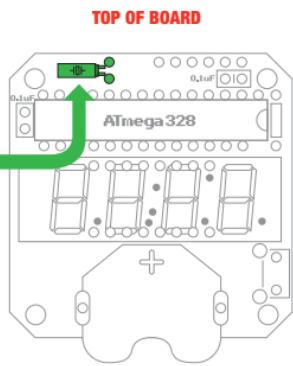




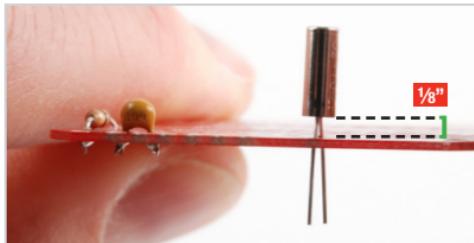
13 32kHz Crystal

32kHz Crystal: For this component, do not push it flush with the surface of the PCB. Leave enough height to allow bending of the legs. (See steps below.)

A Locate the position.



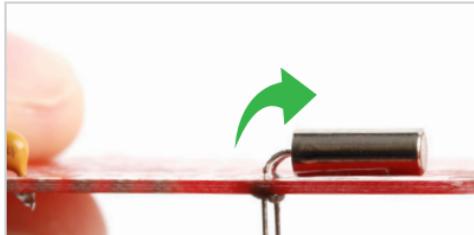
B Position with correct distance from the PCB.



C Flip the board over, and solder solder into place.



D Bend crystal so it lies flat on the PCB.





Remember highlighted components are polarized.



14 ATmega328

ATmega328 (microcontroller): Looking at the **top** of the board, insert the microcontroller. Make sure the notch on the chip aligns with the white silk screen on the board. Flip the board over and solder into place. Note, one of the legs on your IC was intentionally removed to help ensure proper alignment.



15 7-Segment Display

7-Segment Display: As you insert this part, make sure you match up the four decimal points on the bottom of the display to those on the PCB. **Your display won't work upside down!** After soldering all legs, clip off any excess.

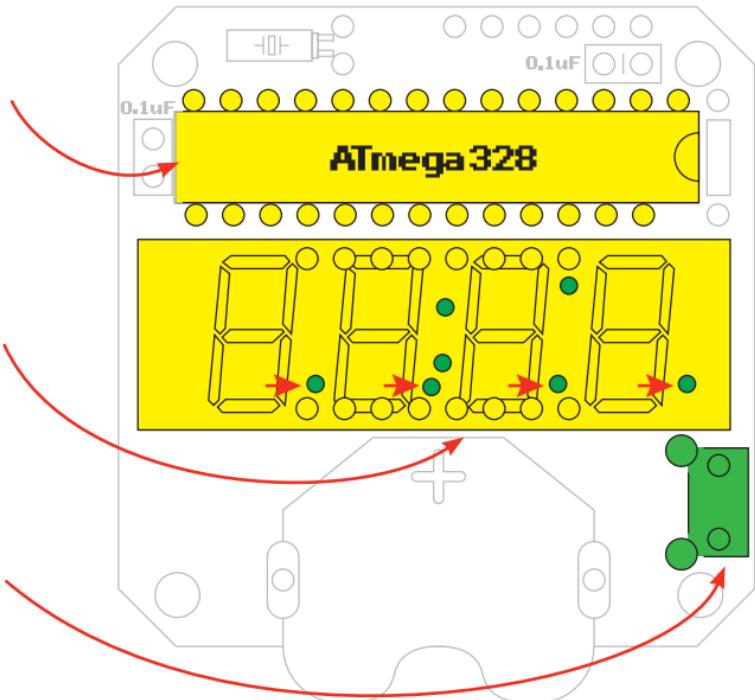
(Display may have protective film on top, feel free to take this off)



16 Button

Button: Place the legs so the button faces off the top of the board to the right. After soldering all four legs, clip off any excess metal.

TOP OF BOARD

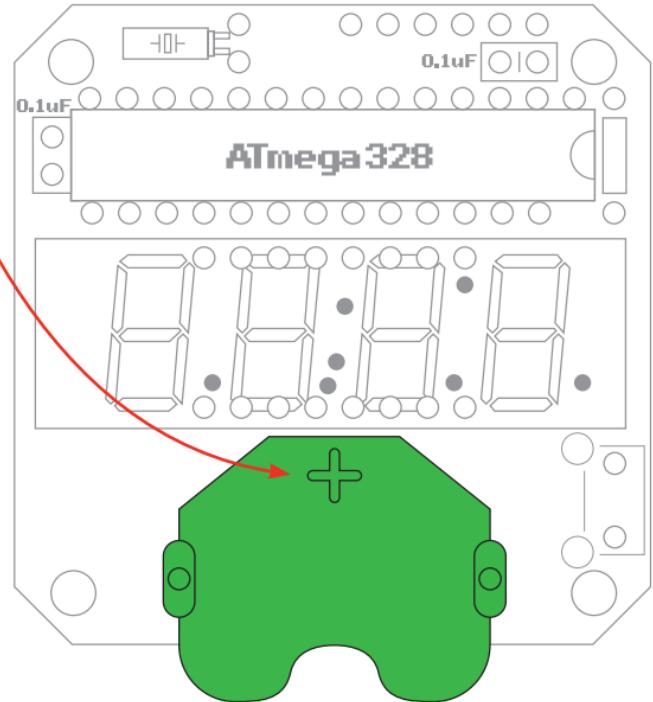




17 Battery Holder

Battery Holder: Looking at the **top** of the board, insert the battery holder on the board. Make sure to align the holder with the white silkscreen on the board. The "+" sign on the battery holder should be closest to the 7-Segment Display.

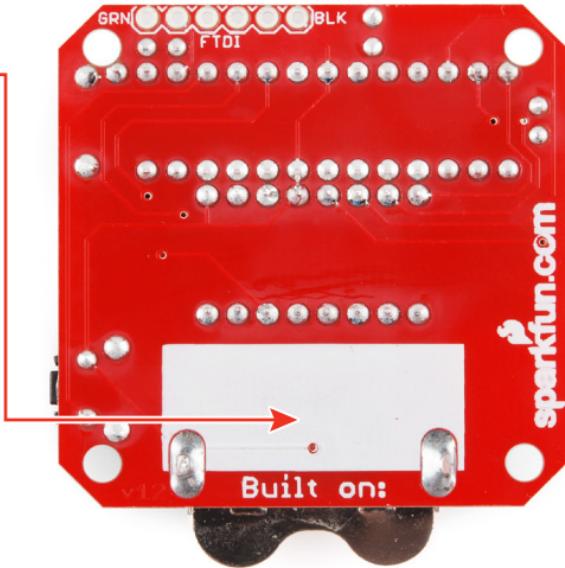
TOP OF BOARD





Sign and Date: Turn it over and date/sign the box that says "Built On."

18 Sign Your Board





Battery: This component is polarized. Make sure to insert your coin cell battery so that the positive side is facing up.

19 Coin Cell Battery

- (A)** First, locate the positive side of the battery. It has the “+” written on the metal.



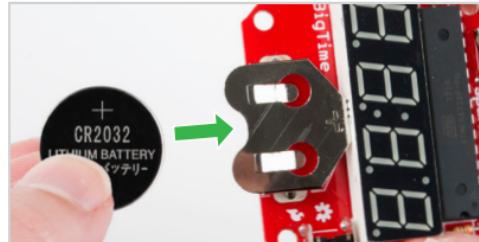
Positive Side



Negative Side

(B)

With positive side up, slide the battery into the holder.



! QUALITY CONTROL

Before moving on to the mechanical assembly, let's double-check that your BigTime is working properly.

- A** With your battery plugged in, try pressing the button. Verify that your display lights up.



B

Now try pressing the button again, but this time hold it in for three seconds. Verify that the colons blink.



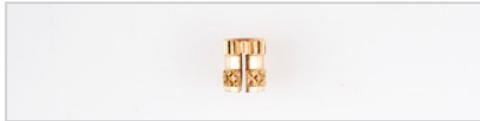
C

Continuing to hold the button will cause the time to increase. Check to see if your display is working properly and all of the segments are lighting up correctly. If something is not working, please see Troubleshooting Tips (Pages 26-27).

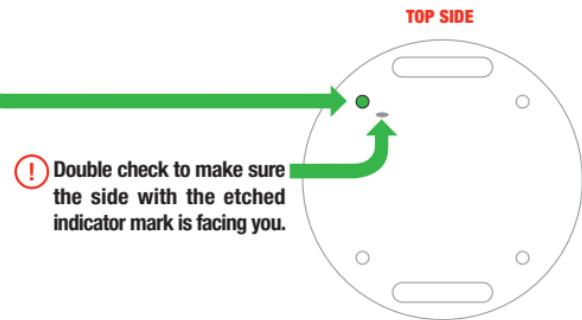
MECHANICAL ASSEMBLY

[STEPS 20 TO 26]

- (20) Locate a **Threaded Insert**.



- (A) Locate the position on the enclosure piece with two curved rectangle holes. There is an indicator mark etched on one side of the enclosure. Make sure that side is facing up.

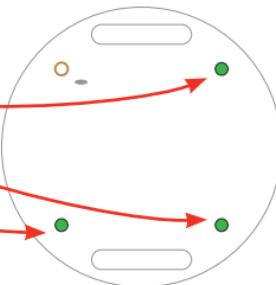


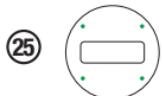
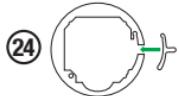
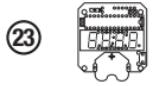
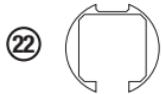
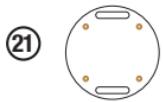
! Double check to make sure the side with the etched indicator mark is facing you.

- (B) Place the **Threaded Insert** into the hole with the slit pointing down.



- (C) Continue with the other three **Threaded Inserts** on the top side of the enclosure piece.





Locate the enclosure piece with two curved rectangle holes. Rotate your piece so the holes with the threaded inserts are vertically aligned, as seen to the left. Make sure that the indicator mark is facing up.

Place this piece directly on top of step 21, with the open end pointed down.

Place your completed board into the open space in step 22's enclosure, battery clip pointed down.

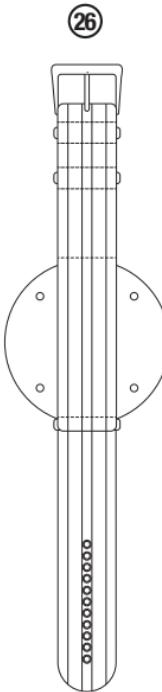
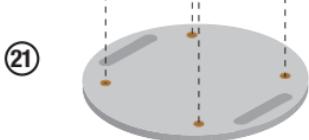
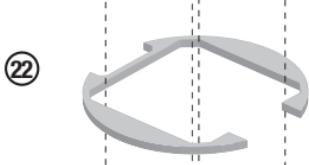
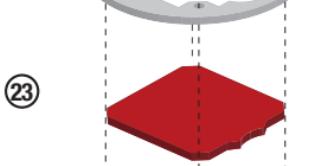
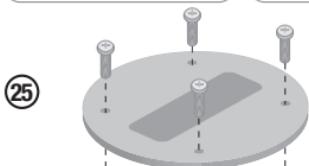
Place this piece on top of the three previous layers. Add the button lever into the opening on the right (see green arrow). The slightly bulbous end of the lever should be the top.

Place the final piece on top. The cut-out area in the middle should fit snugly around your 7-Segment Display. Once this is in place, use a #2 Phillips screwdriver to tighten the four screws into place.

Turn the enclosure upside down and weave the strap through the two curved rectangle holes, metal loops facing the front. Enjoy your new piece of geek flair.



Some plastic enclosures will need to have the protective film removed first before assembly can take place.

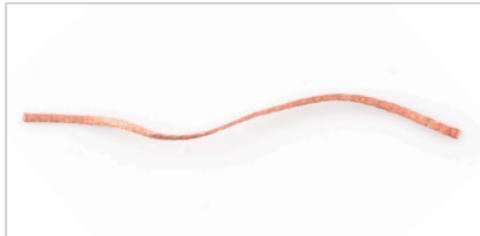


! TROUBLESHOOTING JUMPERS

Did you accidentally solder a jumper between two legs? Don't fret! Here is a simple process using solder wick to remove the excess solder.



- A** Locate a piece of solder wick.



- B** Place solder wick on top of solder.



- C** Place iron on top of solder wick. Hold for 3-4 seconds.



- D** Once the solder begins to flow into the wick, pull the wick and iron away at the same time.



Learning More

To Set the Clock

Hold down the button until you see the colons blink.

Continuing to hold the button will cause the time to increase.

Soldering

The tip of the iron is normally 700 °F, hot enough to melt metal. It is normal for the handle of the soldering iron to heat up a bit. Hold it like a pencil and move your hand further away from the tip if the heat is uncomfortable. The solder smokes because the rosin inside the solder is burning off - it's not harmful.

Microcontroller and PCB

The microcontroller is the brain of the watch. It comes pre-programmed to run the clock properly. It is designed to withstand the heat of the soldering iron and gentle bending of its legs. Just be reasonably gentle with it and you should be fine.