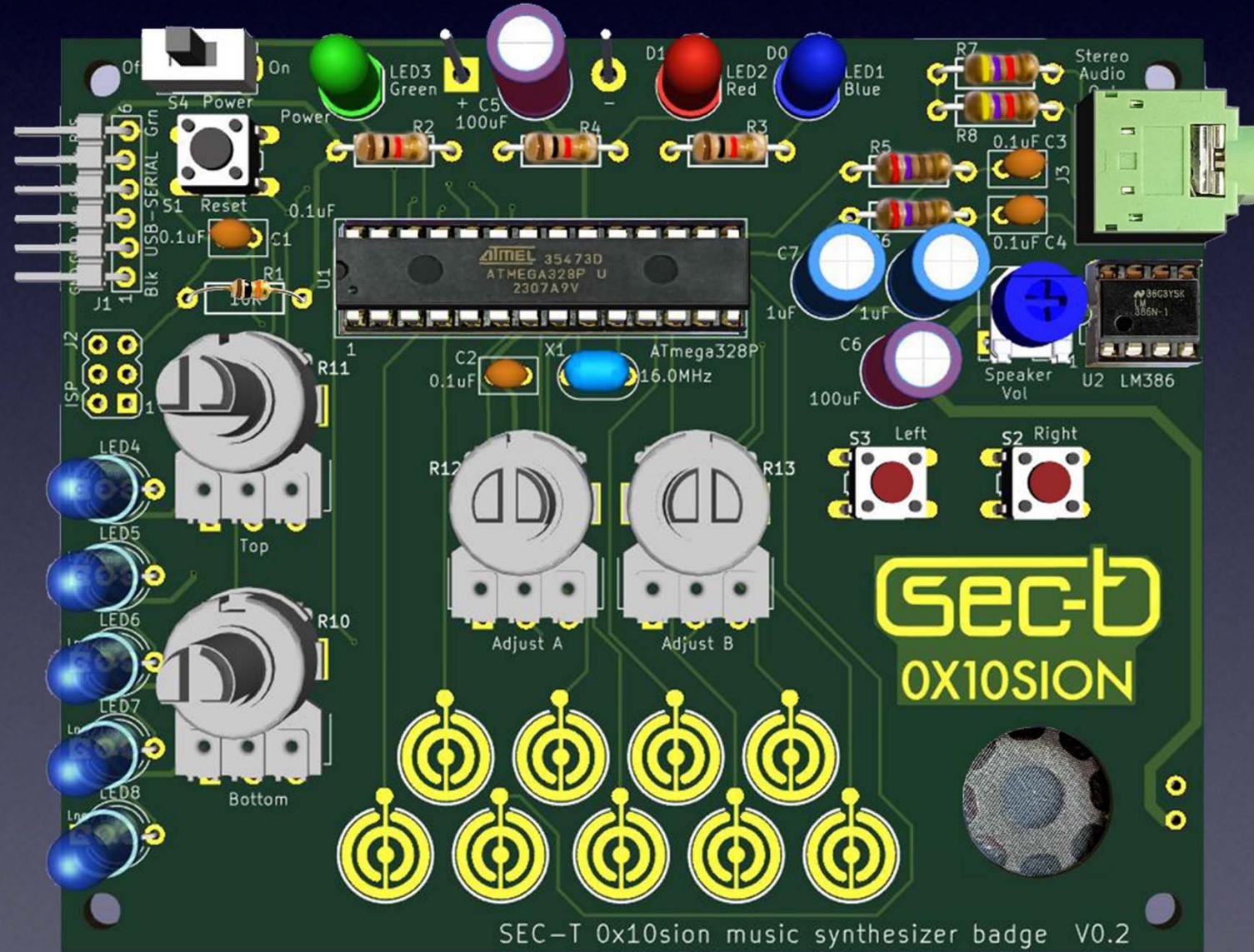


# SEC-T 0x10sion

## Music Synthesizer Badge

### Assembly Instructions

(with re-programming how-to)



v0.2



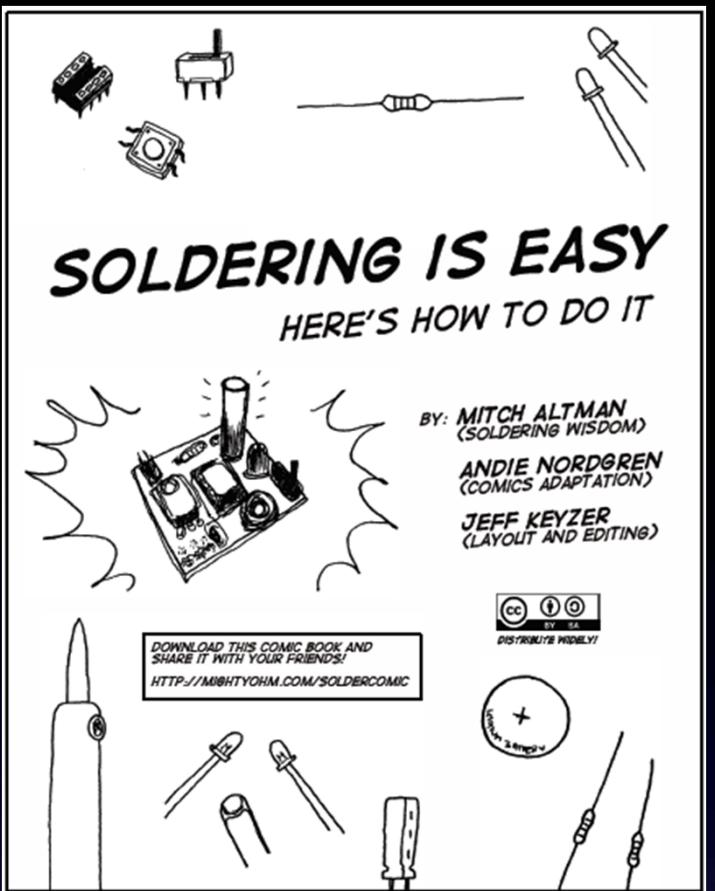
CC BY-SA 4.0 © 2024 Mitch Altman



cornFIELD electronics

SEC-T  
0X10SION

# Learn To Solder

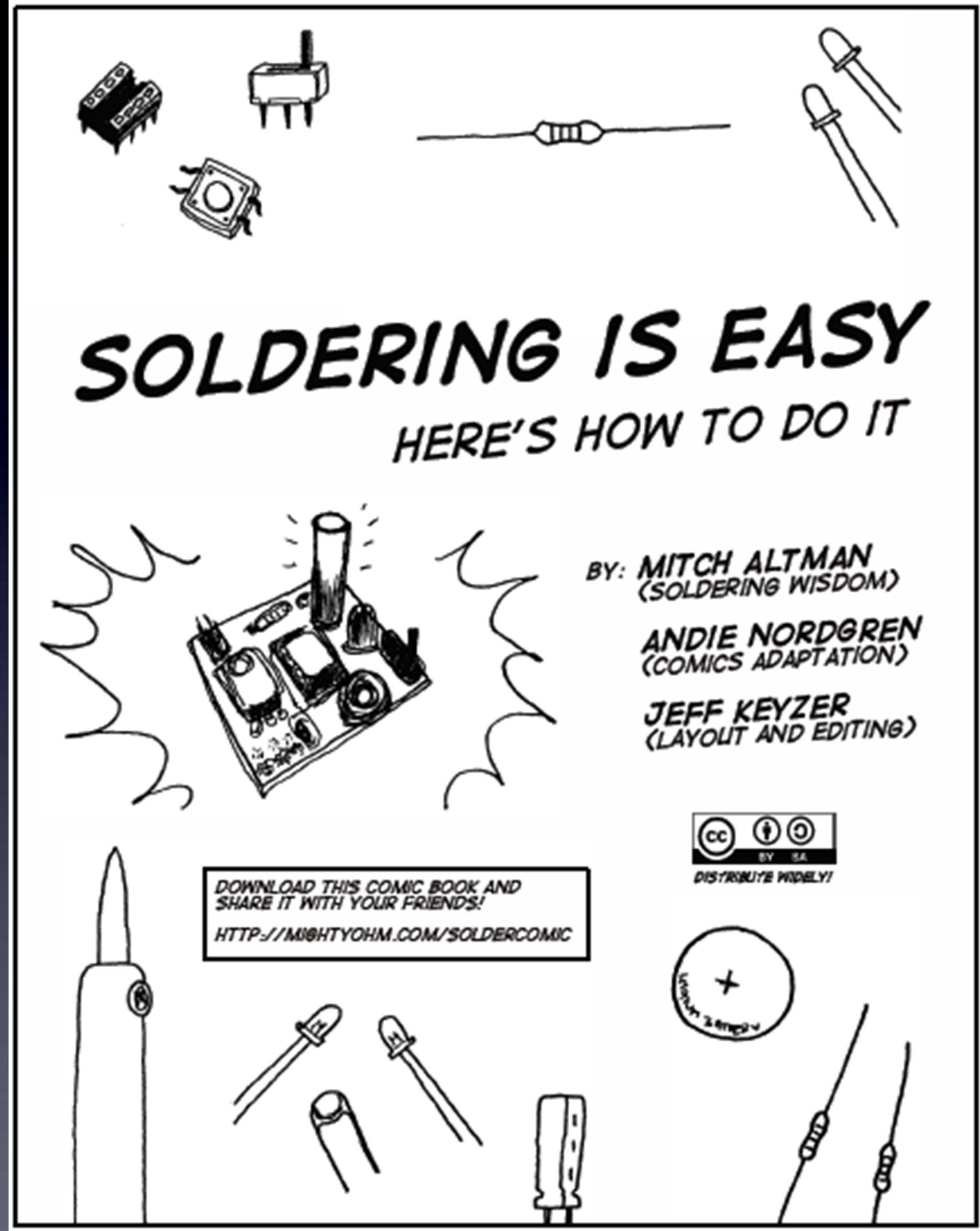


The following photos will show you how to solder.  
But feel free to download the “Soldering Is Easy” comic book for free!

(In many different languages.)

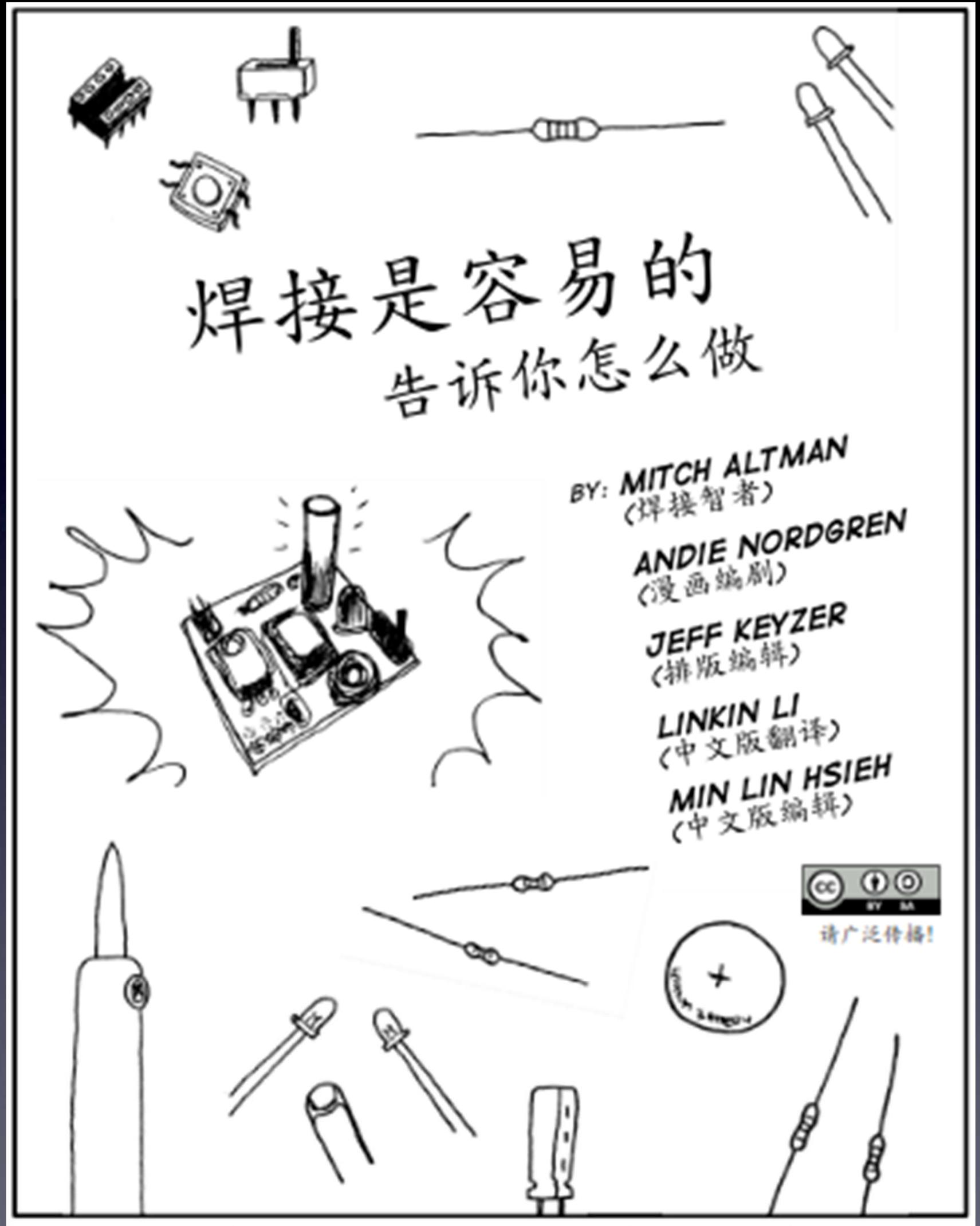
download for free at:  
<http://mightyohm.com/soldercomic>

# Learn To Solder



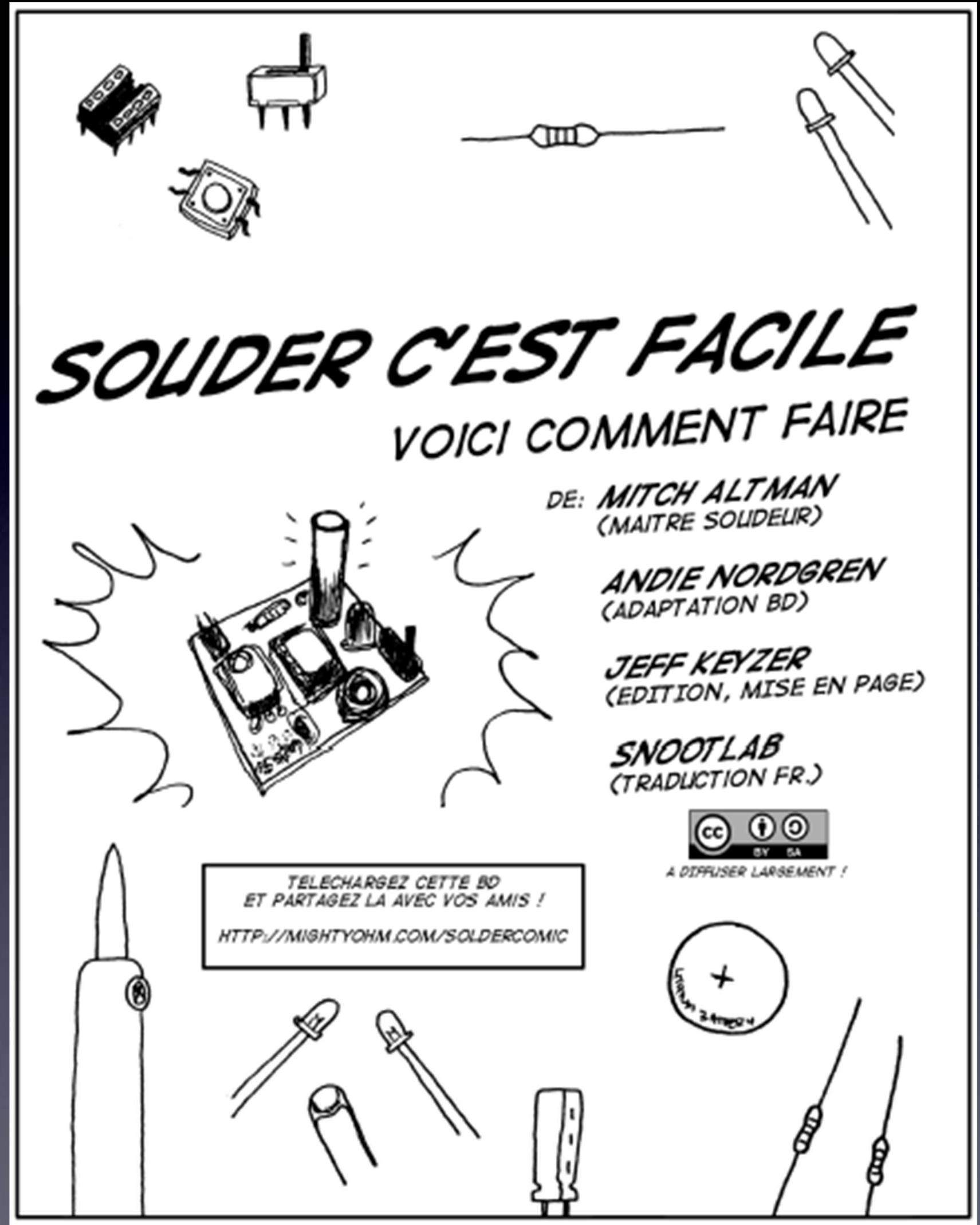
download for free at:  
<http://mightyohm.com/soldercomic>  
(In many different languages.)

# Learn To Solder



download for free at:  
<http://mightyohm.com/soldercomic>  
(In many different languages.)

# Learn To Solder



download for free at:  
<http://mightyohm.com/soldercomic>  
(In many different languages.)

# Learn To Solder



download for free at:  
<http://mightyohm.com/soldercomic>  
(In many different languages.)

# Learn To Solder

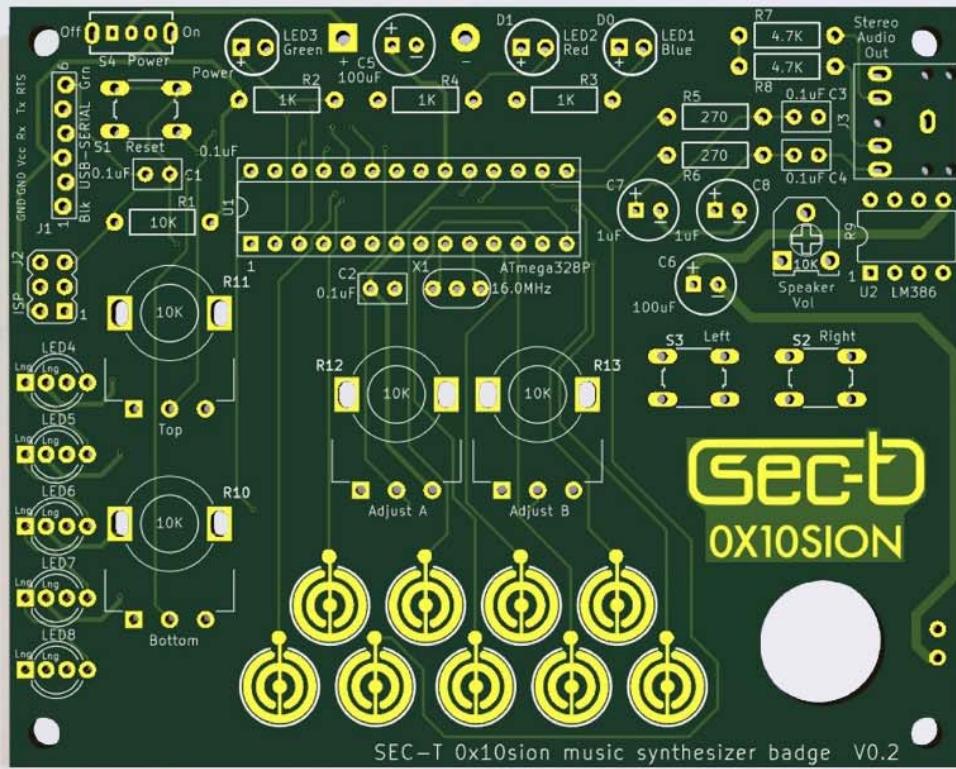


download for free at:  
<http://mightyohm.com/soldercomic>  
(In many different languages.)

# Learn To Solder



download for free at:  
<http://mightyohm.com/soldercomic>  
(In many different languages.)



(short leads  
soldered into PCB)

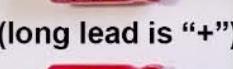
(J2 -- not included)

C7, C8 (1uF)



(long lead is "+")

C5, C6 (100uF)



(long lead is "+")

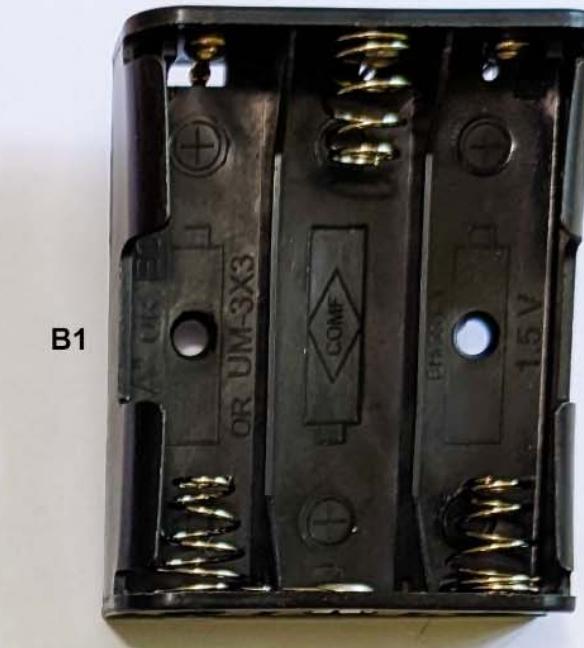


C1, C2, C3, C4 ("104" -- 0.1uF)

X1

R9

R10, R11, R12, R13



ATmega328P chip



U1



socket  
(note polarity)

LM386 chip



U2



socket  
(note polarity)

LED3, LED2, LED1



(long lead is "+")



LED4, LED5, LED6, LED7, LED8  
(NOTE: two LNG leads each)

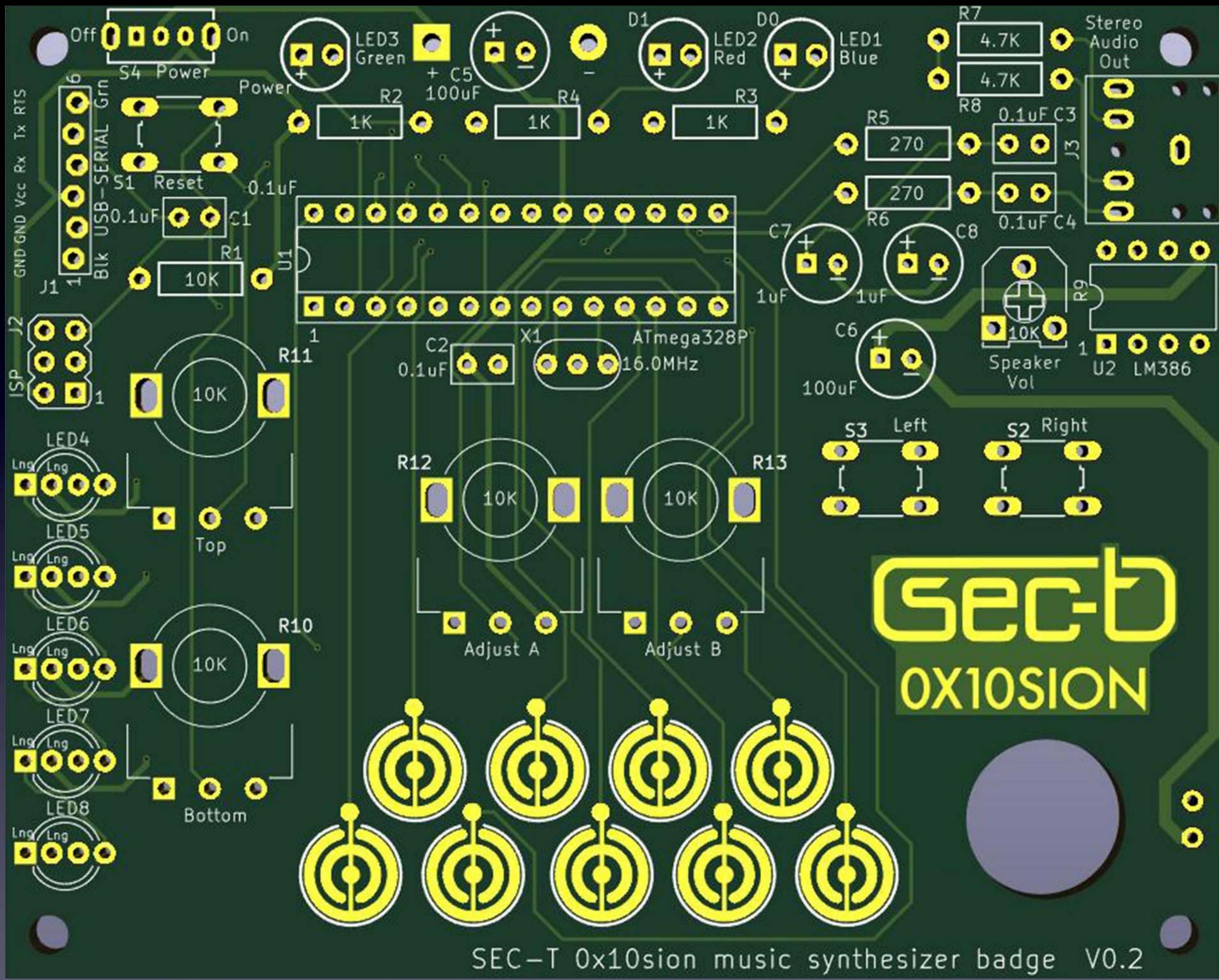
R1 (10K): Brown, Black, Orange, Gold

R2, R3, R4 (1K): Brown, Black, Red, Gold

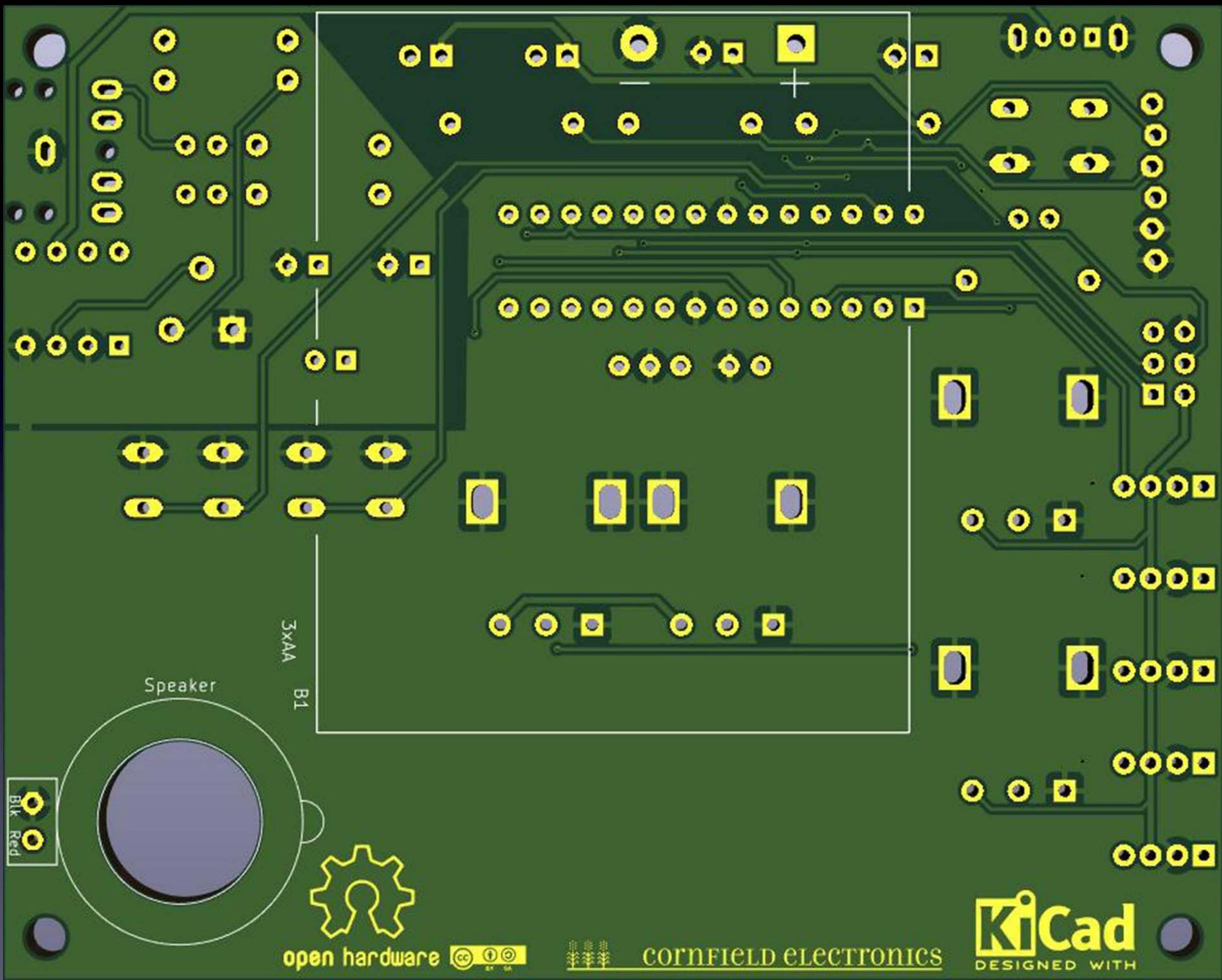
R5, R6 (270): Red, Violet, Brown, Gold

R7, R8 (4.7K): Yellow, Violet, Red, Gold

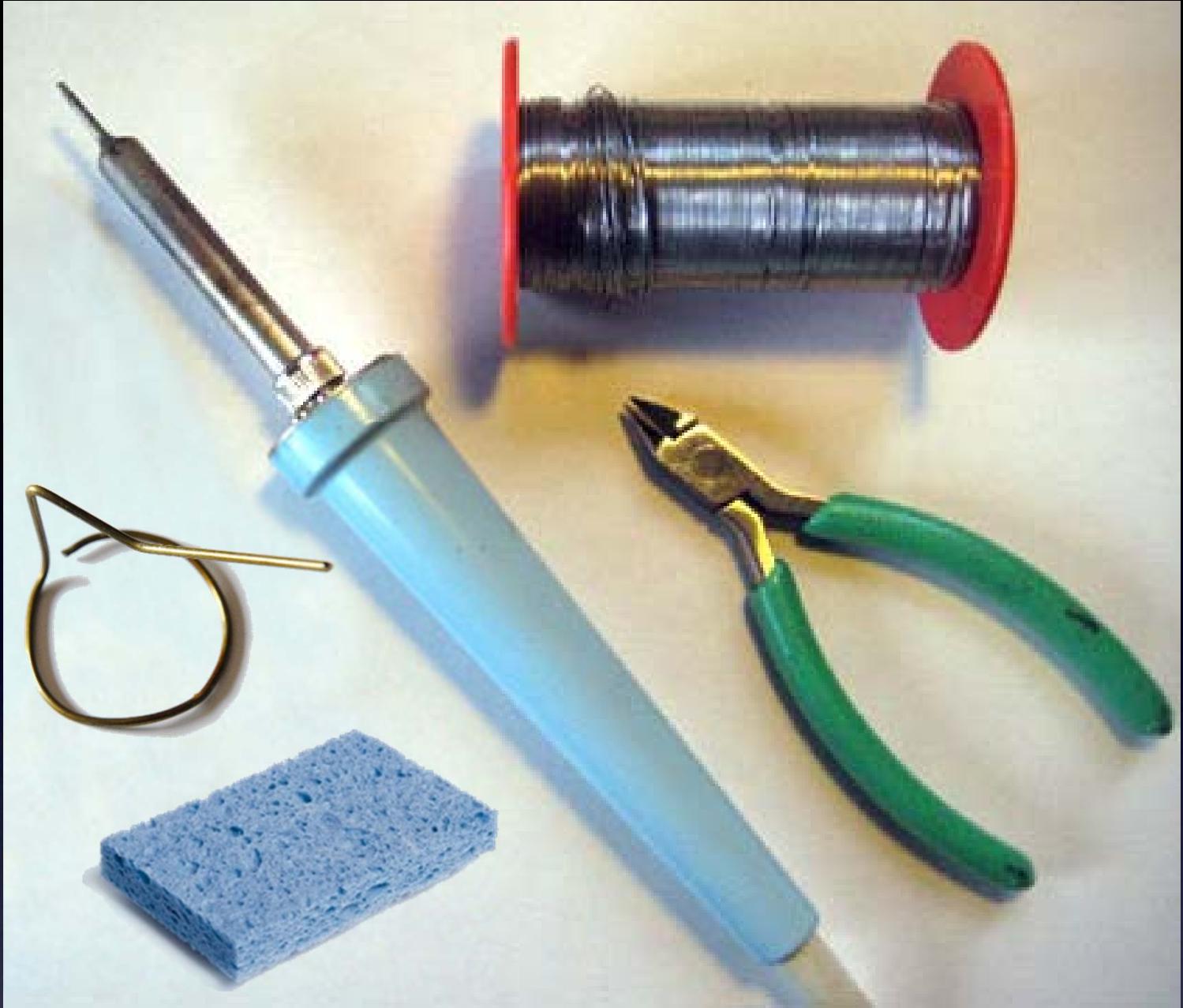
# All of the parts



The board we'll solder the parts to (front)



The board we'll solder the parts to (back)

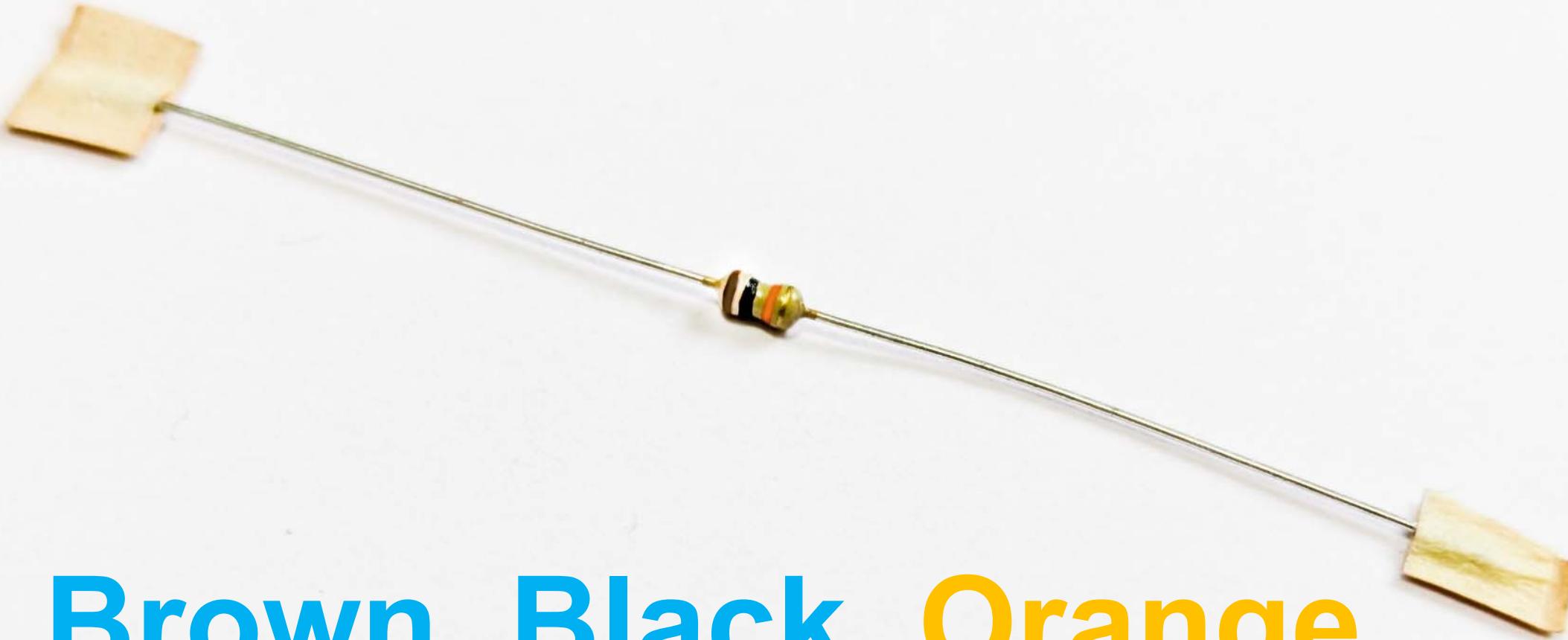


Note:  
Most  
lead-free solder  
has poisonous fumes!

### The tools you'll need:

- soldering Iron (35W or less) (0.7mm)
- solder (60/40 Sn/Pb, rosin core, 0.031" diameter or less)  
(63/37 is also good)
- soldering iron stand
- cellulose kitchen sponge (*not plastic!*)
- *small* wire cutter

# Our first part



**R1: Brown, Black, Orange**

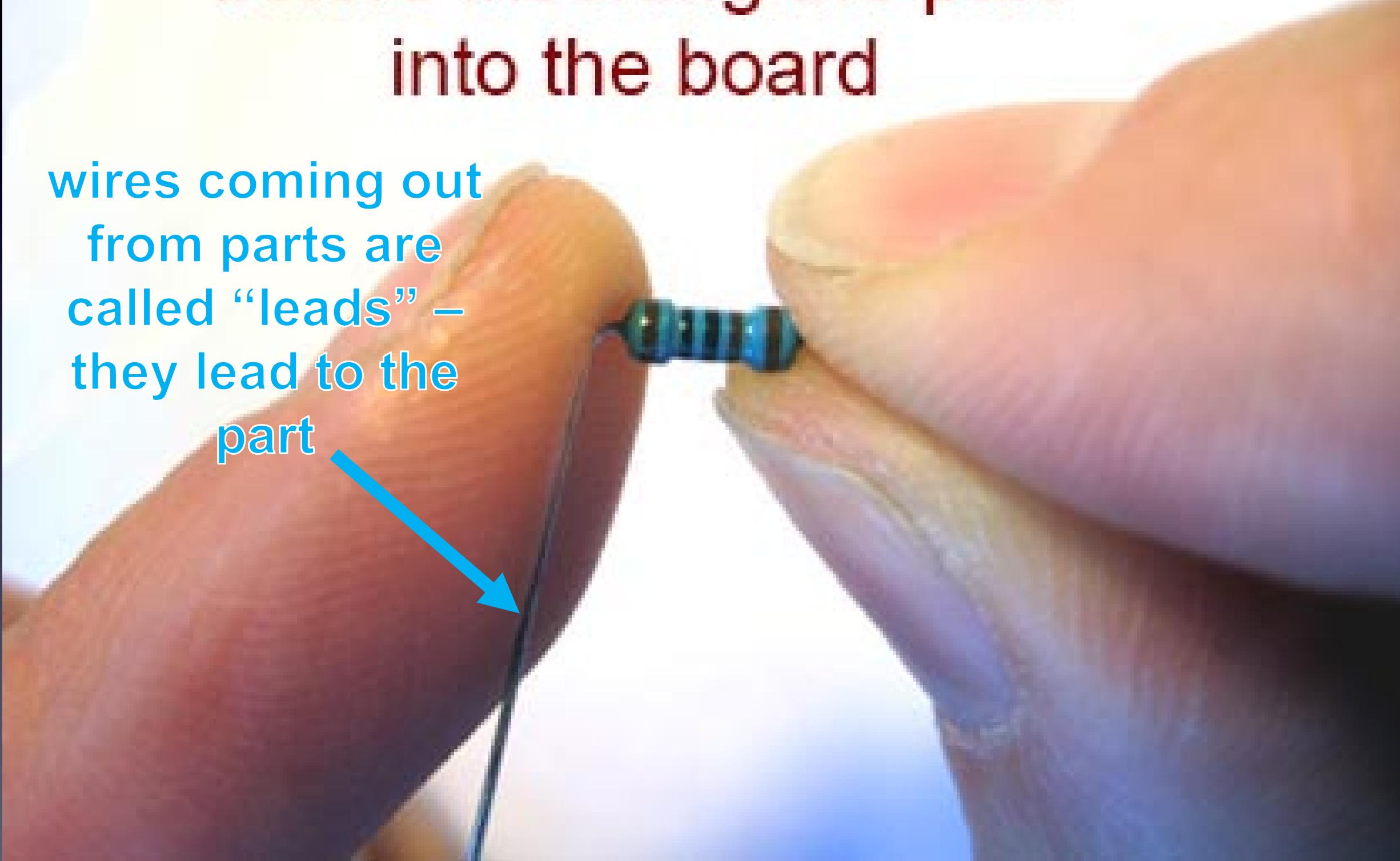
(the small one)

**(not Brown, Black, Red)**

**Some parts, such as resistors, need their leads bent first**

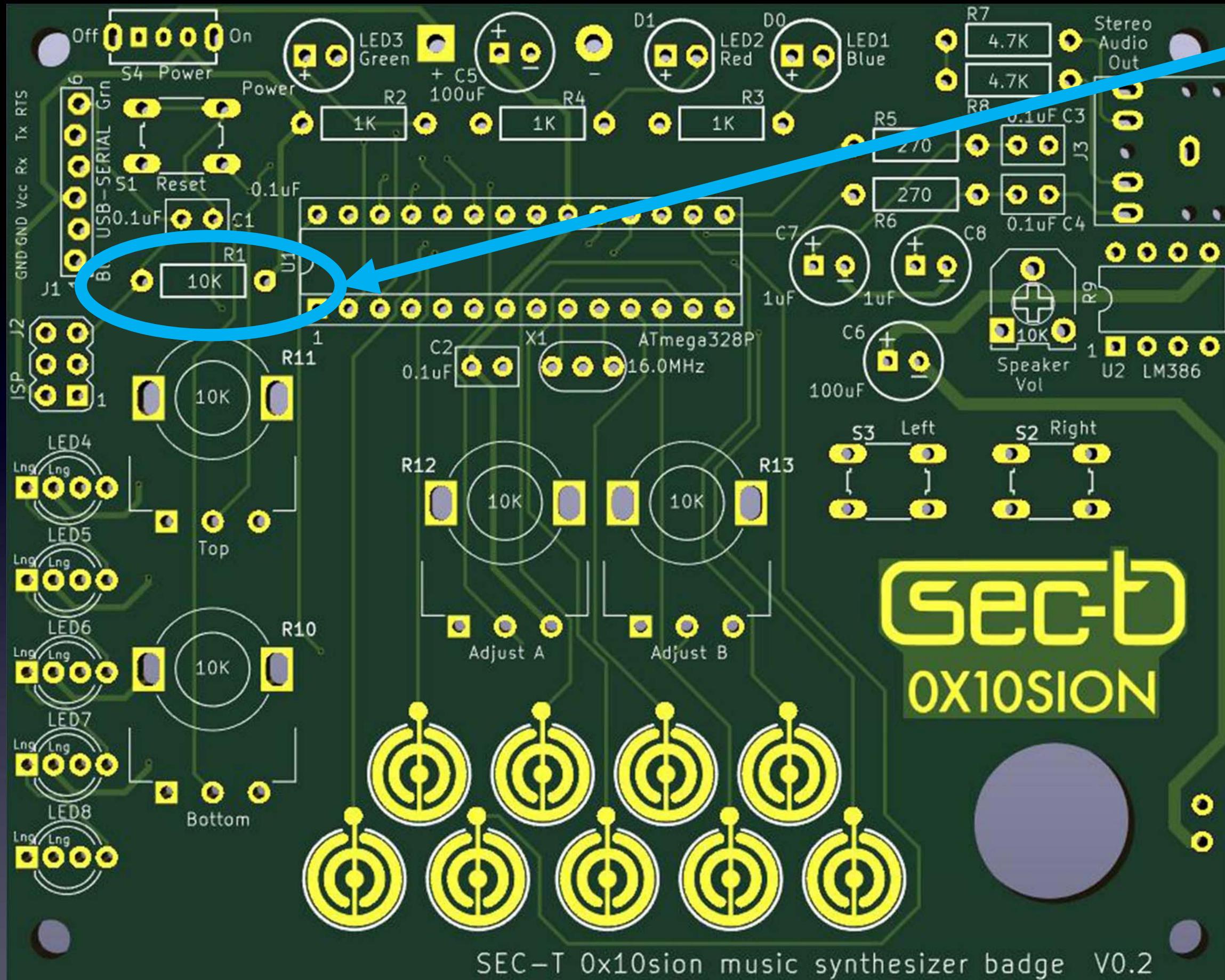
If necessary, Bend leads  
before inserting the part  
into the board

wires coming out  
from parts are  
called “leads” –  
they lead to the  
part





R1 – this is how it will look *before* inserting it into the board

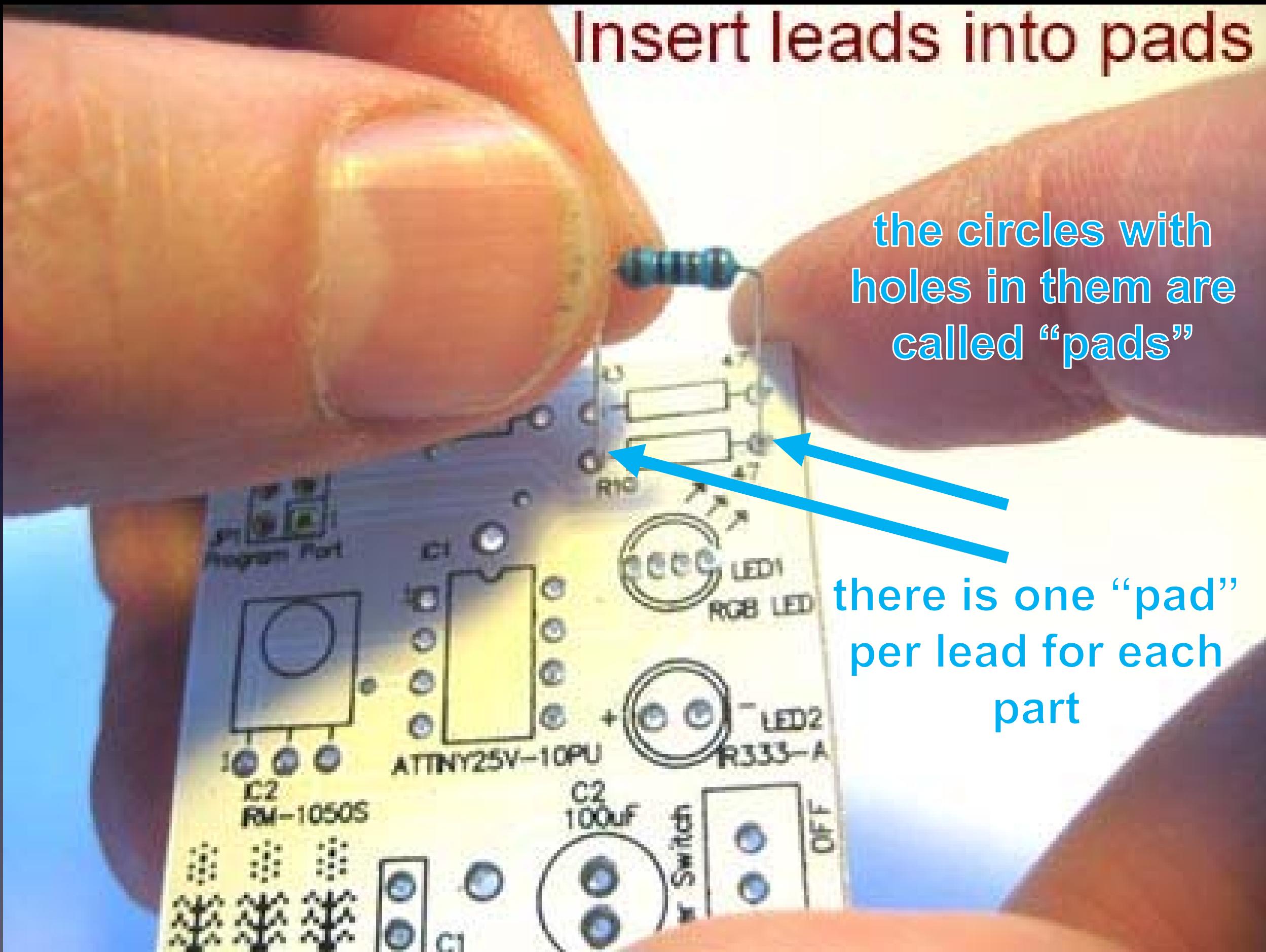


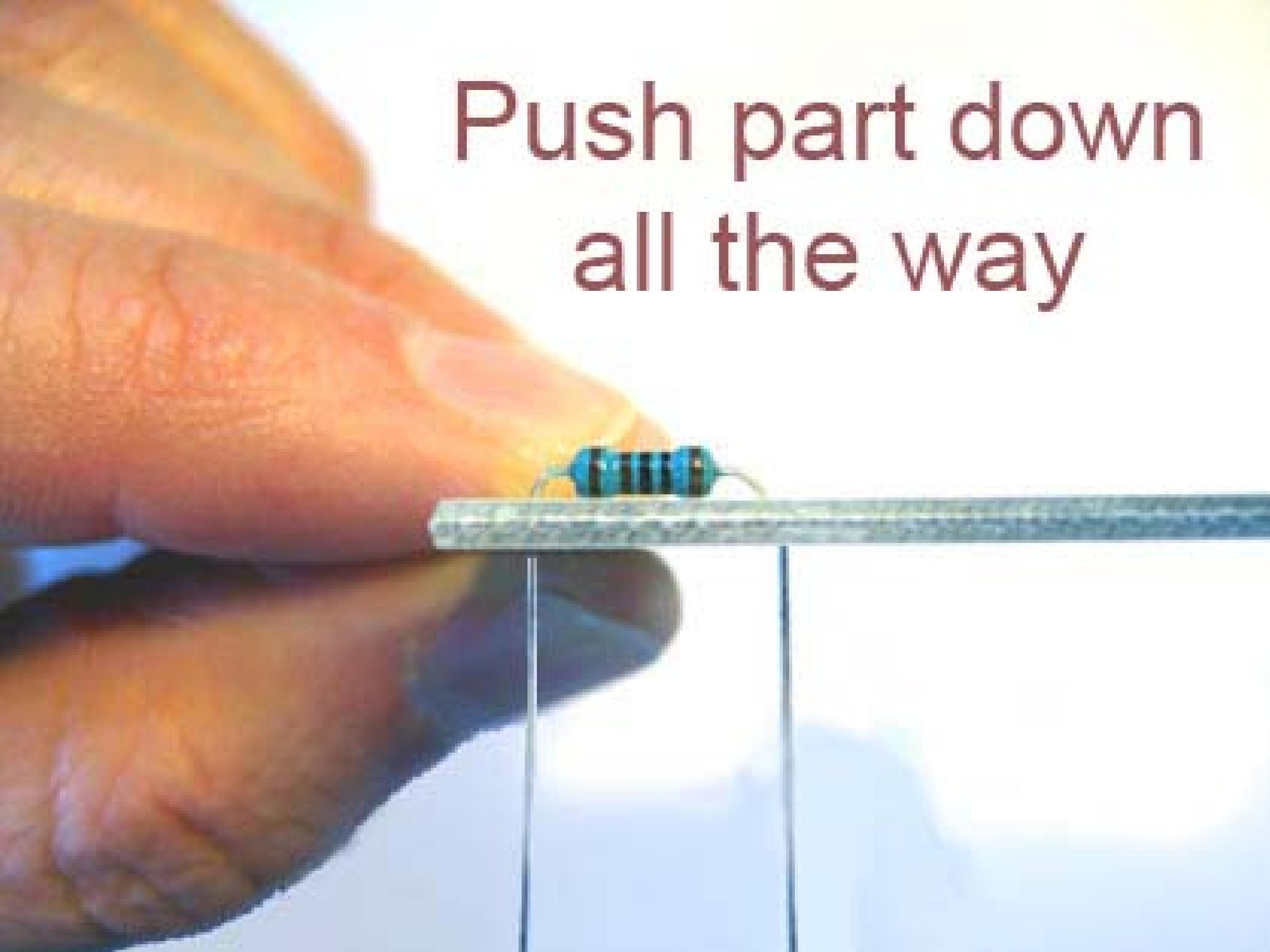
**R1 – this is where it goes**

# Insert leads into pads

the circles with  
holes in them are  
called “pads”

there is one “pad”  
per lead for each  
part



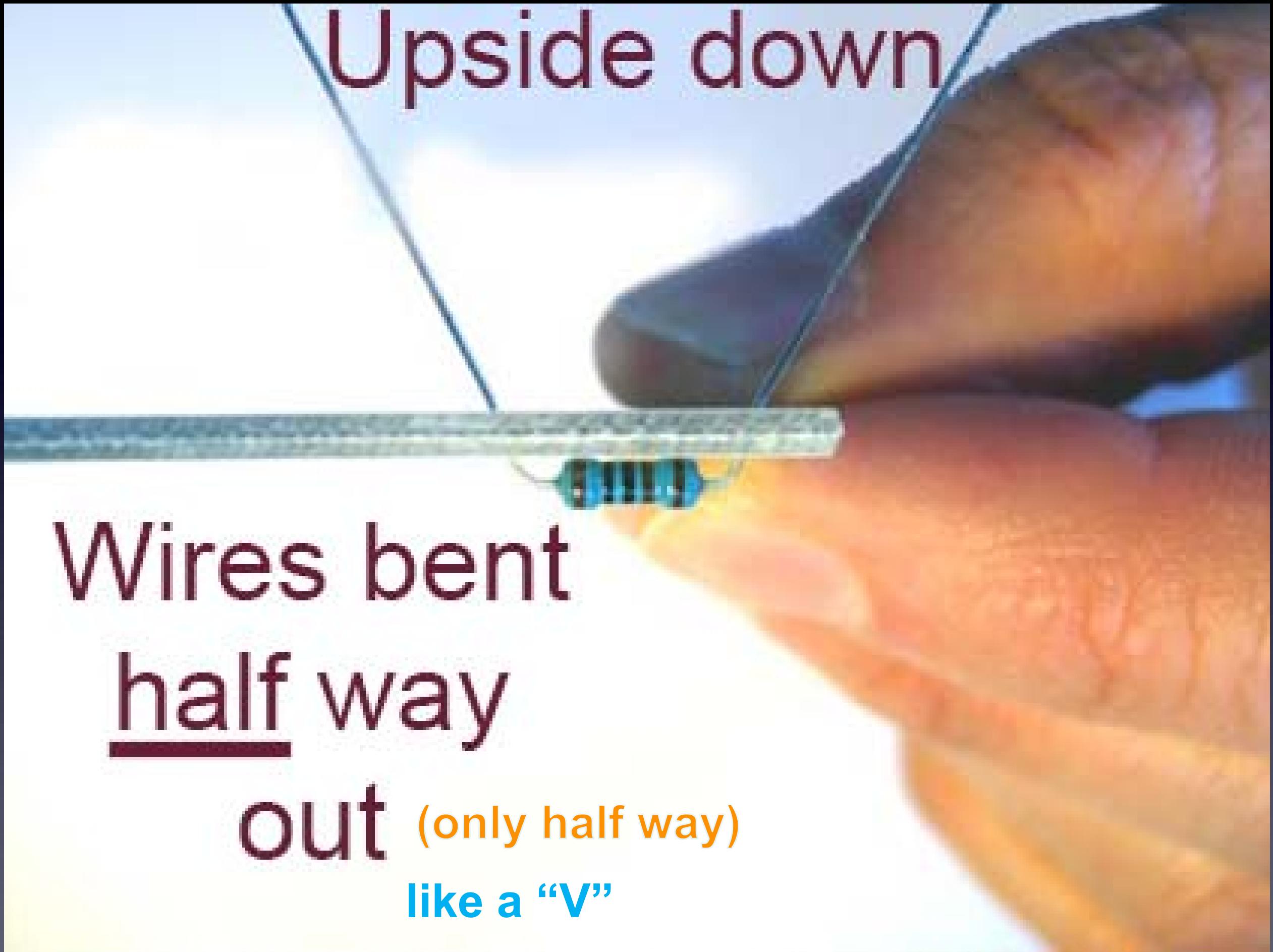


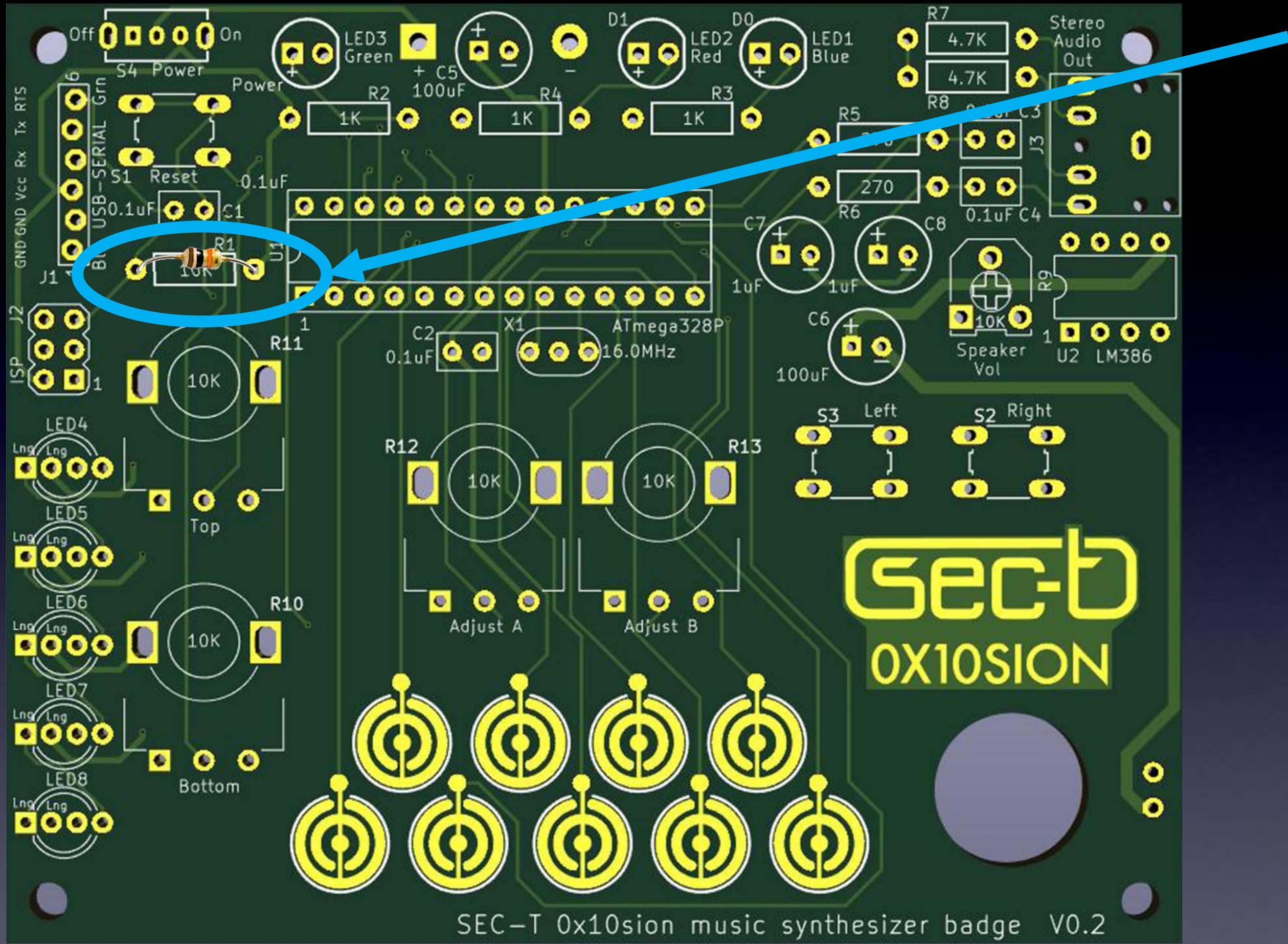
Push part down  
all the way

# Upside down

Wires bent  
half way  
out (only half way)  
like a “V”

so that the part won't fall out while soldering it





**R1 – inserted into the board**



# How to hold a soldering iron

(Like a pencil – held from underneath)

Important

The perfect kind of solder for  
electronics:

60/40 rosin core,  
0.031" (0.7mm) diameter (or smaller)

*(63/37 is also good)*

**Note:**

Most  
lead-free solder  
has poisonous fumes!

# The perfect kind of solder for electronics:

*This is the only good Lead-Free solder I have found!  
(after years of searching)*



**Chip Quik Germanium-Doped Solder  
Sn/Cu0.7/Ni0.05/Ge0.006**

# 3 Safety Tips...

# Safety Tip #1:

Hot !!

(When you touch the tip,  
you *will* let go quickly every time!)

# Safety Tip #2:

Lead (Pb) is toxic

But it easily washes off your hands  
with soap and water

# Safety Tip #3:

*(coming soon)*

2 secrets  
to good soldering...

# Secret #1:

## Clean the tip!

(before every solder connection)

Bang (lightly) 3 times,

Swipe, Rotate, Swipe (on the sponge):

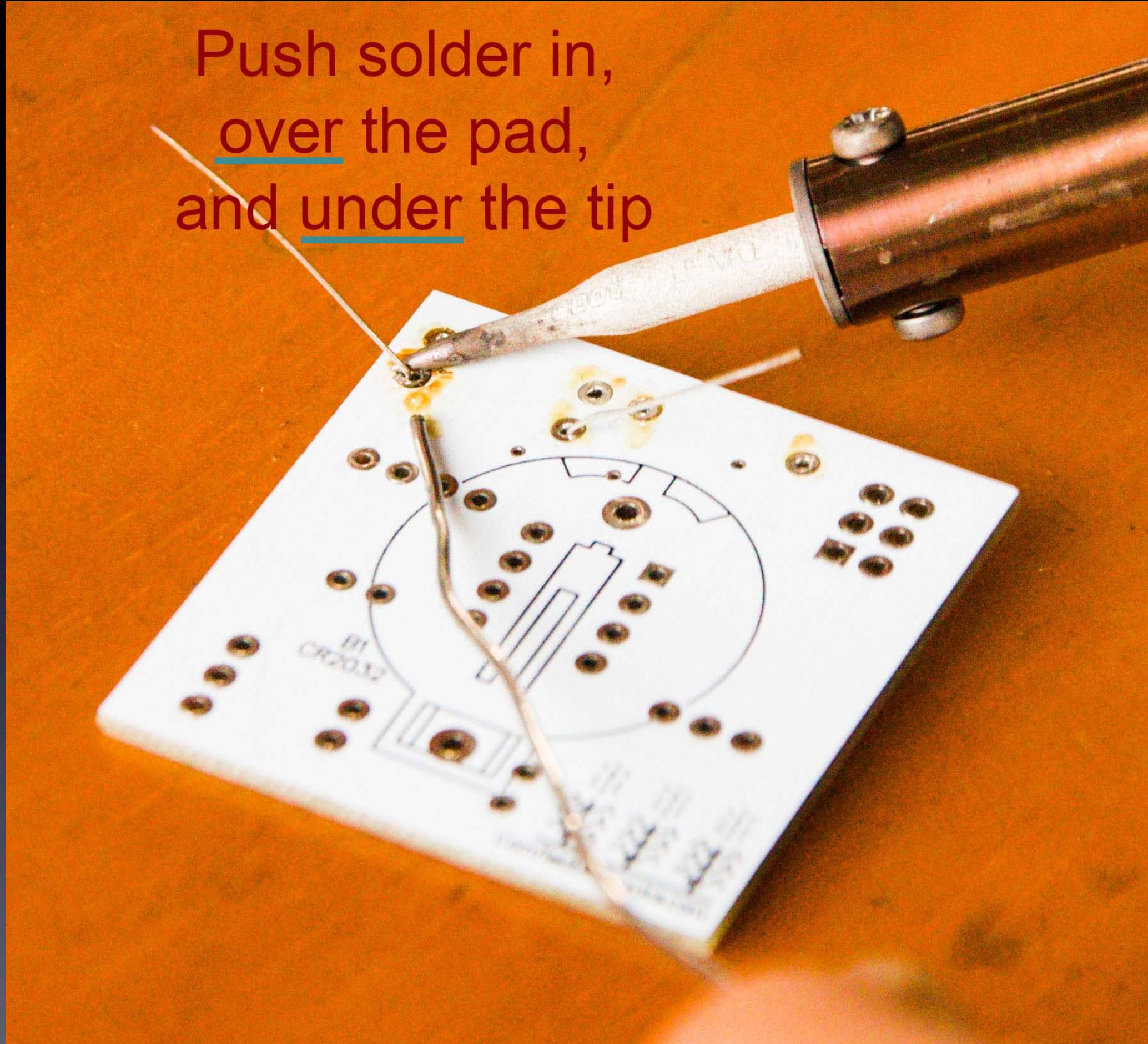
*Keep the tip shiny silver!*

*knock solder off the tip*

Lay clean tip across half of the pad,  
touching the pad and lead  
for 1 second

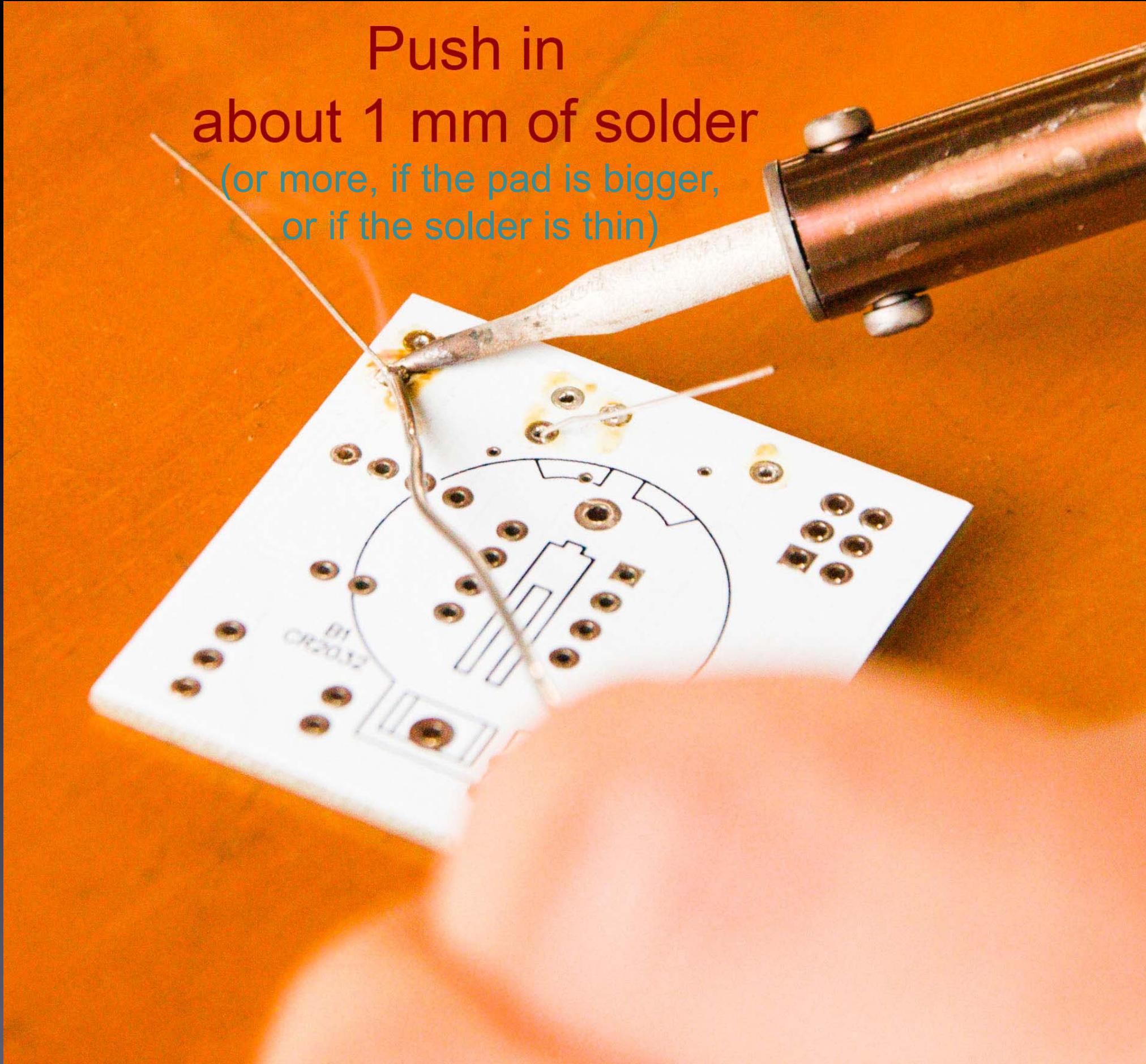


Do this quickly (slowly doesn't work well) – solder in & out in about 1 second

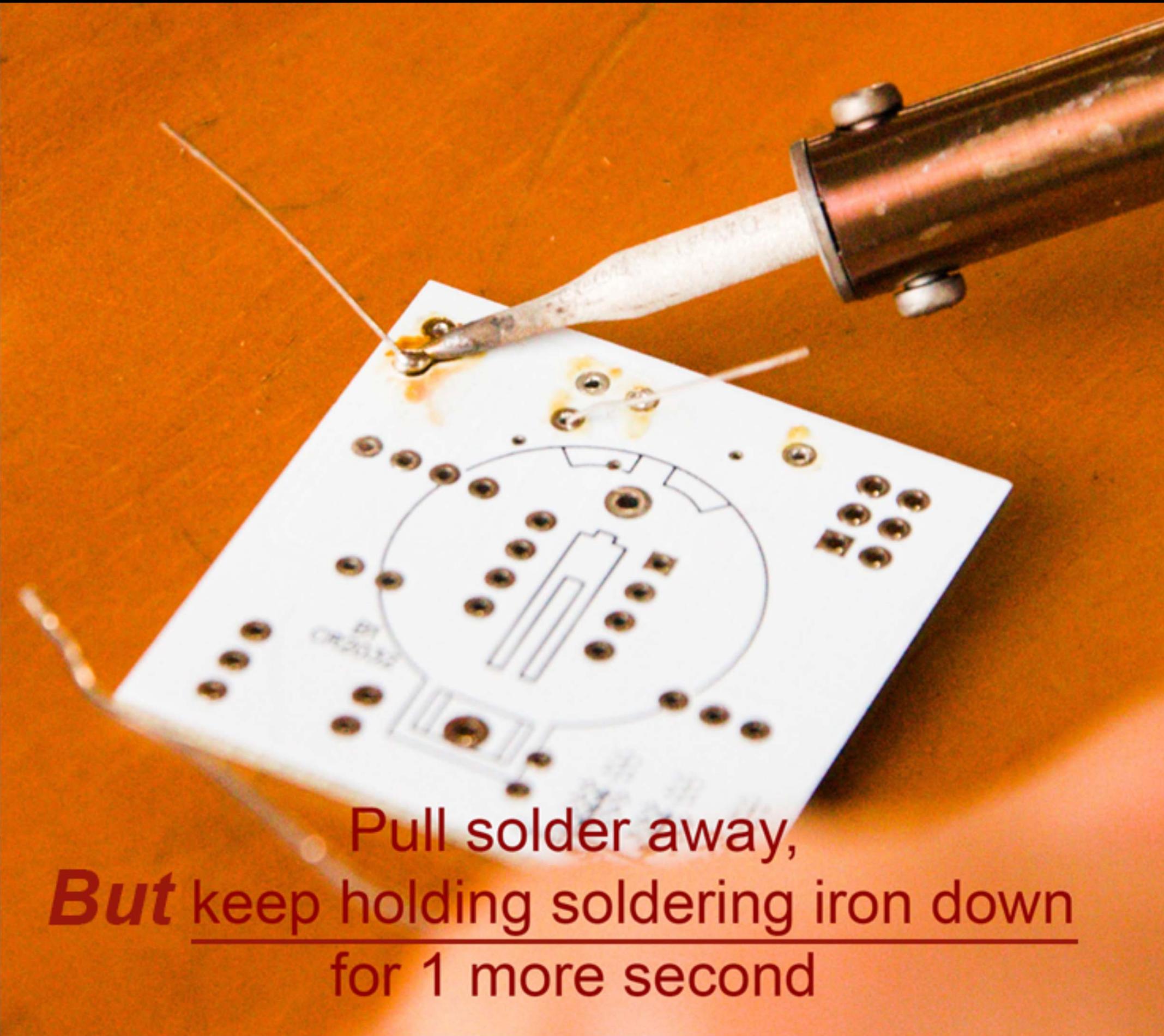


Make sure solder melts on the underside of the soldering iron tip  
(not the side or top of the soldering iron tip)!

Do this quickly (slowly doesn't work well) – solder in & out in about 1 second



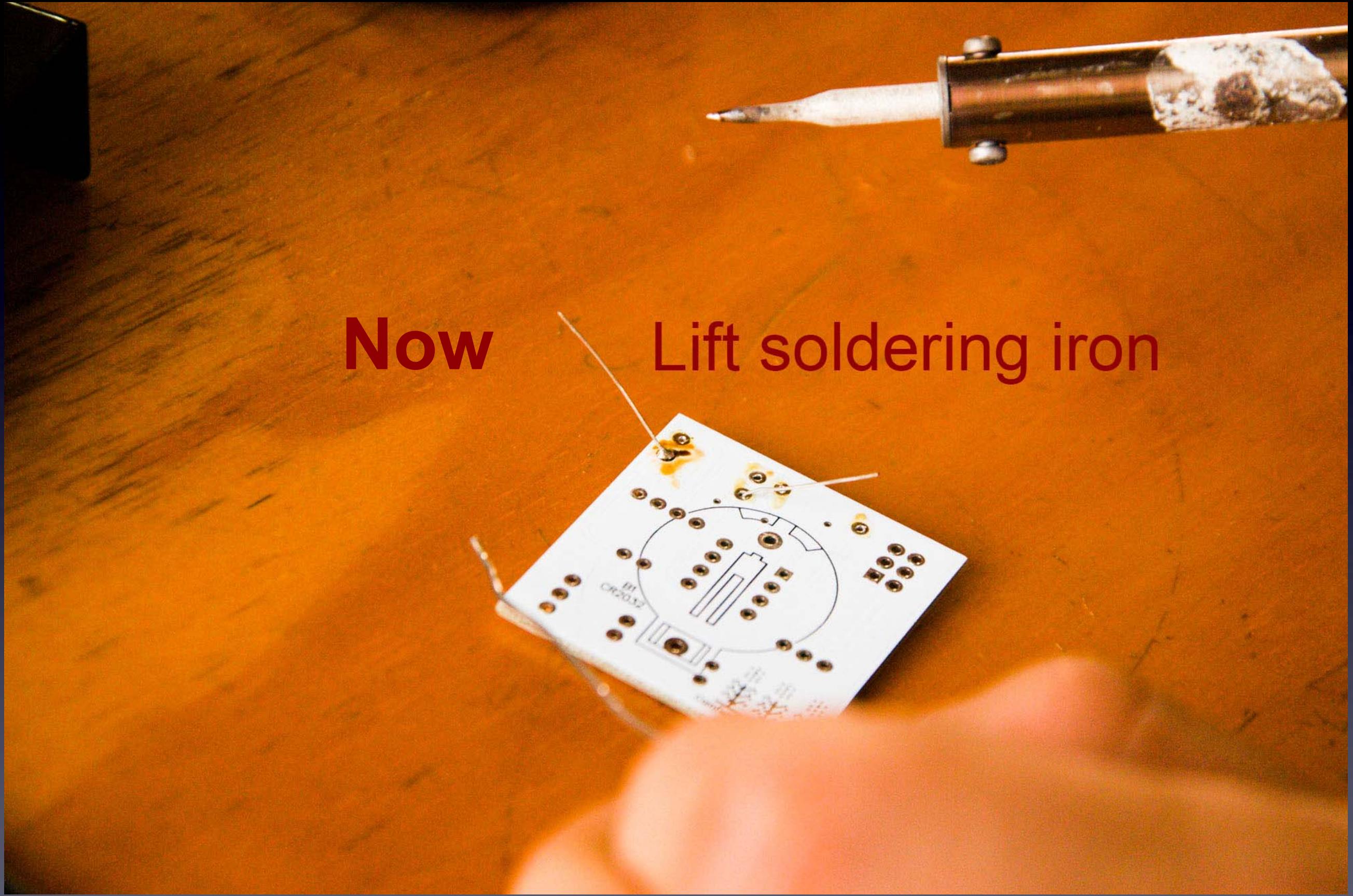
Make sure solder melts on the underside of the soldering iron tip  
(not the side or top of the soldering iron tip)!



Pull solder away,  
**But** keep holding soldering iron down  
for 1 more second

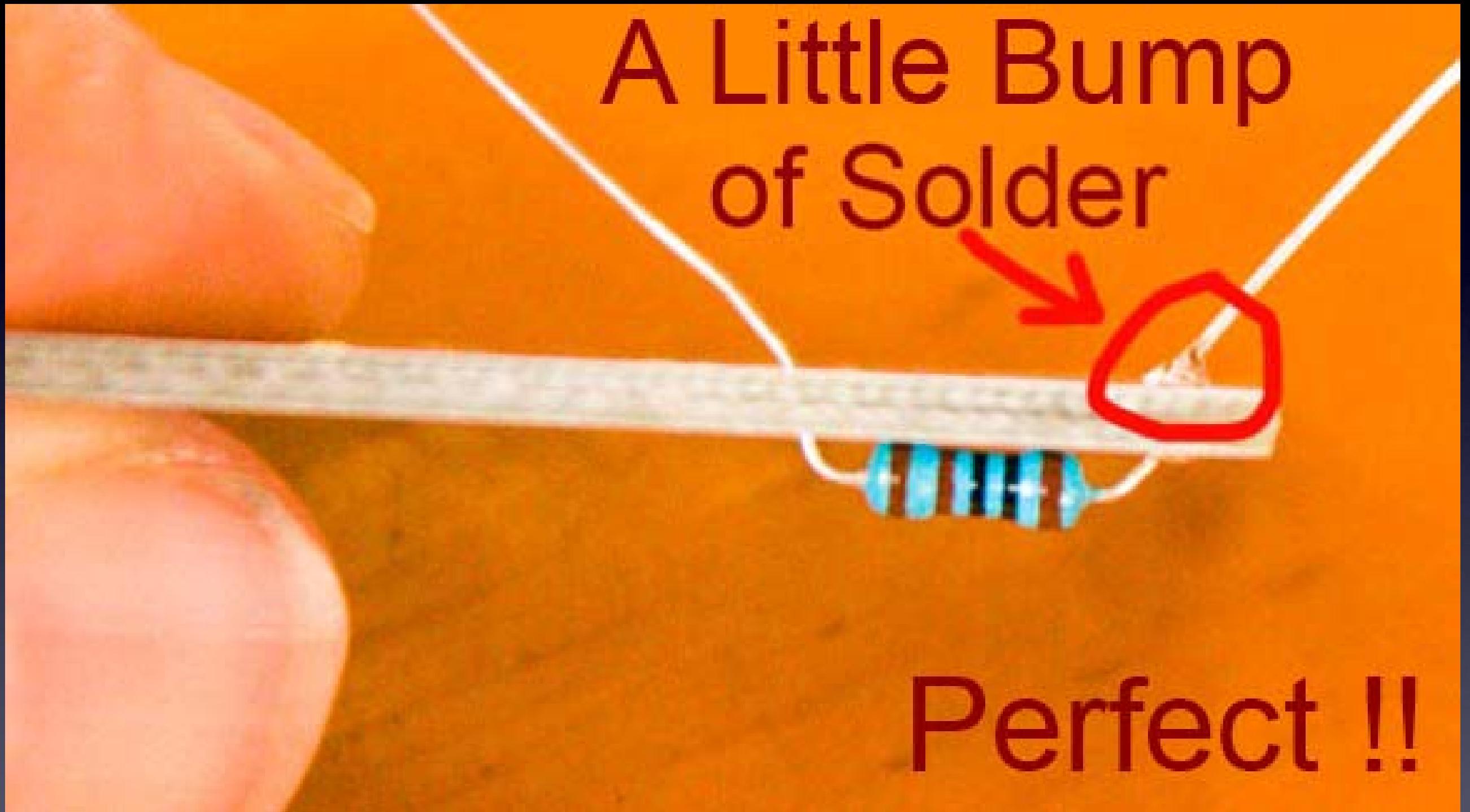
Secret #2:

Keep hot tip down  
1 second  
for solder to flow !!



Now

Lift soldering iron



A Little Bump  
of Solder

Perfect !!

If you can see any of the pad, or the hole, you need more solder – so, just do all the steps again to make it perfect.

The Rhythm !  
and speed (about 1 second per step)



The Rhythm !  
and speed (about 1 second per step)  
**Clean the tip**



The Rhythm !  
and speed (about 1 second per step)



Tip Down

The Rhythm !  
and speed (about 1 second per step)



Solder In

The Rhythm !  
and speed (about 1 second per step)



Solder Out

**The Rhythm !**  
and speed (about 1 second per step)



***WAIT !***

The Rhythm !  
and speed (about 1 second per step)



Lift Tip

The Rhythm !  
and speed (about 1 second per step)



The Rhythm !  
and speed (about 1 second per step)  
**Clean the tip**



The Rhythm !  
and speed (about 1 second per step)



Tip Down

The Rhythm !  
and speed (about 1 second per step)



Solder In

The Rhythm !  
and speed (about 1 second per step)



Solder Out

**The Rhythm !**  
and speed (about 1 second per step)



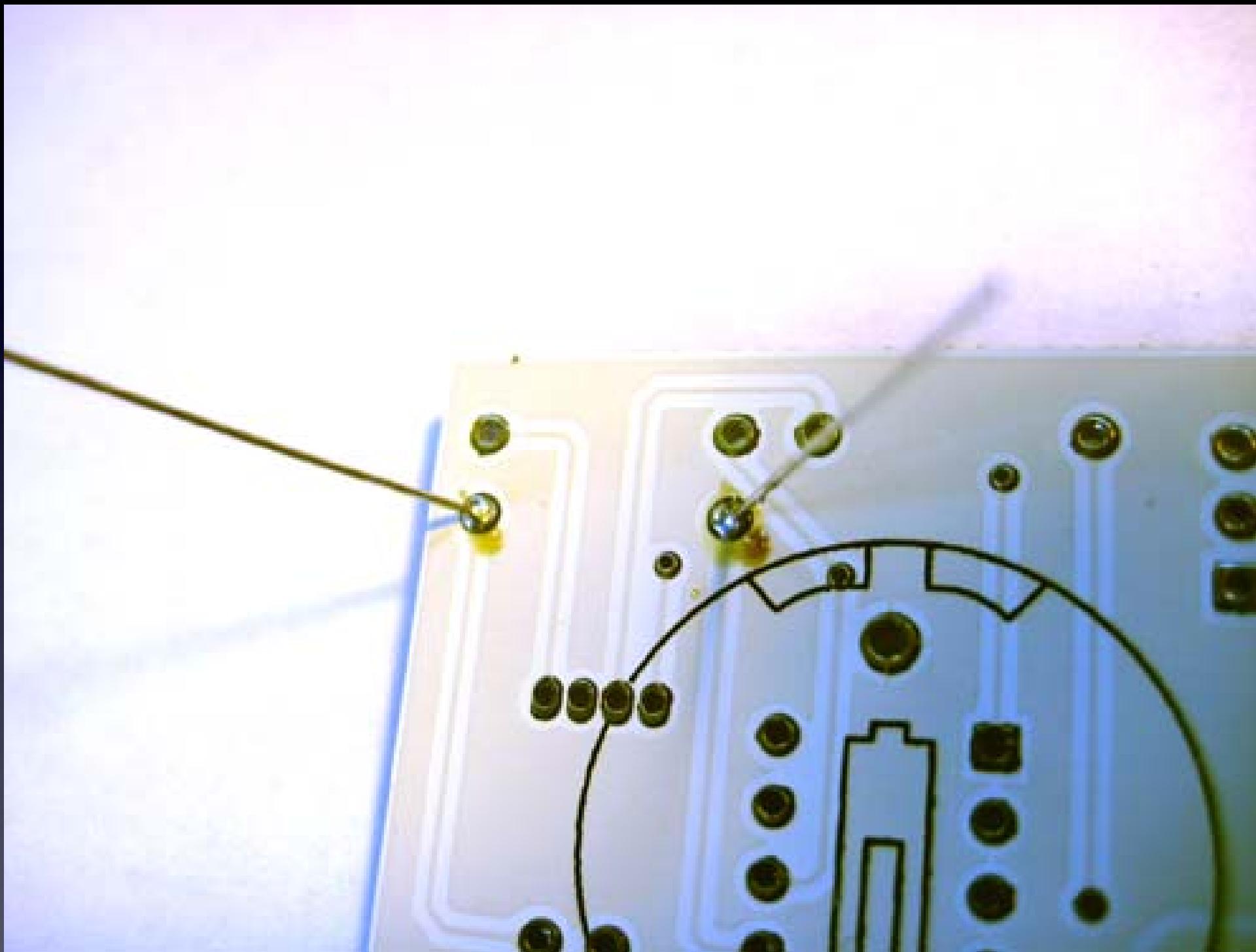
***WAIT !***

The Rhythm !  
and speed (about 1 second per step)



Lift Tip

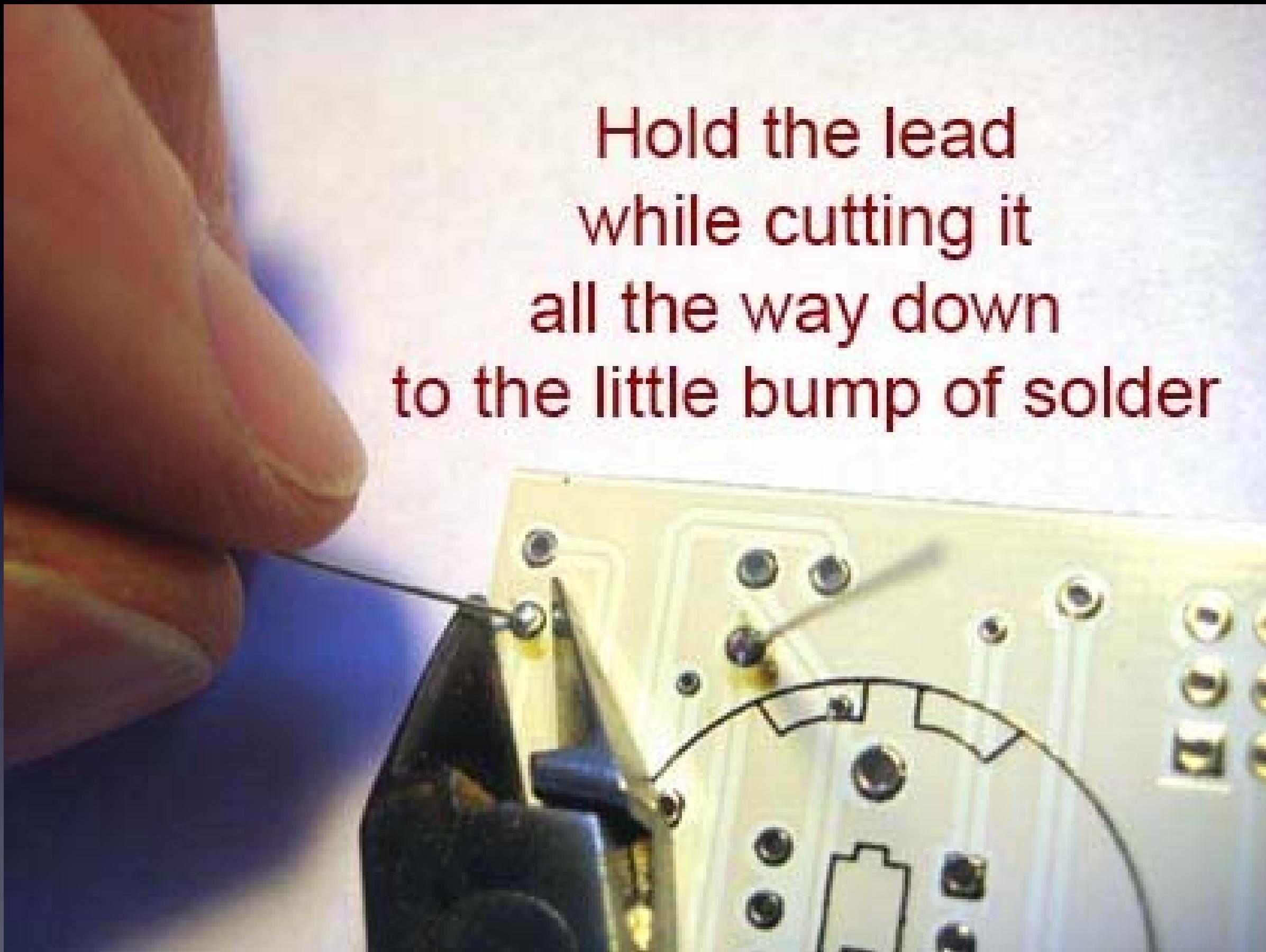
Solder all of the leads of the part to the board



For this part, there are two leads  
Here you can see two good solder connections

Now cut the leads short

Hold the lead  
while cutting it  
all the way down  
to the little bump of solder



Cutting with the tip of the wire cutter gives you more control

# Safety Tip #3:

Hold or cover the lead !

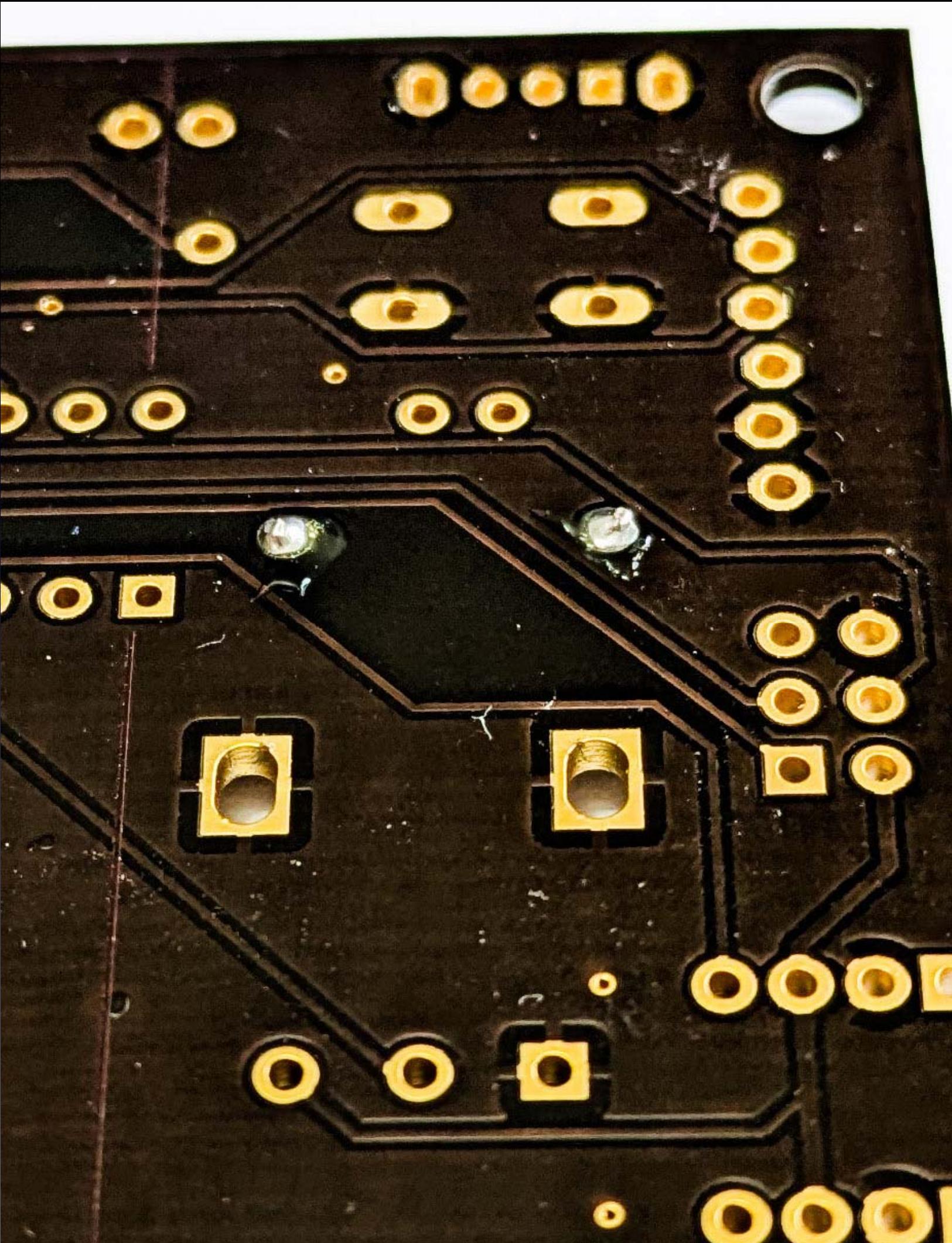
(or it will fly into your eye!)

*(They like doing that – so please hold or cover the lead when you cut.)*



All done !

No wires sticking out



# R1 soldered to the board

Notice that:

- each connection is a small bump (not flat)
- you cannot see any pad (it's totally covered with solder)
- you cannot see the hole (it's totally covered with solder)

One part at a time

Till all the parts are soldered



And it will look like this when you're done.

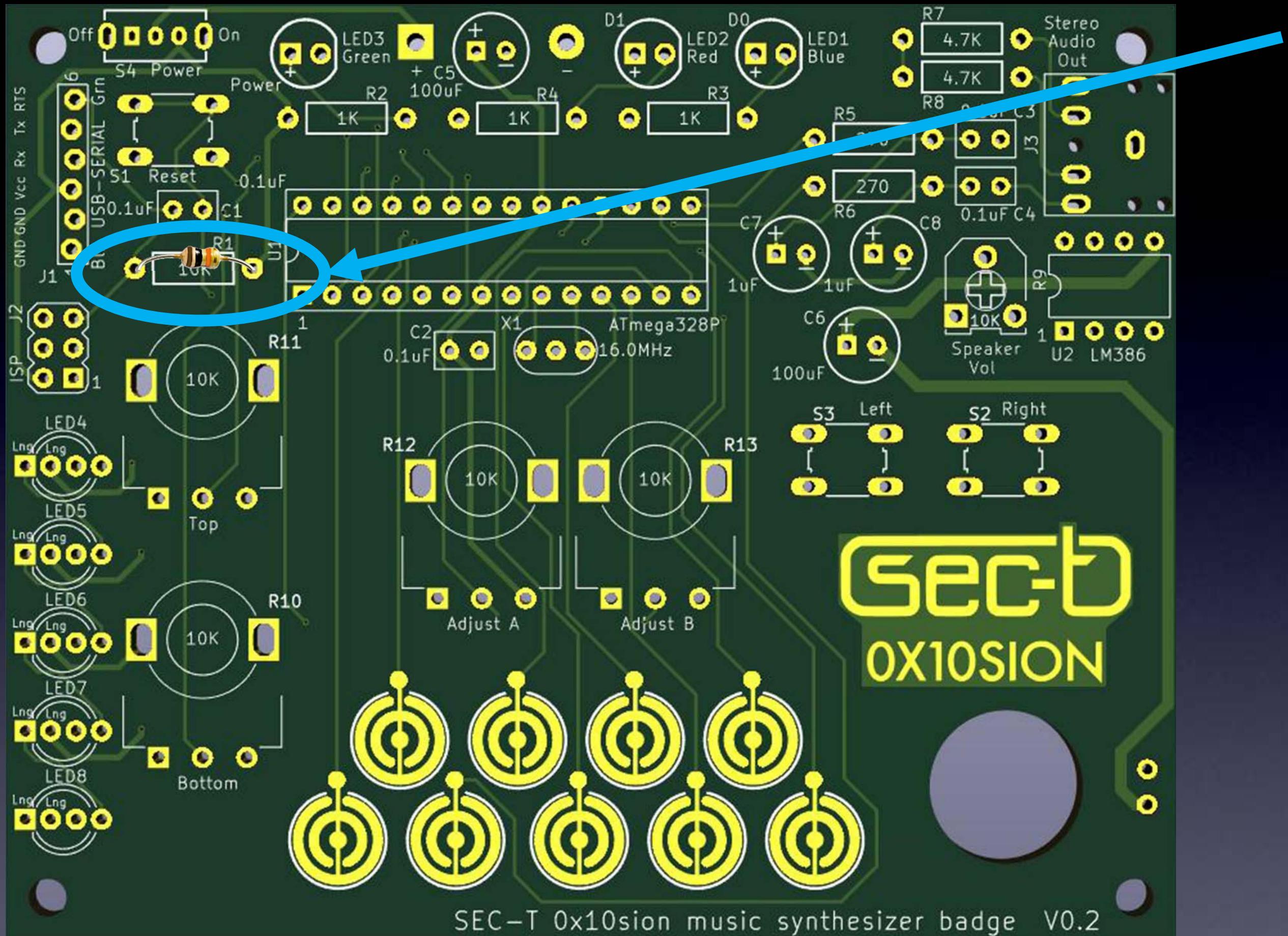
Then put in the batteries,

Turn it on,

And it works!

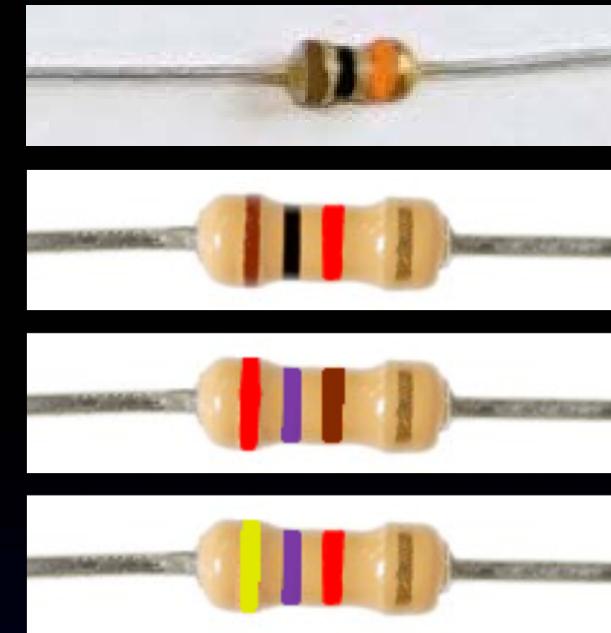
(Or you start debugging.)

Let's start!

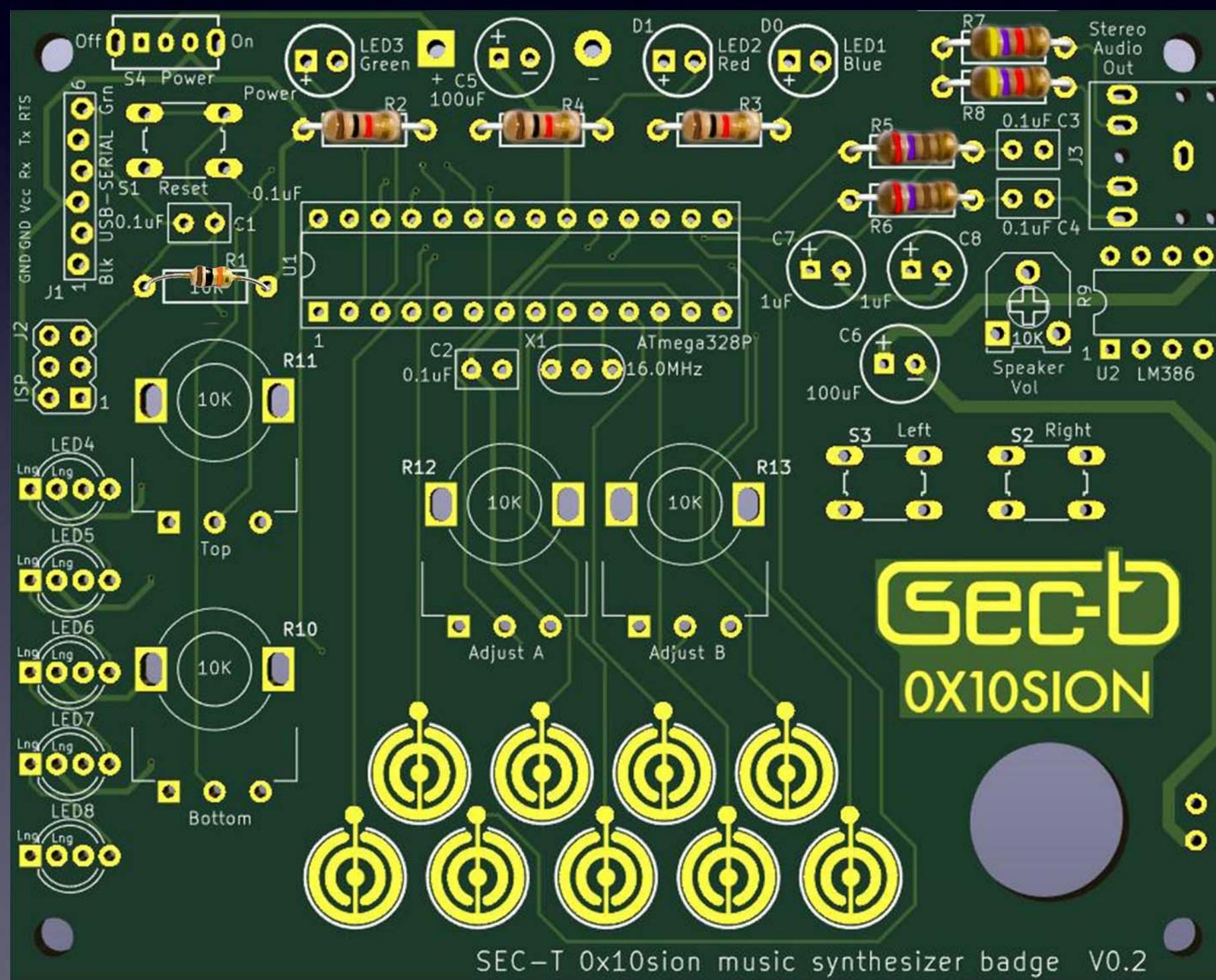


If you haven't done so already, solder R1: brown, black, orange

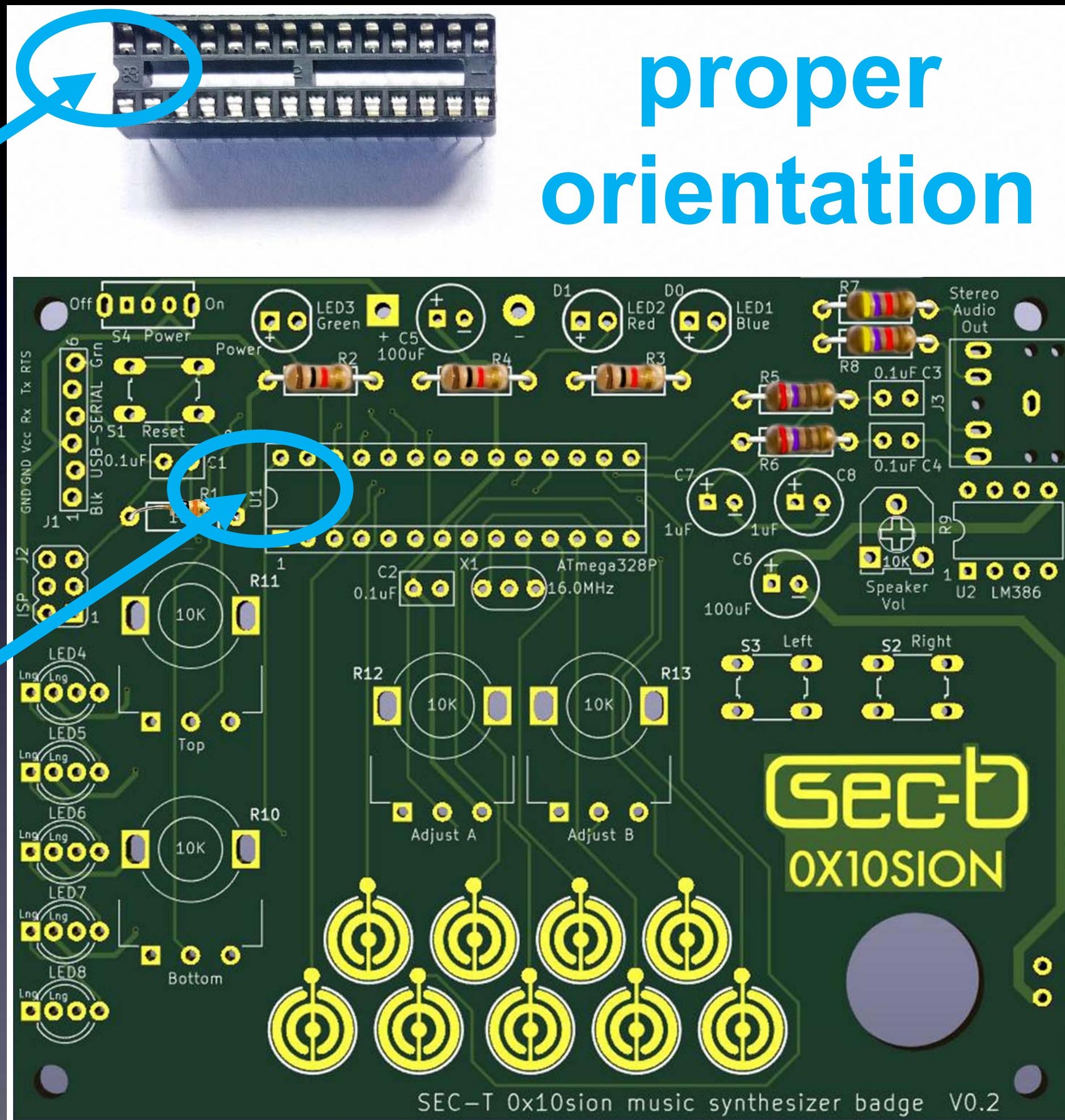
R1:  
R2, R3, R4:  
R5, R6:  
R7, R8:



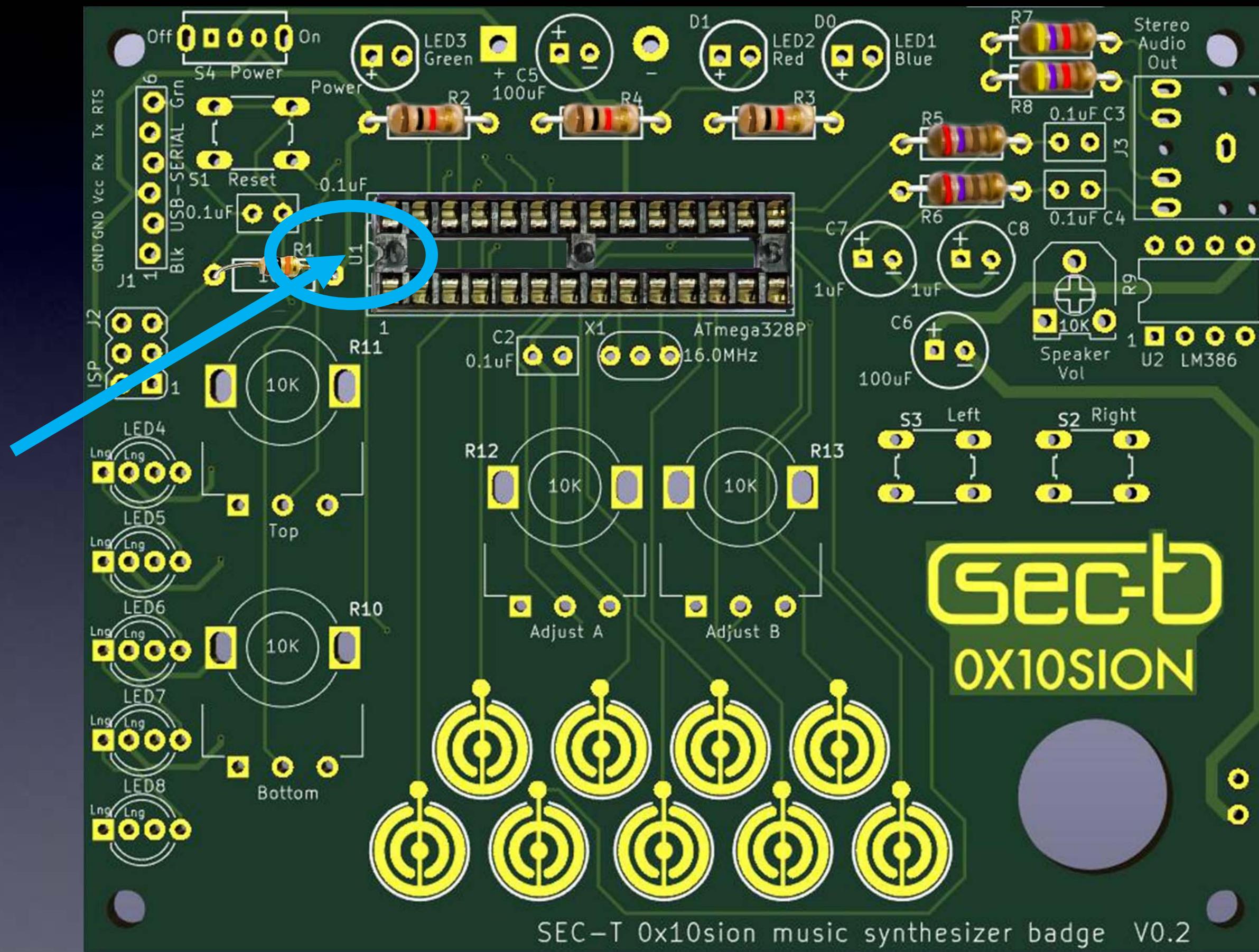
10K: Brown, Black, Orange  
1K: Brown, Black, Red  
270: Red, Violet, Brown  
4.7K: Yellow, Violet, Red



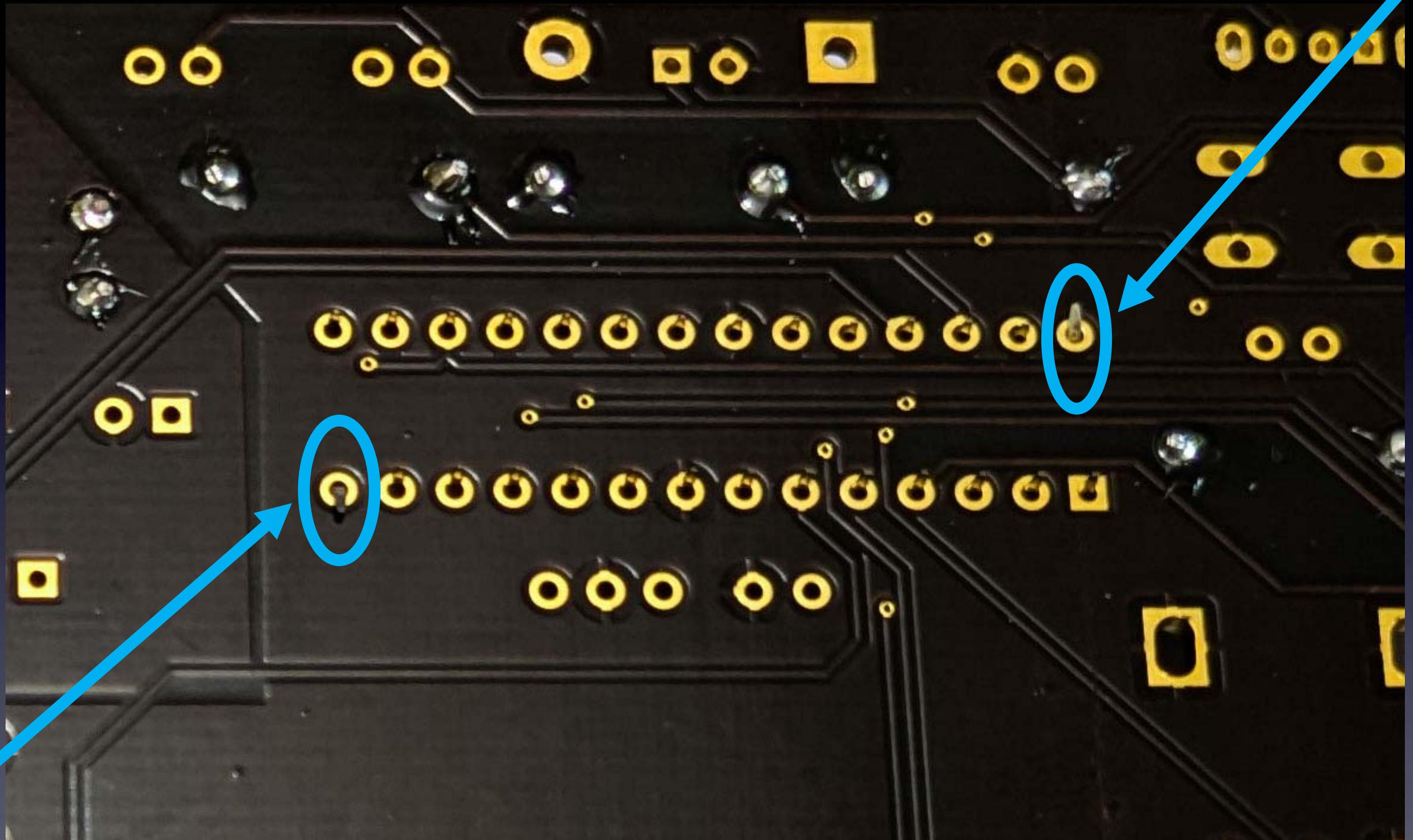
# U1: microcontroller socket



# U1: microcontroller socket: inserted correctly

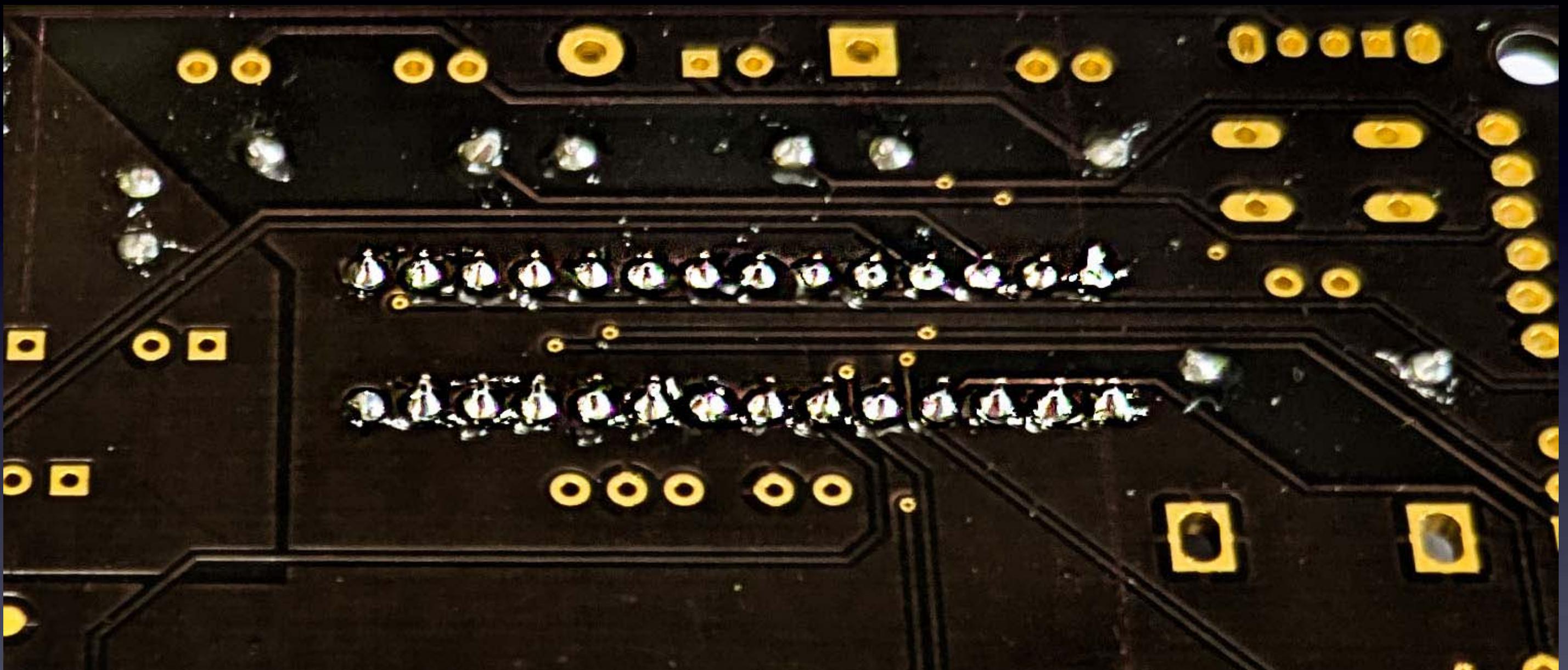


# U1: microcontroller socket



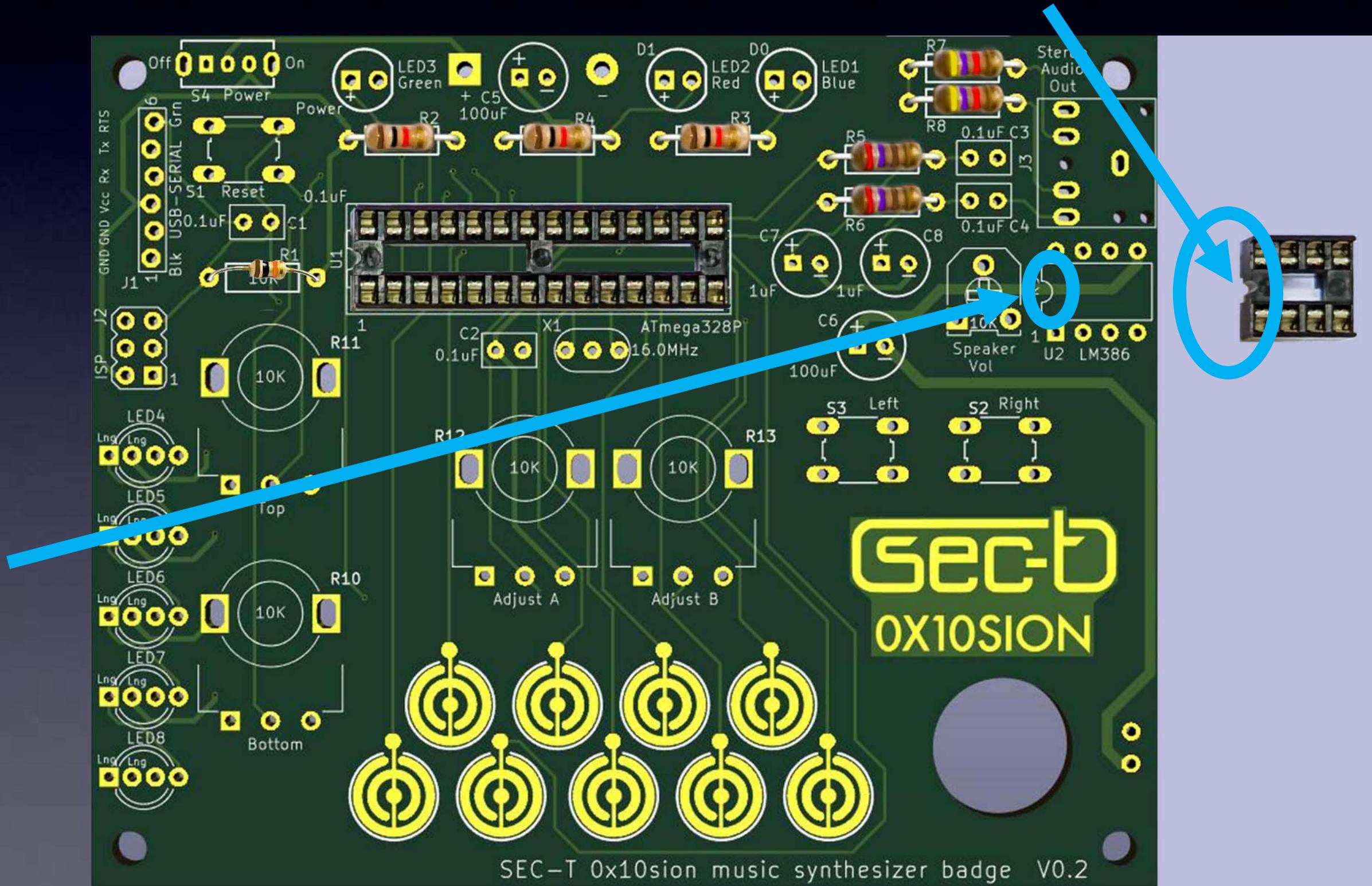
bend pins down on two corners,  
and solder all 28 leads to the board

# U1: microcontroller socket

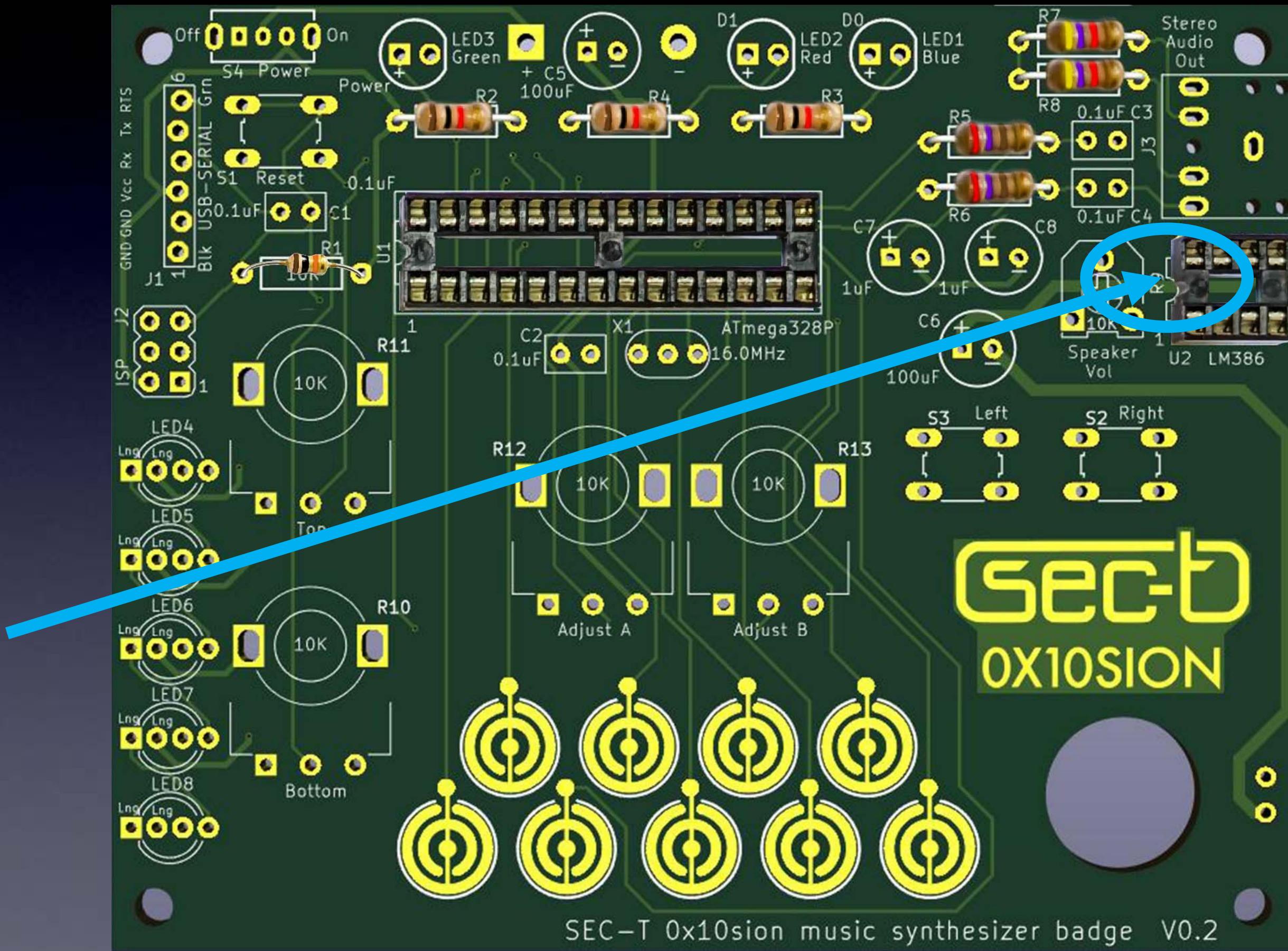


All 28 leads soldered to the board:  
→ Notice that each pad is totally covered with solder. ←

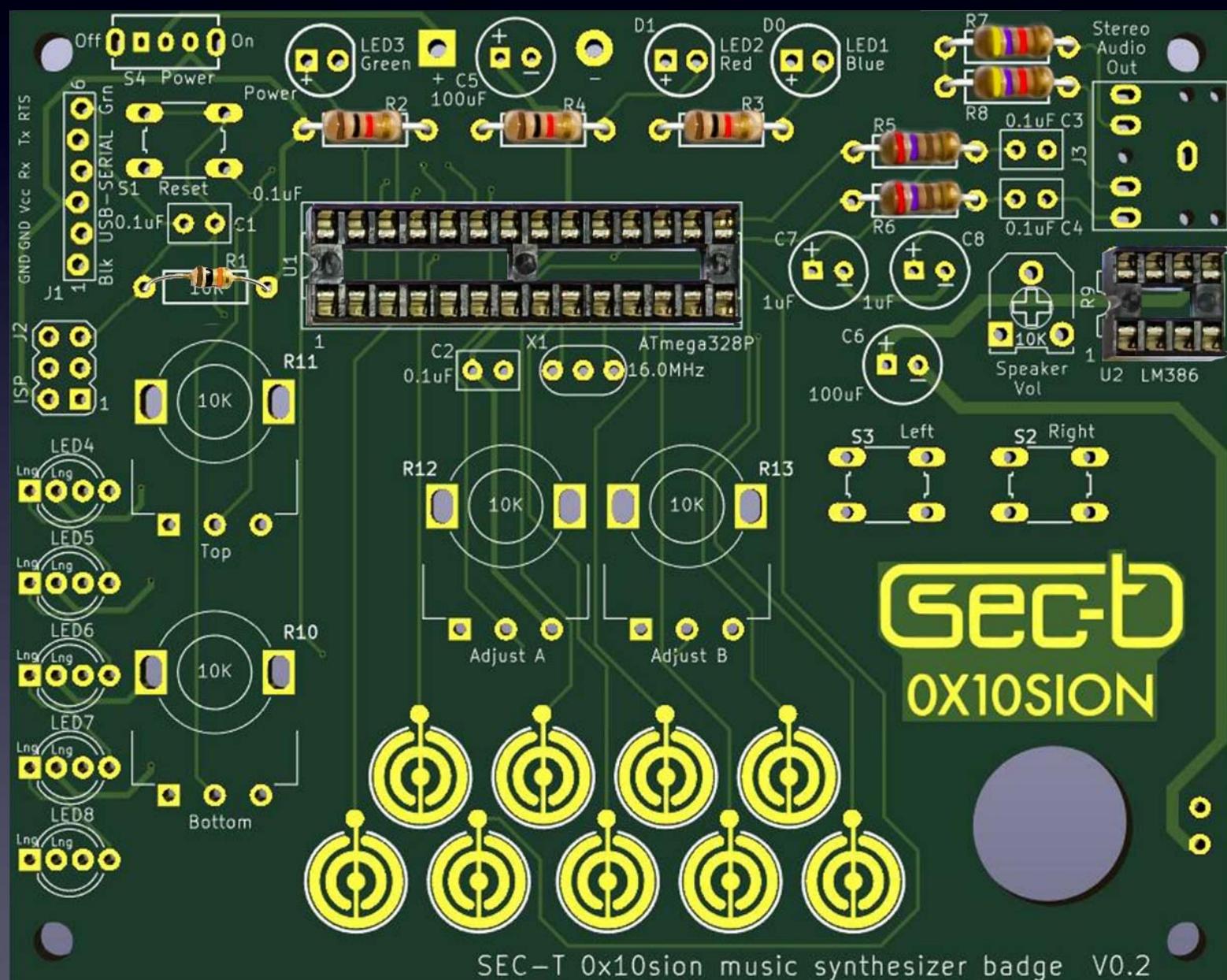
# U2: amplifier chip socket proper orientation



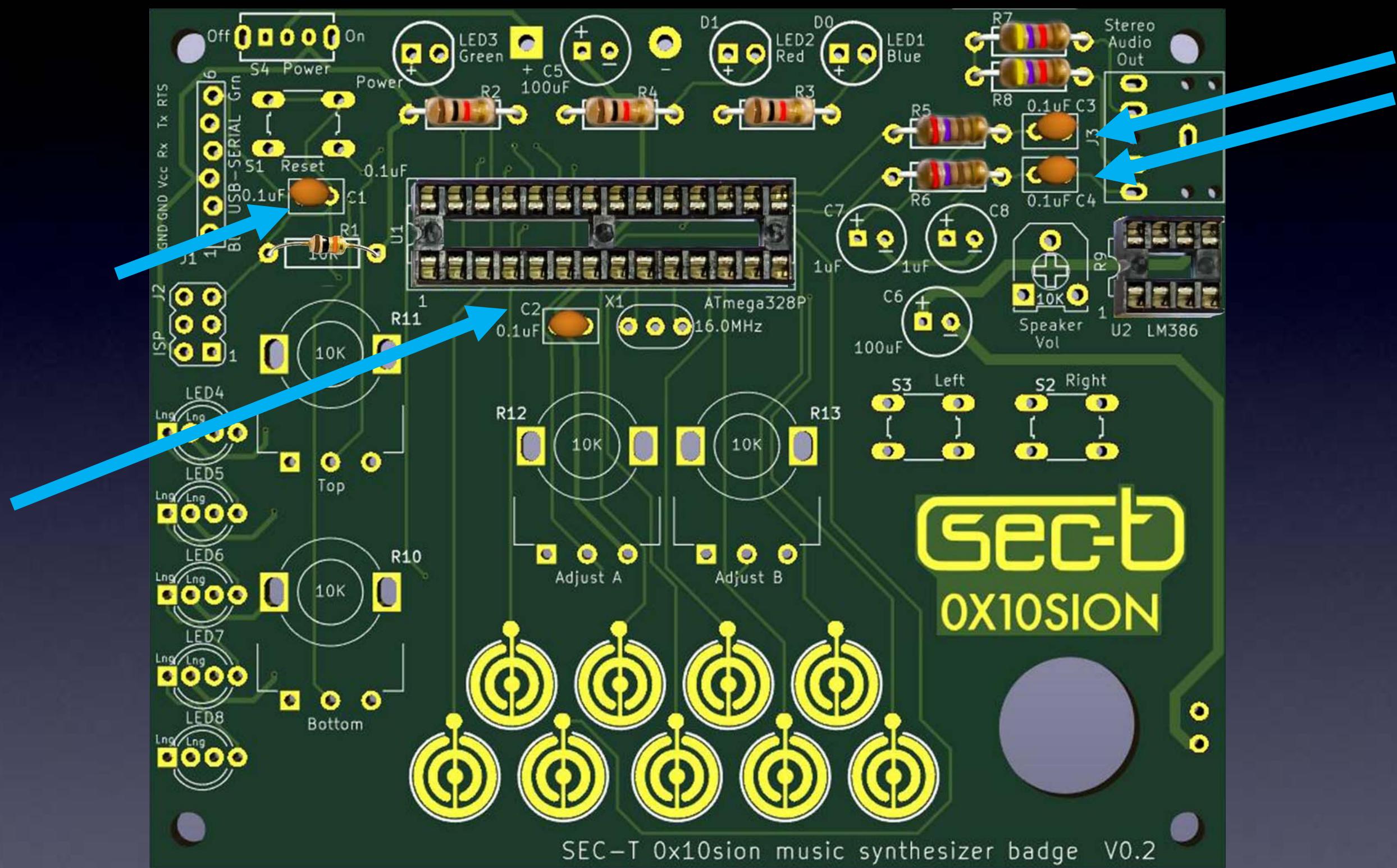
# U2: amplifier chip socket inserted correctly



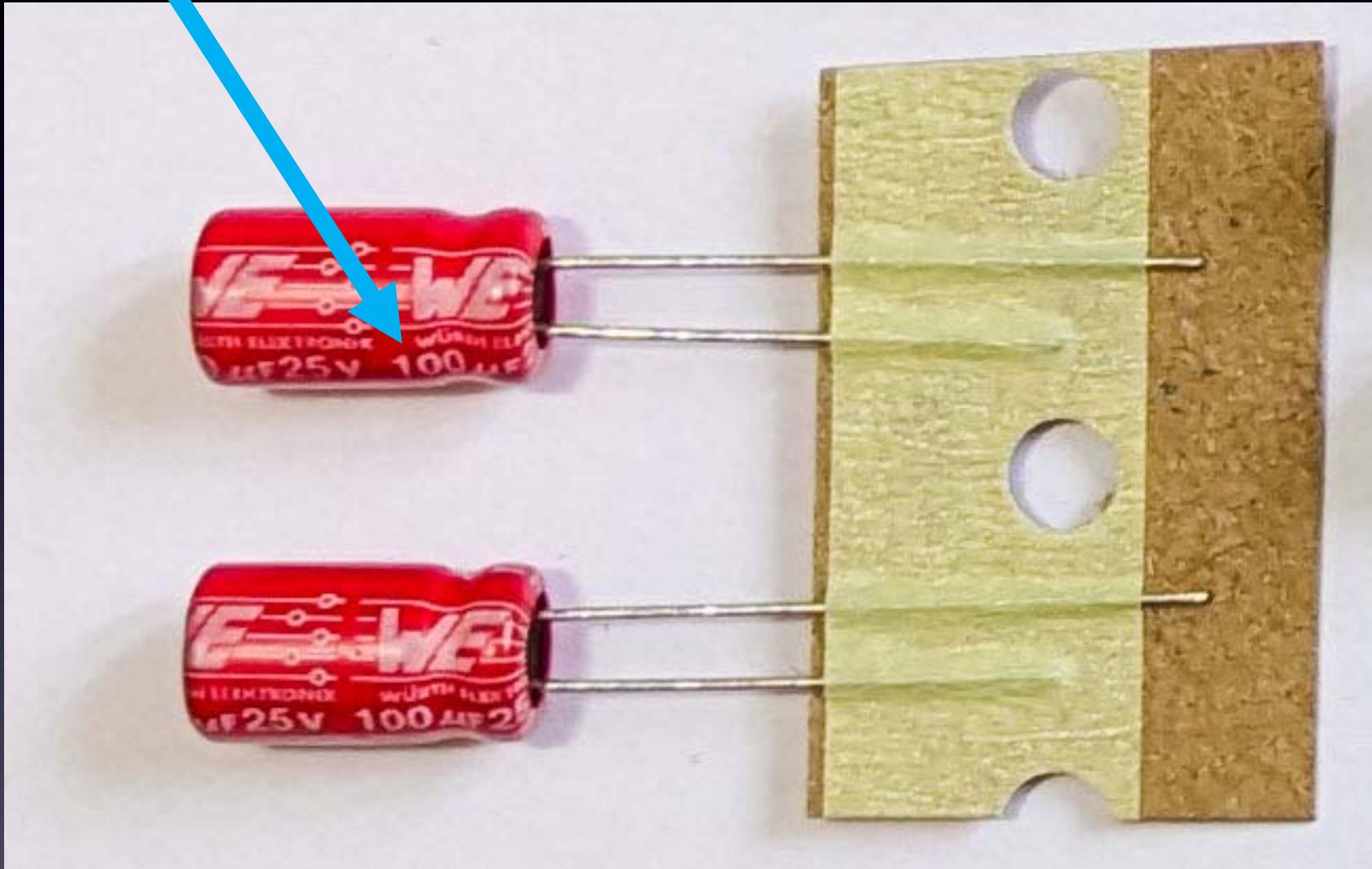
# U2: amplifier chip socket



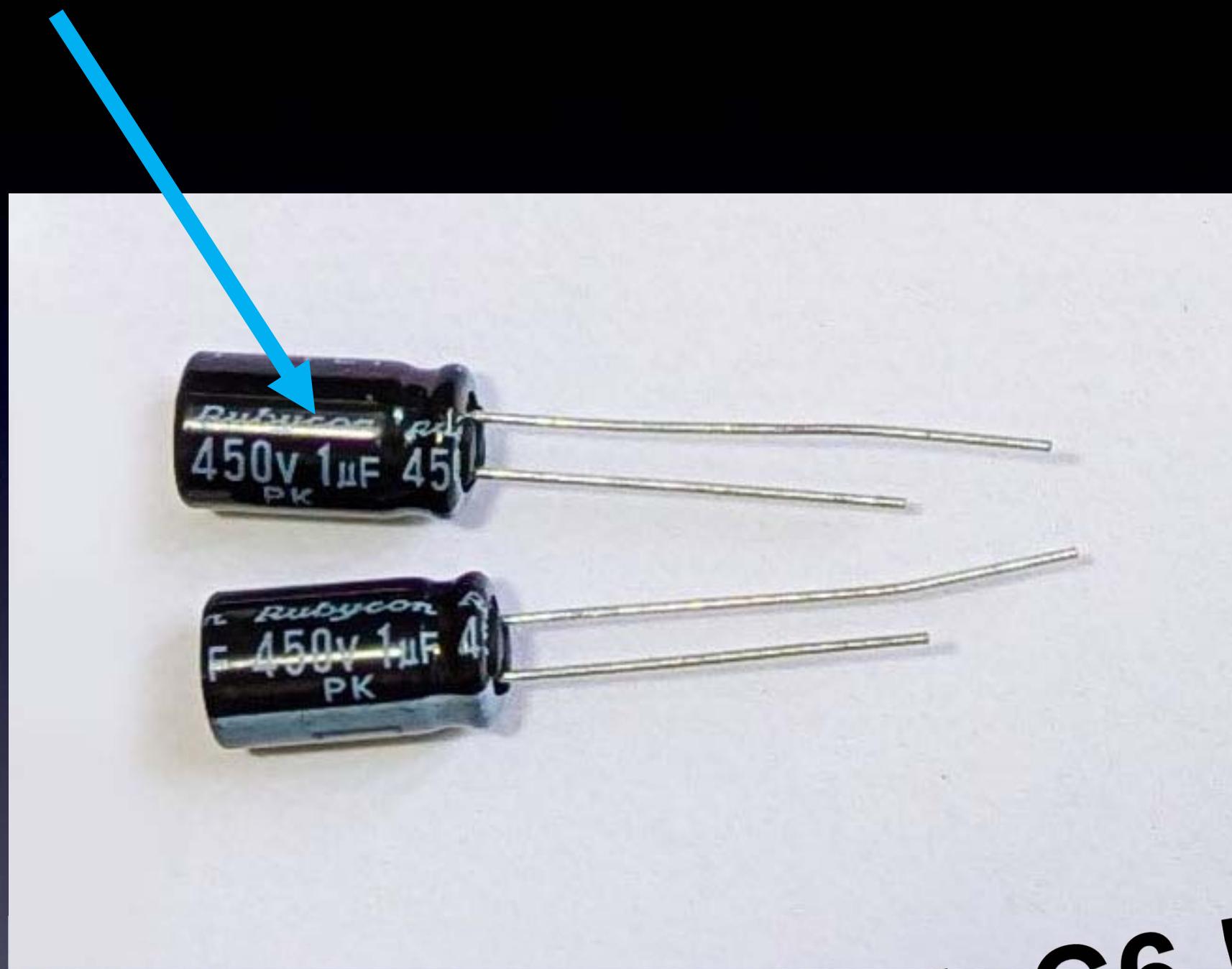
bend pins down on two corners,  
and solder all 8 leads to the board



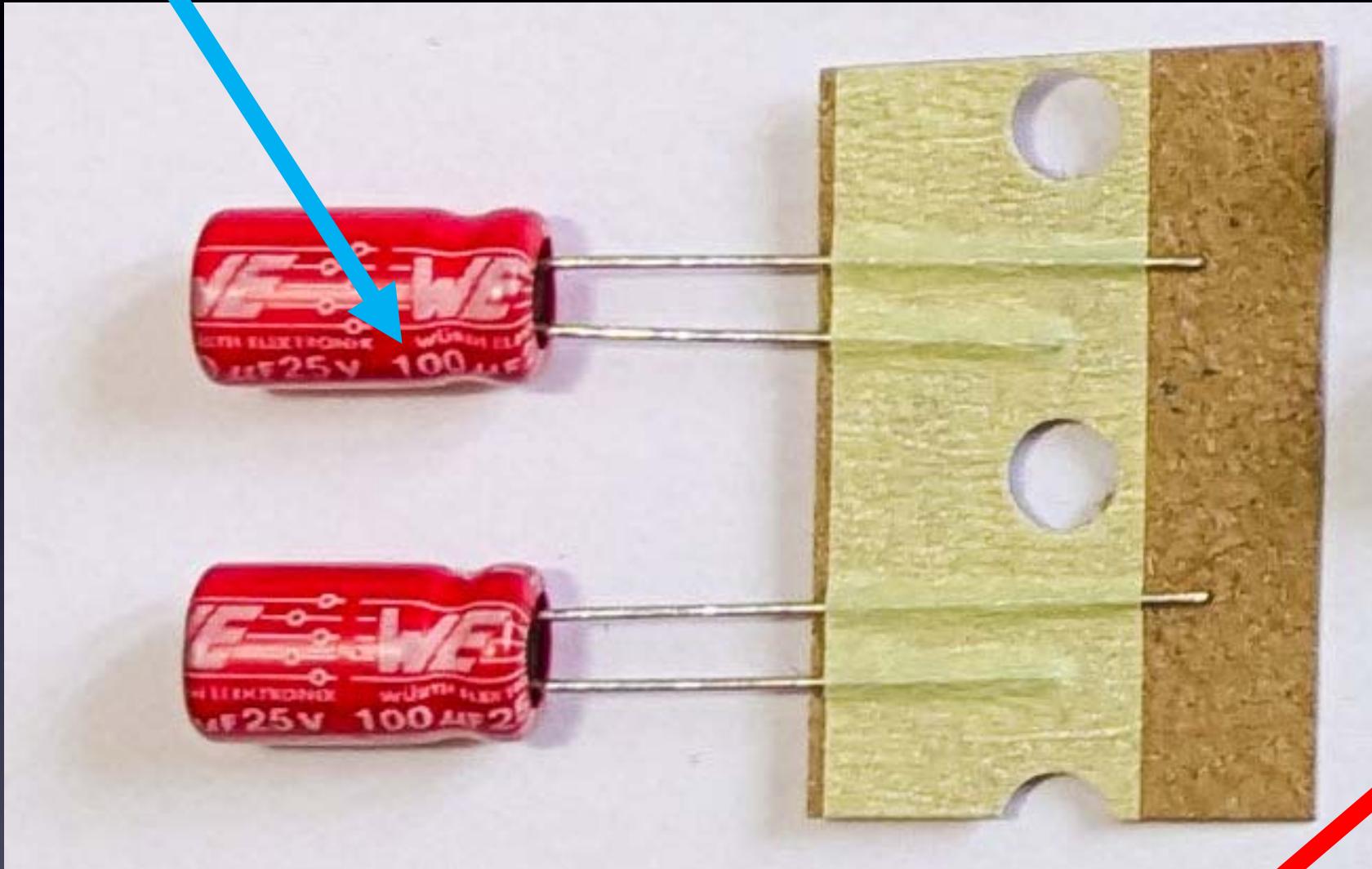
C1, C2, C3, C4



C5, C6: 100uF



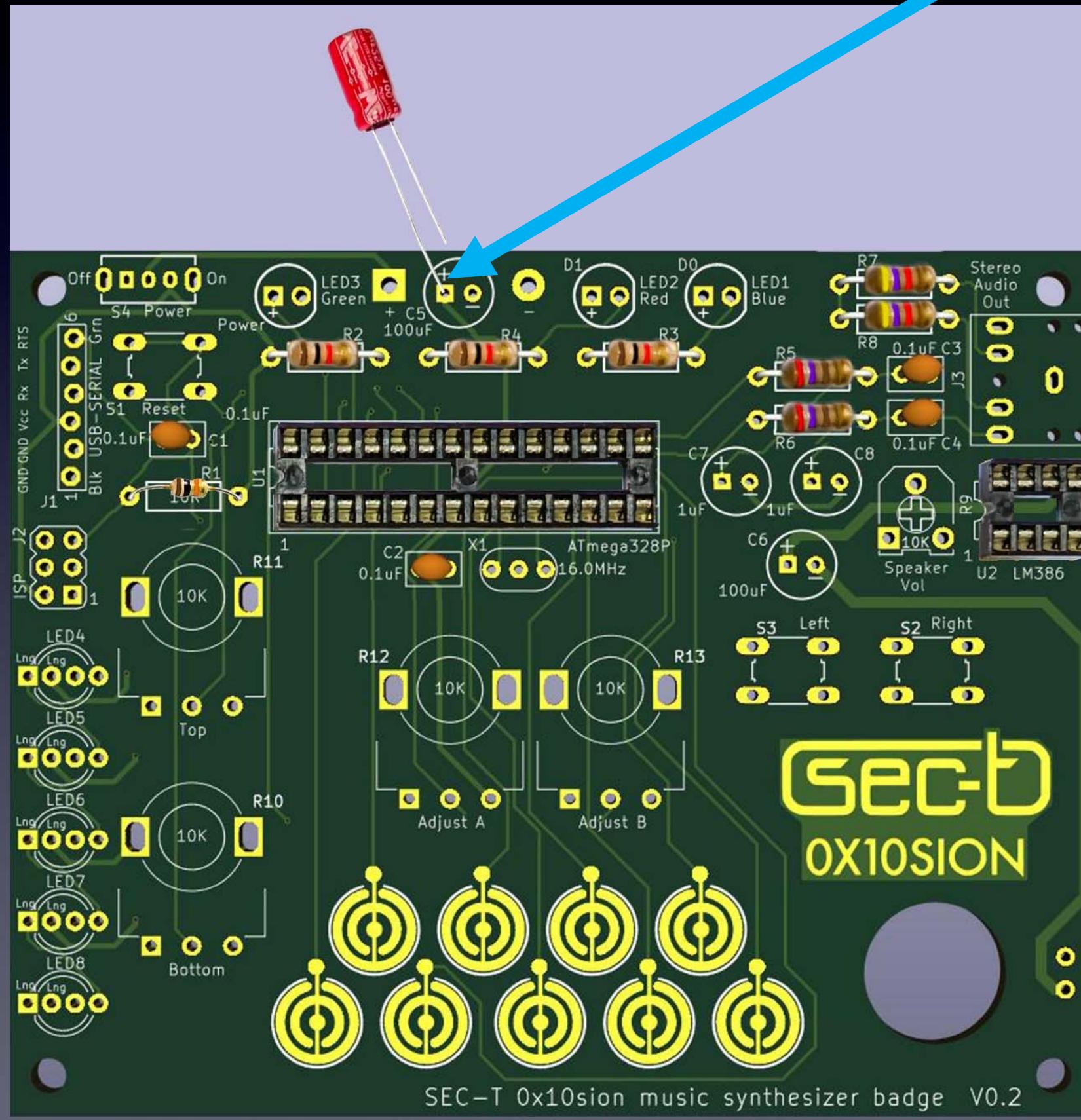
Different than C5, C6 !  
**C7, C8: 1uF**

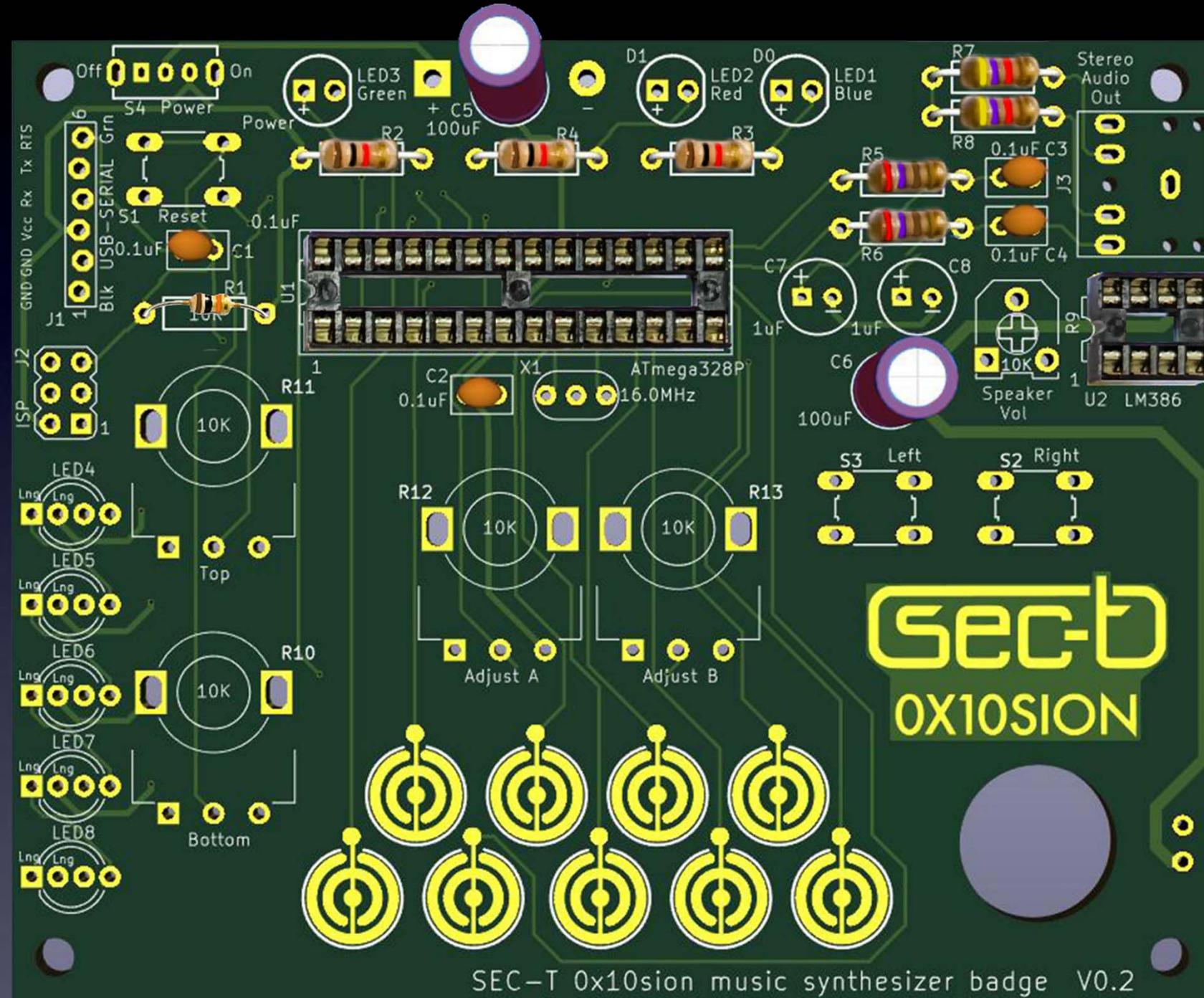


C5, C6: 100uF

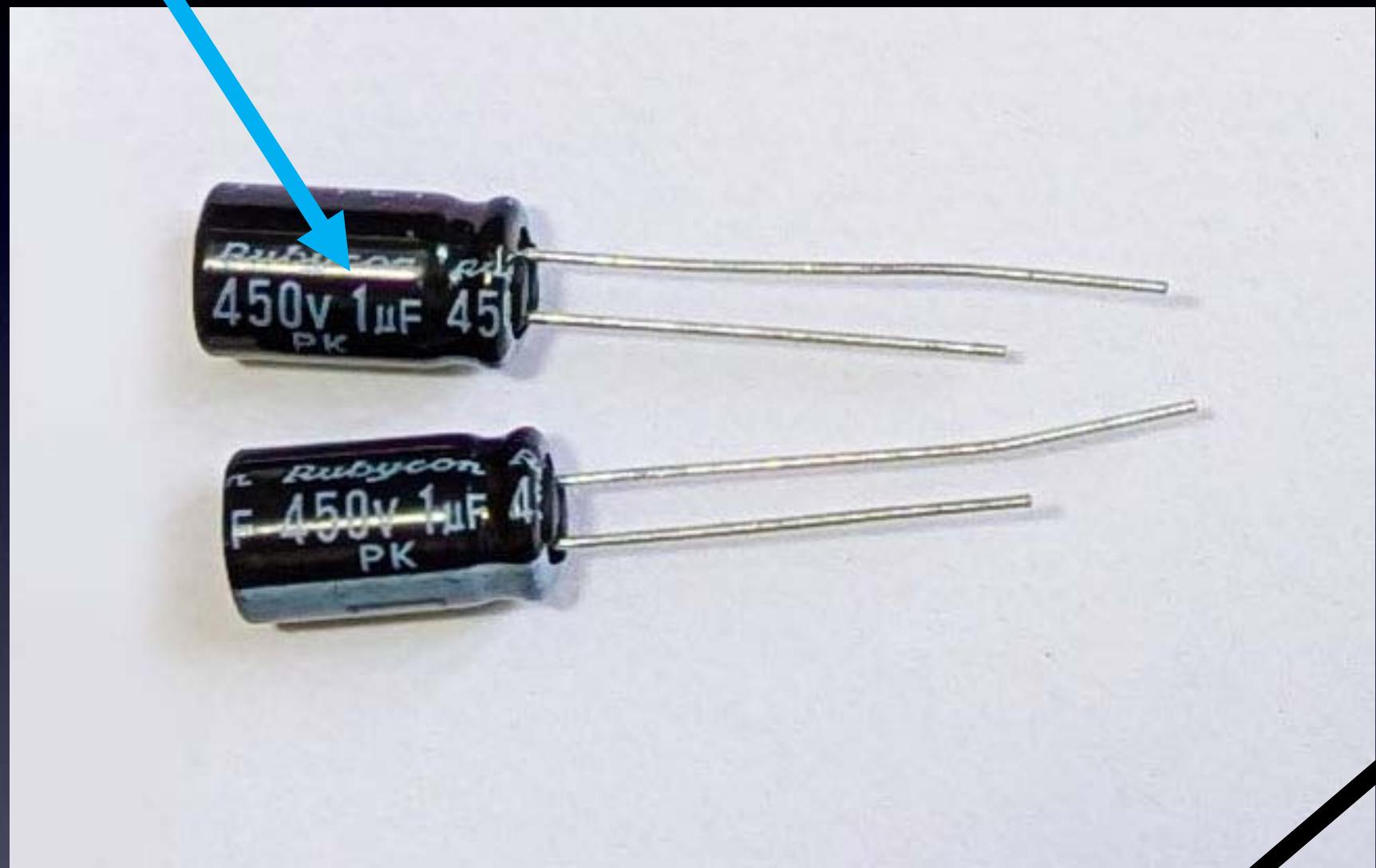
C5, C6:  
Long Lead “+”

Use 100uF !!



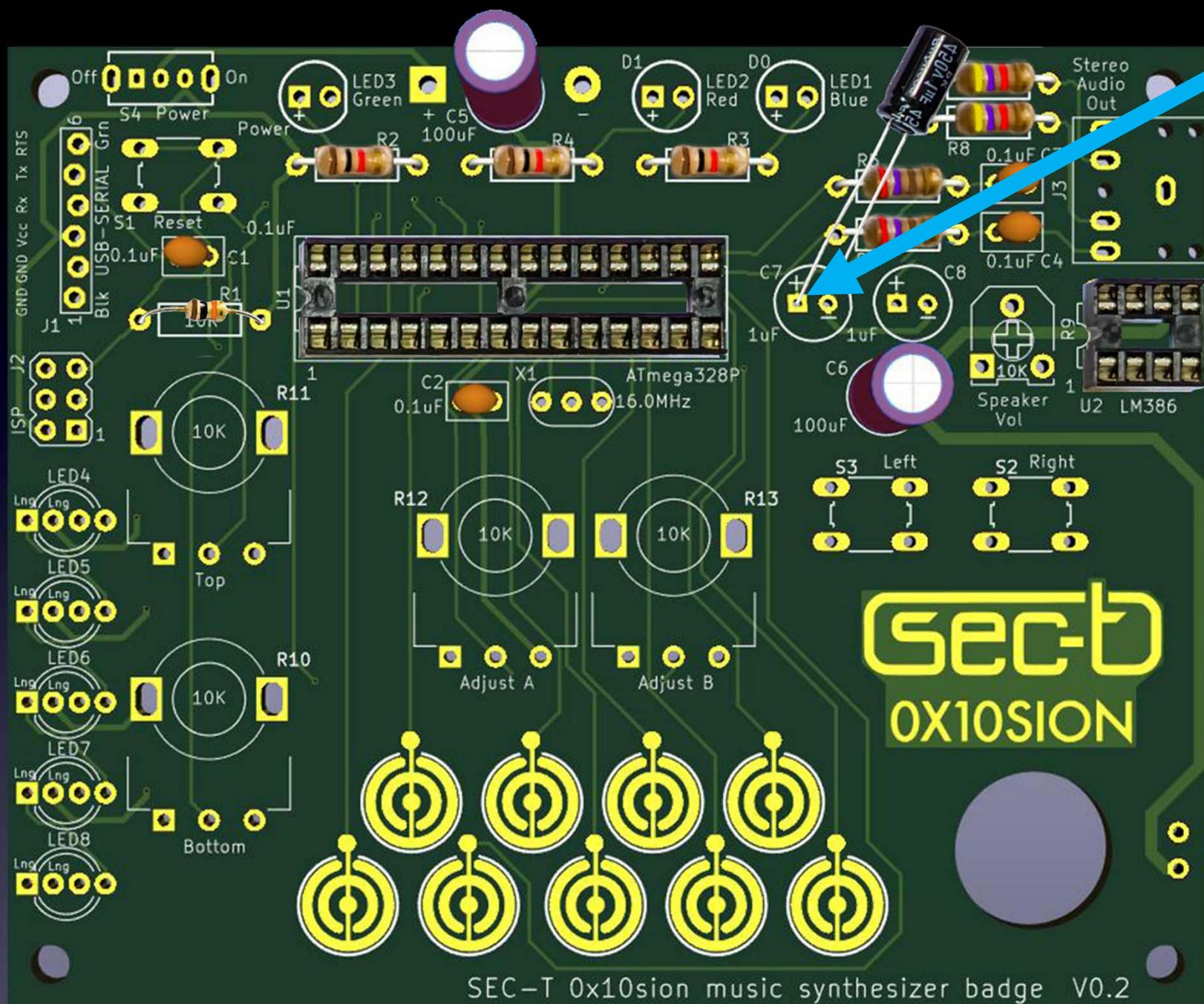


C5, C6: 100uF – soldered to board

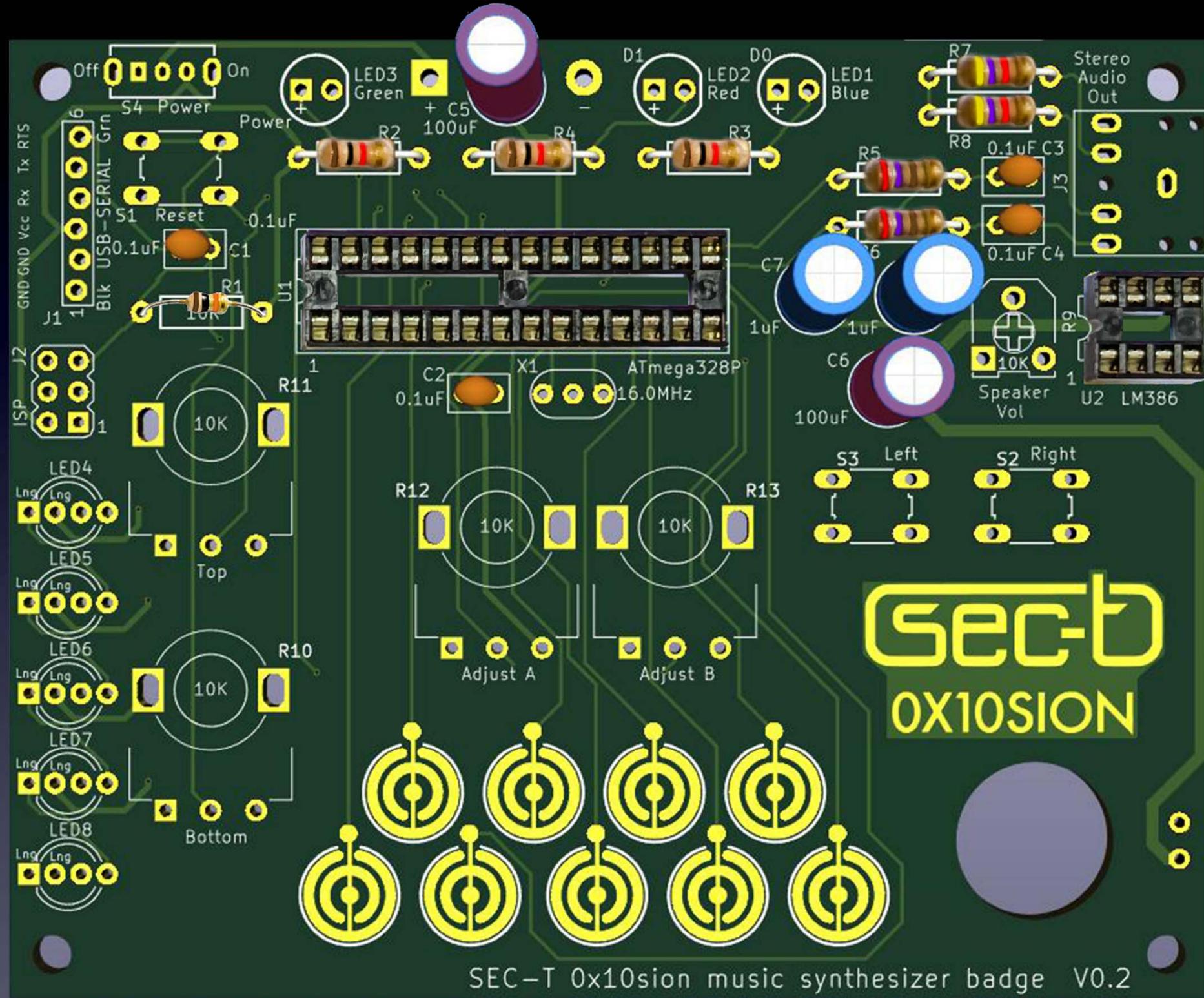


C7, C8: 1uF

C7, C8:  
Long Lead “+”

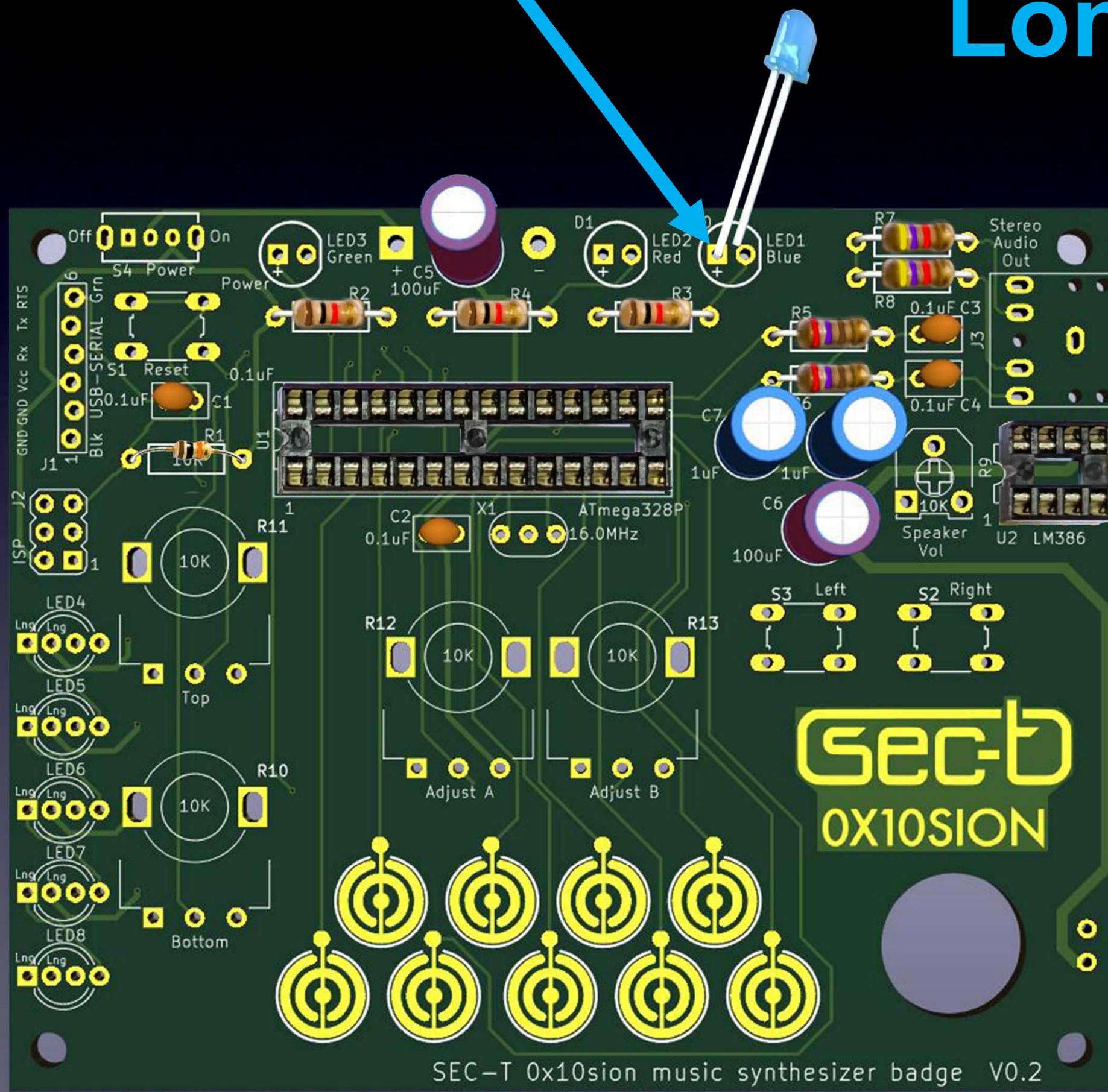


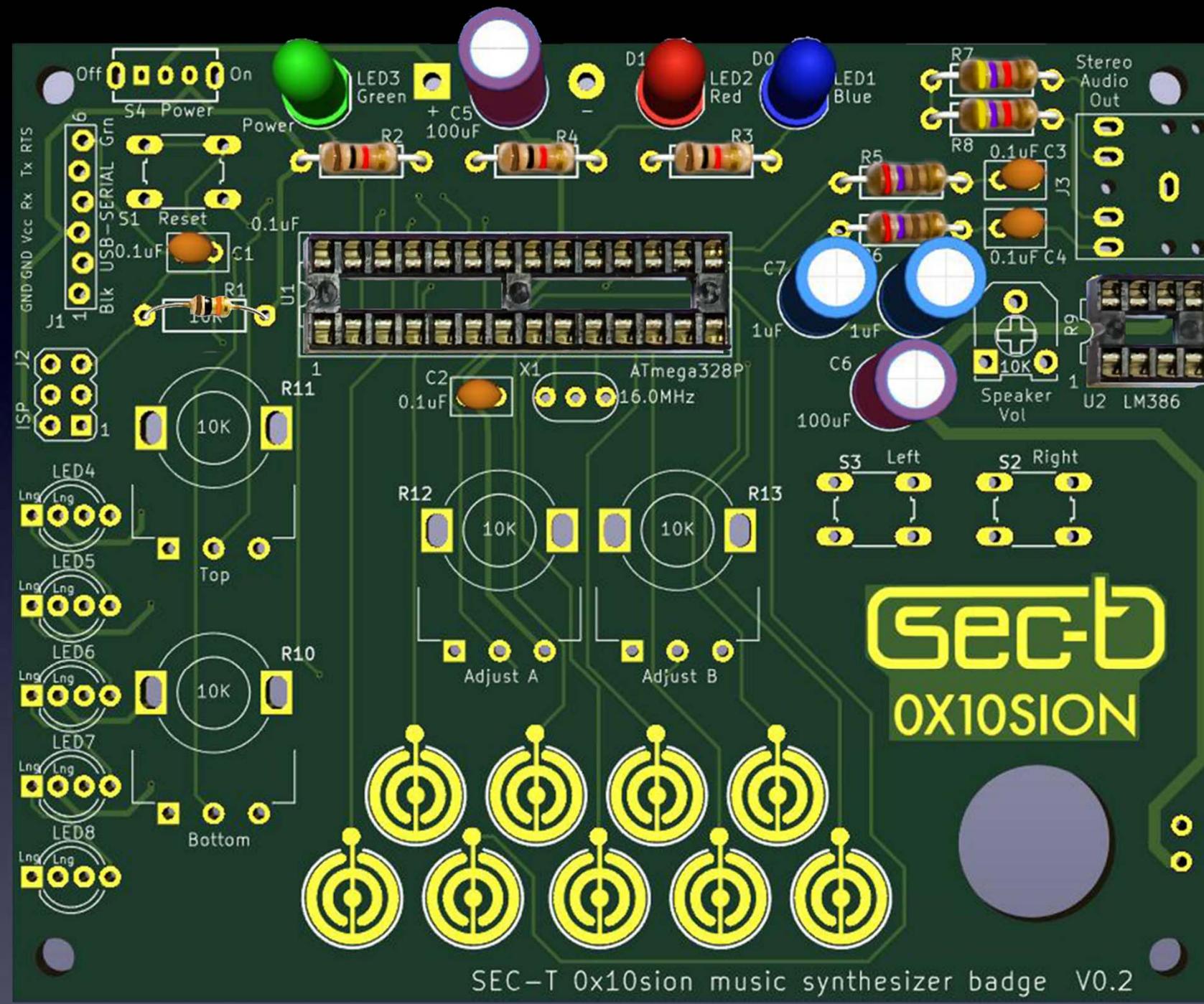
Use 1uF !!



C7, C8: 1uF – soldered to board

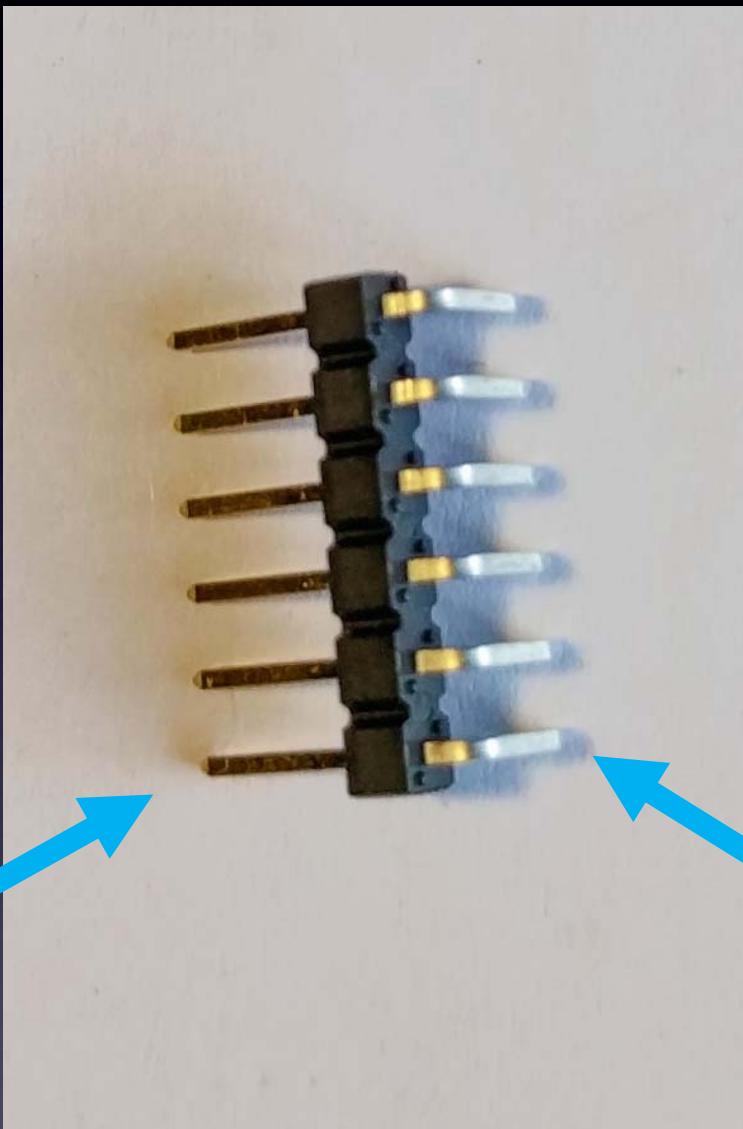
# LED1, LED2, LED3: Long Lead “+”





**LED3, LED2, LED1**

**Green, Red, Blue – soldered to board**



long leads

short leads

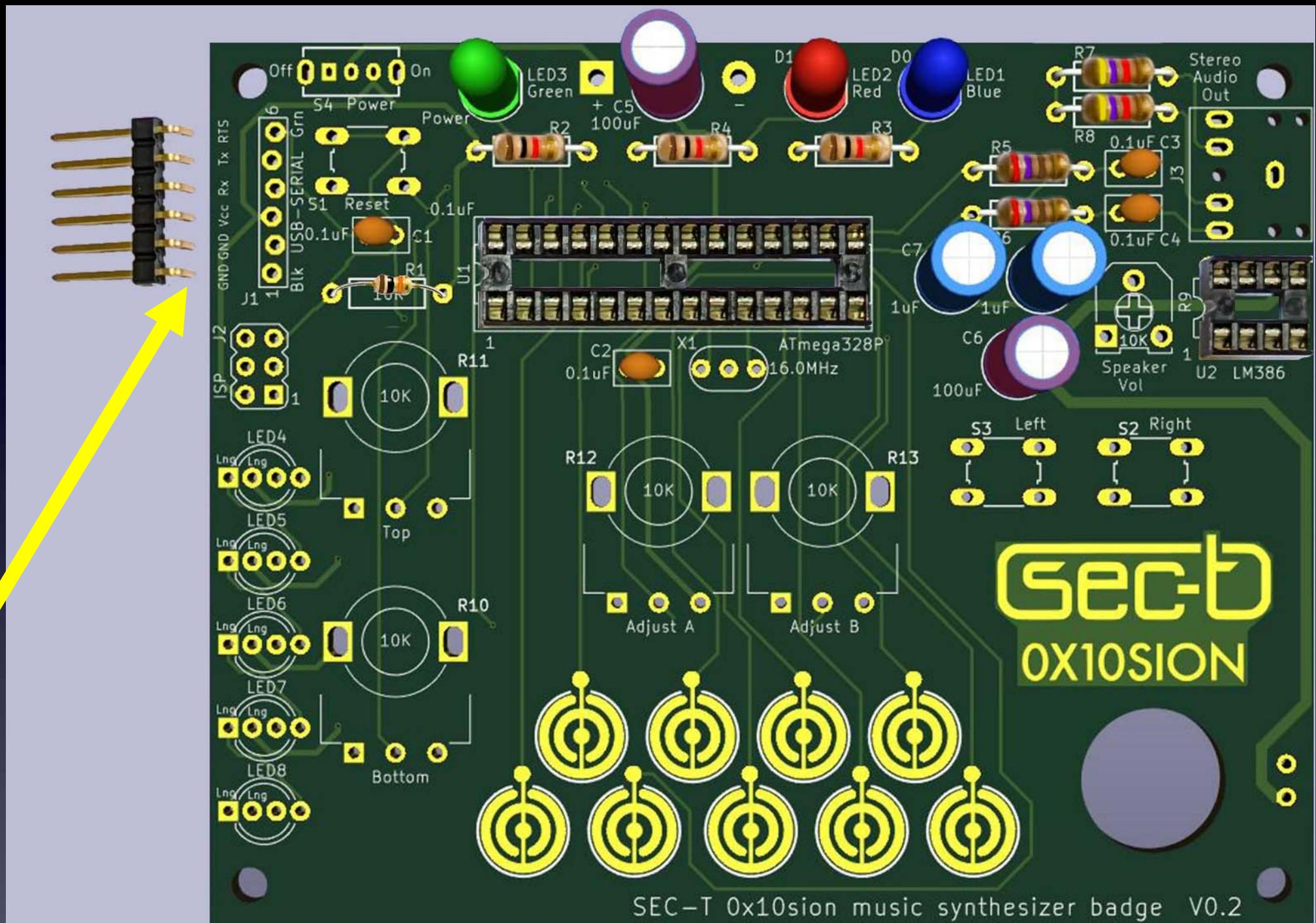
J1

# Short leads into board

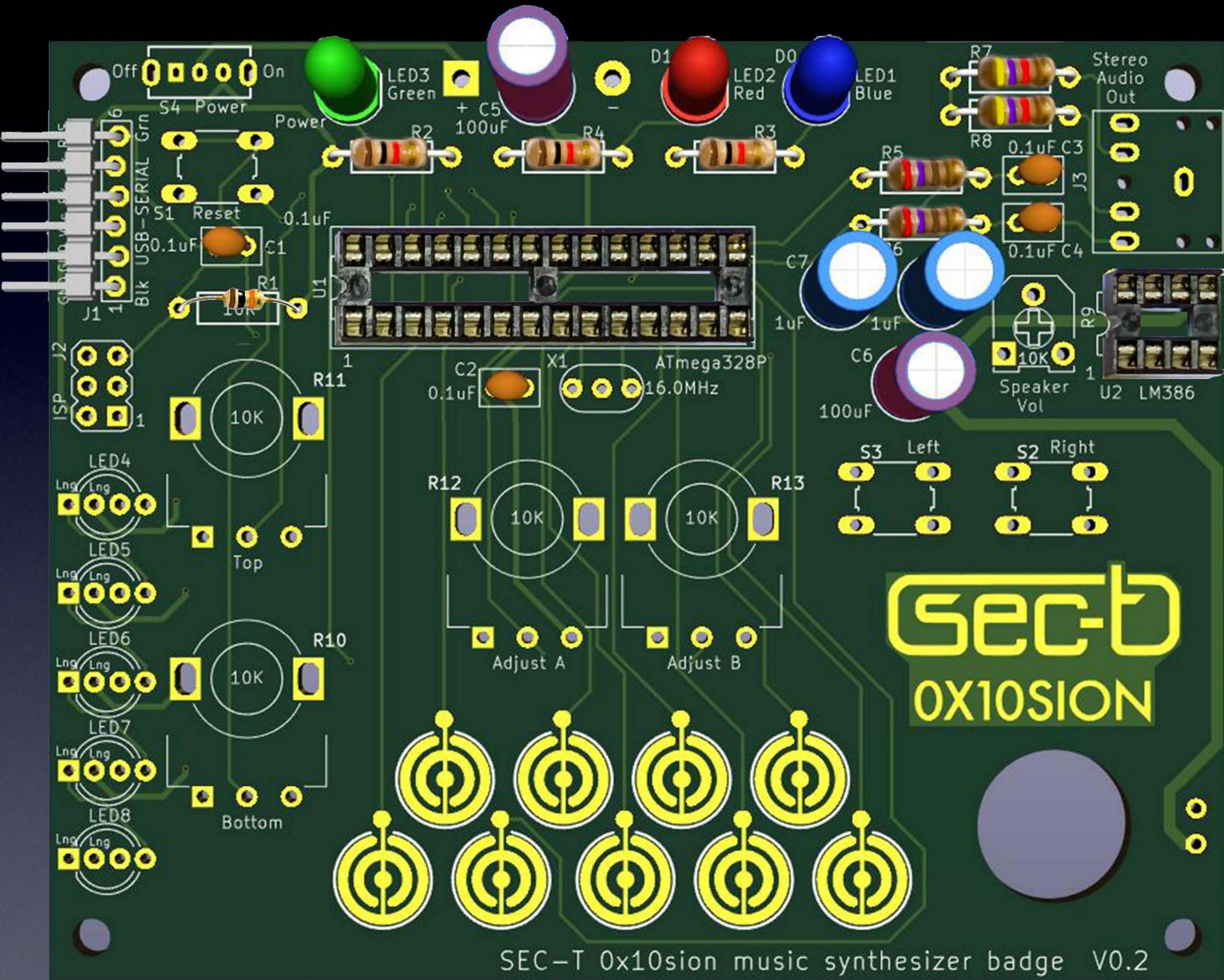
J1

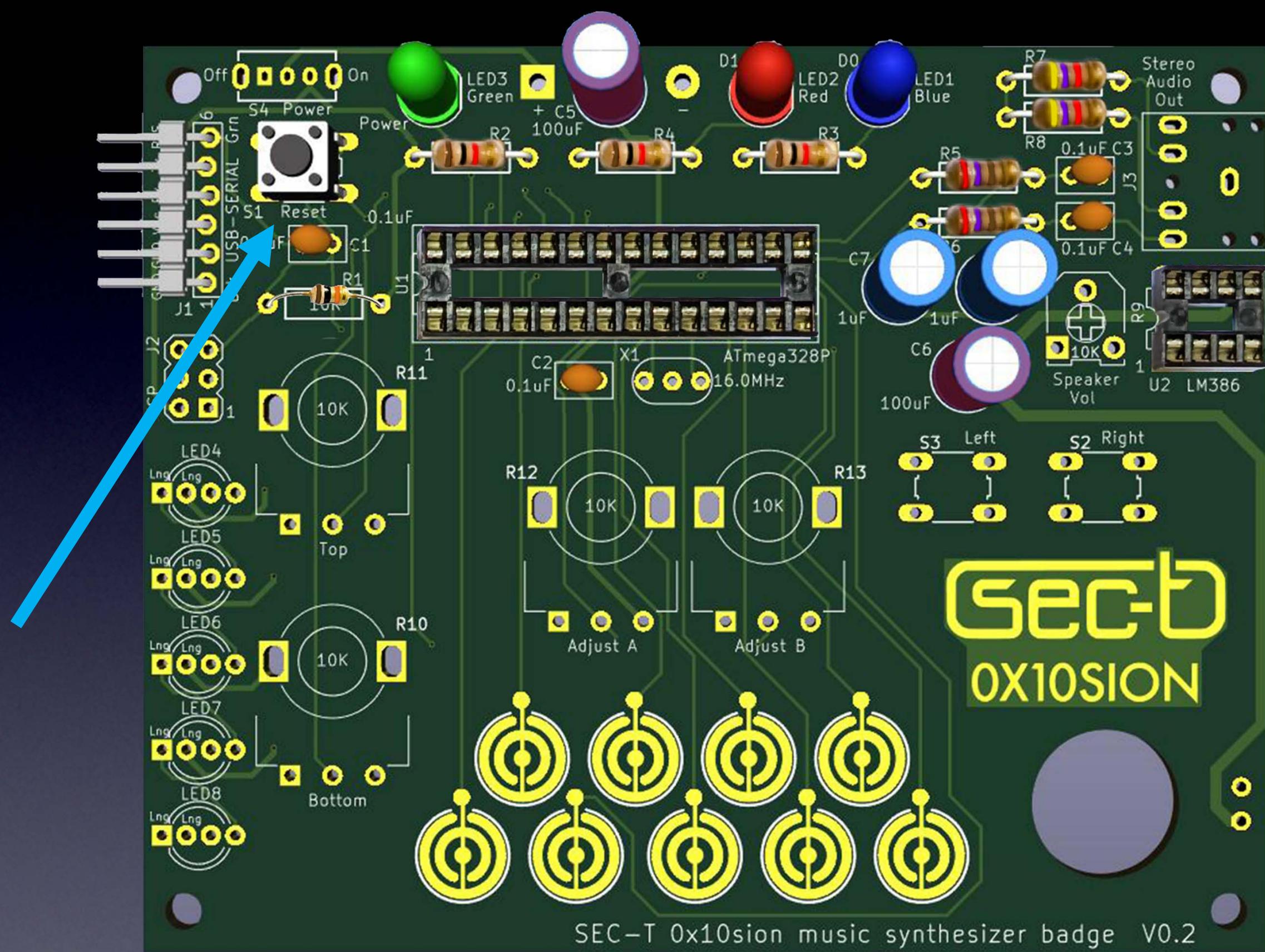
IMPORTANT:  
short leads  
go into the board

→ long leads sticking out from  
board



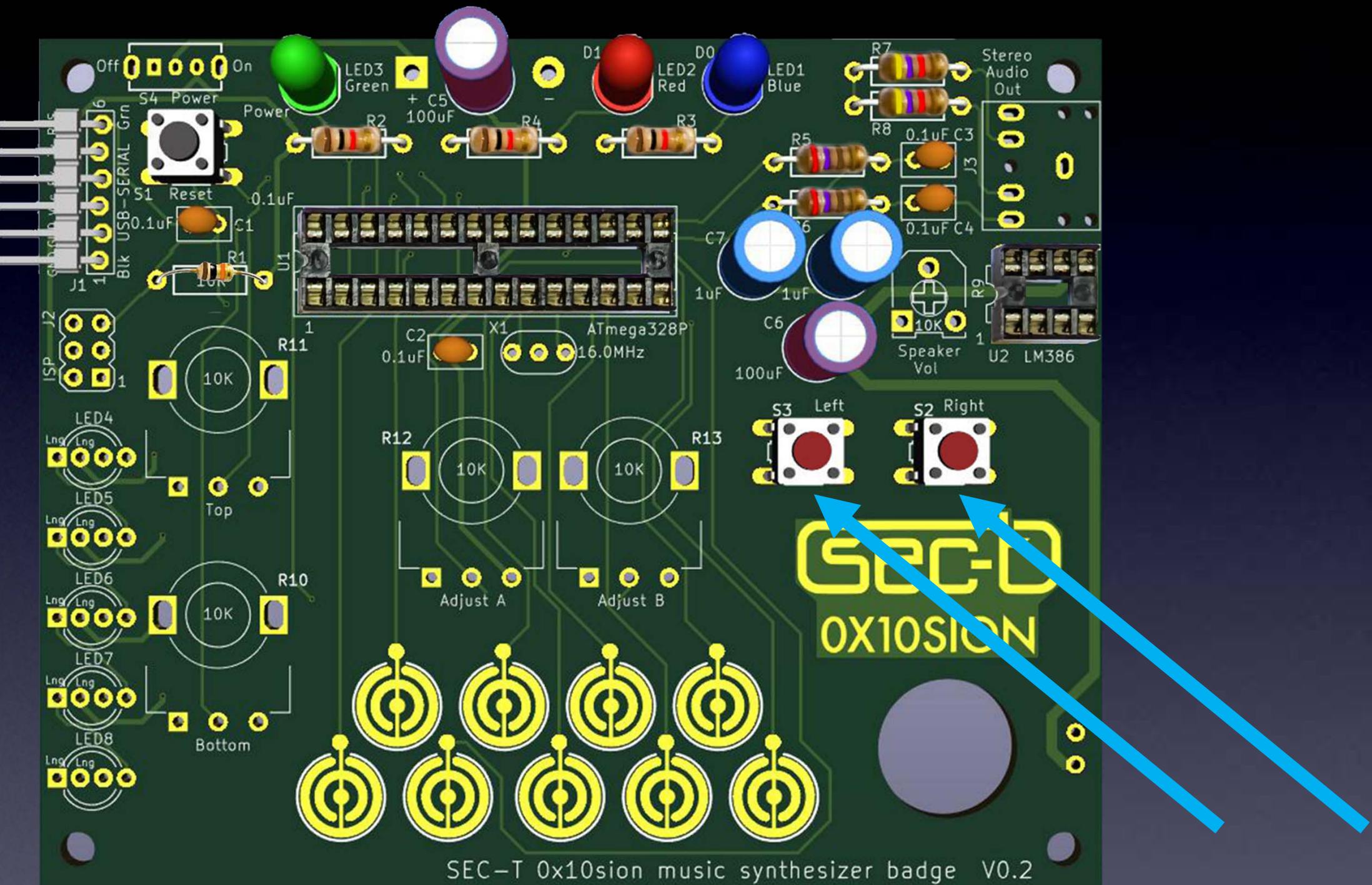
J1

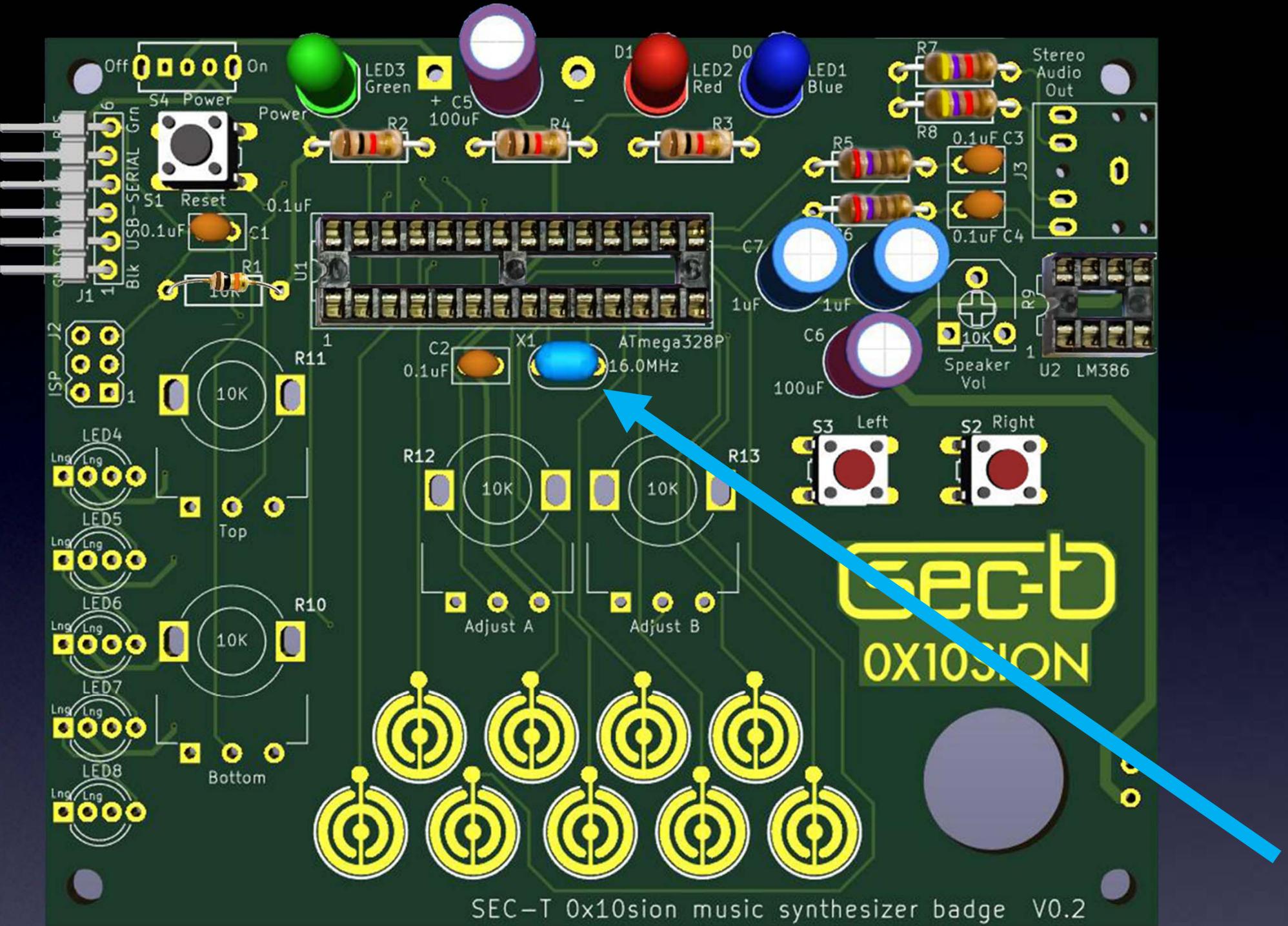




**S1: black Reset button**

# S2, S3: Red buttons

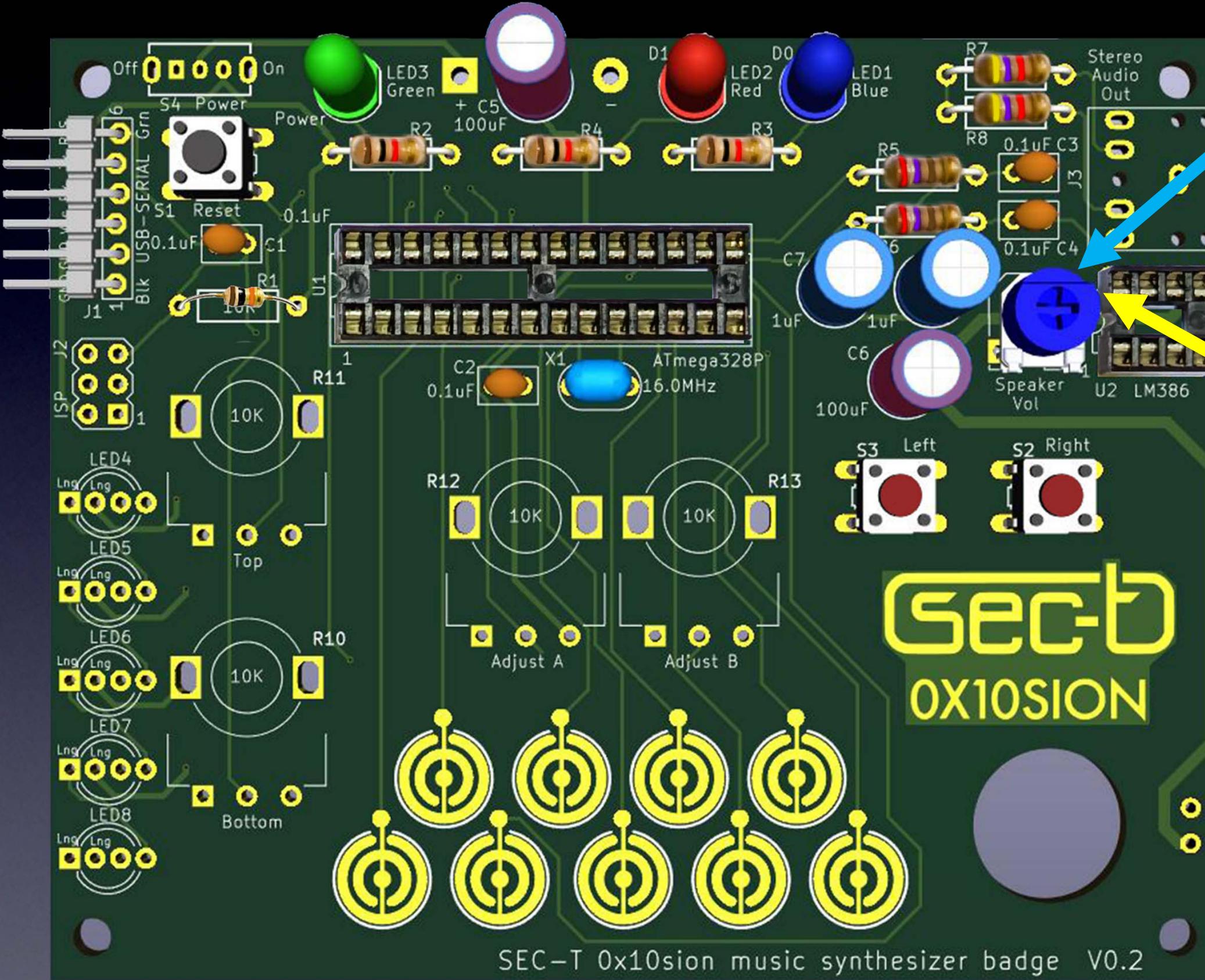




X1

The orientation of X1 does not matter.

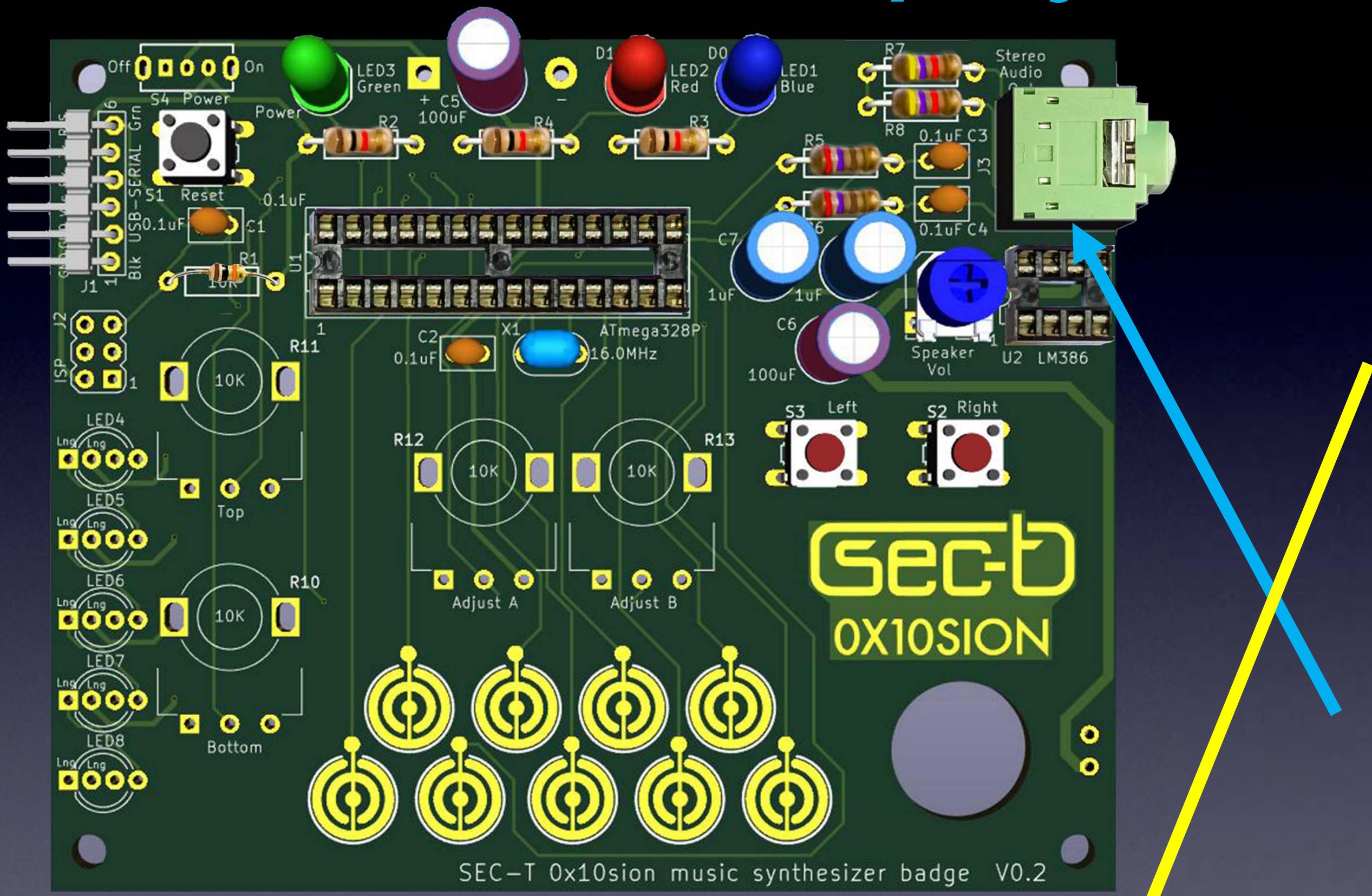
# R9: volume control



If necessary,  
rotate the blue top  
so that it looks  
like this photo  
(rotated half-way)

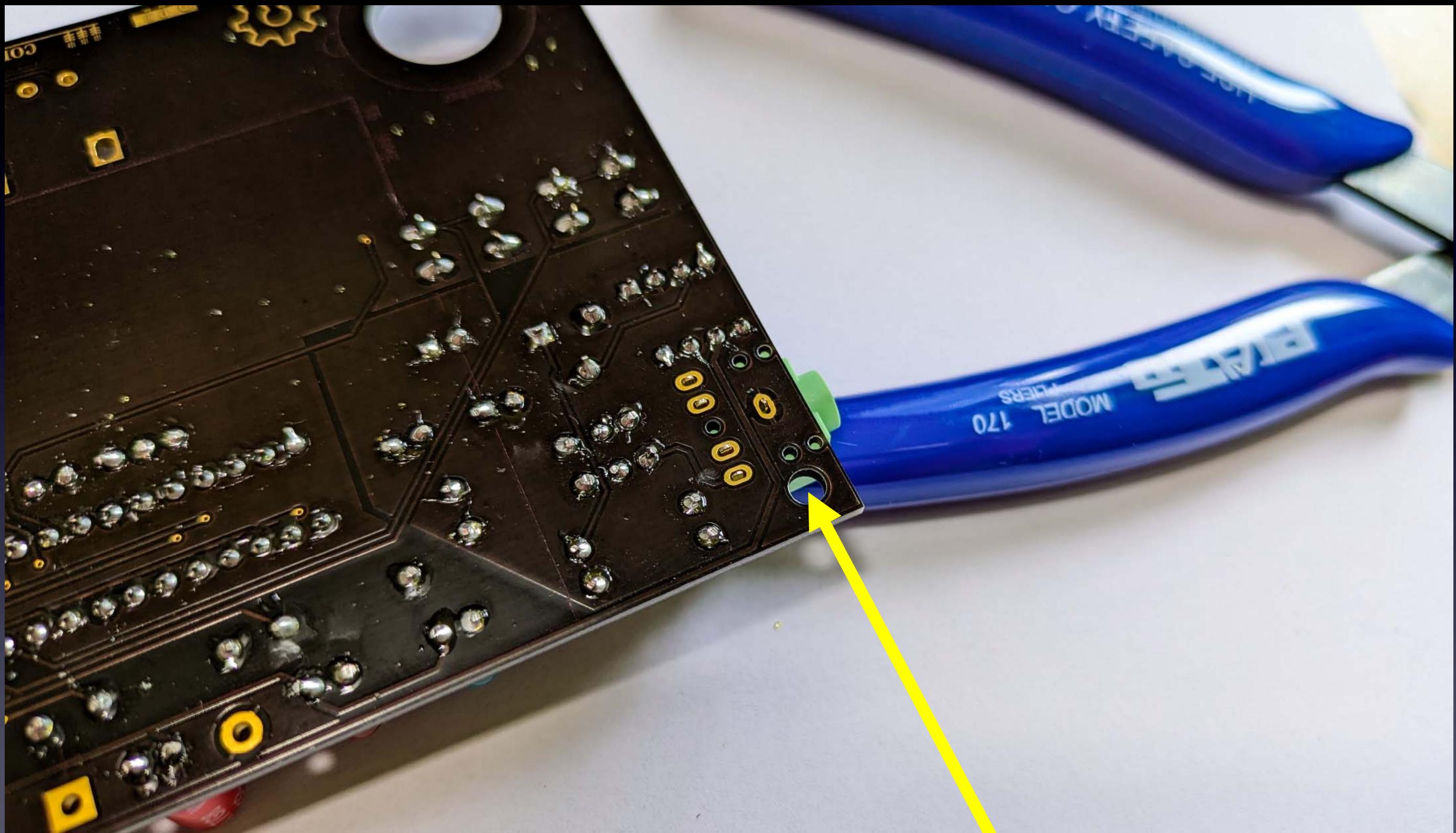
NOTE: R9 only controls the volume to the Speaker, not to Stereo Audio Out (J3)

# J3: Stereo Audio Output jack



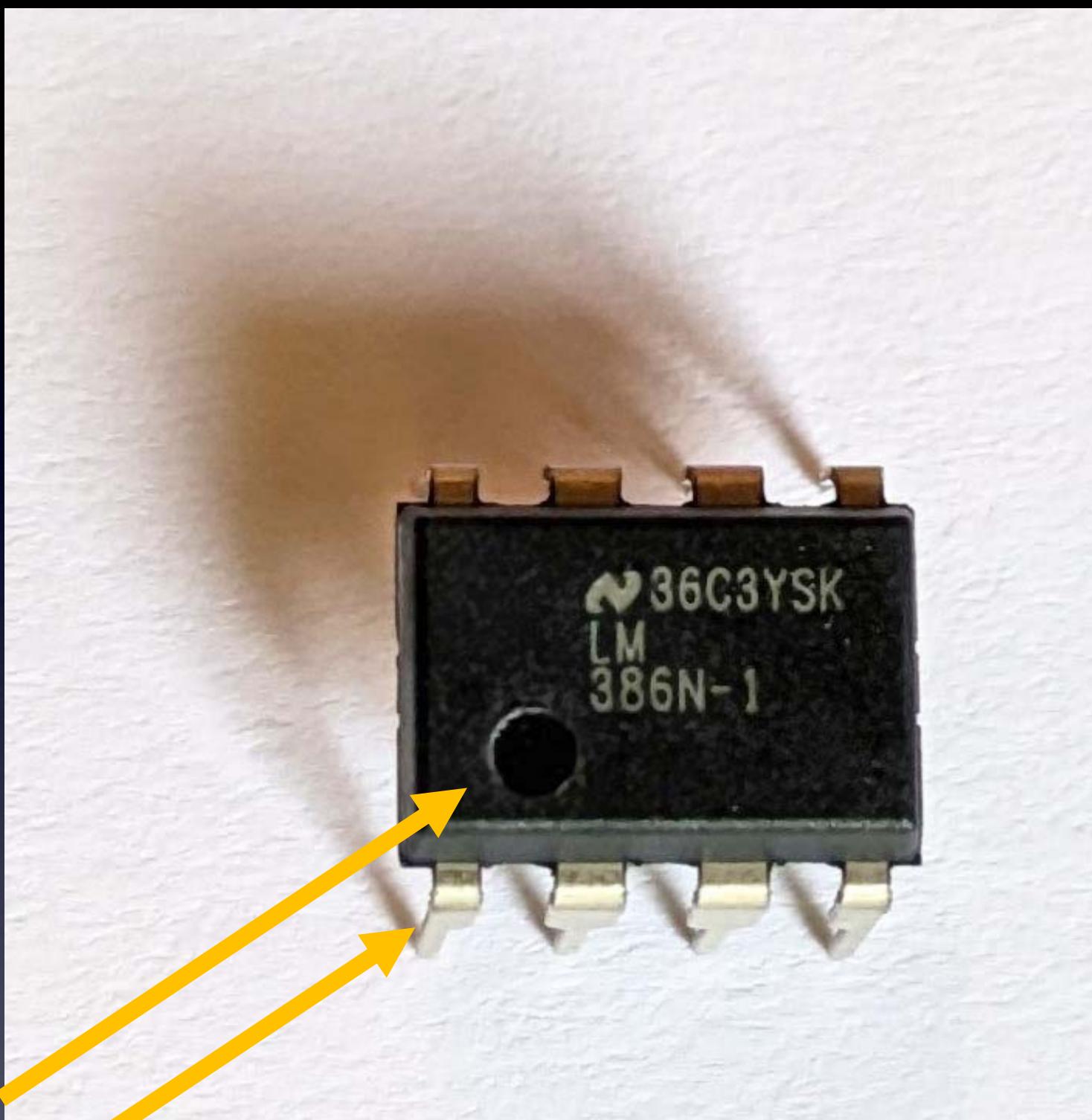
→ See next photo for how to solder this part...

# J3: Stereo Audio Output jack



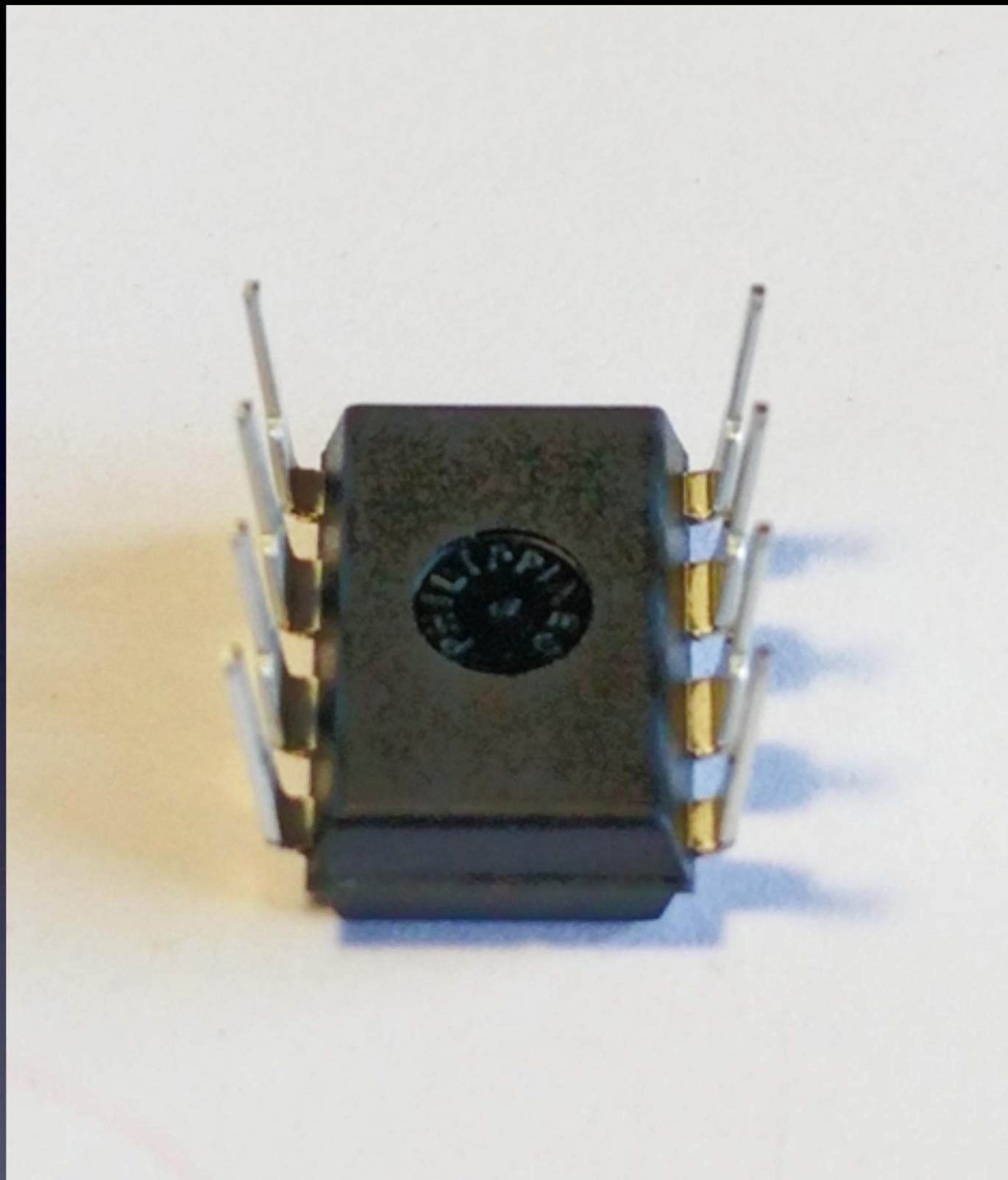
Resting on the wire cutters, J3 is held in place here, so you can solder all 5 leads.

# U2: amplifier chip



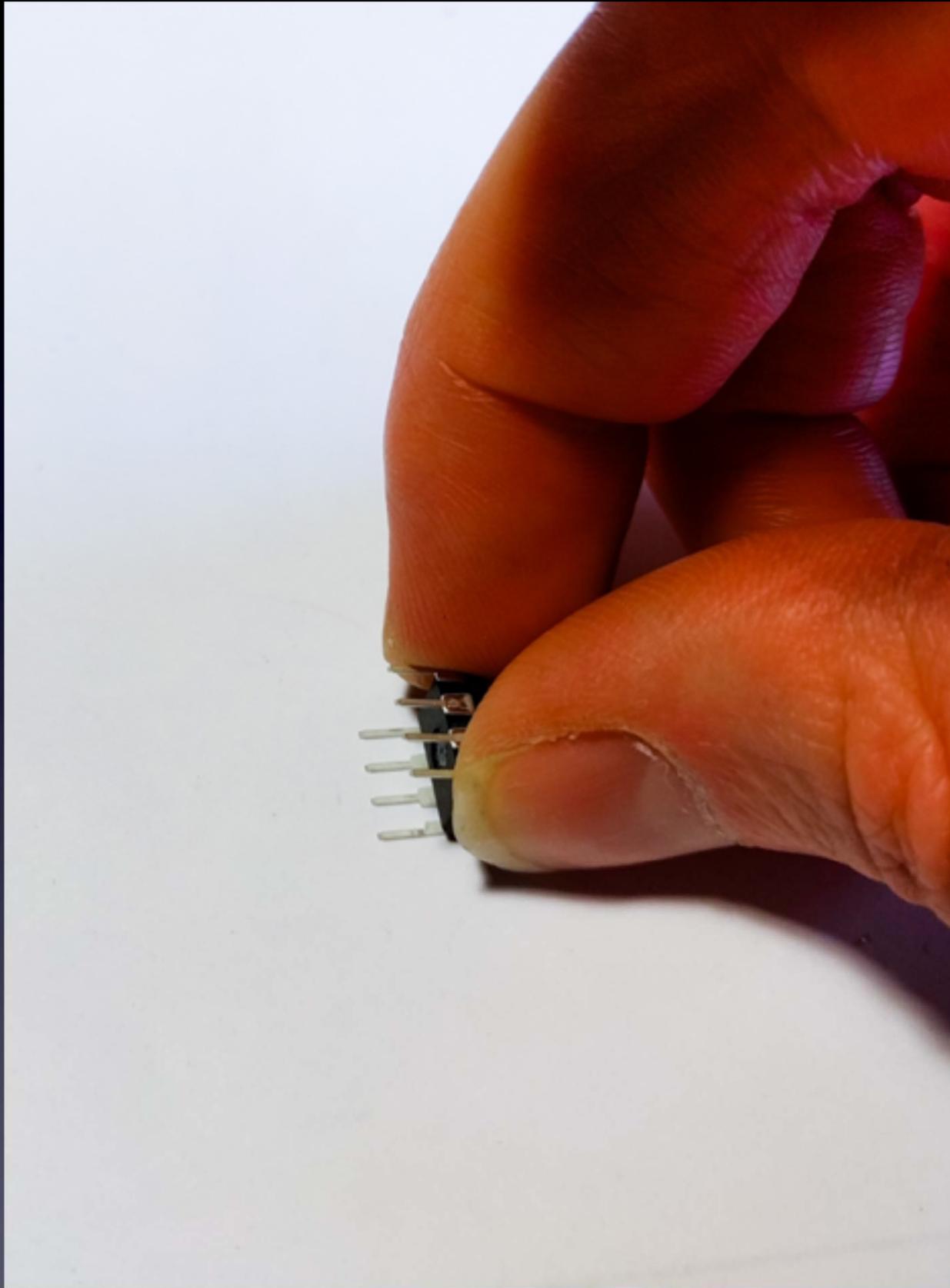
Indented black dot  
Pin 1

# U2: amplifier chip



When chips are new,  
their pins are bent out.

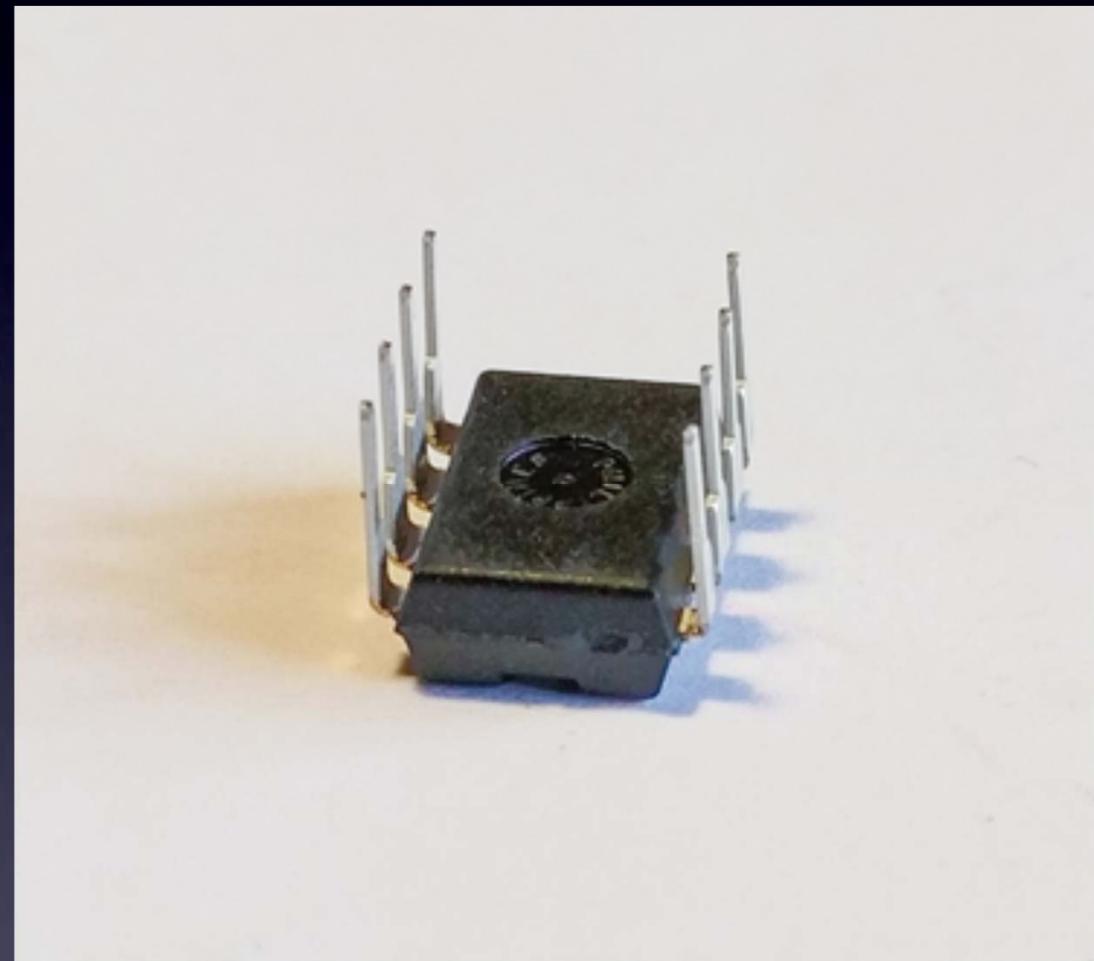
# U2: amplifier chip



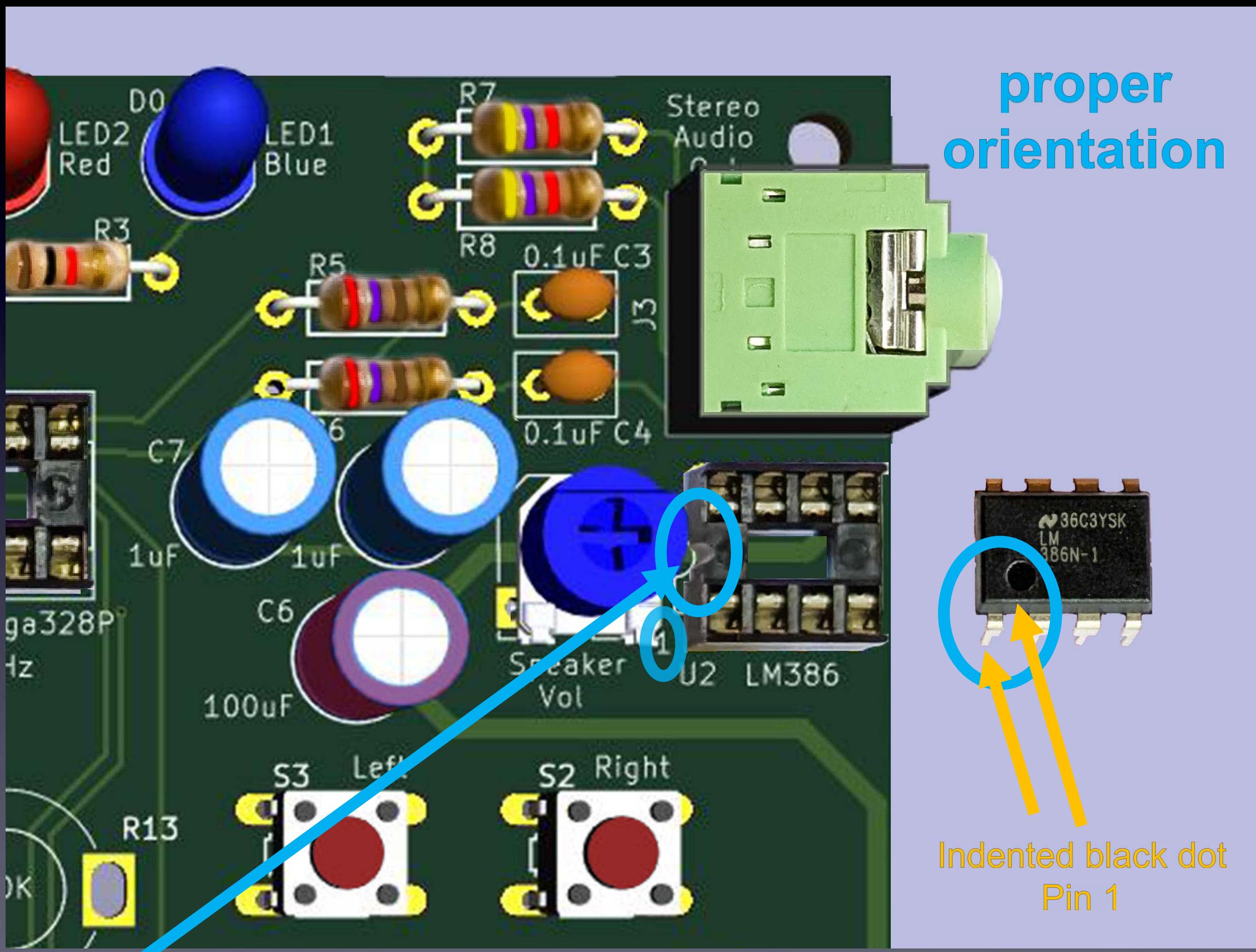
We need the pins bent *straight and parallel*.  
Use your work table to (gently) bend the leads.

# U2: amplifier chip

Gently  
bend leads  
so they're straight  
and parallel



# U2: amplifier chip

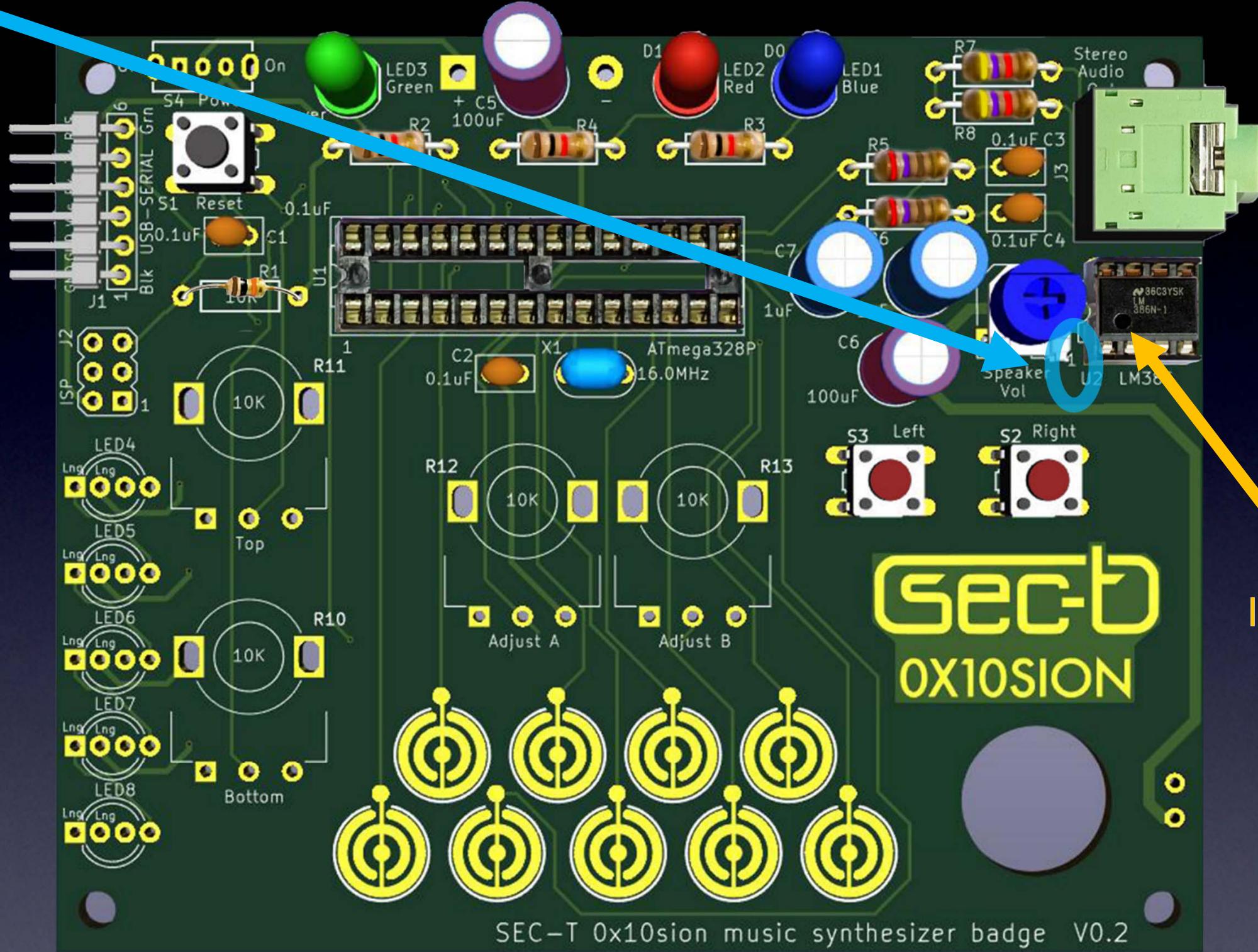


# U2: amplifier chip



Make sure all 8 pins rest in their holes in the socket  
→ with the proper orientation

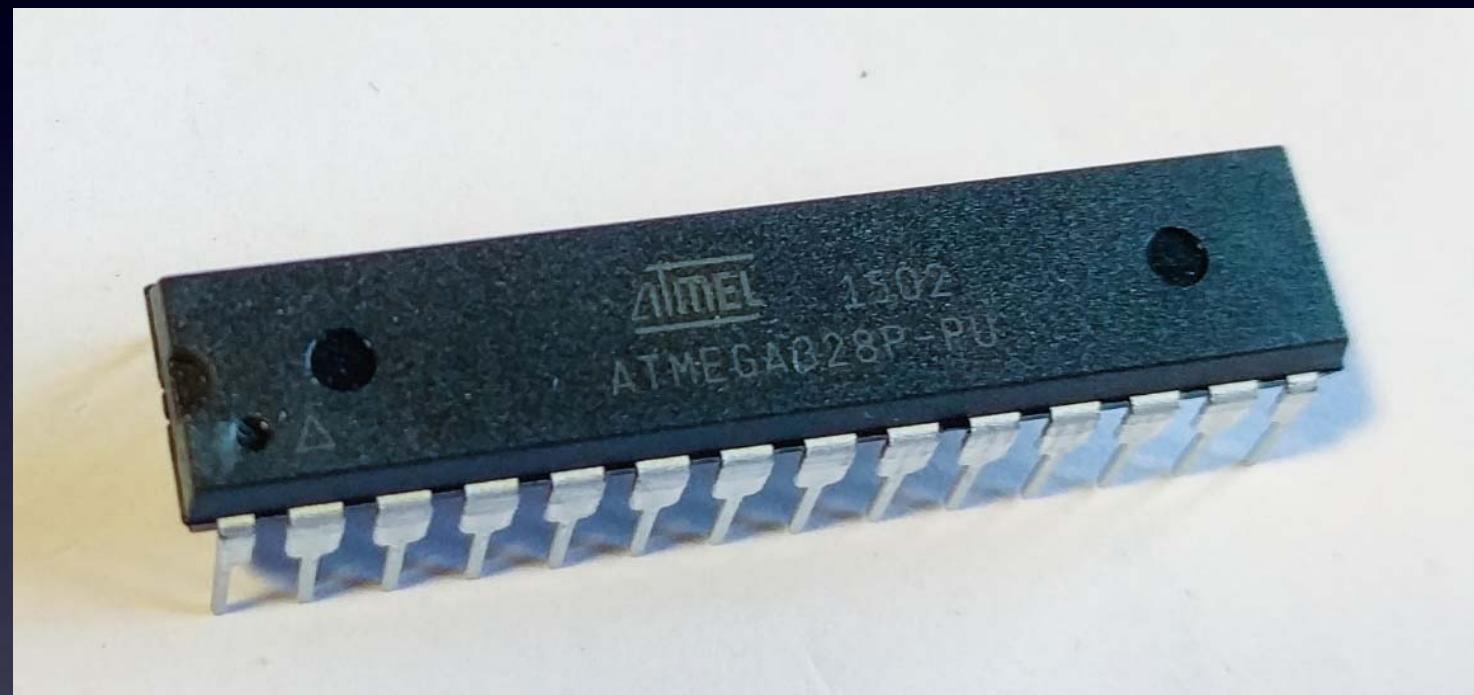
# U2: amplifier chip



Inspect all pins, and be sure each went into its hole in the socket – not bent.

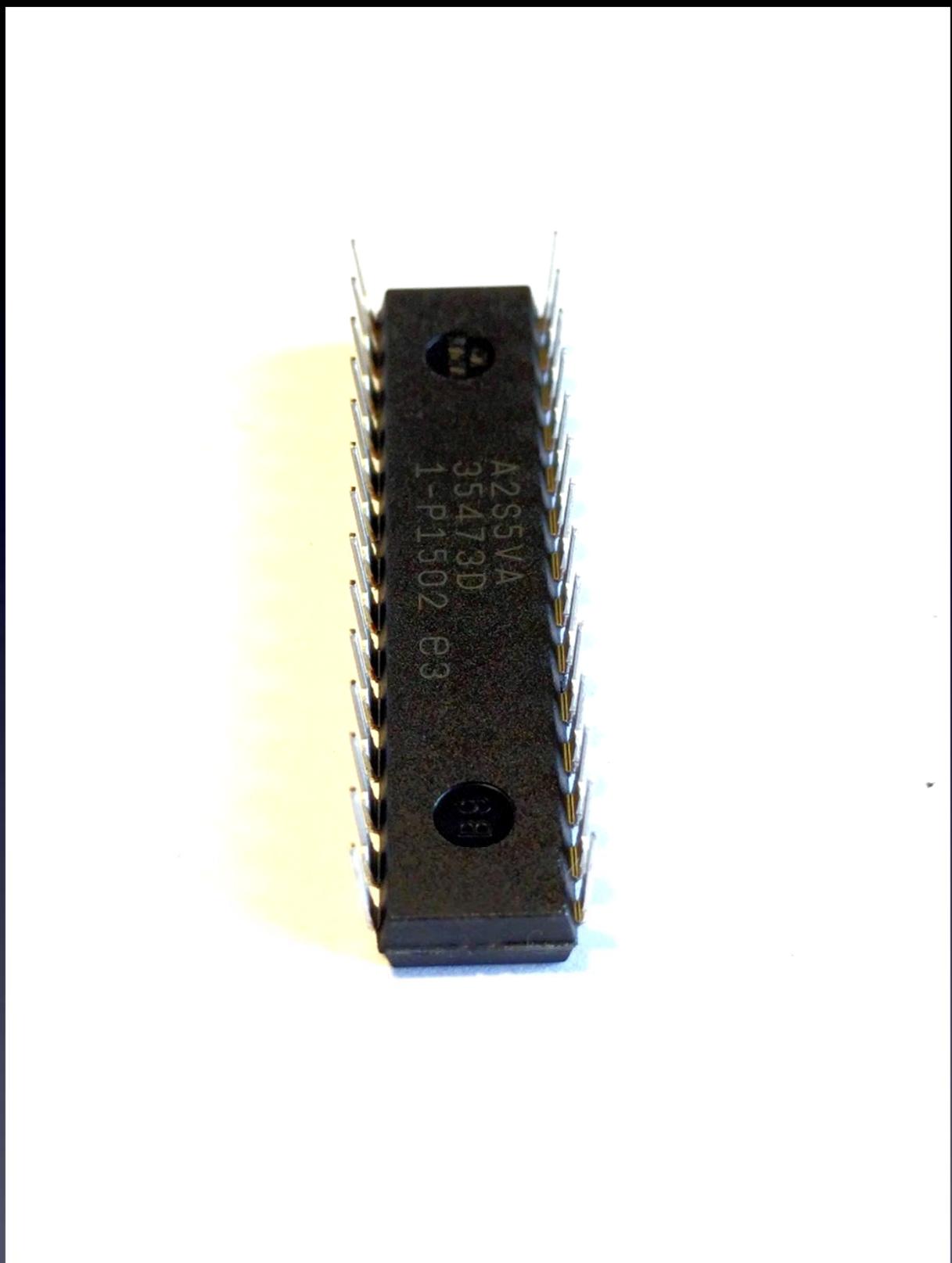
If any pins are bent, (gently) pry out chip, straighten pins, and insert again.

# U1: microcontroller



# U1: microcontroller

U1

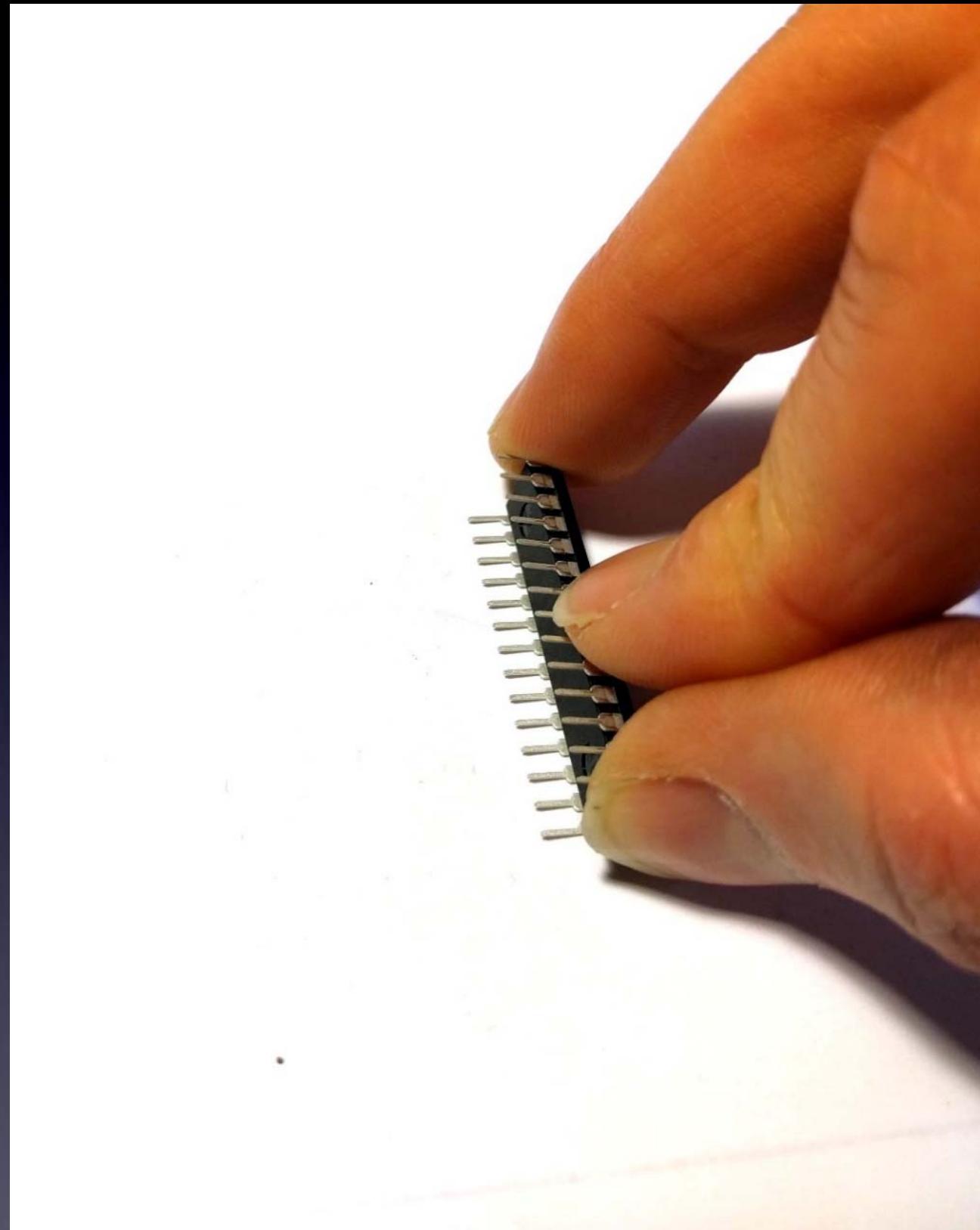


**When chips are new,  
their pins are bent out.**

Note: Your kit's U1 chip may or may not have its pins already bent straight and parallel. If not, you need to bend them, as shown in the next picture.

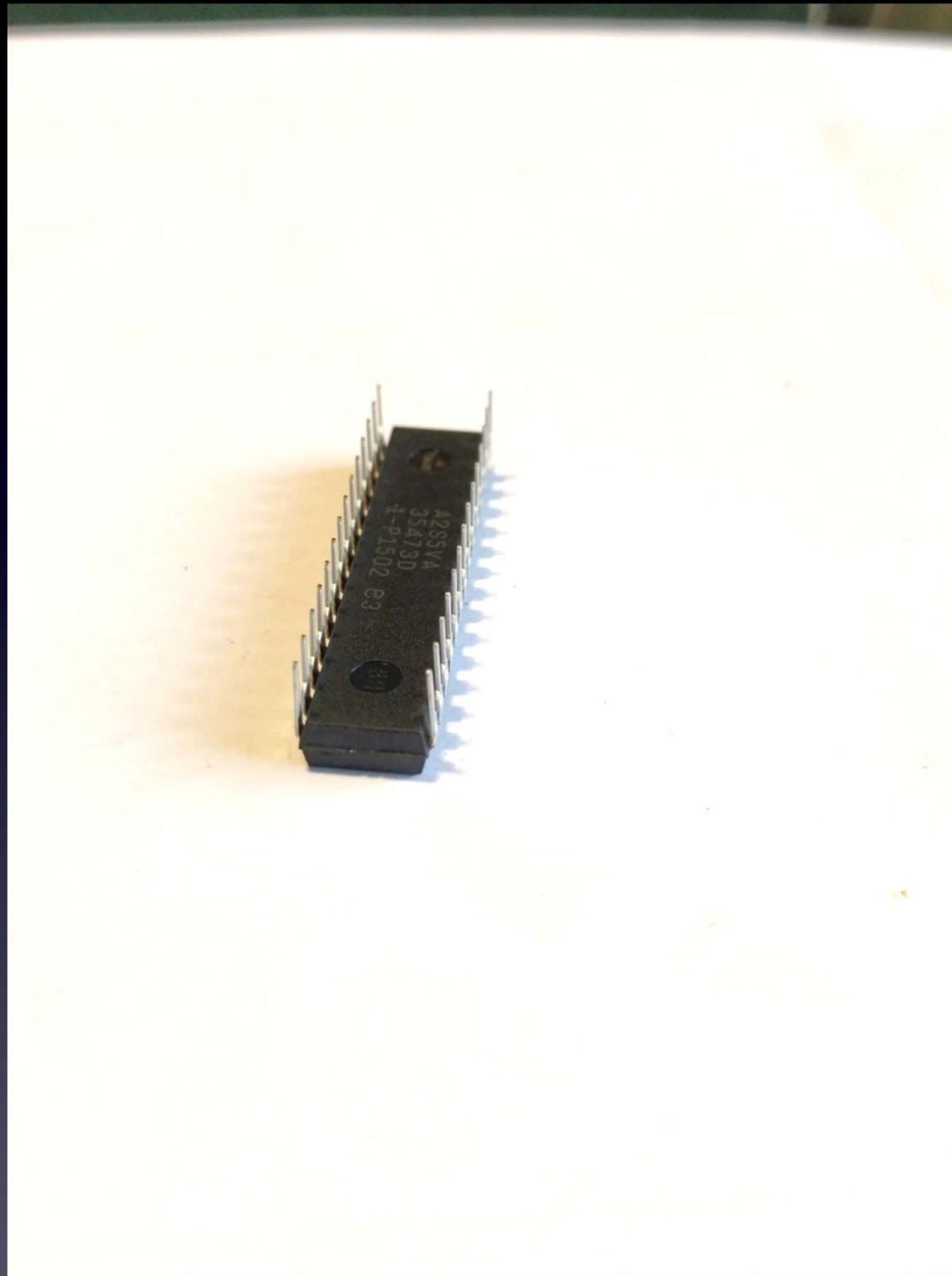
# U1: microcontroller

Note: Your kit's U1 chip may or may not have its pins already bent straight and parallel.  
If not, you need to bend them, as shown in this picture.



**We need the pins bent straight and parallel.  
Use your work table to (gently) bend the leads.**

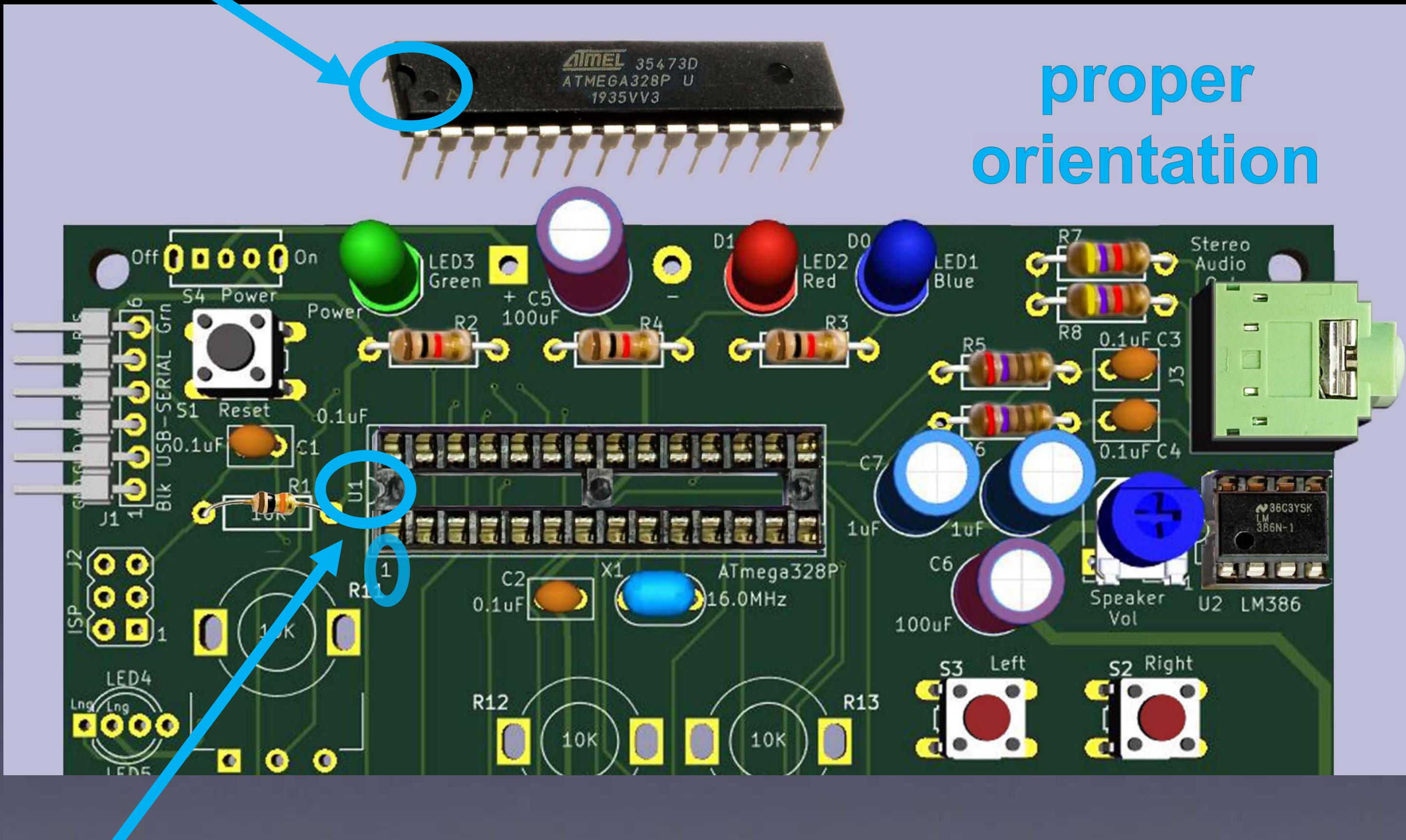
# U1: microcontroller



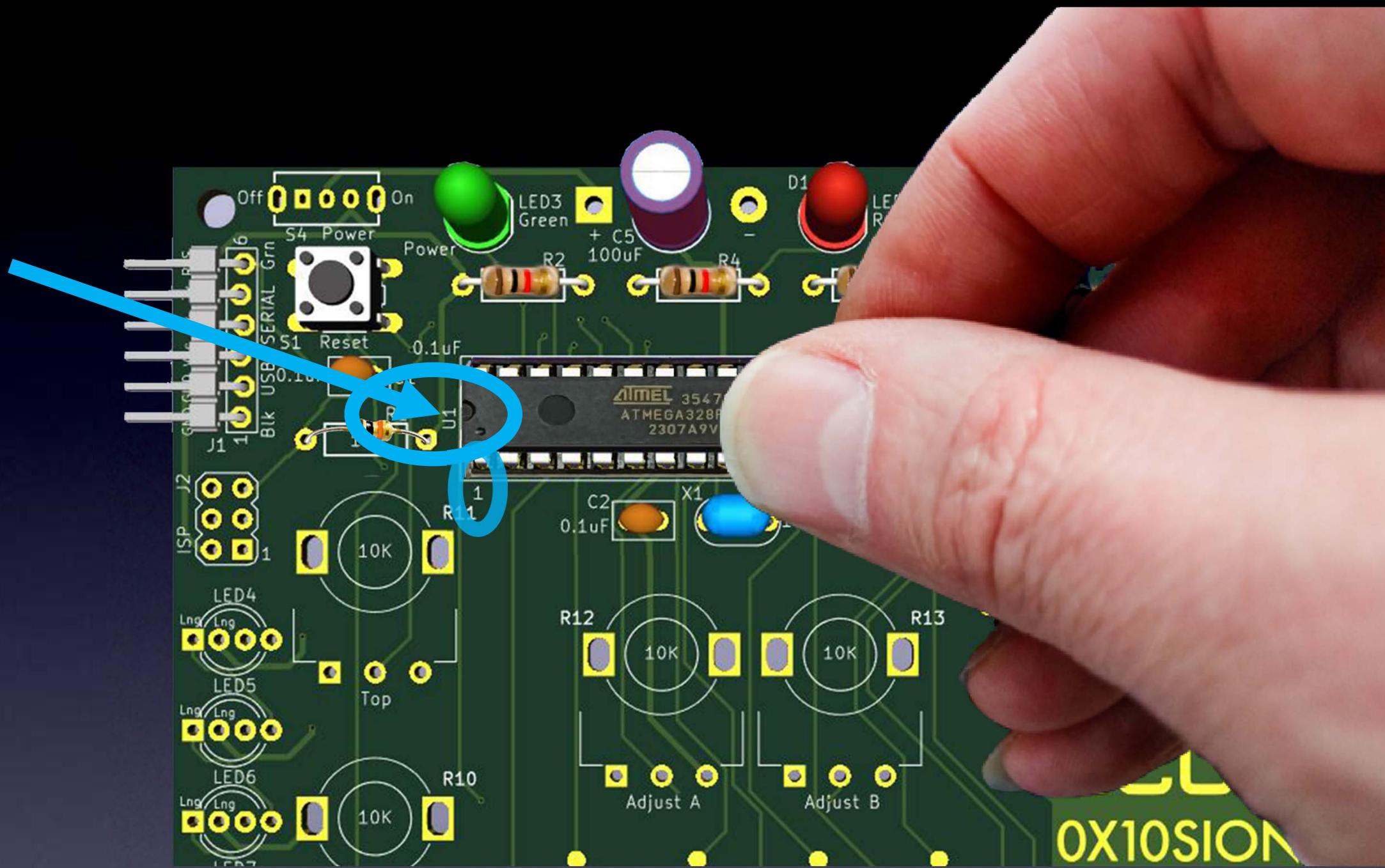
These pins must be straight and parallel

# U1: microcontroller

proper  
orientation



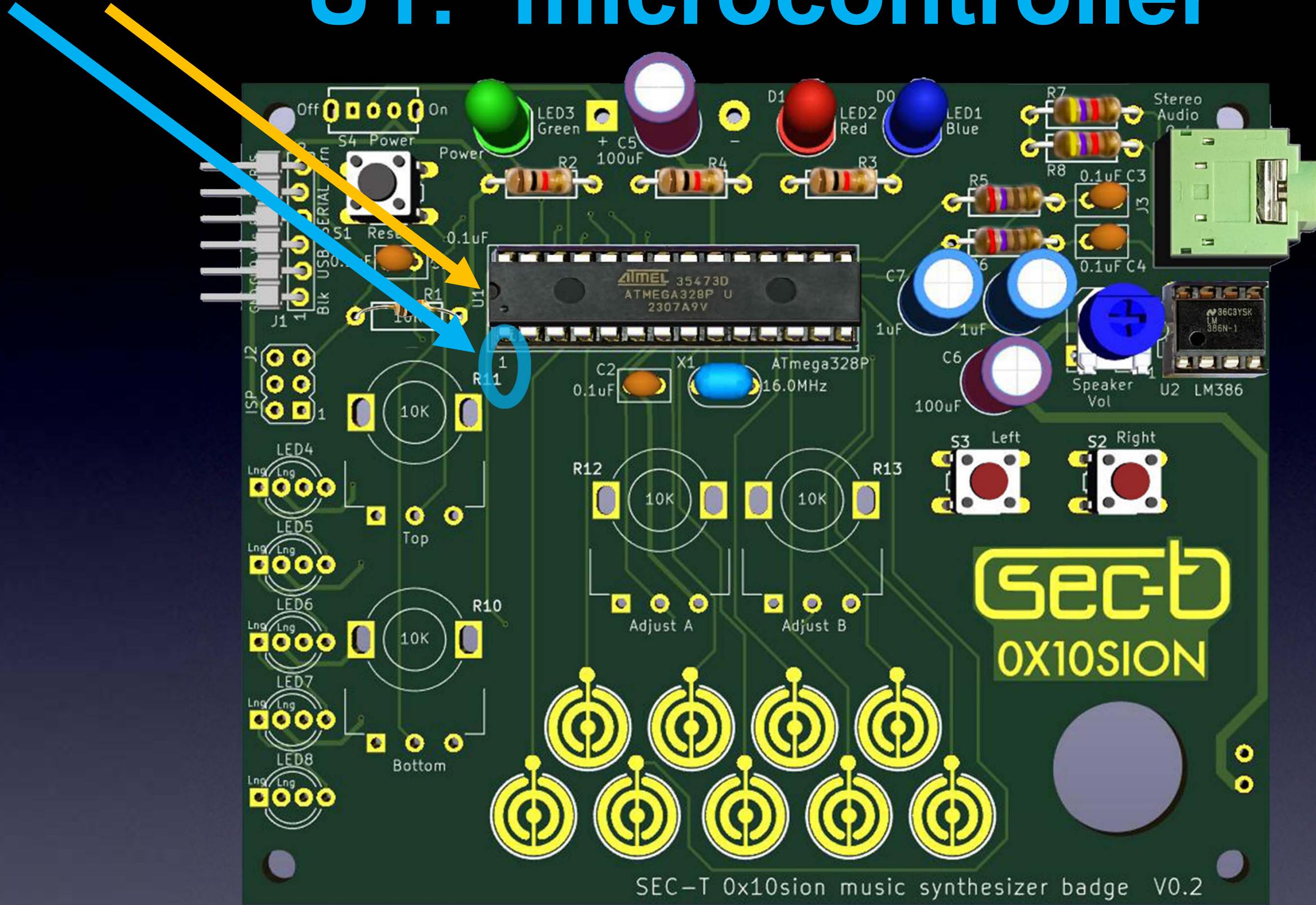
# U1: microcontroller



Make sure all 28 pins rest in their holes in the socket  
→ with the proper orientation

(This is actually way easier with 2 thumbs.)

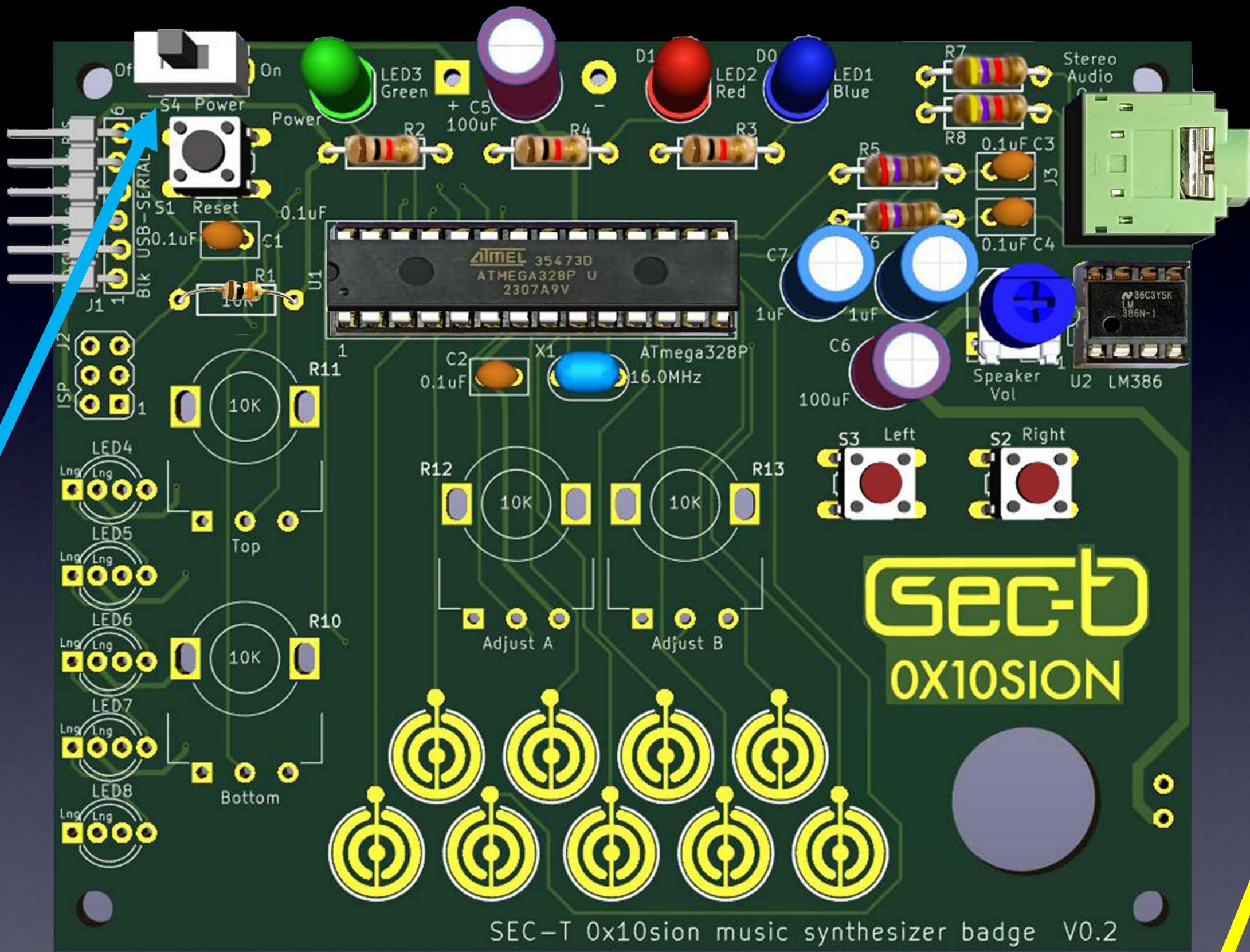
# U1: microcontroller



Inspect all pins, and be sure each went into its hole in the socket – not bent.

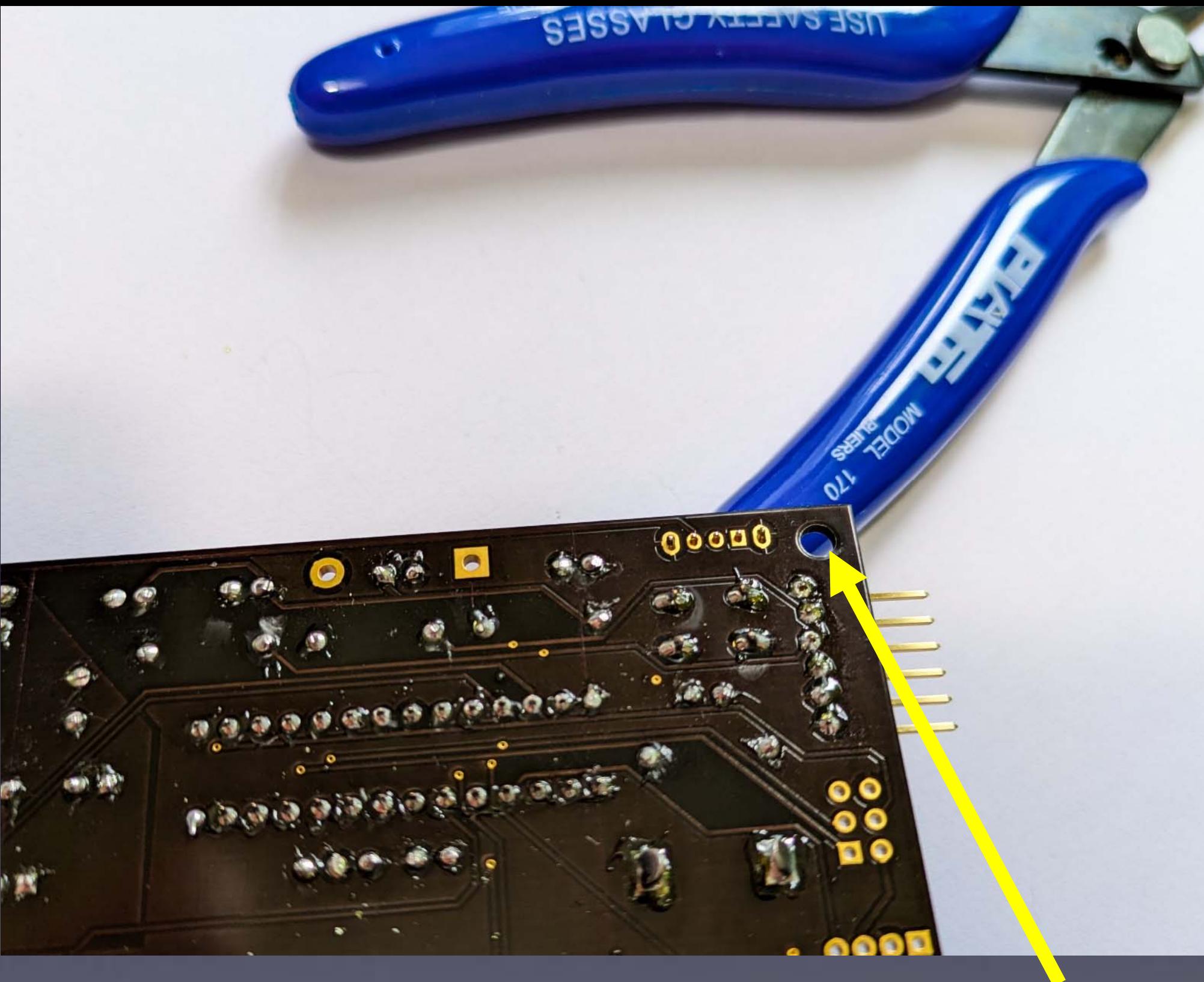
If any pins are bent, (gently) pry out chip, straighten pins, and insert again.

# J4: Power switch



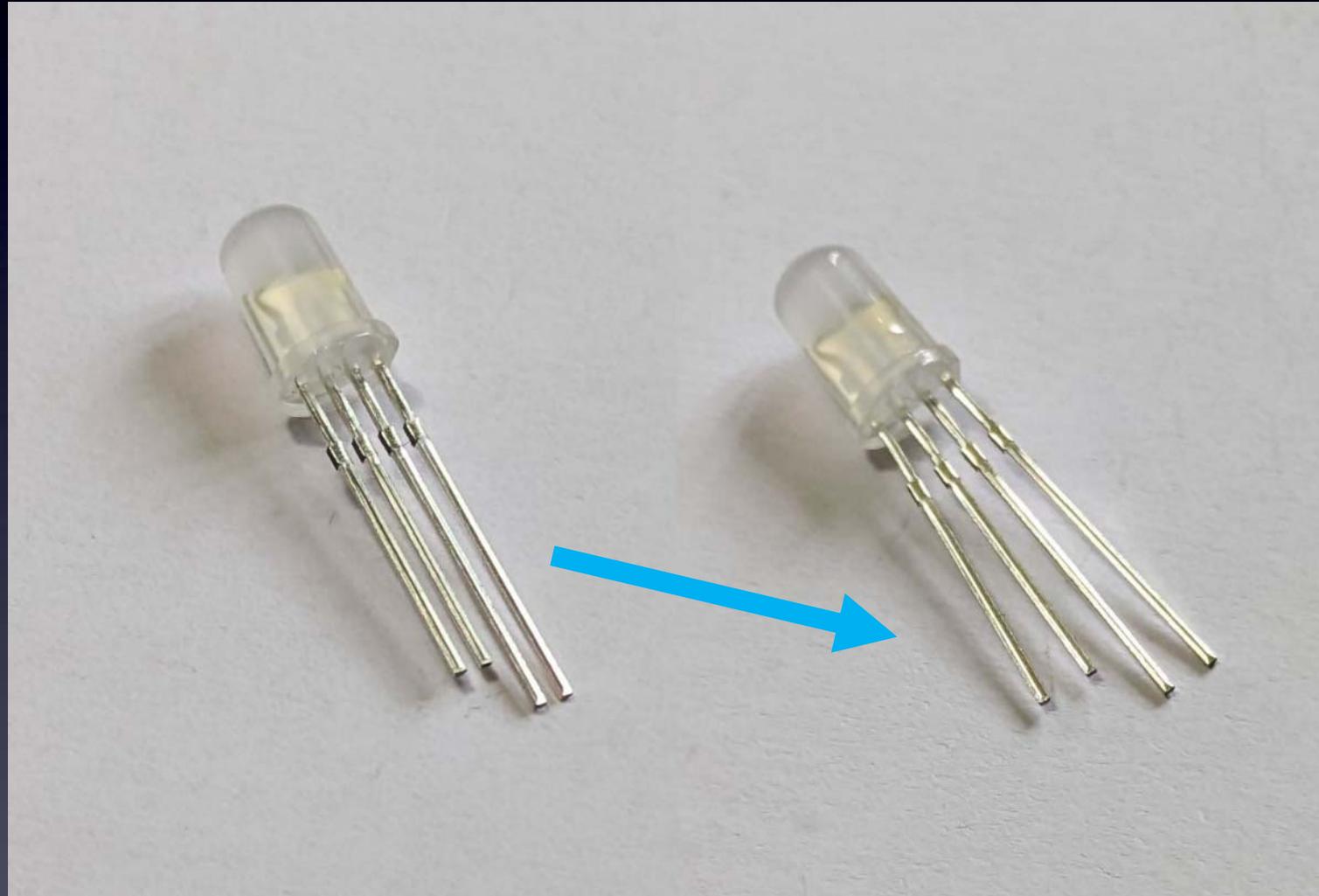
→ See next photo for how to solder this part...

# J4: Power switch



Resting on the wire cutters, S4 is held in place here, so you can solder all 5 leads.

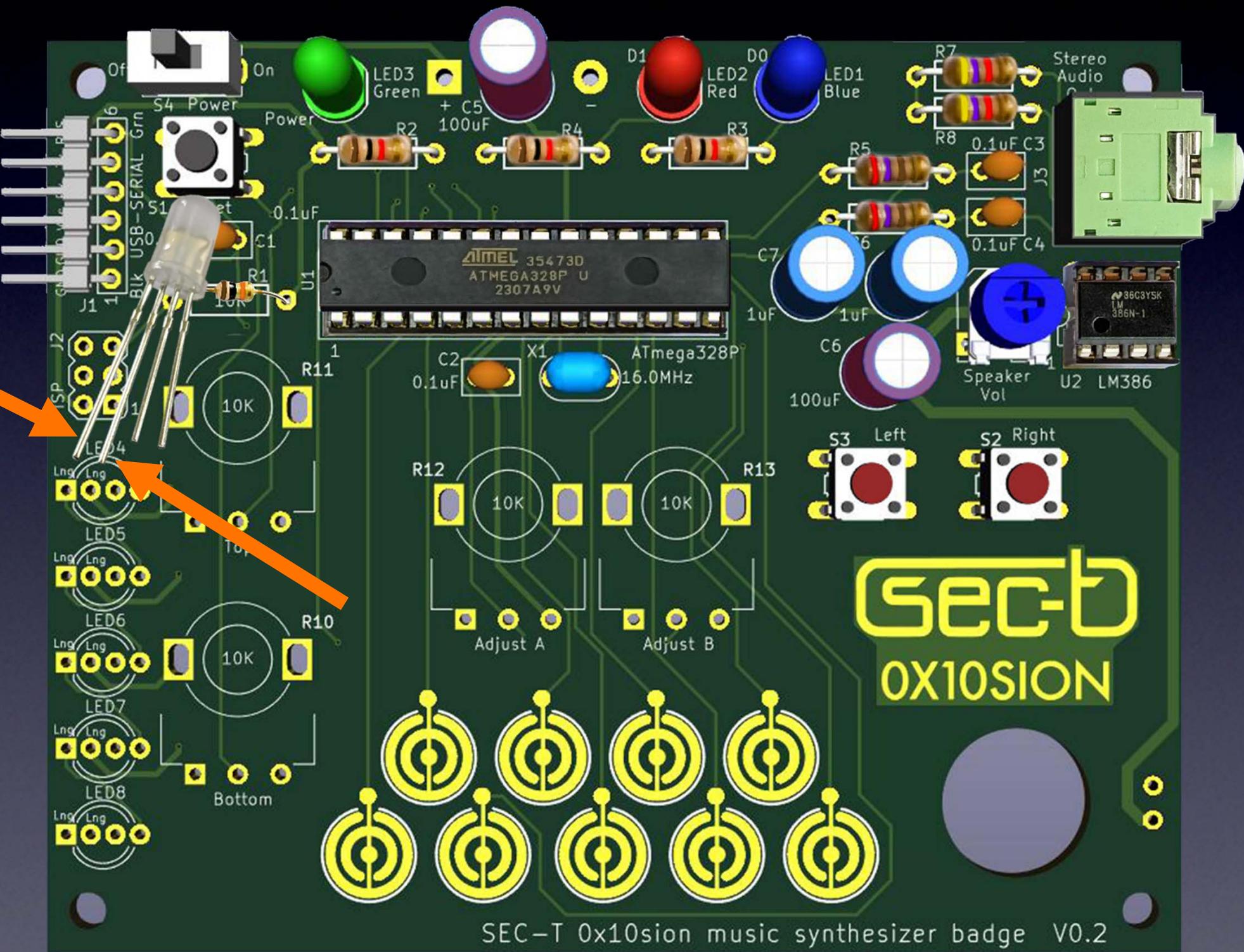
# LED4, LED5, LED6, LED7, LED8: RGB LEDs



Bend the leads out a little so they fit into their pads.

# LED4, LED5, LED6, LED7, LED8: RGB LEDs

Note the orientation of the 2 long leads

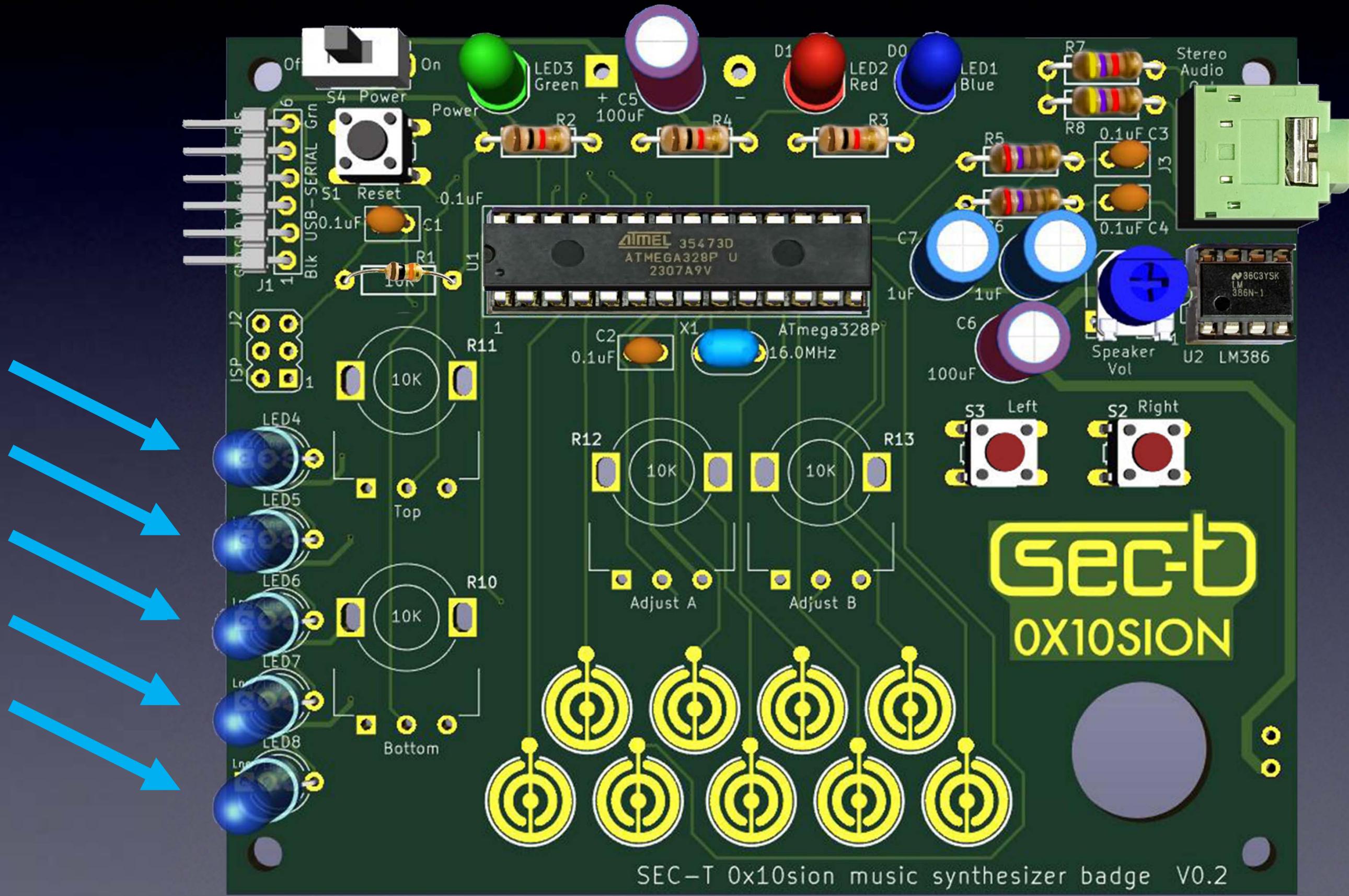


# LED4, LED5, LED6, LED7, LED8: RGB LEDs

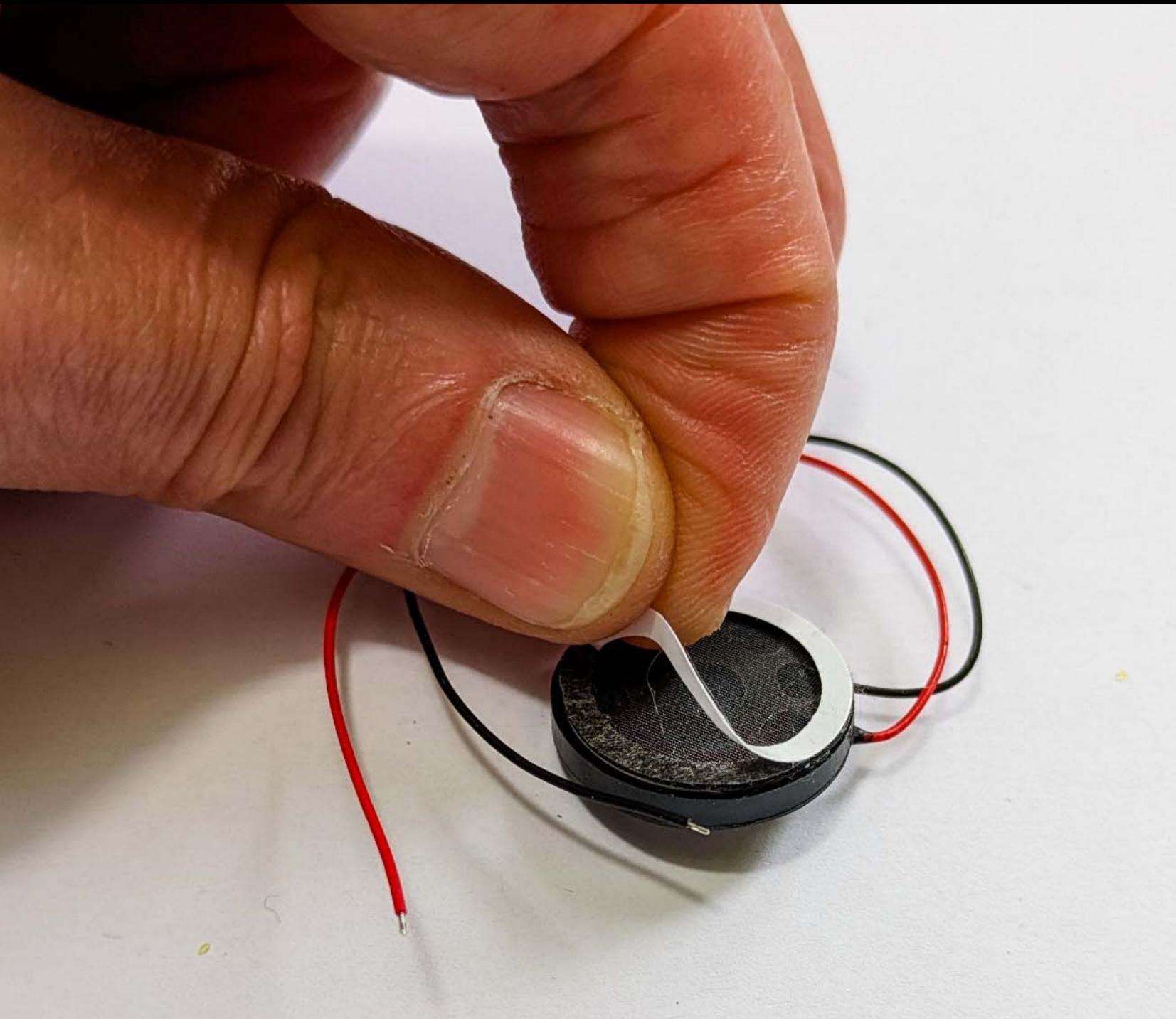


These LEDs will be inserted about this far into the board

# LED4, LED5, LED6, LED7, LED8: RGB LEDs

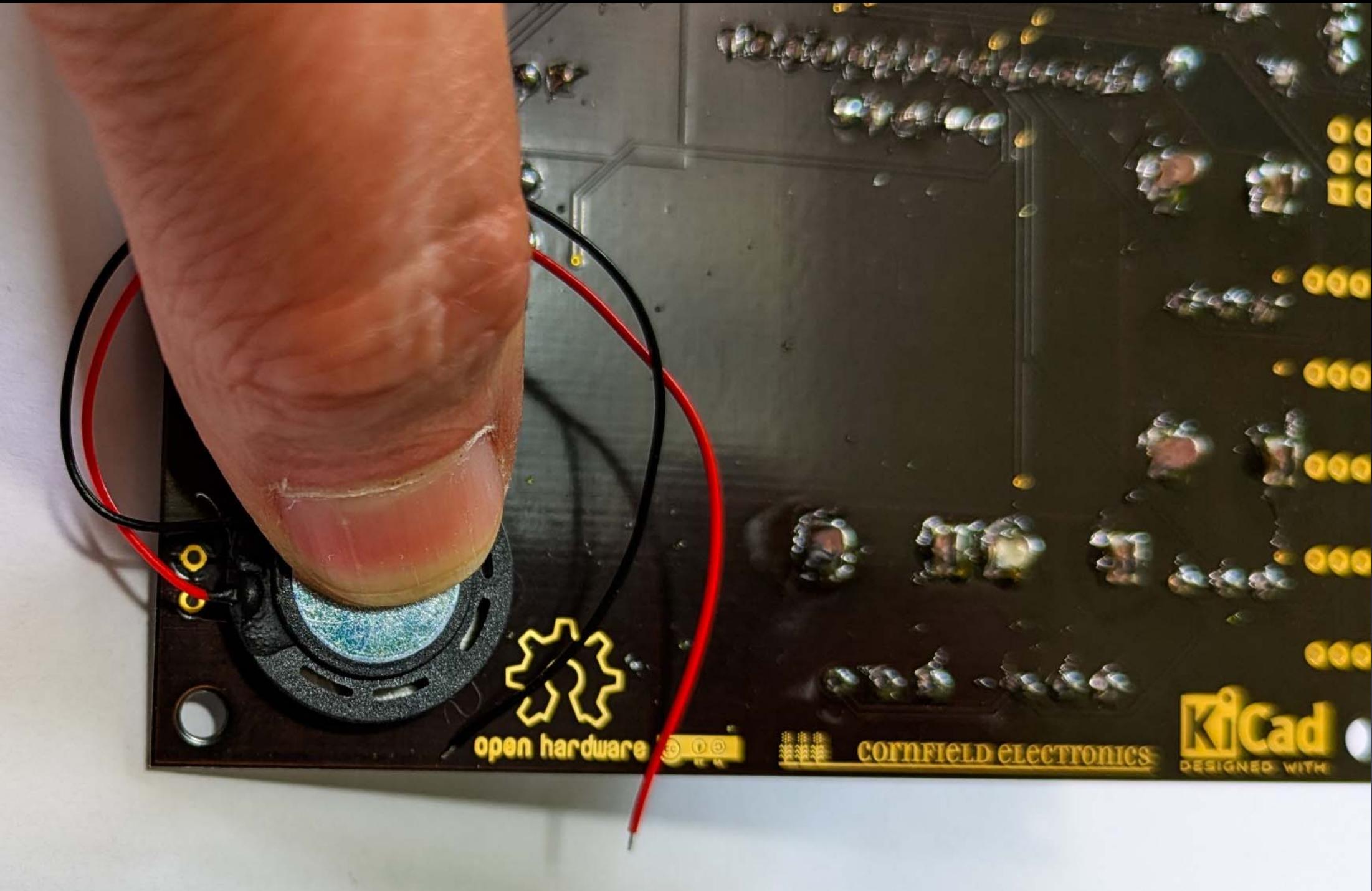


# Speaker



Pull off the protective covering to reveal the adhesive

# Speaker



Carefully center the speaker over its hole, and then push

# Speaker



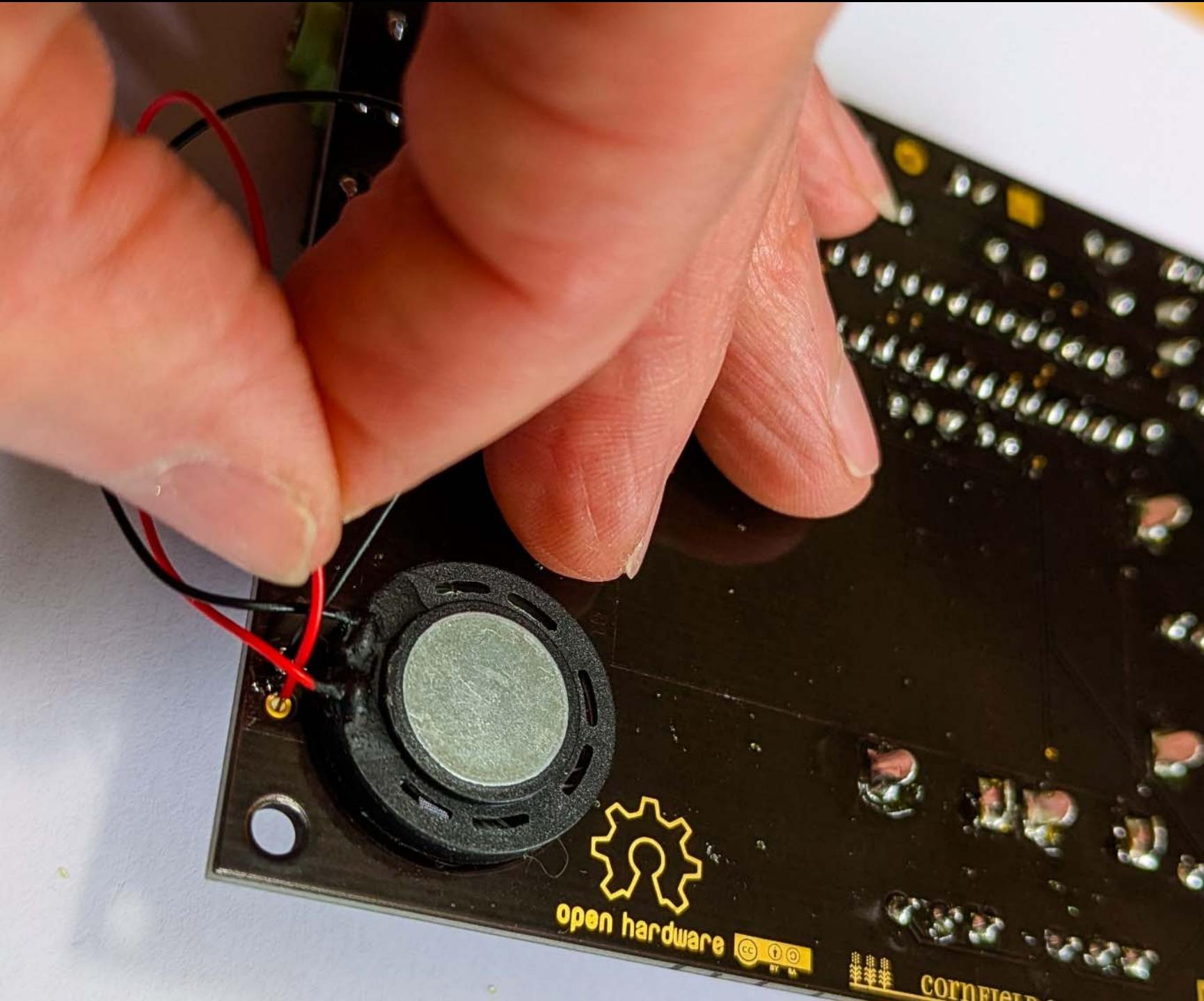
Here you can see the speaker centered under its hole

# Speaker



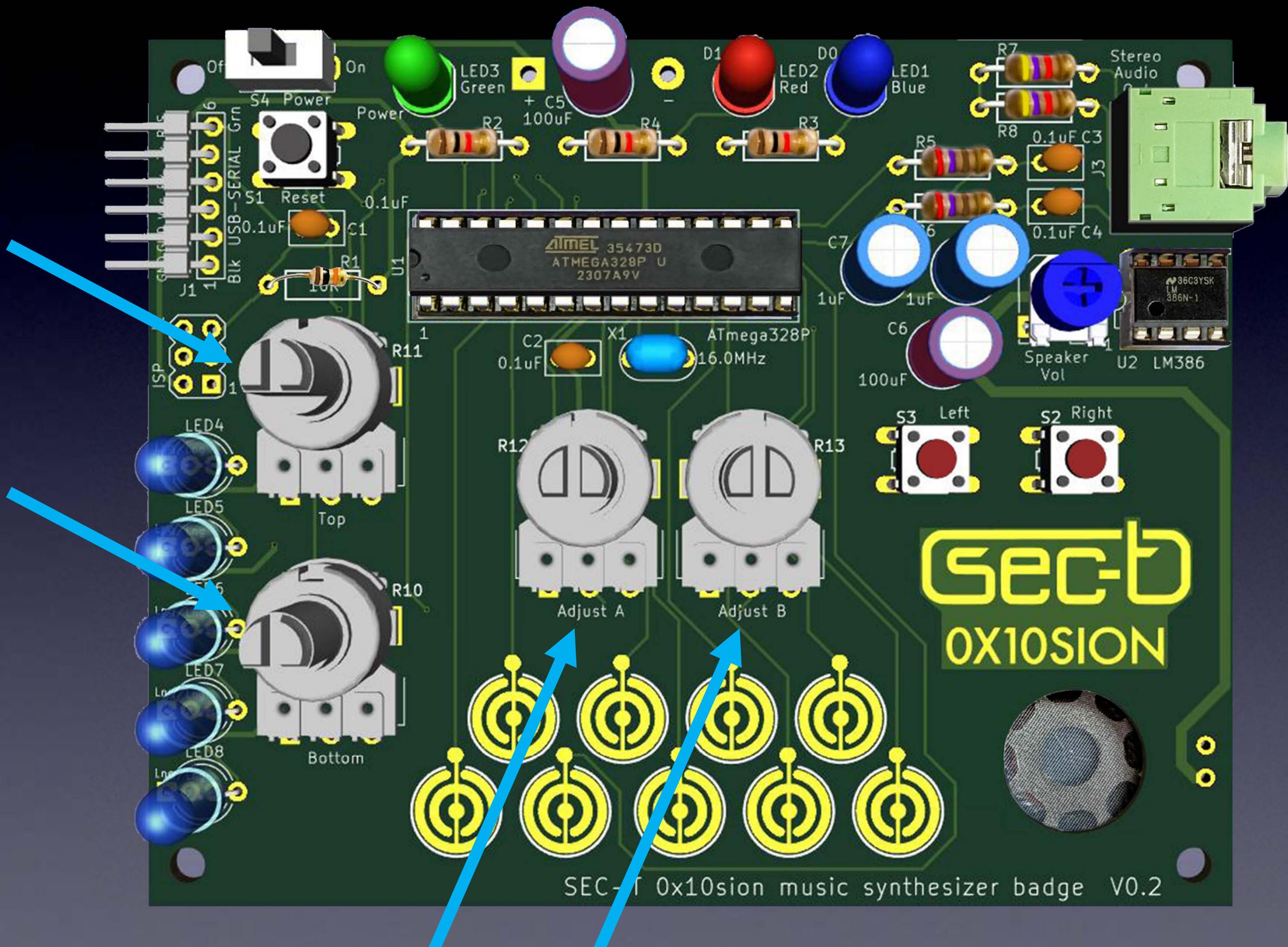
Place the black wire into its pad, and solder it

# Speaker

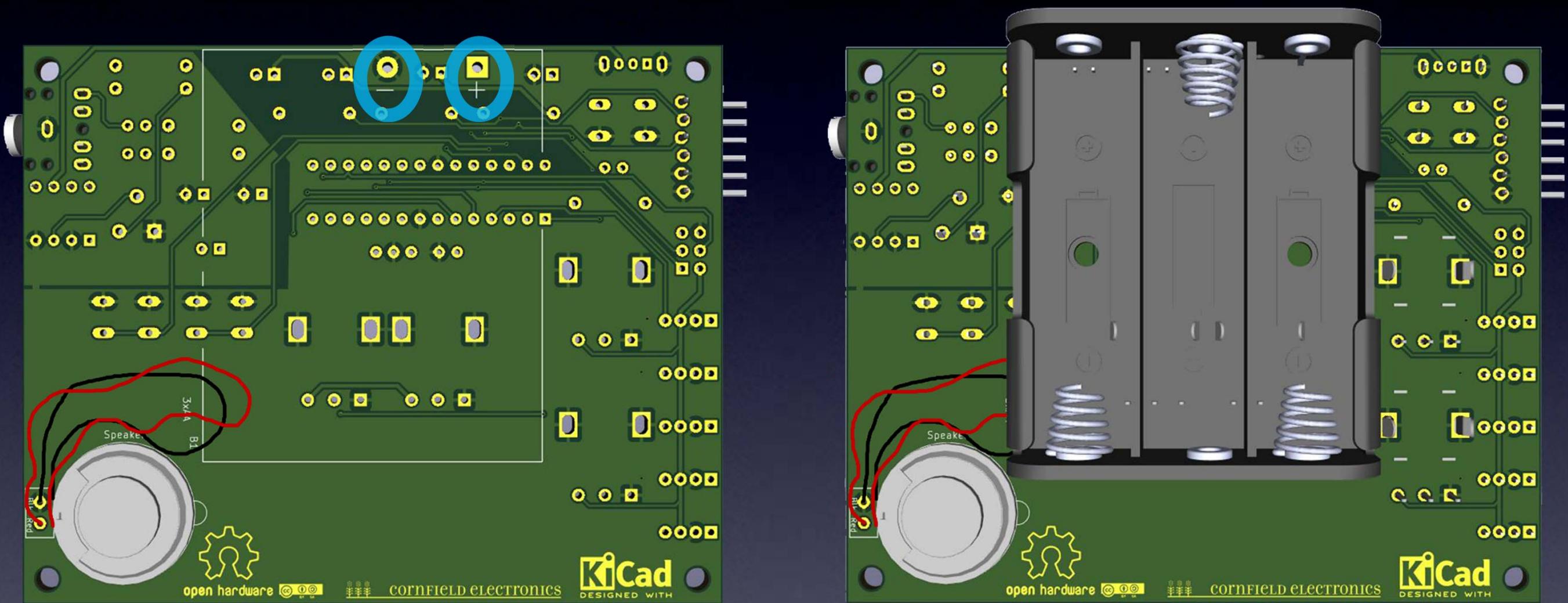


Place the red wire into its pad, and solder it

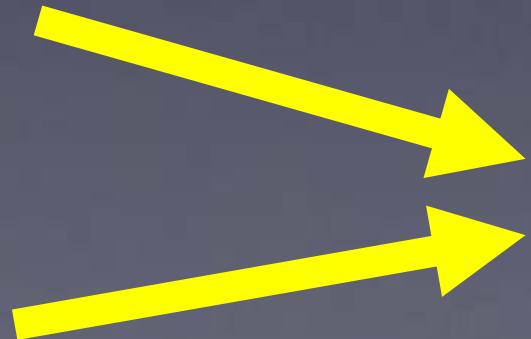
# R10, R11, R12, R13: potentiometers



# Battery pack



Place the Battery pack into place, with its leads in its “-” and “+” pads  
and solder the leads on the front



DO **NOT** CUT THE “-” and “+” leads !

# Battery pack

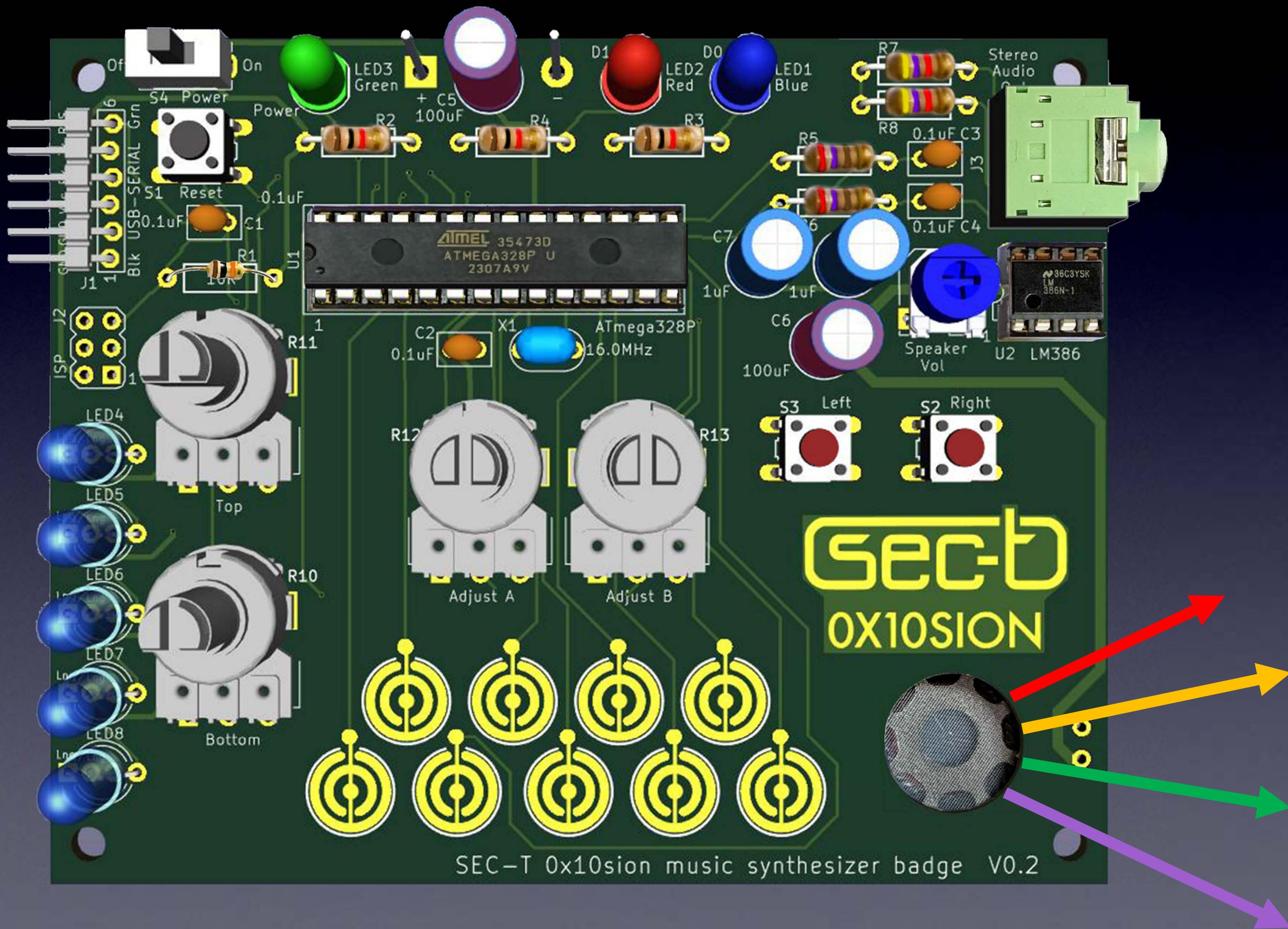
DO NOT CUT THE “-” and “+” leads !



# Done!



# Let's make some noise!



Please Remember:

to

Wash your hands  
after soldering

# Let's make noise!

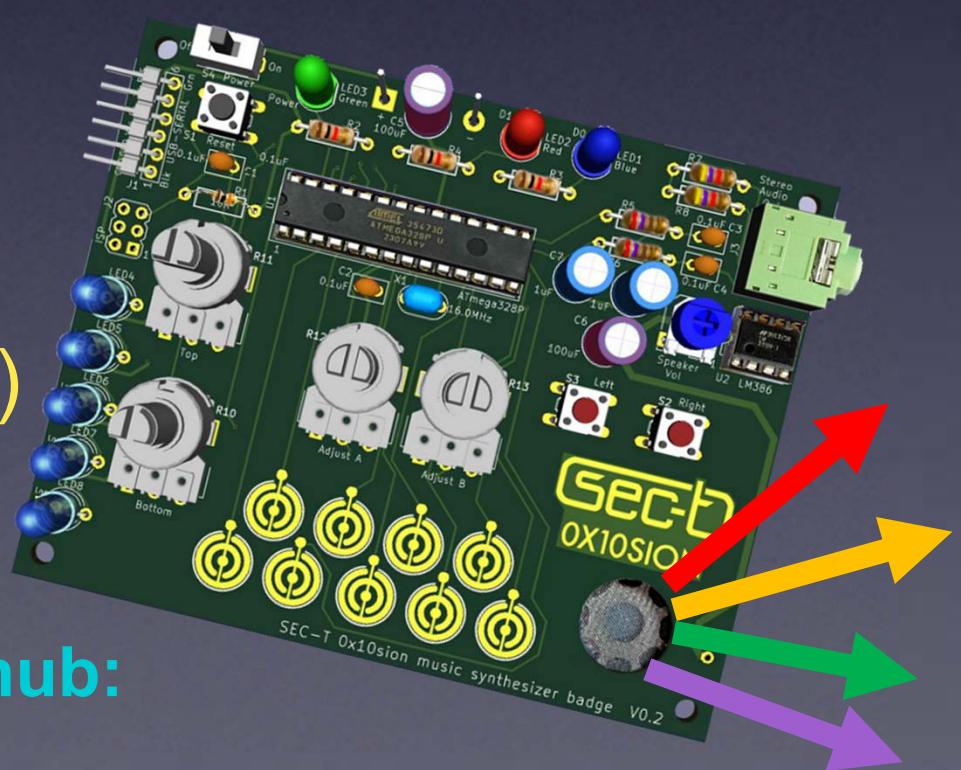
Your SEC-T 0x10sion Synth Badge comes pre-programmed with a really cool synthesizer, called “Quadrant”.

“Quadrant” is like a looper, but with the ability to warp each time around the loop.

- the left and right red buttons change octaves
- double-click the right red button and then hit a bottom-row touch-key to change to different preset – there are 5 very different presets
- the Bottom knob controls the looping rate
- the Top knob controls warping (detuning) each time through the loop
- the Adjust A knob controls the wah speed
- the Adjust B knob controls the wah depth
- Try playing with these and see!
- Long-pressing the left and right red buttons changes other parameters that the knobs can control (more info on the project’s Github)
- Experiment, and see what sounds you get!

Complete documentation is on the project’s Github:

<https://github.com/SEC-T/badge-2024>

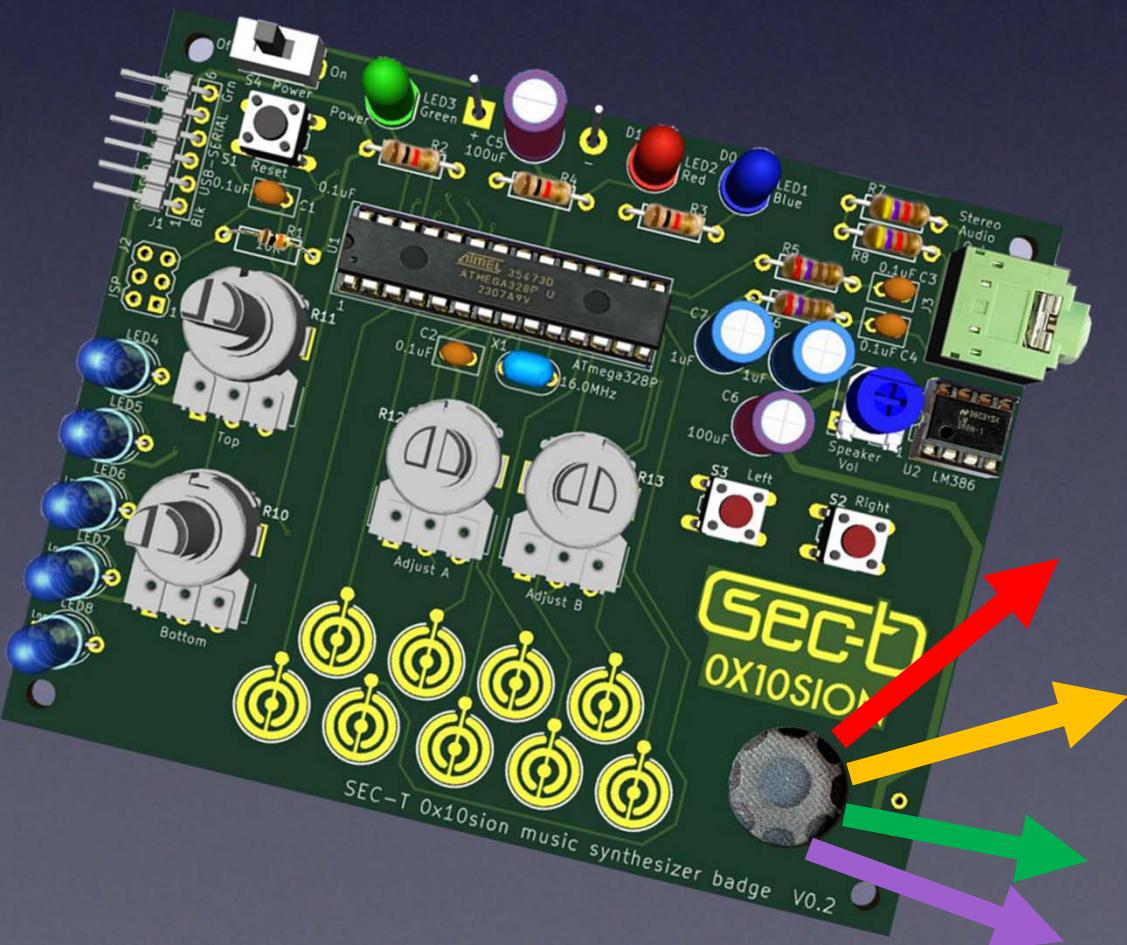


# Let's make noise!

Your SEC-T 0x10sion Synth Badge comes pre-programmed with a really cool synthesizer, called “Quadrant”.

If you are happy playing with “Quadrant” then no need to re-program your SEC-T Synth Badge.

But if you want to program other synths into your SEC-T Synth Badge, the next pages show you how...

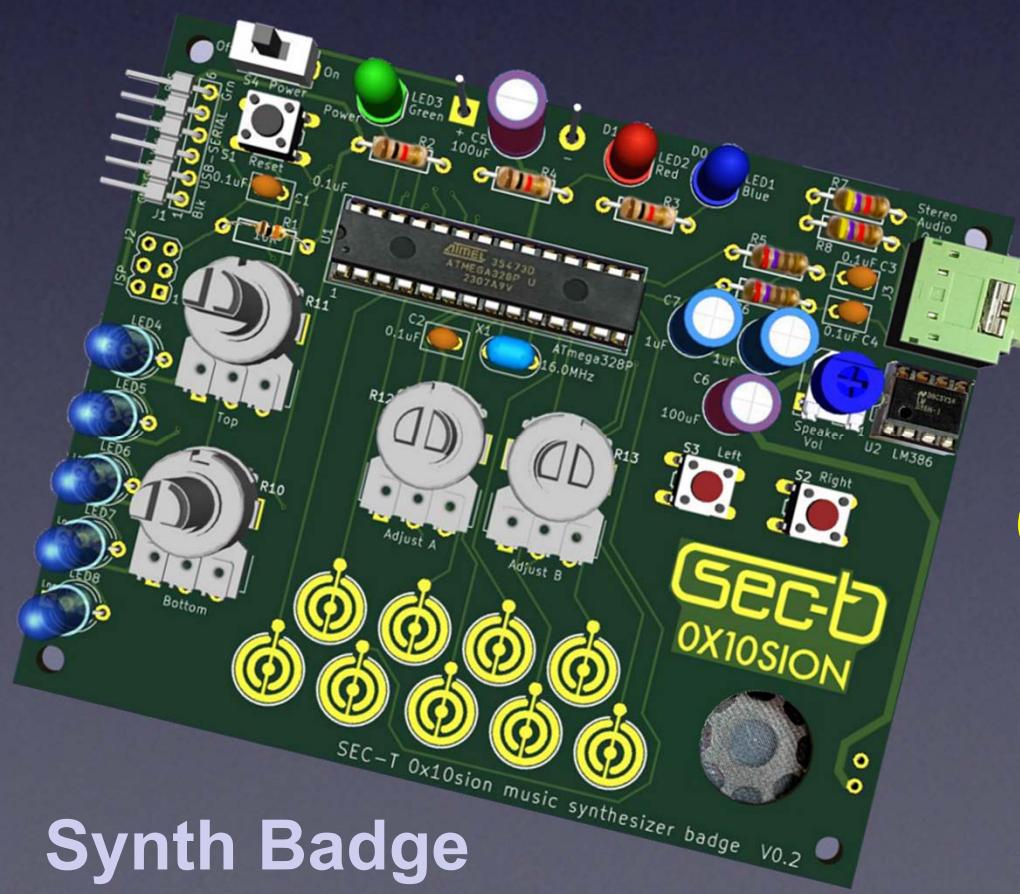


# Re-programming the Synth Badge

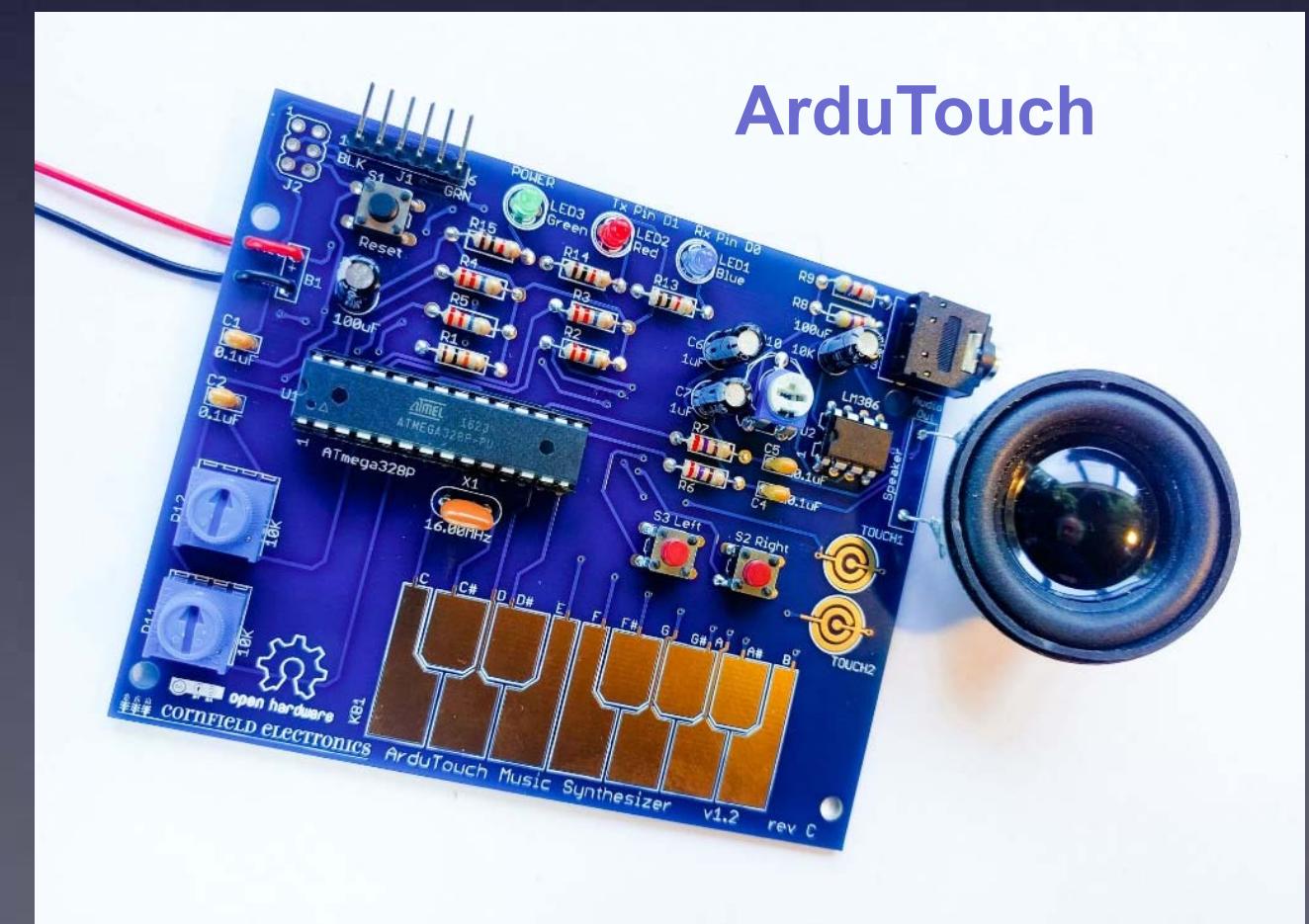
The SEC-T 0x10sion Music Synthesizer Badge  
was created from the ArduTouch Music Synthesizer project

The following pages show how to re-program the ArduTouch synthesizer

*Re-Programming the Synth Badge board  
is the same as  
re-programming the ArduTouch board*



Or



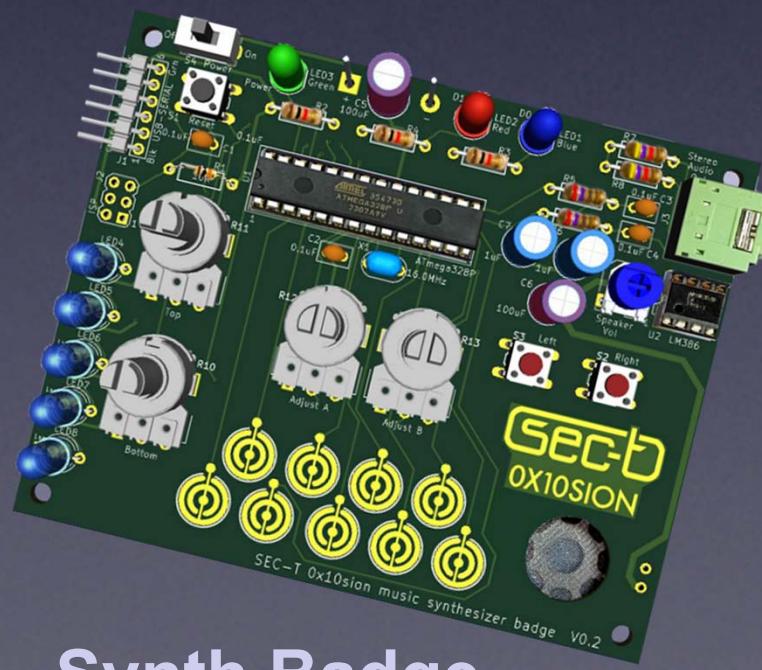
Synth Badge

# Re-programming the Synth Badge

We have written several way cool synthesizers for the ArduTouch!  
Each is unique, and each way different than the others.

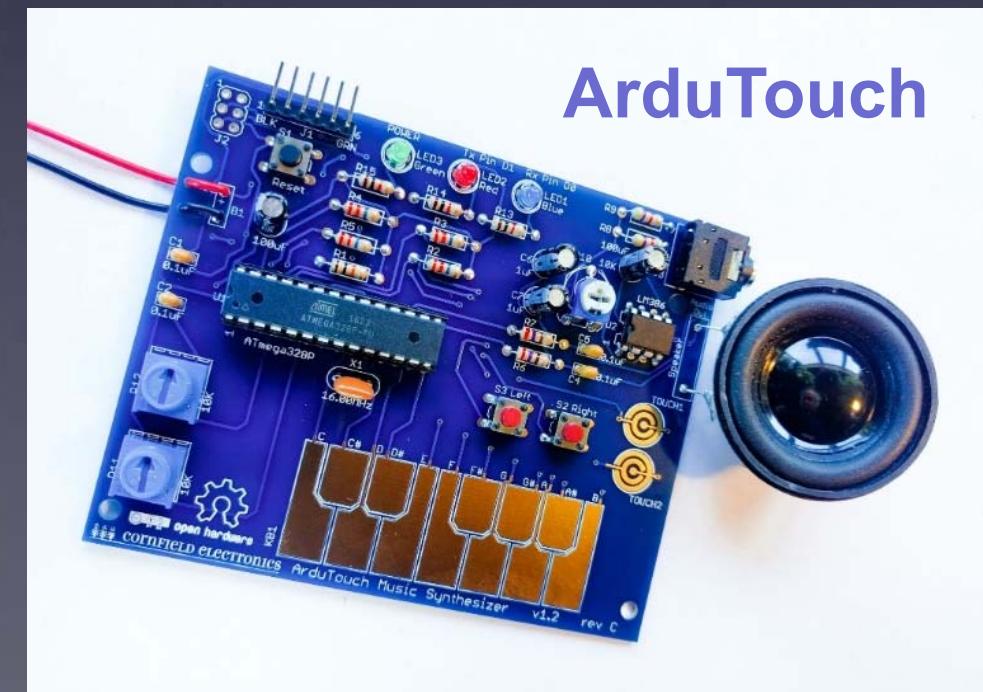
To program in a new synth in your Synth Badge, you will need:

- the Arduino software  
[<http://arduino.cc>](http://arduino.cc)
- a USB-Serial adapter cable (such as an FTDI, or equivalent)  
with its driver installed
- the SEC-T 0x10sion Synth Badge Arduino library  
[<https://github.com/SEC-T/badge-2024/tree/main/Firmware/Arduino%20Library>](https://github.com/SEC-T/badge-2024/tree/main/Firmware/Arduino%20Library)
- An ArduTouch synth sketch  
[<http://cornfieldelectronics.com/cfe/projects.php#ardutouch>](http://cornfieldelectronics.com/cfe/projects.php#ardutouch)



Synth Badge

Or



ArduTouch

# Re-programming the Synth Badge

We have written several way cool synthesizers for the ArduTouch!  
Each is unique, and each way different than the others.

To program in a new synth in your Synth Badge, you will need:

- the Arduino software  
[<http://arduino.cc>](http://arduino.cc)
- a USB-Serial adapter cable (such as an FTDI, or equivalent)  
with its driver installed
- the SEC-T 0x10sion Synth Badge Arduino library  
[<https://github.com/SEC-T/badge-2024/tree/main/Firmware/Arduino%20Library>](https://github.com/SEC-T/badge-2024/tree/main/Firmware/Arduino%20Library)
- An ArduTouch synth sketch  
[<http://cornfieldelectronics.com/cfe/projects.php#ardutouch>](http://cornfieldelectronics.com/cfe/projects.php#ardutouch)

The following pages show you how to do the above, in detail.

# Arduino

**Arduino is a very powerful tool!  
But it is very easy to use.  
It was designed for total beginners to use successfully.**

I won't give a complete tutorial here – just some basics.  
For more info, there are many good Arduino tutorials online.  
A good place to start is:  
[<https://www.arduino.cc/en/Tutorial/HomePage>](https://www.arduino.cc/en/Tutorial/HomePage)



# Arduino

**First:**  
Download and install the Arduino software  
< <http://arduino.cc> >

Any version is OK

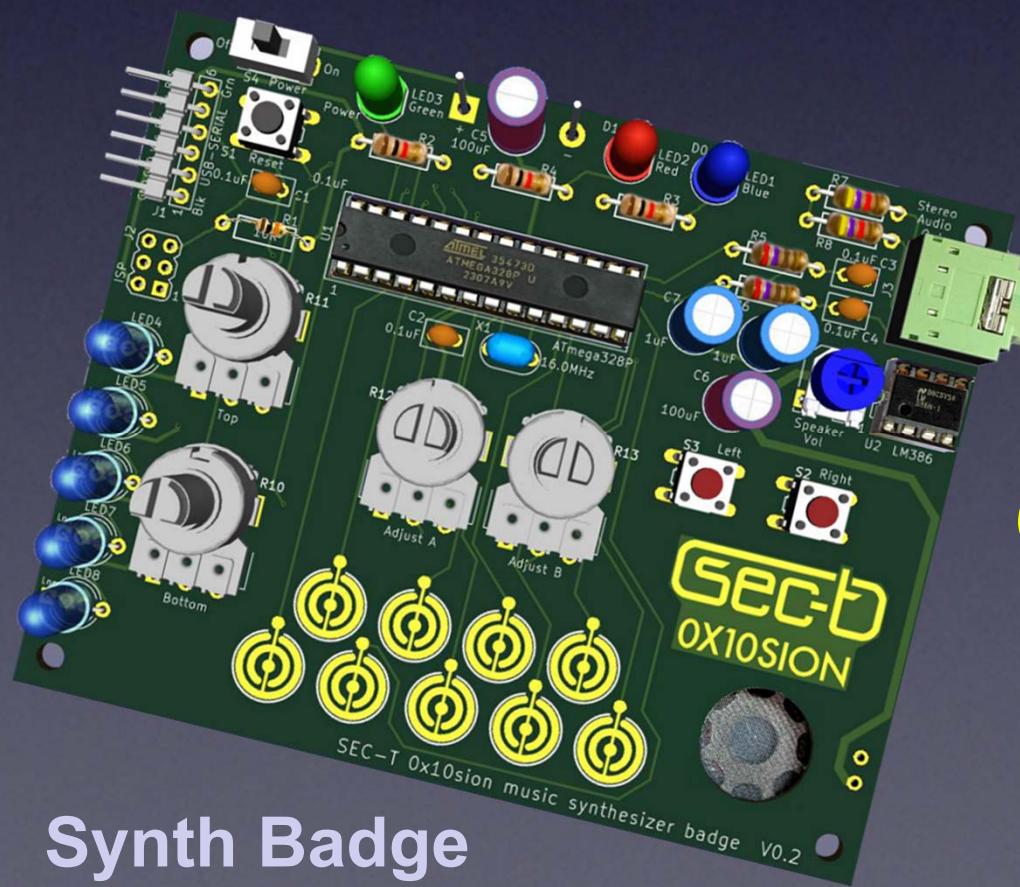


# Re-programming the Synth Badge

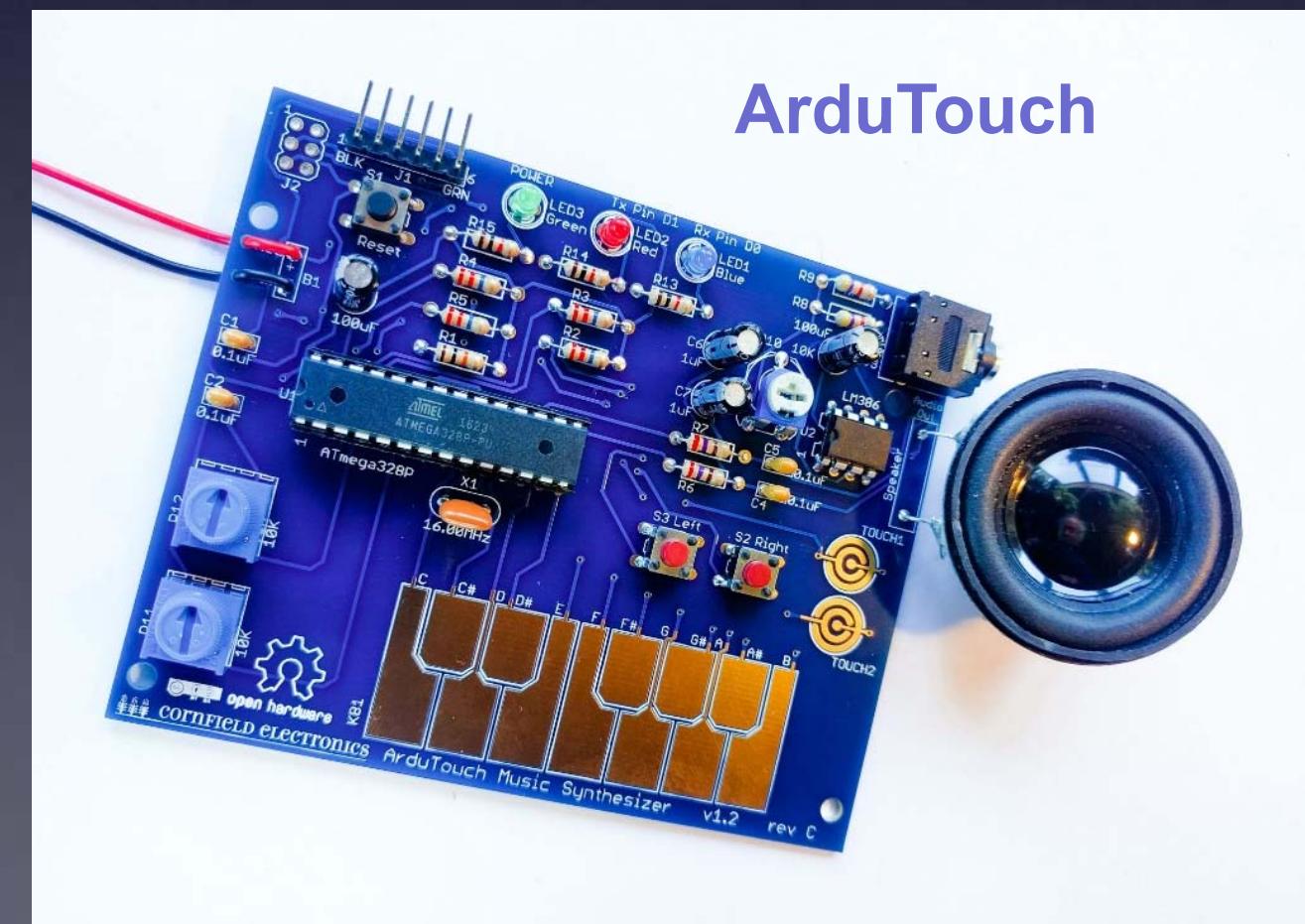
**Second:**

Download and install the SEC-T 0x10sion ArduTouch Arduino library  
<https://github.com/SEC-T/badge-2024/tree/main/Firmware/Arduino%20Library>

(details on this soon)



**Or**



# Re-programming the Synth Badge

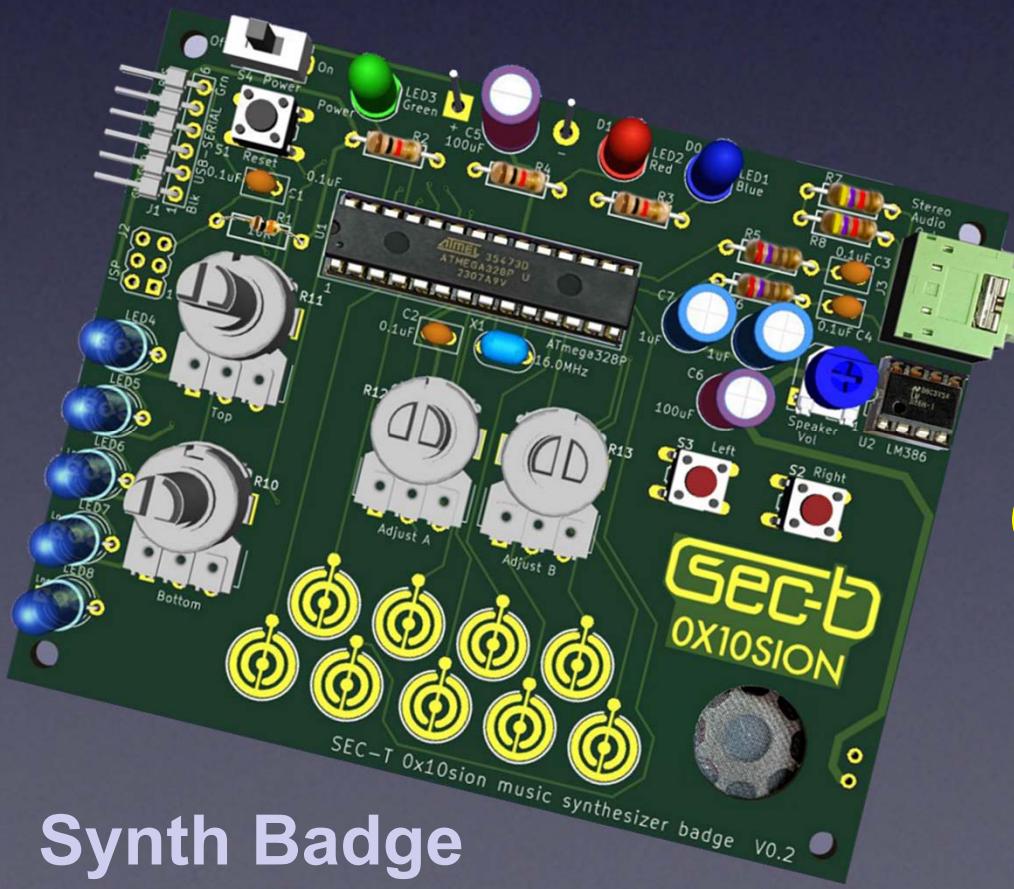
Third:

Download ArduTouch synth sketches

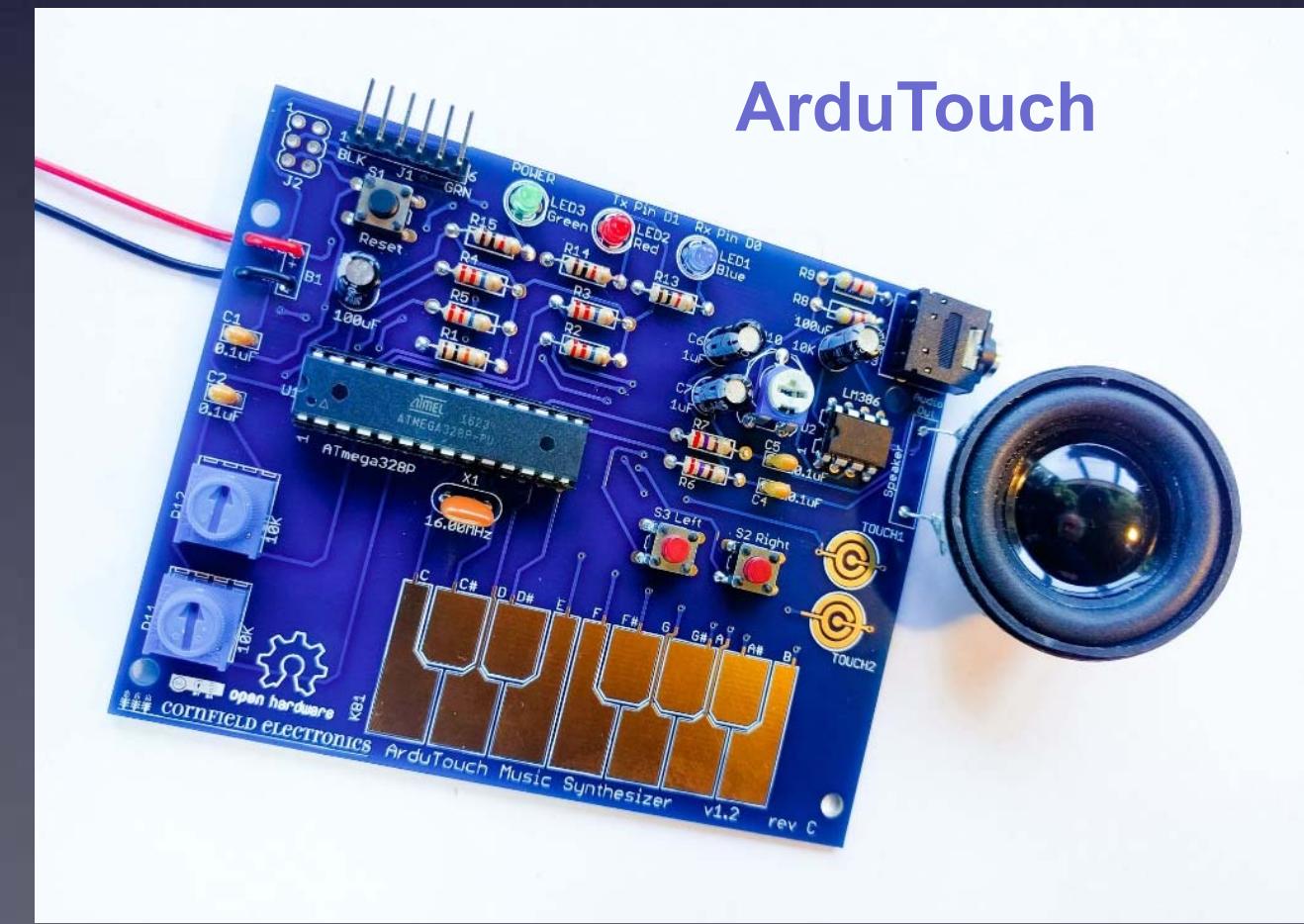
<<http://cornfieldelectronics.com/cfe/projects.php#ardutouch>>

Store them on your computer anywhere you like.

(details on this soon)



Or

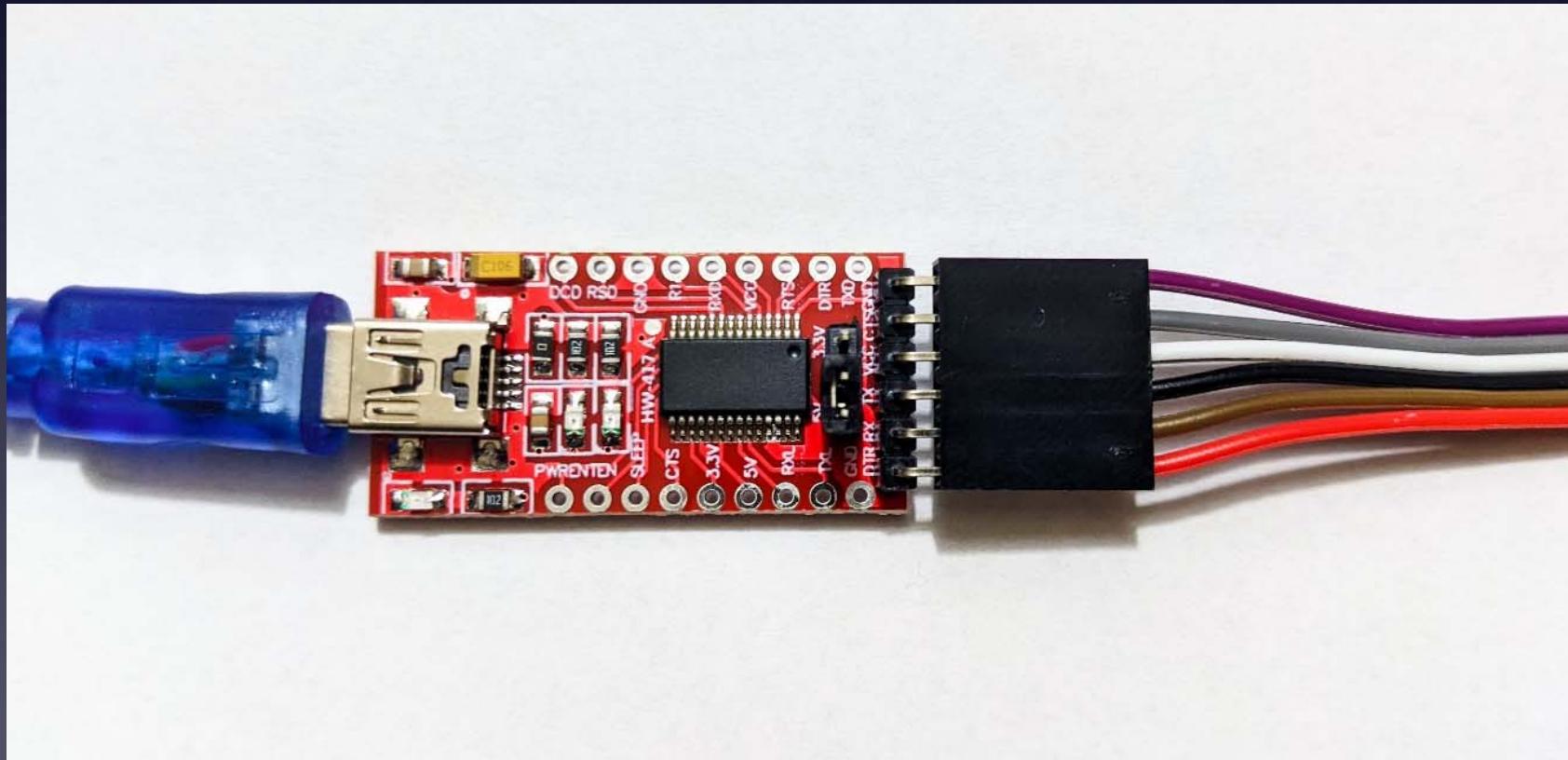


# Connecting your Synth Badge to your computer

**USB-Serial adapter cable**

**Ones available from Cornfield Electronics look like this:**

<<https://cornfieldelectronics.com/cfe/products/buy.php?productId=usbcable>>

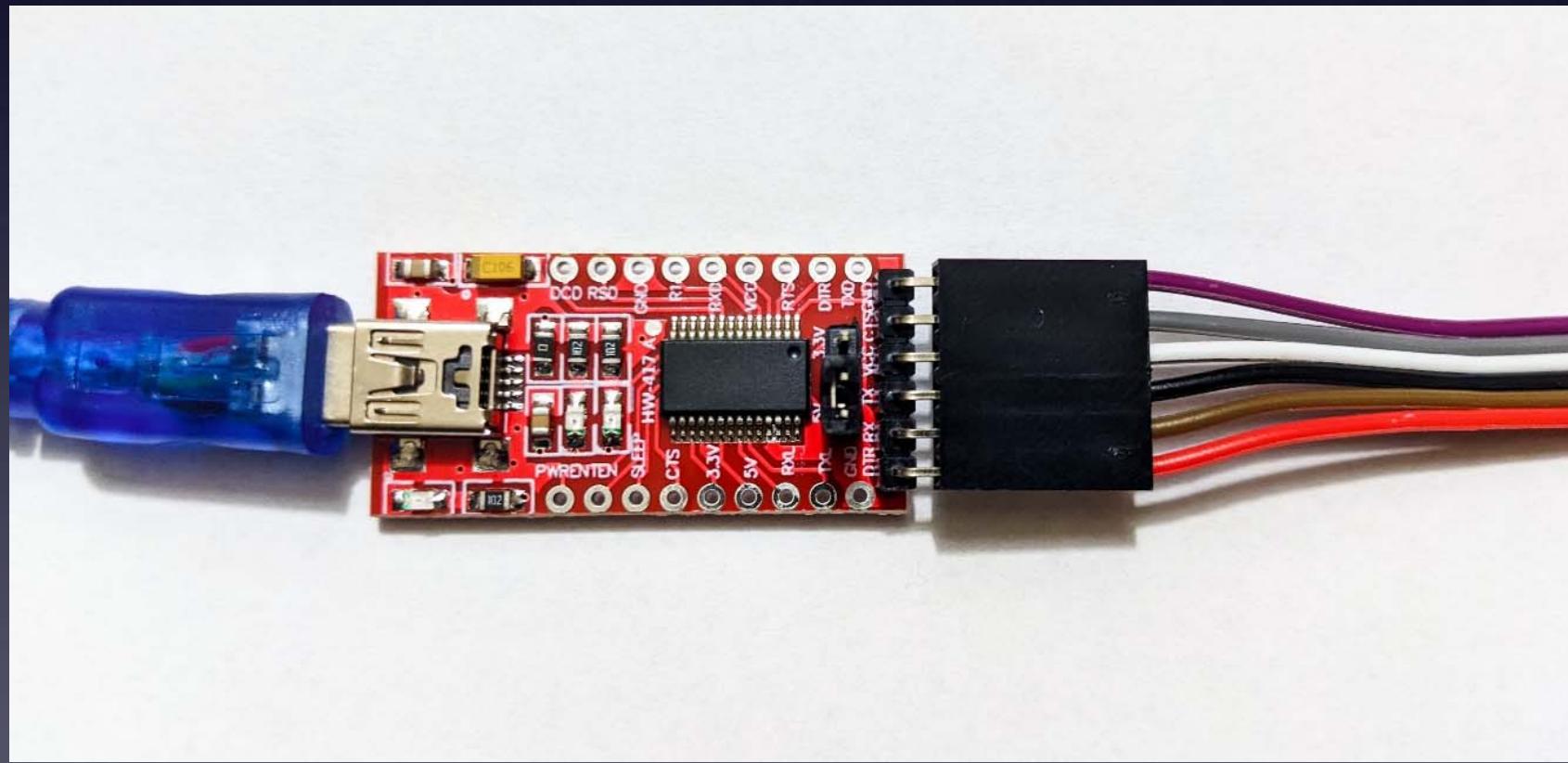


# Connecting your Synth Badge to your computer

**USB-Serial adapter cable**

**Ones available from Cornfield Electronics look like this:**

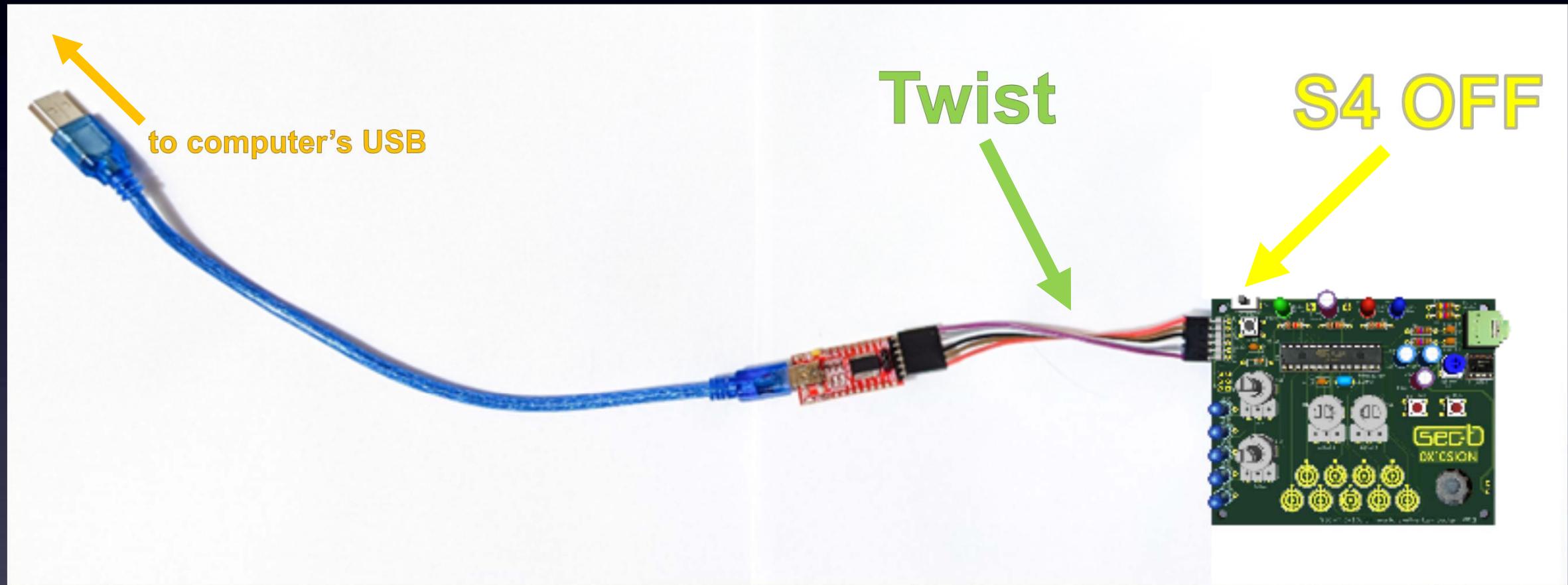
<<https://cornfieldelectronics.com/cfe/products/buy.php?productId=usbcable>>



**You may need to download and install a driver  
for your Operating System (Windows, MacOS, or Linux):**

<<https://ftdichip.com/drivers/vcp-drivers/>>

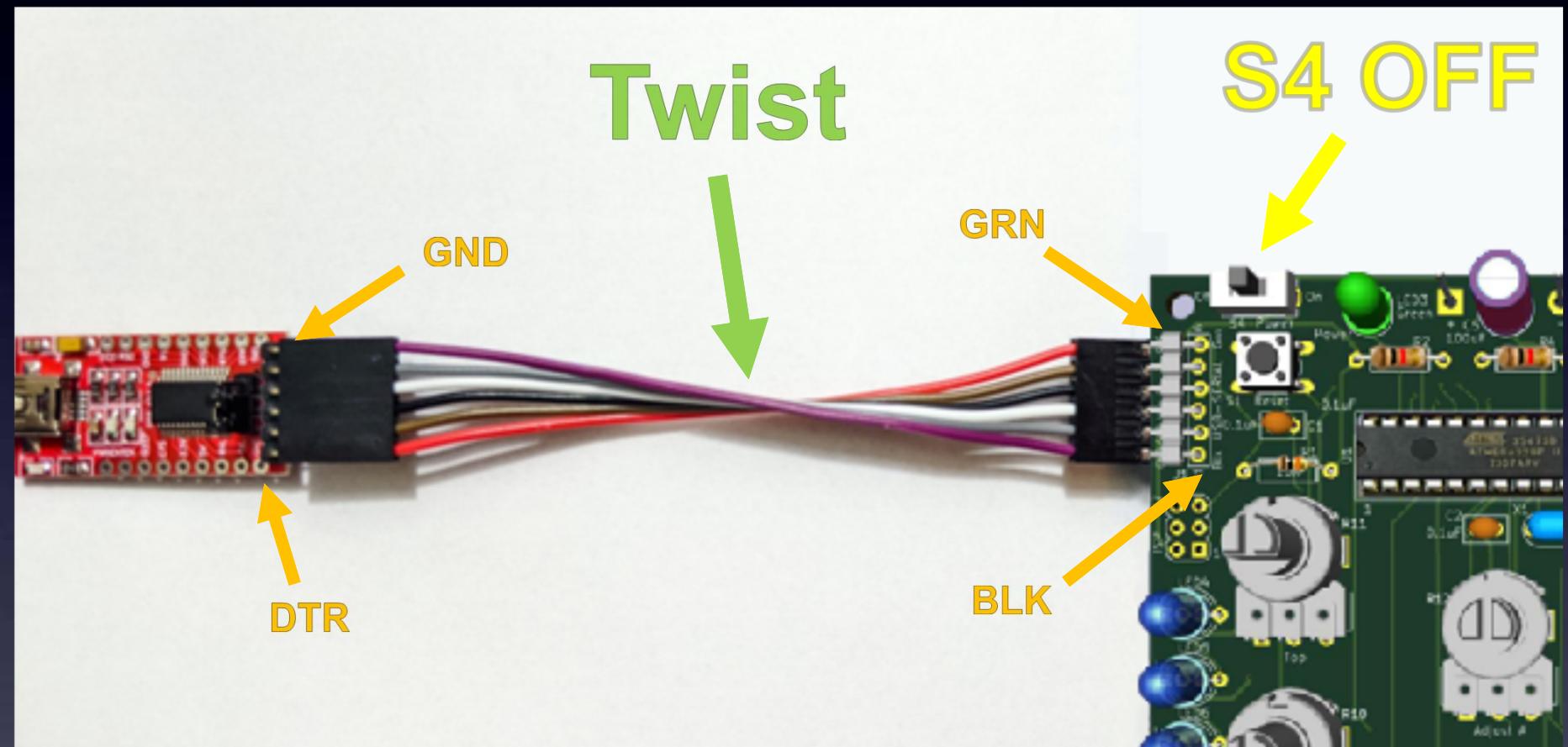
# Connecting your Synth Badge to your computer



**IMPORTANT:**  
Make sure the  
Power switch S4  
on your Synth Badge  
is OFF

# Connecting your Synth Badge to your computer

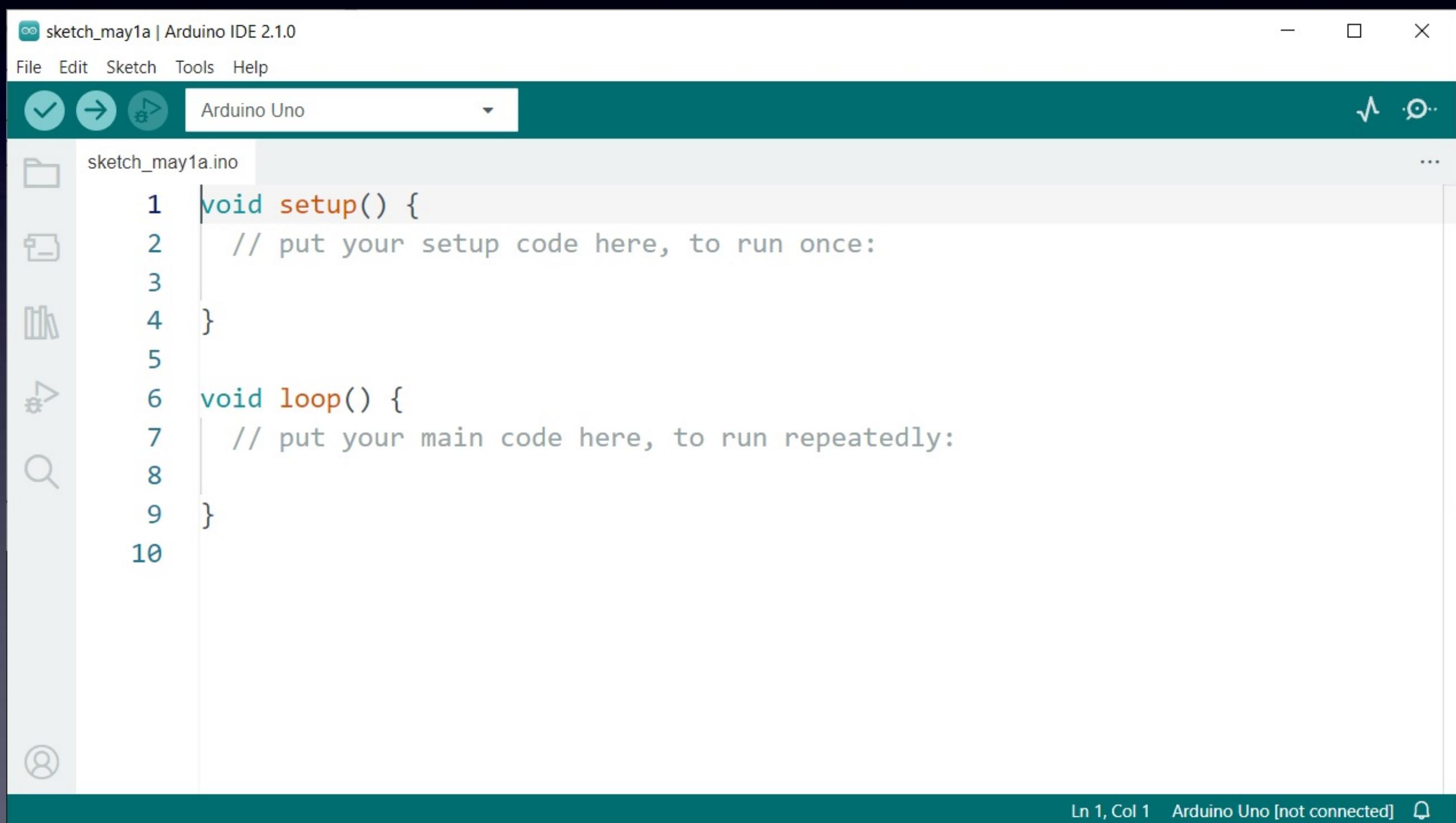
This shows a few more details:



**IMPORTANT:**  
Make sure the  
Power switch S4  
on your Synth Badge  
is OFF

# Arduino

**After you download and install the Arduino software start it, and you will see a screen that looks like this:**

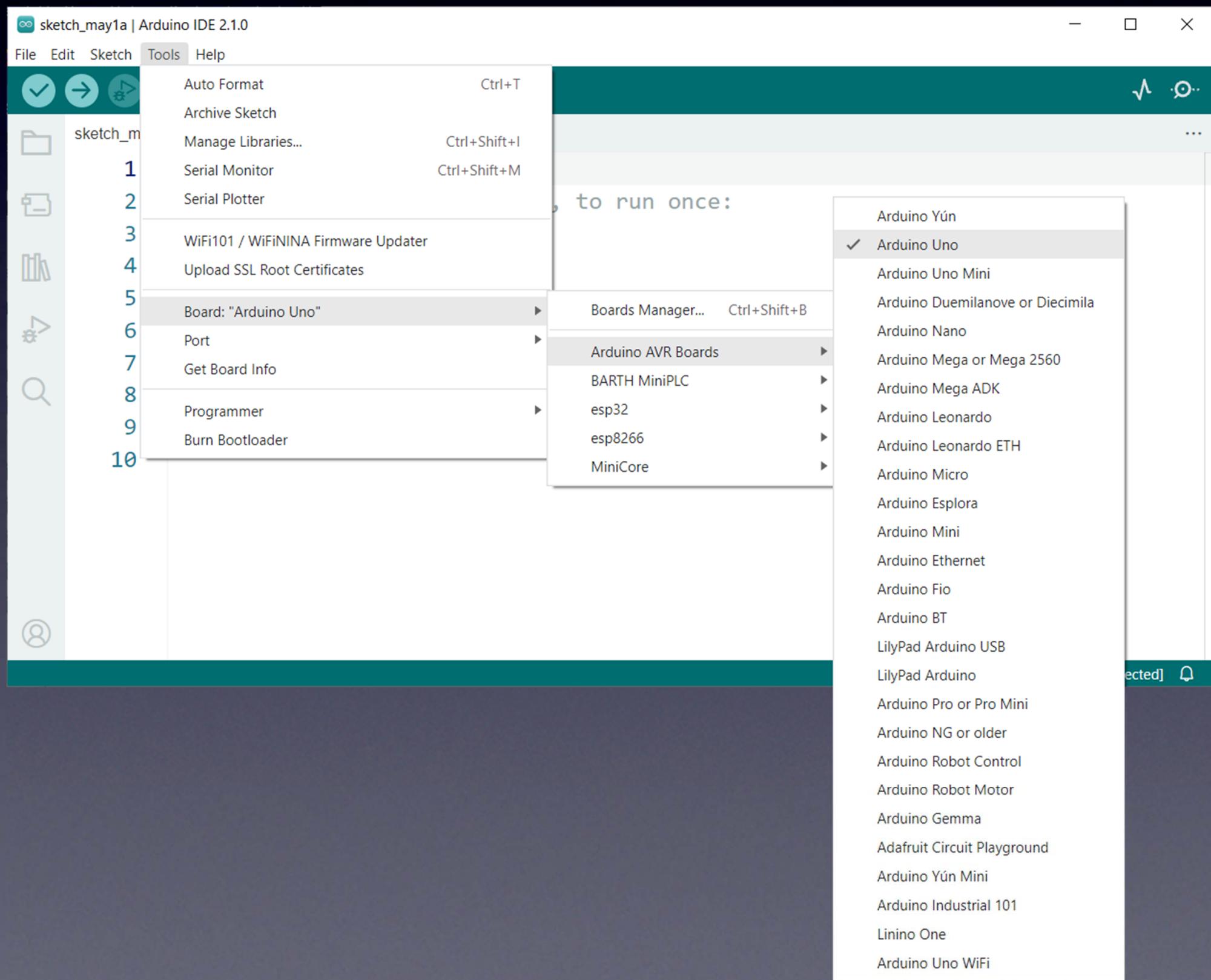


# Arduino

The first time you start your Arduino software  
you need to do three things to set things up

(1)  
**Choose “Uno”  
as the Board**

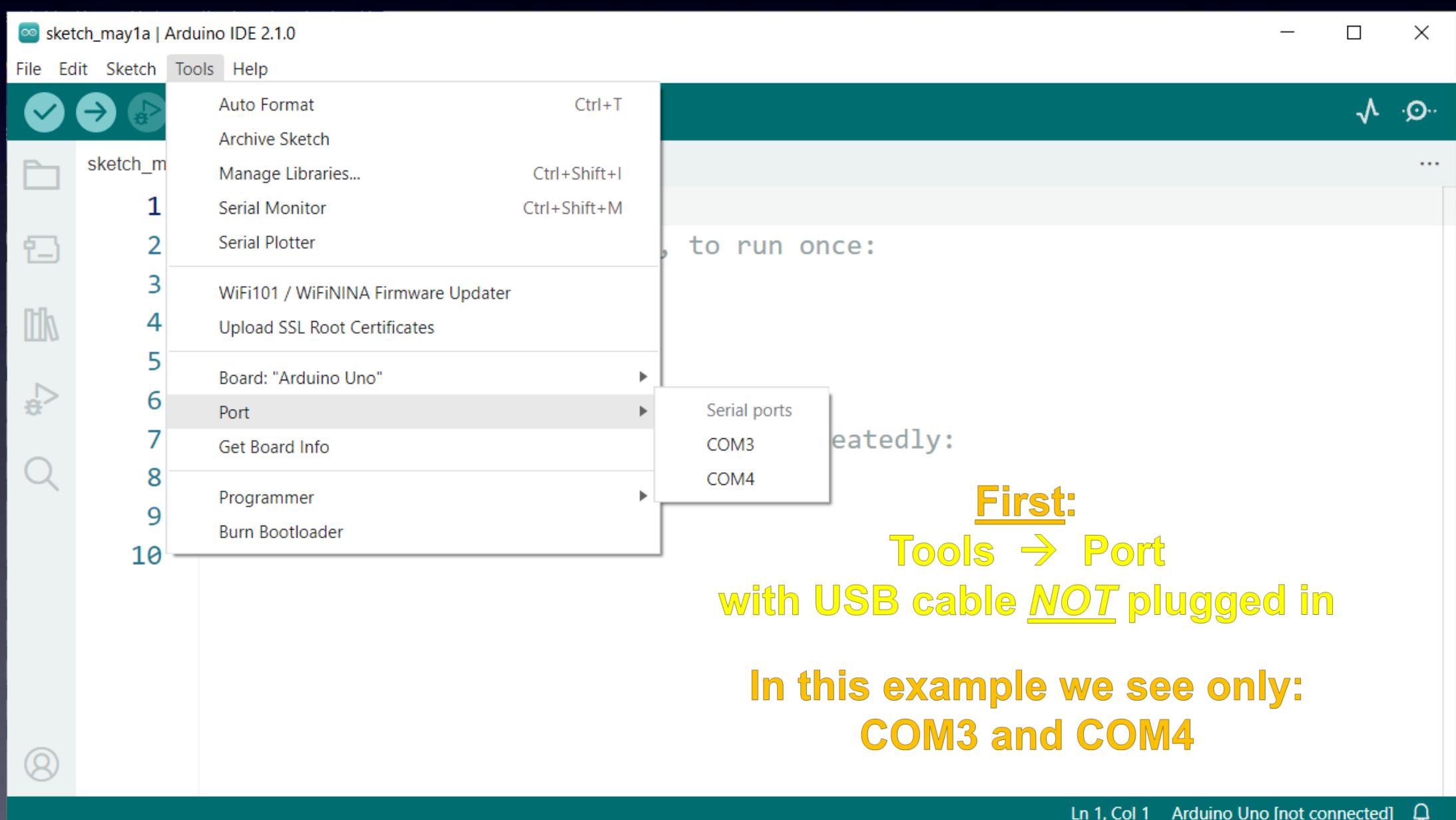
(Your  
Synth Badge board  
acts  
just like  
an  
Arduino Uno board)



# Arduino

The first time you start your Arduino software  
you need to do three things to set things up

(2)  
**Choose  
the Port  
(this will be  
different  
depending on  
your Operating  
System)**



# Arduino

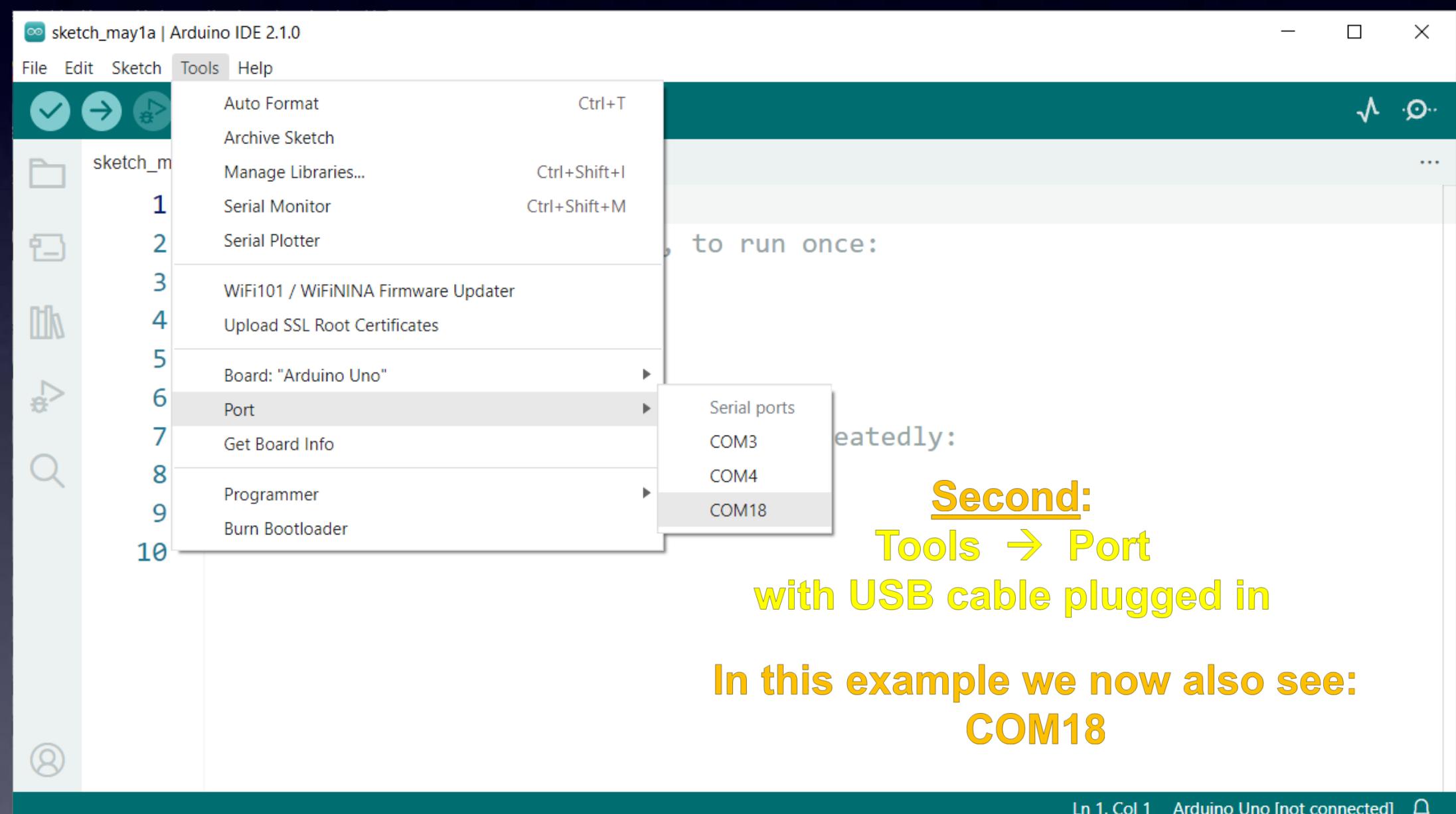
The first time you start your Arduino software  
you need to do three things to set things up

with USB cable plugged in (with driver installed):

(2)

Choose  
the Port  
(this will be  
different  
depending on  
your Operating  
System)

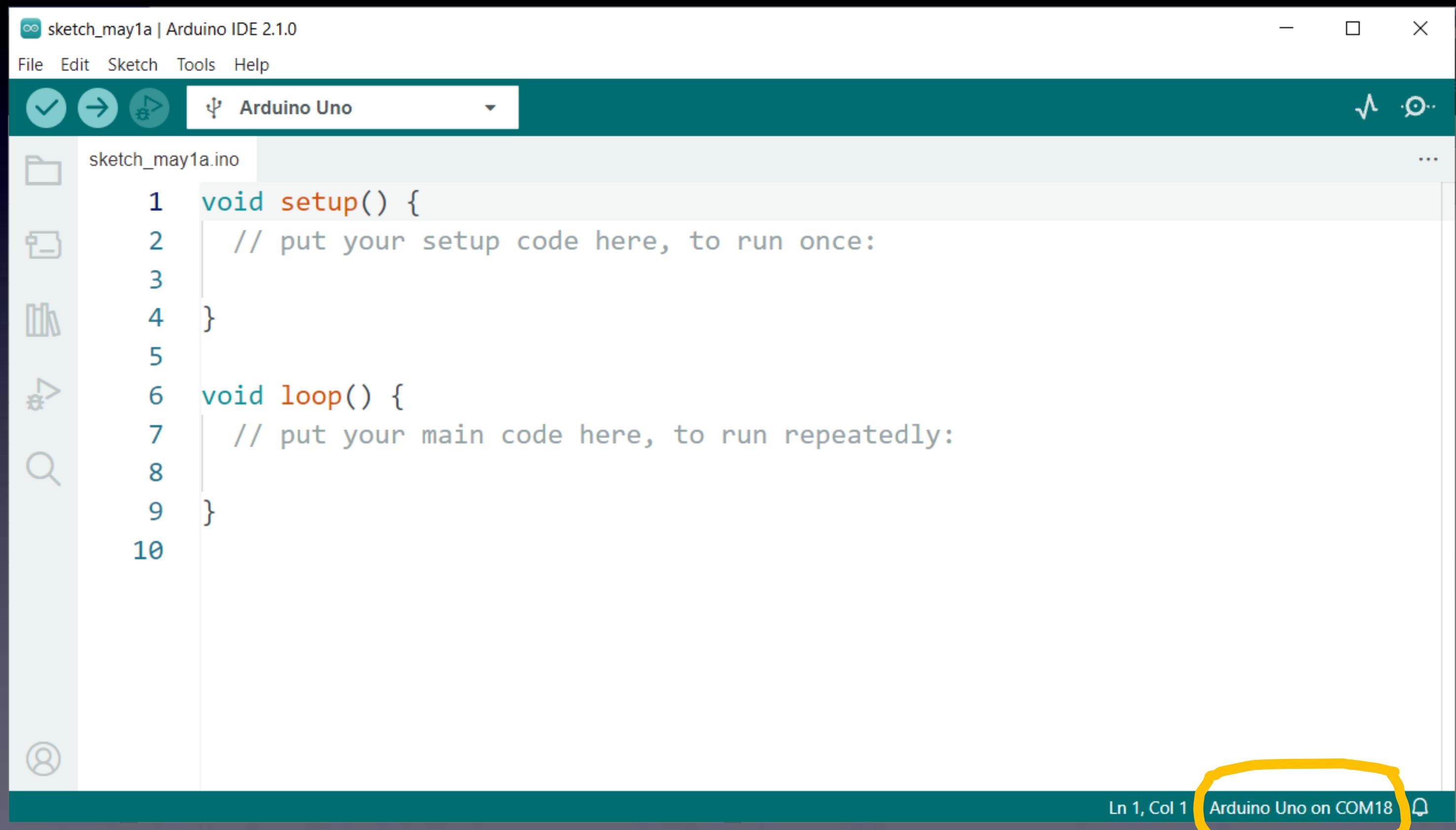
(After installing  
the driver for  
your USB-Serial cable  
and plugging it in  
your operating system  
will see a serial port  
and it appears here.)



Choose the new port:  
In this example: COM18

# Arduino

Your Arduino software is almost ready



sketch\_may1a | Arduino IDE 2.1.0

File Edit Sketch Tools Help

Arduino Uno

sketch\_may1a.ino

```
1 void setup() {
2     // put your setup code here, to run once:
3
4 }
5
6 void loop() {
7     // put your main code here, to run repeatedly:
8
9 }
10
```

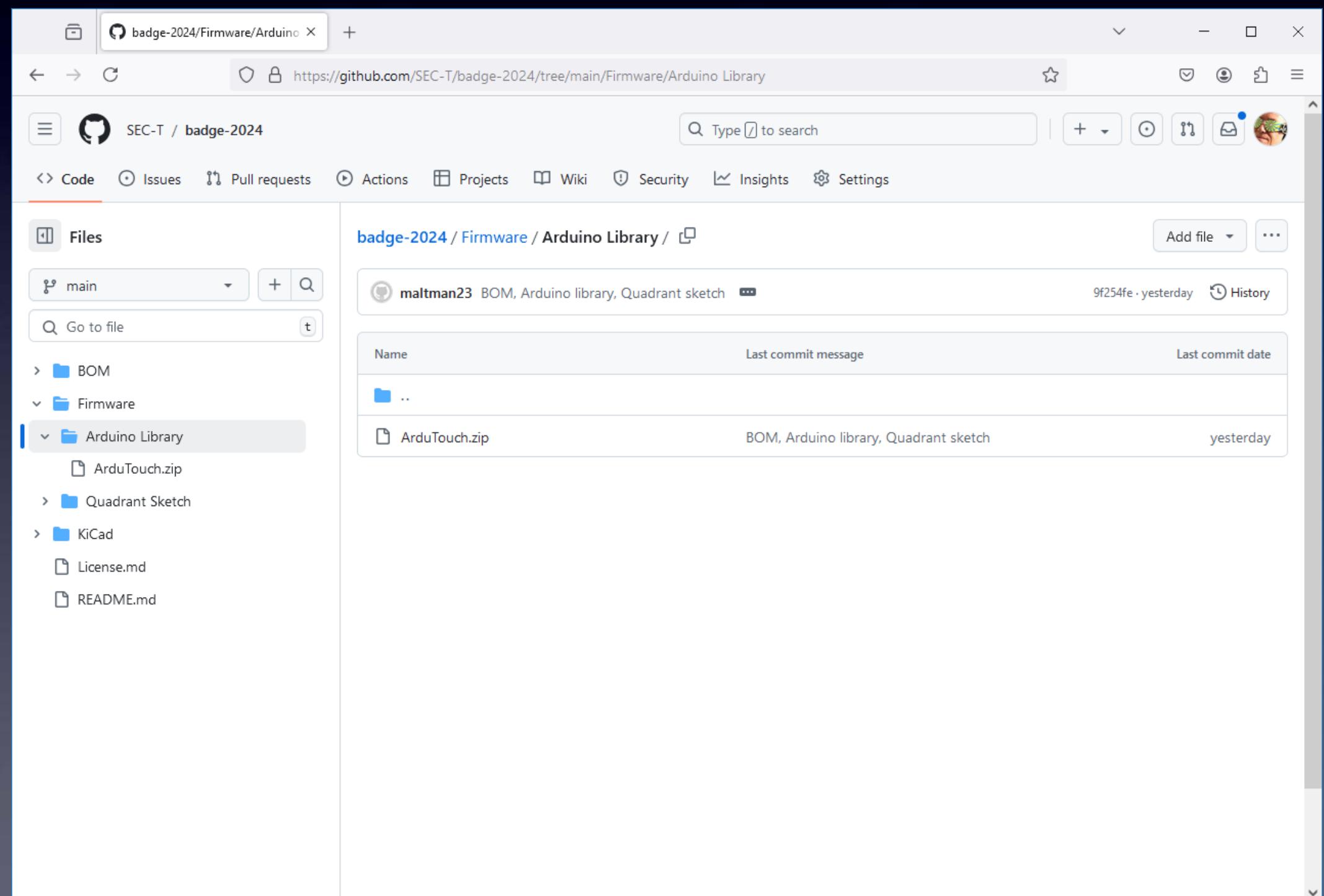
Ln 1, Col 1 Arduino Uno on COM18

# Arduino

The first time you start your Arduino software  
you need to do three things to set things up

(3) <https://github.com/SEC-T/badge-2024/tree/main/Firmware/Arduino%20Library>

Install  
the  
SEC-T 0x10sion  
Synth Badge  
library

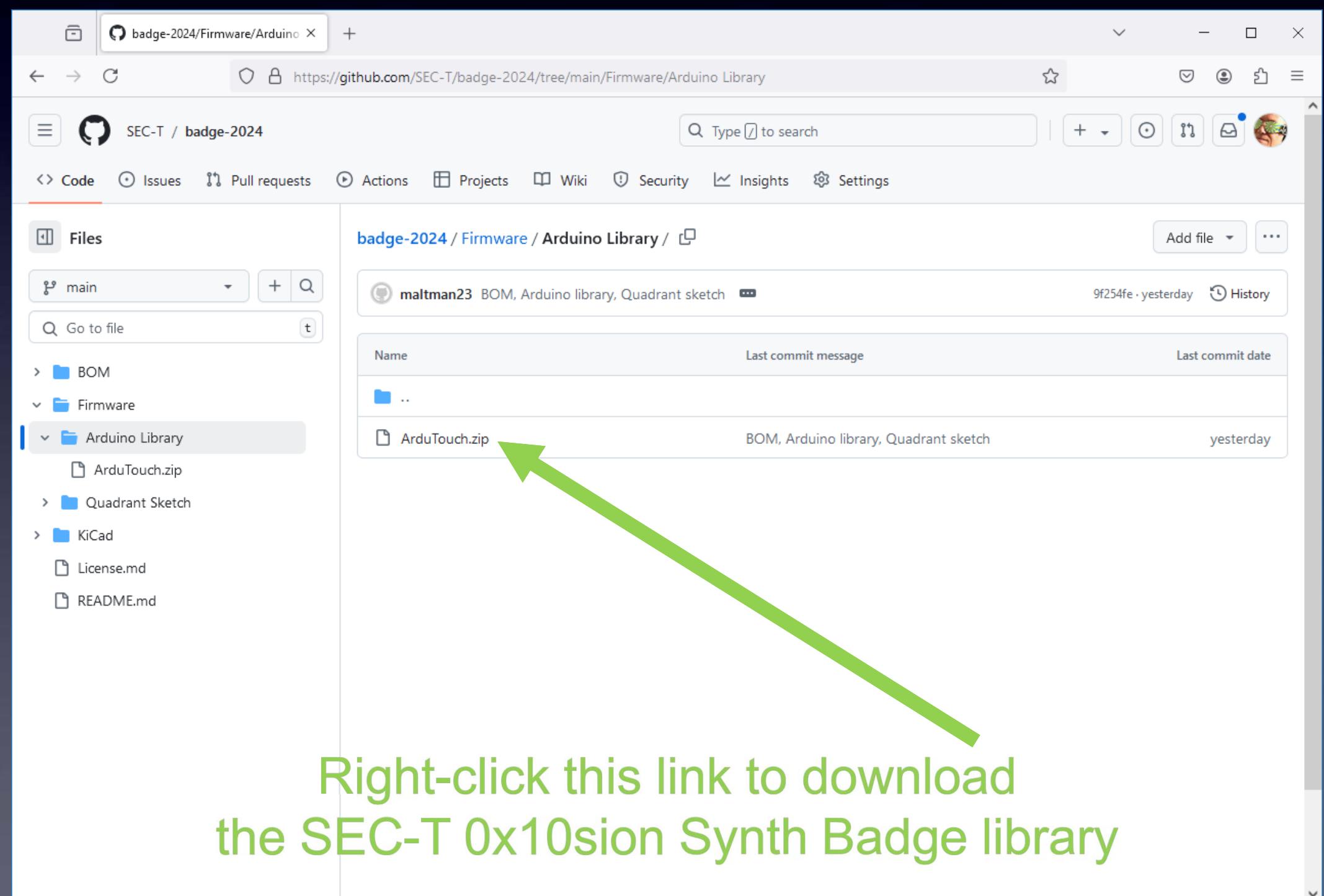


# Arduino

The first time you start your Arduino software  
you need to do three things to set things up

(3) <https://github.com/SEC-T/badge-2024/tree/main/Firmware/Arduino%20Library>

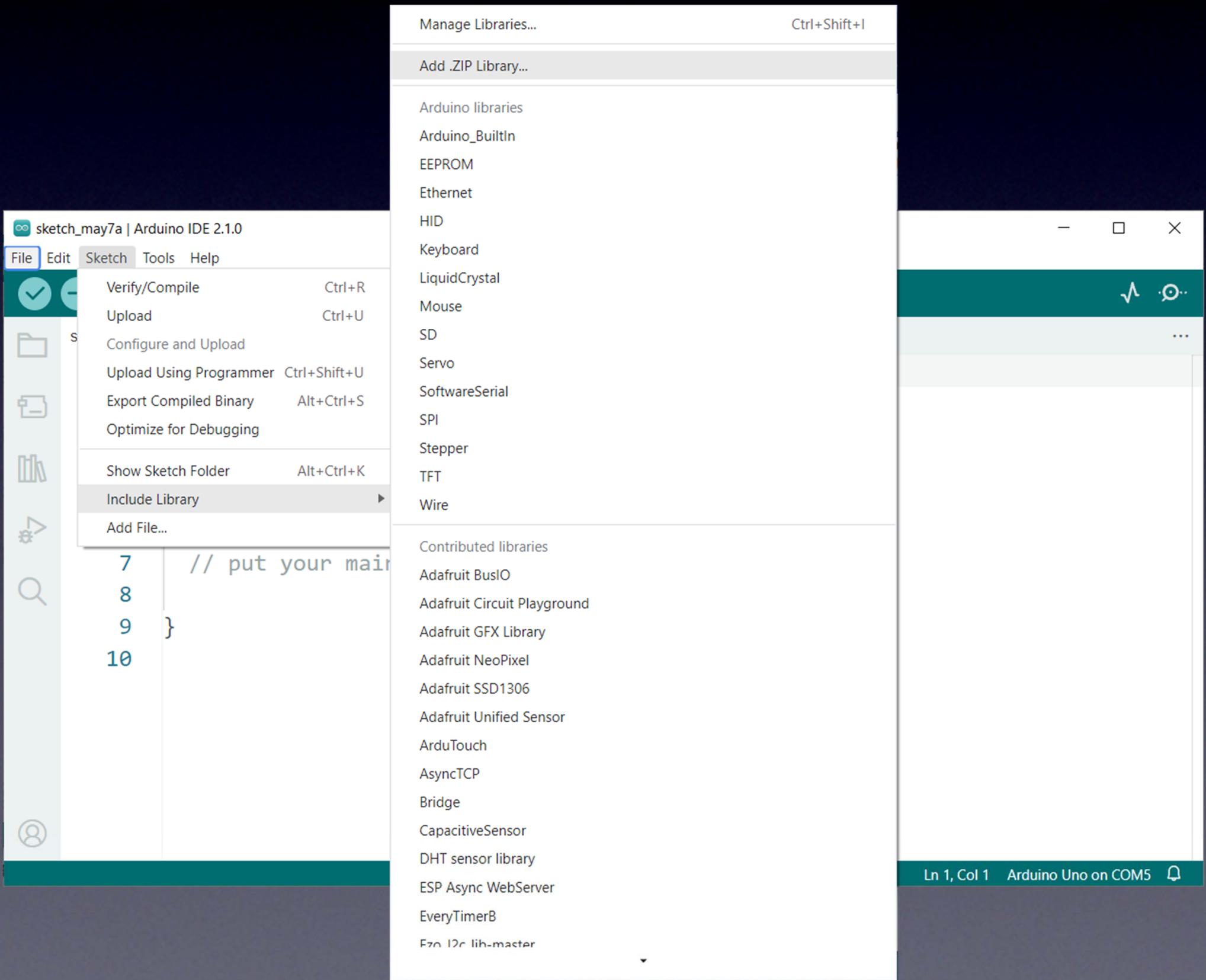
Install  
the  
SEC-T 0x10sion  
Synth Badge  
library



# Arduino

The first time you start your Arduino software  
you need to do three things to set things up

(3)  
**Install  
the  
SEC-T 0x10sion  
Synth Badge  
library**



# Arduino

**The first time you start your Arduino software  
you need to do three things to set things up**

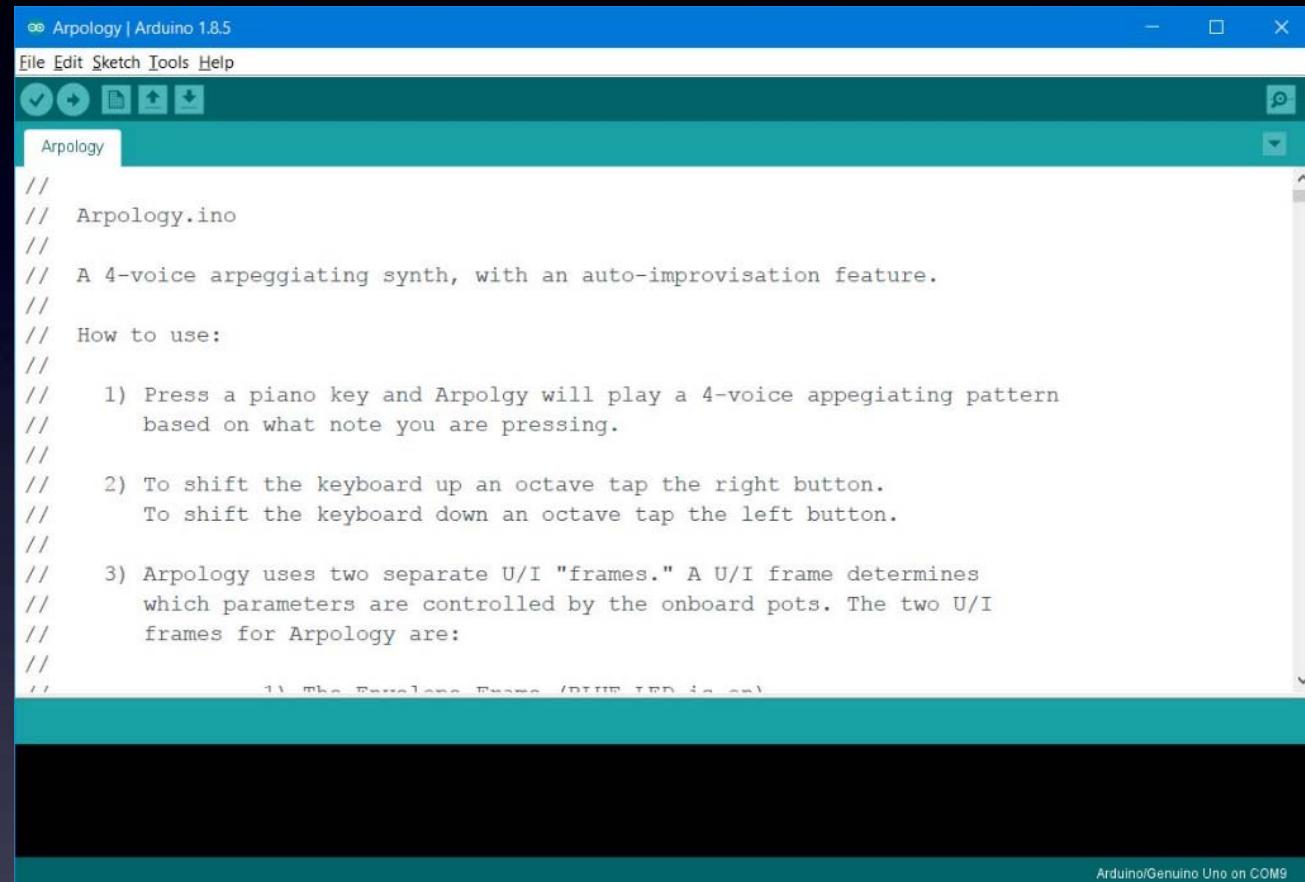
*Your Arduino software is now ready*

to program a synth sketch  
into your SEC-T 0x10sion Synth Badge !

# Arduino

Designed for non-geeky artists

Download  
a new  
Synth Badge  
synth “sketch”



The screenshot shows the Arduino IDE interface with the title bar "Arpology | Arduino 1.8.5". The main window displays the code for "Arpology.ino". The code is a C++ program with comments explaining its functionality. It includes instructions for using a piano key to play a 4-voice arpeggiating pattern, shifting the keyboard up or down an octave using buttons, and controlling two separate UI frames with onboard pots. The code ends with a note about the blue LED being on. At the bottom of the IDE, it says "Arduino/Genuino Uno on COM9".

```
//  
// Arpology.ino  
//  
// A 4-voice arpeggiating synth, with an auto-improvisation feature.  
//  
// How to use:  
//  
// 1) Press a piano key and Arpolgy will play a 4-voice appiegiating pattern  
// based on what note you are pressing.  
//  
// 2) To shift the keyboard up an octave tap the right button.  
// To shift the keyboard down an octave tap the left button.  
//  
// 3) Arpology uses two separate U/I "frames." A U/I frame determines  
// which parameters are controlled by the onboard pots. The two U/I  
// frames for Arpology are:  
  
//  
// The Parallel Frame (blue LED is on)  
  
//  
// Arduino/Genuino Uno on COM9
```

“Sketch” :  
an Arduino program

# Arduino

Download a new Synth Badge synth “sketch”

The screenshot shows a web browser window with the Cornfield Electronics website. The page features a yellow header with the logo 'cornFIELD electronics' and a subtext 'useful electronics for a better world'. Below the header is a navigation bar with links for 'home', 'buy', 'about us', 'press', 'distributors', 'projects', and 'show cart'. The main content area has a large title 'Take control' and a paragraph about Cornfield Electronics' mission to empower people through technology. It highlights the 'TV-B-Gone' universal remote and the 'NeuroDreamer' sleep mask. To the left, there are three product images: a blue Arduino-like circuit board, a purple 'NeuroDreamer' sleep mask, and a black 'TV-B-Gone' remote control. The bottom of the page includes a 'join our mailing list' button, legal notices, and a CC BY-SA license notice.

At Cornfield Electronics we create devices that give people opportunities for effective choices in their lives. Each of us can decide whether to watch TV monitors, and when to watch. Each of us can decide when to get the rest we want, and how we dream. Everyone can learn to make cool things with our kits. Please explore our [products](#), make your own choices, and see how your life can be enhanced.

join our mailing list

Love it or hate it, TV screens are all around us. [TV-B-Gone®](#) universal remote control is the first fruit of our technical savvy, embodying our belief in empowerment, and sense of humor. This universal remote control fits in your pocket and allows you to discreetly turn TVs off wherever you go. TV-B-Gone fans around the world are using it for a variety of practical, philosophical, and humorous purposes. Imagine the possibilities...

Years in the making [NeuroDreamer](#) sleep mask is another of our personal empowerment inventions. We all need rest, but we don't always get it in our busy lives. NeuroDreamer sleep mask lets you use your own brainwaves to

bring you the rest you need. And with the [lucid dreaming model](#), you can take control of your dreams.

Want to learn electronics? We make way cool, fun, intriguing, educational [kits](#) that **anyone can make!** Our most POPULAR kits are: [ArduTouch music synthesizer kit](#) and [TV-B-Gone kit!](#)

We make truly useful technological solutions that put you in charge.

Welcome to our better world!

**NOTE: As of 14-Feb-2023 Cornfield Electronics is a sole proprietorship of Mitch Altman.**

legal notices & privacy policy

CC BY-SA 2023 cornfield electronics

# Arduino

Download a new Synth Badge synth “sketch”

The screenshot shows a web browser window with the Cornfield Electronics website open at <https://cornfieldelectronics.com/cfe/cfe.main.php>. The page features a yellow header with the text "cornFIELD electronics" and a sub-header "useful electronics for a better world". Below the header, there's a navigation bar with links for "home", "buy", "about us", "press", "distributors", "projects" (which has a green arrow pointing to it), and "show cart". The main content area has a large title "Take control". It includes a paragraph about Cornfield Electronics creating devices for effective choices, mentioning the TV-B-Gone and NeuroDreamer products. There are three product images on the left: a blue Arduino-like board, a purple sleep mask labeled "Neuro Dreamer", and a black remote control. The right side of the page contains more text about the TV-B-Gone and NeuroDreamer, along with a note about Mitch Altman's proprietorship. At the bottom, there are links for legal notices, privacy policy, and a CC BY-SA license notice.

At Cornfield Electronics we create devices that give people opportunities for effective choices in their lives. Each of us can decide whether to watch TV monitors, and when to watch. Each of us can decide when to get the rest we want, and how we dream. Everyone can learn to make cool things with our kits. Please explore our [products](#), make your own choices, and see how your life can be enhanced.

join our mailing list

Love it or hate it, TV screens are all around us. **TV-B-Gone®** universal remote control is the first fruit of our technical savvy, embodying our belief in empowerment, and sense of humor. This universal remote control fits in your pocket and allows you to discreetly turn TVs off wherever you go. TV-B-Gone fans around the world are using it for a variety of practical, philosophical, and humorous purposes. Imagine the possibilities...

Years in the making **NeuroDreamer** sleep mask is another of our personal empowerment inventions. We all need rest, but we don't always get it in our busy lives. NeuroDreamer sleep mask lets you use your own brainwaves to

bring you the rest you need. And with the **lucid dreaming model**, you can take control of your dreams.

Want to learn electronics? We make way cool, fun, intriguing, educational [kits](#) that **anyone can make!** Our most POPULAR kits are: [ArduTouch music synthesizer kit](#) and [TV-B-Gone kit!](#)

We make truly useful technological solutions that put you in charge.

Welcome to our better world!

**NOTE: As of 14-Feb-2023 Cornfield Electronics is a sole proprietorship of Mitch Altman.**

legal notices & privacy policy

CC BY-SA

2023 cornfield electronics

# Arduino

Download a new Synth Badge synth “sketch”



The screenshot shows a web browser window with the following details:

- Address Bar:** https://cornfieldelectronics.com/cfe/projects.php?PHPSESSID=d5d4714nuevrq25drkkoirr1m3
- Page Title:** cornFIELD electronics
- Page Description:** useful electronics for a better world
- Header Navigation:** home, buy, about us, press, distributors, projects, show cart
- Section Header:** DO-IT-YOURSELF PROJECTS
- Text:** by [Mitch Altman](#), and friends.  
Last modified: 5-Oct-2022
- Text:** You Can Make Cool Things With Electronics!  
The projects on this page were all created for total beginners, with no experience,  
so everyone can complete them successfully at my workshops, or at home, or anywhere!
- Text:** All you need is:  
a desire, a handful of parts, a soldering iron (with stand and sponge), a wire-cutter, a wire-stripper, solder, and an afternoon.
- Image:** A photograph of basic soldering tools: a soldering iron, a spool of solder, and various pliers and cutters.
- Text:** Here is a really nice tutorial on how to solder -- for total beginners!  
[Soldering Tutorial for total beginners](#)
- Text:** Open Hardware!  
Everything on this page (and everything I do) is free and open source!  
(That's free as in freedom.)  
(But everything here is free to download -- and that is free as in beer.)  
If you have any questions on anything, please feel free to email me:  
Transferring data from cornfieldelectronics.com... [mitch AT CornfieldElectronics DOT com](mailto:mitch AT CornfieldElectronics DOT com)

# Arduino

Download a new Synth Badge synth “sketch”

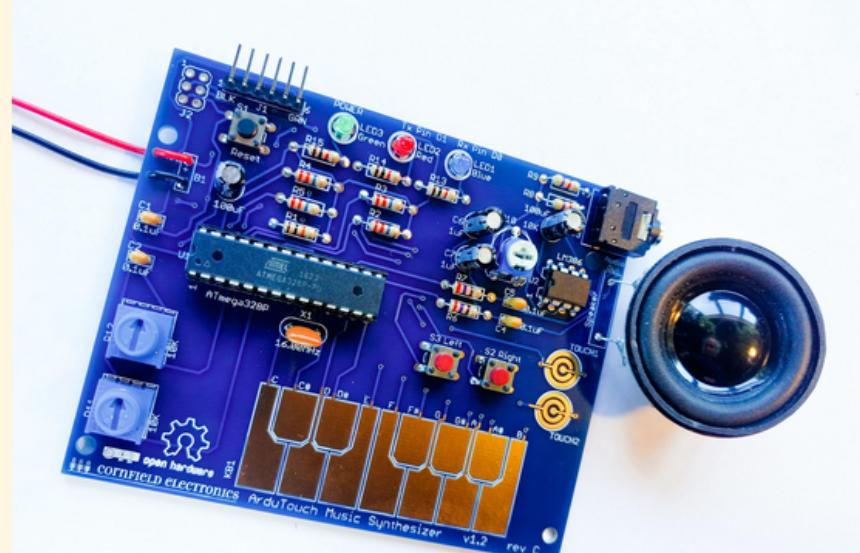


File Edit View History Bookmarks Tools Help

Cornfield Electronics :: Projects

https://cornfieldelectronics.com/cfe/projects.php?PHPSESSID=d5d4714nuevrq25drkkoirr1m3

Project: ArduTouch Arduino-compatible Music Synthesizer kit  
-- make way cool sounds and music!



==> BUY an ArduTouch music synthesizer kit! <==

Solder your ArduTouch kit together, and it works! You can make way wonderful music, sound, and noise. Use the ArduTouch Library or hack the existing sketches to create your own cool synthesizers. *The documentation is getting good enough to learn how to use Digital Signal Processing (DSP) to make your own sounds for your own projects. (More documentation coming.)*

This kit takes about 120 minutes to complete.

For assembly instructions, please see:  
[ArduTouch assembly instructions for Rev C board](#)

older versions (before 2017):  
[\(assembly instructions for Rev B, Rev A, and mono\)](#)

To program your ArduTouch music synthesizer kit, you'll need a **USB-Serial TTL cable**, such as an **FTDI Friend** or **FTDI Cable**, available all over the place. You can **purchase a nice one** from Cornfield Electronics. These USB-Serial TTL cables (made by Samurai Circuits), require a driver (from Silicon Labs):  
**Samurai Circuits board (SiLabs CP210x USB-to-Serial TTL) drivers:**  
[The latest drivers from SiLabs' website \(Windows, MacOS, Linux\)](#)

You will also need to download the free, open-source, Arduino software (for Windows, MacOS, or Linux).  
[Arduino software](#) (the latest version is fine to use).

Scroll down

# Arduino

Download a new Synth Badge synth “sketch”

The screenshot shows a web browser window with the title "Cornfield Electronics :: Projects". The URL is <https://cornfieldelectronics.com/cfe/projects.php?PHPSESSID=d5d4714nuevrq25drkkoirr1m3>. The page content is as follows:

**Here are the slides I use when I give my ArduTouch workshops**  
(including assembly instructions and reprogramming instructions):  
[Slides I use for ArduTouch workshops.](#)

-----

**One ArduTouch synth is really nice -- and 7 ArduTouch synths are even nicer!**  
Here's a demo Video:

-----

**The ArduTouch library and example sketches will work on any Arduino board!**  
**The ArduTouch board behaves like an Arduino Uno.**

The **ArduTouch Library** contains everything you need to start creating your own synthesizers!  
It was mostly written by my friend Bill Alessi.  
The ArduTouch Library comes with a sequence of **example sketches** -- read through these and try them! As well as being way cool synthesizers, they also serve as **really good tutorials** on how to create your own synthesizer sketches for ArduTouch.  
You can download the ArduTouch library, and then import it using the Arduino software:  
[ArduTouch Library v1.16](#) for ArduTouch Music Synthesizer kit.

-----

**Thick** is an example of a **way cool, easy-to-play synthesizer sketch** for ArduTouch!  
Check it out -- it sounds like it comes from a vintage analog Mini Moog.  
(Your ArduTouch synthesizer kit comes pre-programmed with this synthesizer.)  
[Instructions for how to use the Thick synthesizer.](#)  
Thick was written by my friend Bill Alessi.  
The sketch will work on any Arduino (the ArduTouch has its own Arduino Uno clone built in).  
Thick uses the ArduTouch library (so be sure to download it, too -- see above).  
[Thick v0.72 synthesizer sketch](#)

-----

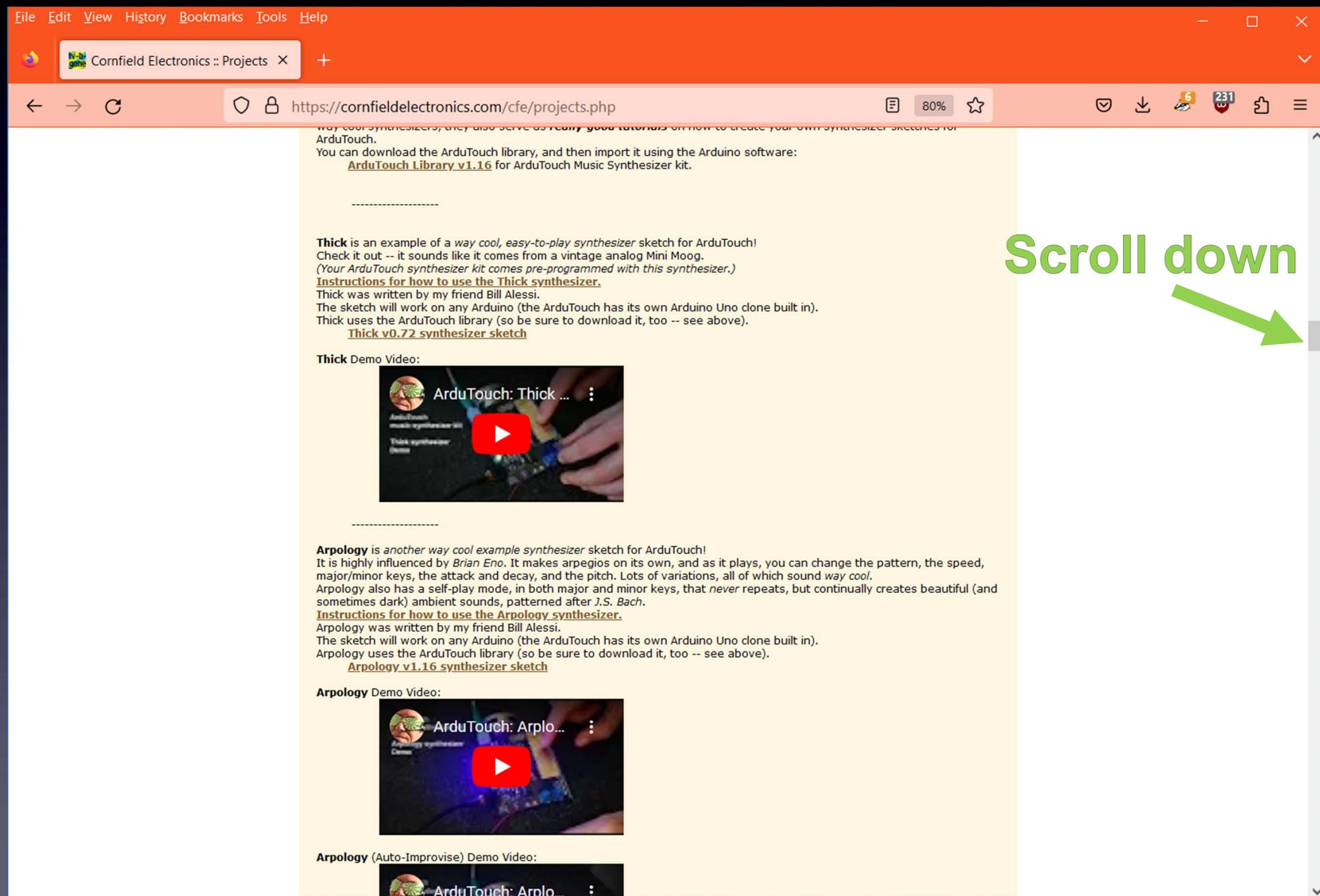
**Thick Demo Video:**

A large green arrow points downwards on the right side of the page, and another green arrow points upwards towards the "Thick" section.

**NOTE: Do NOT use this ArduTouch library for the SEC-T Synth Badge**

# Arduino

Download a new Synth Badge synth “sketch”



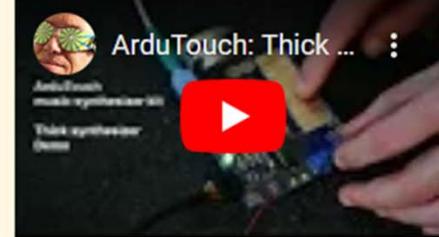
The screenshot shows a web browser window with the title "Cornfield Electronics :: Projects". The URL in the address bar is <https://cornfieldelectronics.com/cfe/projects.php>. The page content is about ArduTouch synthesizer sketches. It includes sections for "Thick" and "Arpology". Each section has a description, a link to the sketch library, and a video thumbnail. A large green arrow points downwards on the right side of the page, with the text "Scroll down" above it.

way cool synthesizers, they also serve as *really* good tutorials on how to create your own synthesizer sketches for ArduTouch.  
You can download the ArduTouch library, and then import it using the Arduino software:  
[ArduTouch Library v1.16](#) for ArduTouch Music Synthesizer kit.

-----

**Thick** is an example of a *way cool, easy-to-play synthesizer sketch* for ArduTouch!  
Check it out -- it sounds like it comes from a vintage analog Mini Moog.  
(Your ArduTouch synthesizer kit comes pre-programmed with this synthesizer.)  
[Instructions for how to use the Thick synthesizer.](#)  
Thick was written by my friend Bill Alessi.  
The sketch will work on any Arduino (the ArduTouch has its own Arduino Uno clone built in).  
Thick uses the ArduTouch library (so be sure to download it, too -- see above).  
[Thick v0.72 synthesizer sketch](#)

Thick Demo Video:

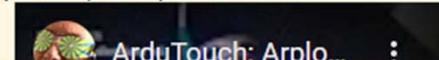


**Arpology** is another *way cool example synthesizer sketch* for ArduTouch!  
It is highly influenced by Brian Eno. It makes arpeggios on its own, and as it plays, you can change the pattern, the speed, major/minor keys, the attack and decay, and the pitch. Lots of variations, all of which sound *way cool*.  
Arpology also has a self-play mode, in both major and minor keys, that never repeats, but continually creates beautiful (and sometimes dark) ambient sounds, patterned after J.S. Bach.  
[Instructions for how to use the Arpology synthesizer.](#)  
Arpology was written by my friend Bill Alessi.  
The sketch will work on any Arduino (the ArduTouch has its own Arduino Uno clone built in).  
Arpology uses the ArduTouch library (so be sure to download it, too -- see above).  
[Arpology v1.16 synthesizer sketch](#)

Arpology Demo Video:



Arpology (Auto-Improvise) Demo Video:



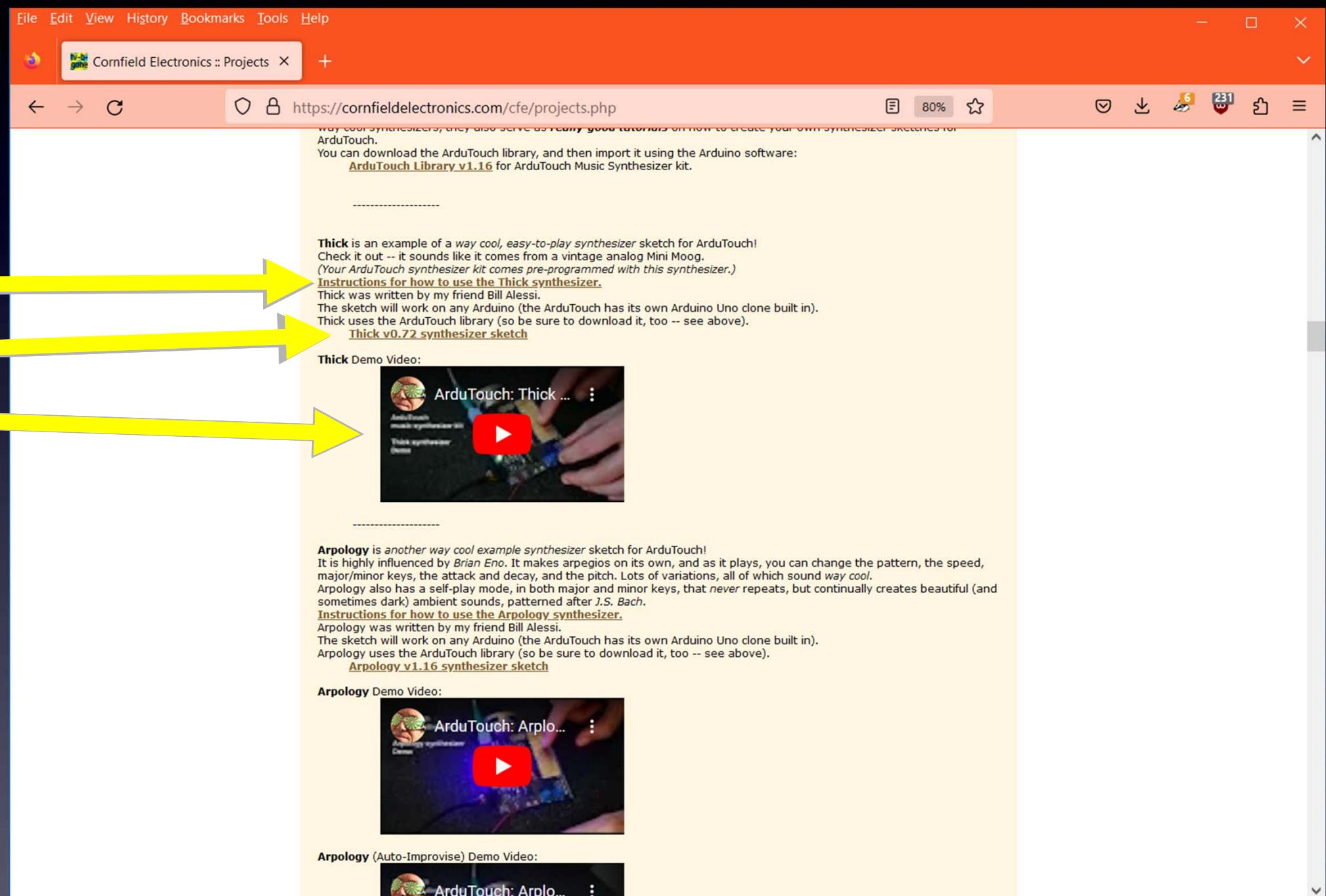
Here you will see several ArduTouch synth sketches

# Arduino

Download a new Synth Badge synth “sketch”

Each ArduTouch  
synth sketch has:

- Instructions
- Sketch download
- Demo video(s)



Here you will see several ArduTouch synth sketches

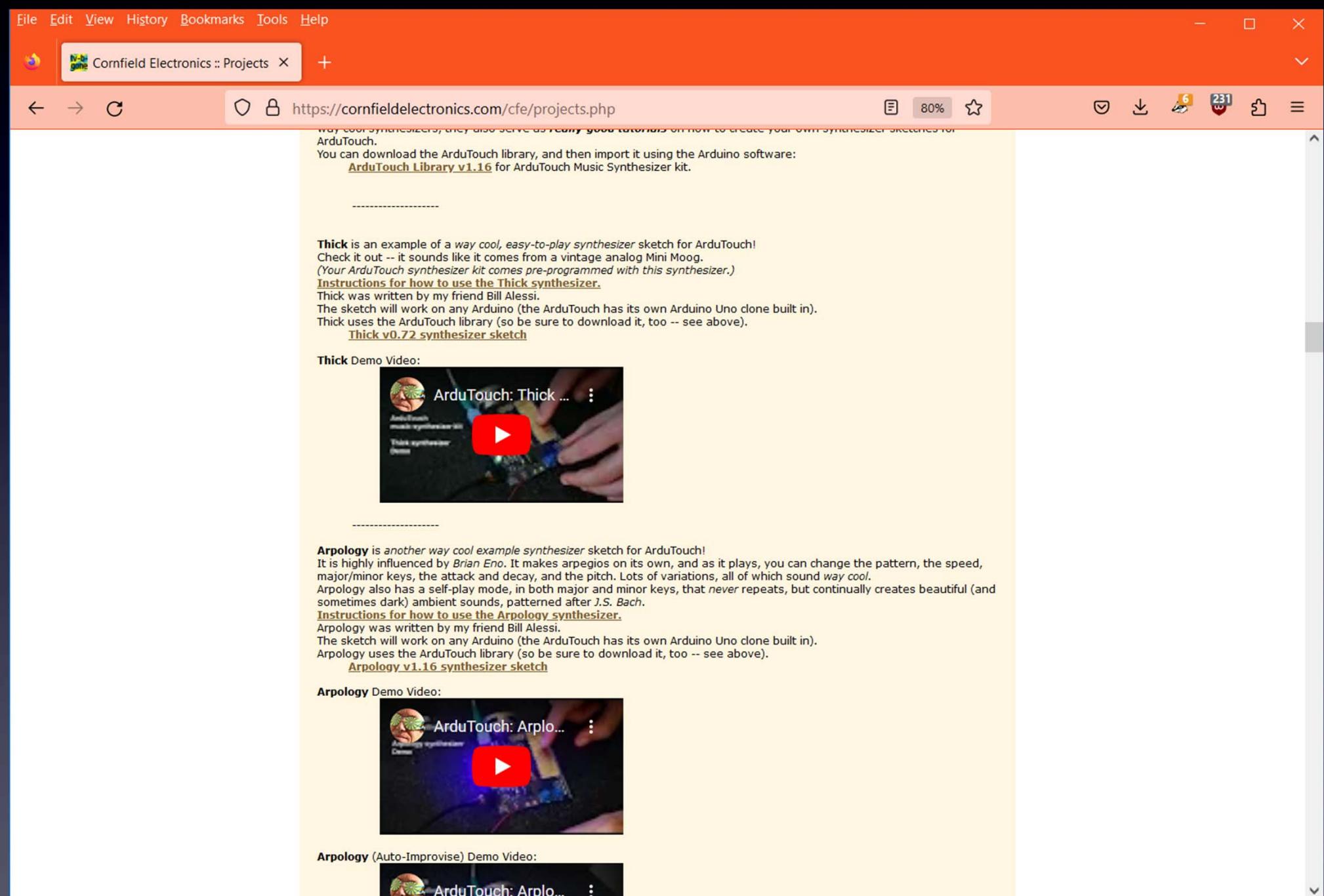
# Arduino

Download a new Synth Badge synth “sketch”

**NOTE:**

These sketches  
do NOT have  
functionality for:

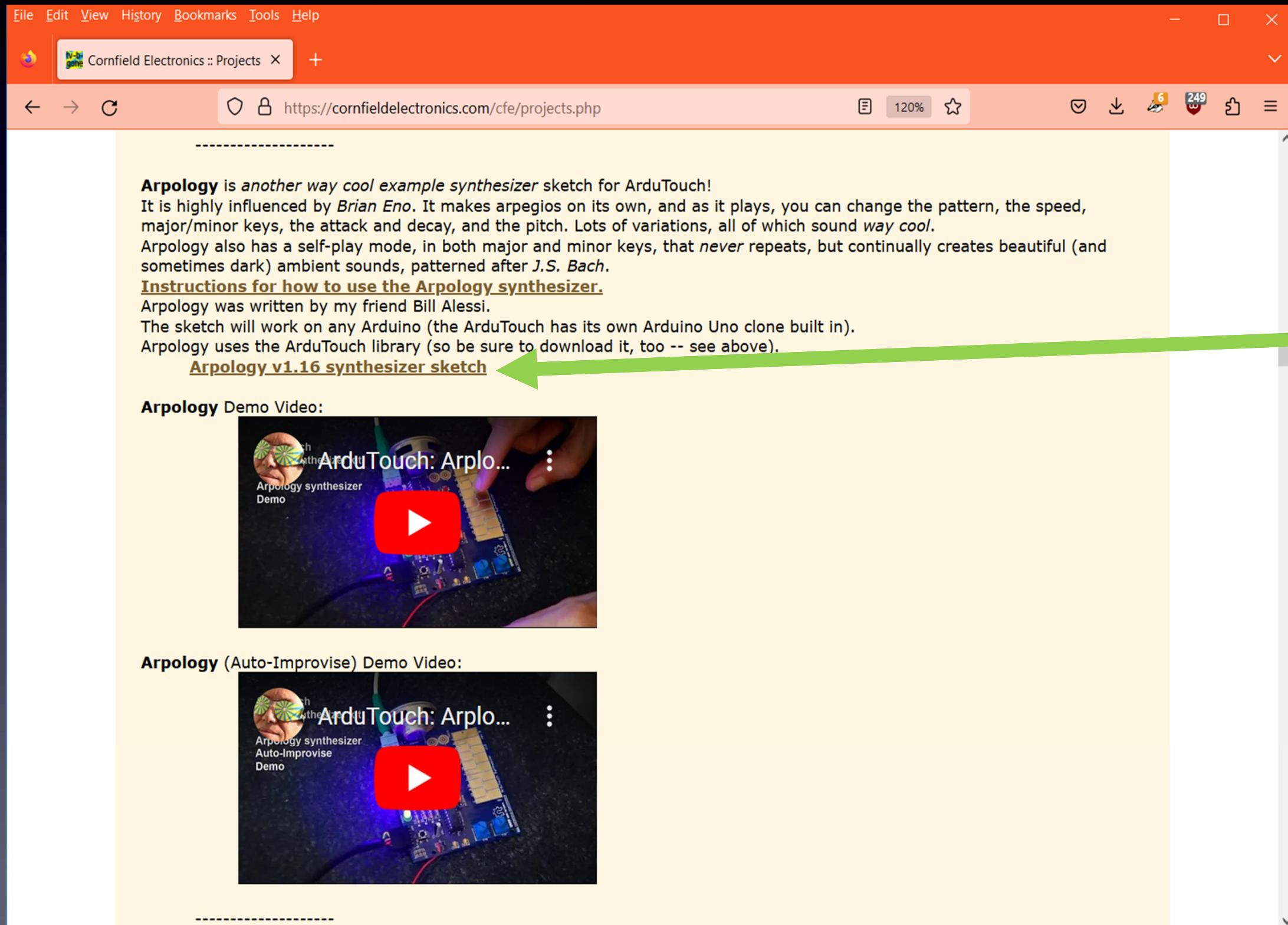
- RGB LEDs
- knobs A and B



Here you will see several ArduTouch synth sketches

# Arduino

# Download a new Synth Badge synth “sketch”

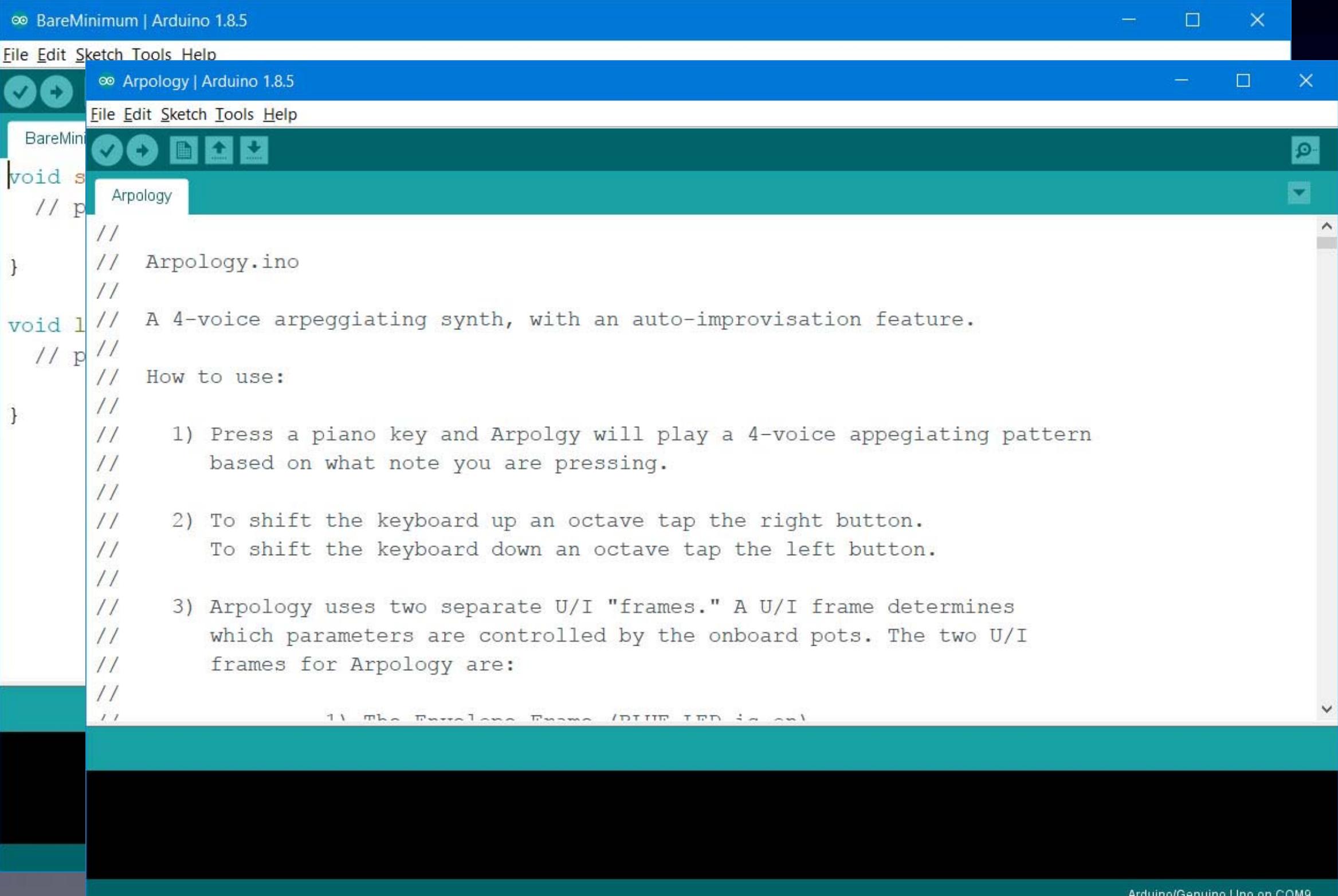


— Click the sketch link to download the sketch

# Arduino

You can open the ArduTouch / Synth Badge synth sketch:  
File → Open...

(I opened “Apology here)

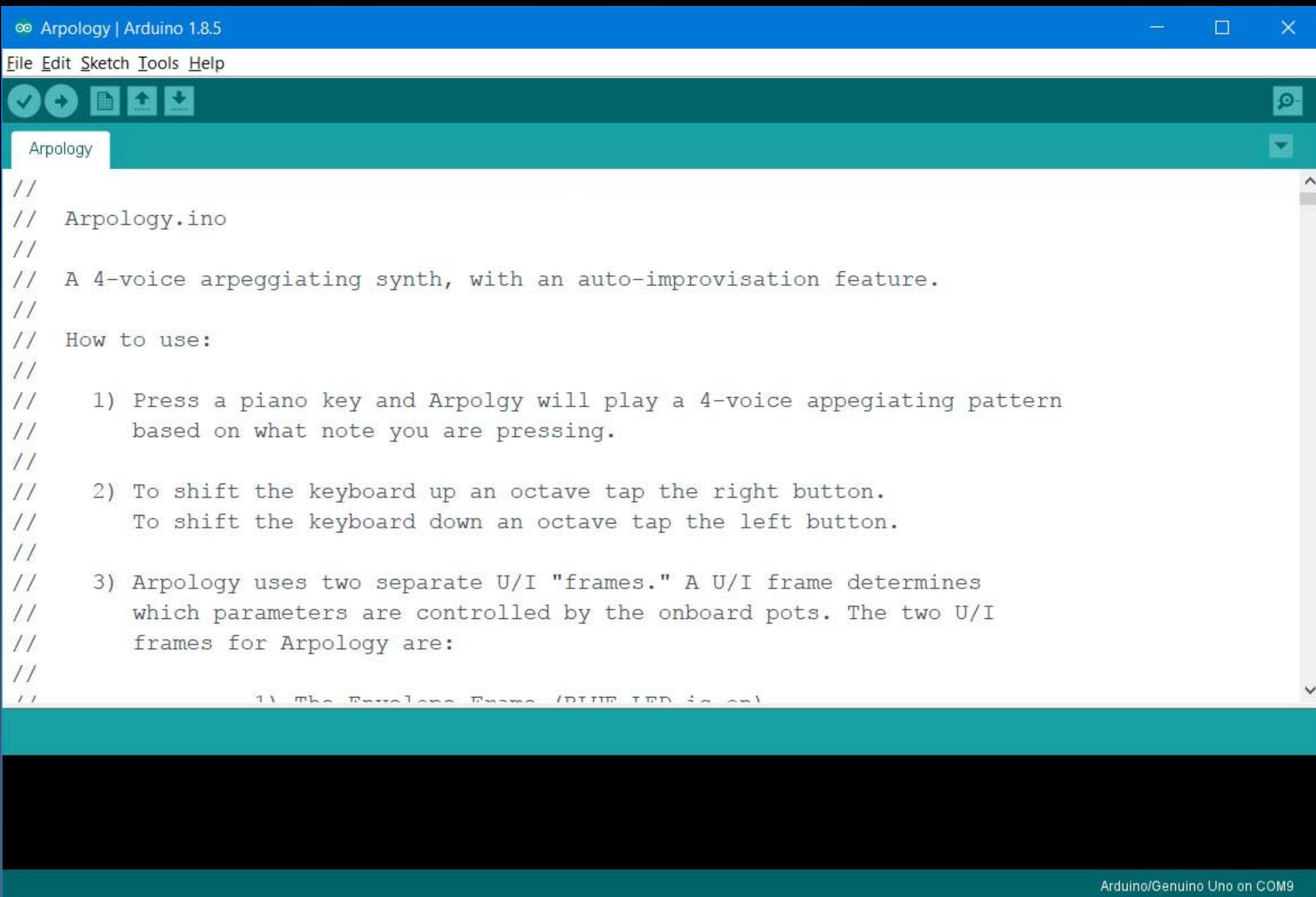


```
BareMinimum | Arduino 1.8.5
File Edit Sketch Tools Help
Arpology | Arduino 1.8.5
File Edit Sketch Tools Help
BareMinimum.ino
void setup() {
    // put your setup code here, to run once:
    // Arpology
}
// Arpology.ino
//
void loop() {
    // A 4-voice arpeggiating synth, with an auto-improvisation feature.
    // How to use:
    // 1) Press a piano key and Arpolgy will play a 4-voice appegiating pattern
    //     based on what note you are pressing.
    //
    // 2) To shift the keyboard up an octave tap the right button.
    //     To shift the keyboard down an octave tap the left button.
    //
    // 3) Arpology uses two separate U/I "frames." A U/I frame determines
    //     which parameters are controlled by the onboard pots. The two U/I
    //     frames for Arpology are:
    //
}

  11 mins ago 11 mins ago /DUE TEE is on!
```

# Arduino

You can now program your Synth Badge with a new synth sketch !

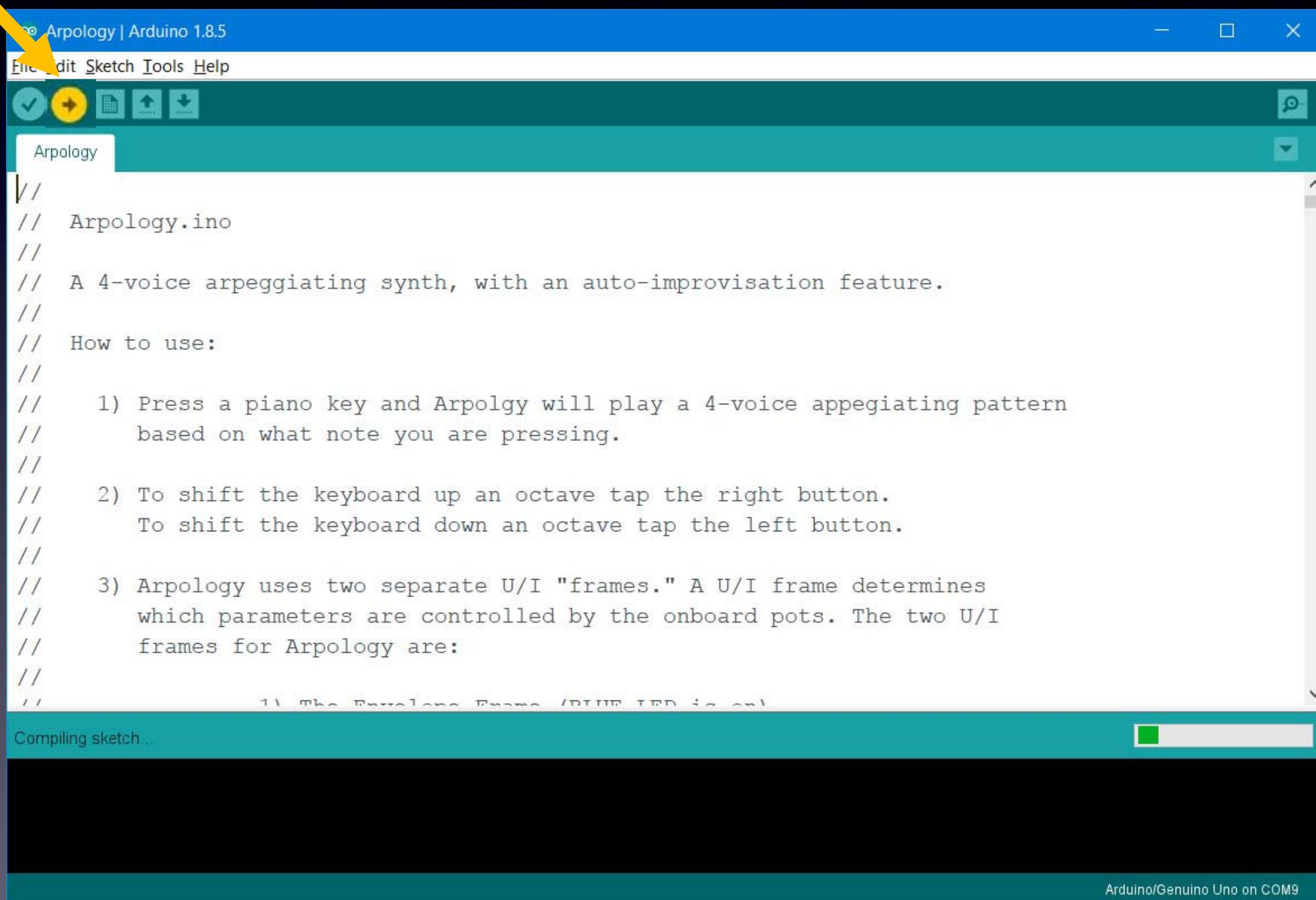


The screenshot shows the Arduino IDE interface with the title bar "Arpology | Arduino 1.8.5". The menu bar includes File, Edit, Sketch, Tools, and Help. Below the menu is a toolbar with icons for back, forward, file operations, and a search function. The main code editor window displays the "Arpology" sketch. The code is a C++ program with extensive comments using double slashes (//). It describes a 4-voice arpeggiating synth with an auto-improvisation feature. It includes instructions for using piano keys and buttons to control the synth. It also mentions two separate UI frames, one of which is the "Arpology Frame" (blue LED is on). At the bottom of the code editor, there is a status bar indicating "Arduino/Genuino Uno on COM9".

```
//  
// Arpology.ino  
//  
// A 4-voice arpeggiating synth, with an auto-improvisation feature.  
//  
// How to use:  
//  
// 1) Press a piano key and Arpolgy will play a 4-voice appegiating pattern  
//     based on what note you are pressing.  
//  
// 2) To shift the keyboard up an octave tap the right button.  
//     To shift the keyboard down an octave tap the left button.  
//  
// 3) Arpology uses two separate U/I "frames." A U/I frame determines  
//     which parameters are controlled by the onboard pots. The two U/I  
//     frames for Arpology are:  
//  
//     1) The Arpology Frame (BLUE LED is on)
```

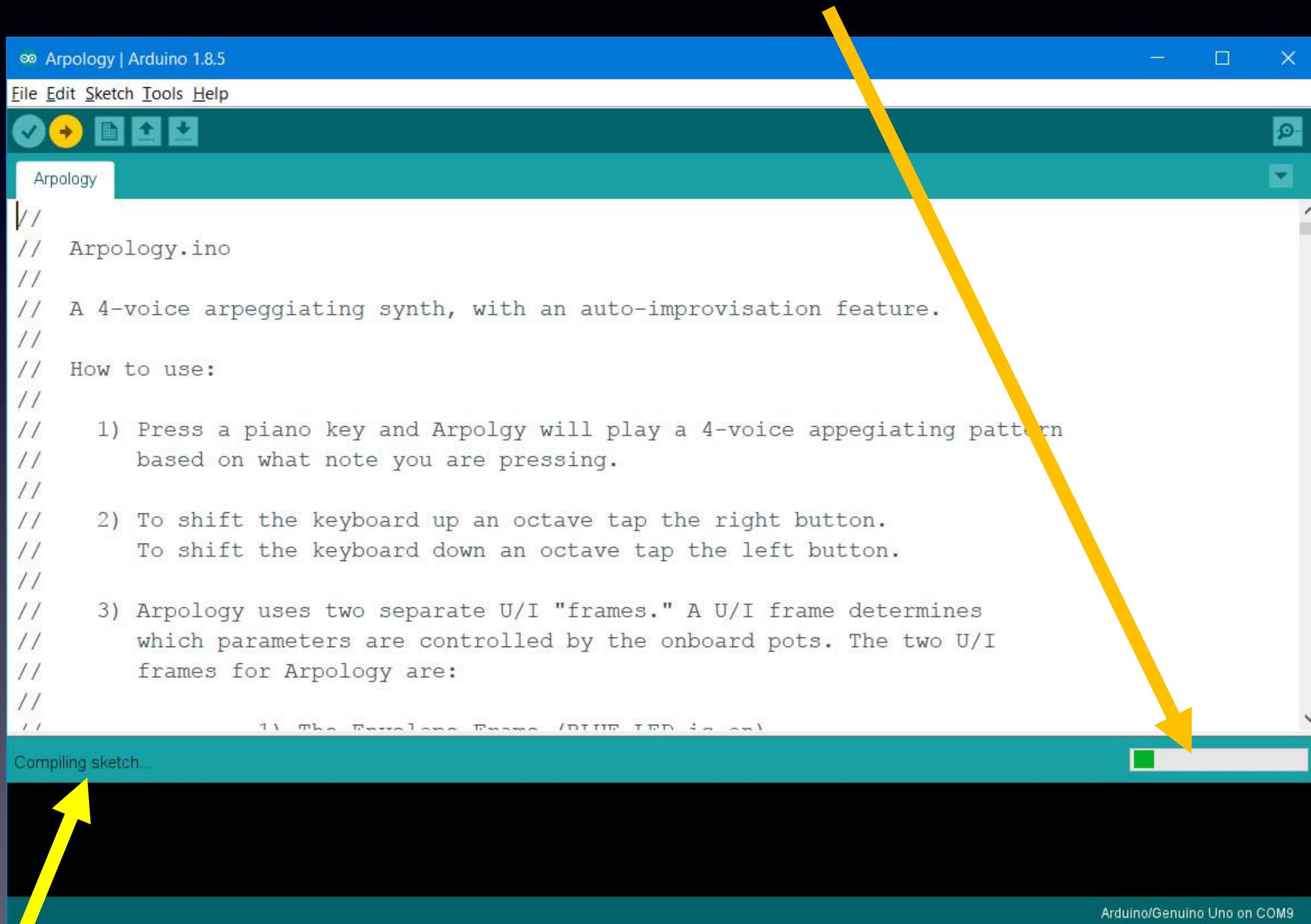
# Arduino

**With the USB-Serial cable connected to your Synth Badge board  
press the Upload button**



# Arduino

**While uploading, you will see a progress bar...**



**...and when it's completed successfully, it says: “Upload done”**

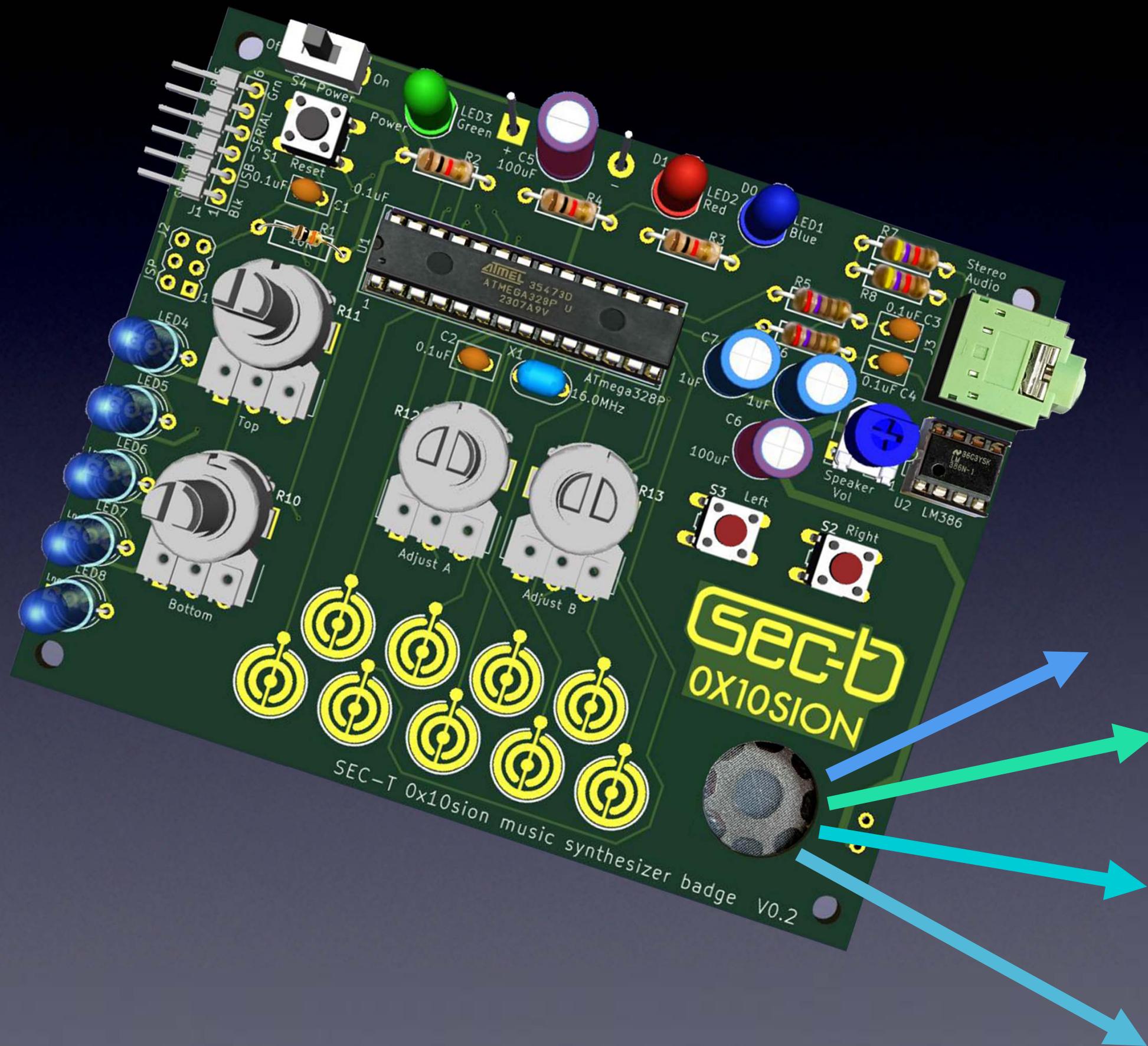
# ArduTouch

**Disconnect your SEC-T 0x10sion Synth Badge board  
from the USB-Serial cable,**

**turn on the Power switch S4,**

**And...**

# Let's make new noise!



Please Remember:

to

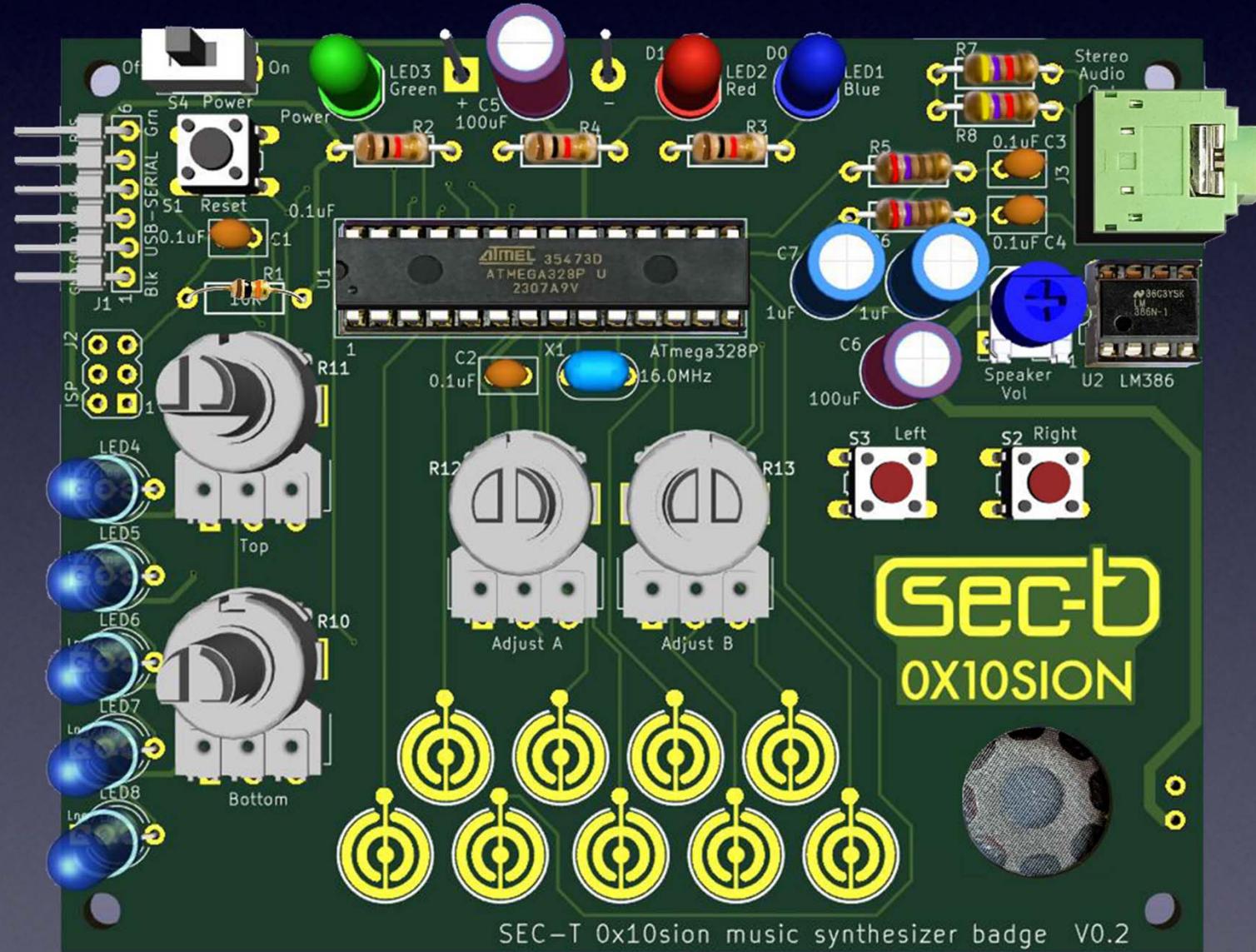
Wash your hands  
after soldering

# SEC-T 0x10sion

## Music Synthesizer Badge

### Assembly Instructions

(with re-programming how-to)



v0.2



CC BY-SA 4.0 © 2024 Mitch Altman



cornFIELD electronics

SEC-T  
0X10SION