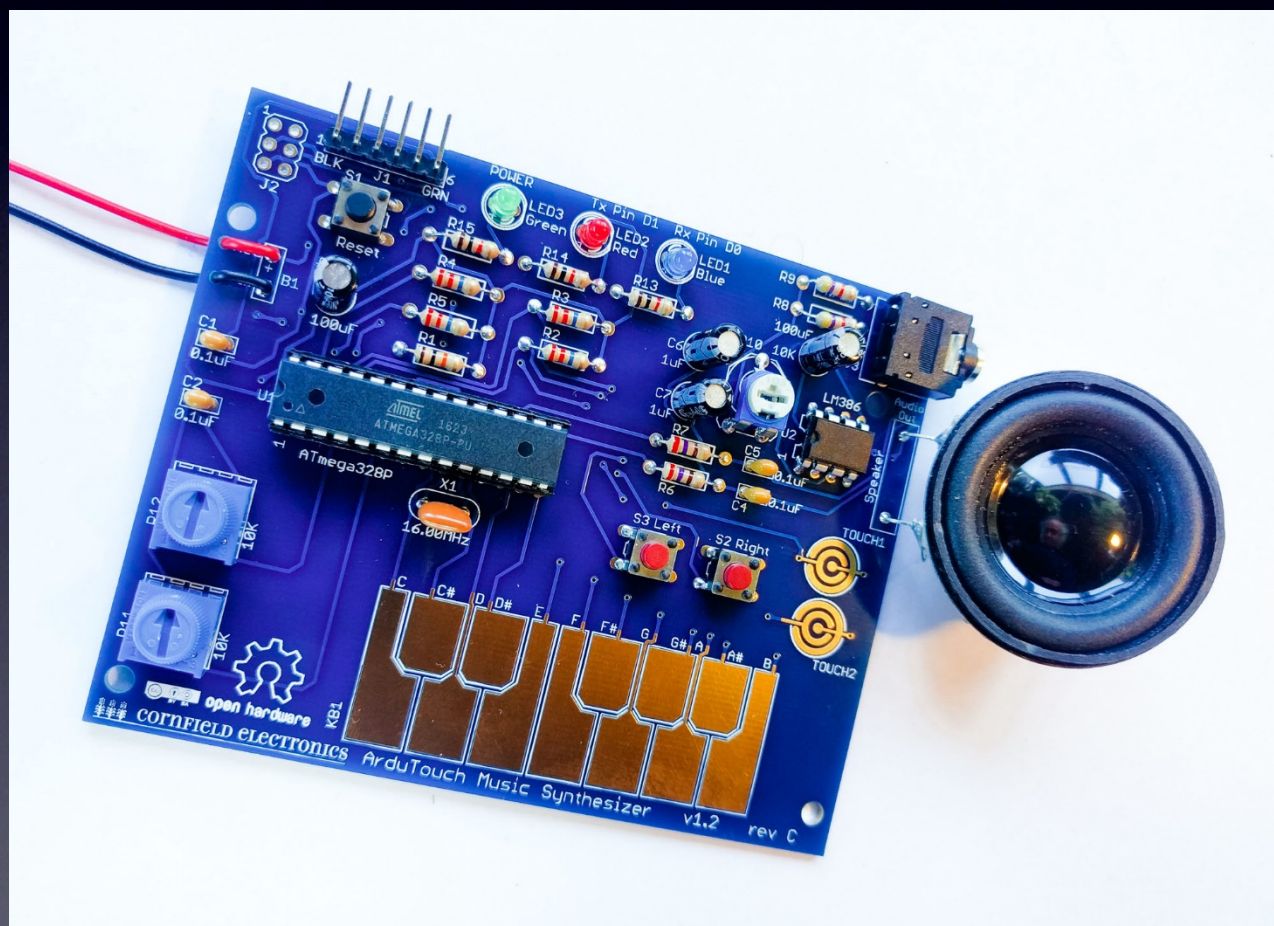


ArduTouch Music Synthesizer

Assembly Instructions & Programming Instructions



rev C



open source hardware

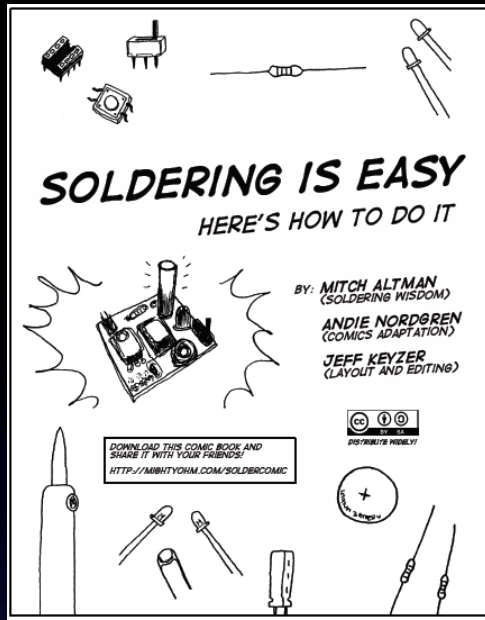


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CORNFIELD ELECTRONICS

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.)

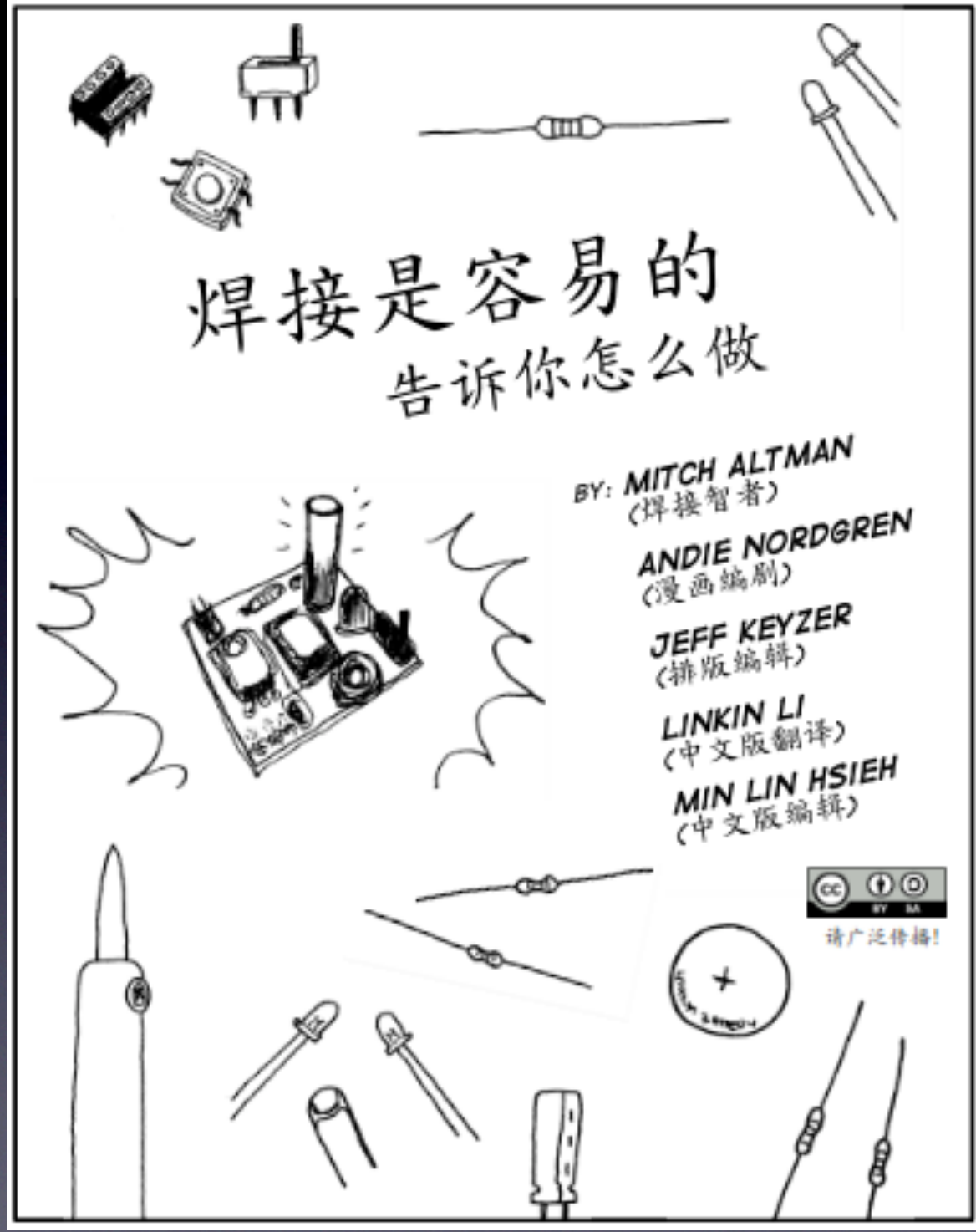
download for free at:
<http://mightyohm.com/soldercomic>

Learn To Solder



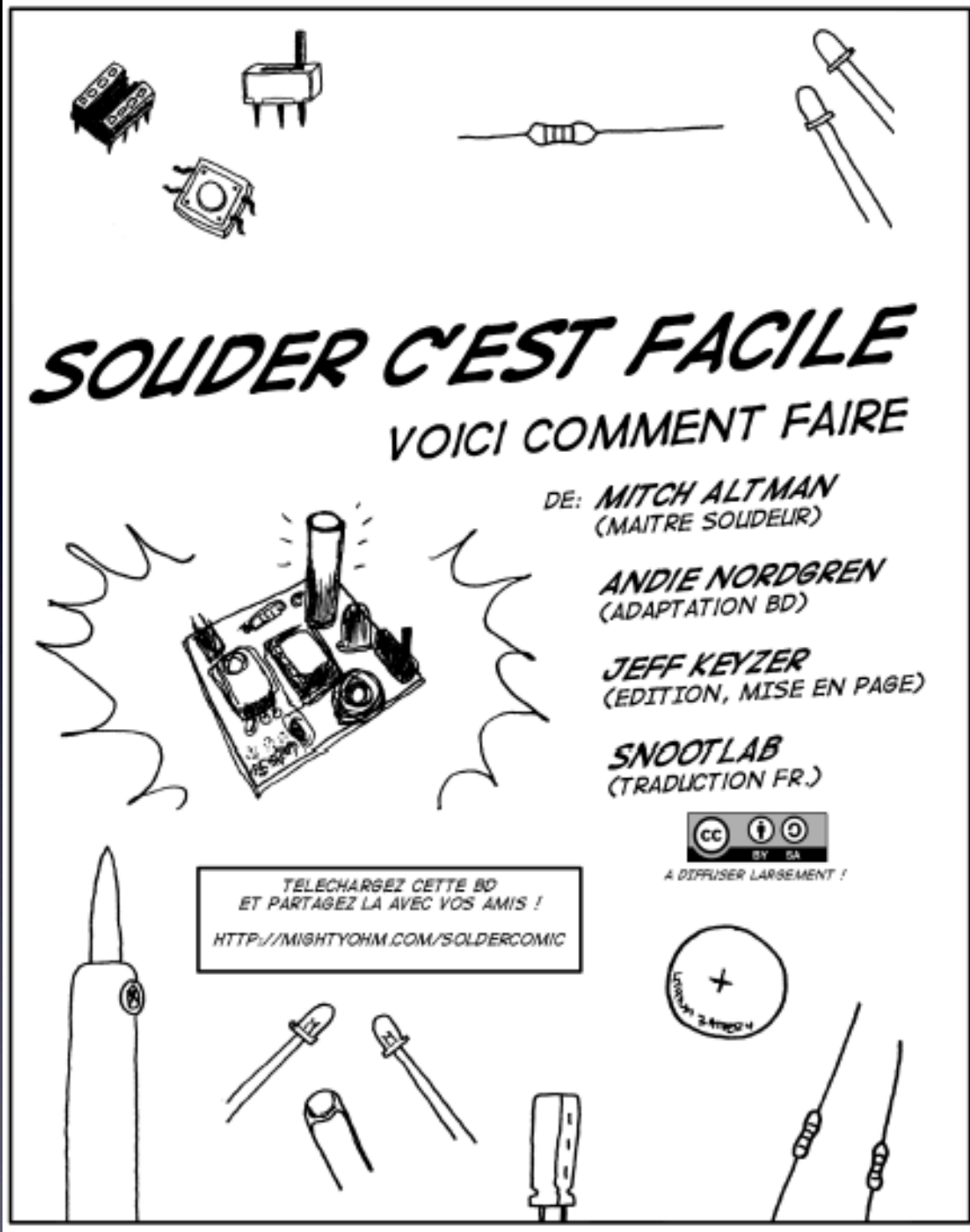
download for free at:
<http://mightyohm.com/soldercomic>
(In many different languages.)

Learn To Solder



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

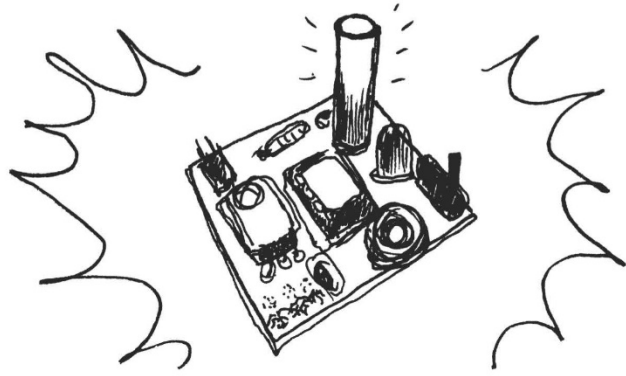
Learn To Solder



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

Learn To Solder

SOLDAR ES FÁCIL! APRENDE CÓMO HACERLO



POR: **MITCH ALTMAN**
(SABIDURÍA EN SOLDADO)

ANDIE NORDGREN
(ADAPTACIÓN A COMIC)

JEFF KEYZER
(DISEÑO Y EDICIÓN)



DISTRIBUYE AMPLIAMENTE!



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

Learn To Solder



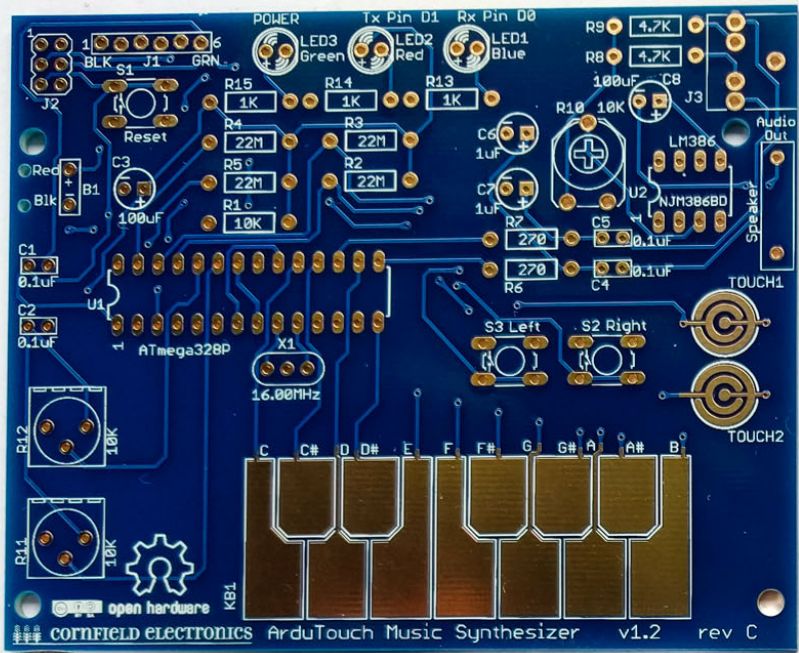
LÖTEN IST EINFACH SO WIRD ES GEMACHT

VON: MITCH ALTMAN
(LÖTWEISHEITEN)
ANDIE NORDGREN
(KOMIK-UMSETZUNG)
JEFF KEYZER
(LAYOUT UND BEARBEITUNG)
ALEXANDER BODORA
(ÜBERSETZUNG UND BEARBEITUNG)
RICHARD MEINSEN
(ÜBERARBEITUNG UND KORREKTUR)



WEITER
VERTEILEN!

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



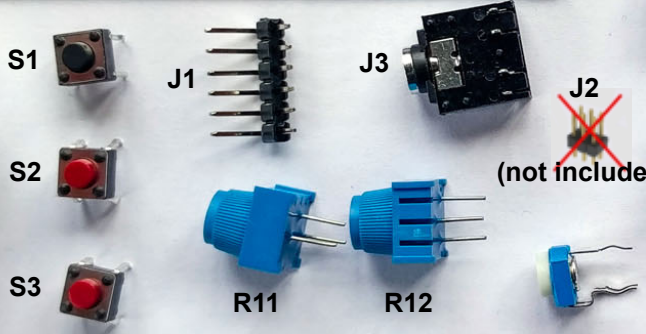
Some parts are inside of this battery pack



B1



Speaker



ATmega328P chip

LM386 chip



U1

U2



Socket (note polarity)



(not included)

R6, R7 (270) Red, Violet, Brown, Gold



R13, R14, R15 (1K) Brown, Black, Red, Gold



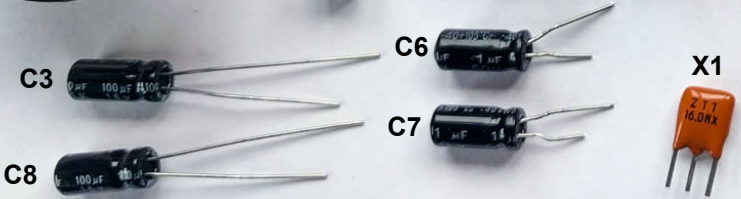
R8, R9 (4.7K) Yellow, Violet, Red, Gold



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



R2, R3, R4, R5 (22M) Red, Red, Blue, Gold

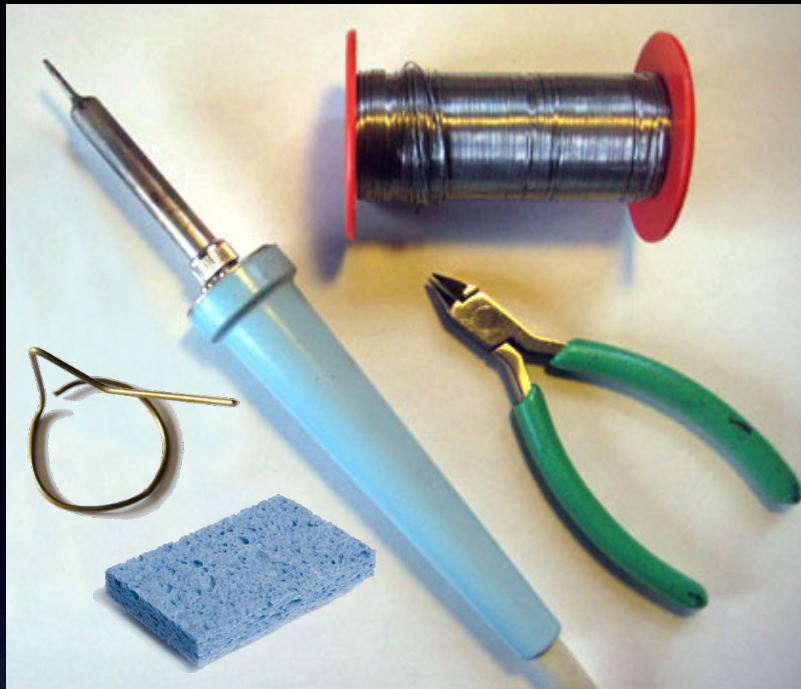


C1, C2, C4, C5

LED3, LED2, LED1



All of the parts



Note:

If you use
Lead-Free solder
it is helpful
to also have
flux paste in a syringe
and Isopropyl Alcohol



The tools you'll need:

- soldering Iron (35W or less)
- solder (*more details coming*)
- soldering iron stand
- cellulose kitchen sponge (*not plastic!*)
- *small* wire cutter

Our first part



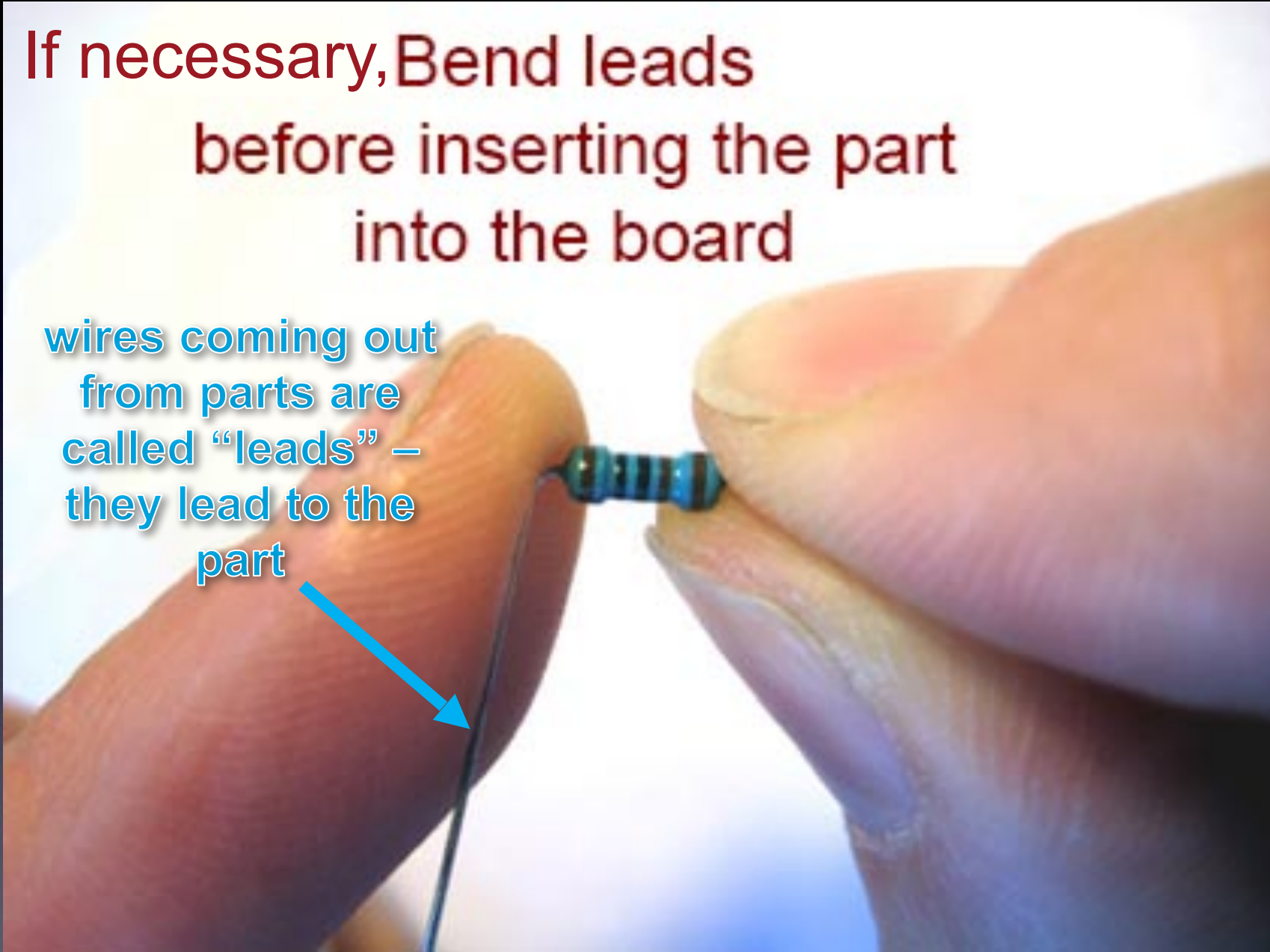
R1: Brown, Black, Orange

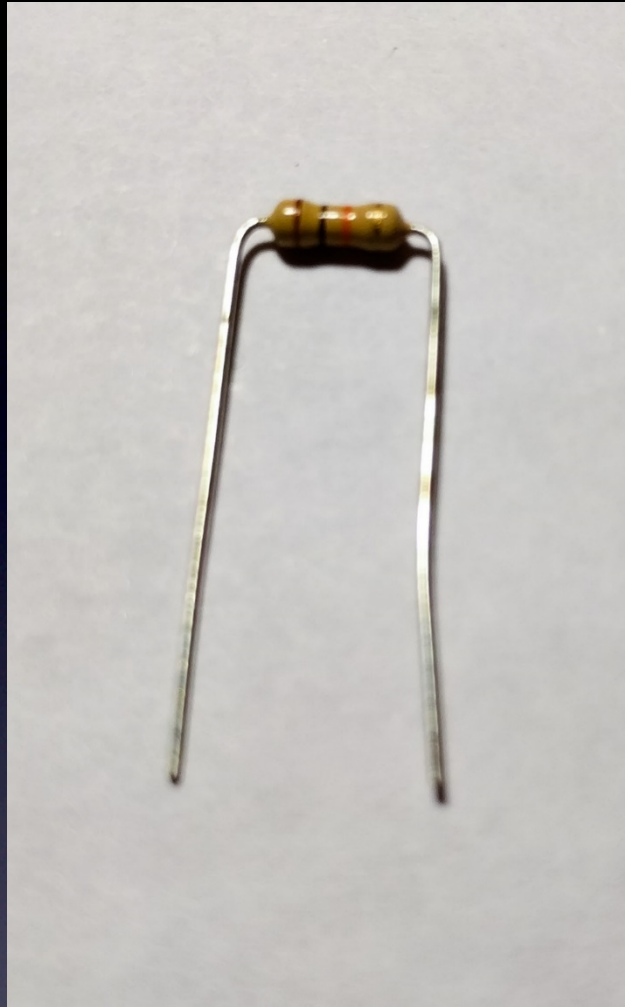
(not Brown, Black, ~~Red~~)

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

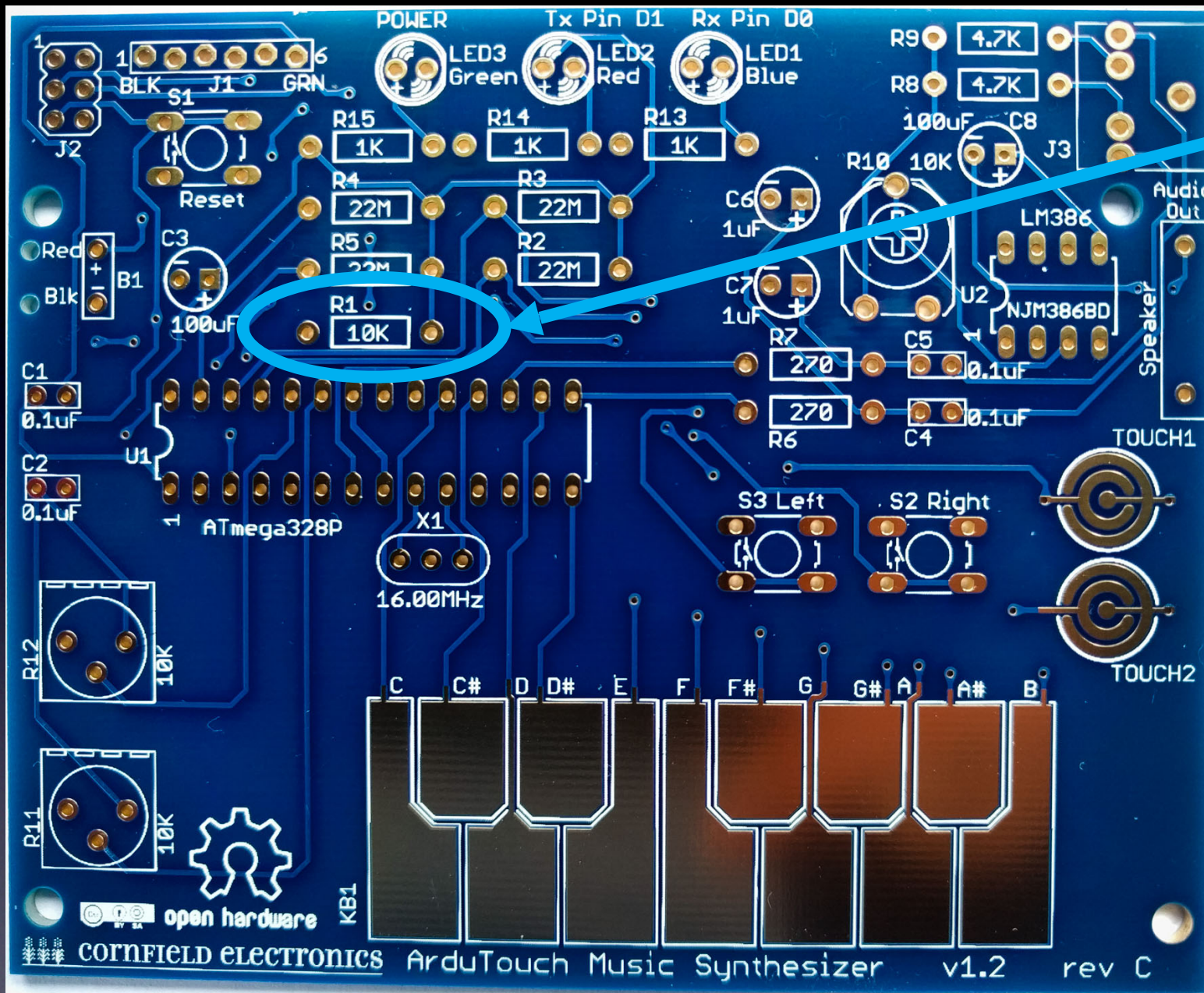
If necessary, Bend leads
before inserting the part
into the board

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



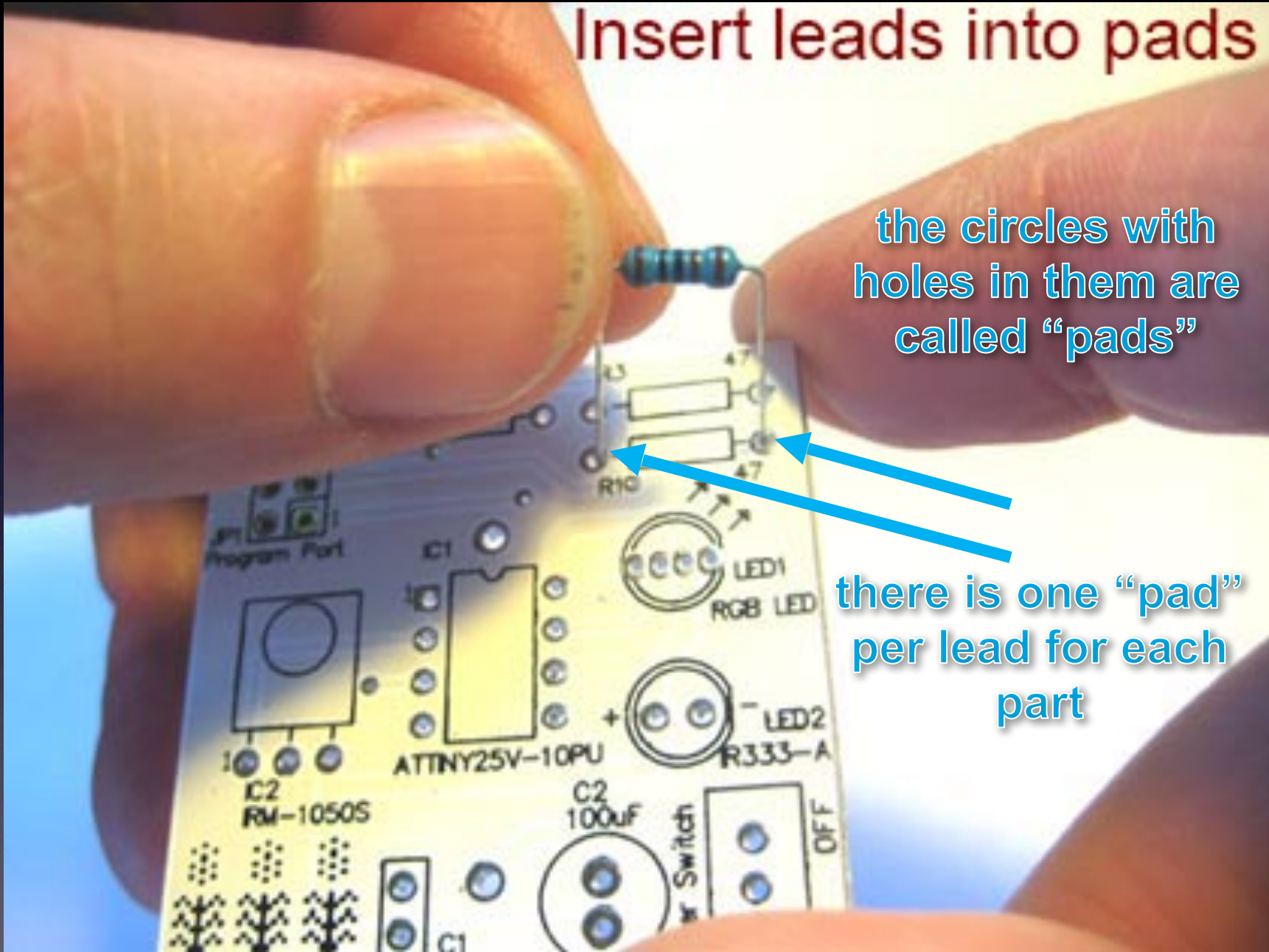
R1

R1 – this is where it goes

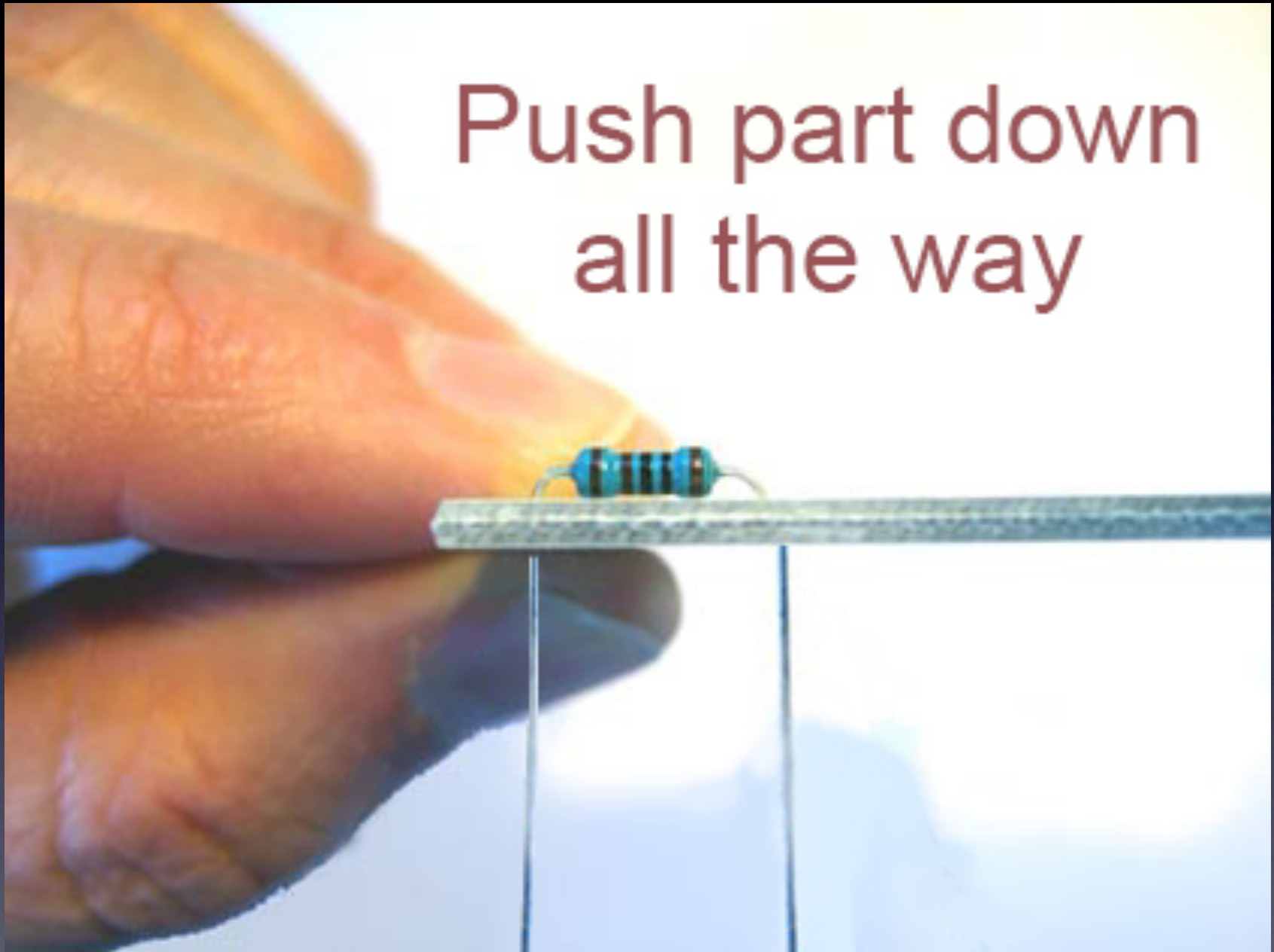
Insert leads into pads

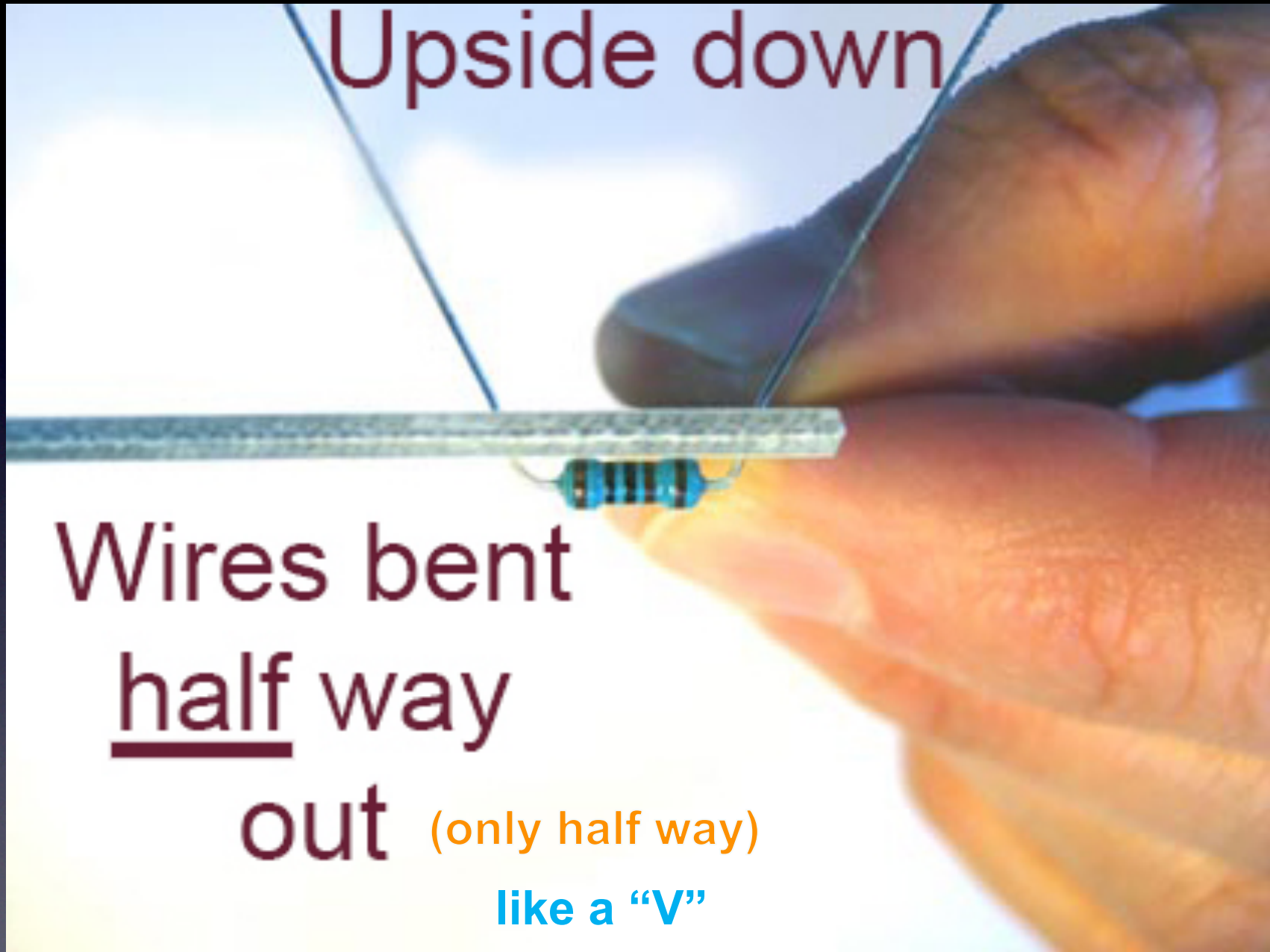
the circles with holes in them are called "pads"

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



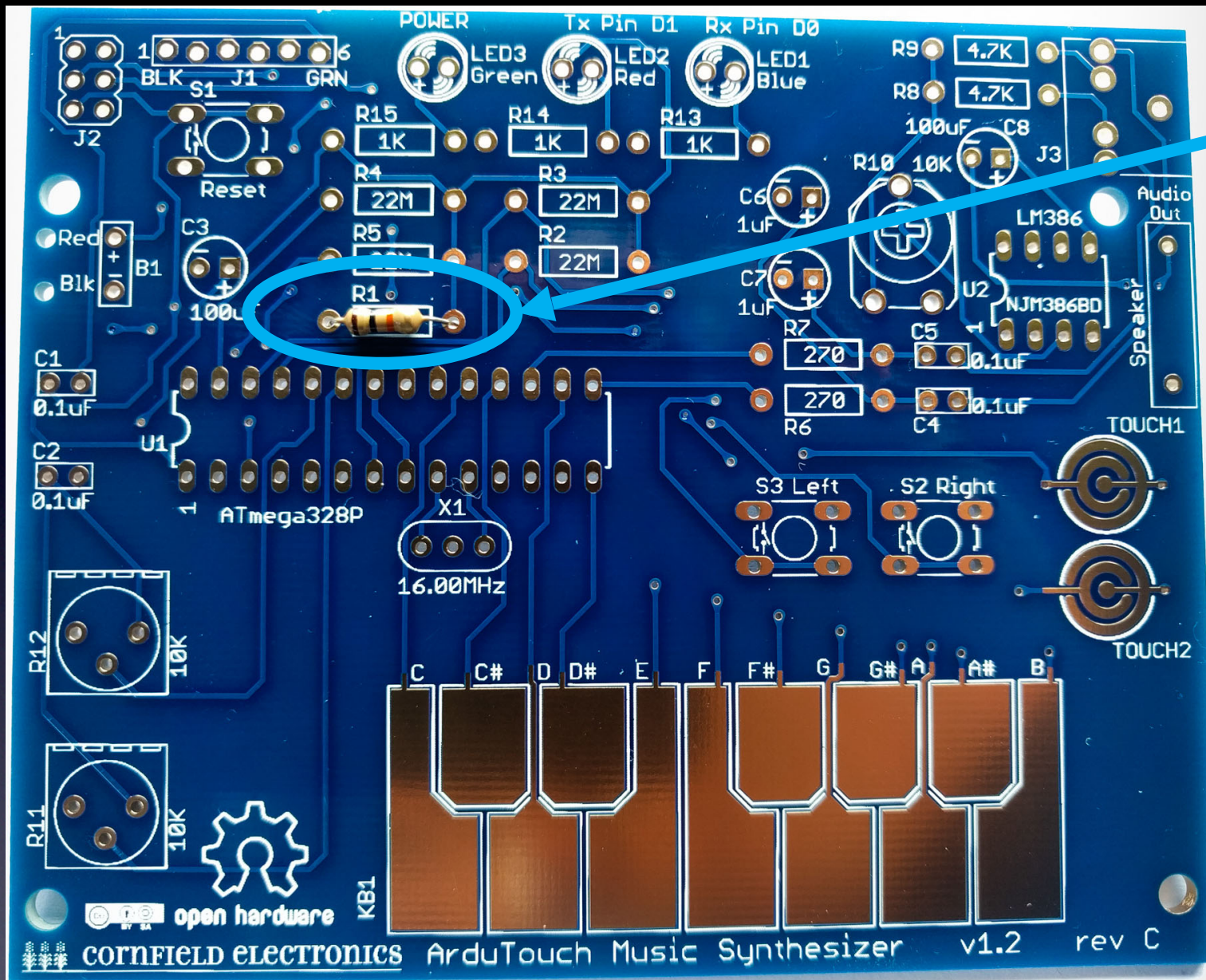
Upside down

Wires bent
half way
out

(only half way)

like a "V"

Ready to Solder !



R1 – inserted into the board



How to hold a soldering iron

(Like a pencil – held from underneath)

Important

The best kind of solder for DIY electronics:

(Sn – Tin / Pb – Lead)

63/37 rosin core,
0.031" (0.8mm) diameter (or smaller)

(60/40 is also good)

Note:

Most
Lead-Free solder
has poisonous fumes!

A good kind of solder for DIY electronics:

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



Kester
K100LD Rosin
(not “No Clean”)
0.031” diameter (0.8mm)

A good kind of solder for DIY electronics:

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



Kester **K100LD Rosin** Solder
0.031" diameter (0.8mm)

Lead-Free

solder I have found!

(after years of searching)

Note:

If you use *Lead-Free* solder

it is *helpful*

to also have

flux paste in a syringe

and *Isopropyl Alcohol*



AMTECH NC-559-ASM

99%



16 FL. OZ. (1 PT) 473 mL

Another good kind of solder for DIY electronics:

*This is another good **Lead-Free** solder I have found!*



**Duratool
D01685 Rosin**

0.7mm diameter

*(as good as the
Kester K100LD Rosin)*

Another good kind of solder for DIY electronics:

This is another good **Lead-Free** solder I have found!



**MG Chemicals
4900 Rosin (112g, 227g, 454g)**

0.8mm diameter

*(as good as the
Kester K100LD Rosin)*

Another good kind of solder for DIY electronics:

*This is another good **Lead-Free** solder I have found!*



iFixit
IF145-077-2 (12g)
1.0mm diameter

*(as good as the
Kester K100LD Rosin)*

3 Safety Tips...

Safety Tip #1:

Hot!!

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

Safety Tip #2:
Soldering chemicals
are toxic

But they easily wash 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,

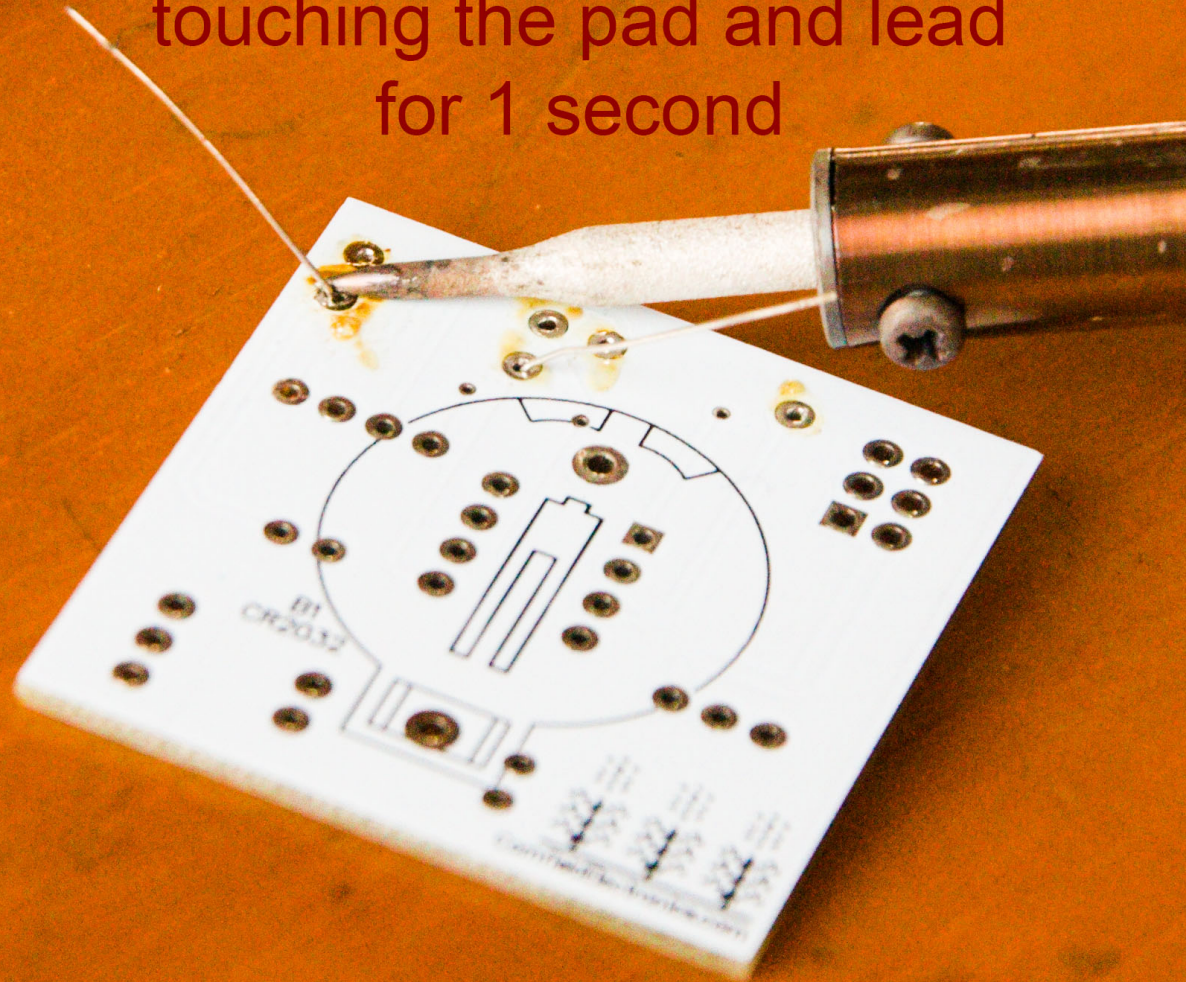
Swipe, Rotate, Swipe (on the sponge):

Keep the tip shiny silver!

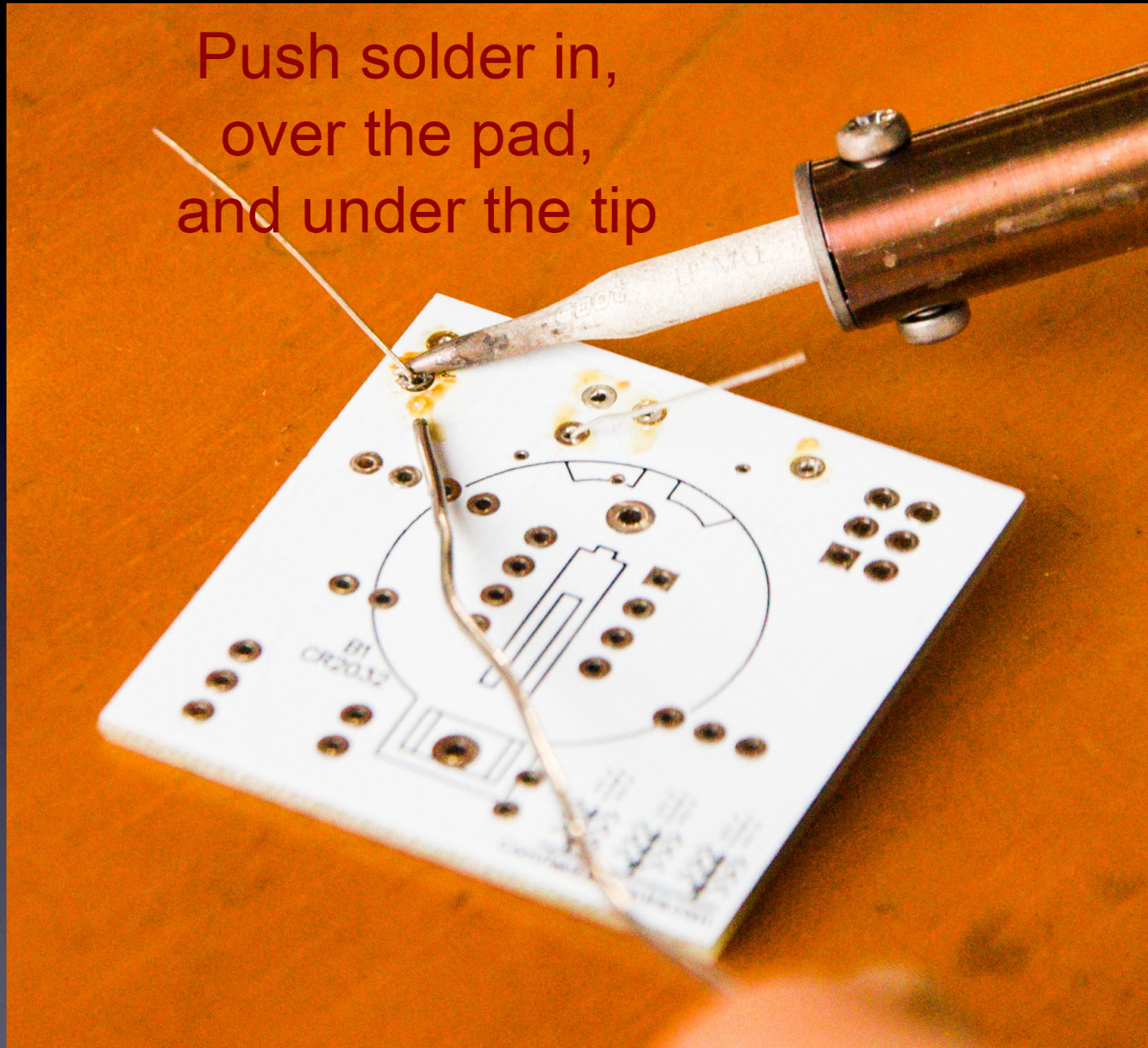
knock solder off the tip



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

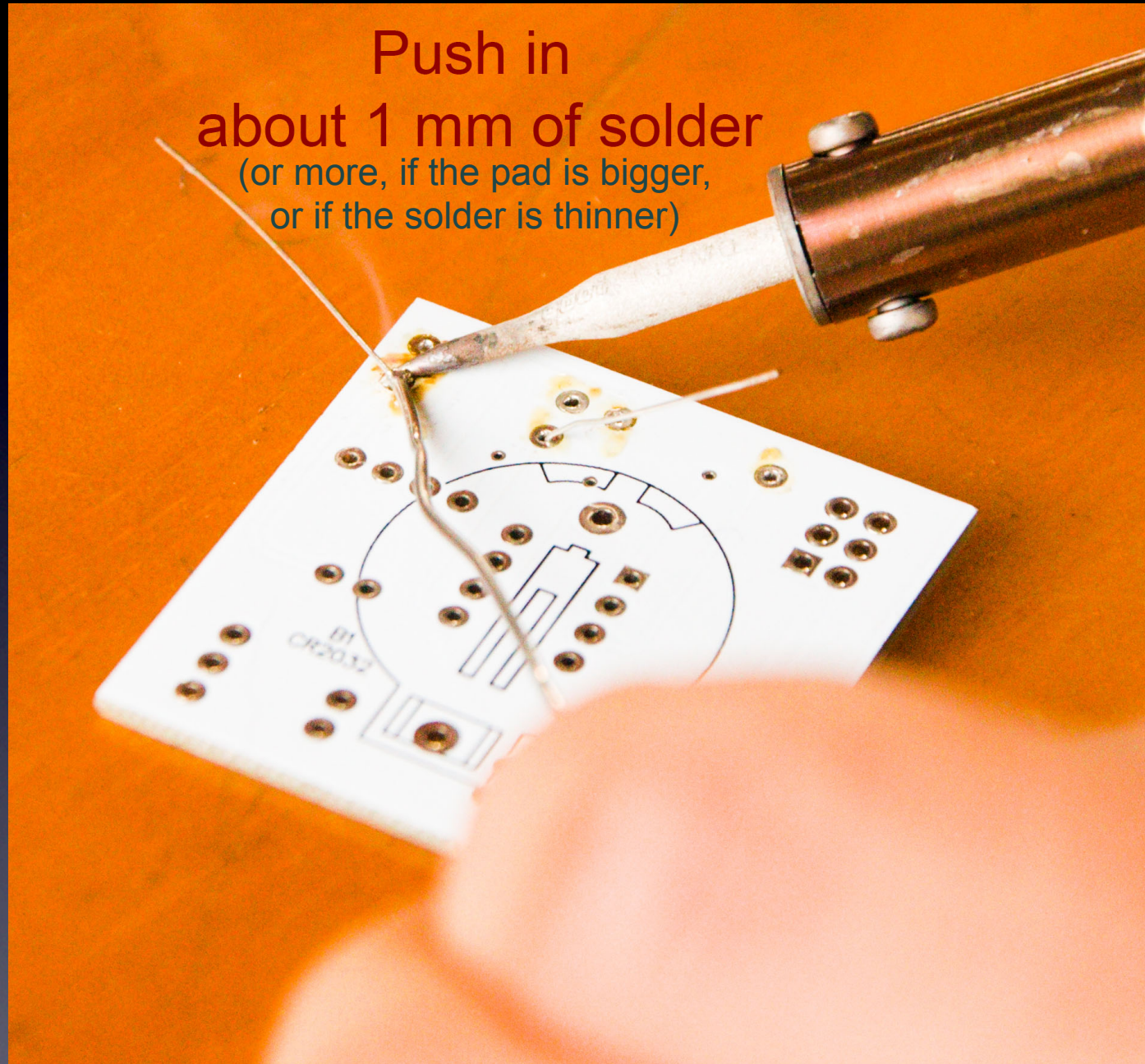


Do this quickly (slowly doesn't work well) – solder in & out in about 1 second



IMPORTANT: 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)!

HEY !!!

KEEP HOLDING TIP DOWN FOR 1 MORE SECOND !!



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

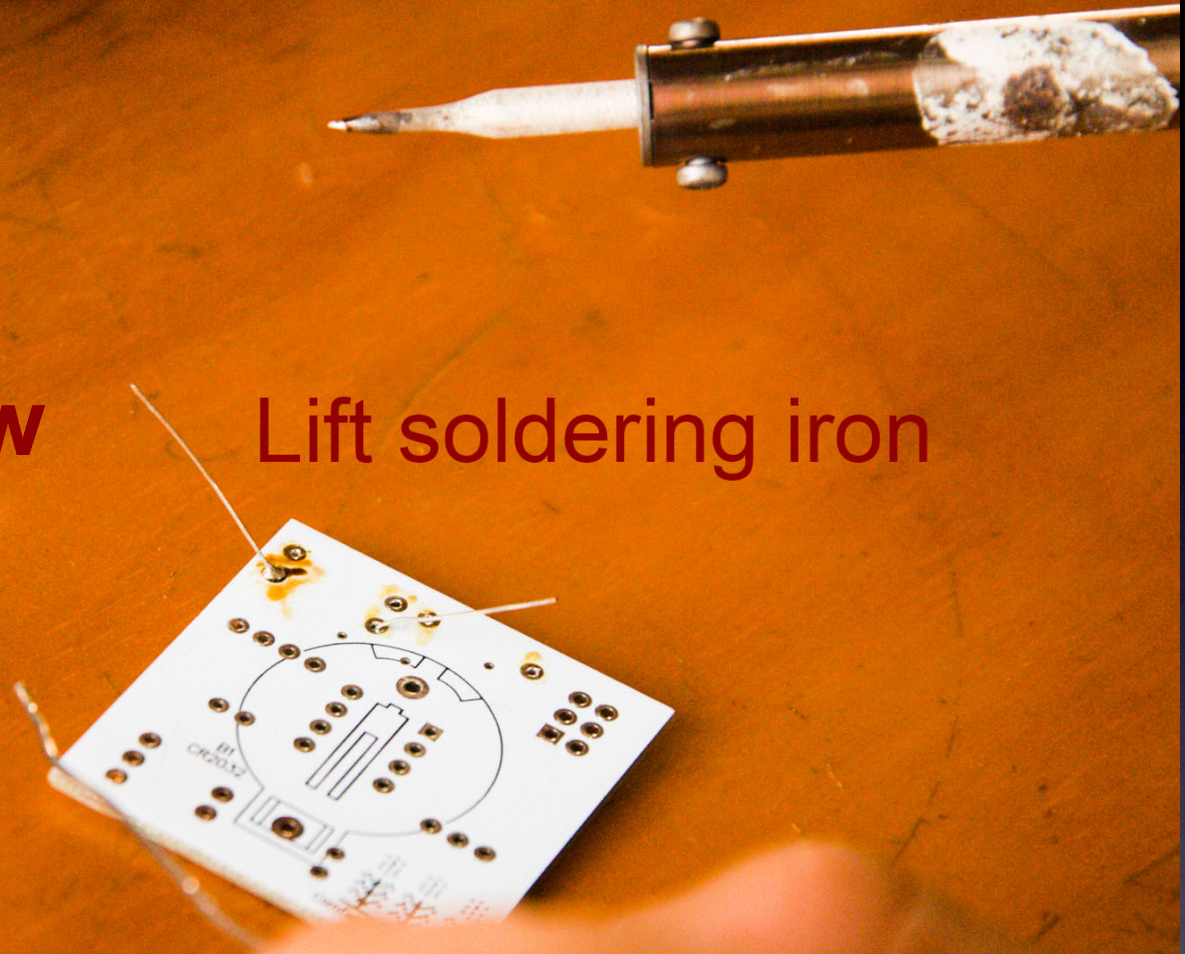
WAIT !!
Don't lift the tip !!

Secret #2:

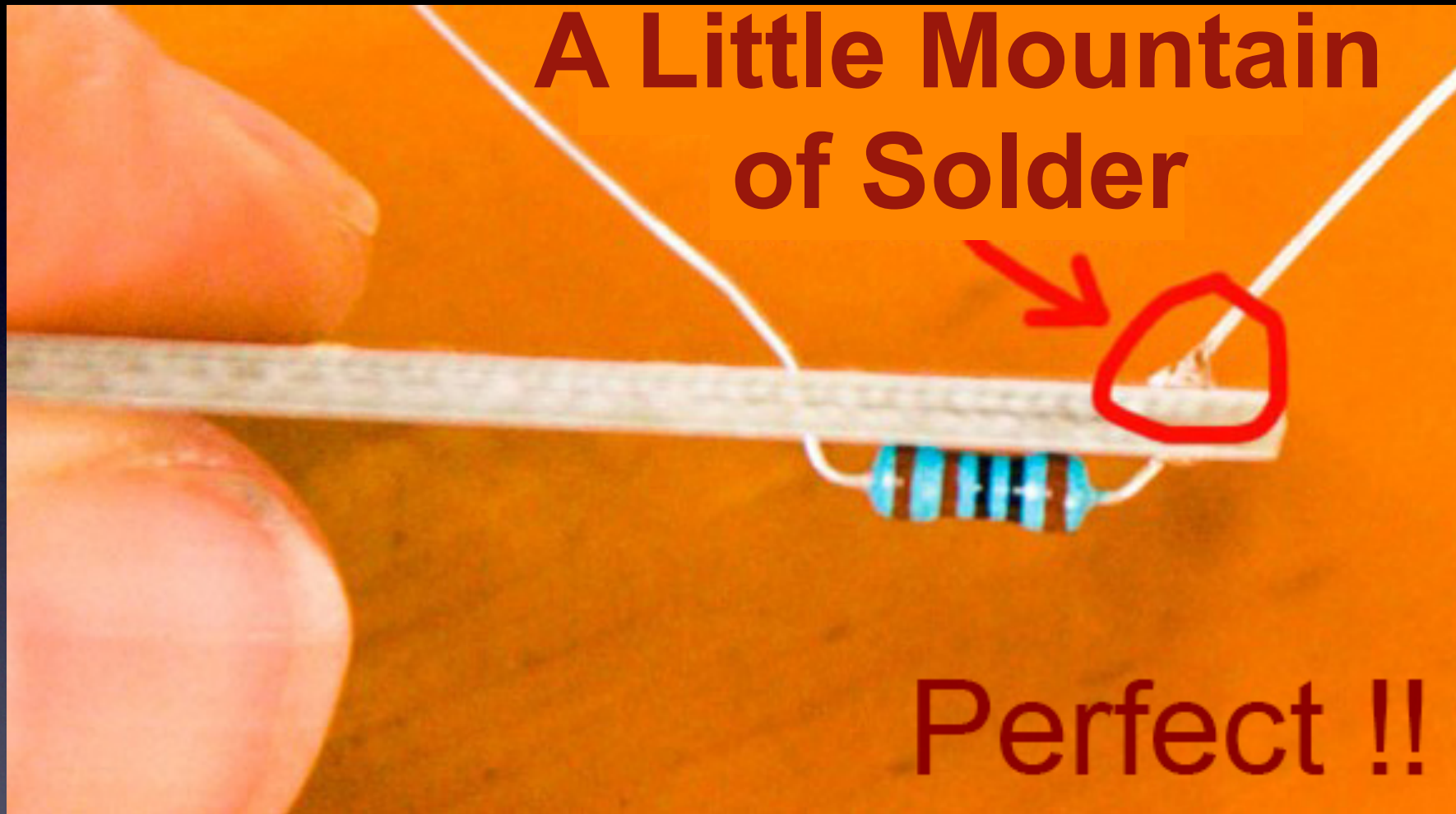
Keep hot tip down
1 second
For solder to flow !!

Now

Lift soldering iron



**A Little Mountain
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 !

is just as important as the preceding steps!

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 !

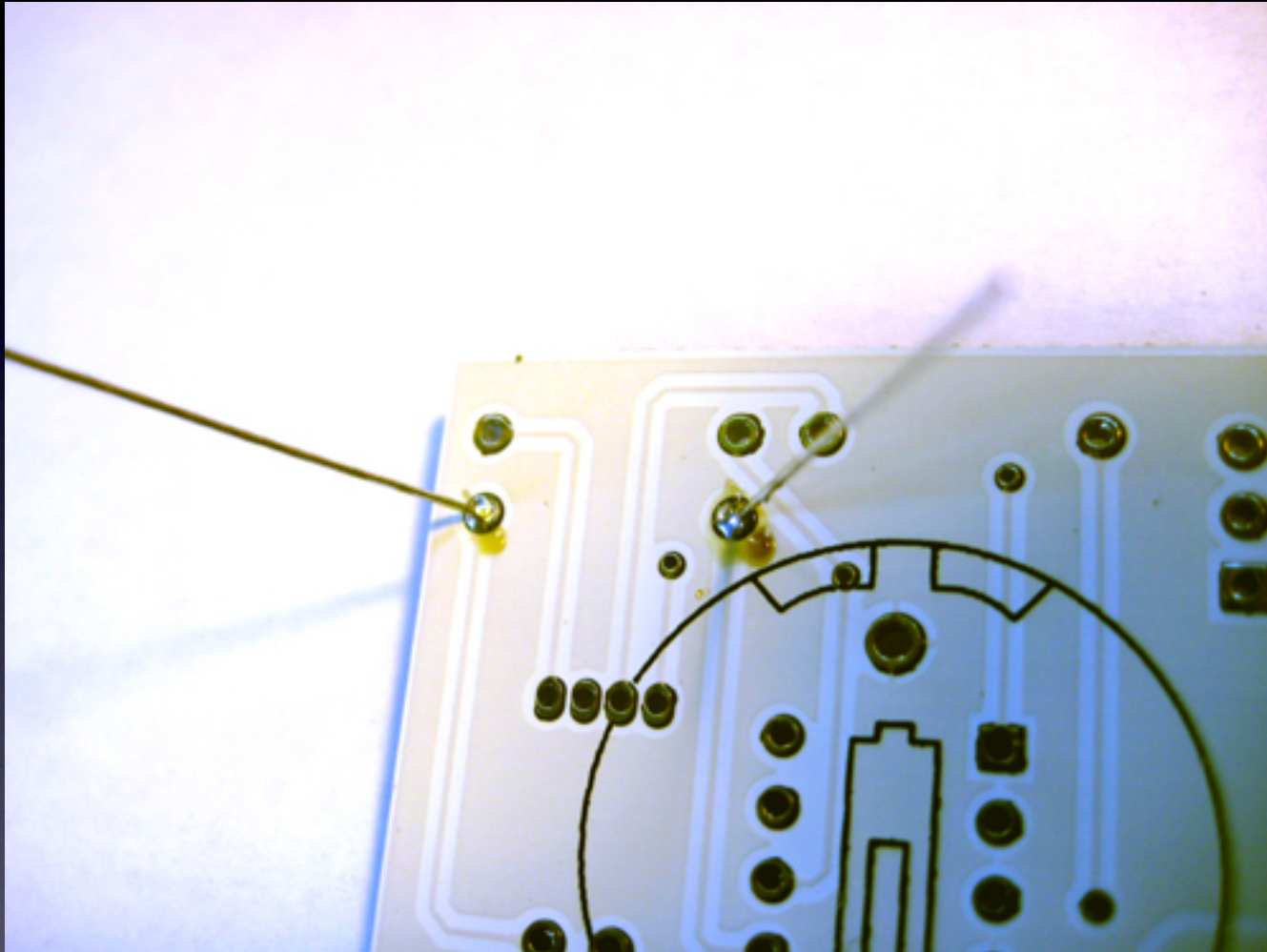
The Rhythm !

and speed (about 1 second per step)



Lift Tip

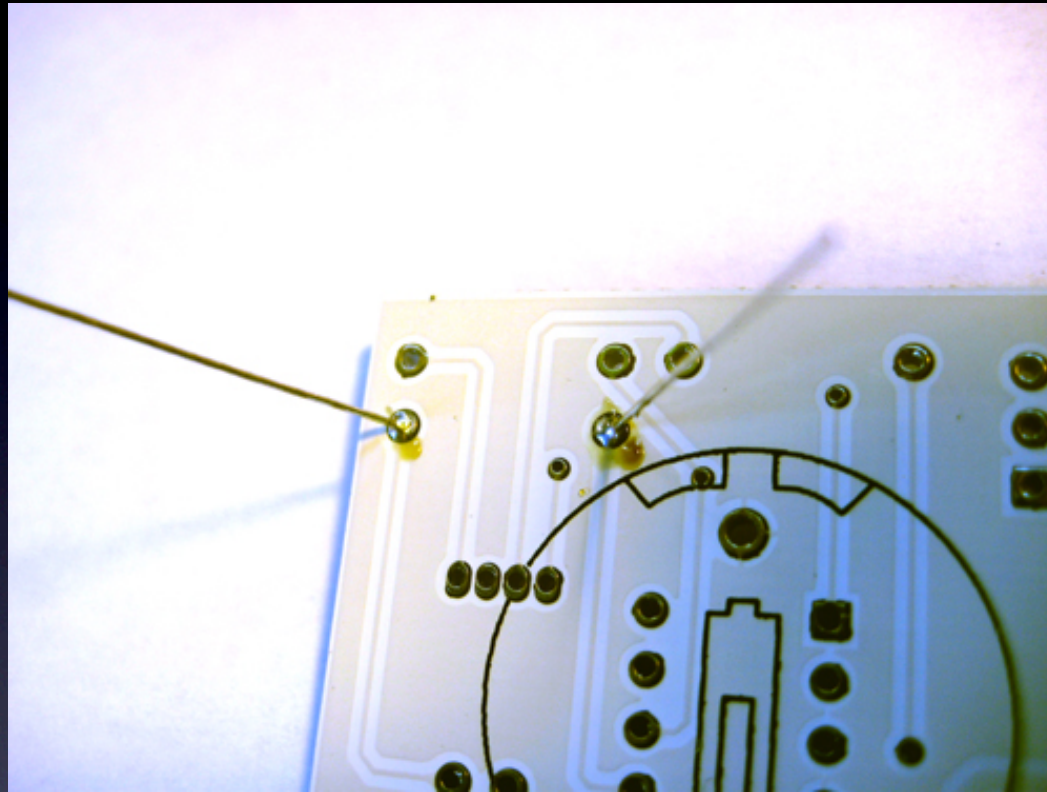
Solder all of the leads of the part to the board



For this part, there are two leads

Here you can see two good solder connections

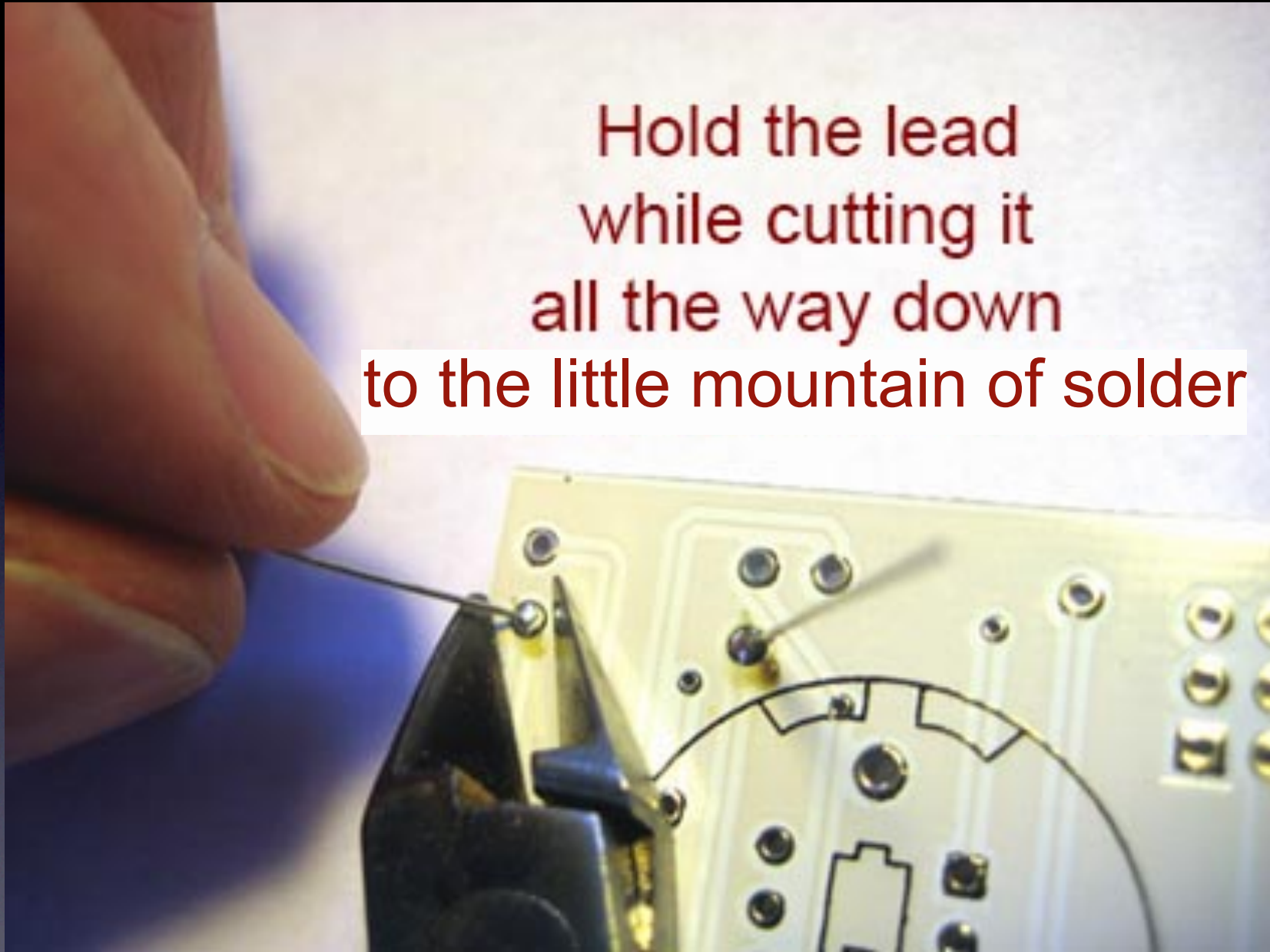
Two good solder connections



- Little mountains (not flat)
- Pads totally covered in solder
- Can't see the hole
- No connections to other pads

Now cut the leads short

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



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

Safety Tip #3:

Hole 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.)



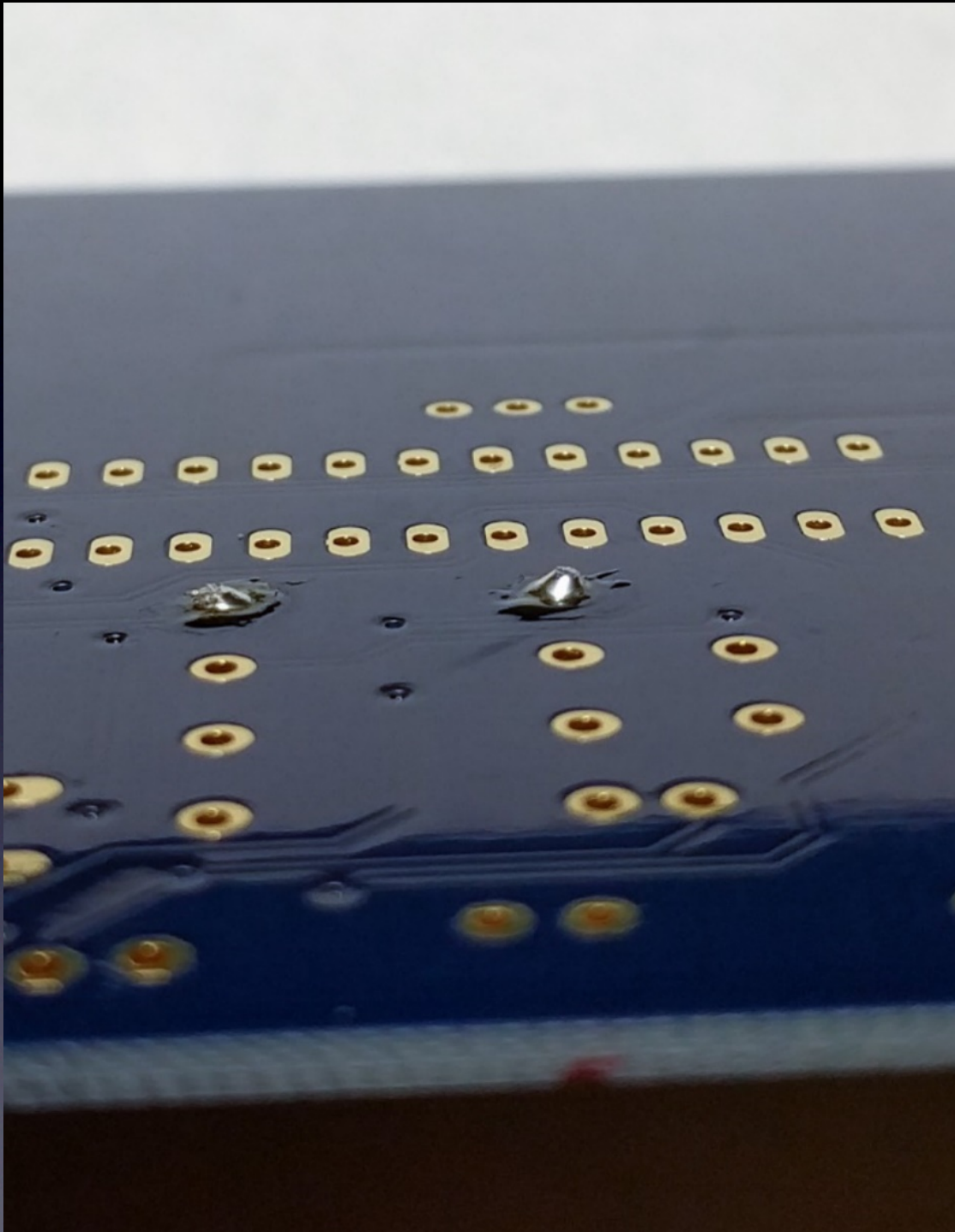
All done !

No wires sticking out

R1 soldered to the board

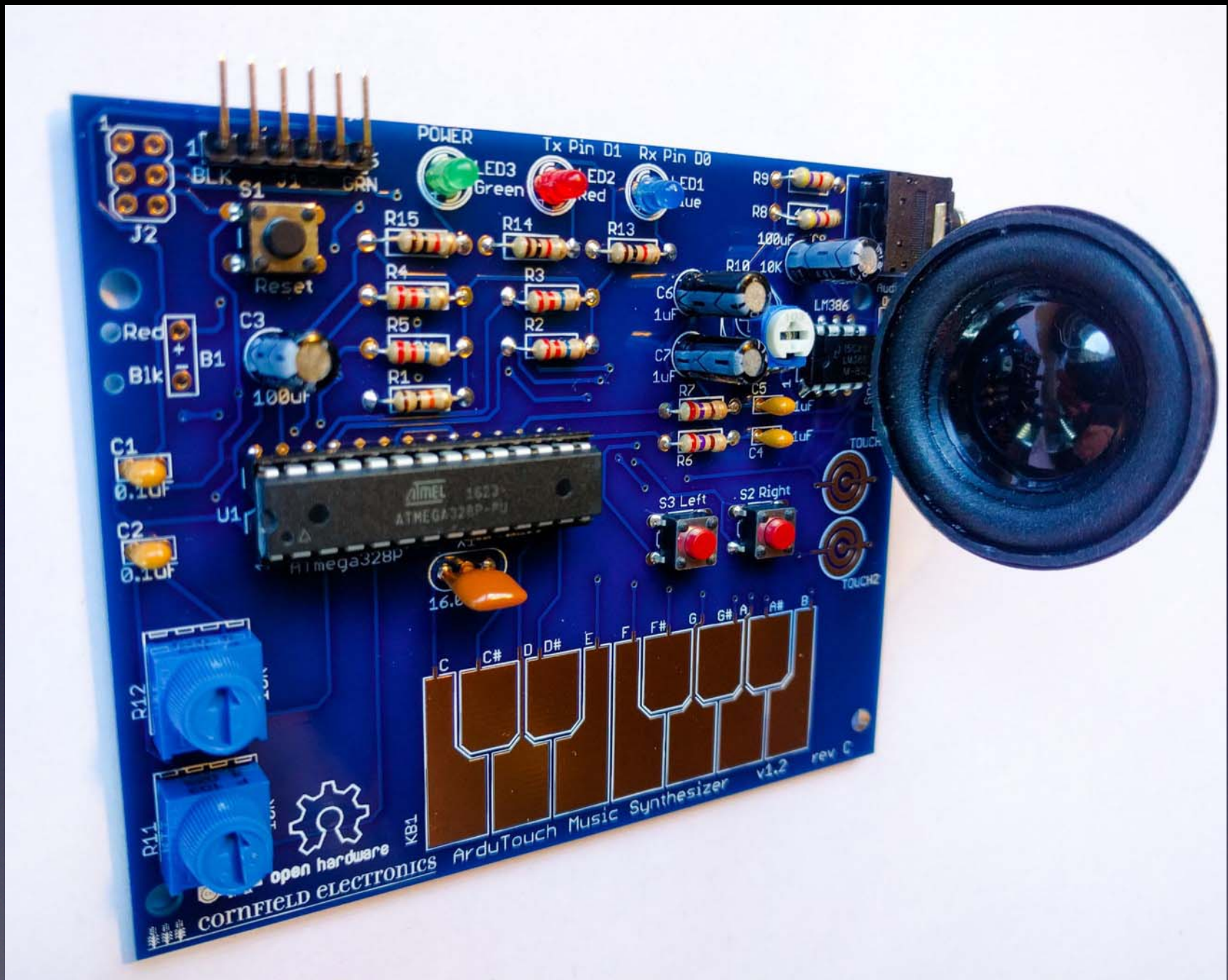
Notice that:

- Each connection is a small mountain (not flat)
- You cannot see any pad (they're totally covered with solder)
- You cannot see the holes (they're totally covered with solder)
- No connections to other pads



One part at a time

Till all the parts are soldered

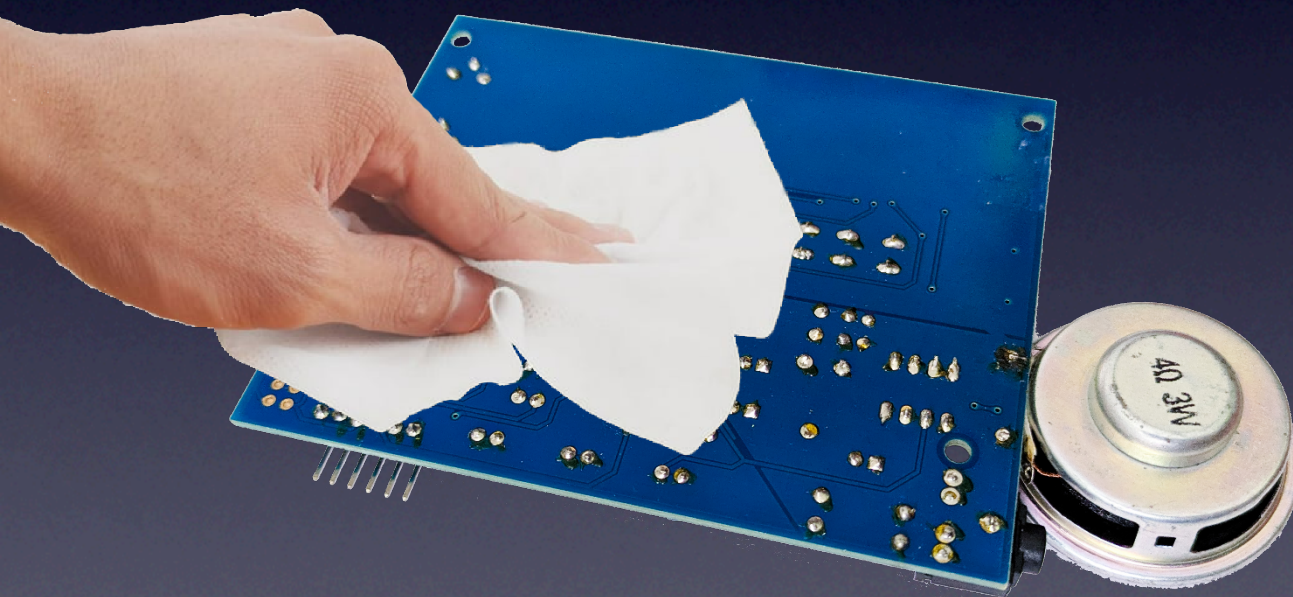


And it will look like this when you're done.

If you used any *flux paste* for re-working problems



The bottom of the PCB will be sticky from the flux



You can clean it with a cloth wet with *Isopropyl Alcohol*

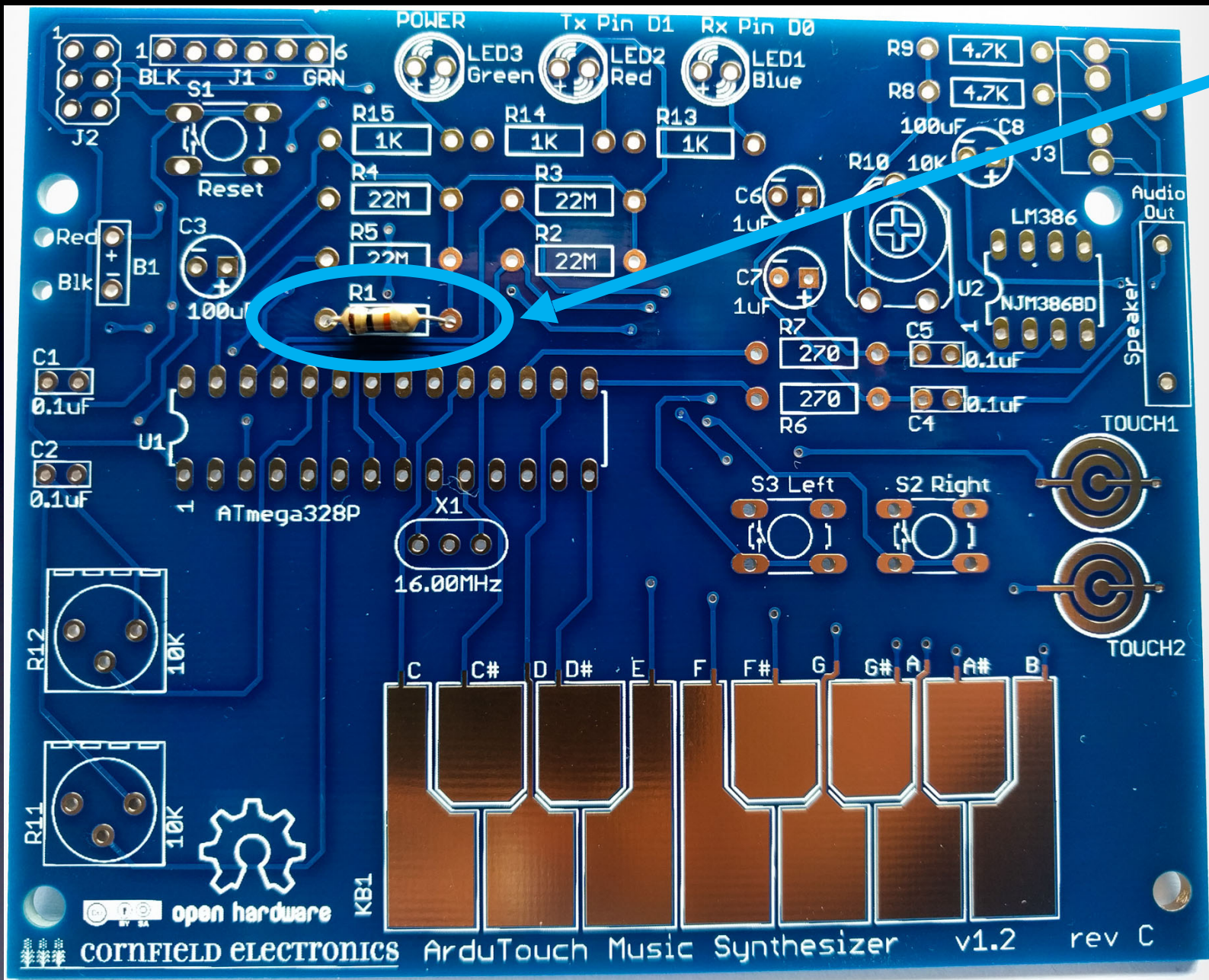
Then put in the batteries,

Turn it on,

And it works!

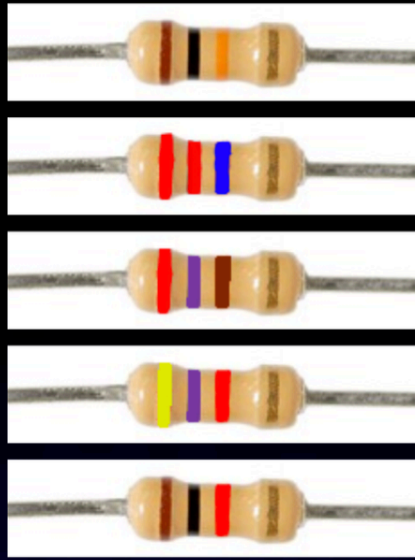
(Or you start debugging.)

Let's start!

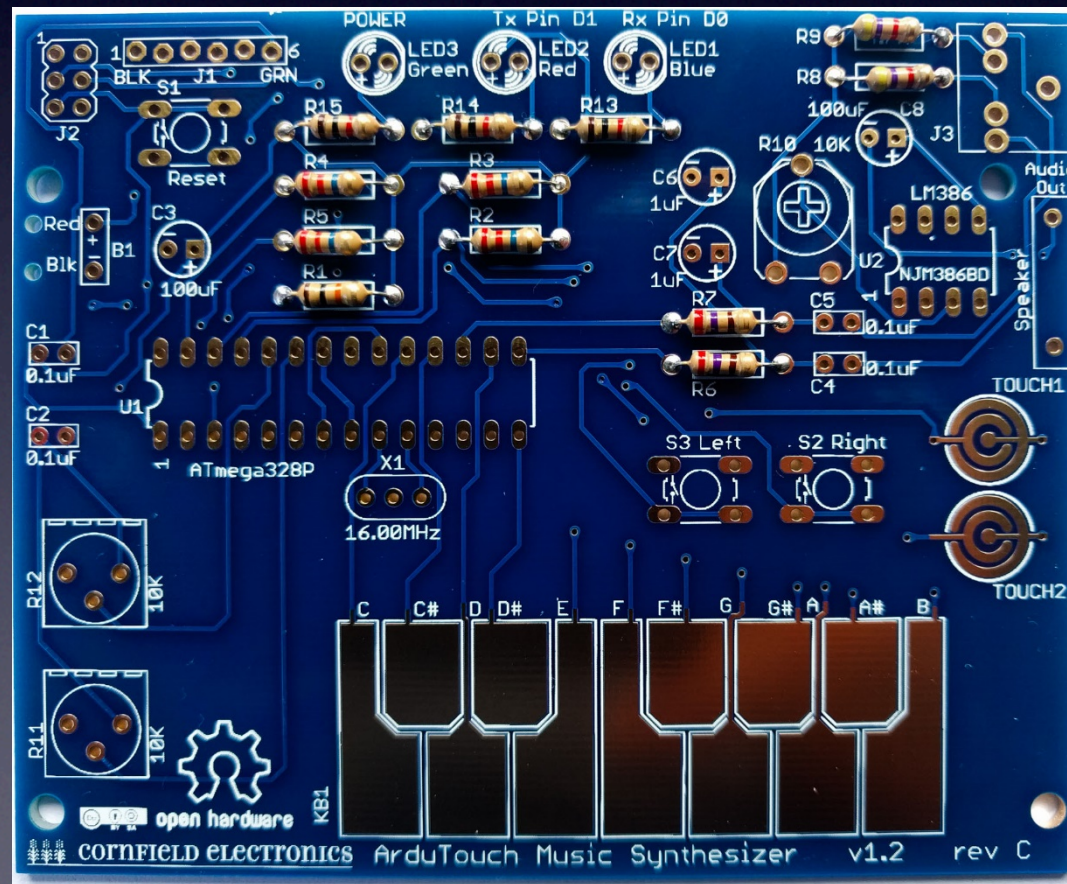


If you haven't done so already, solder R1: brown, black, orange

R1:
 R2, R3, R4, R5:
 R6, R7:
 R8, R9:
 R13, R14, R15:

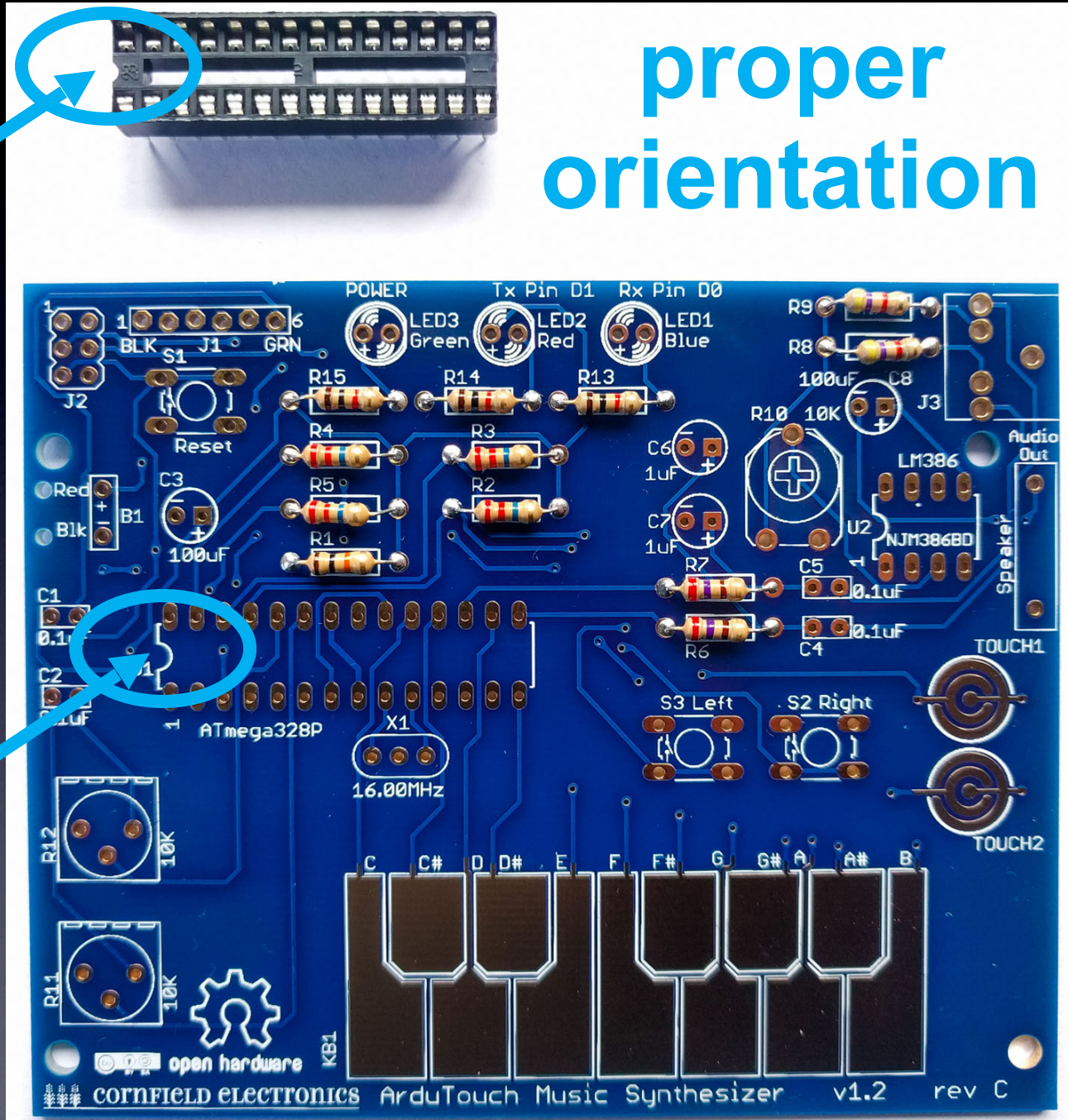


10K: Brown, Black, Orange
 22M: Red, Red, Blue
 270: Red, Violet, Brown
 4.7K: Yellow, Violet, Red
 1K: Brown, Black, Red

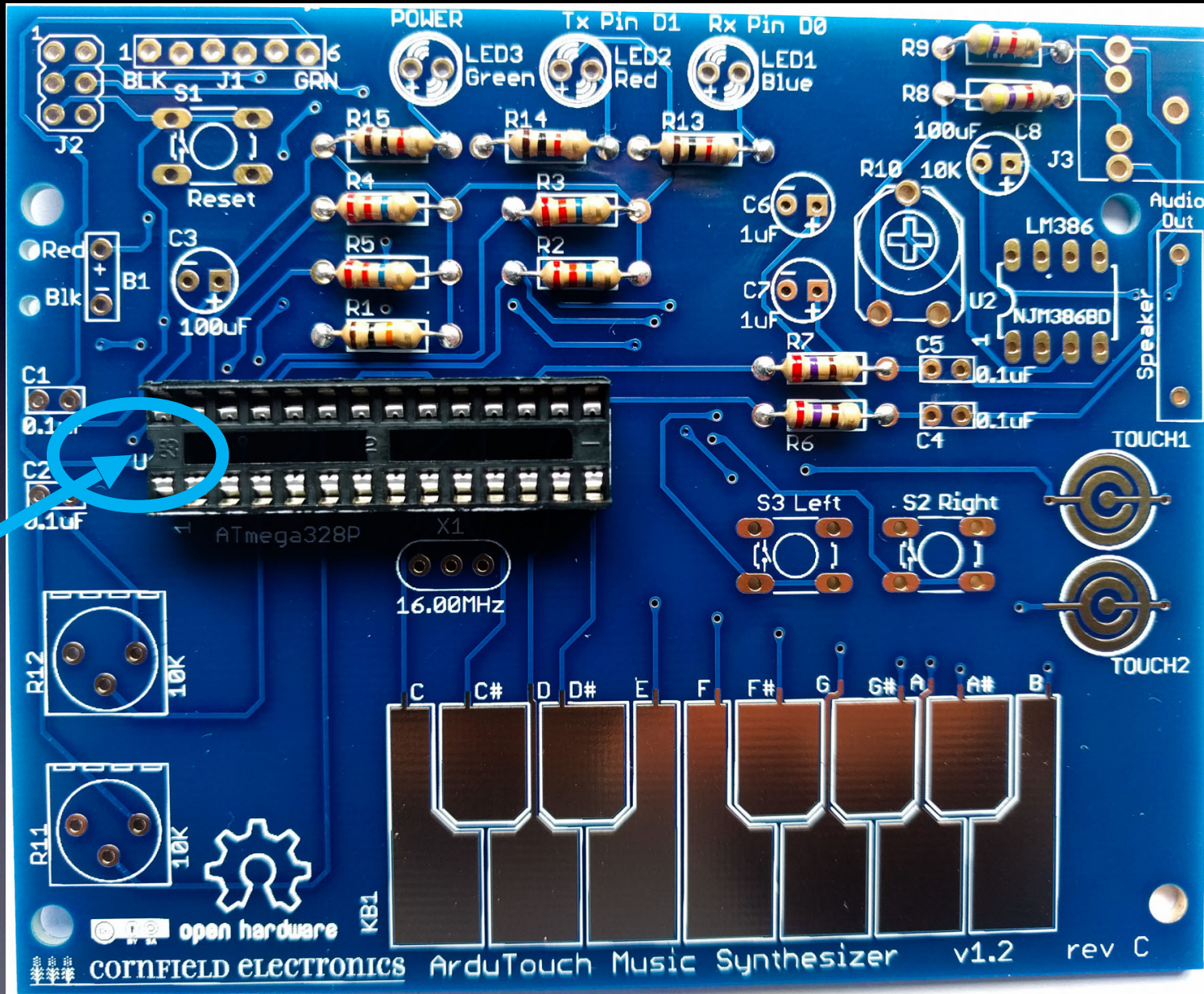


U1: microcontroller socket

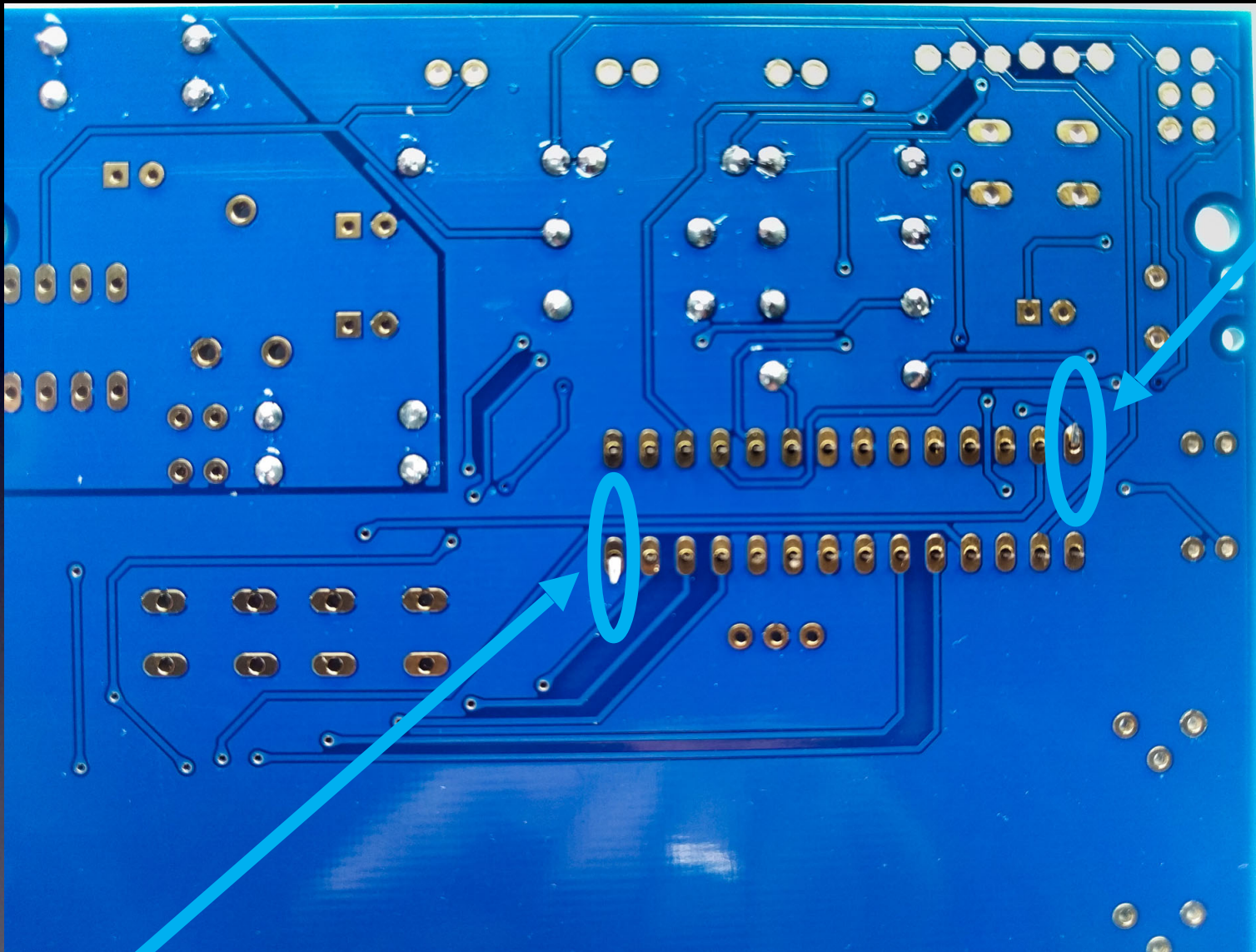
proper orientation



U1: microcontroller socket: inserted correctly

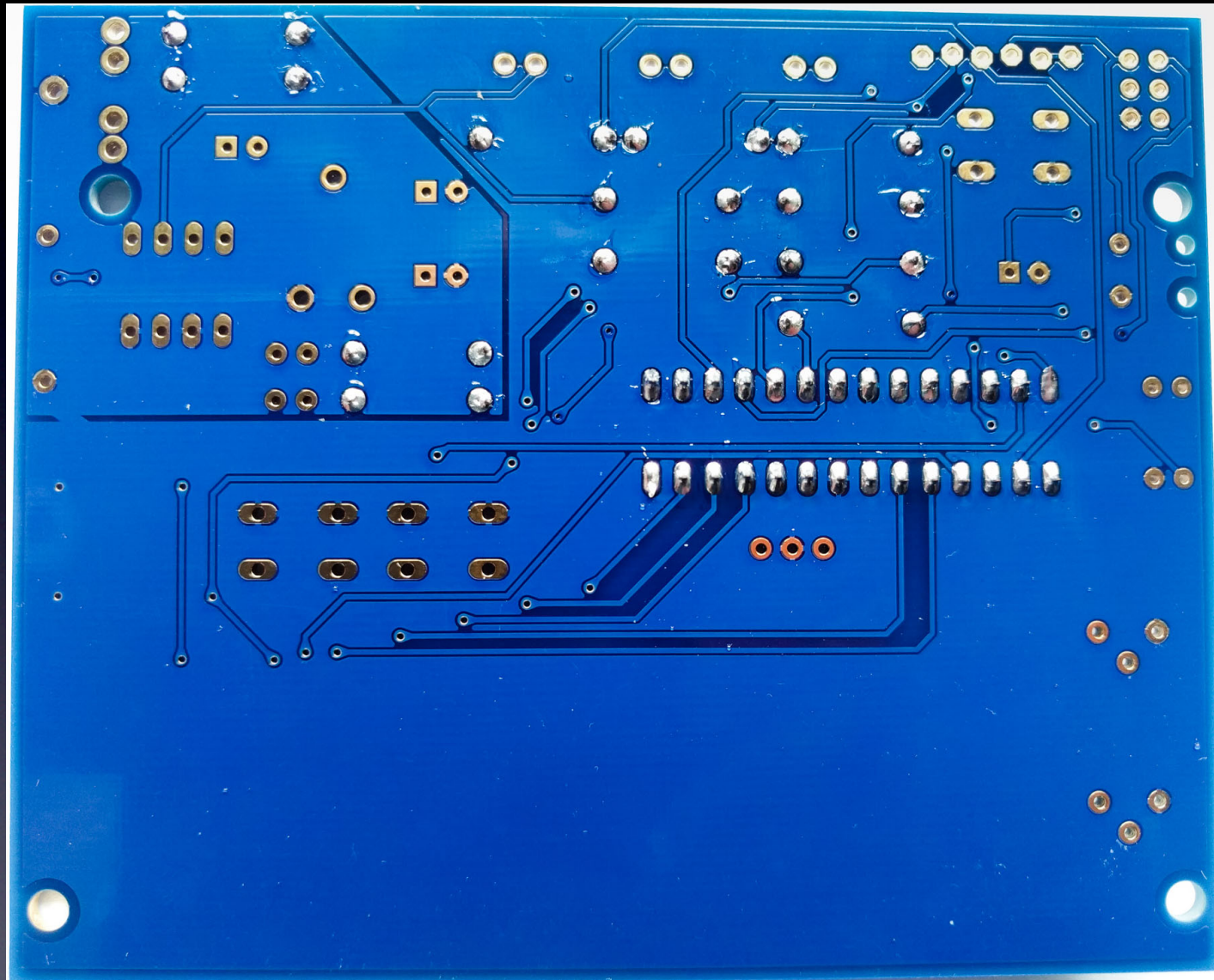


U1: microcontroller socket



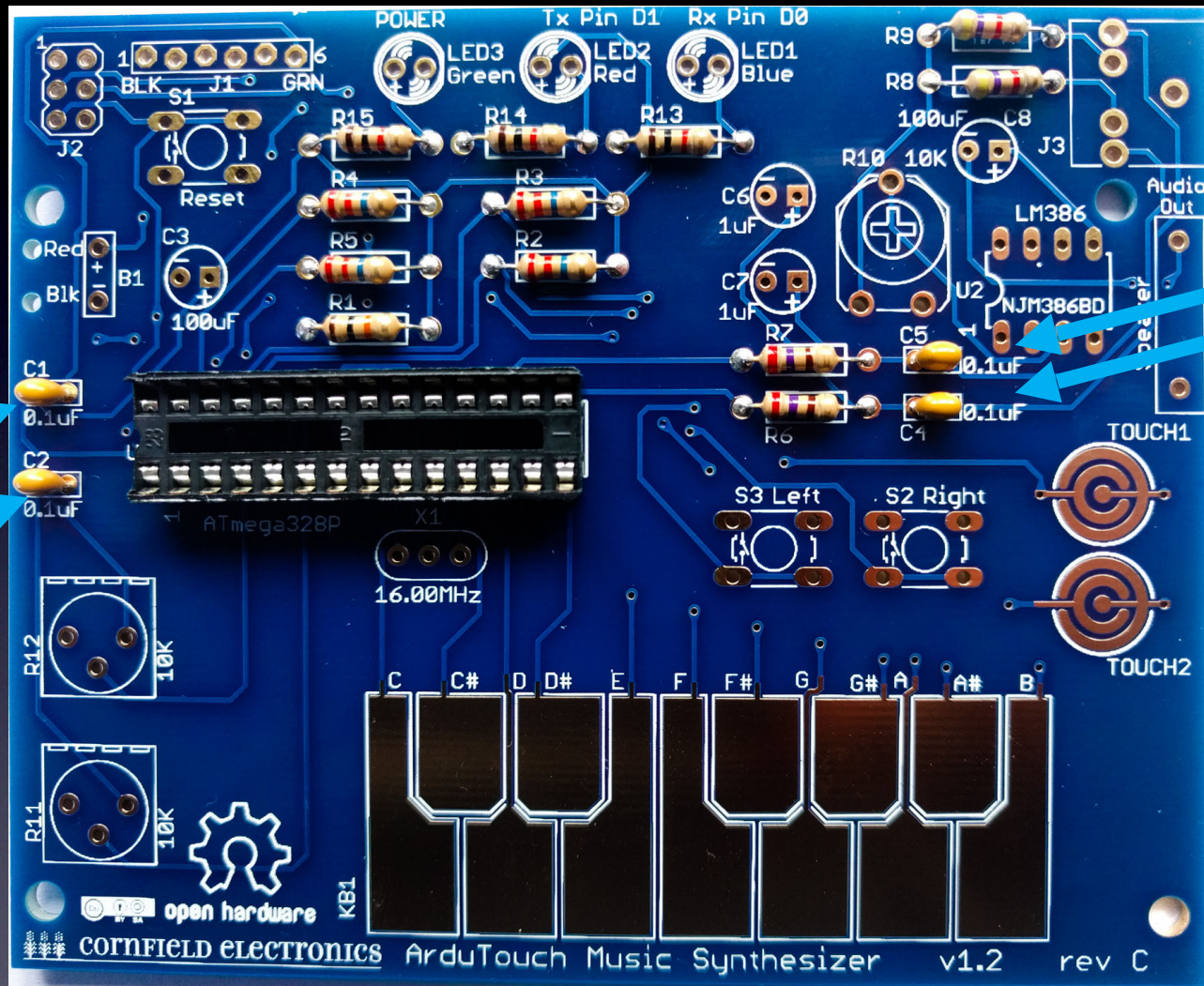
bend pins down on two corners,
and solder all 28 leads to the board

U1: microcontroller socket

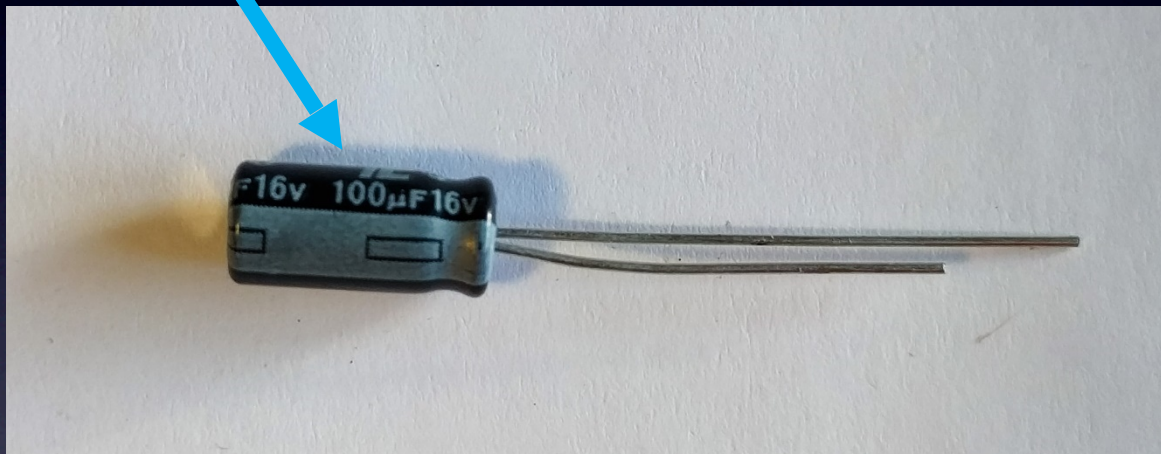


All 28 leads soldered to the board:

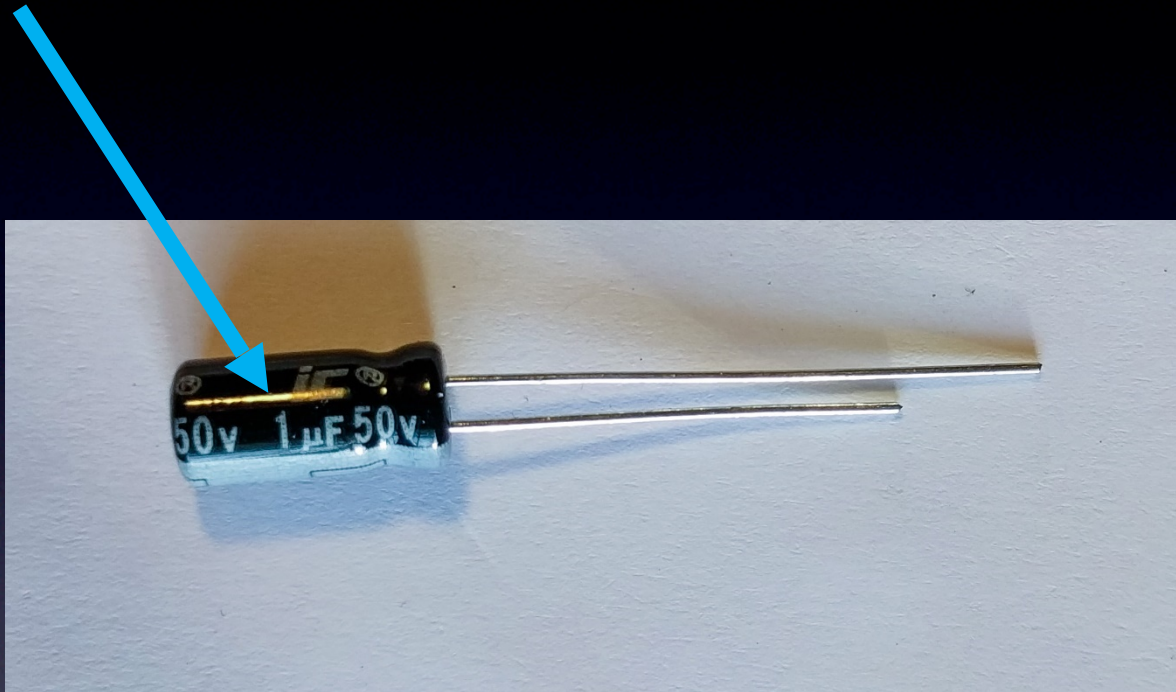
→ Notice that each pad is totally covered with solder. ←



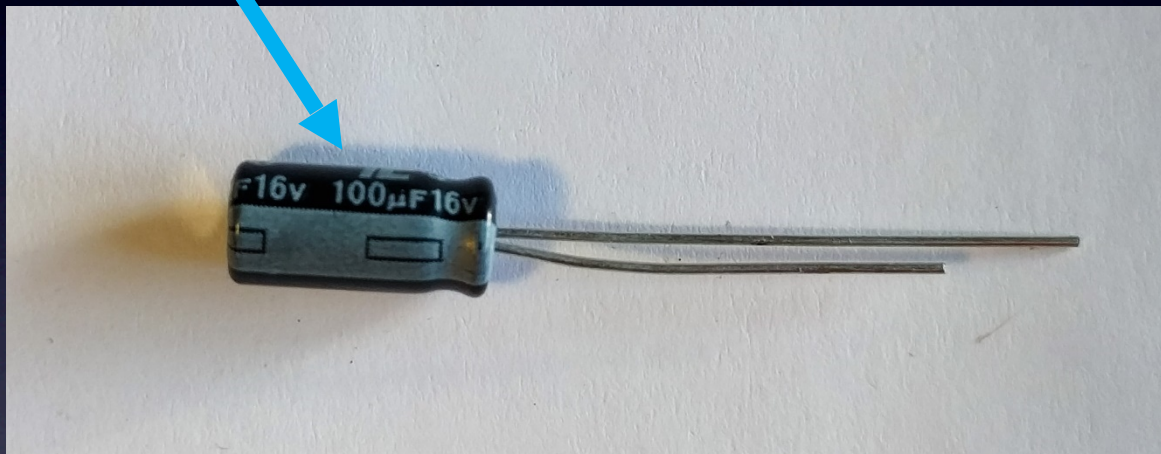
C1, C2, C4, C5



C3, C8: 100µF



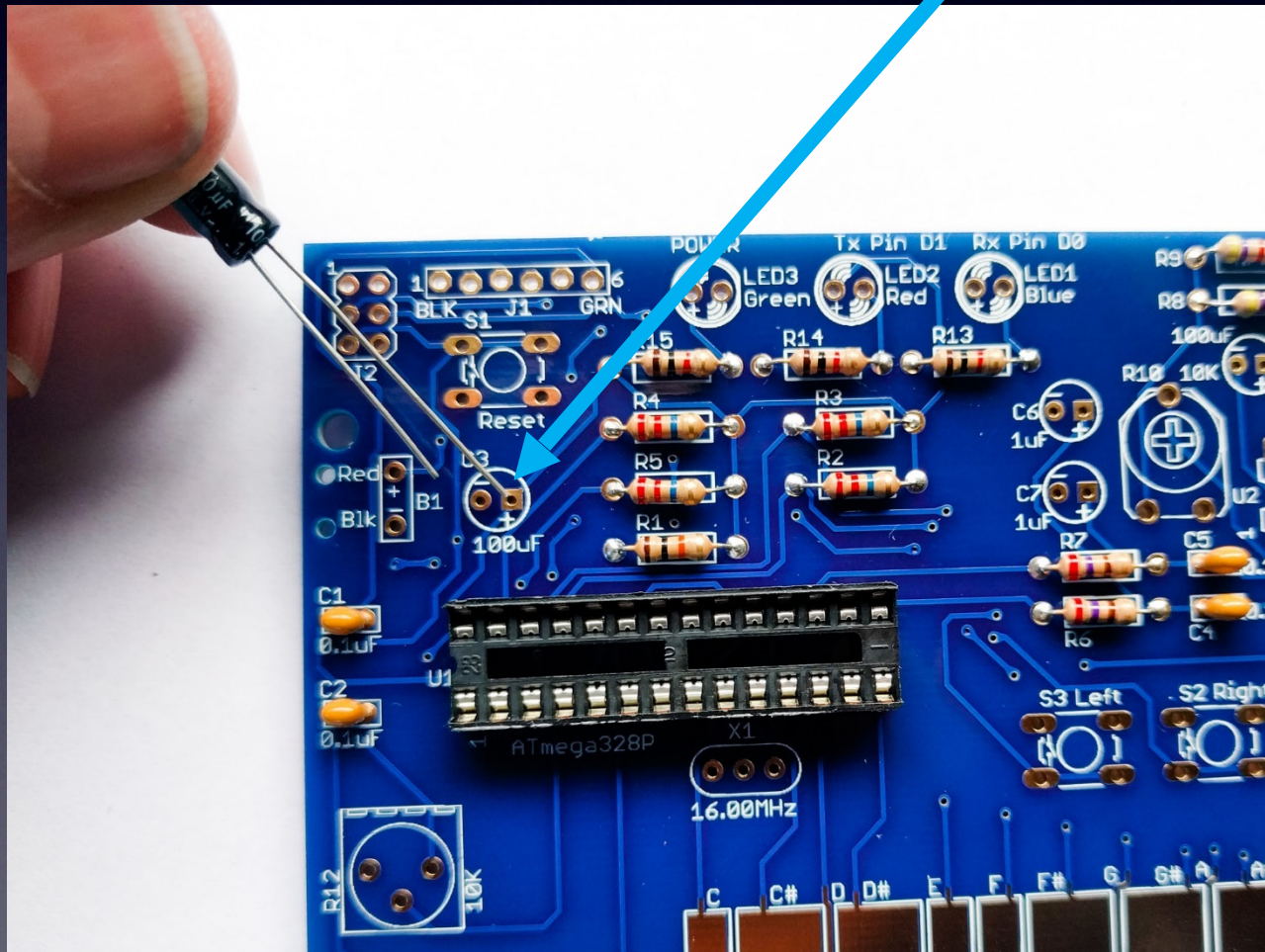
Different than C3, C8 !
C6, C7: 1uF

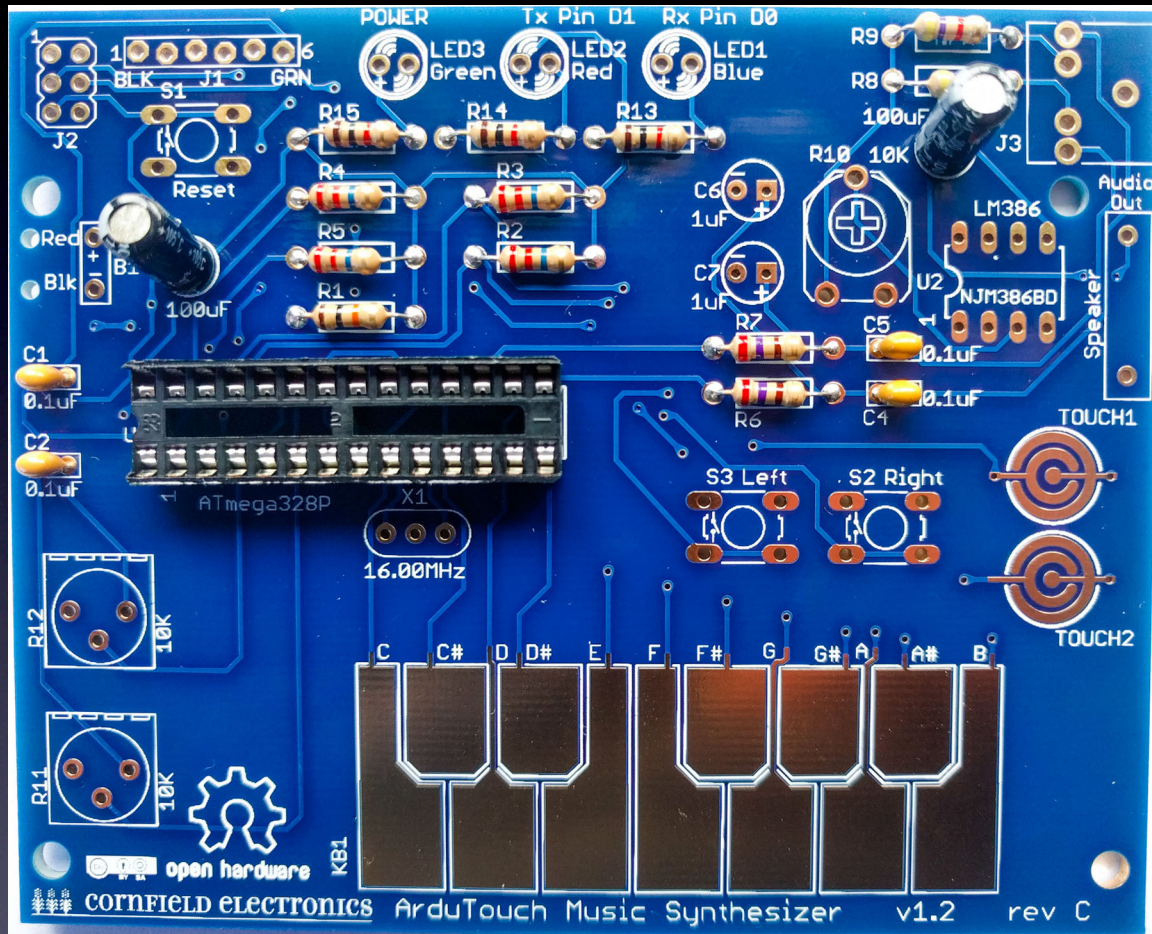


C3, C8: 100µF

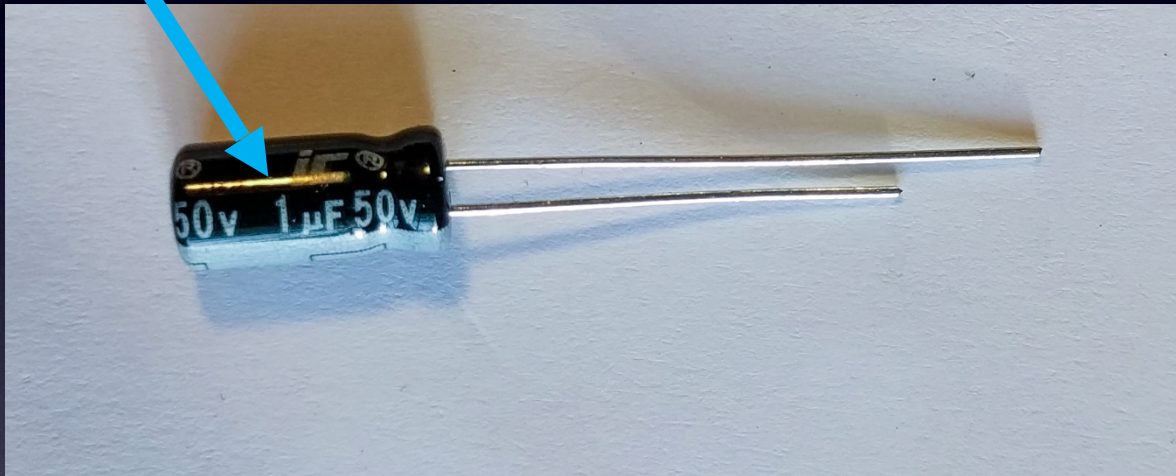
**C3, C8:
Long Lead “+”**

Use 100uF !!

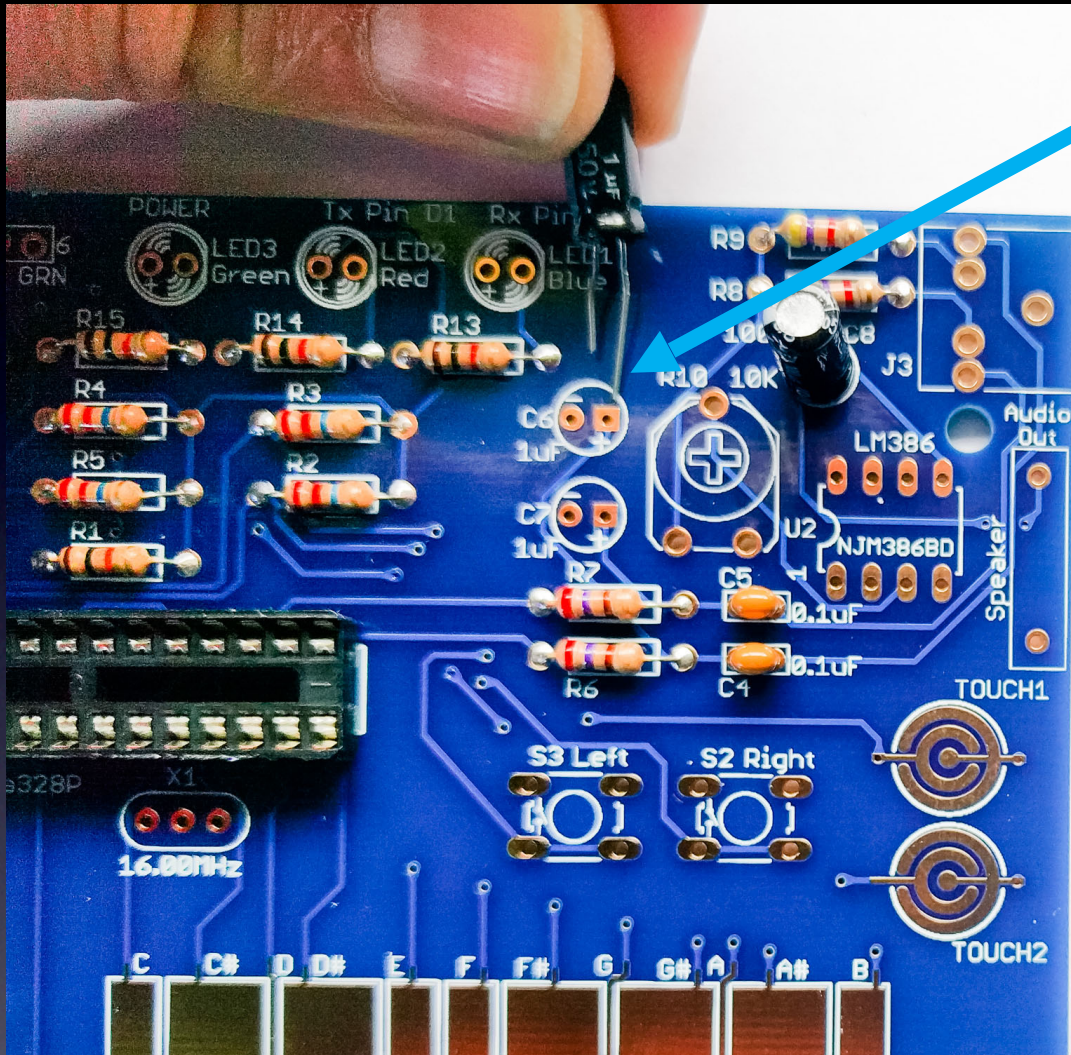




C3, C8: 100uF – soldered to board

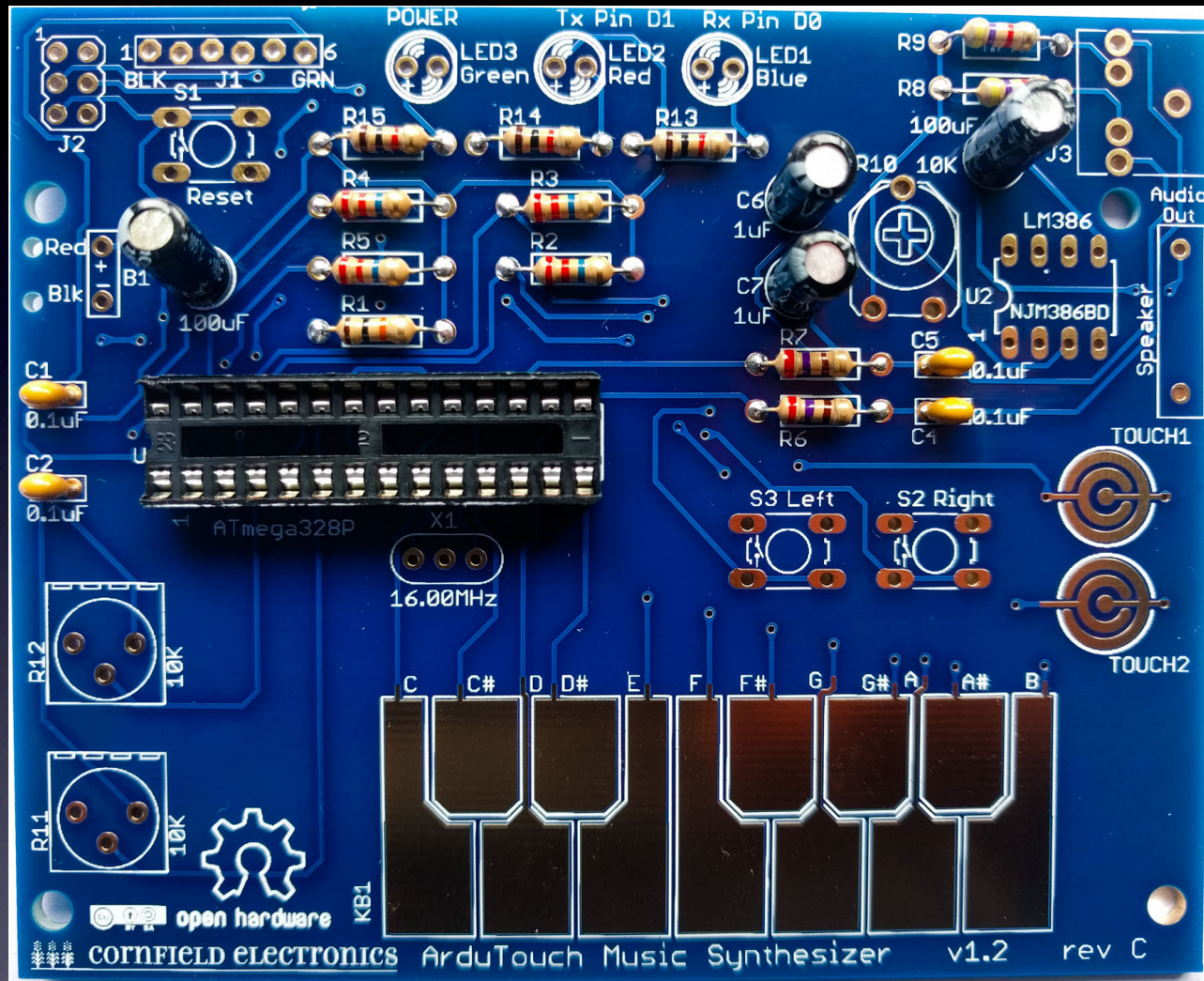


C6, C7: 1µF



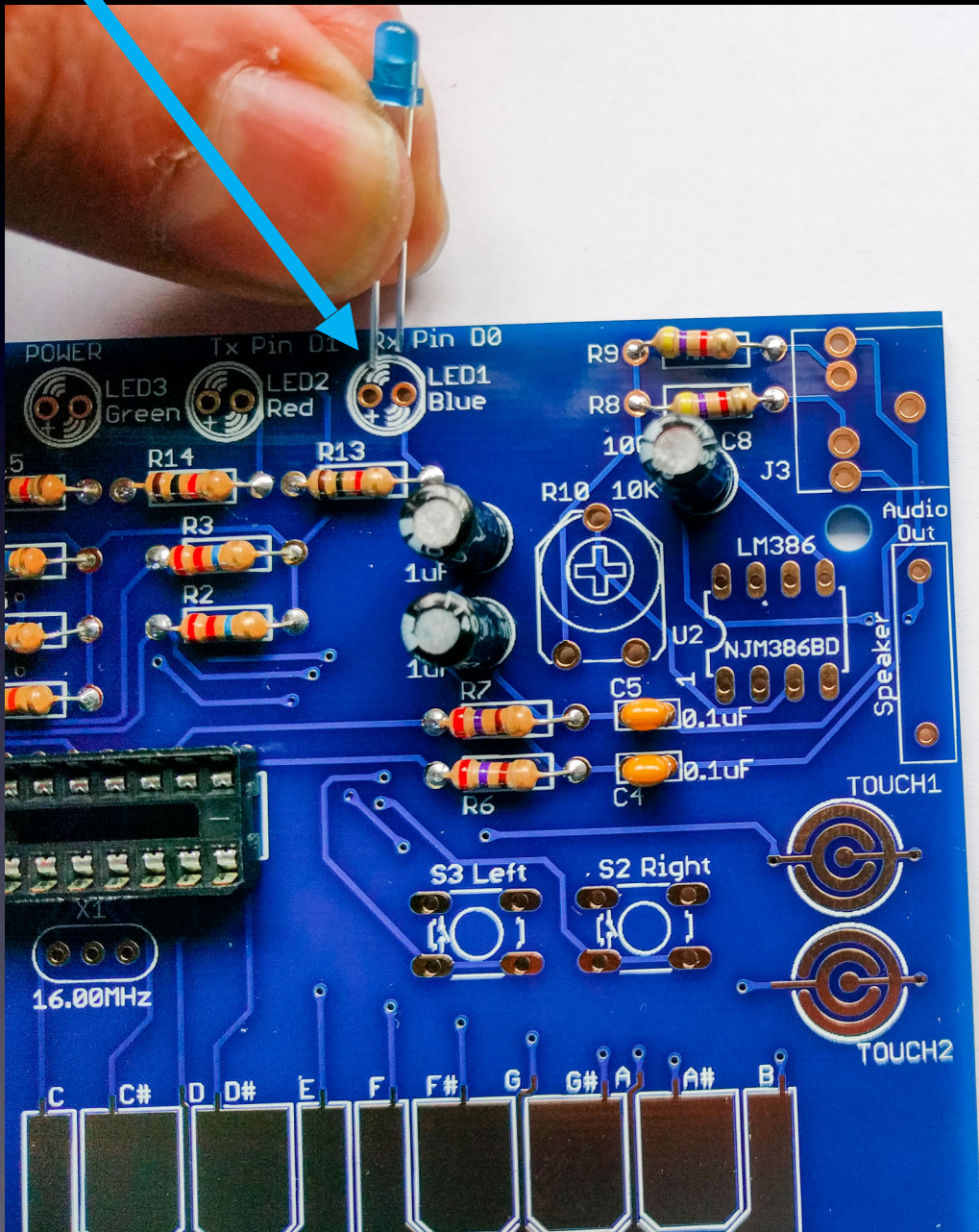
**C6, C7:
Long Lead “+”**

Use 1uF !!



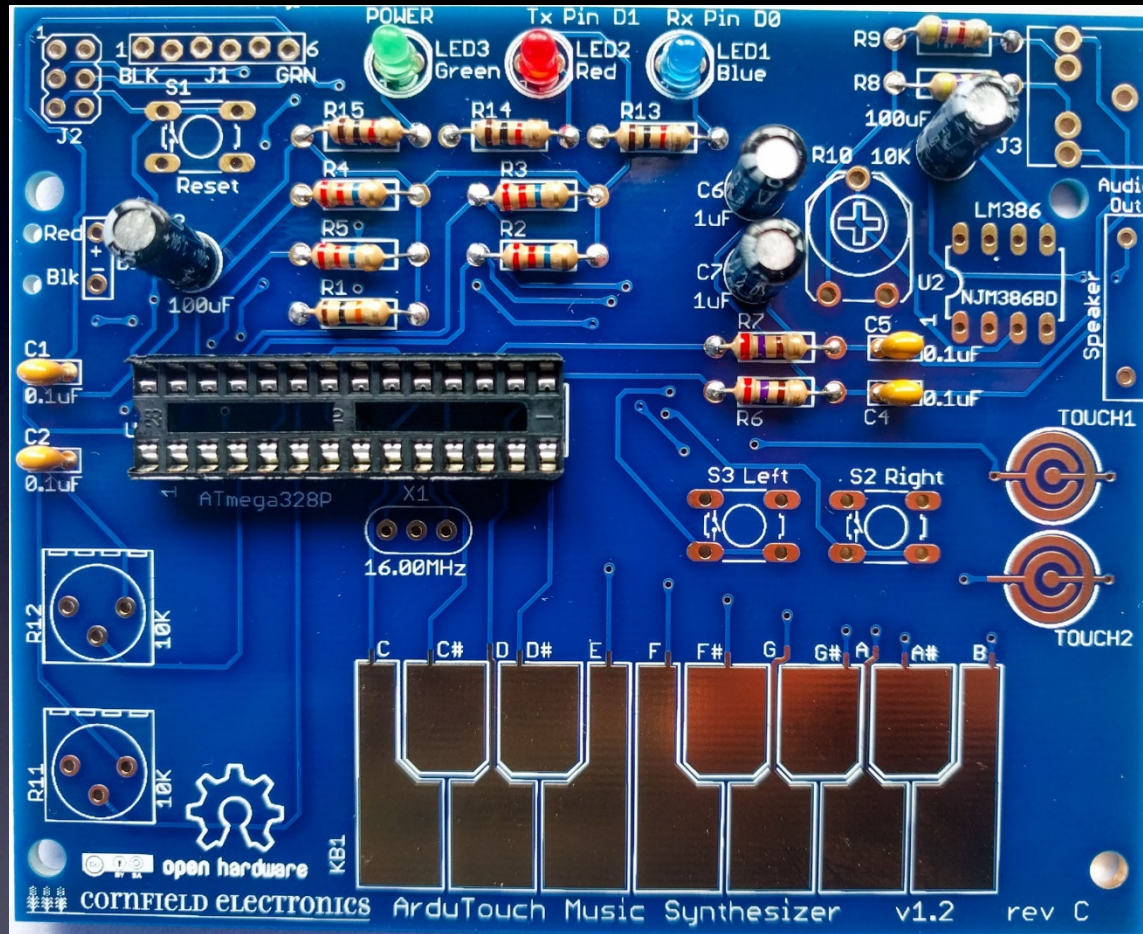
C6, C7: 1uF – soldered to board

LED1, LED2, LED3: Long Lead “+”



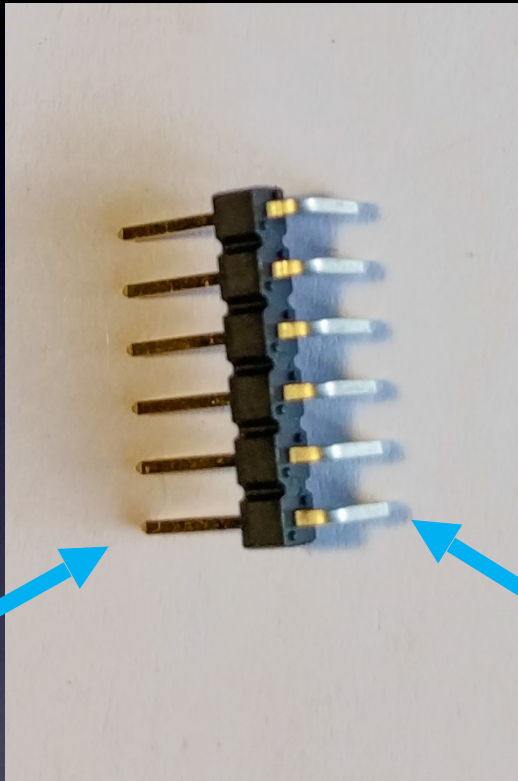
Save
these leads

We'll use them for the speaker



LED3, LED2, LED1

Green, Red, Blue – soldered to board



long leads

short leads

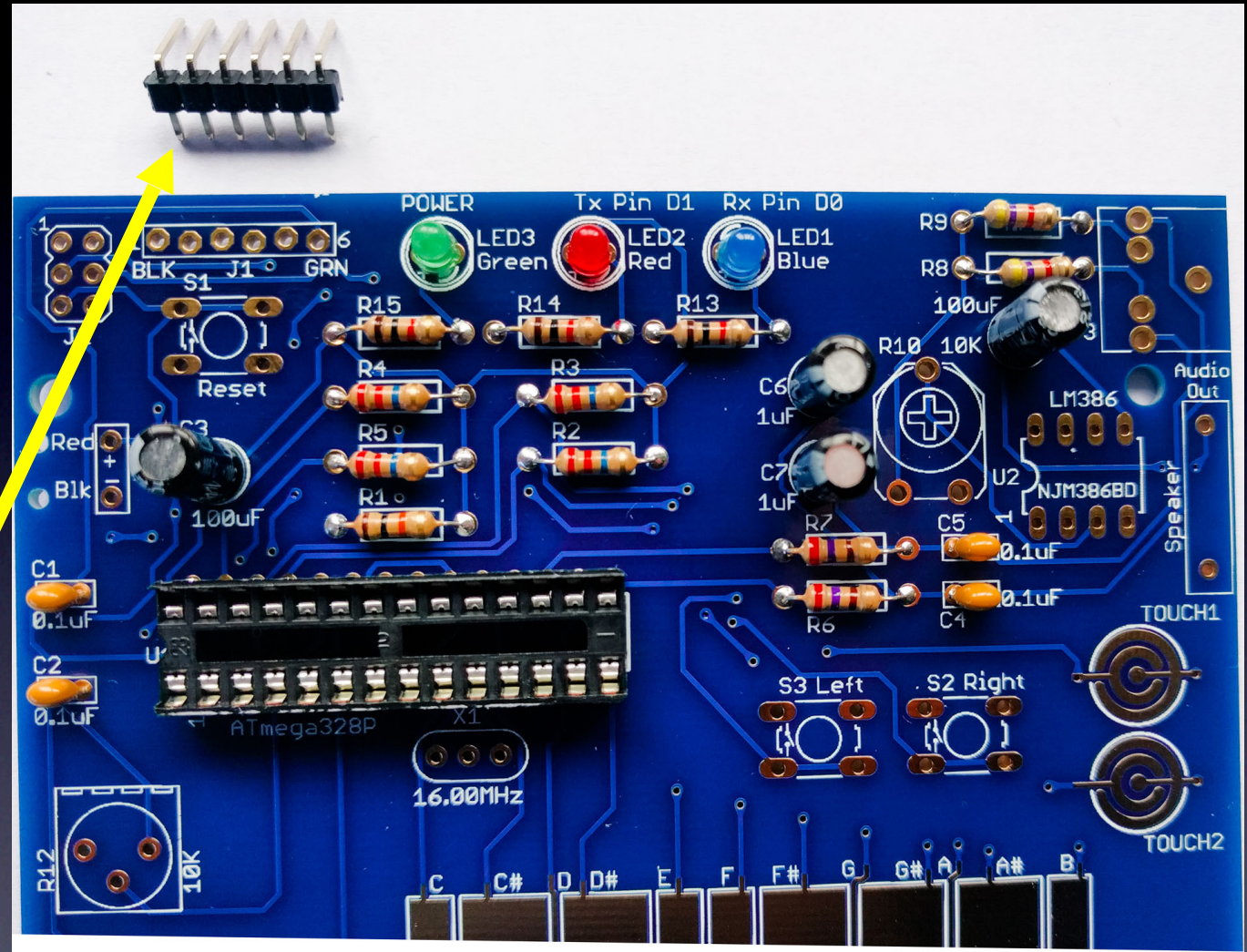
J1

Short leads into board

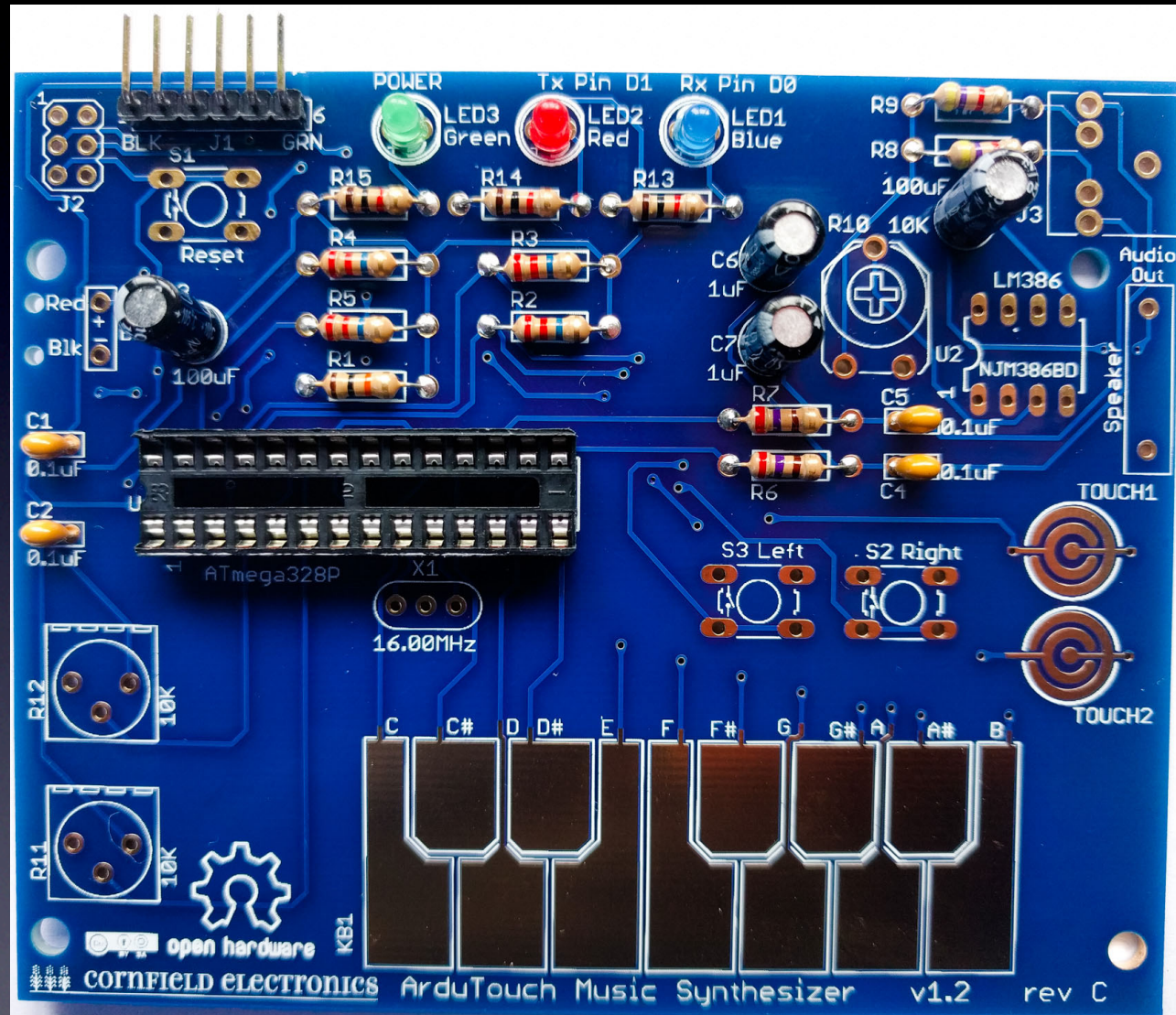
J1

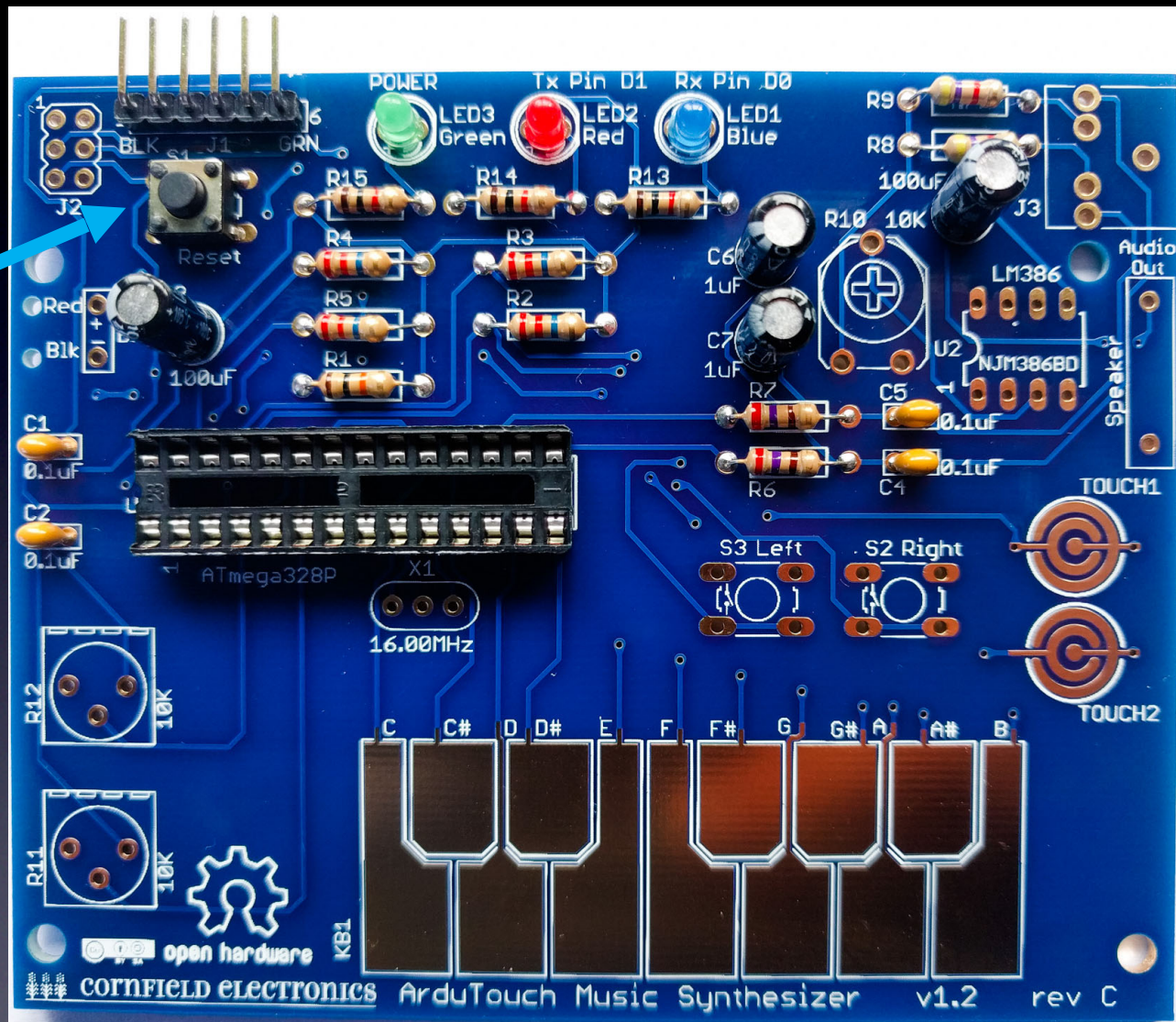
IMPORTANT:
short leads
go into the board

→ long leads sticking out from
board



J1



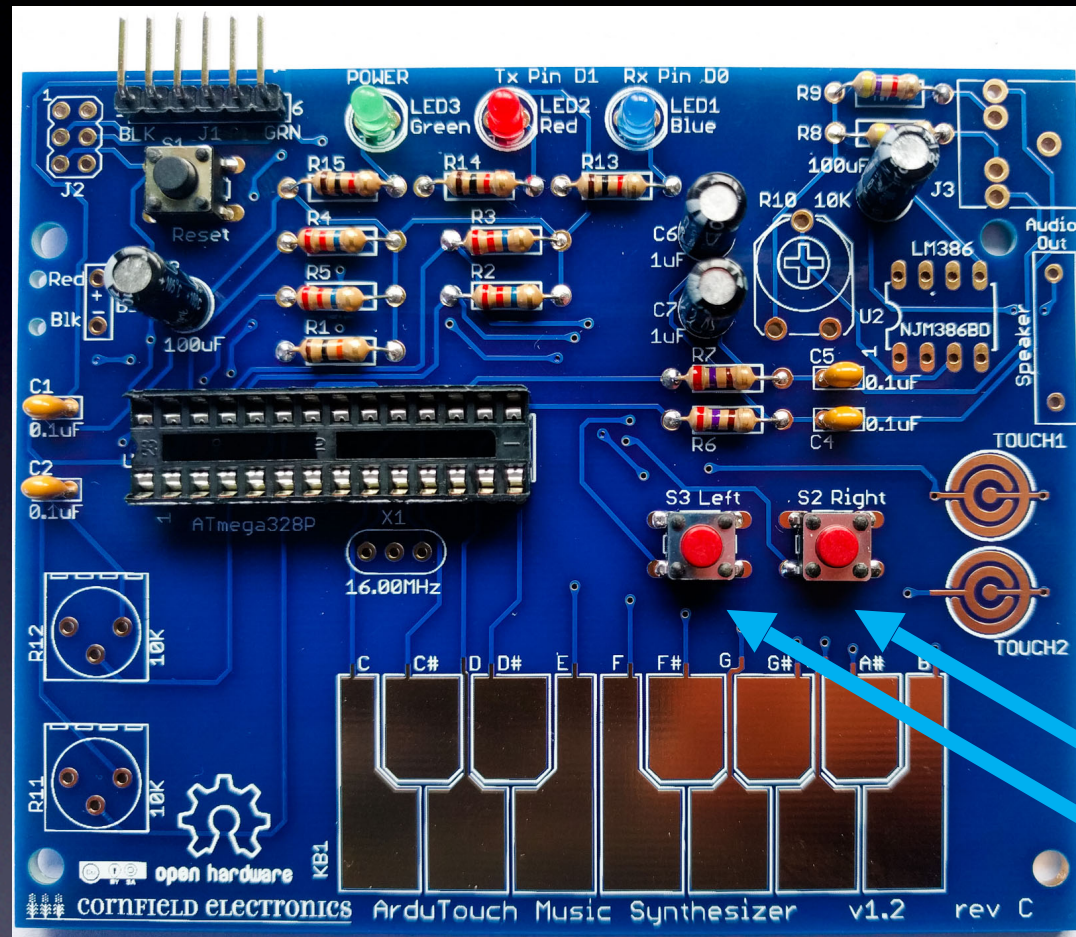


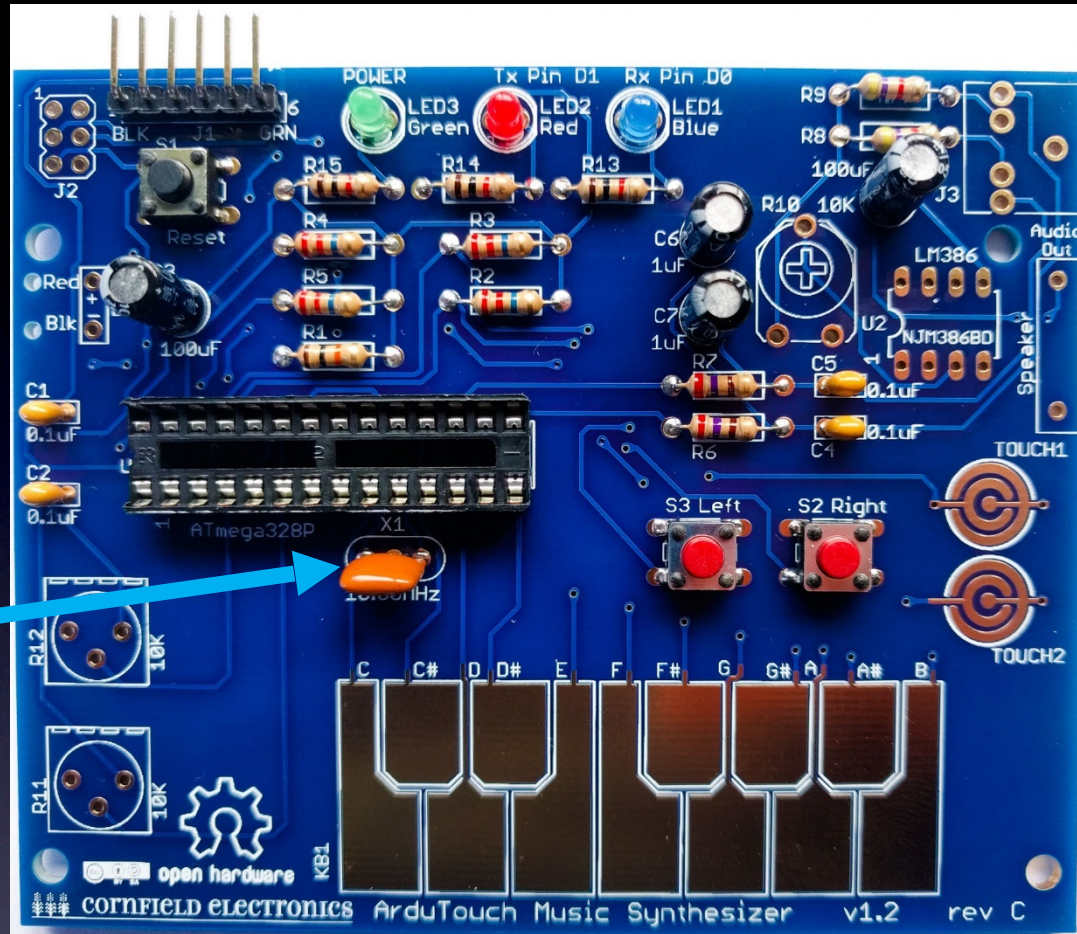
S1: black Reset button

Note: The color of this switch is not important (some kits may have different colors).

S2, S3: Red buttons

Note: The color of these switches is not important (some kits may have different colors).



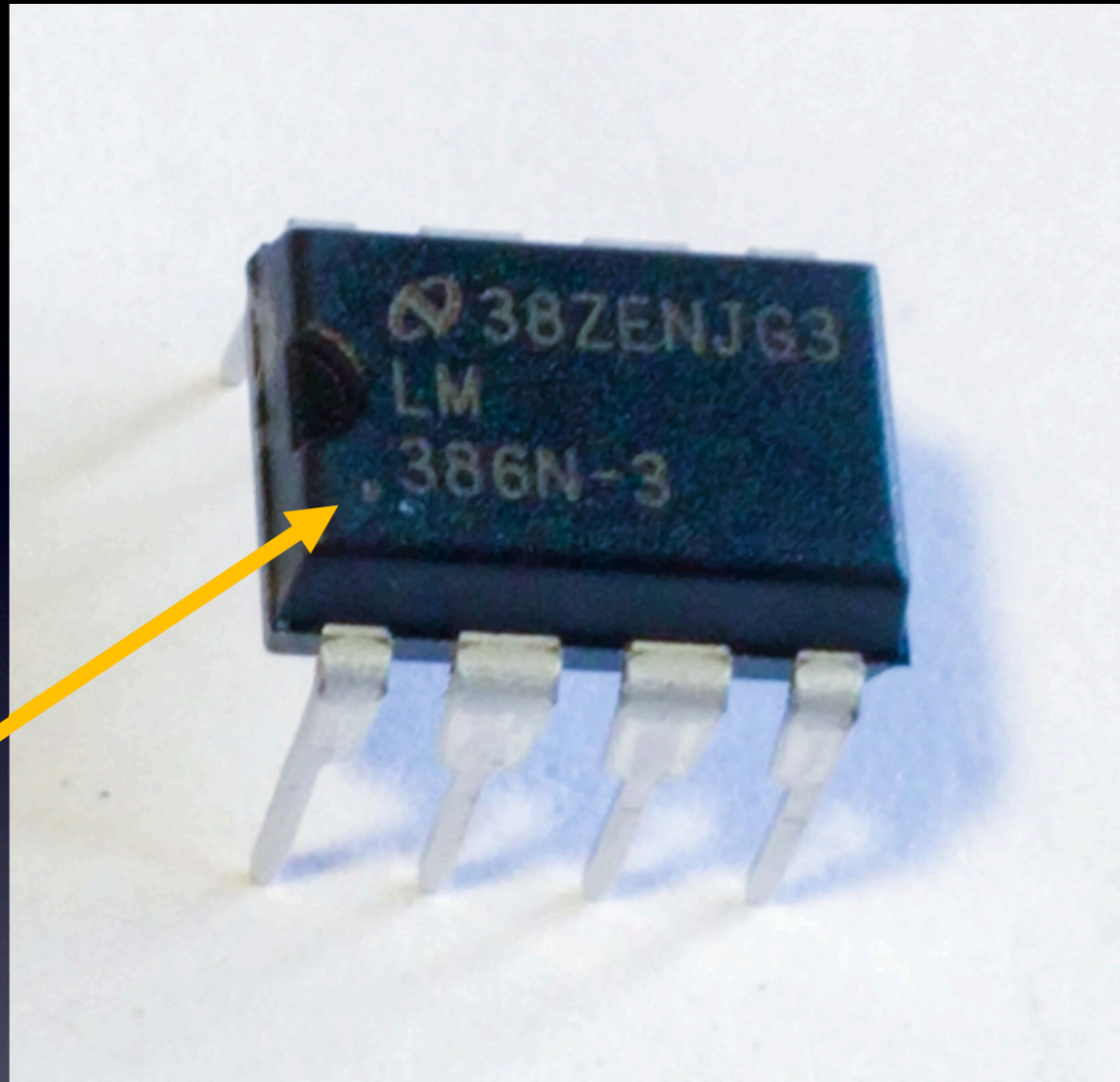


X1

The orientation of X1 does not matter.

Note: X1 may be yellow or blue.

U2

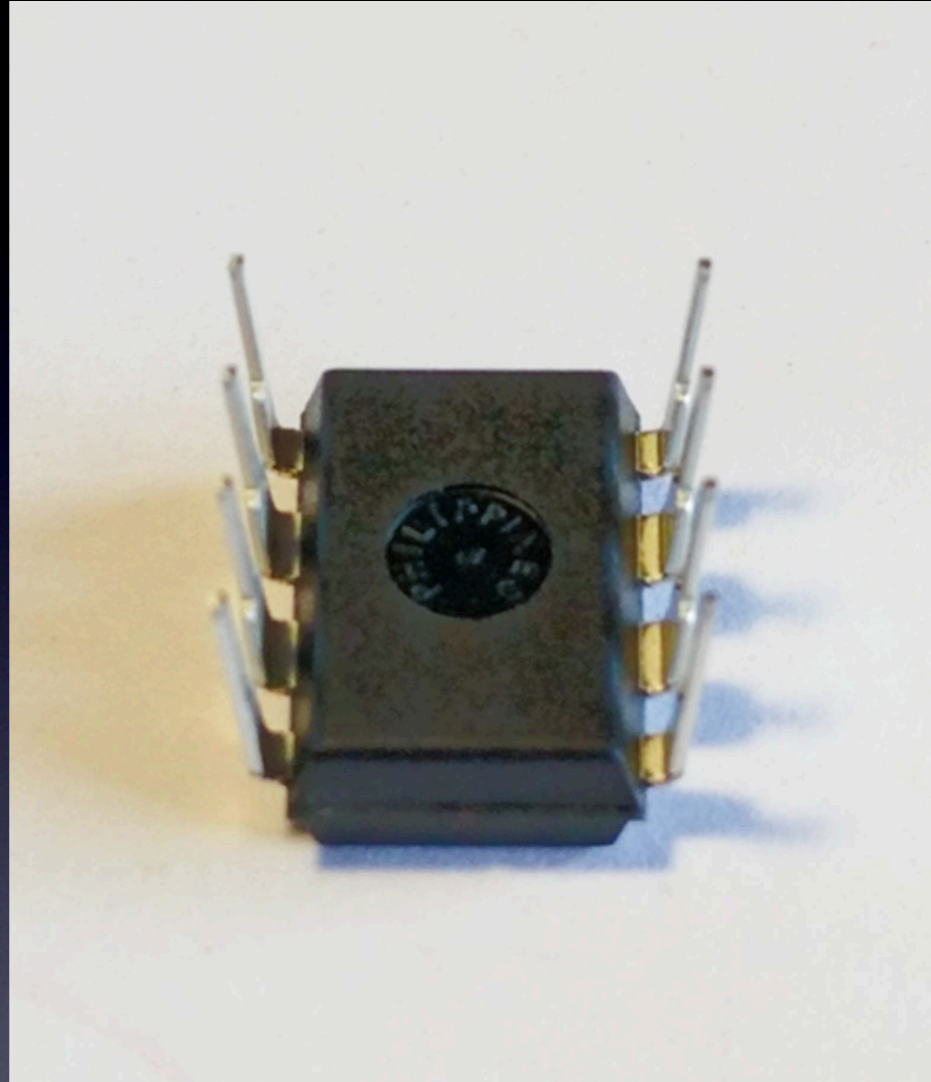


Indented black dot
Pin 1

Note: Your chip may be marked differently, but “386” will be printed on it somewhere.

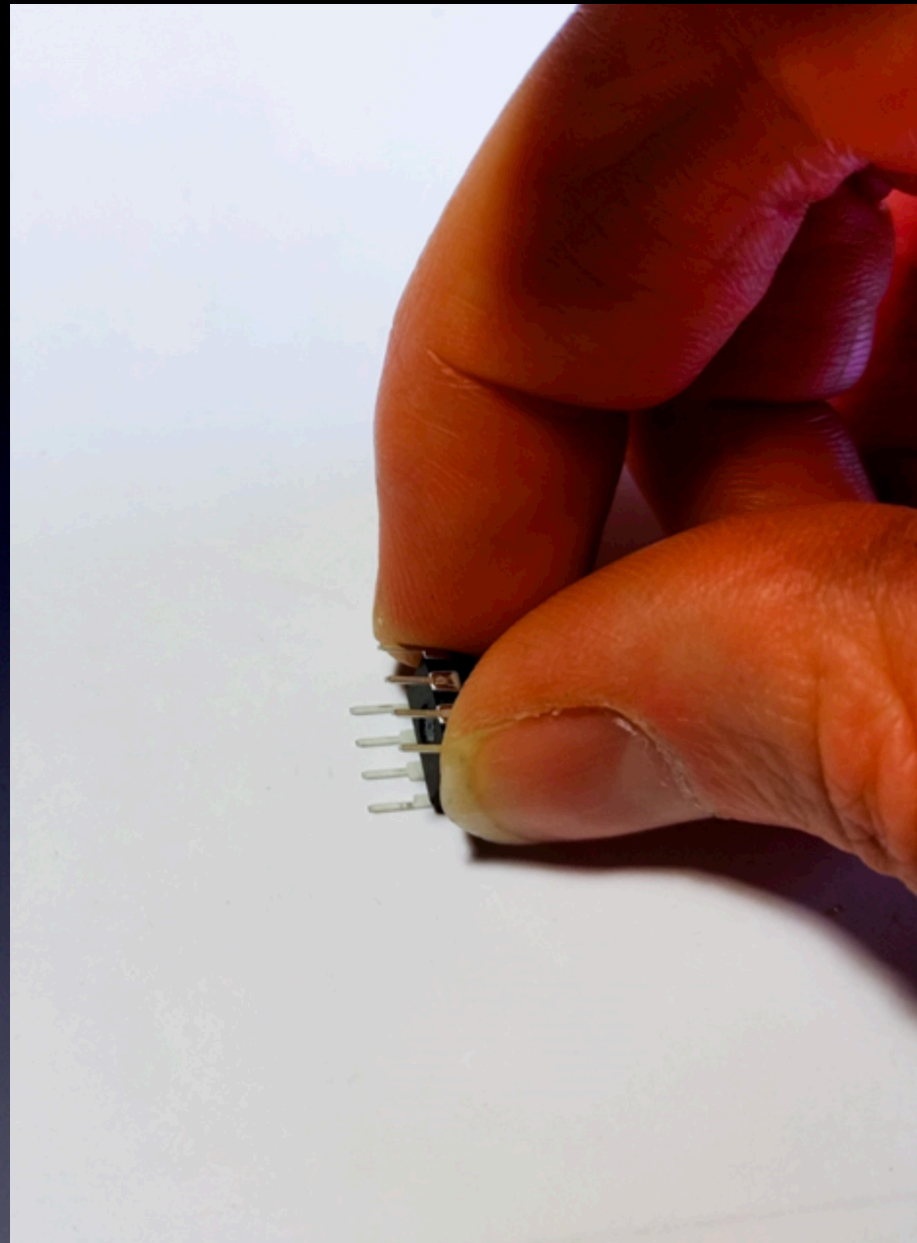
Note: Your chip may or may not have the indented half-moon at the left, it may have a black indented dot at the lower-left corner showing Pin 1.

U2



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

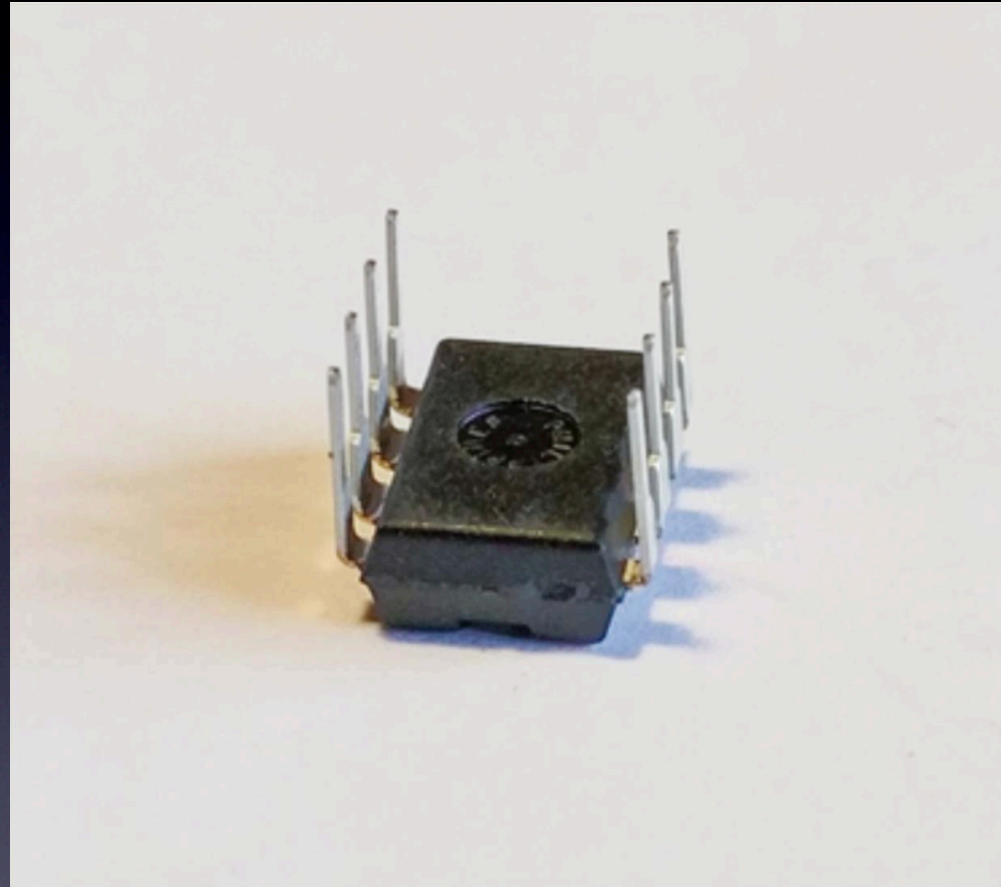
U2

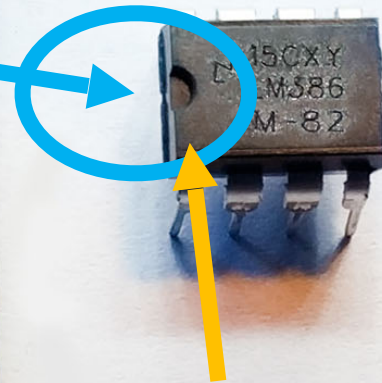
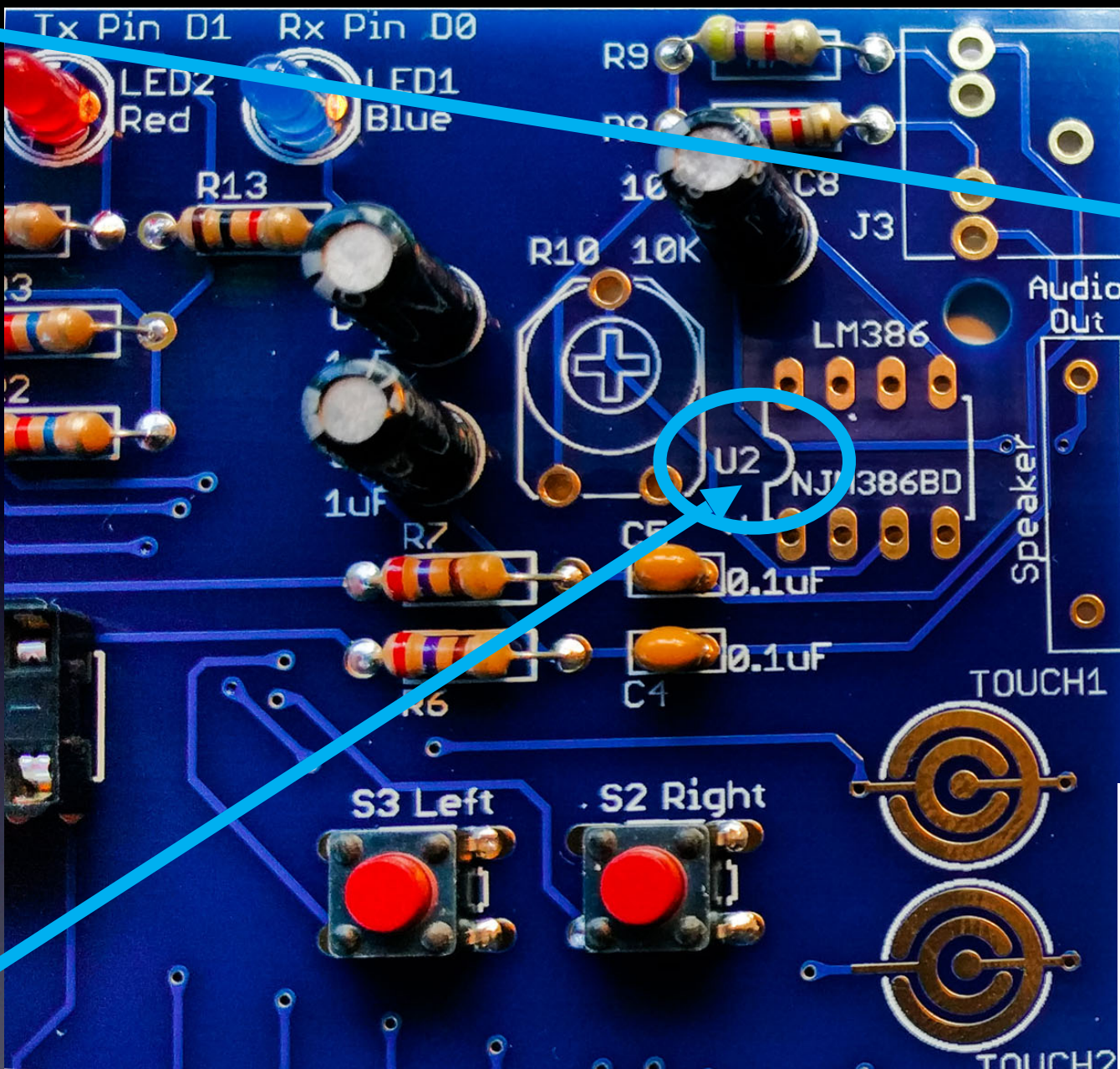


**We need the pins bent straight and parallel.
Use your work table to (gently) bend the leads.**

U2

**Gently
bend leads
so they're straight
and parallel**



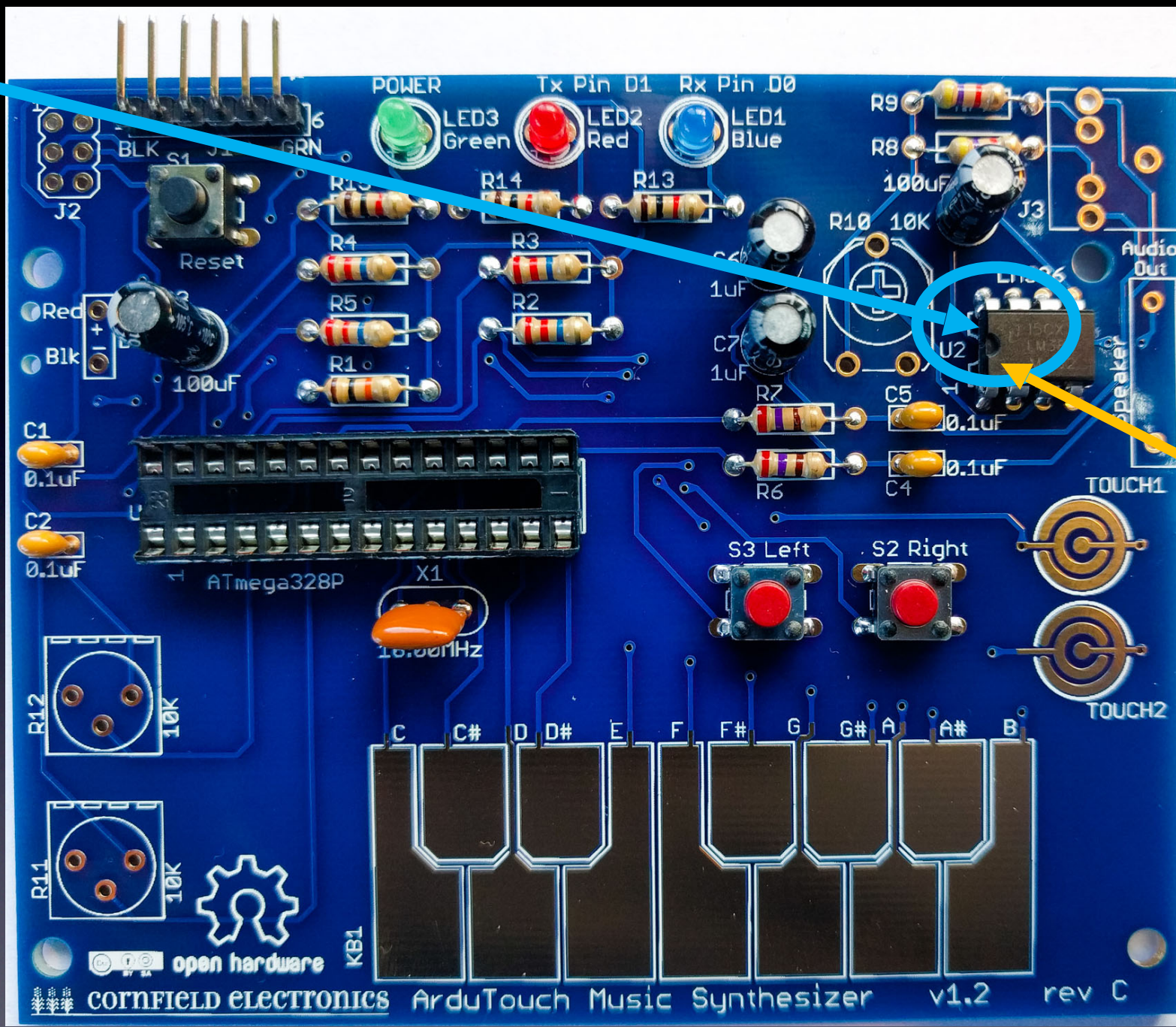


Indented black dot
Pin 1

**proper
orientation**

Note: Your chip may or may not have the indented half-moon at the left, it may have a black indented dot at the lower-left corner showing Pin 1.

U2: audio amp chip

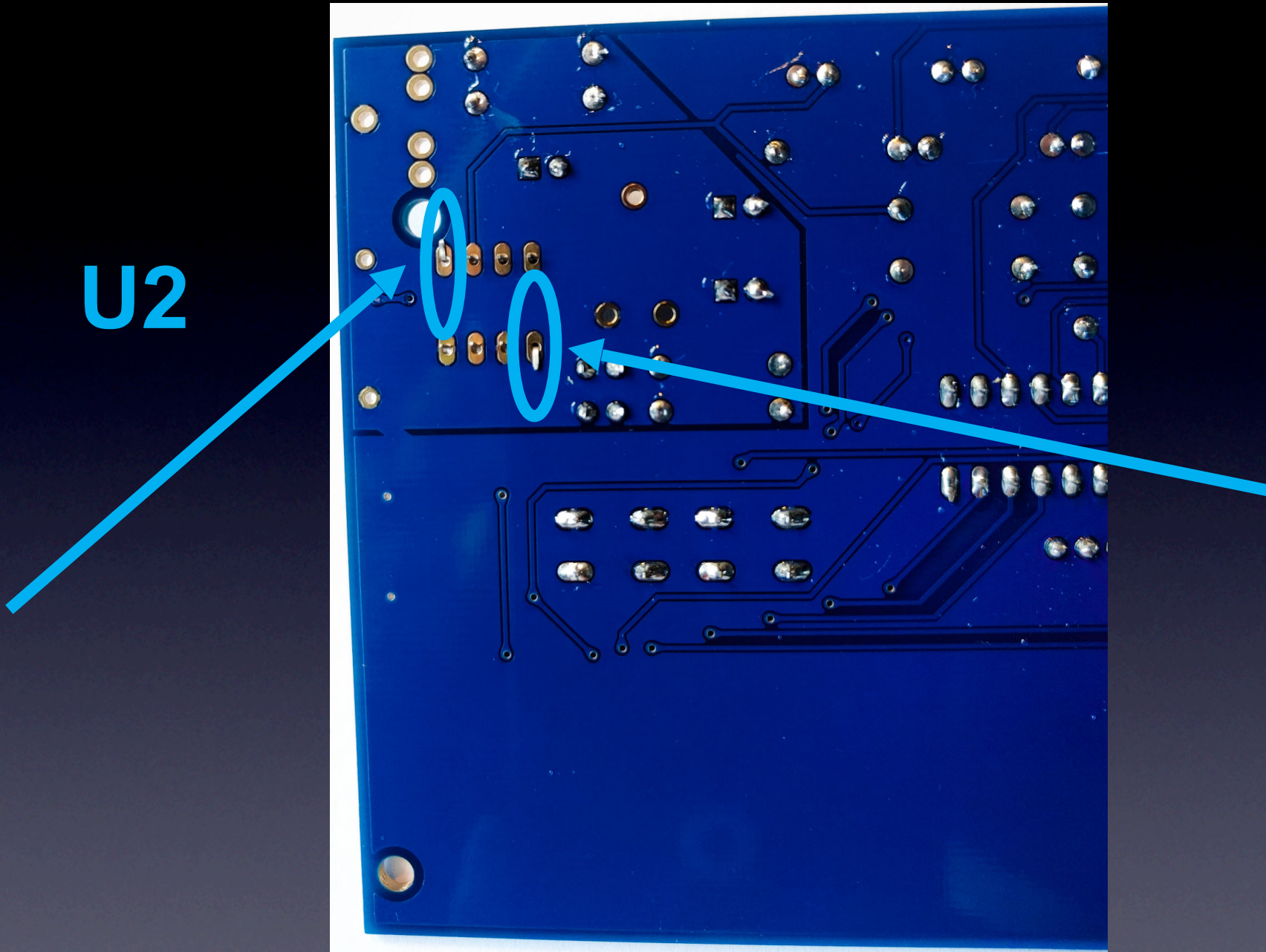


Indented black dot
Pin 1

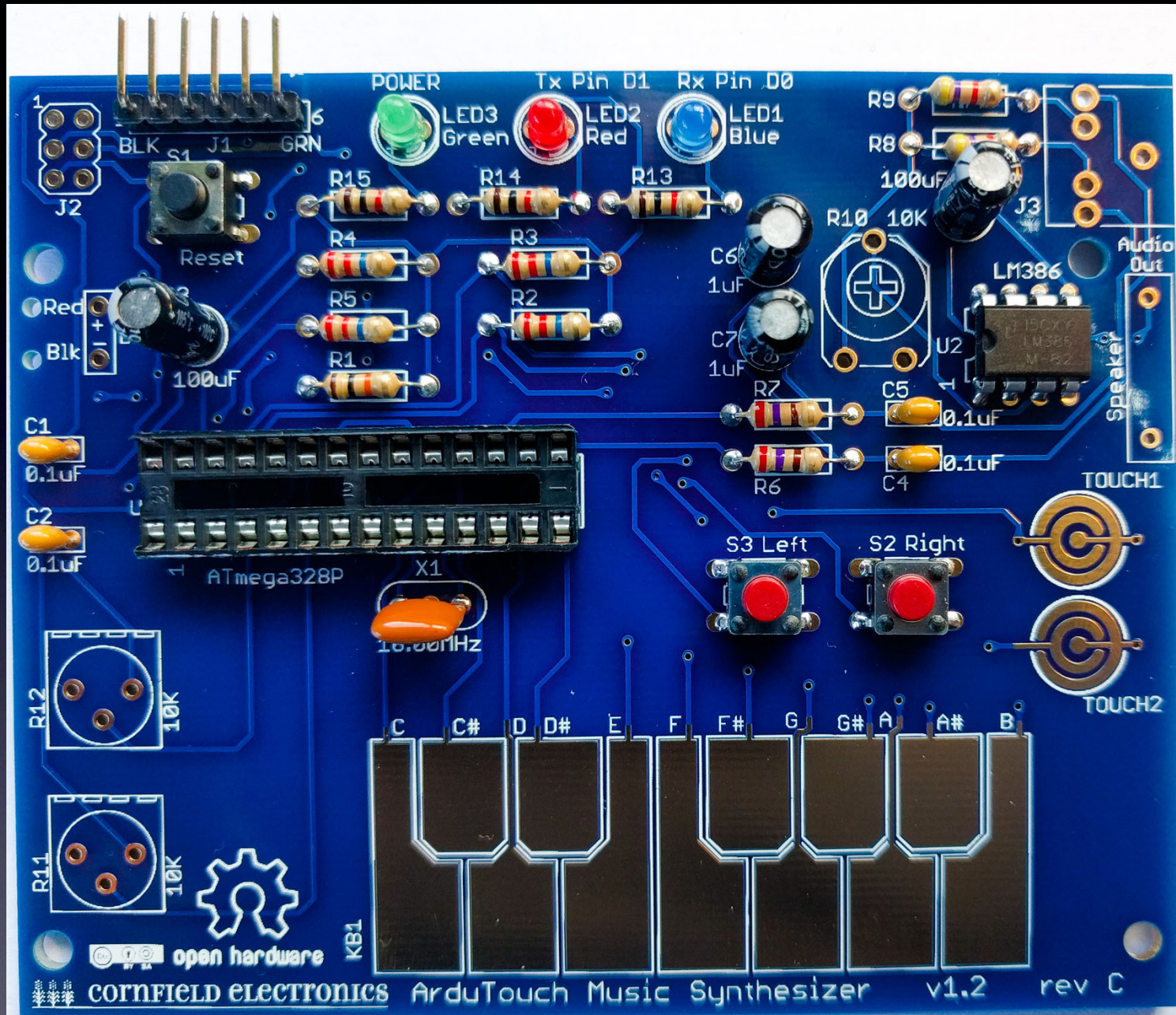
U2: inserted correctly

open hardware
CORNFIELD ELECTRONICS

ArduTouch Music Synthesizer v1.2 rev C

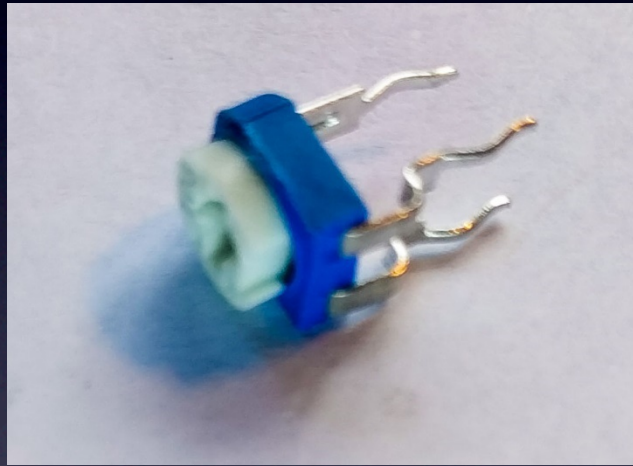


bend pins down on two corners,
and solder all 8 leads to the board



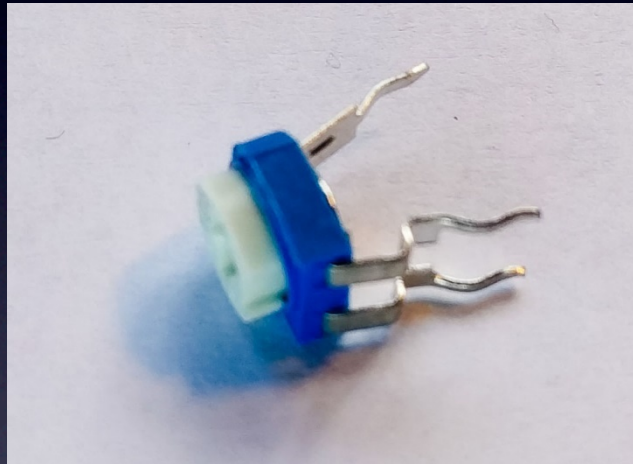
U2 – soldered to board

R10: volume control



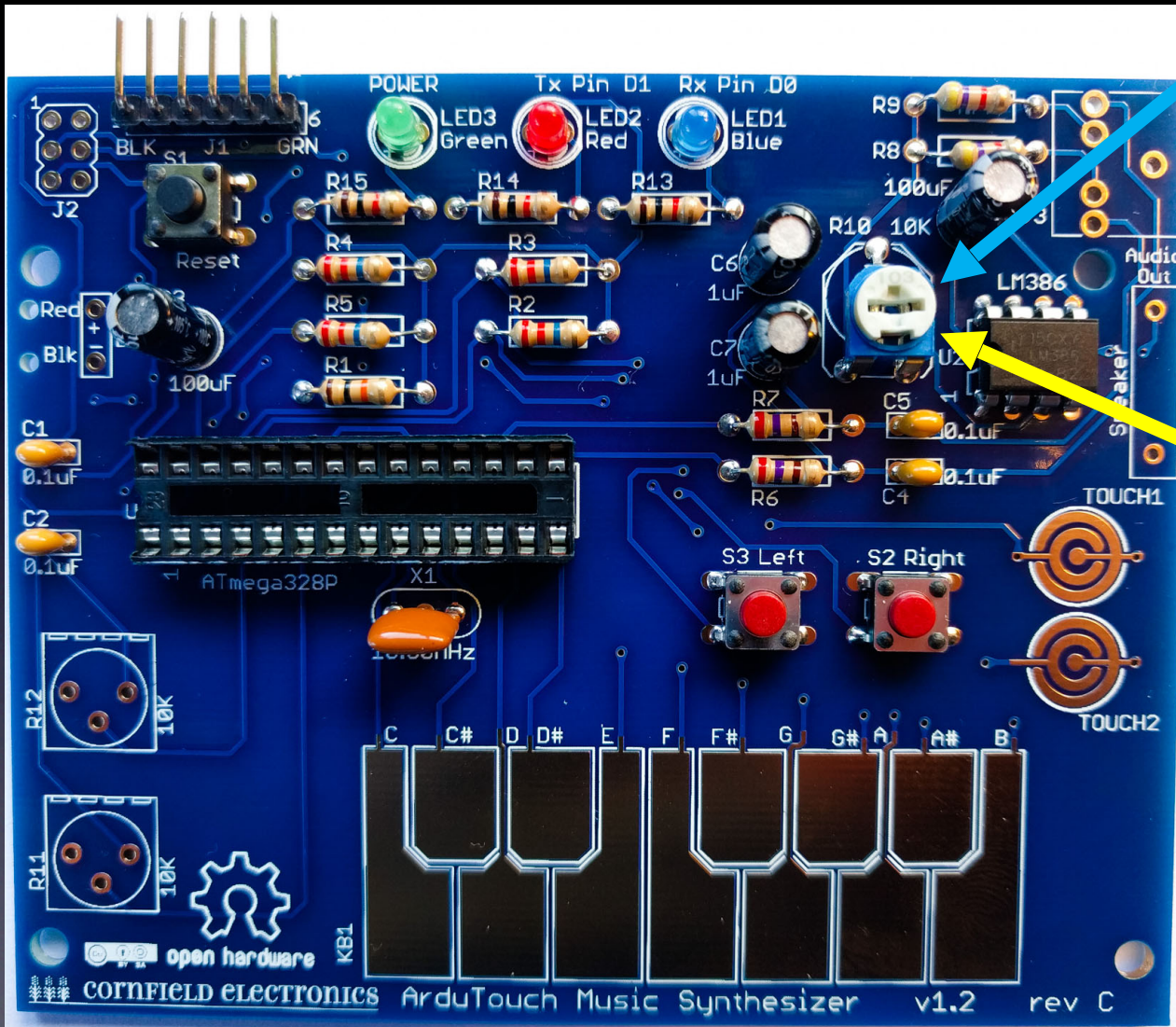
When new, the pins point straight down.

R10: volume control

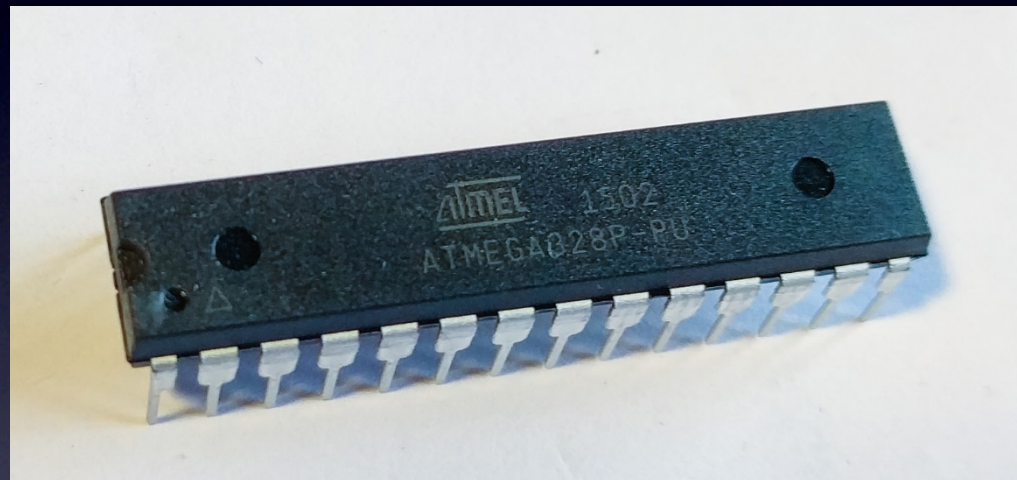


We need to bend them out a little to fit into the board.

R10: volume control

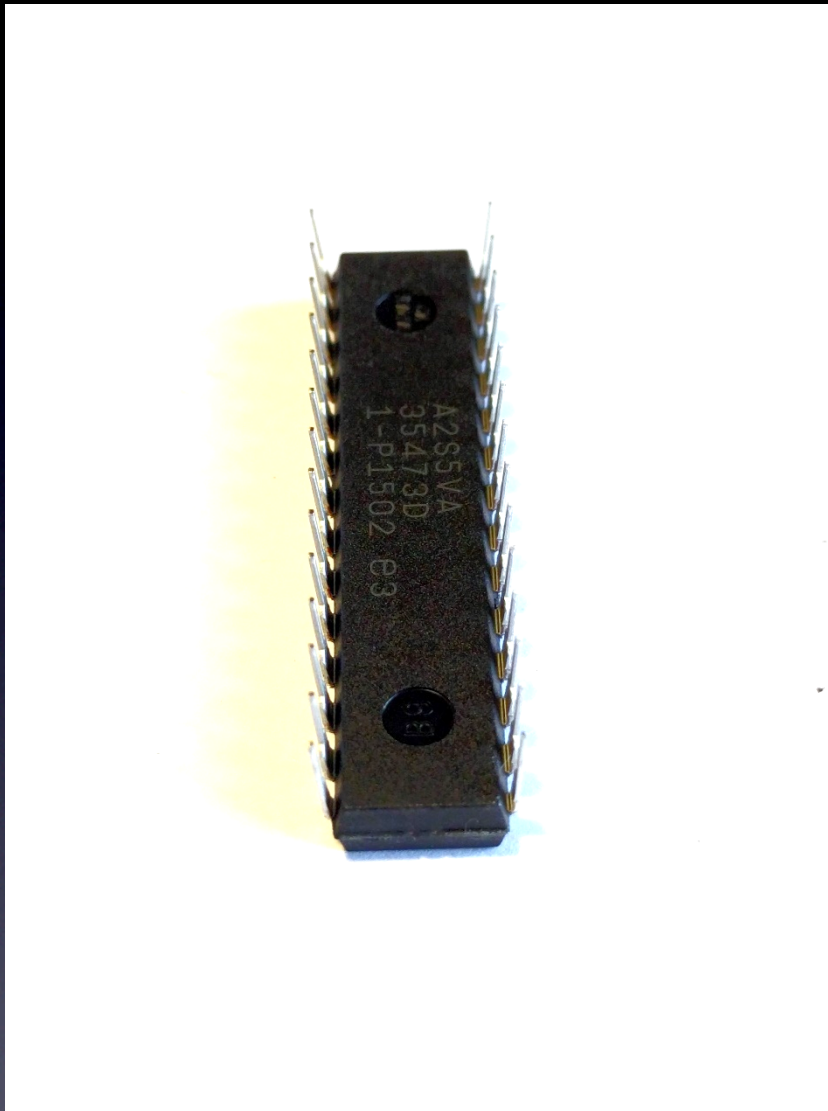


If necessary, rotate the white top so that it looks like this photo (rotated half-way)



U1: microcontroller

U1

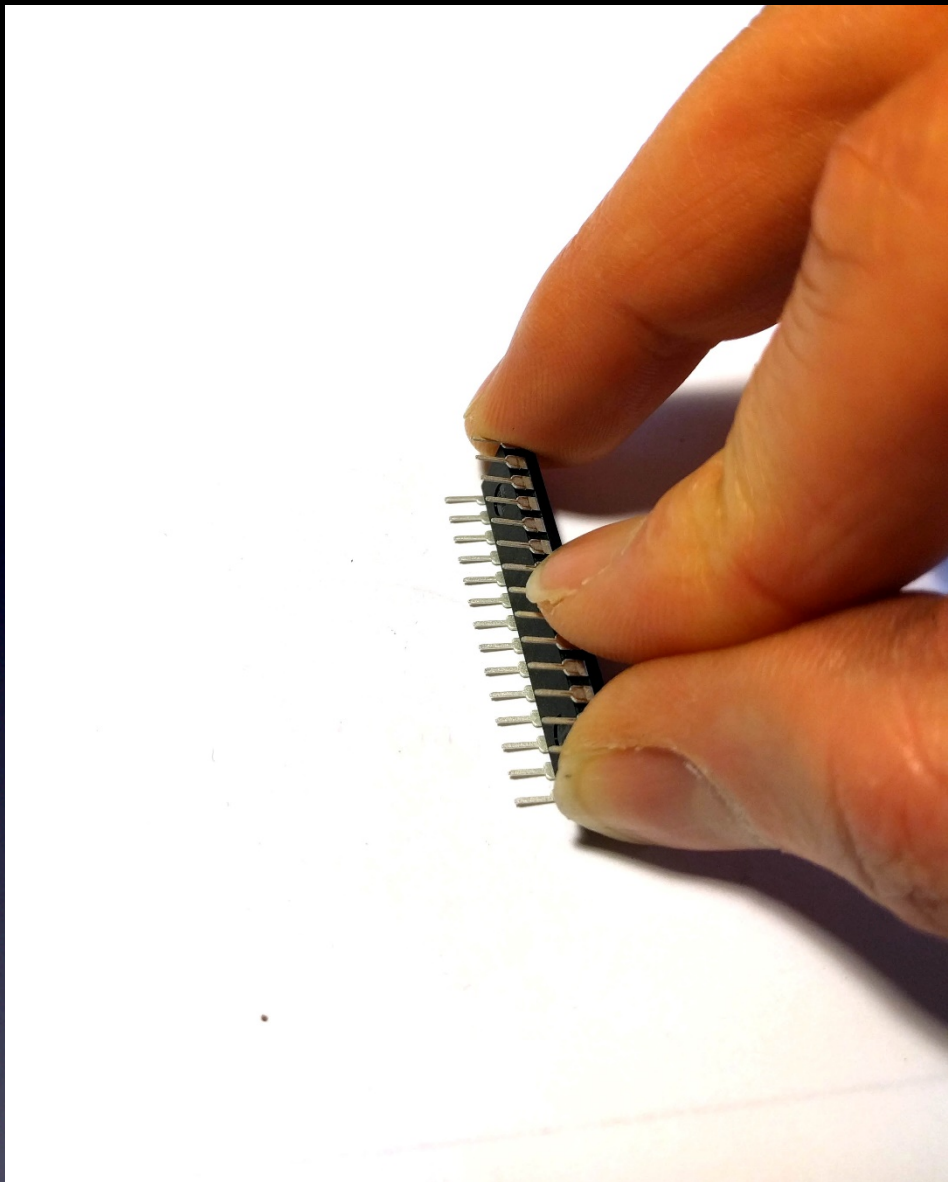


**When chips are new,
their pins are bent out.**

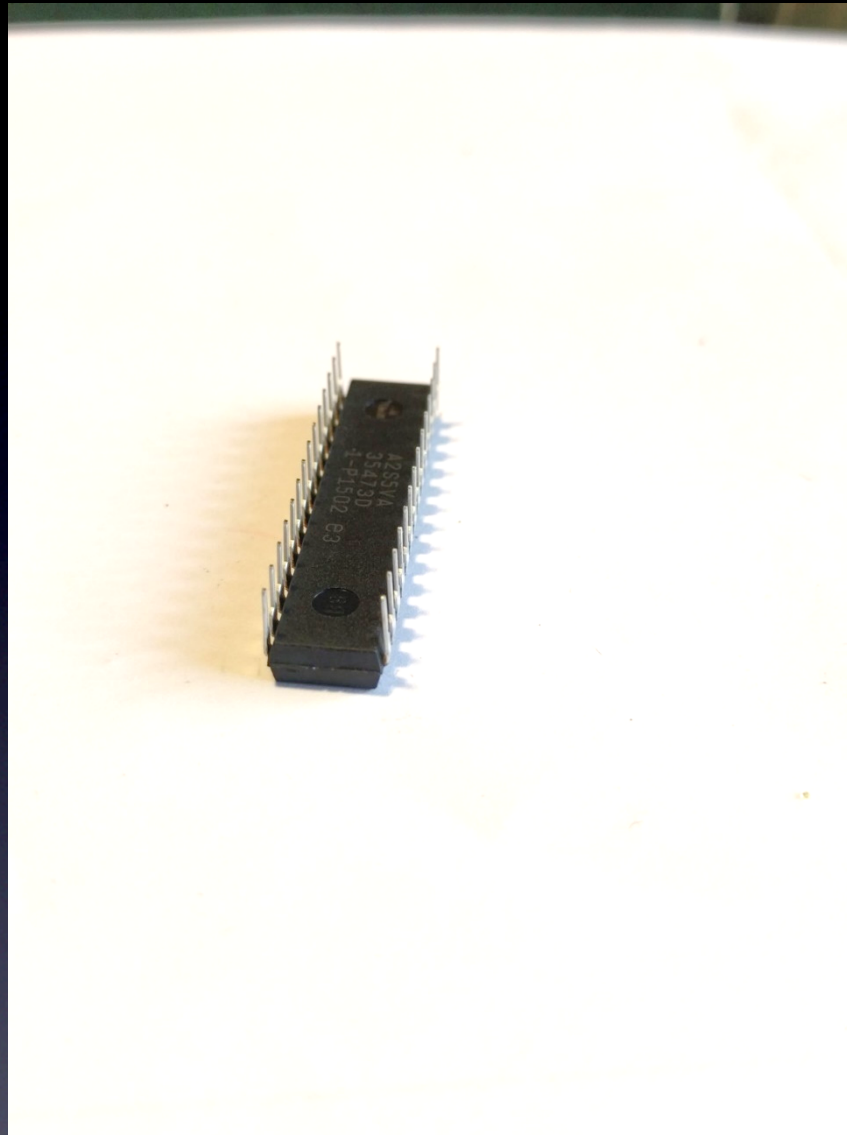
Note: Your kit's U1 chip may or may not have its pins already bent straight and parallel. If not, you need to bend them, as shown in the next picture.

U1

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.

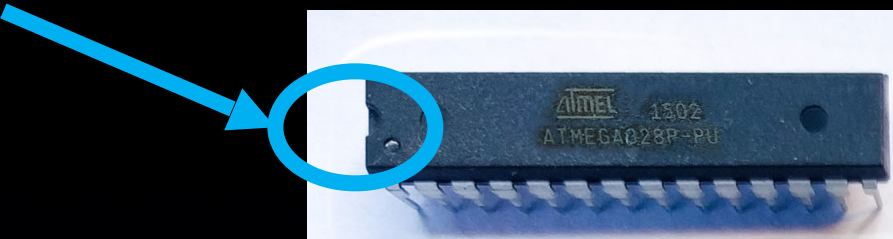


**We need the pins bent straight and parallel.
Use your work table to (gently) bend the leads.**

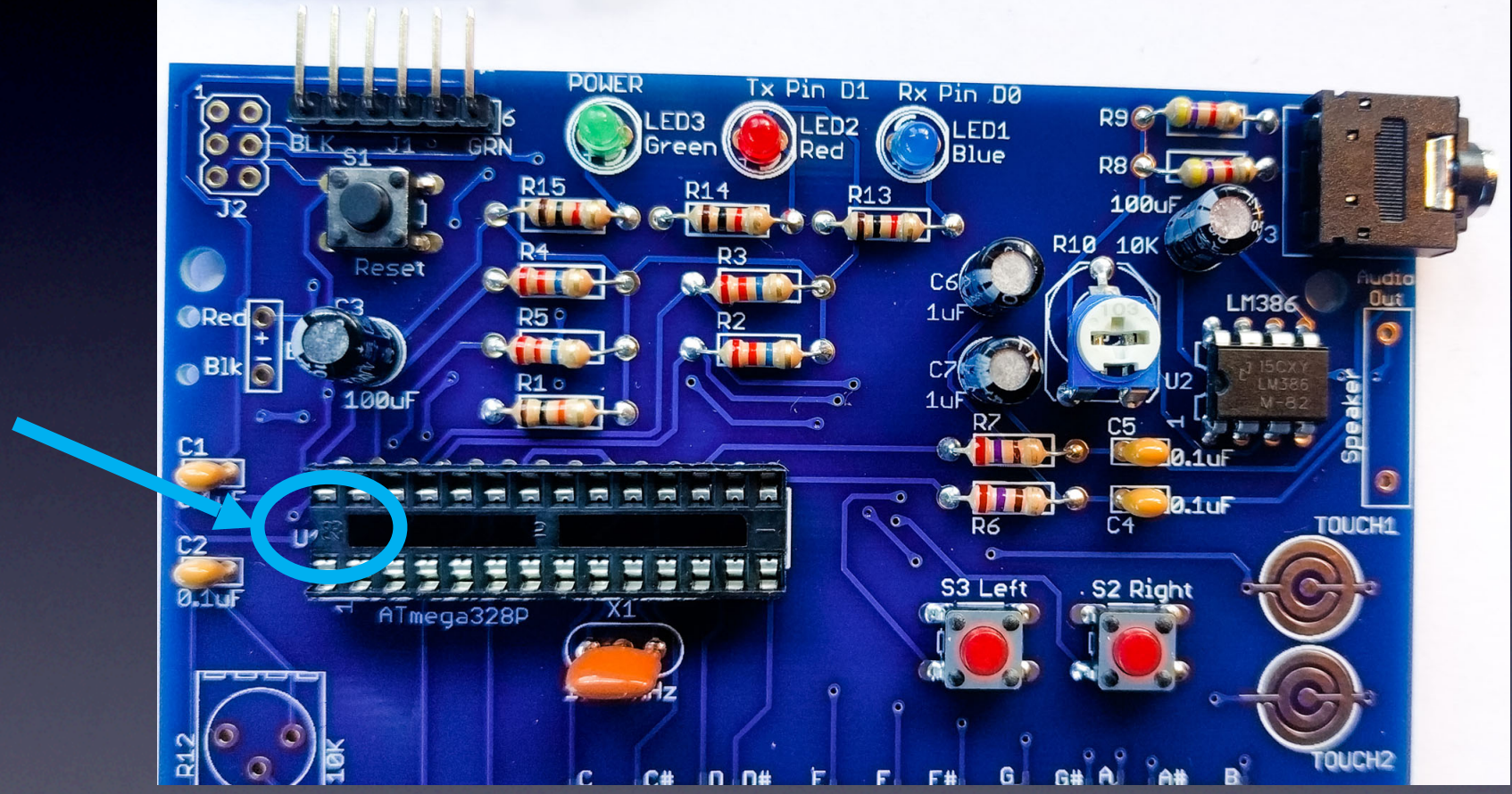


U1: microcontroller

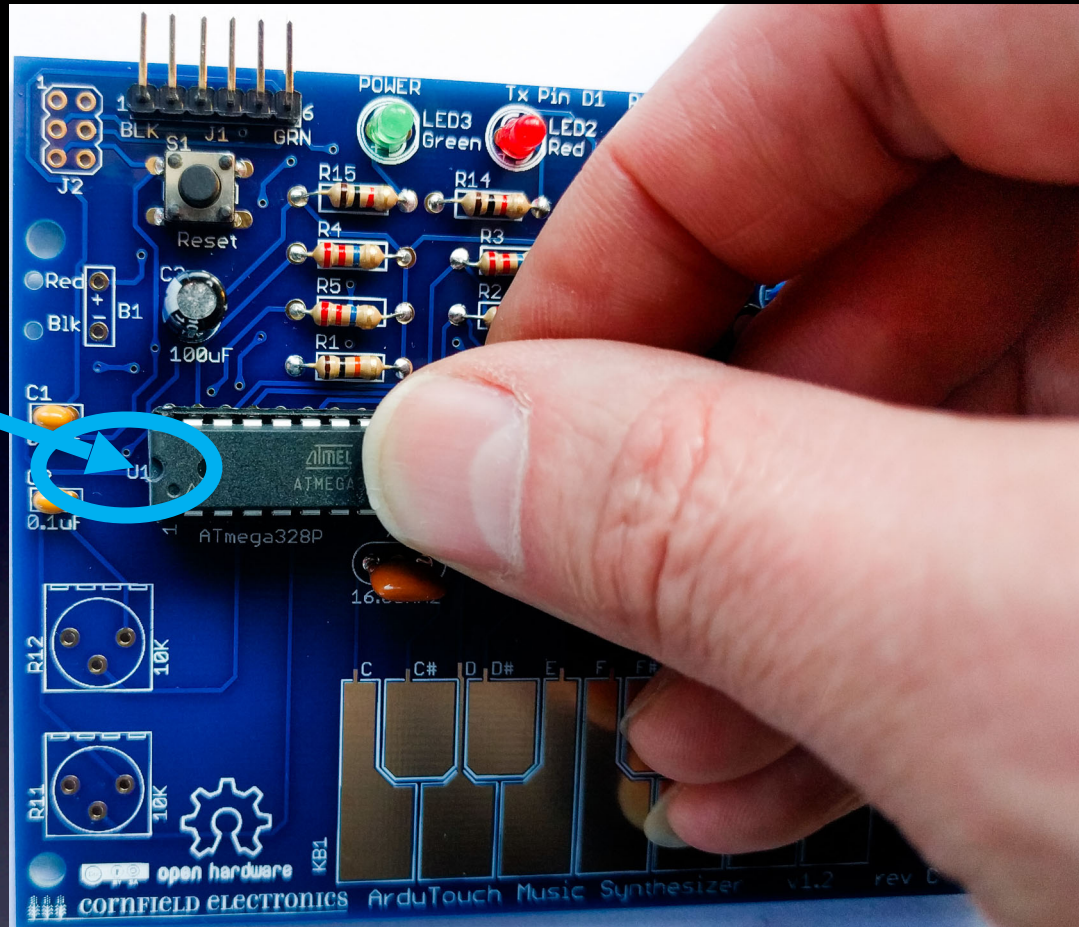
These pins must be straight and parallel



proper orientation



U1: microcontroller



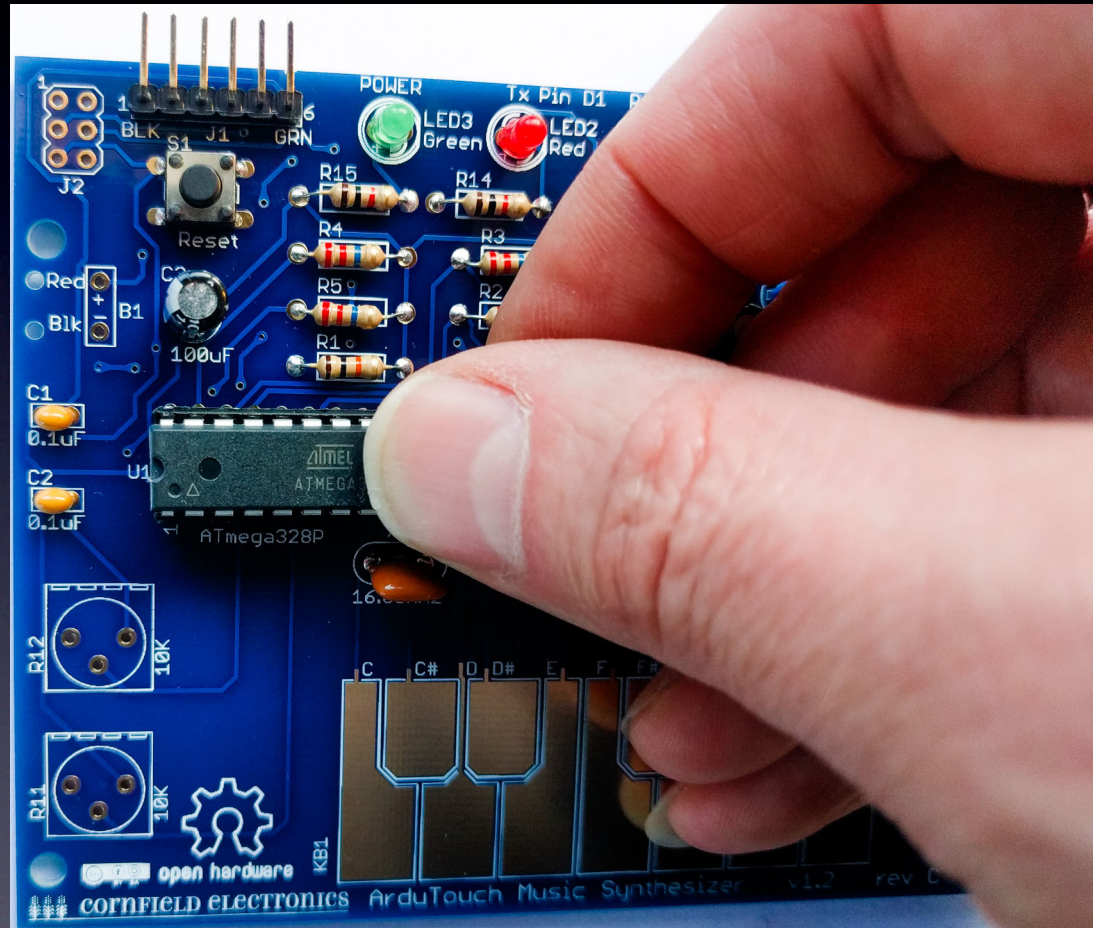
U1: microcontroller

make sure each pins rests in its hole in the socket
→ with the proper orientation

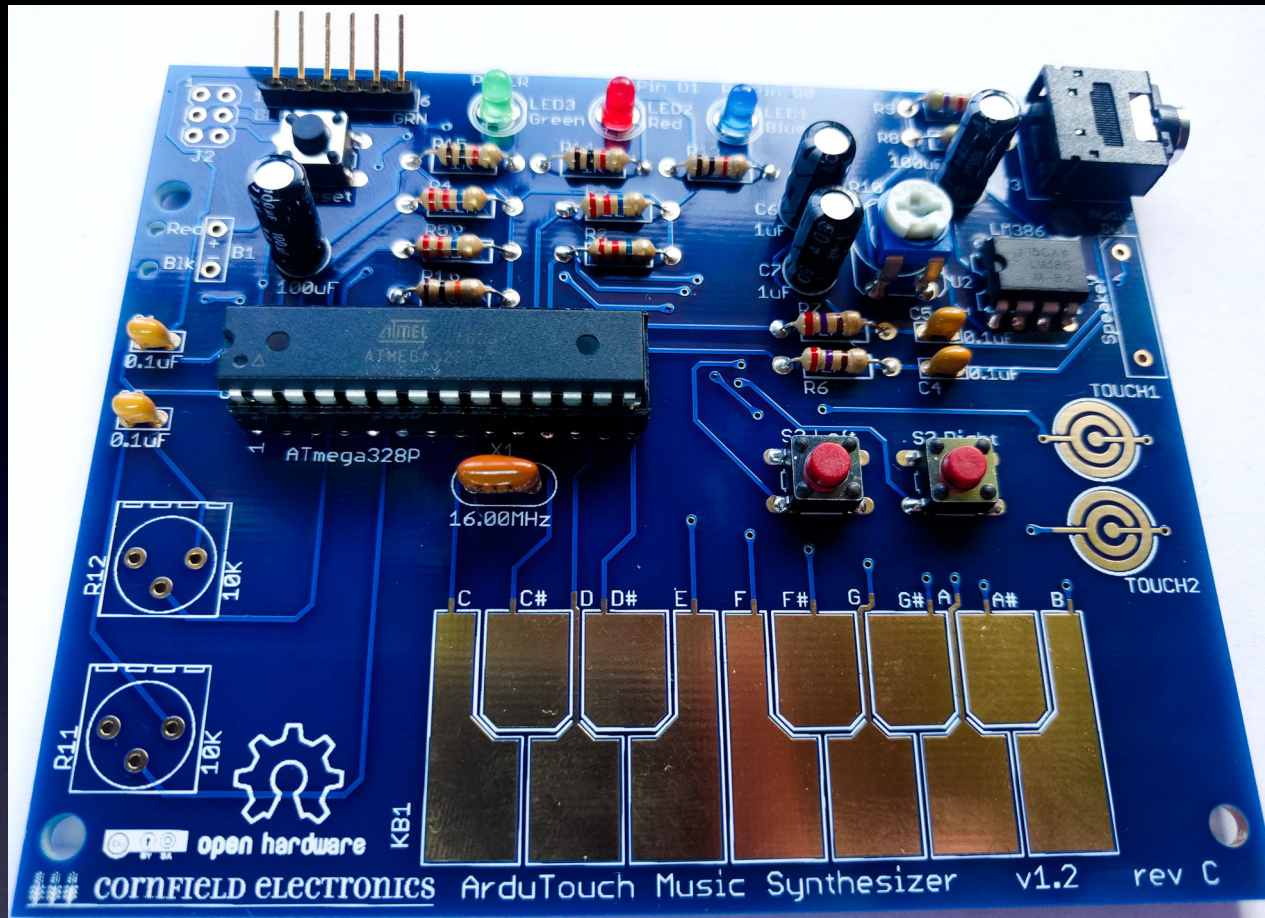
Use two thumbs to push microcontroller into its socket

Make sure all 28 pins
are in place,
and push it into its socket.

(This is actually way easier
with *2 thumbs*.)



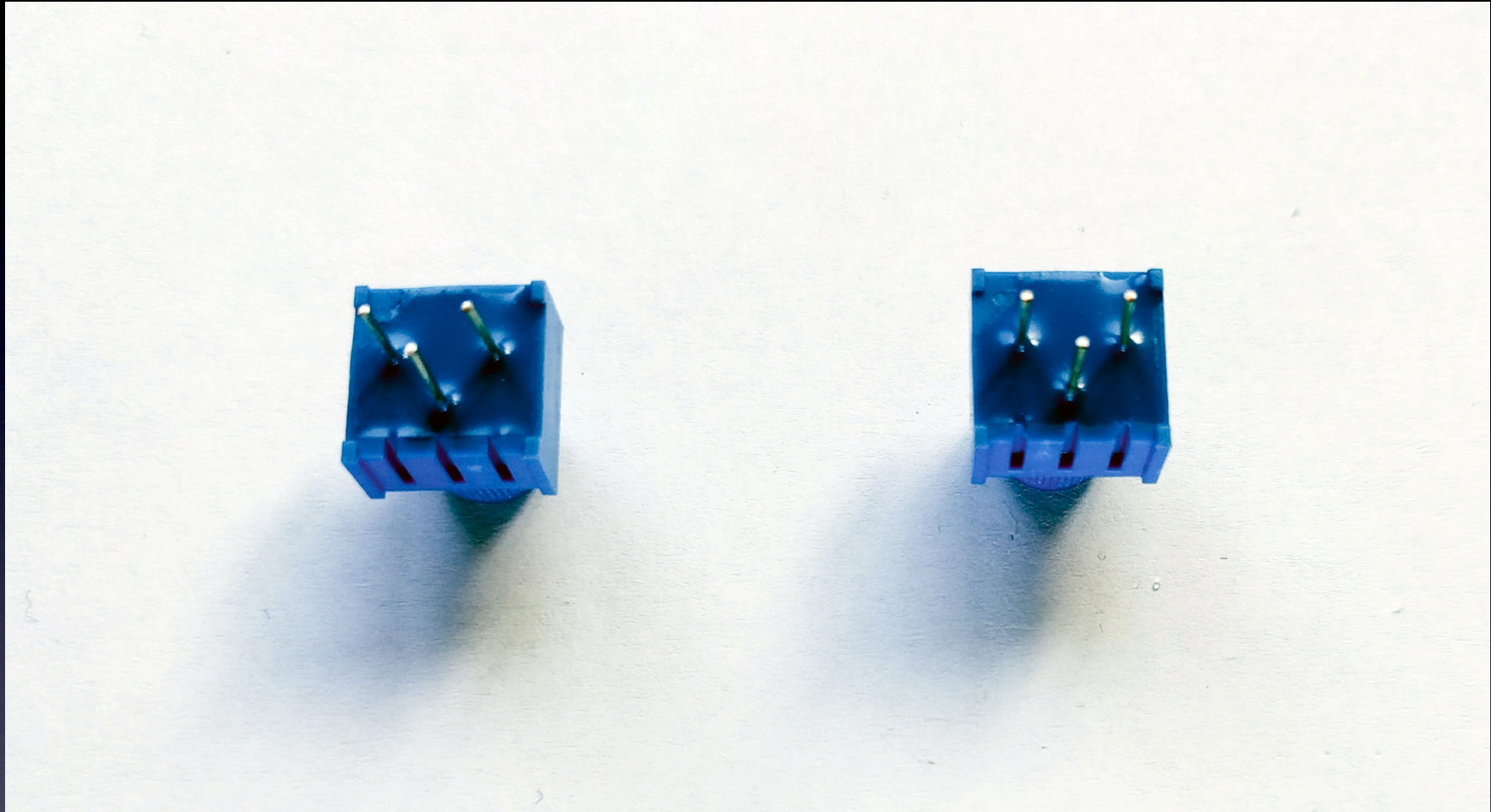
U1: microcontroller



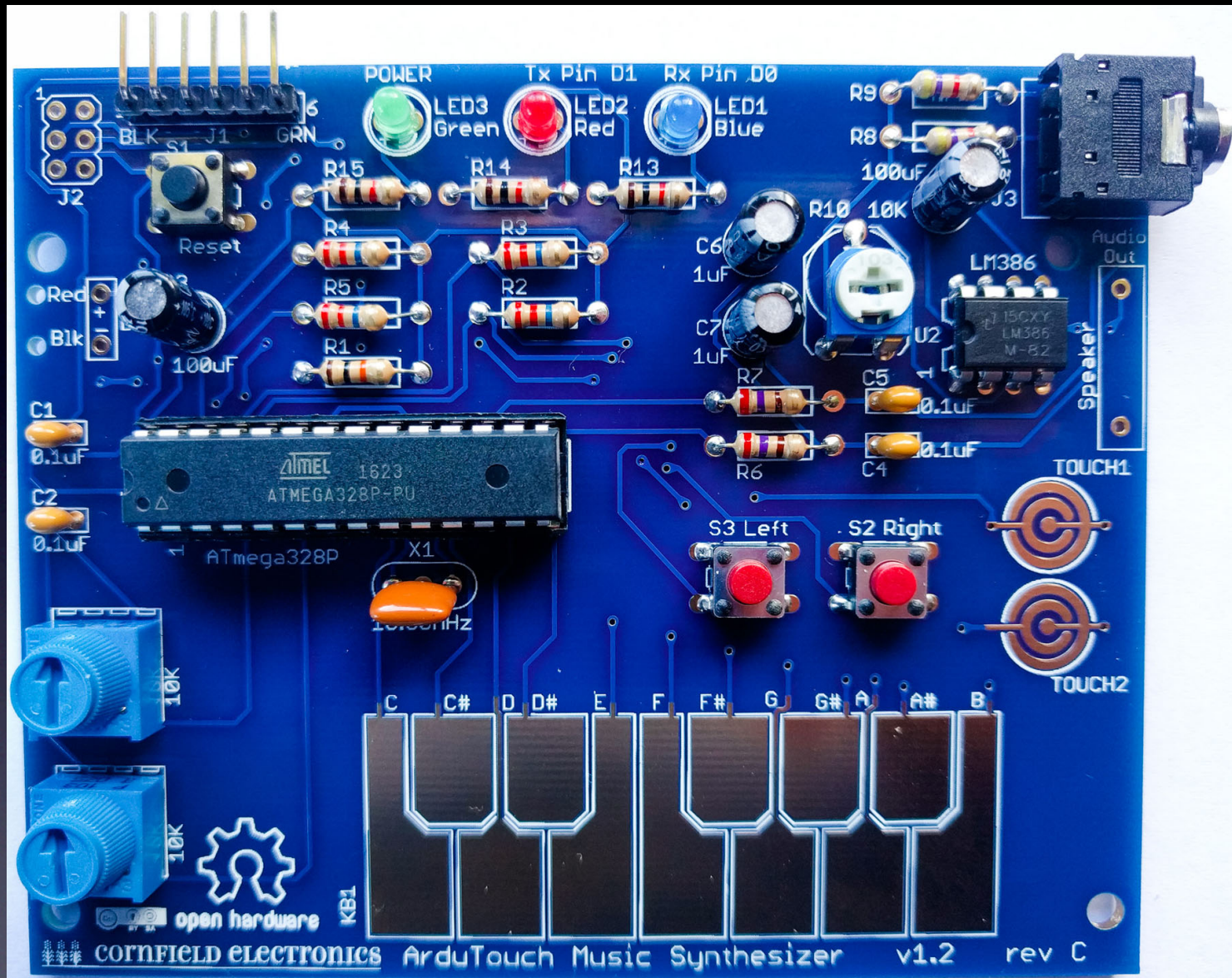
U1: microcontroller

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.



R11 & R12: potentiometers



R11 & R12: potentiometers



Speaker

We'll add leads to the speaker

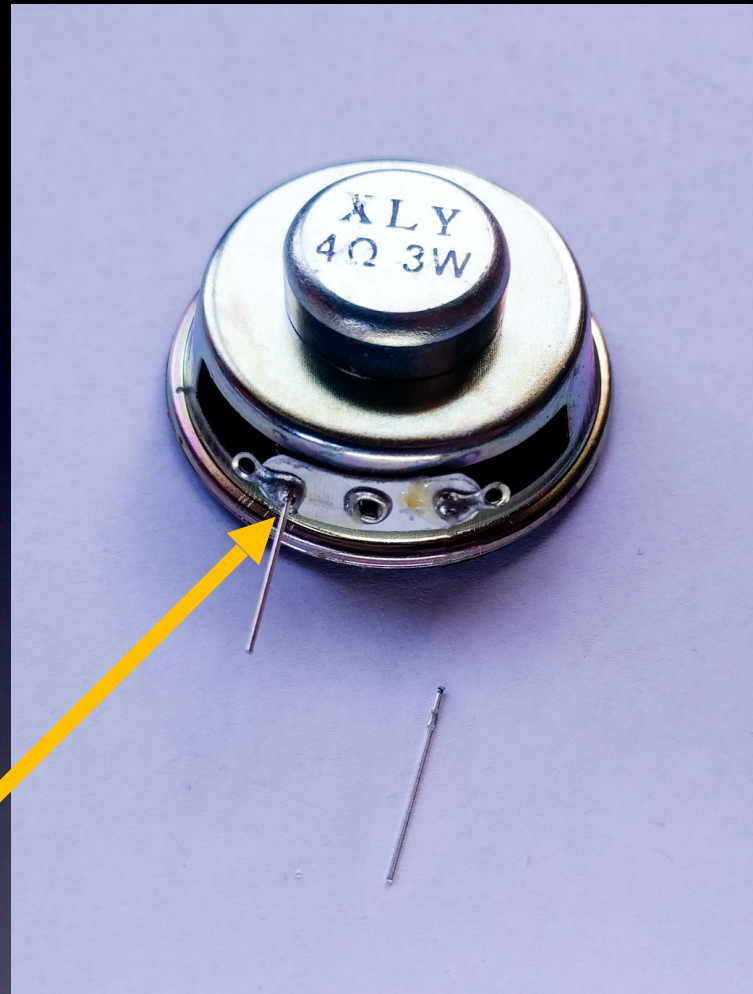


Saved leads

from the LEDs

Speaker

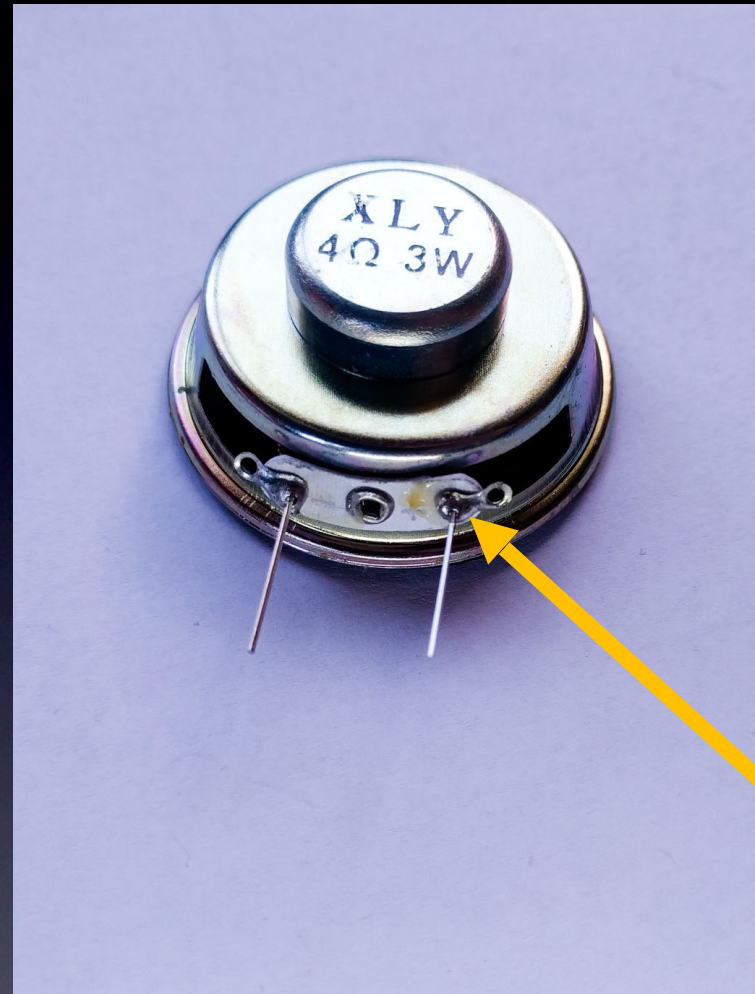
**Solder one lead
to speaker**



**Notice the
correct place
to solder the wire**

Speaker

**Solder next lead
to speaker**



**Notice the
correct place
to solder the wire**

Speaker

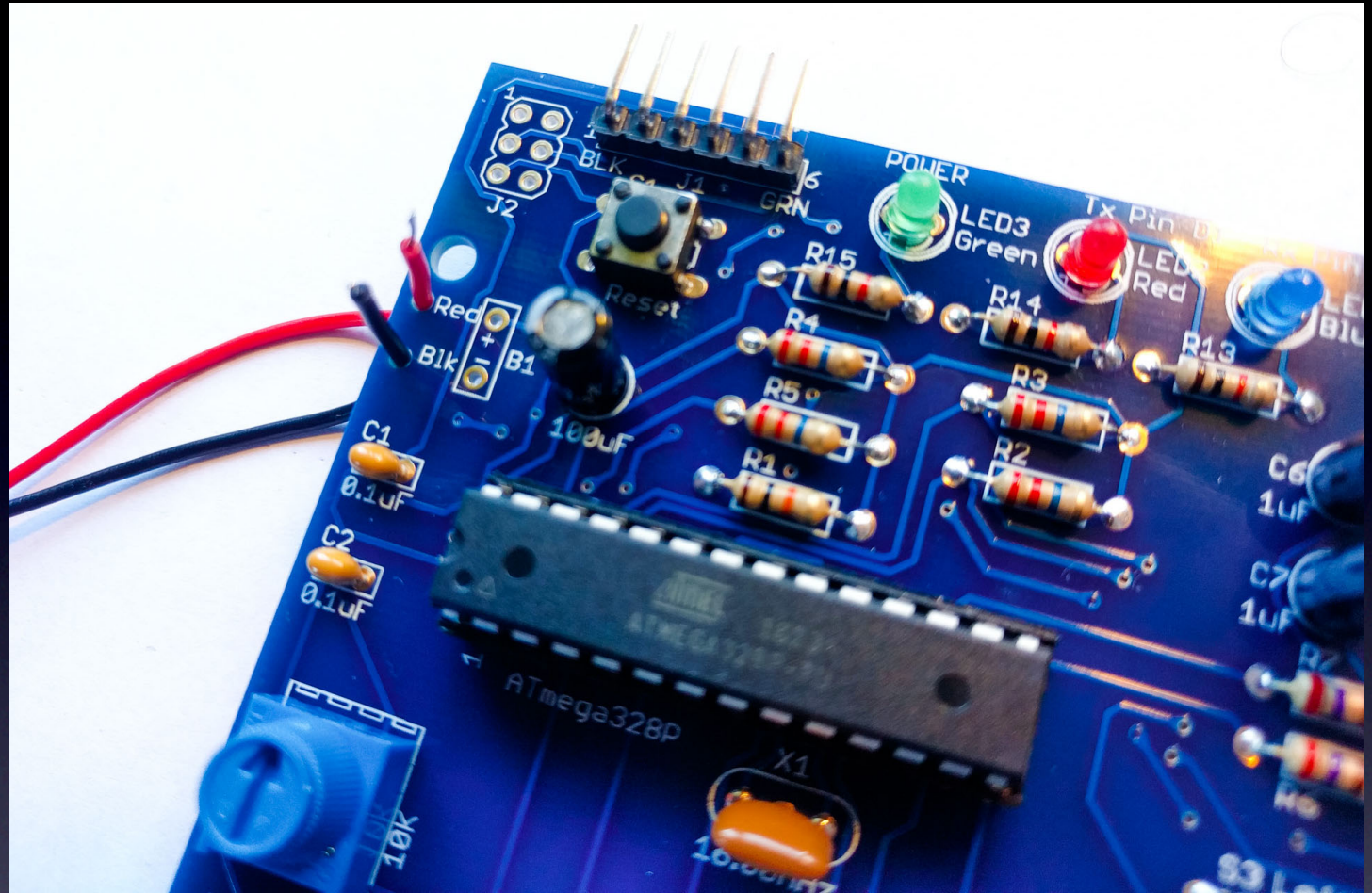
Insert
speaker into board
and solder
both leads to board.



Speaker

Note: Some battery pack wires have thicker red and black plastic coatings.

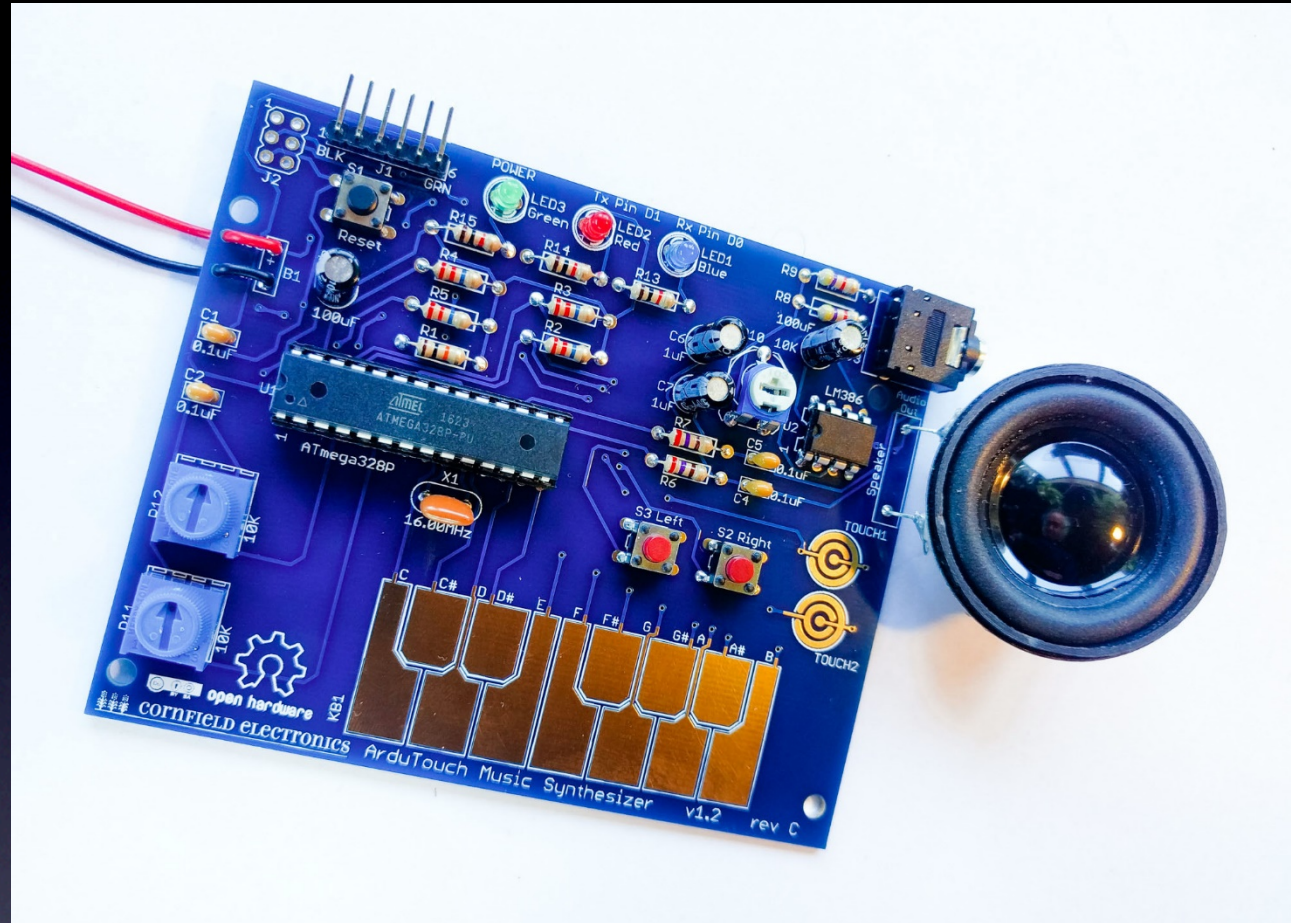
If so, you can widen the these two holes by gently rotating a scissors or small knife or small Phillips screwdriver on the top and bottom of these two holes.



Push battery pack leads through holes.

Make sure Red and Black go through their correct holes!

Battery pack



Loop one lead into its pad,
and solder.

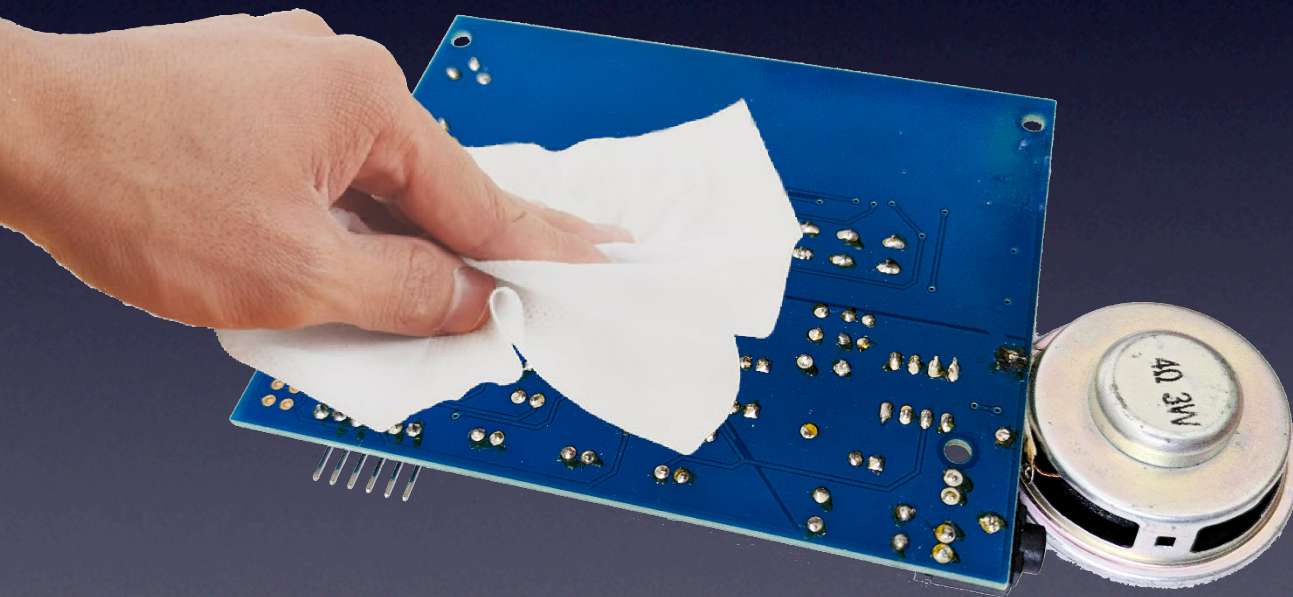
Then loop the other lead into its pad,
and solder.

Battery pack

If you used any *flux paste* for re-working problems

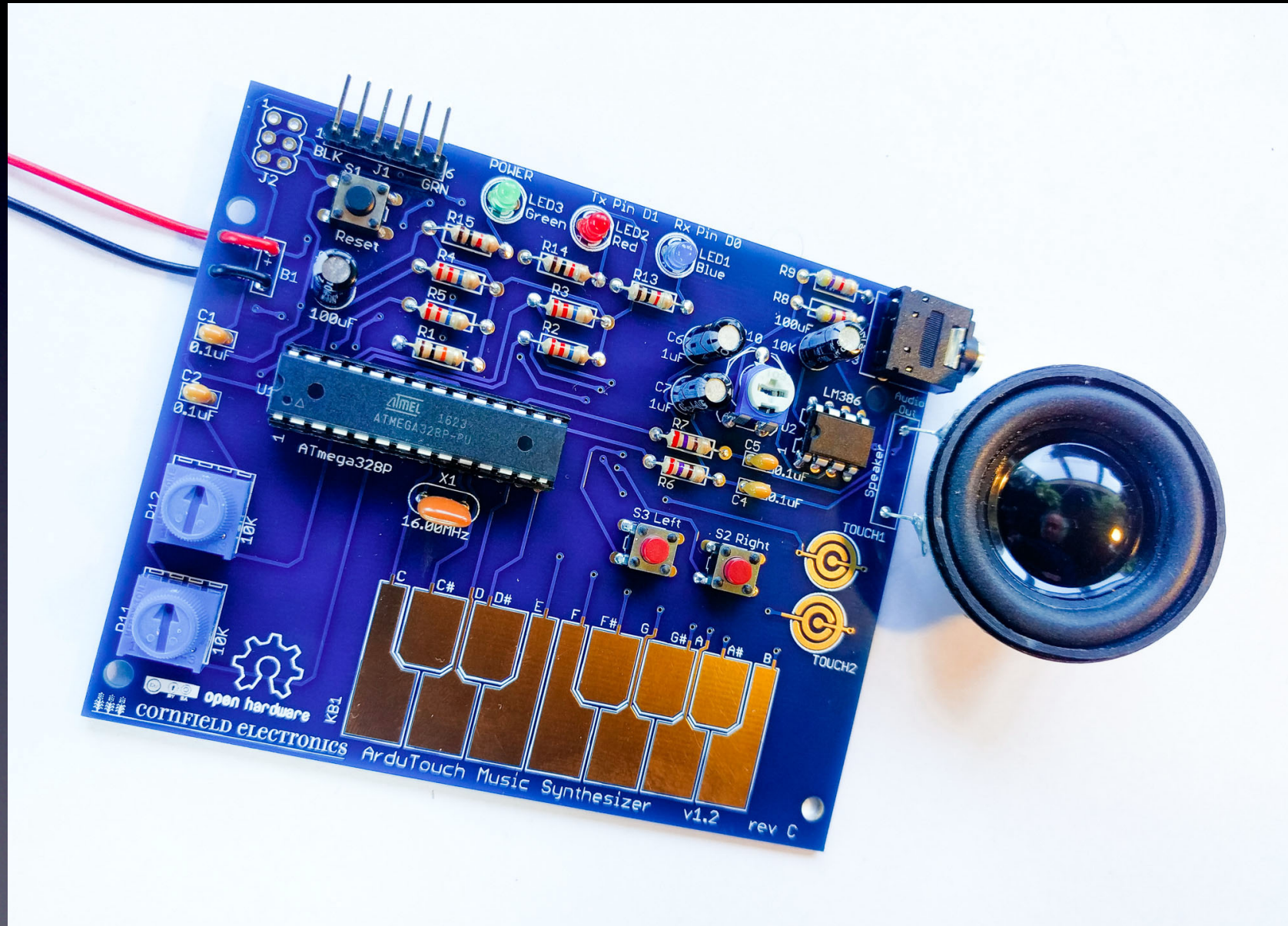


The bottom of the PCB will be sticky from the flux

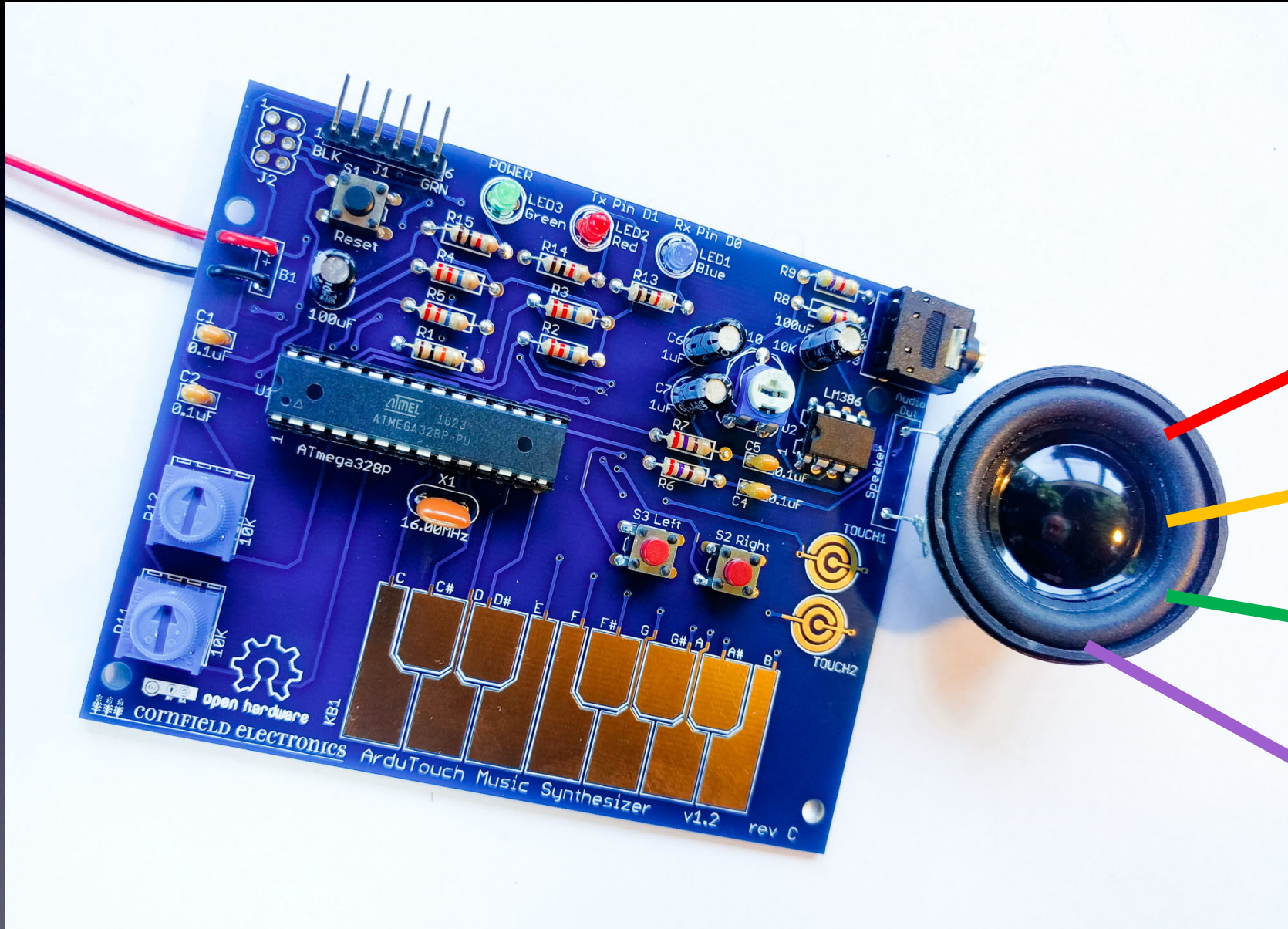


You can clean it with a cloth wet with *Isopropyl Alcohol*

Done!



Let's make noise!



Please Remember:

to

Wash your hands

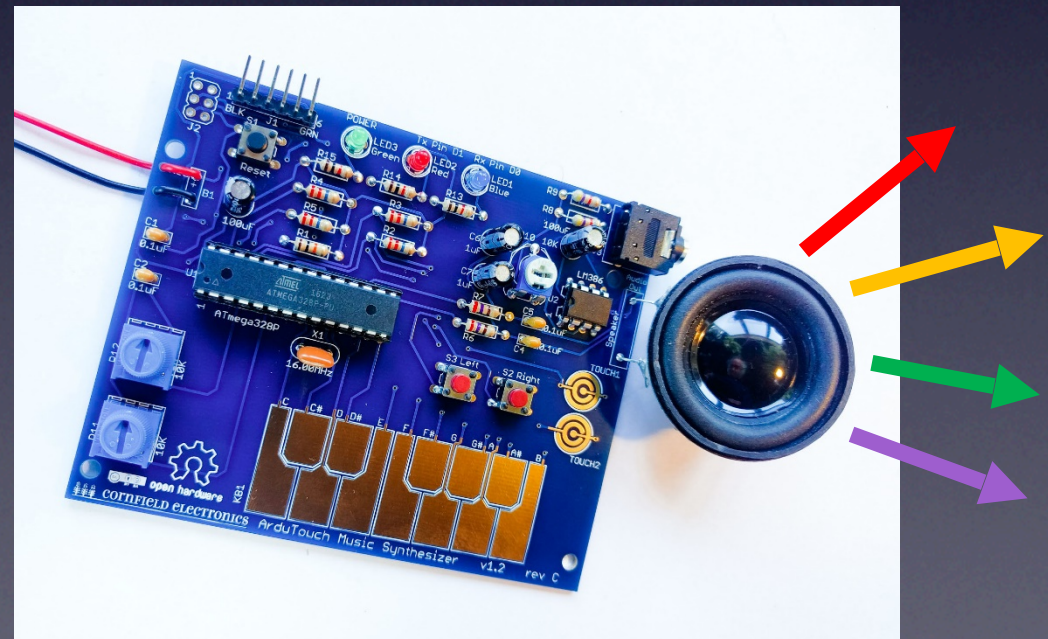
after soldering

Let's make noise!

Your ArduTouch comes pre-programmed with a really cool synthesizer, called "Thick".

"Thick" plays 4 sawtooth waveform notes at once.

- the left and right buttons change octaves
- long press the left and right buttons to change sounds
- the Bottom knob controls the glide rate
- the Top knob controls how each of the 4 notes glide separately
- Try playing with these and see!

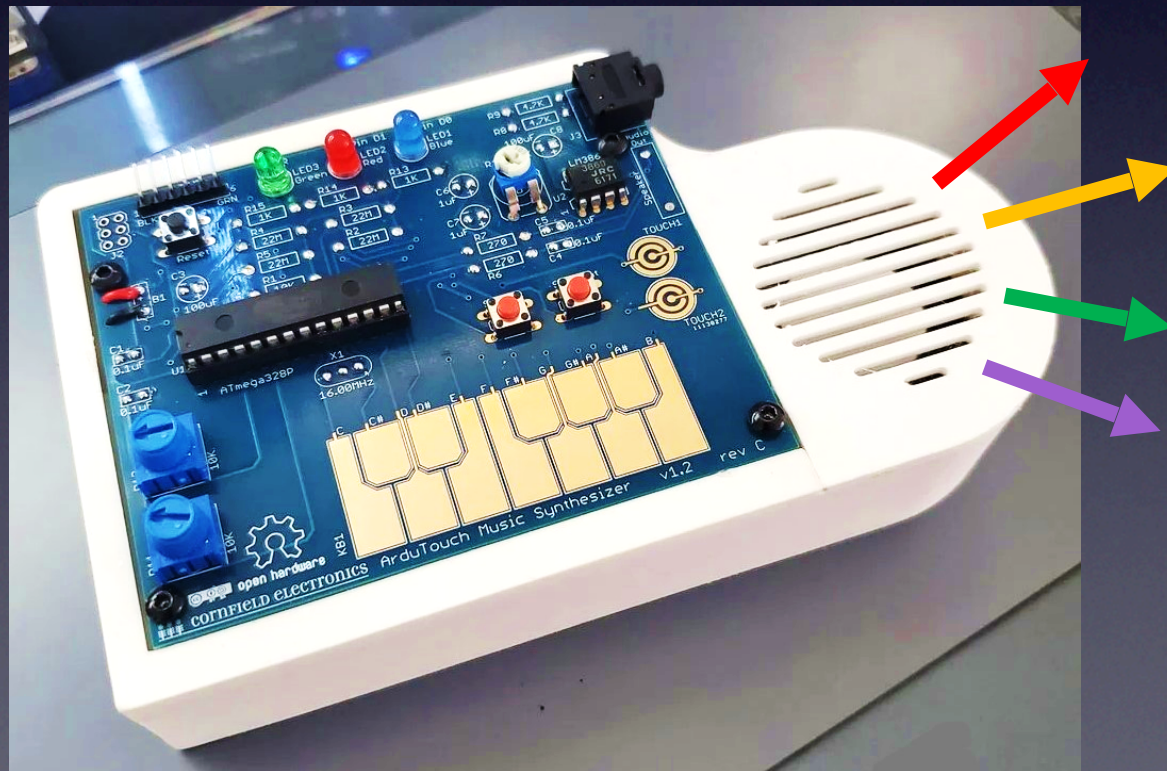


Optional: 3D Printed Case !

The built-in speaker will sound ****way**** nicer with a case.

ArduTouch Case, by ipsosfatso – on Thingiverse:

<https://www.thingiverse.com/thing:4702927>

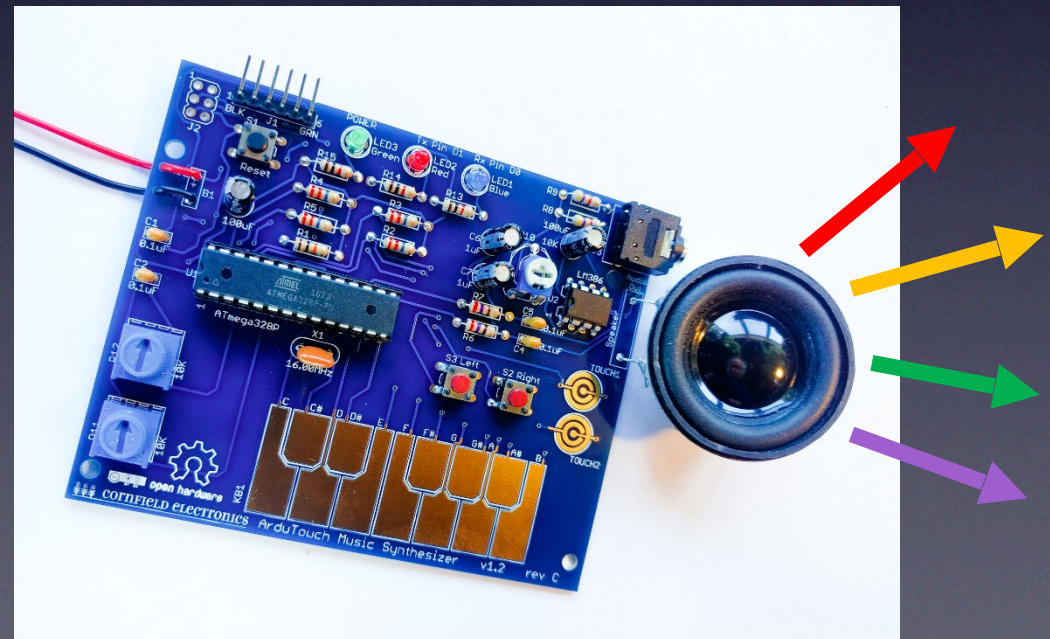


Let's make noise!

Your ArduTouch comes pre-programmed with a really cool synthesizer, called "Thick".

If you are happy playing with "Thick" then no need to re-program your ArduTouch.

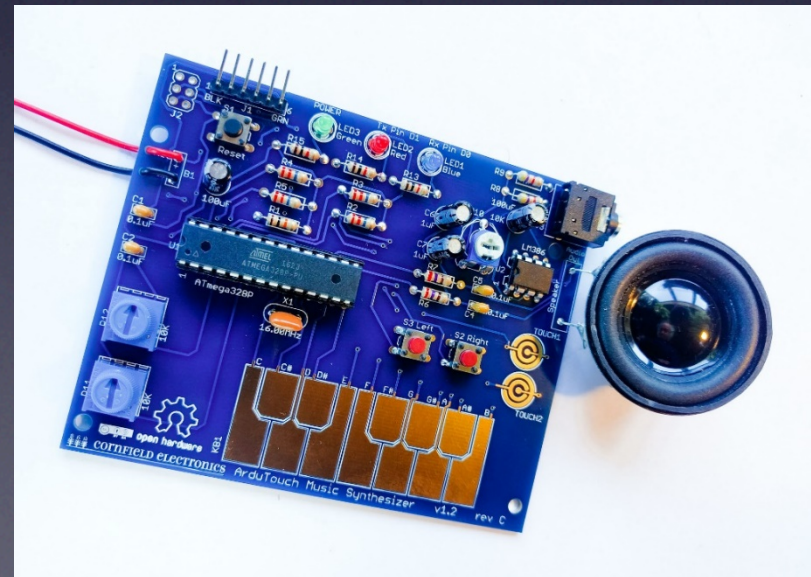
But if you want to program other synths into your ArduTouch, the next pages show you how...



Re-programming the ArduTouch

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

The following slides show you
how to program these into your ArduTouch board...



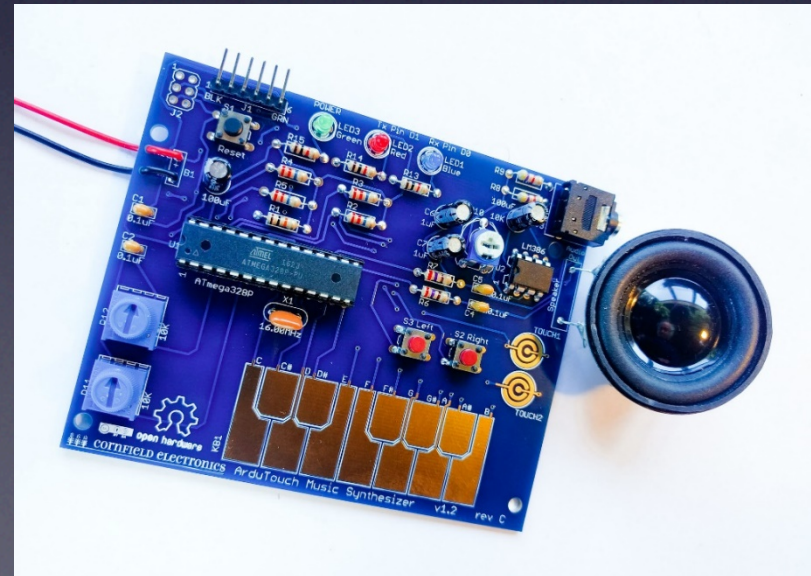
Re-programming the ArduTouch

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 ArduTouch, you will need:

- the Arduino software
<<http://arduino.cc>>
- a USB-Serial adapter cable (such as an FTDI, or equivalent)
a nice one is available at
<<https://cornfieldelectronics.com/cfe/products/buy.php?productId=usbccable>>
- a synth sketch & the ArduTouch Arduino library
<<http://cornfieldelectronics.com/cfe/projects.php#ardutouch>>

The following slides 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>>



Arduino

First:

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

Any version is OK

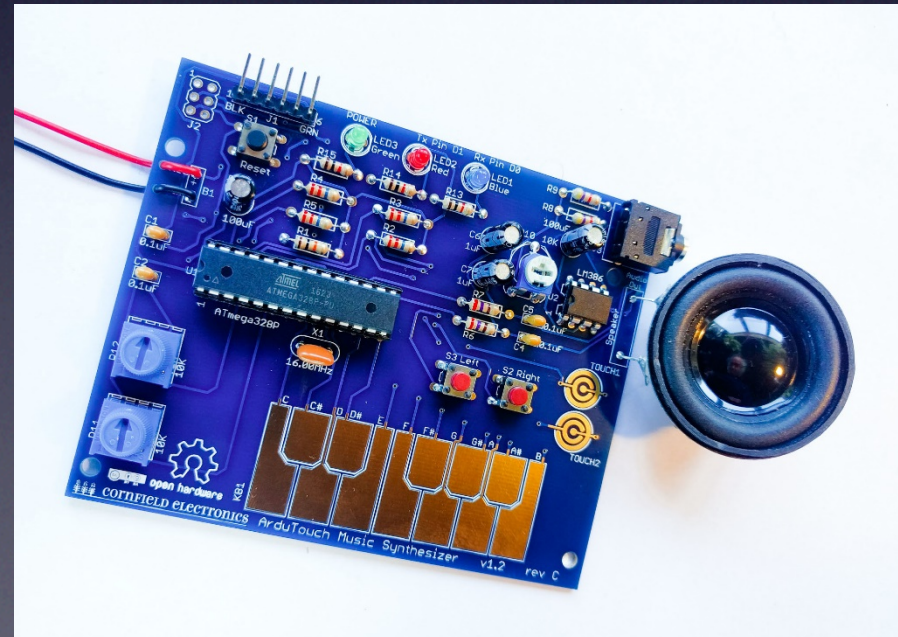


Re-programming the ArduTouch

Second:

Download and install the ArduTouch Arduino library
<<http://cornfieldelectronics.com/cfe/projects.php#ardutouch>>

(details on this soon)



Re-programming the ArduTouch

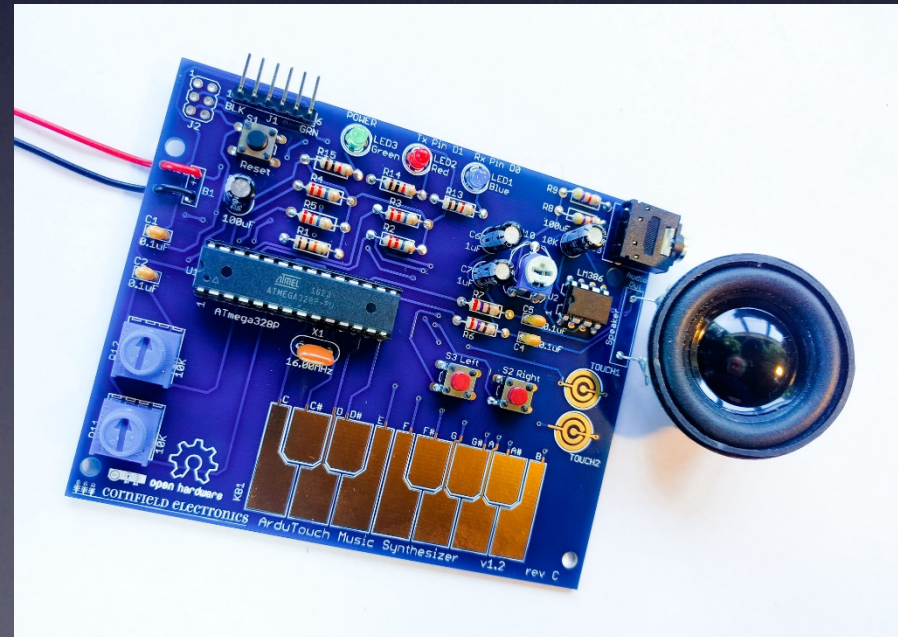
Third:

Download ArduTouch synth sketches

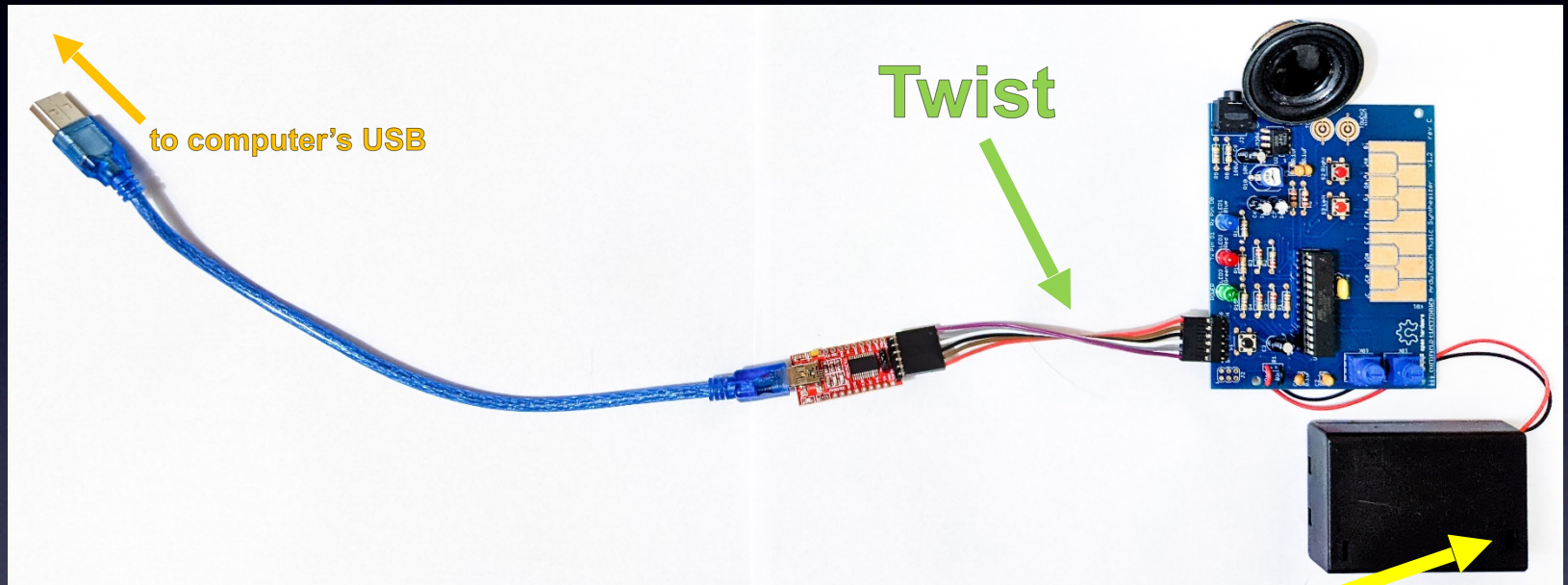
<<http://cornfieldelectronics.com/cfe/projects.php#ardutouch>>

Store them on your computer anywhere you like.

(details on this soon)



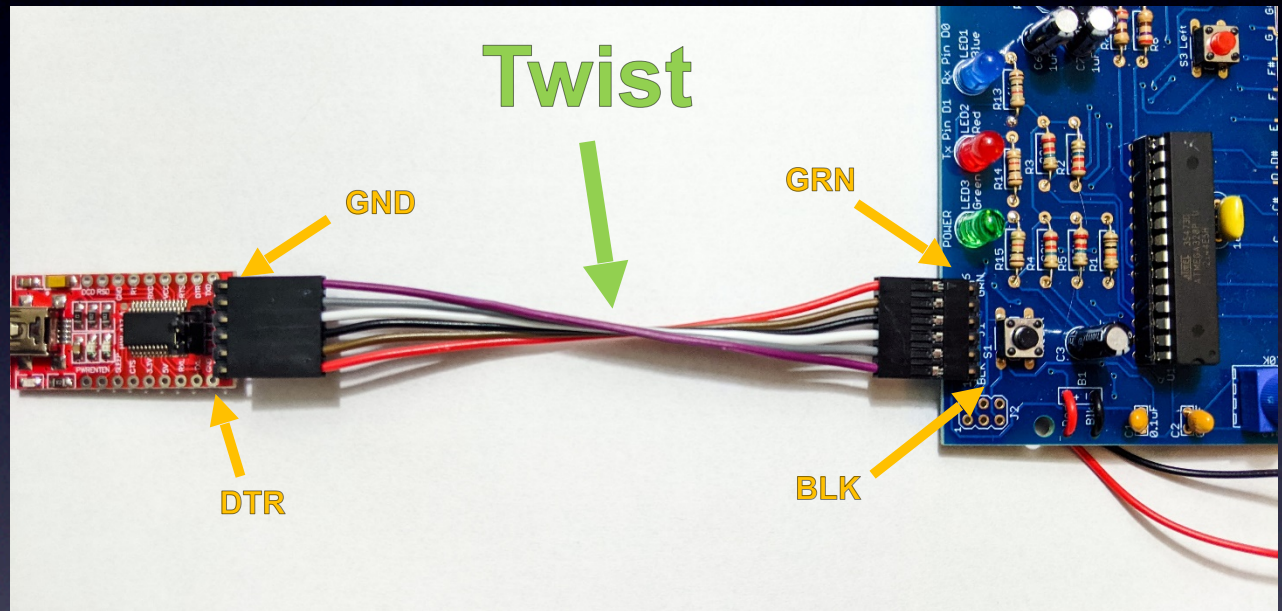
Connecting your ArduTouch to your computer



IMPORTANT:
Make sure the
battery pack on your
ArduTouch
is *OFF*

Connecting your ArduTouch to your computer

This shows a few more details:

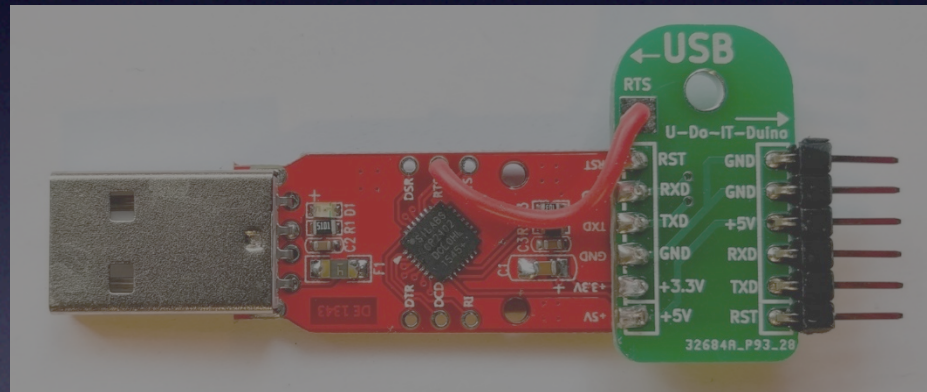


IMPORTANT:
Make sure the
battery pack on
your ArduTouch
is *OFF*

Connecting your ArduTouch to your computer

USB-Serial adapter cable

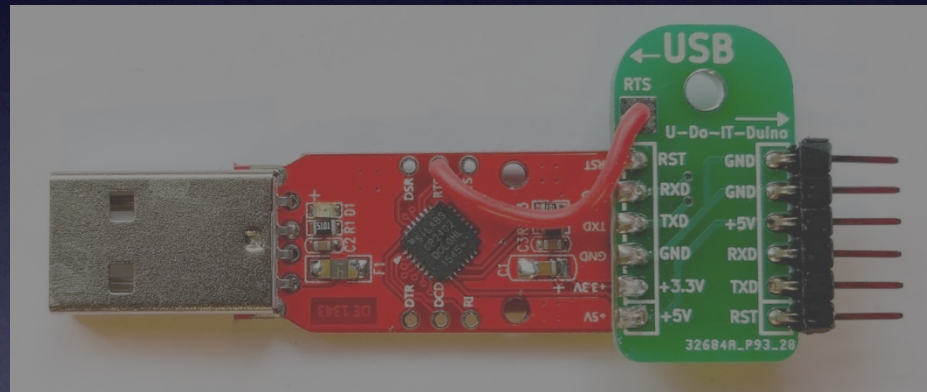
Old ones from Cornfield Electronics looked like this:



Connecting your ArduTouch to your computer

USB-Serial adapter cable

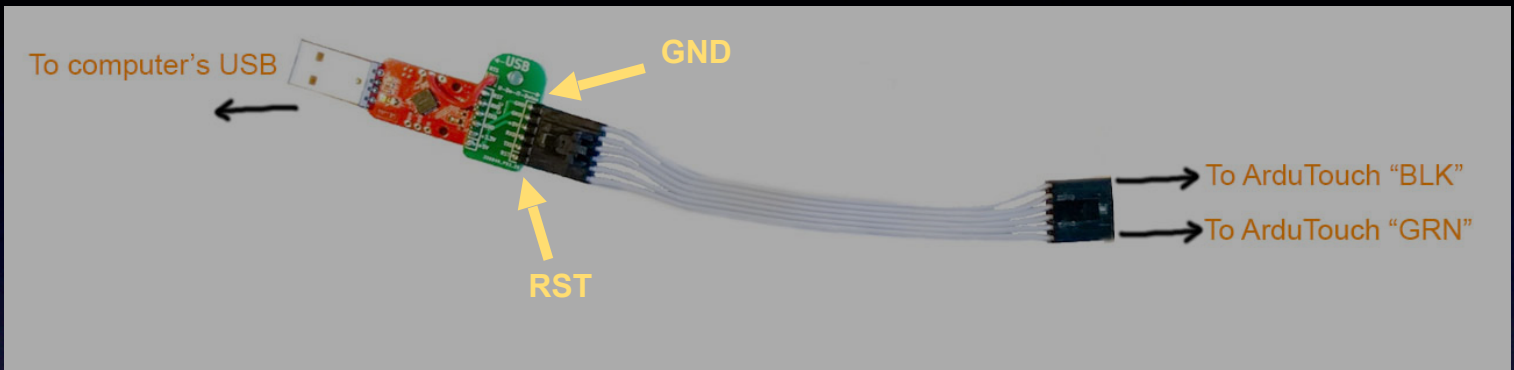
Old ones from Cornfield Electronics looked like this:



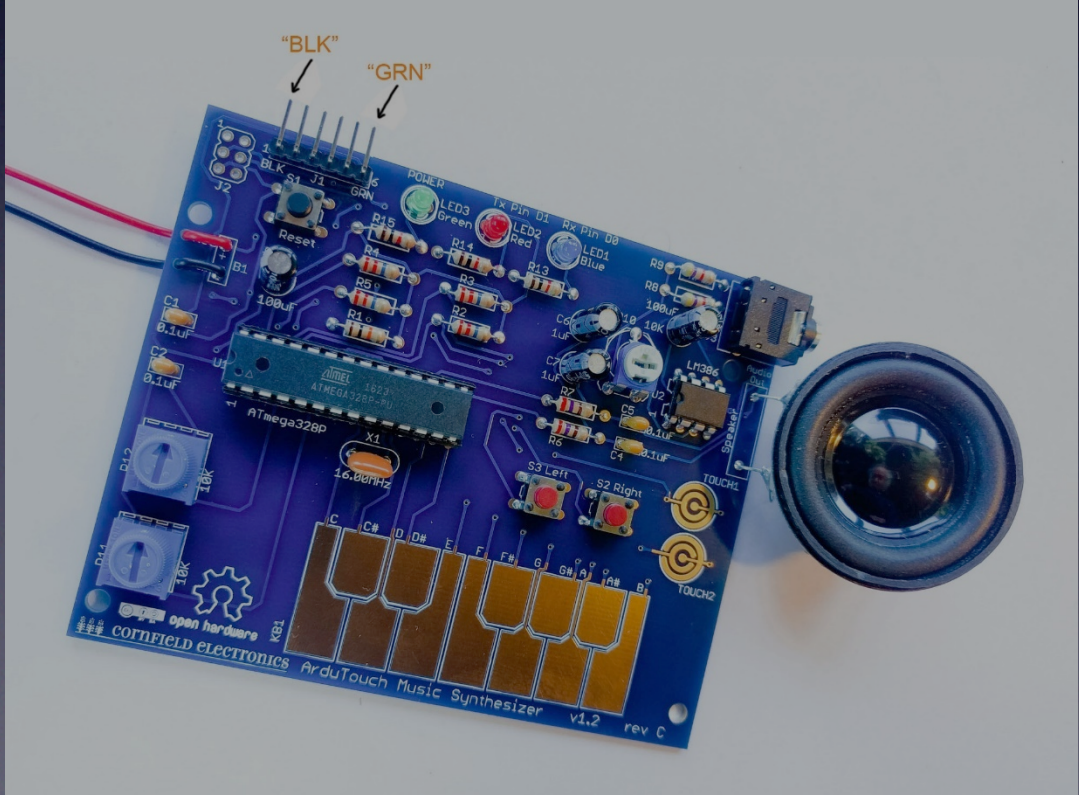
You may need to download and install a driver for your Operating System (Windows, MacOS, or Linux):

<<https://www.silabs.com/products/development-tools/software/usb-to-uart-bridge-vcp-drivers>>

Connecting your ArduTouch to your computer



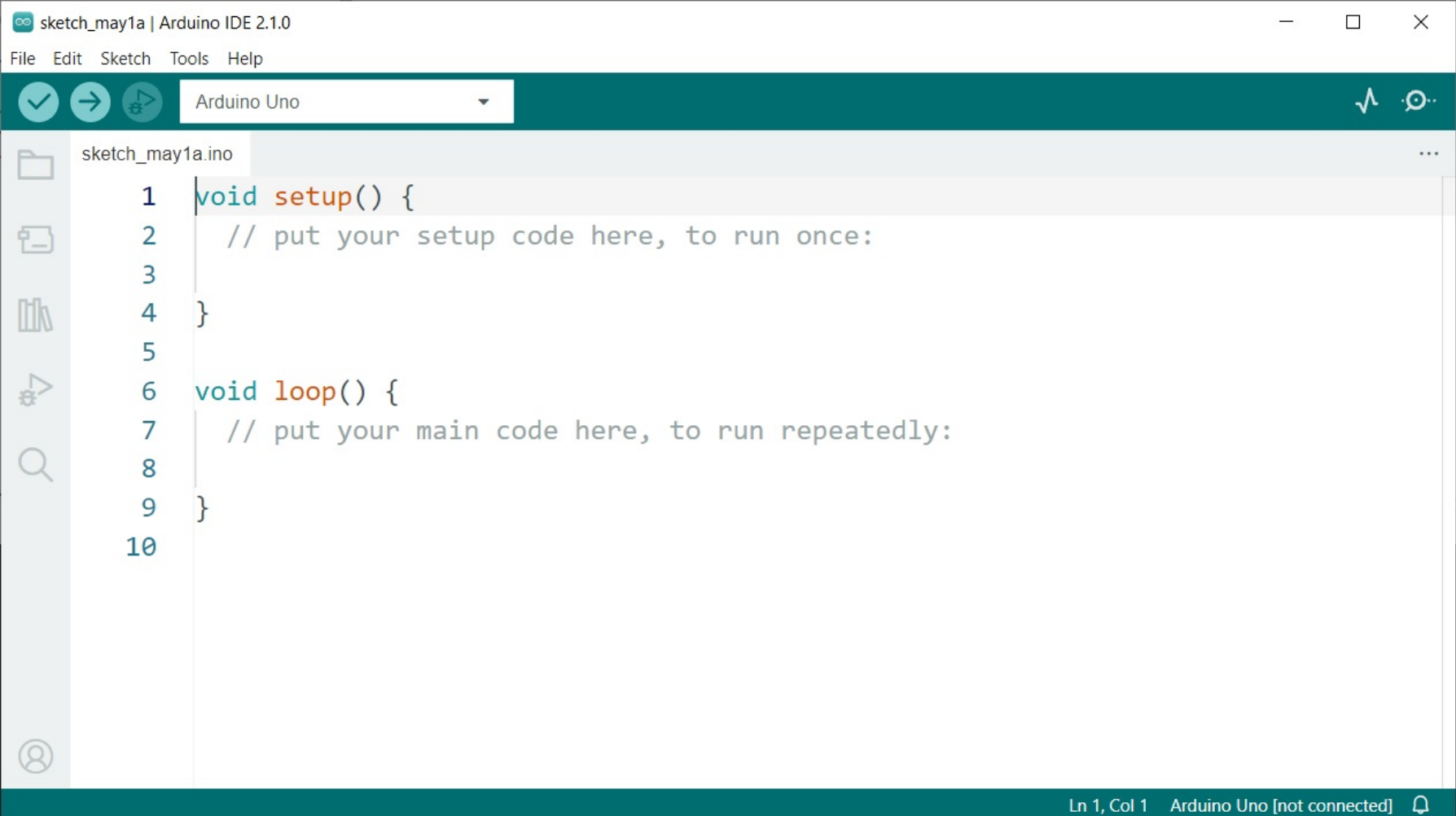
(Old ones)



IMPORTANT:
Make sure the
battery pack on your
ArduTouch
is OFF

Arduino

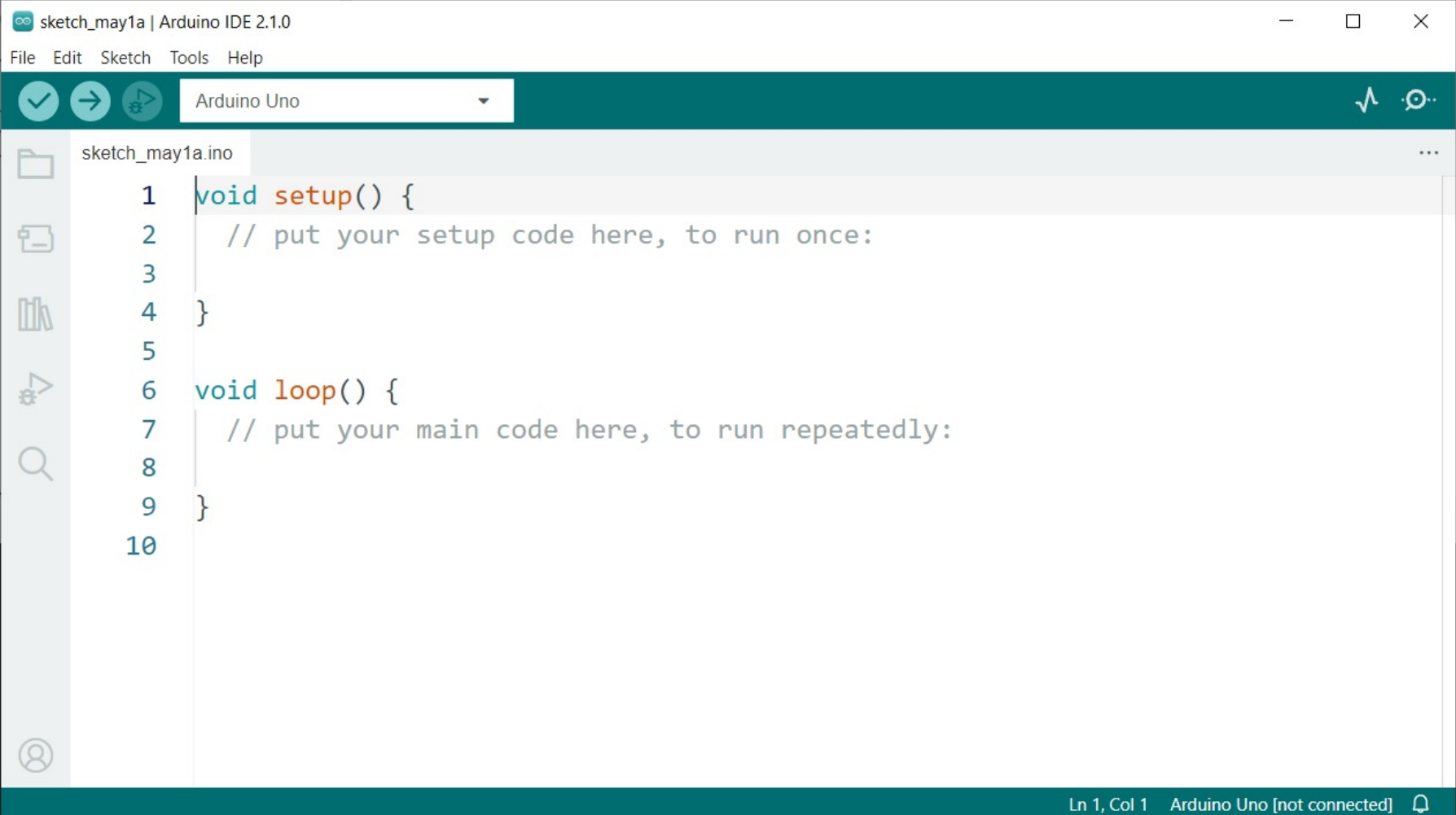
After you download and install the Arduino software start it, and you will see a screen that looks like this:



```
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 [not connected]
```

Arduino

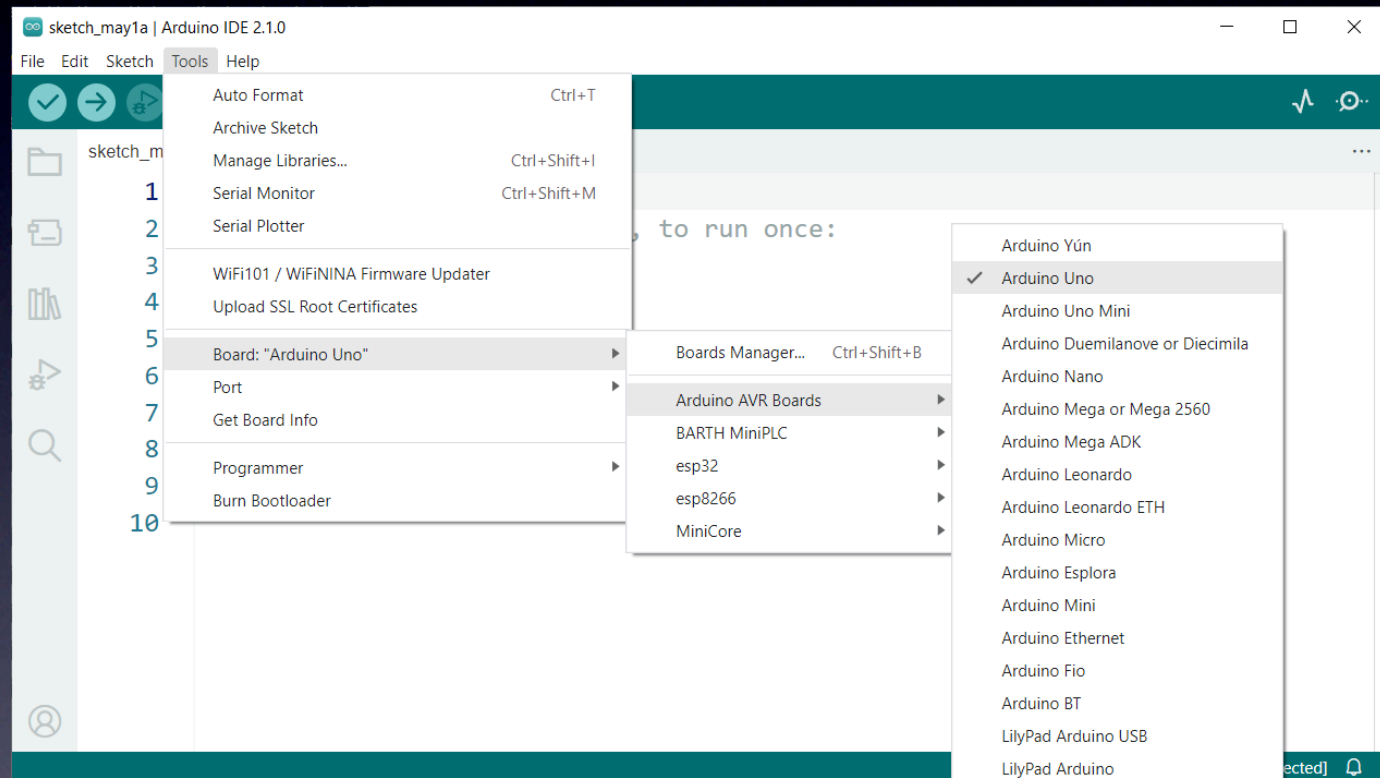
The **first time** you start your Arduino software you need to do **three things** to set things up:



```
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 [not connected]
```

Arduino

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



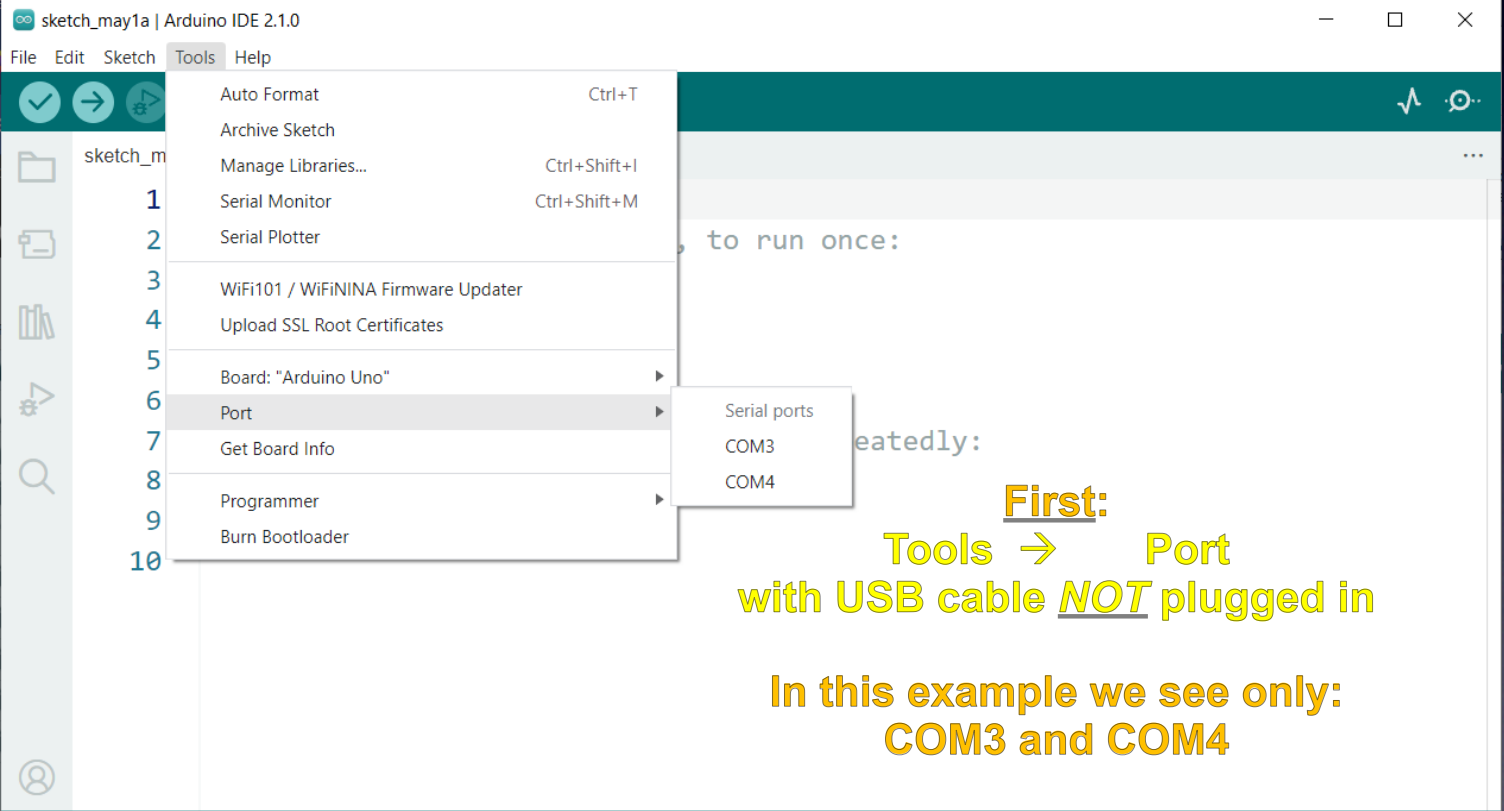
(1)
Choose "Uno"
as the Board

(Your
ArduTouch 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)



The screenshot shows the Arduino IDE 2.1.0 interface. The 'Tools' menu is open, and the 'Port' option is selected. A sub-menu is displayed showing 'Serial ports' with 'COM3' and 'COM4' listed. The status bar at the bottom right indicates 'Ln 1, Col 1 Arduino Uno [not connected]'.

First:
Tools → Port
with USB cable NOT plugged in

In this example we see only:
COM3 and COM4

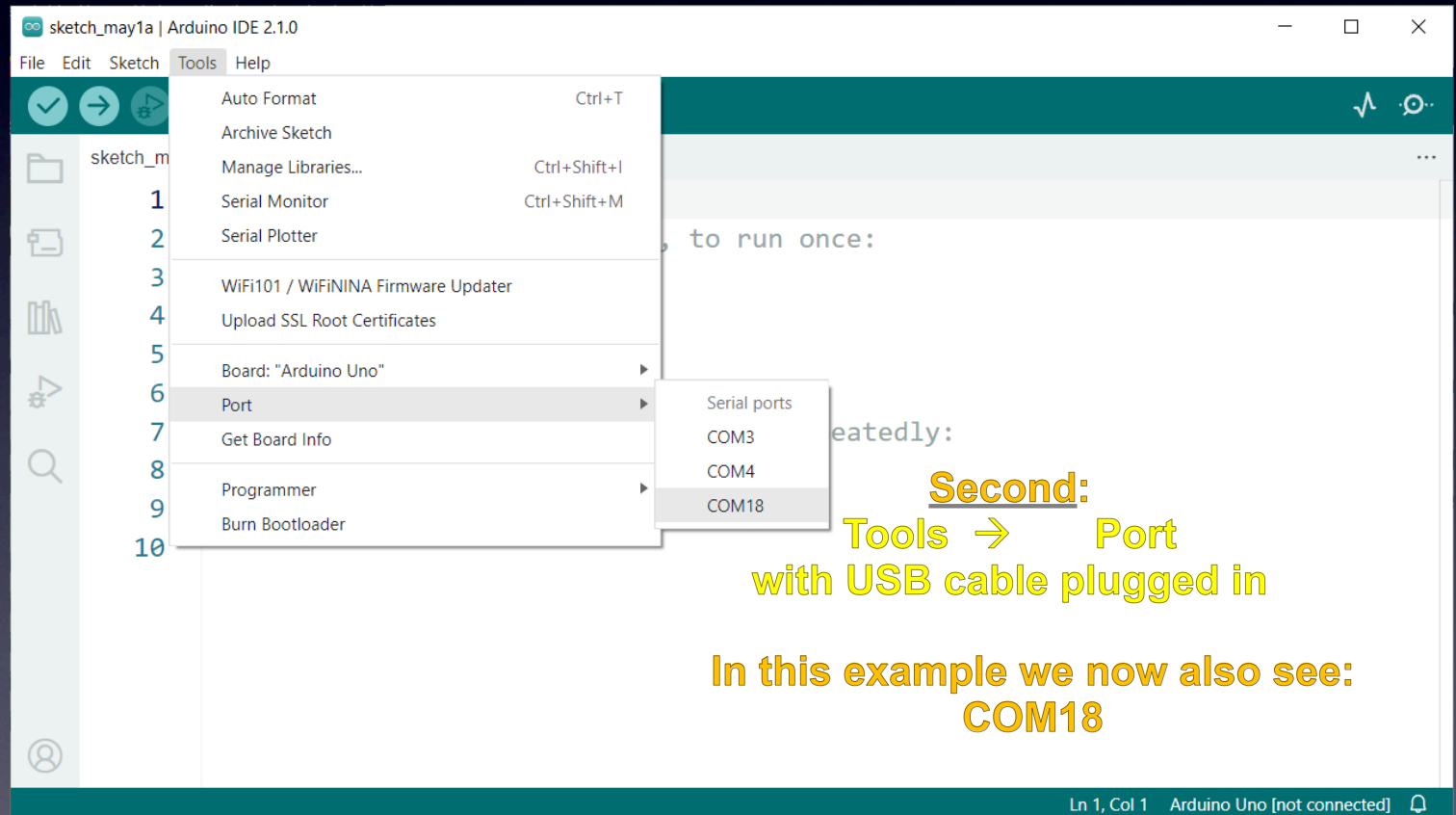
Arduino

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)

(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.)



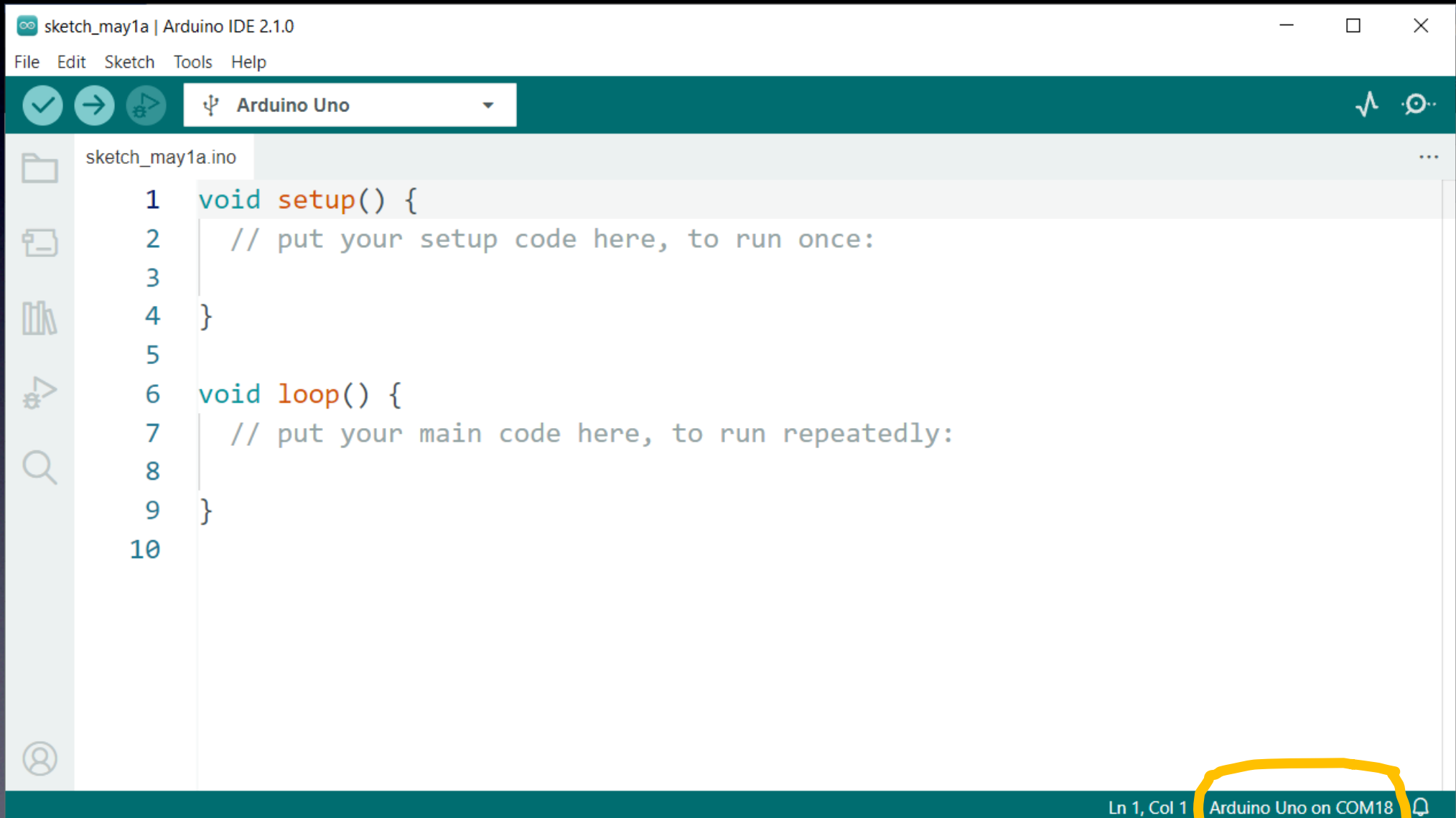
Second:
Tools → Port
with USB cable plugged in

In this example we now also see:
COM18

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)
Install
the
ArduTouch
library

File Edit View History Bookmarks Tools Help
Cornfield Electronics :: Home
https://cornfieldelectronics.com/cfe/cfe.main.php
150%
cornfield electronics
useful electronics for a better world
home buy about us press distributors projects show cart
TAKE CONTROL
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...
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!
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
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

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

(3)
Install
the
ArduTouch
library



The screenshot shows the homepage of Cornfield Electronics. The navigation menu includes links for 'home', 'buy', 'about us', 'press', 'distributors', 'projects', and 'show cart'. A green arrow points to the 'projects' link. The main content area features a large heading 'TAKE CONTROL' and a sub-heading 'At Cornfield Electronics we create devices that give people opportunities for effective choices in their lives.' Below this, there are three images: a blue Arduino board, a purple 'NeuroDreamer' sleep mask, and a black 'TV-B-Gone' universal remote control. The footer contains a 'legal notices & privacy policy' link, a Creative Commons BY-SA license, and the year '2023 cornfield electronics'.

Arduino

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

(3)
Install
the
ArduTouch
library



The screenshot shows a web browser window displaying the 'Cornfield Electronics' website. The page features a navigation menu with links for 'home', 'buy', 'about us', 'press', 'distributors', 'projects', and 'show cart'. The main content area is titled 'DO-IT-YOURSELF PROJECTS' and includes the following text:

DO-IT-YOURSELF PROJECTS
by **Mitch Altman**, and friends.
Last modified: 5-Oct-2022

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!

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.



Here is a really nice tutorial on how to solder -- for total beginners!
[Soldering Tutorial for total beginners](#)

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... ch AT CornfieldElectronics DOT com

Arduino

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

(3)
Install
the
ArduTouch
library



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 \(Windows, MacOS, Linux\)](#)

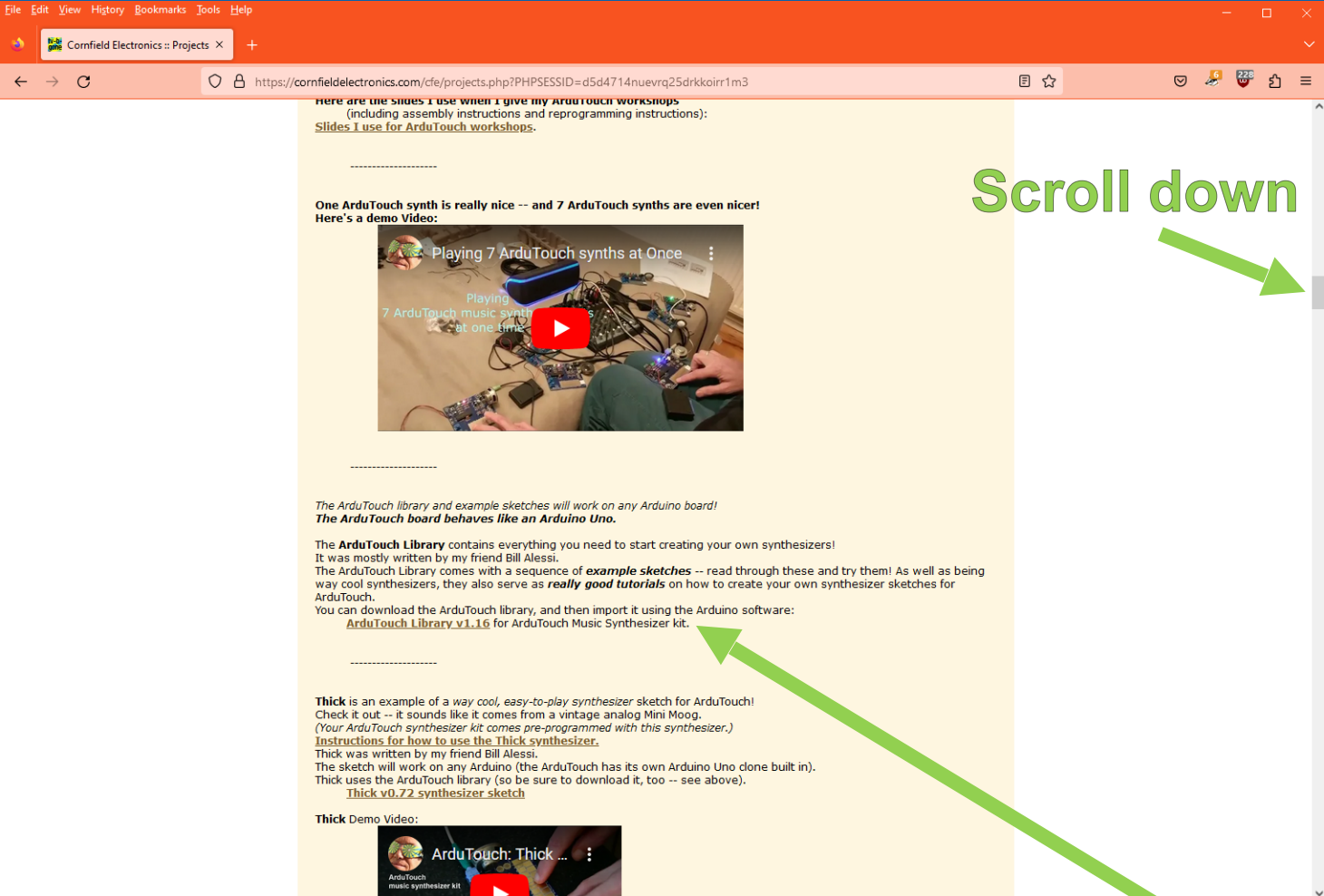
You will also need to download the free, open-source, Arduino software (for Windows, MacOS, or Linux).
[Arduino software](#) (the latest version is fine to use).

Scroll down

Arduino

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

(3)
Install
the
ArduTouch
library



The screenshot shows a web browser window with the URL <https://cornfieldelectronics.com/cfe/projects.php?PHPSESSID=d5d4714nuevraq25drkkoirr1m3>. The page content includes:

- Text: "here are the slides I use when I give my arduTouch workshops (including assembly instructions and reprogramming instructions): [Slides I use for ArduTouch workshops.](#)"
- Text: "One ArduTouch synth is really nice -- and 7 ArduTouch synths are even nicer! Here's a demo Video:"
- Video player: "Playing 7 ArduTouch synths at Once" with a play button.
- Text: "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."
- Text: "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](#)"
- Text: "Thick Demo Video:"
- Video player: "ArduTouch: Thick ..." with a play button.

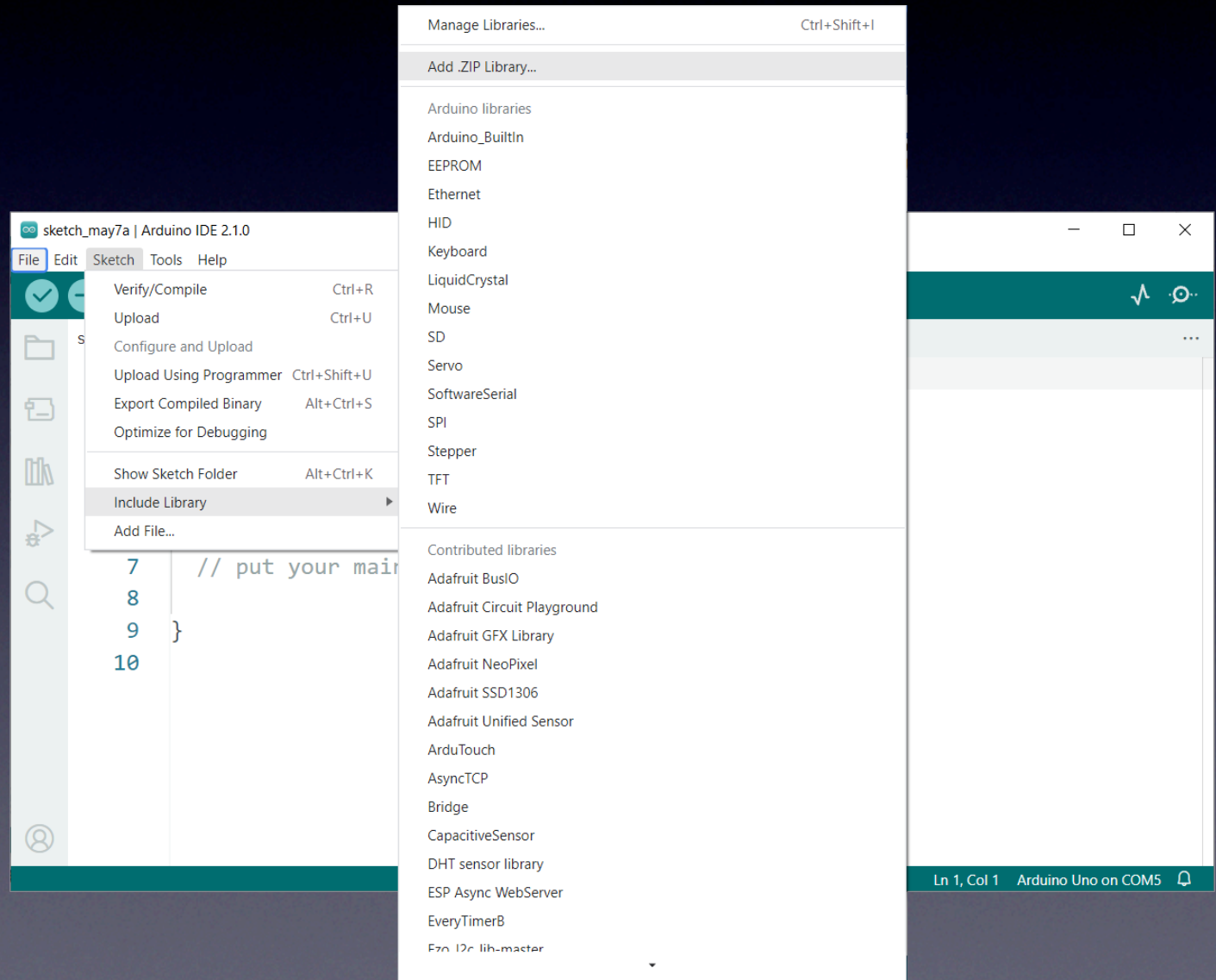
Two green arrows are overlaid on the image: one pointing to the video player and another pointing to the download link.

click this link to download the ArduTouch library

Arduino

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

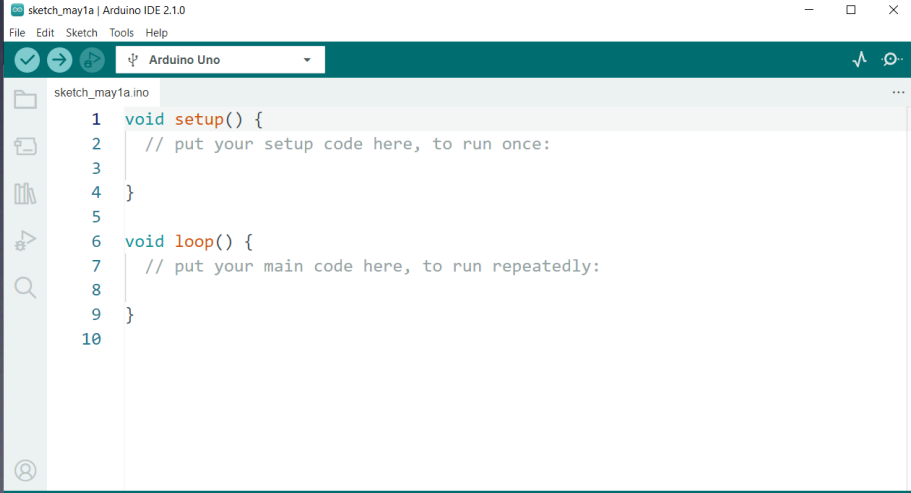
(3)
Install
the
ArduTouch
library



Arduino

Your Arduino software is now ready

to program a new synth sketch
into your ArduTouch !

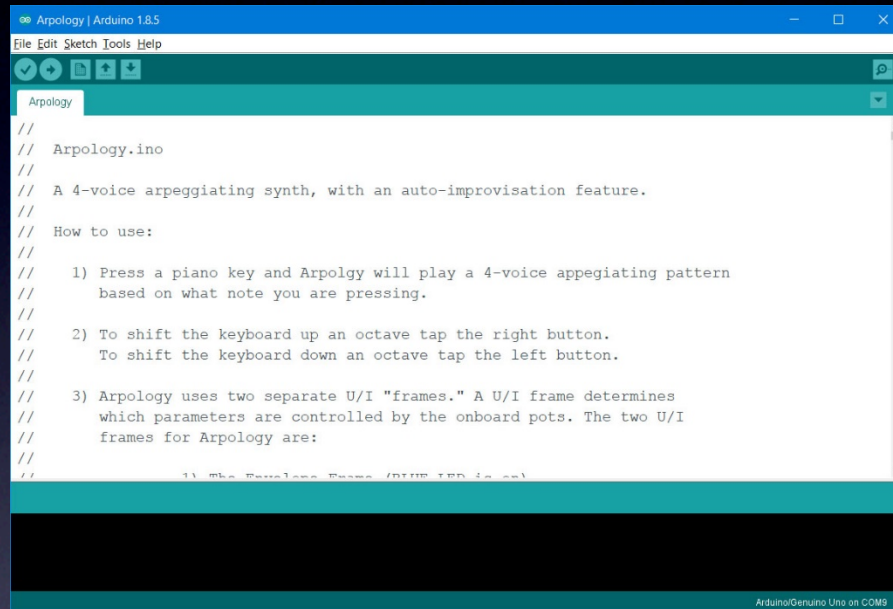


```
sketch_may1a | Arduino IDE 2.1.0
File Edit Sketch Tools Help
Arduino Uno
sketch_may1a.ino
1 void setup() {
2   // put your setup code here, to run once:
3
4 }
5
6 void loop() {
7   // put your main code here, to run repeatedly:
8
9 }
10
Ln 1, Col 1 | Arduino Uno on COM18
```

Arduino

Designed for non-geeky artists

Download
a new
ArduTouch
synth “sketch”

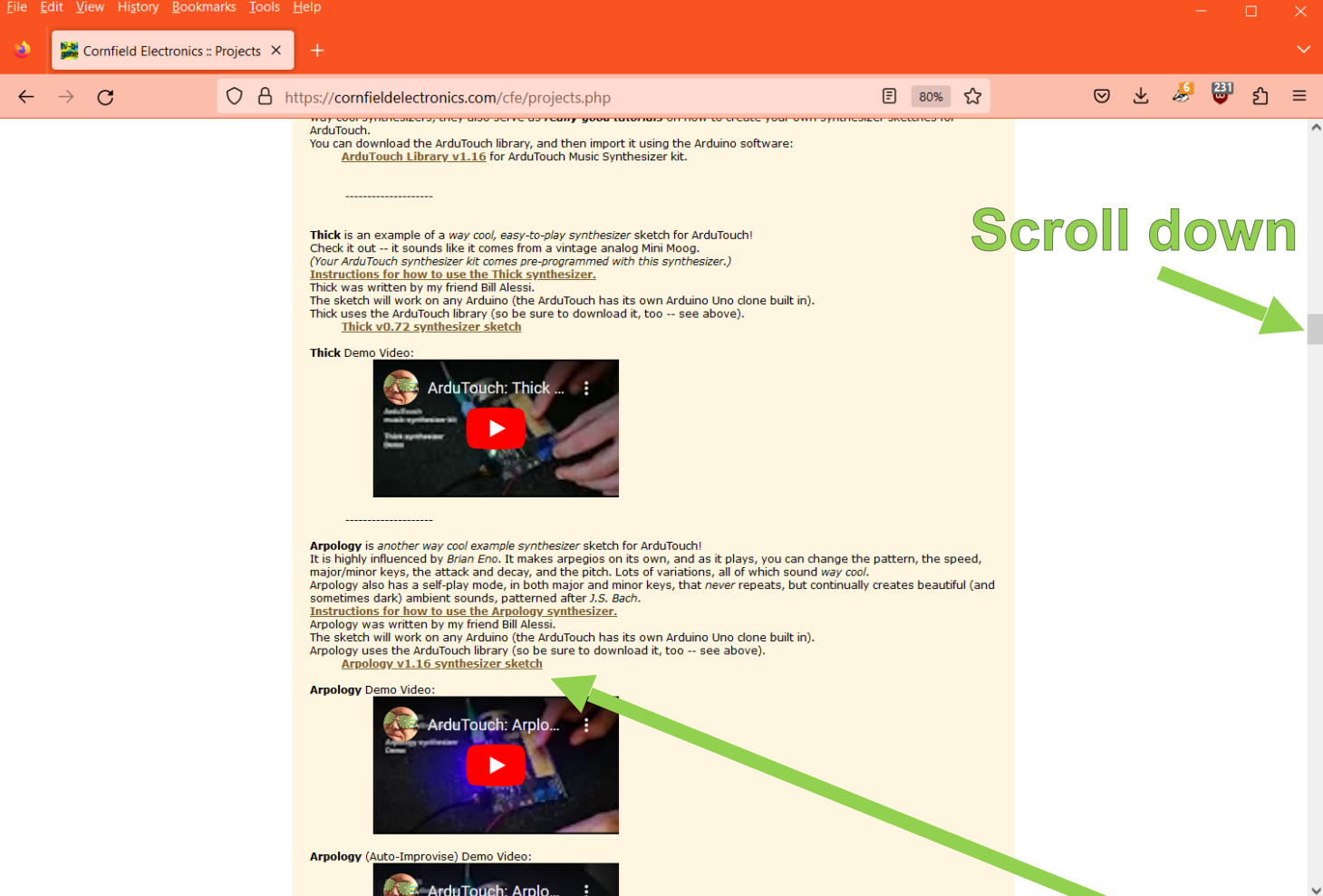


```
Arpology | Arduino 1.8.5
File Edit Sketch Tools Help
Arpology
//
// Arpology.ino
//
// A 4-voice arpeggiating synth, with an auto-improvisation feature.
//
// How to use:
//
// 1) Press a piano key and Arpology will play a 4-voice arpeggiating pattern
//    based on what note you are pressing.
//
// 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 Envelope Frame (DUE LED is on)
```

“Sketch” :
an Arduino program

Arduino

Download a new ArduTouch synth “sketch”



The screenshot shows a web browser window with the address bar displaying <https://cornfieldelectronics.com/cfe/projects.php>. The page content includes:

- A paragraph about downloading the ArduTouch library, with a link to [ArduTouch Library v1.16](#) for ArduTouch Music Synthesizer kit.
- A section for the **Thick** sketch, described as a "way cool, easy-to-play synthesizer sketch for ArduTouch!". It includes instructions for use and a link to [Thick v0.72 synthesizer sketch](#).
- A video player for "ArduTouch: Thick ...".
- A section for the **Arpology** sketch, described as another "way cool example synthesizer sketch for ArduTouch!". It includes instructions for use and a link to [Arpology v1.16 synthesizer sketch](#).
- A video player for "ArduTouch: Arplo...".
- A section for the **Arpology (Auto-Improvise)** sketch, with a video player for "ArduTouch: Arplo...".

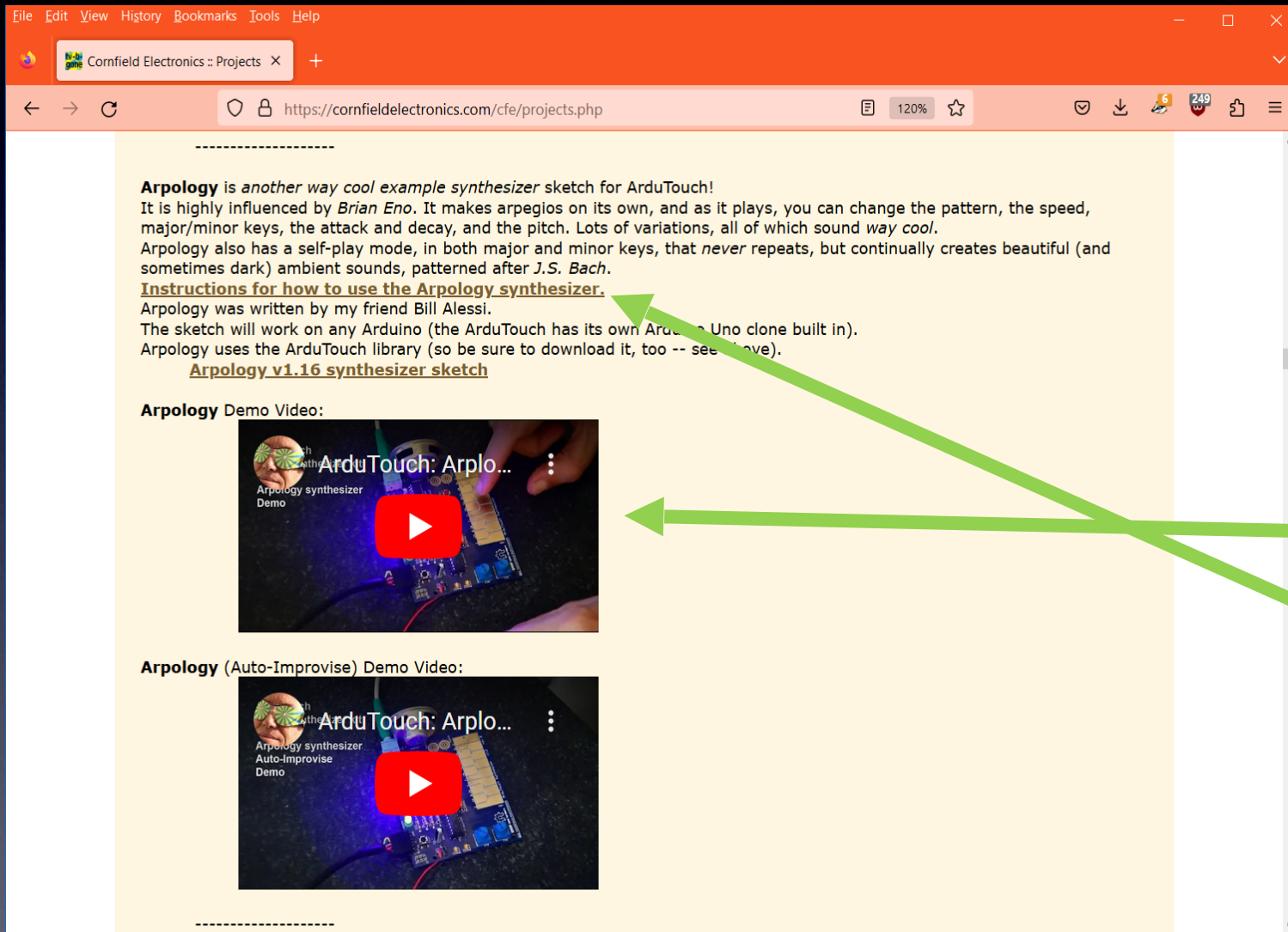
Scroll down



click link to download a synth “sketch”

Arduino

Download a new ArduTouch synth “sketch”



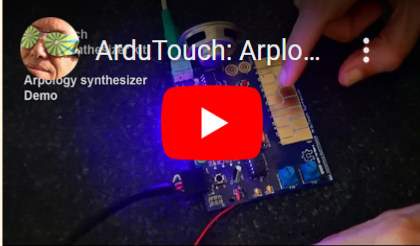
The screenshot shows a web browser window with the URL <https://cornfieldelectronics.com/cfe/projects.php>. The page content includes:

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*.

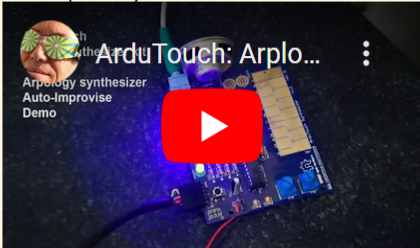
[Instructions for how to use the Arpology synthesizer.](#)
Arpology was written by my friend Bill Alessi.
The sketch will work on any Arduino (the ArduTouch has its own Arduino Uno clone built in).
Arpology uses the ArduTouch library (so be sure to download it, too -- see above).

[Arpology v1.16 synthesizer sketch](#)

Arpology Demo Video:



Arpology (Auto-Improvise) Demo Video:



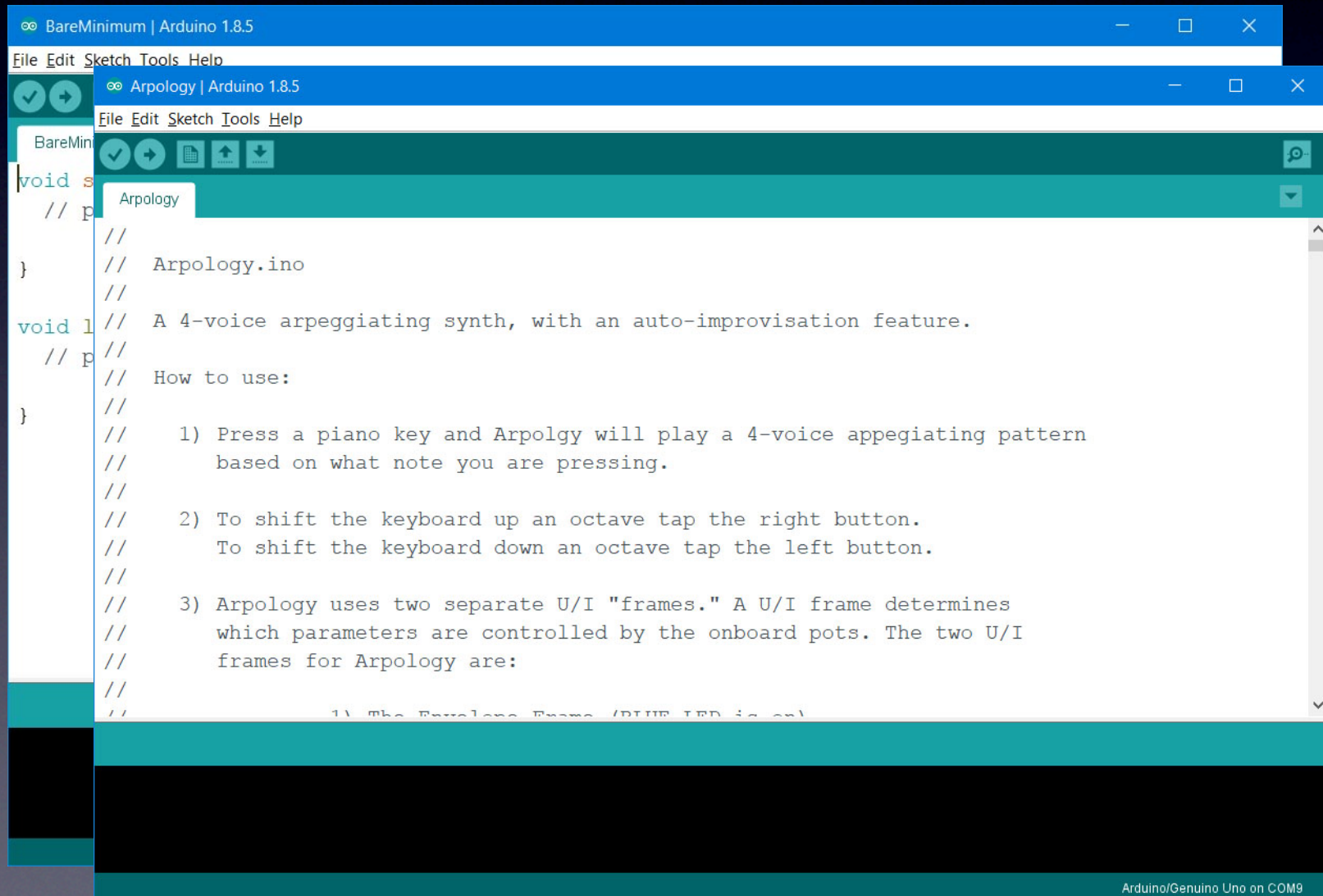
Check it out!

- Also available for each synth:**
- Demo Videos
 - Instructions

Arduino

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

(I opened “Arpology here)

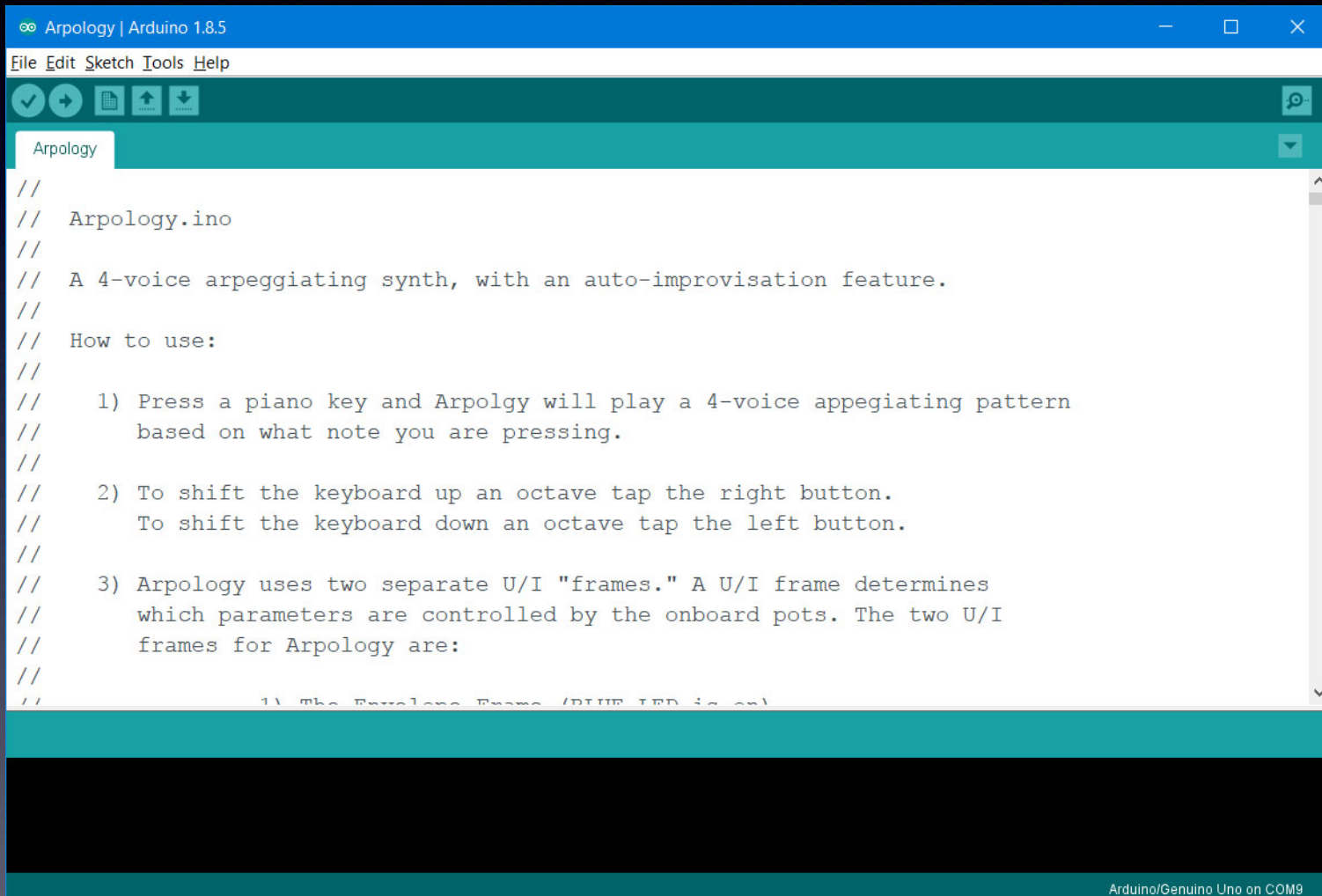


```
void s
// p
}
// Arpology.ino
//
// A 4-voice arpeggiating synth, with an auto-improvisation feature.
void l
// p
// How to use:
//
// 1) Press a piano key and Arpology will play a 4-voice arpeggiating pattern
// based on what note you are pressing.
//
// 2) To shift the keyboard up an octave tap 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 Envelope Frame (BLUE LED is on)
```

Arduino/Genuino Uno on COM9

Arduino

You can now program your ArduTouch with a new synth sketch !

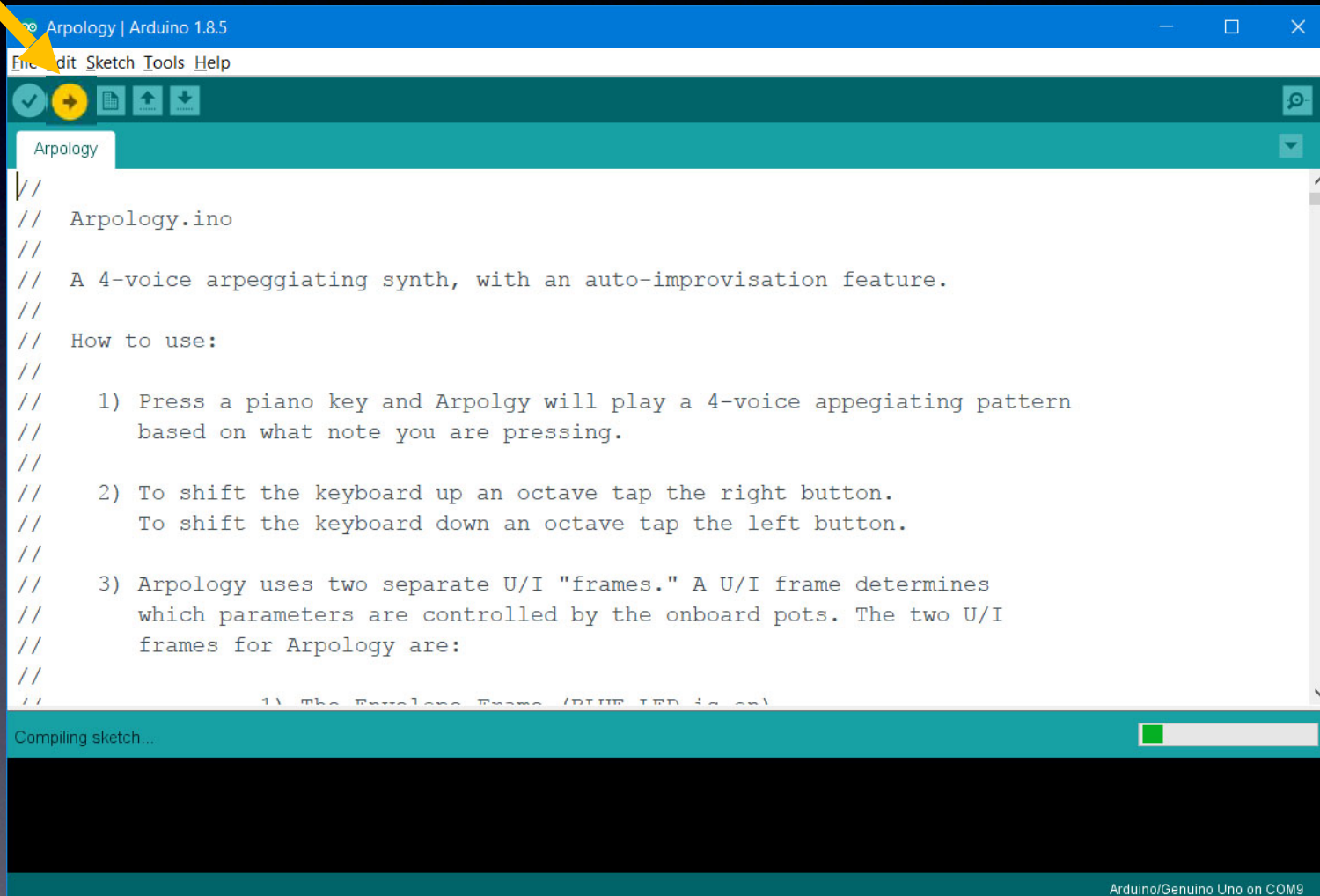


```
Arpology | Arduino 1.8.5
File Edit Sketch Tools Help
Arpology
//
// Arpology.ino
//
// A 4-voice arpeggiating synth, with an auto-improvisation feature.
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//    which parameters are controlled by the onboard pots. The two U/I
//    frames for Arpology are:
//
//    1) The Envelope Frame (BLUE LED is on)
```

Arduino/Genuino Uno on COM9

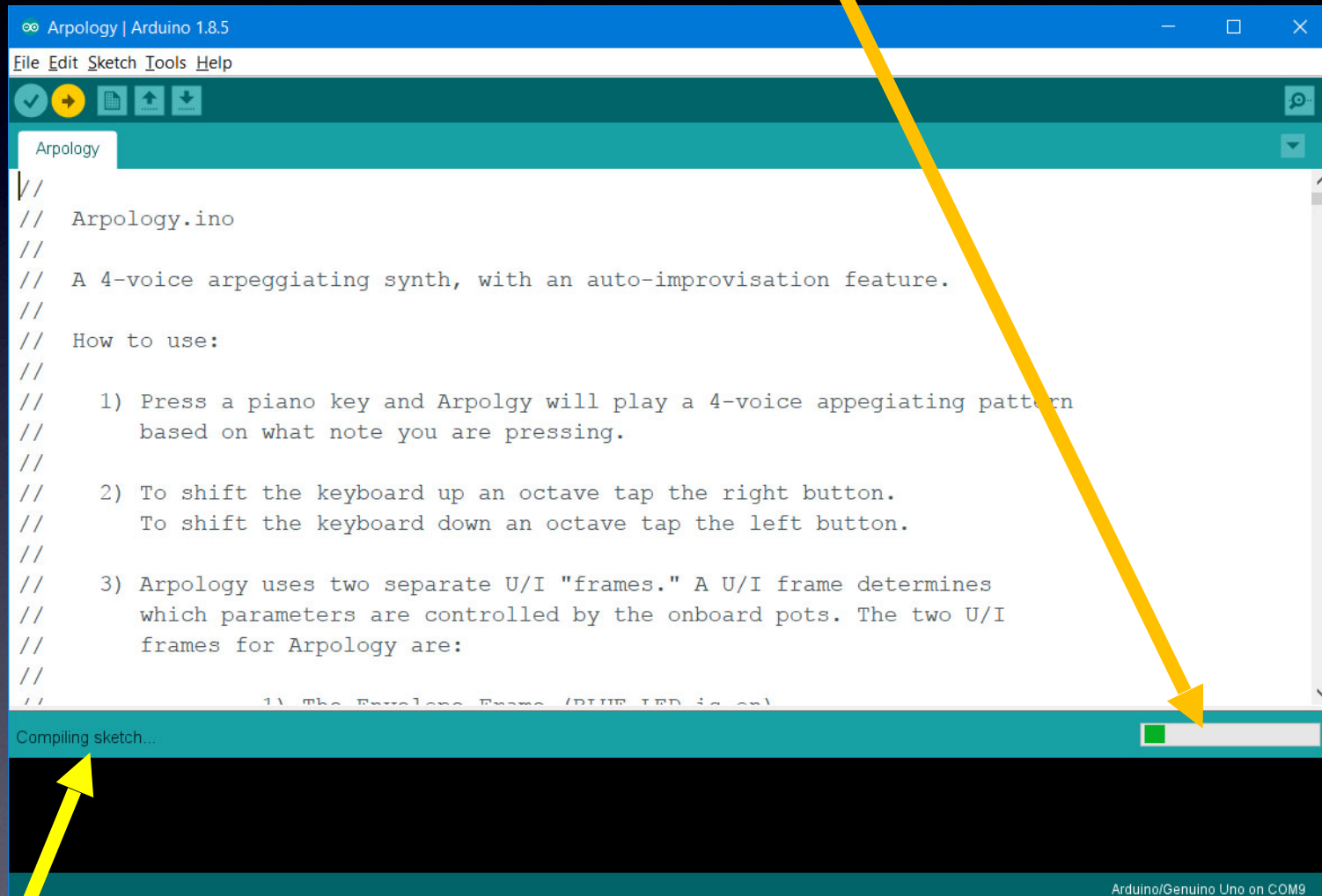
Arduino

With the USB-Serial cable connected to your ArduTouch board press the Upload button



Arduino

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



...and when it's completed successfully, it says: "Upload done"

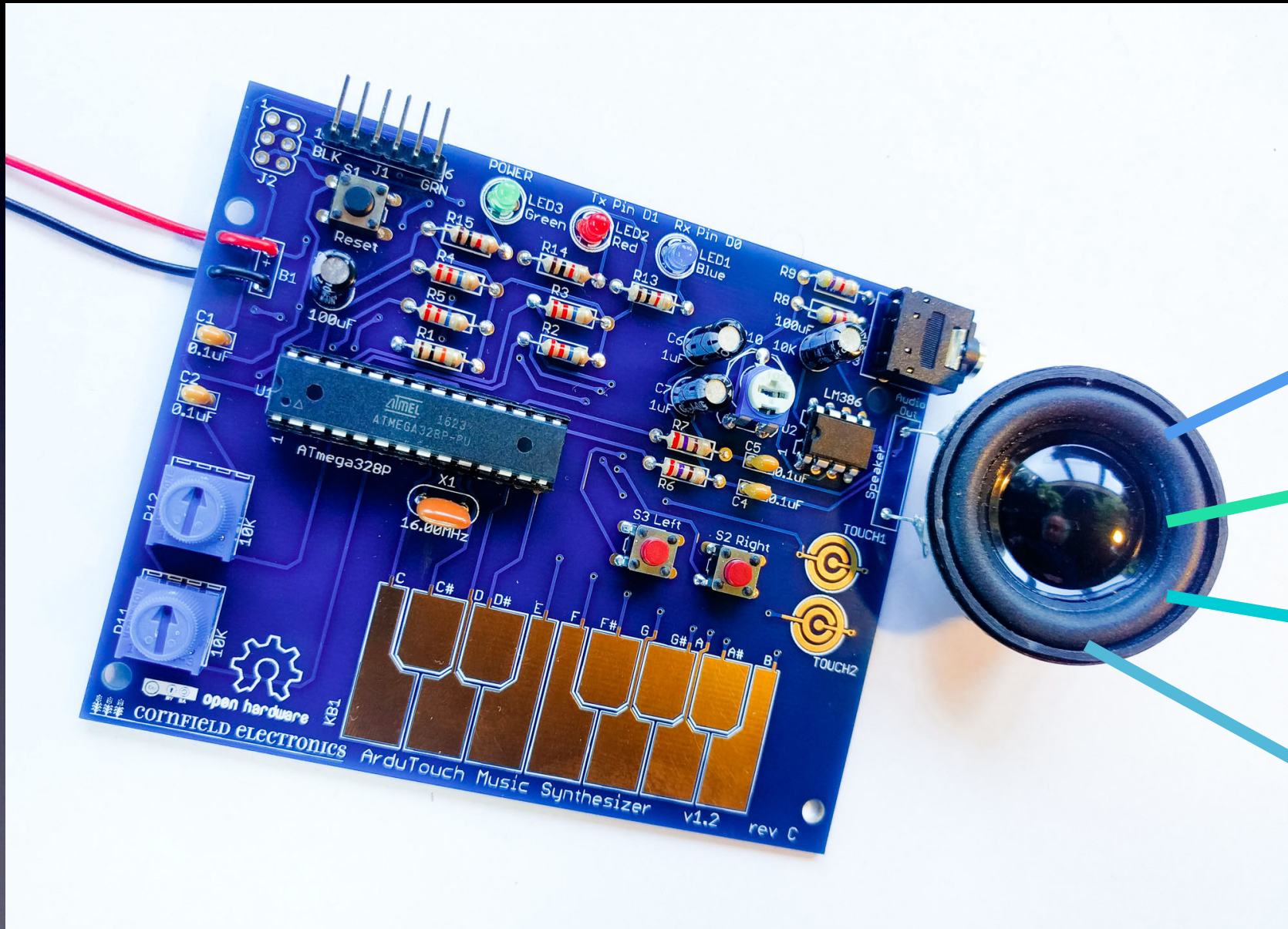
ArduTouch

**Disconnect your ArduTouch board
from the USB-Serial cable,**

turn on your battery pack,

And...

Let's make new noise!



Please Remember:

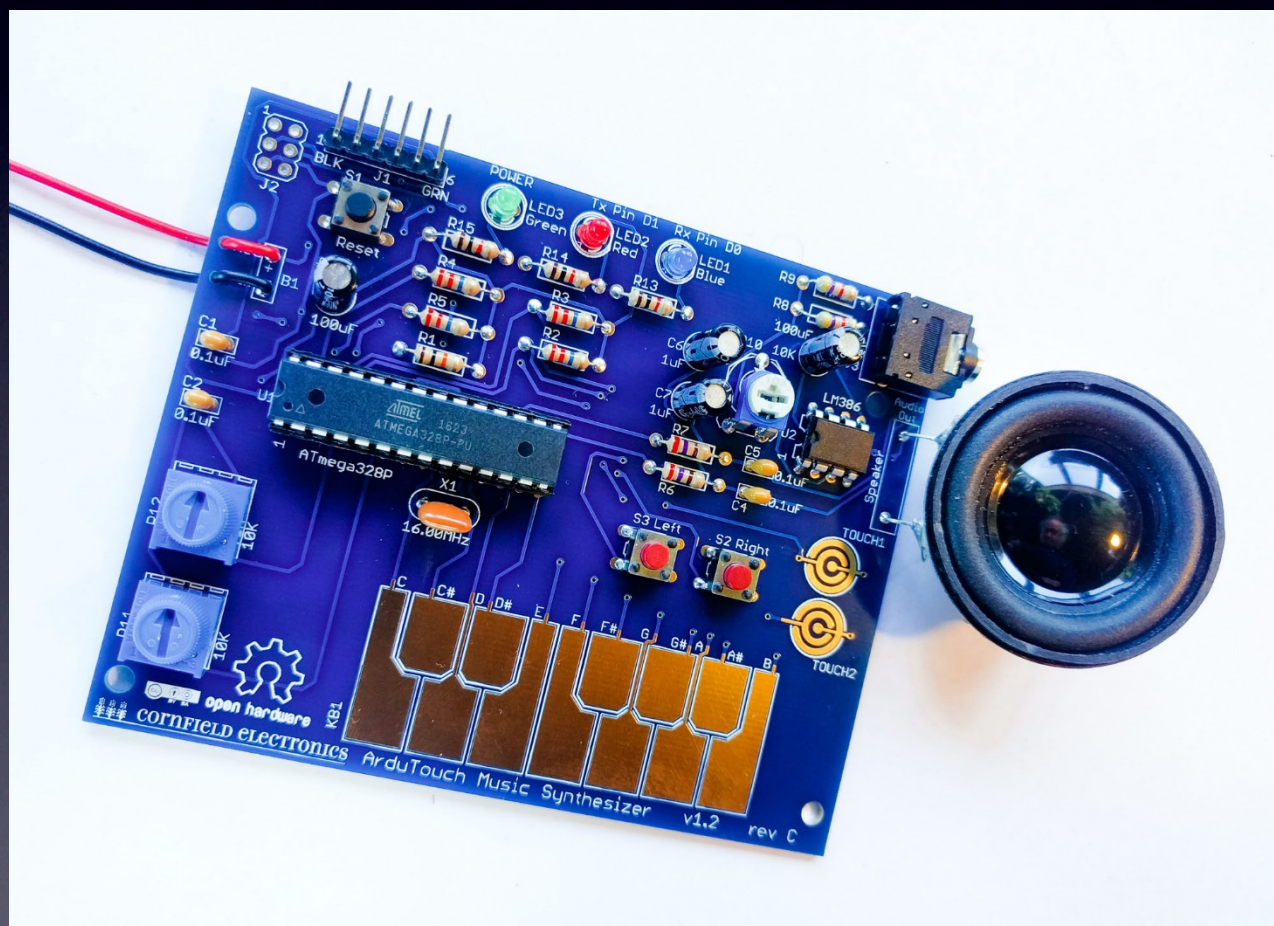
to

Wash your hands

after soldering

ArduTouch Music Synthesizer

Assembly Instructions & Programming Instructions



rev C



open source hardware



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CORNFIELD ELECTRONICS