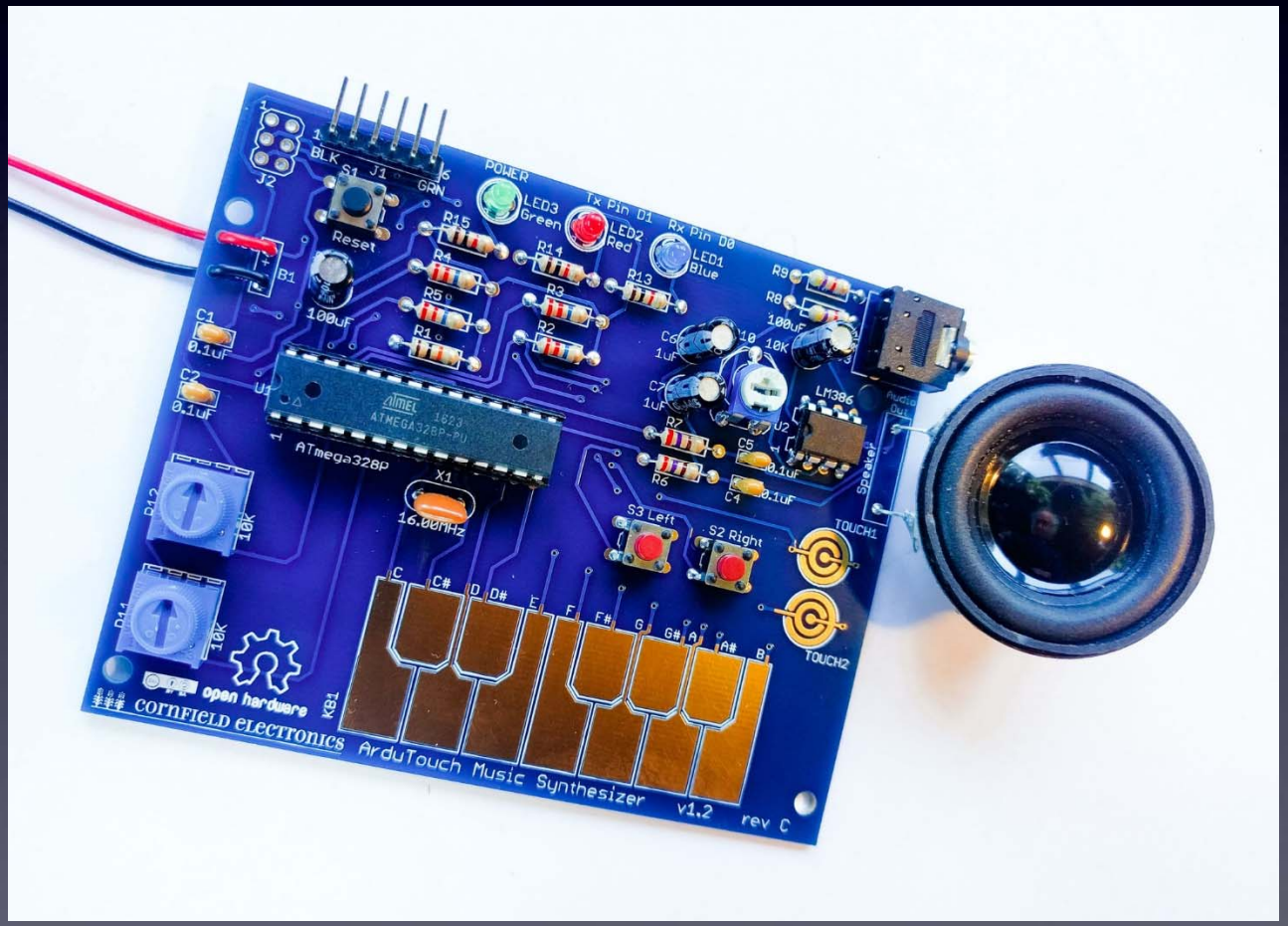
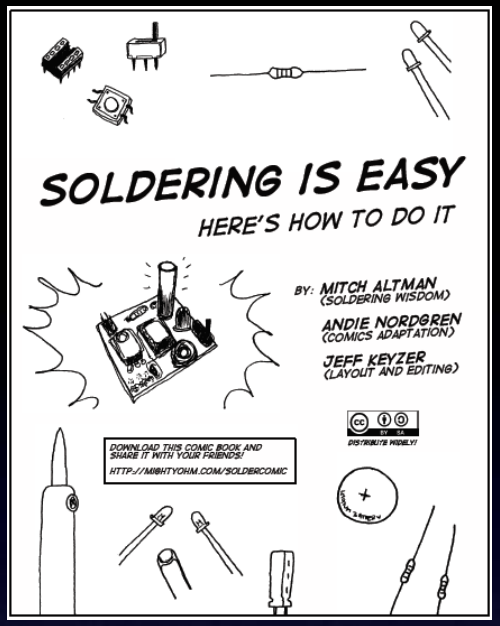
ArduTouch Music Synthesizer

Assembly Instructions



rev C

Learn To Solder

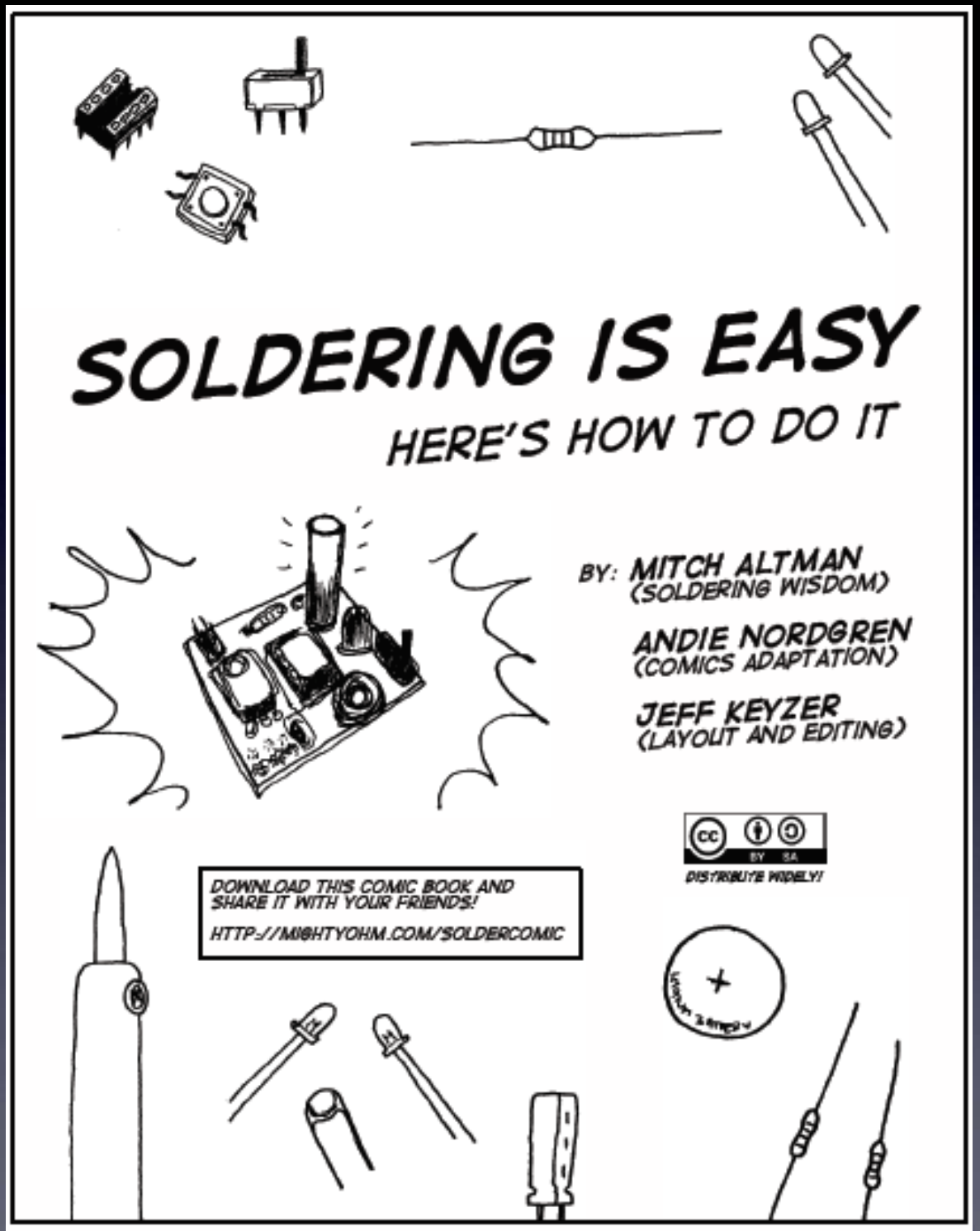


The following photos will show you how to solder.

But feel free to download the “Soldering Is Easy” comic book for free!

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

Learn To Solder



download for free at:
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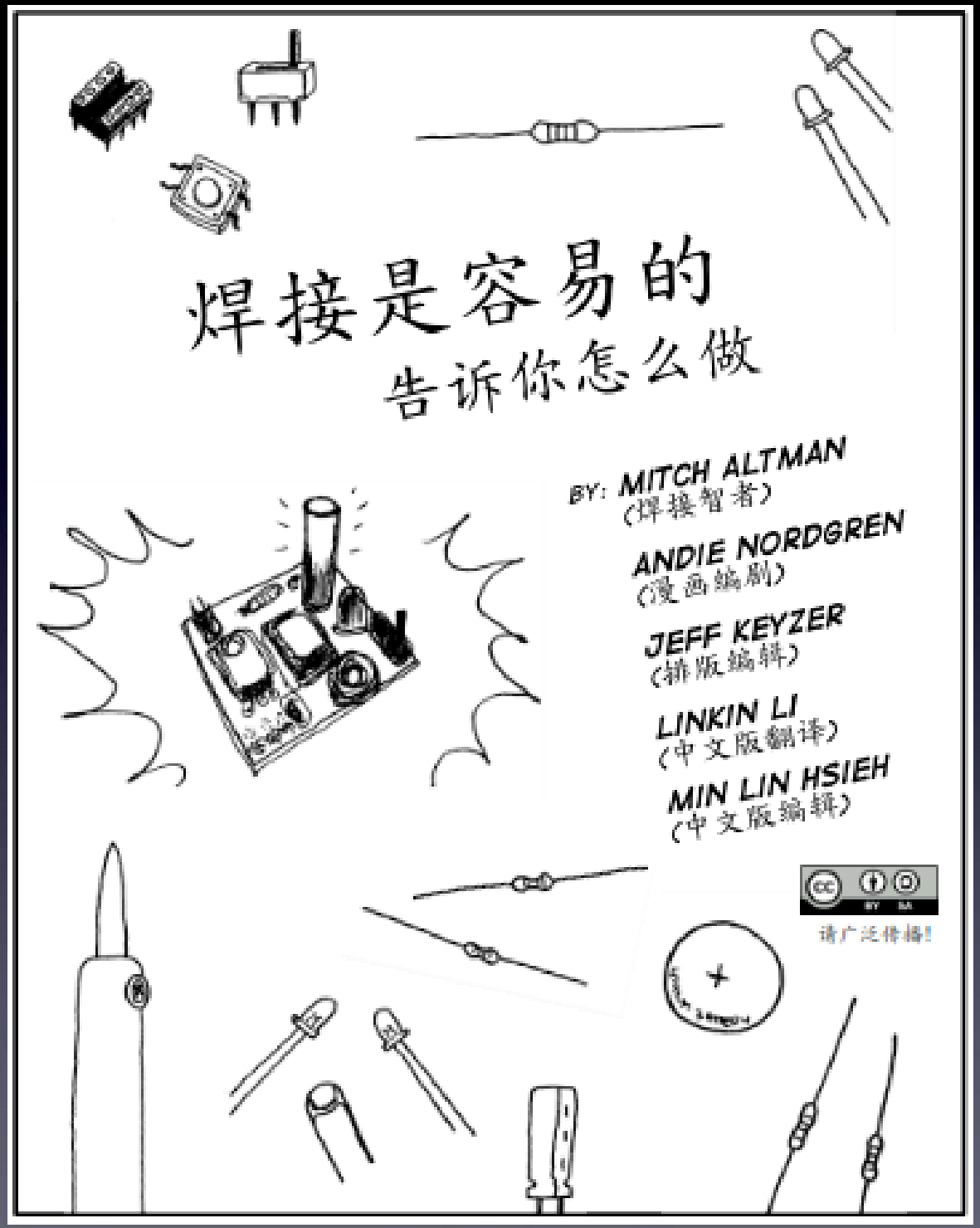
Learn To Solder



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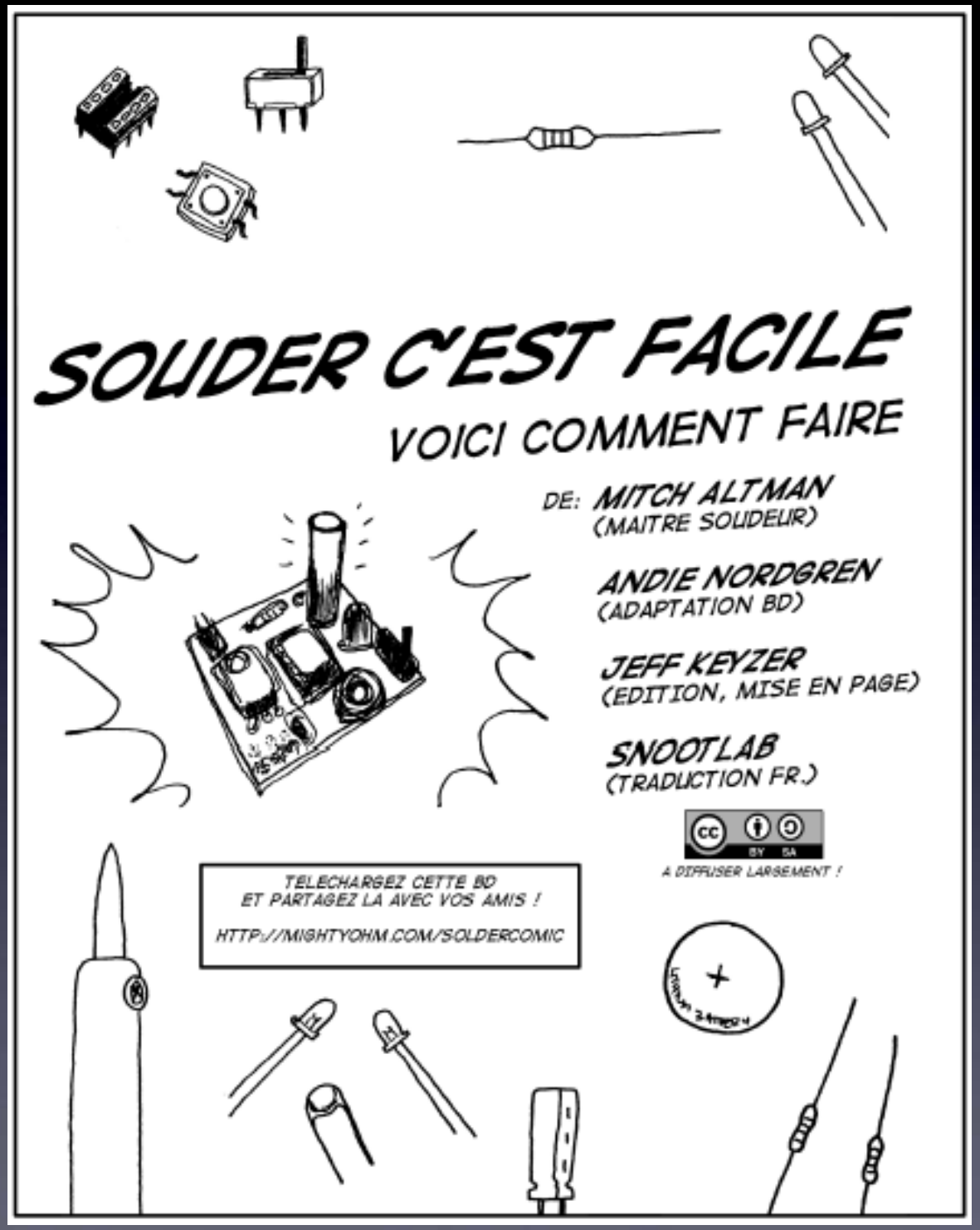
Learn To Solder



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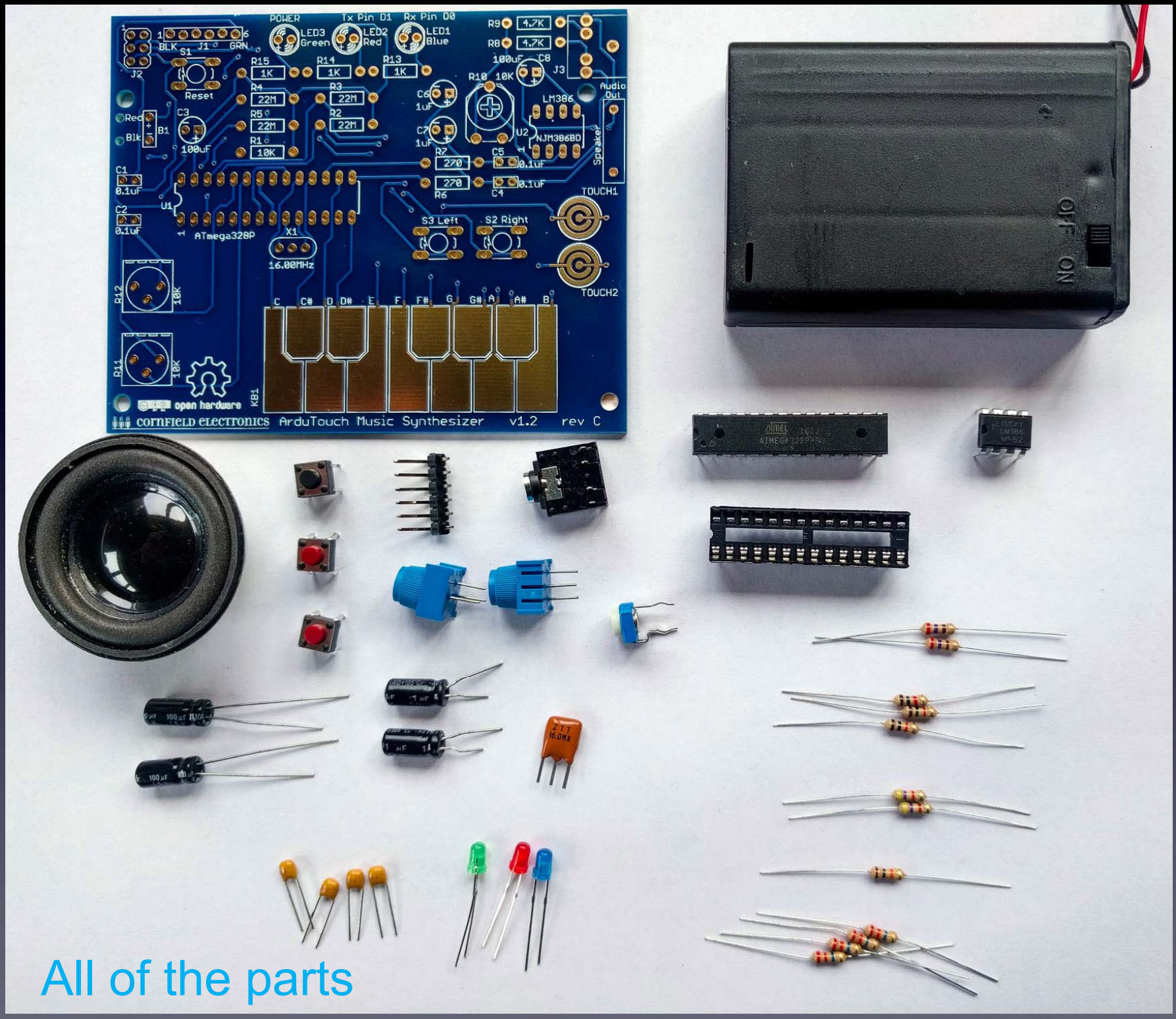
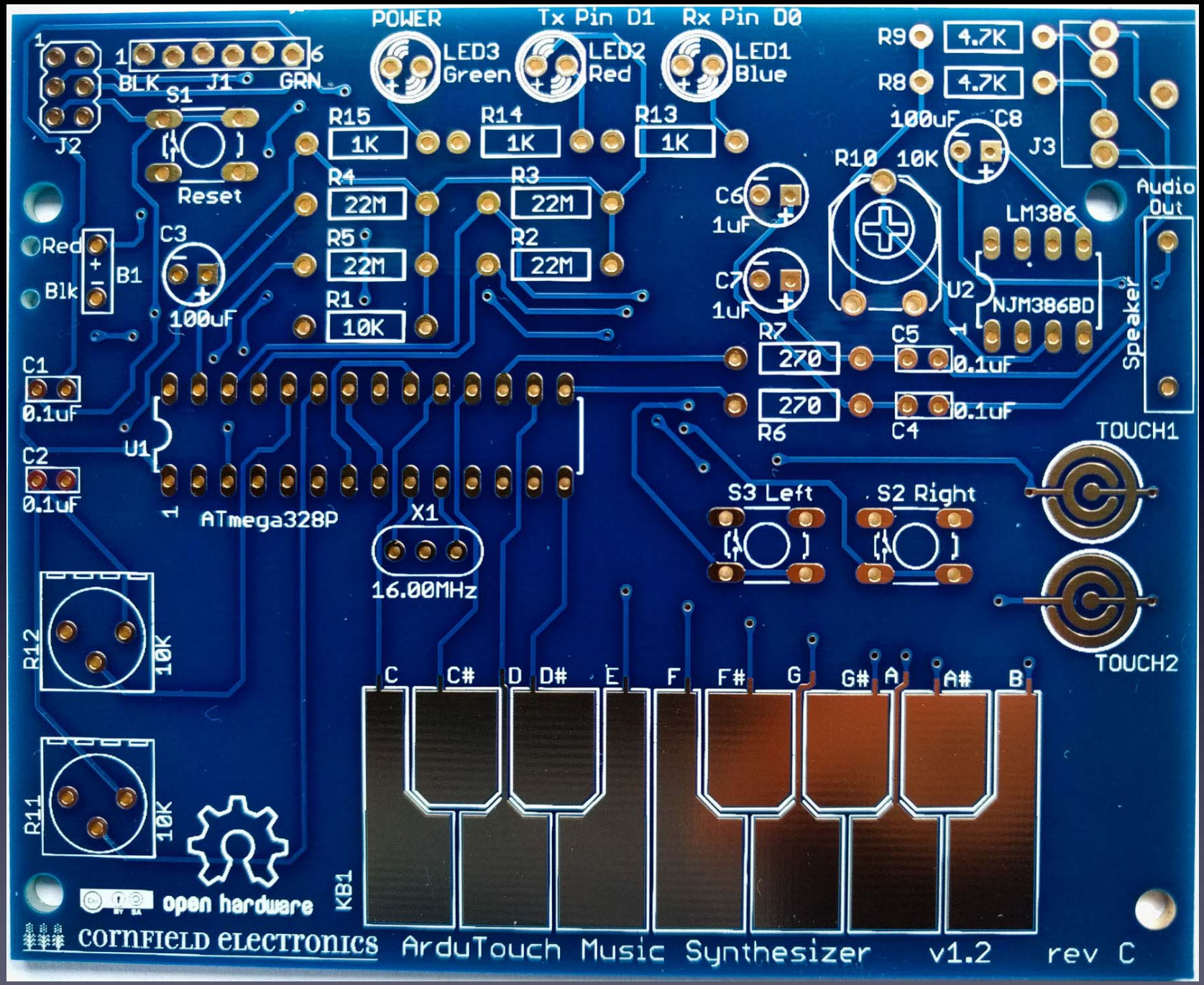
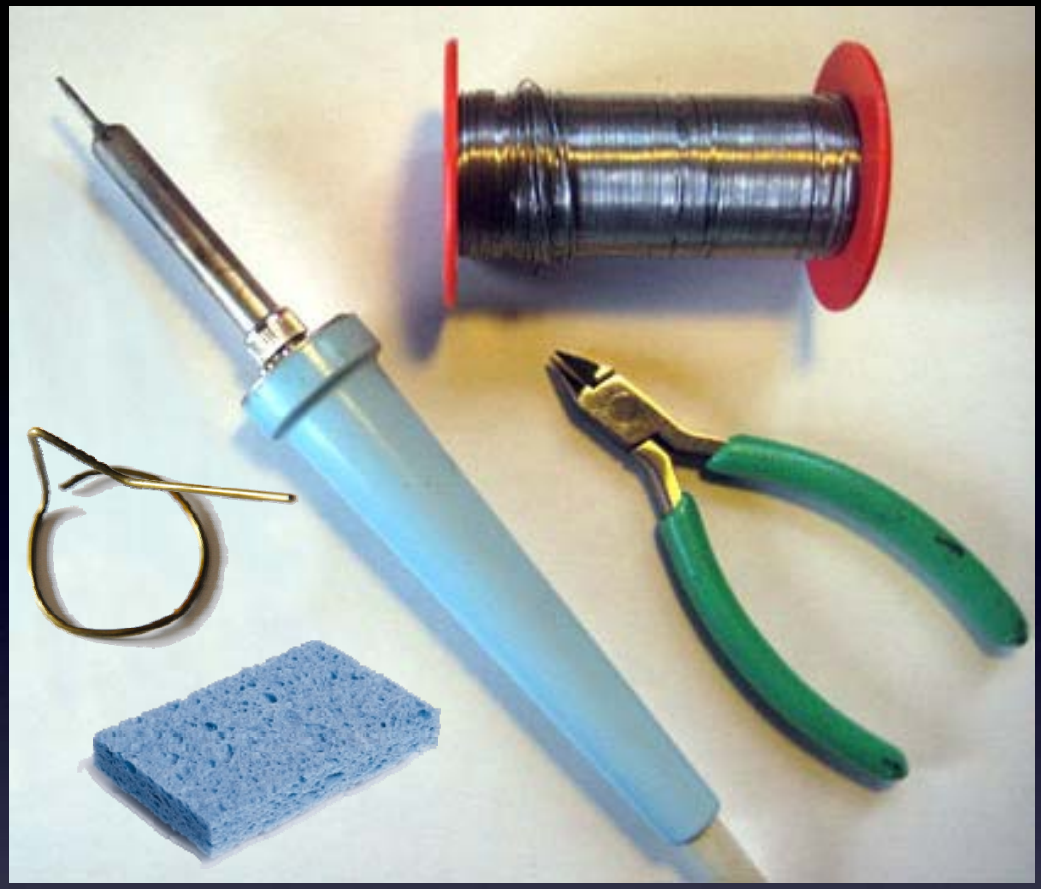

POWER
Tx Pin D1
Rx Pin D0
LED3 Green
LED2 Red
LED1 Blue
Reset
ATmega328P
16.00MHz
LM386
NJM386BD
TOUCH1
TOUCH2
S3 Left
S2 Right
Audio Out
Speaker
ON OFF
open hardware
CORNFIELD ELECTRONICS
ArduTouch Music Synthesizer v1.2 rev C
All of the parts



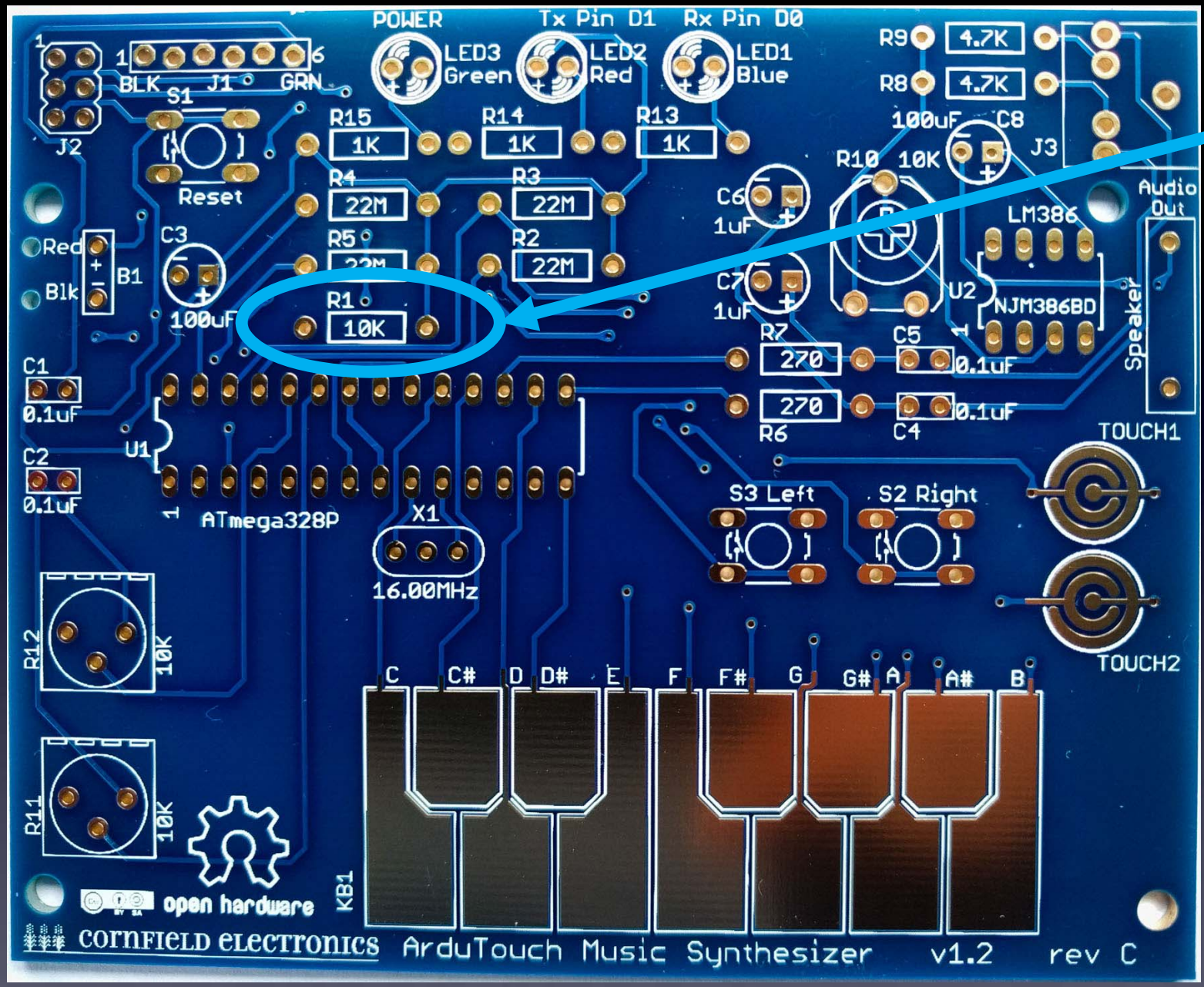
The board we'll solder the parts to



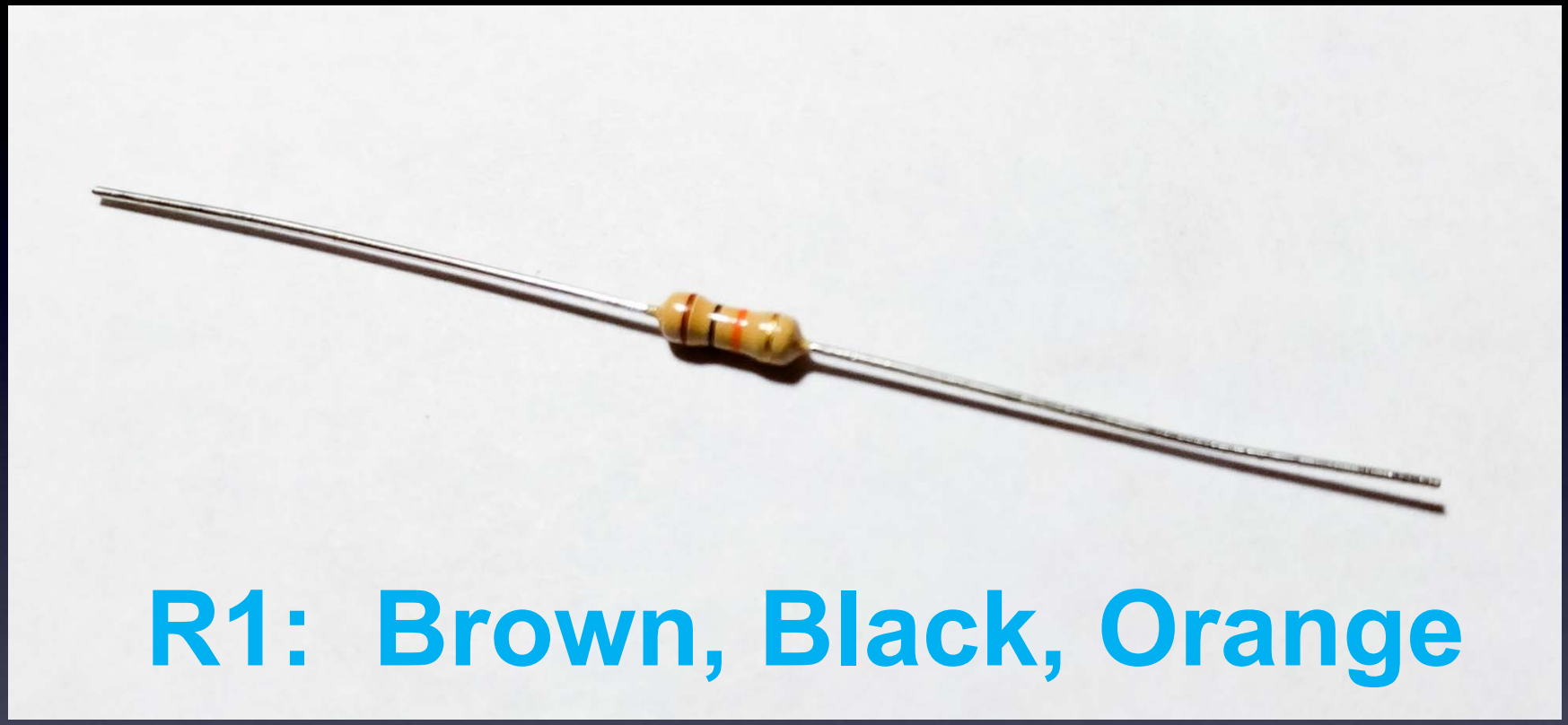
<u>Important</u>:
Use solder WITH lead (Pb) !!
Unleaded solder
has very poisonous fumes!

<u>The tools you'll need</u>:

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

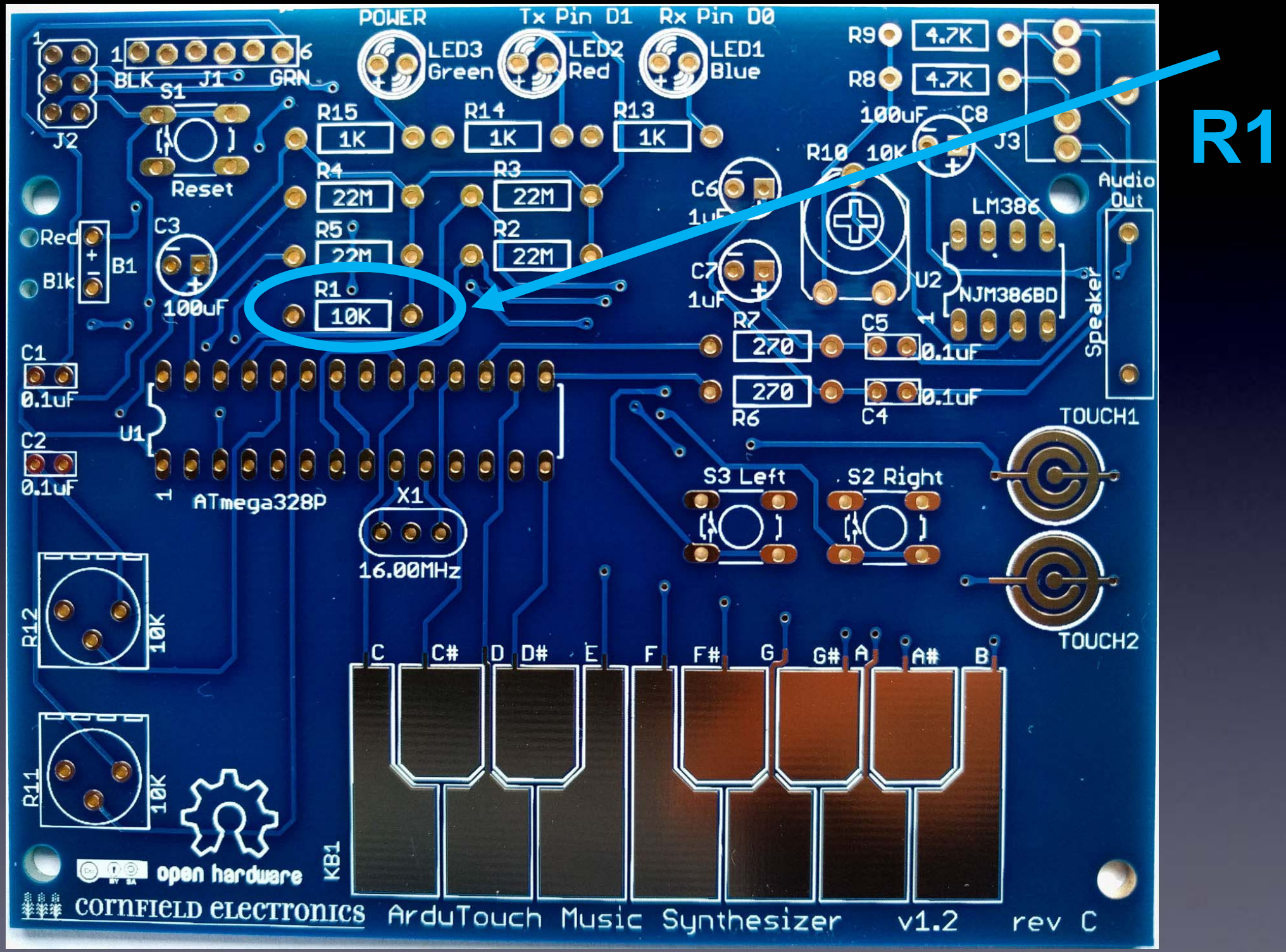


R1 – this is where it goes



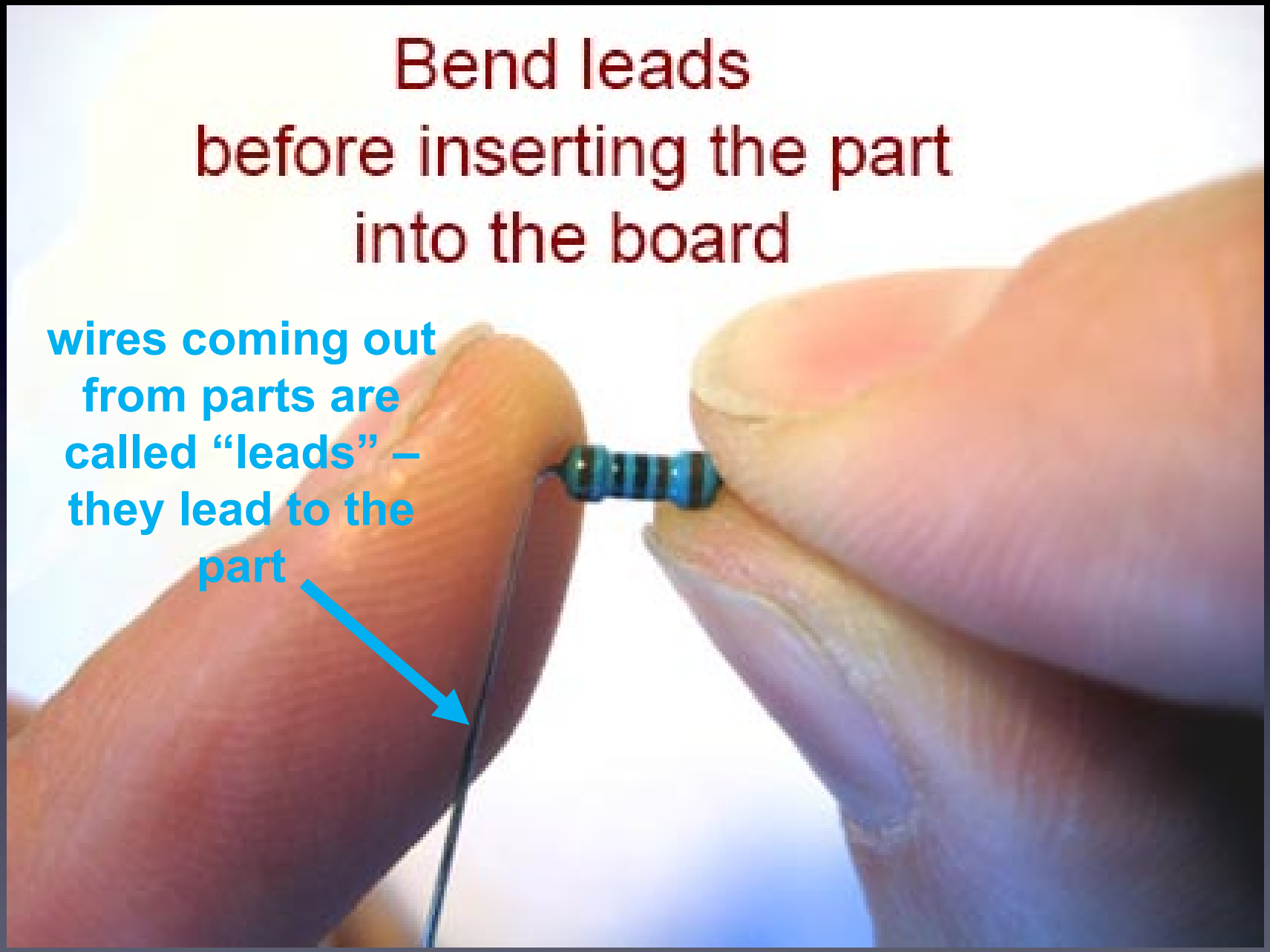
R1: Brown, Black, Orange

(*not* Brown, Black, Red)

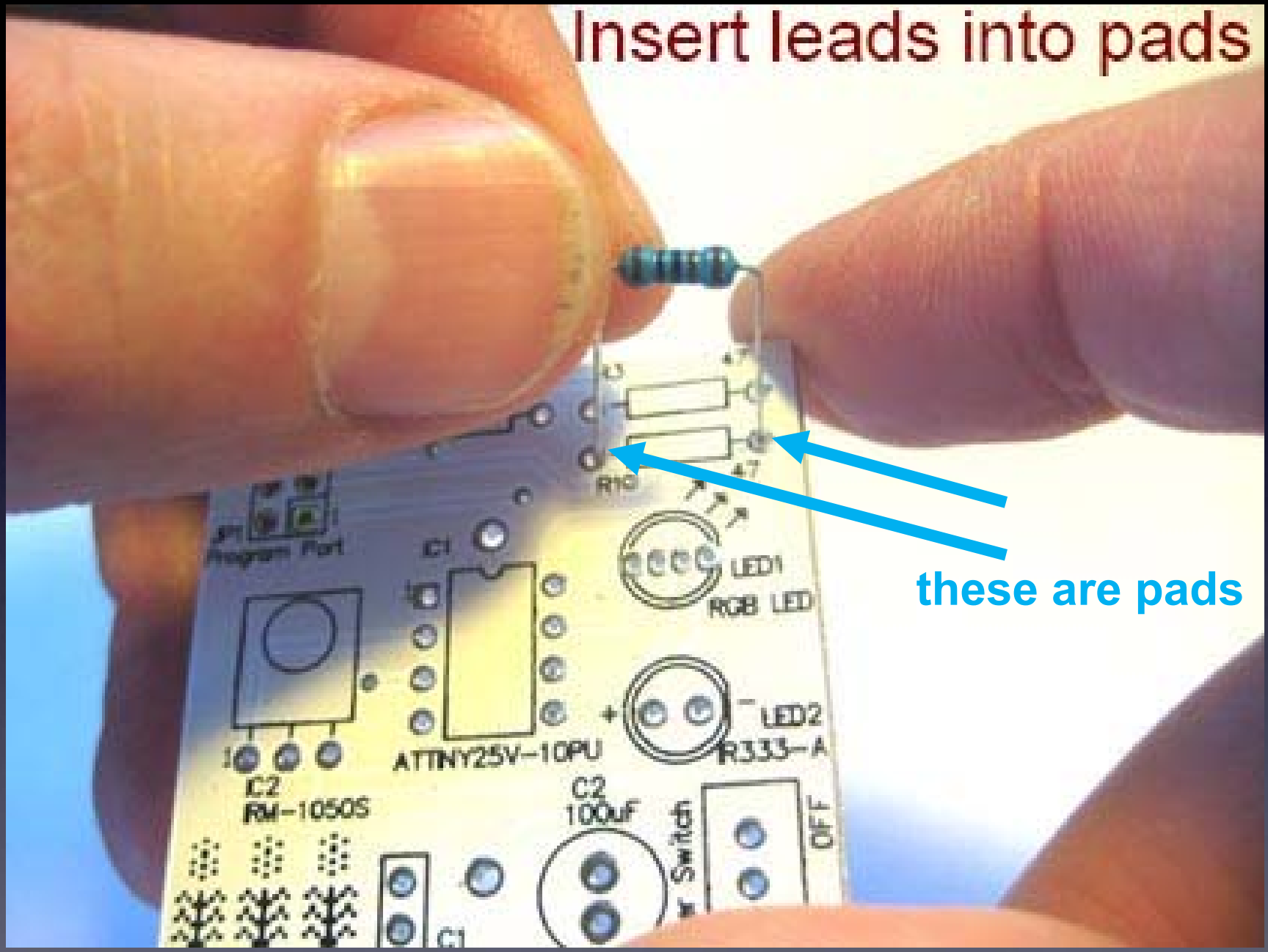

POWER
Tx Pin D1
Rx Pin D0
LED3 Green
LED2 Red
LED1 Blue
R9 4.7K
R8 4.7K
100uF C8
R10 10K
J3
J2
J1
BLK
GRN
S1
Reset
R15 1K
R14 1K
R13 1K
R4 22M
R3 22M
R5 22M
R2 22M
R1 10K
C6 1uF
C7 1uF
U2
LM386
NJM386BD
Audio Out
Speaker
Red
Blk
B1
C3 100uF
R7 270
R6 270
C5 0.1uF
C4 0.1uF
C1 0.1uF
C2 0.1uF
U1
ATmega328P
X1
16.00MHz
S3 Left
S2 Right
TOUCH1
TOUCH2
R12 10K
R11 10K
C C# D D# E F F# G G# A A# B
KB1
open hardware
CORNFIELD ELECTRONICS
ArduTouch Music Synthesizer v1.2 rev C

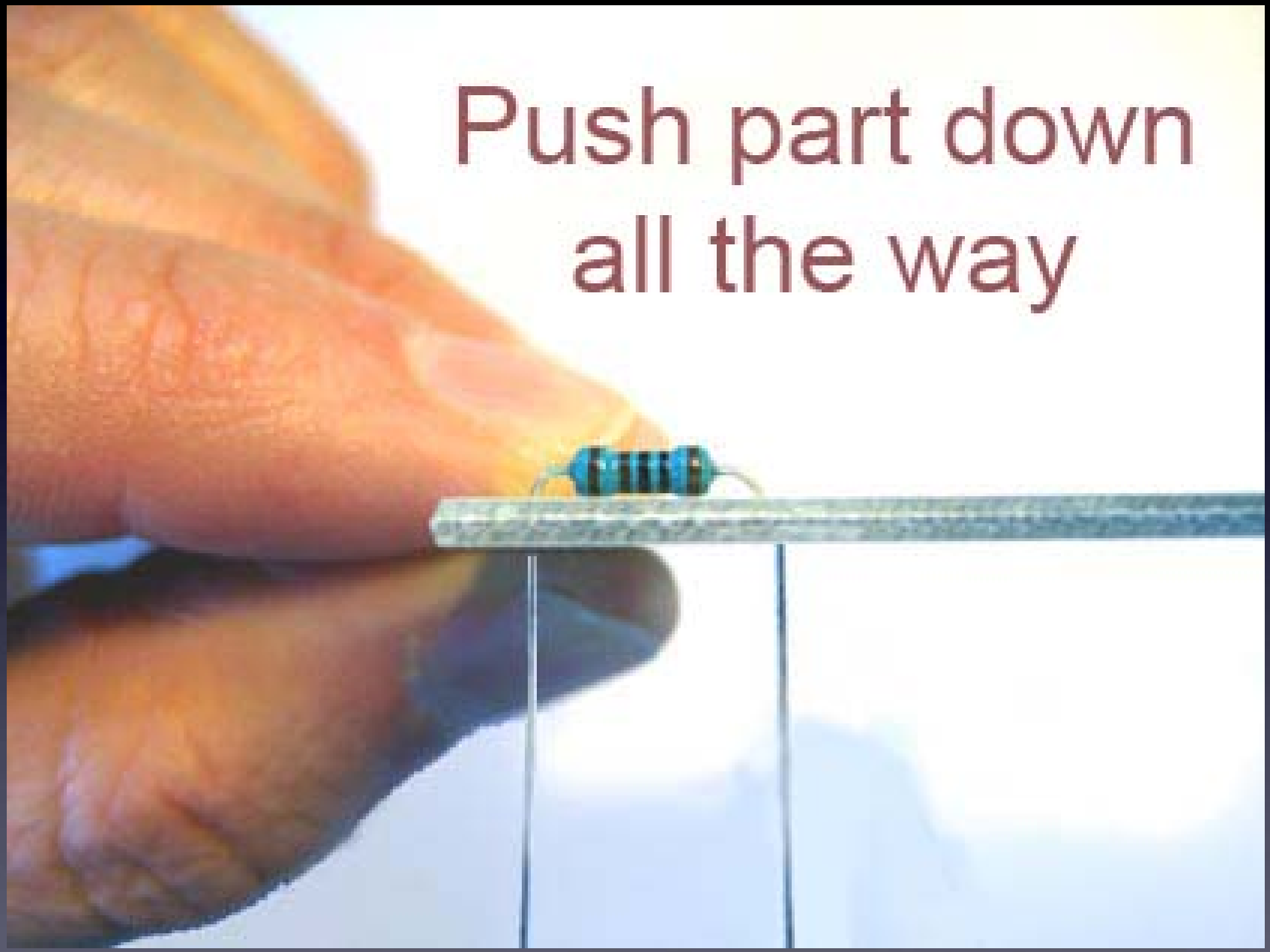
R1

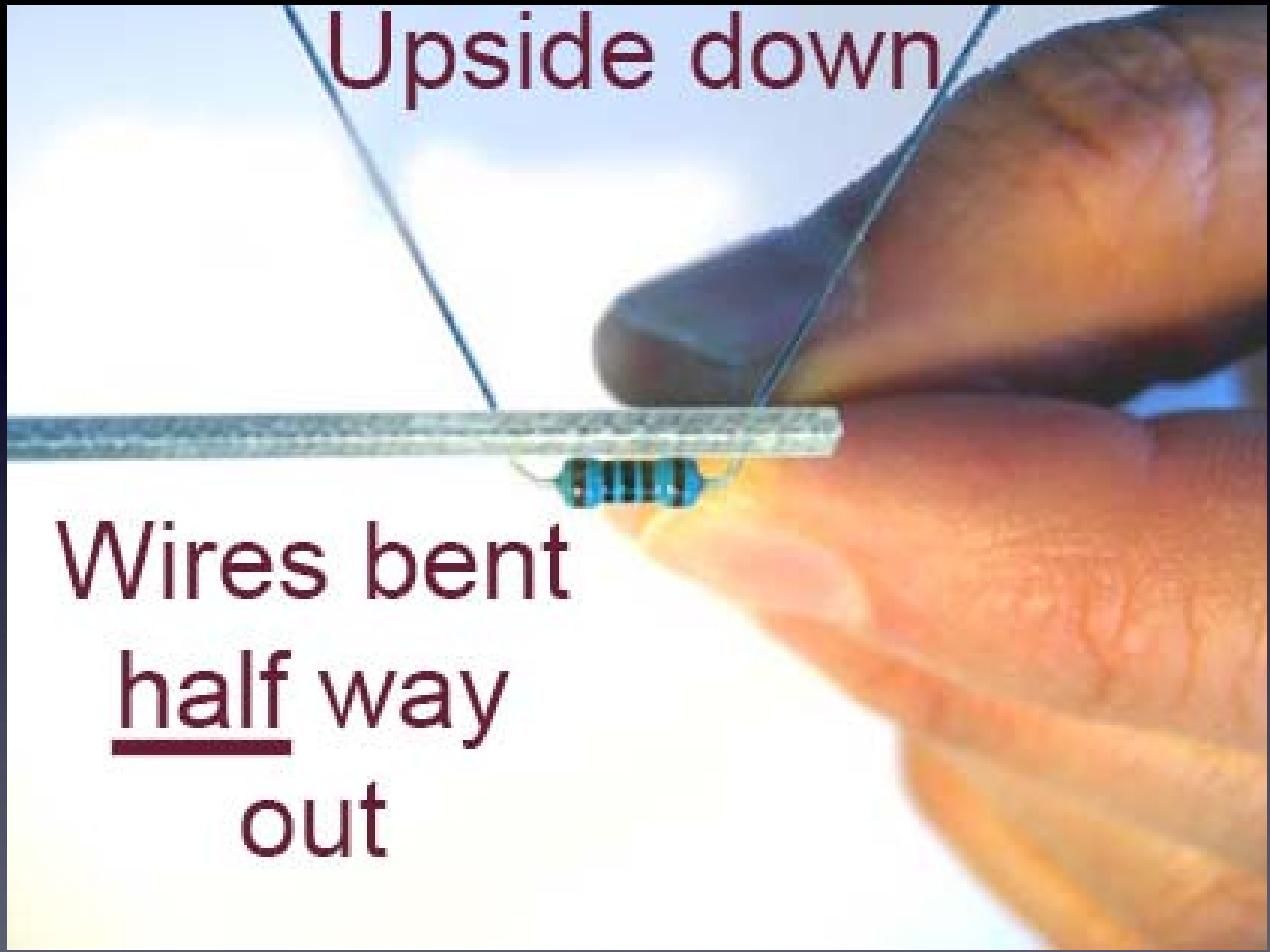
Bend leads before inserting the part into the board

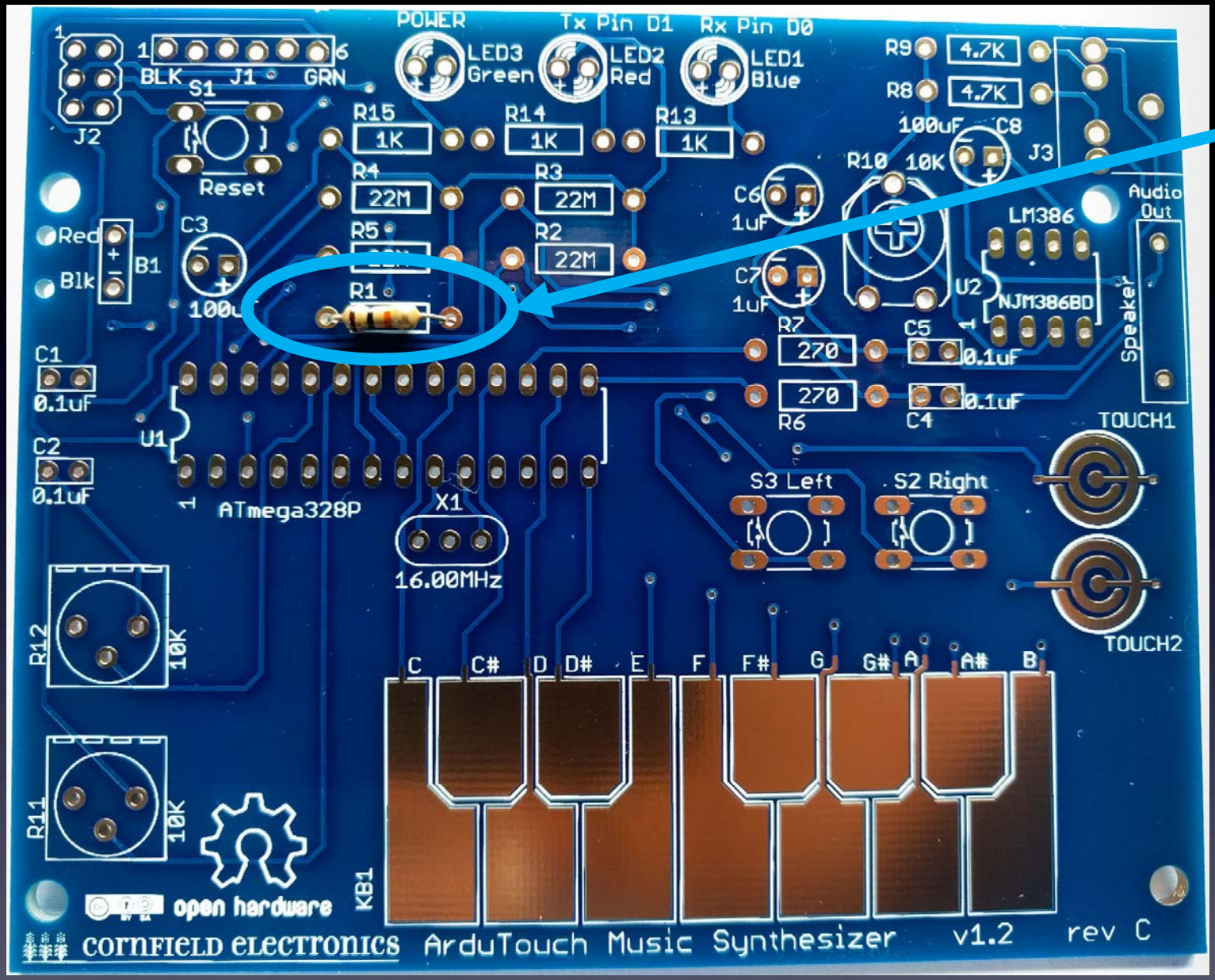


R1 – this is how it will look before inserting it into the board


Insert leads into pads
these are pads
R10
LED1
RGB LED
IC1
ATTINY25V-10PU
LED2
IC2
RM-1050S
C2
100uF
Switch
OFF


Push part down
all the way


Upside down
Wires bent
half way
out



R1 – inserted into the board

How to hold a soldering iron

(Like a pencil – held from underneath)

The perfect kind of solder for electronics:

60/40 rosin core,

0.031” diameter (or smaller)

Important:

Use solder WITH lead (Pb) !!
Unleaded solder
has very poisonous fumes!

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)

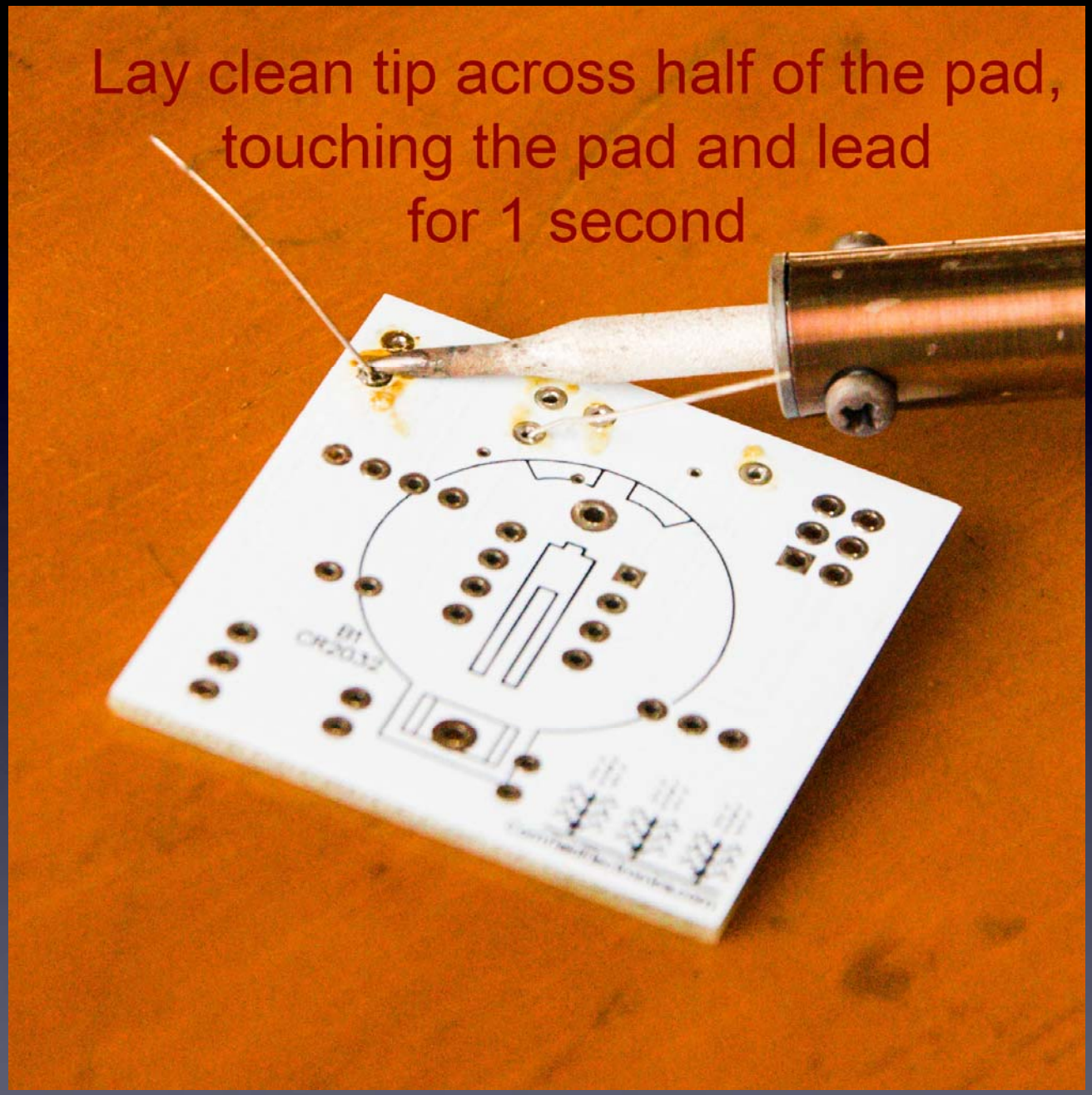
2 secrets
to good soldering…

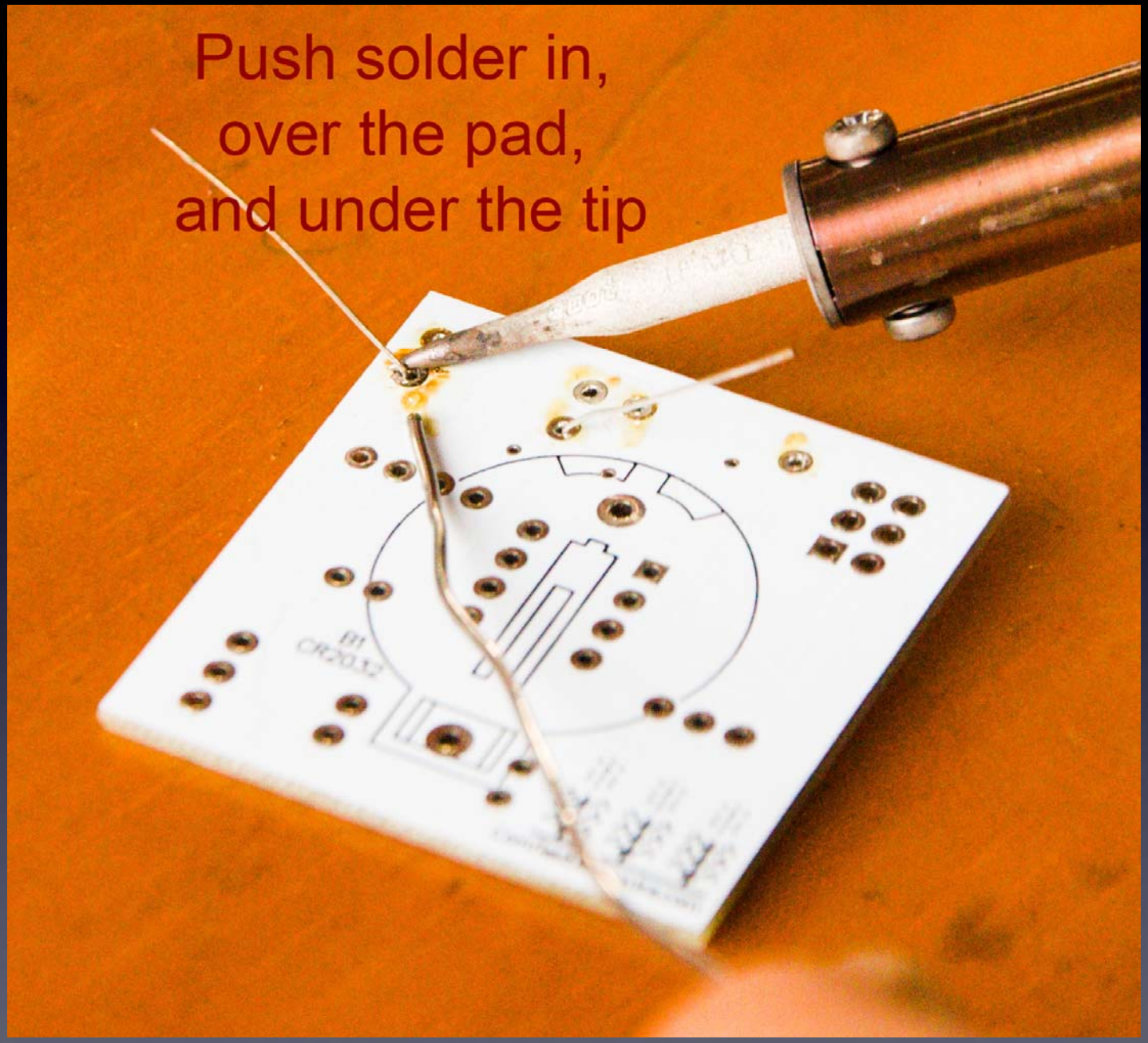
Secret #1:

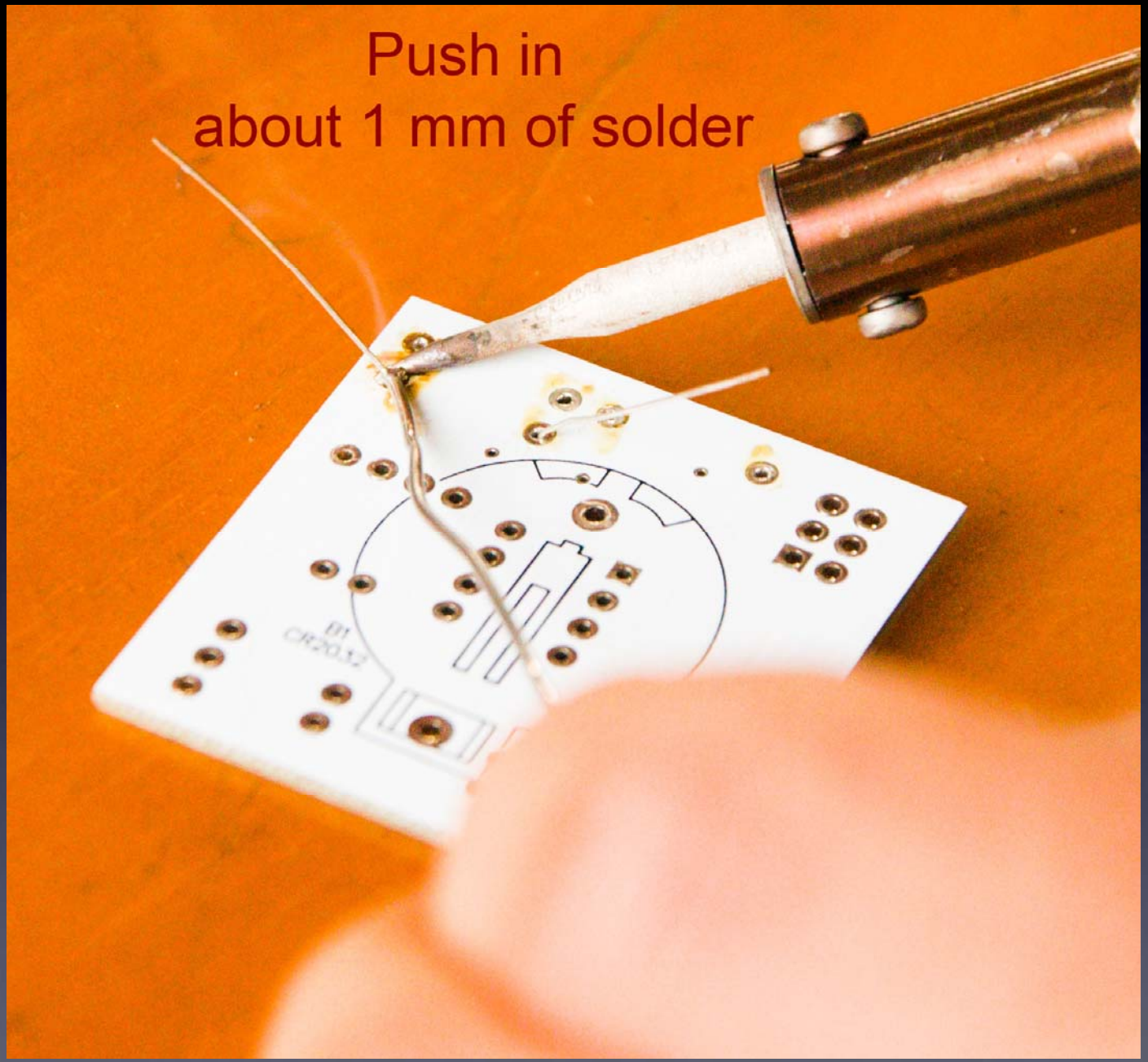
Clean the tip!

(before every solder connection)

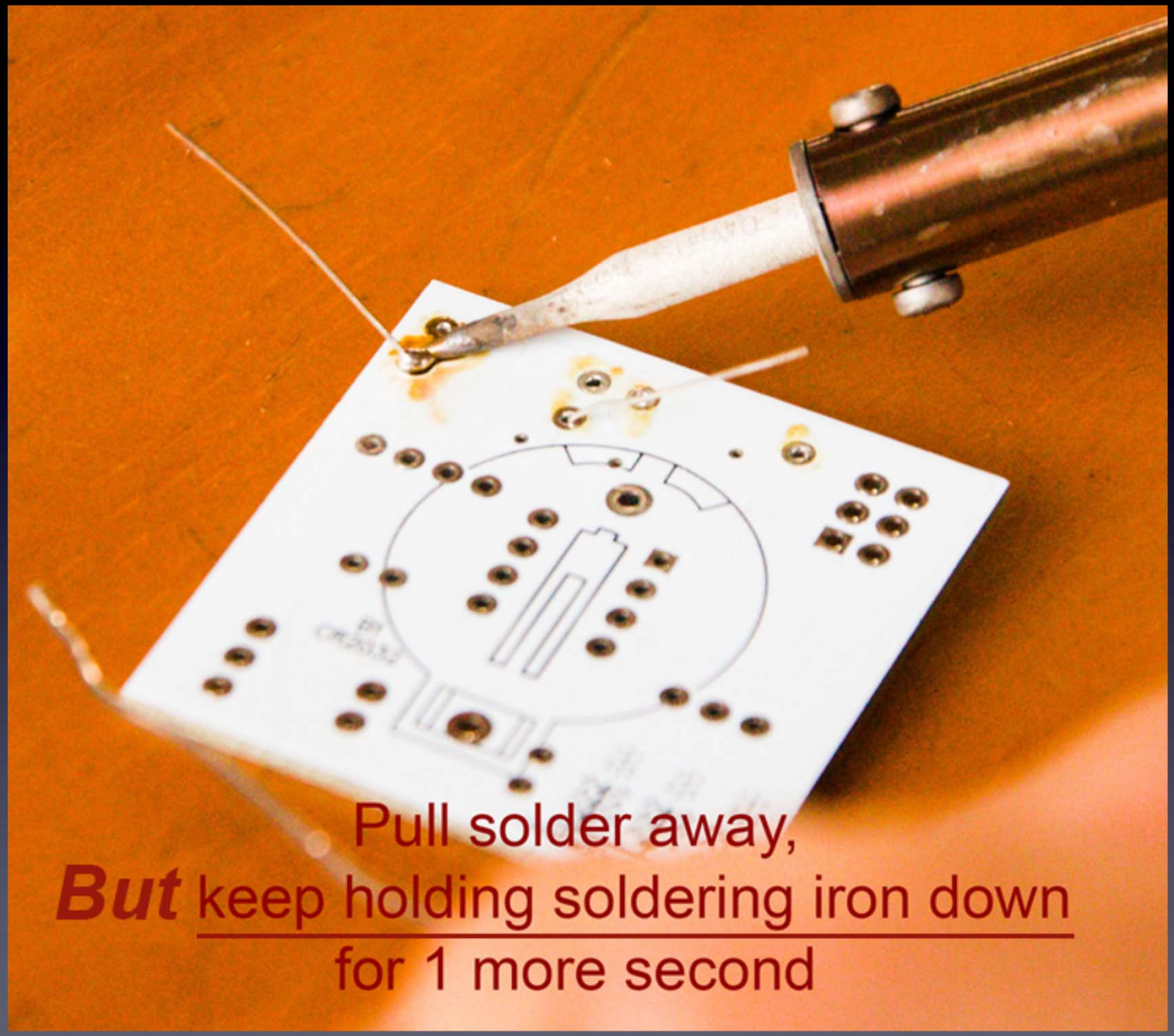
Bang (lightly) 3 times,
Swipe, Rotate, Swipe:
Keep the tip shiny silver!


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


Push solder in,
over the pad,
and under the tip

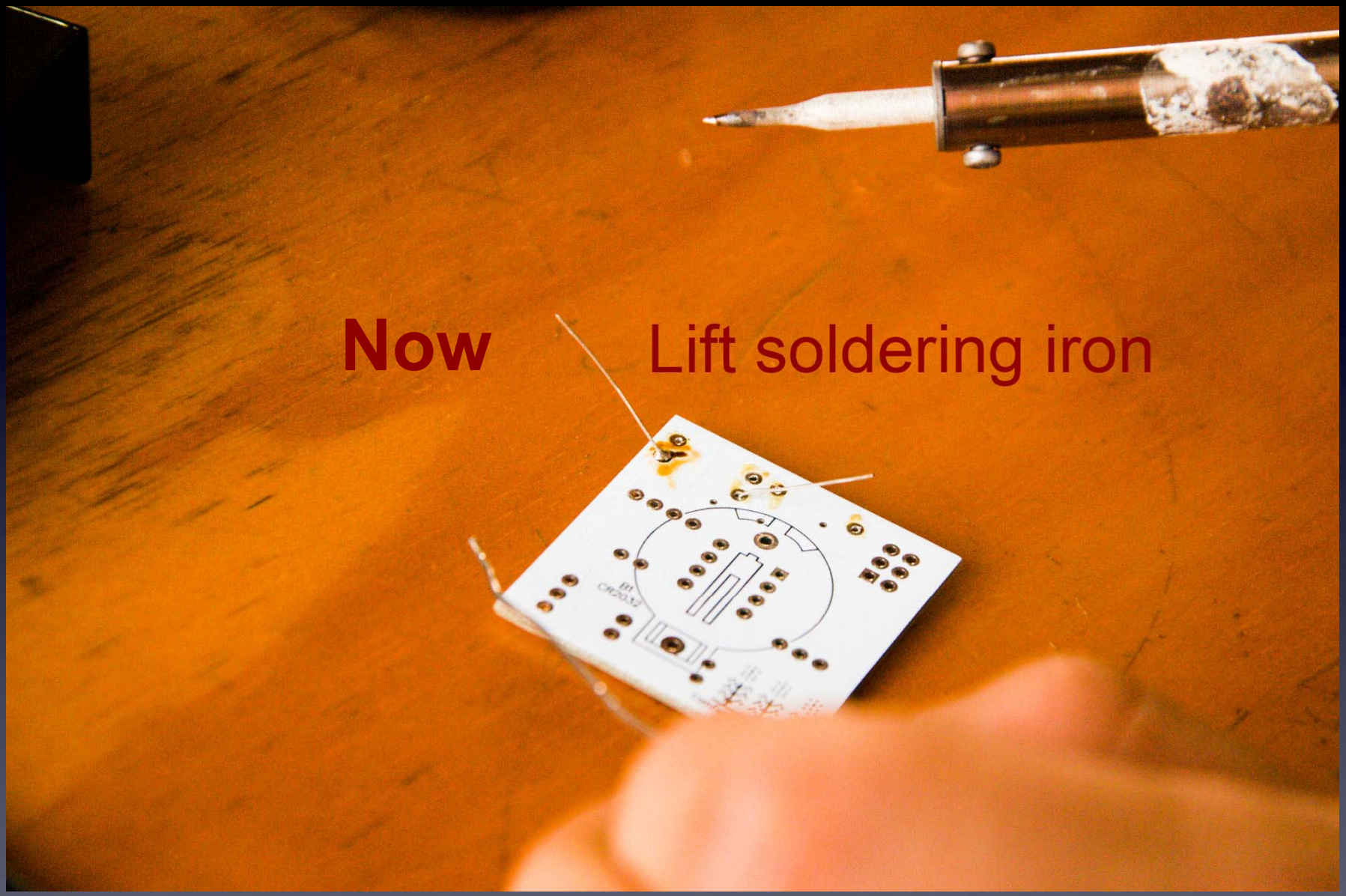


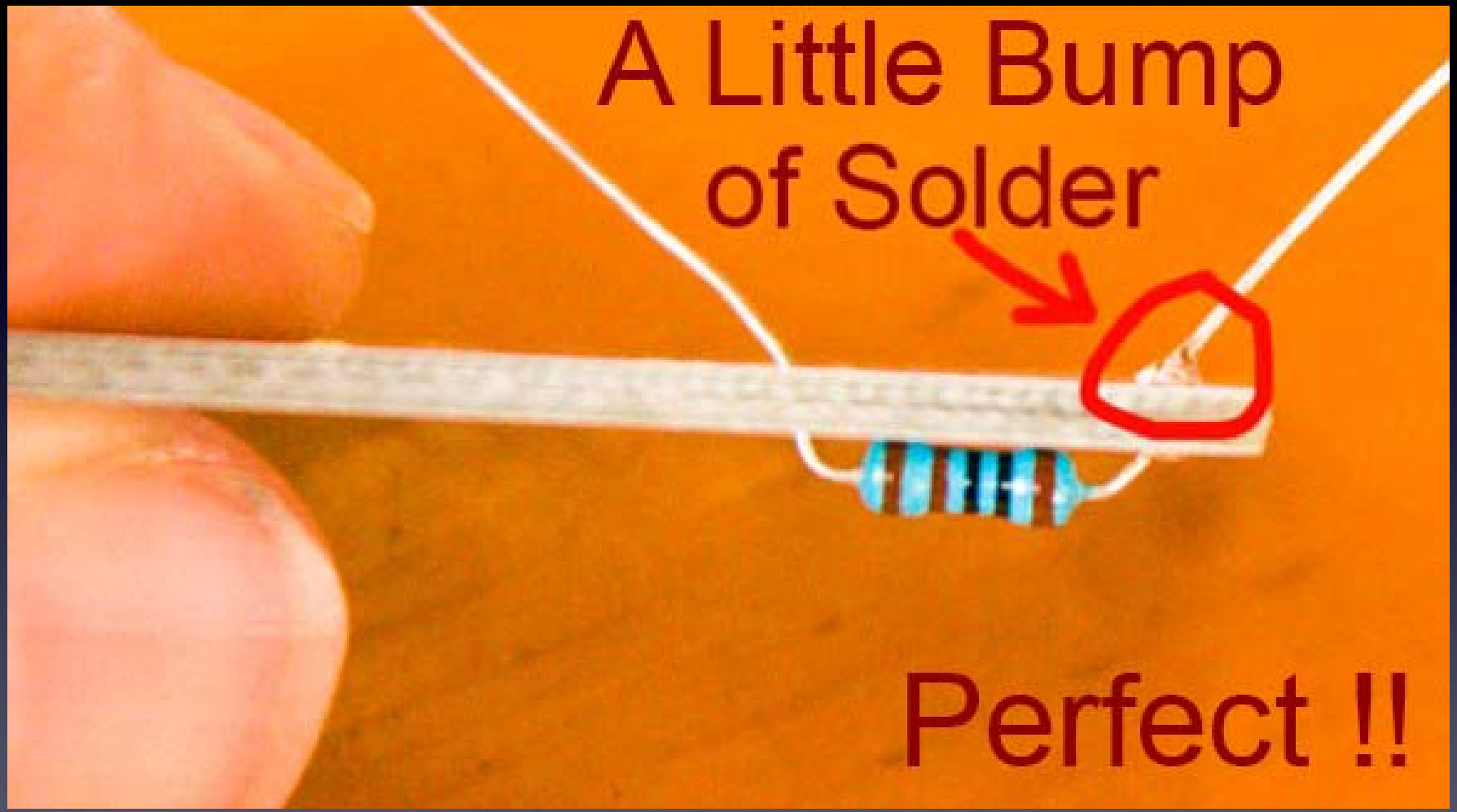
Make sure solder melts on the underside of the soldering iron
(not the side or top of the soldering iron tip)!


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

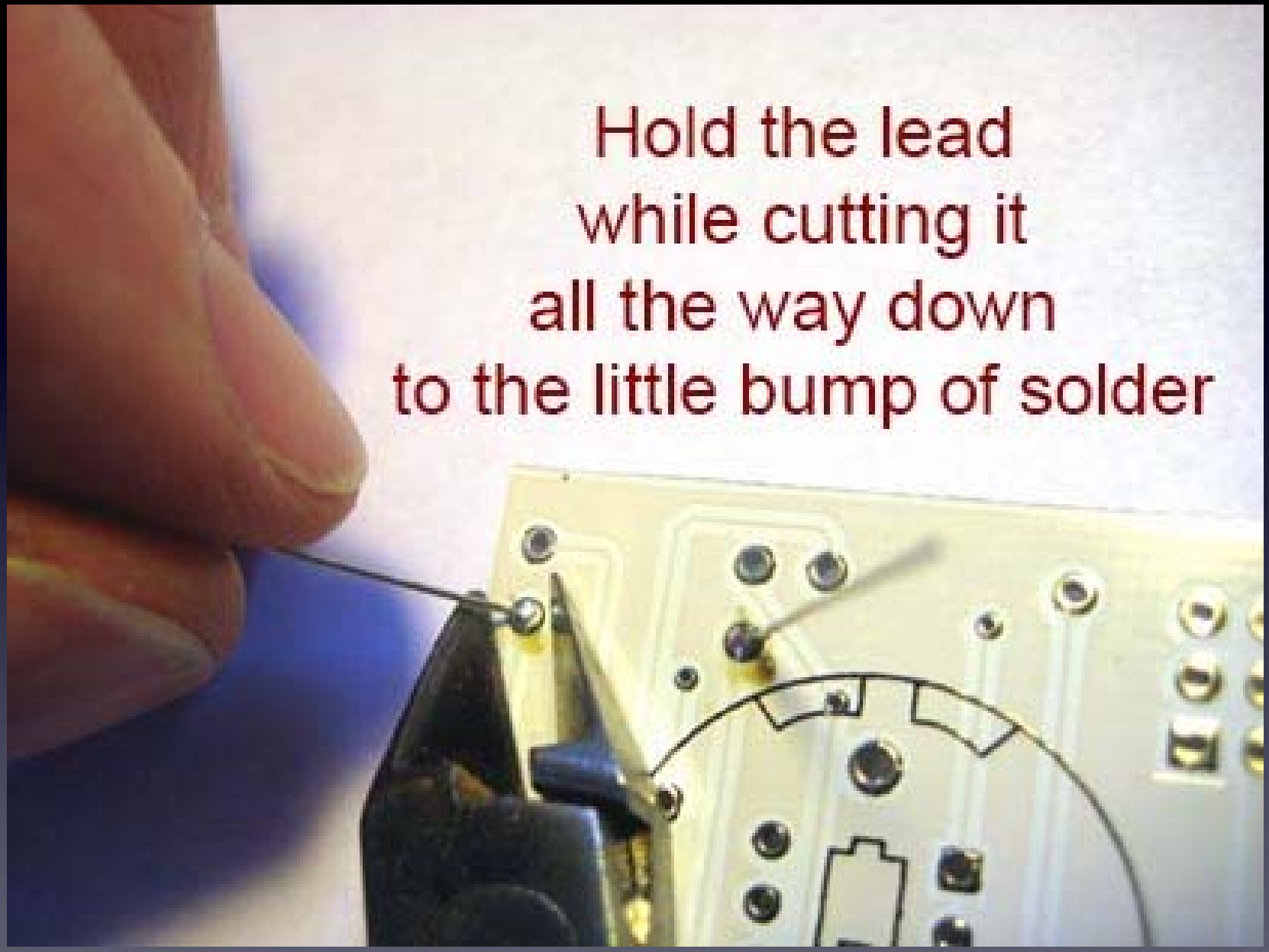
Secret #2:

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


Now
Lift soldering iron



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.



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!)

No wire sticking out

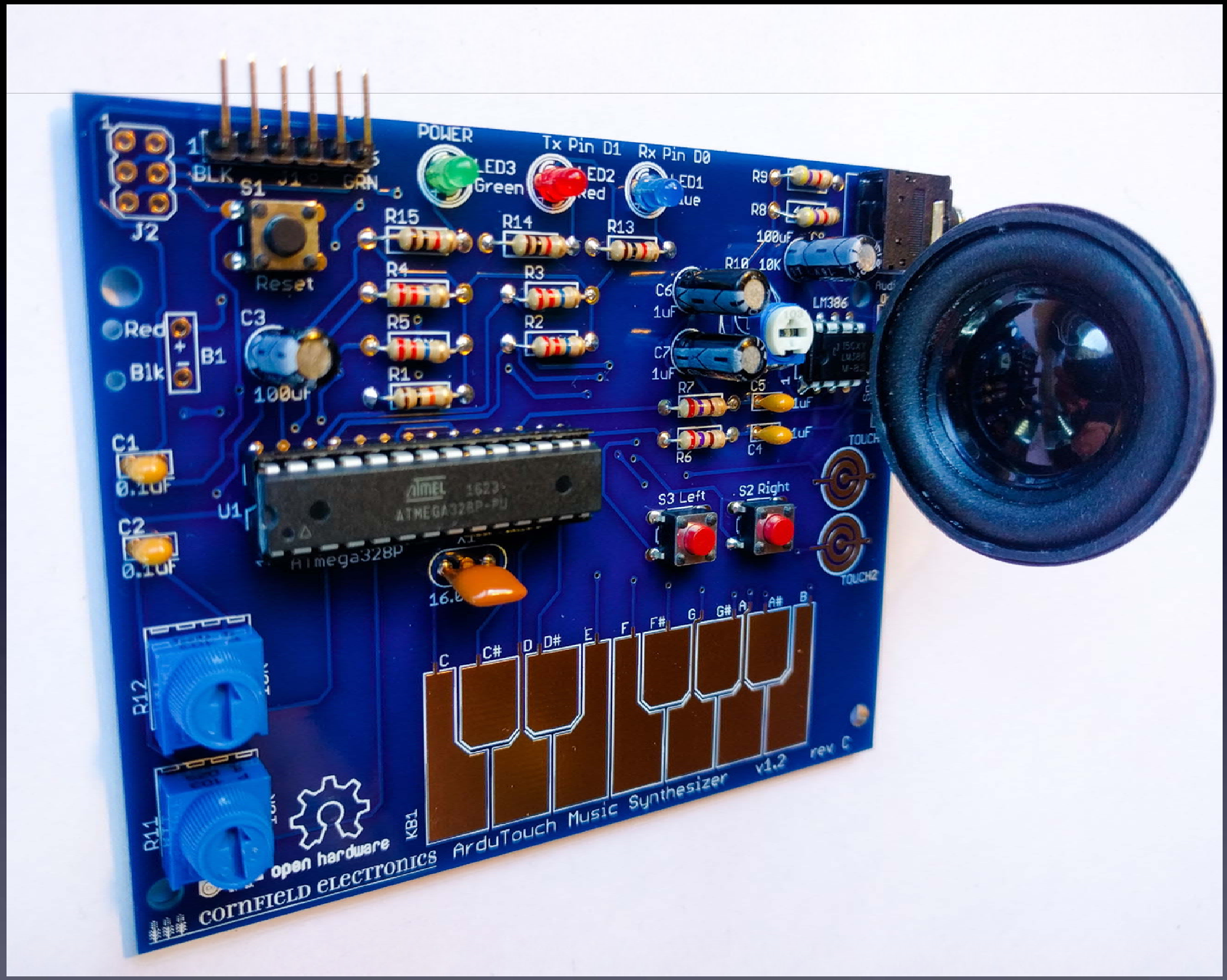
R1 soldered to the board

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)

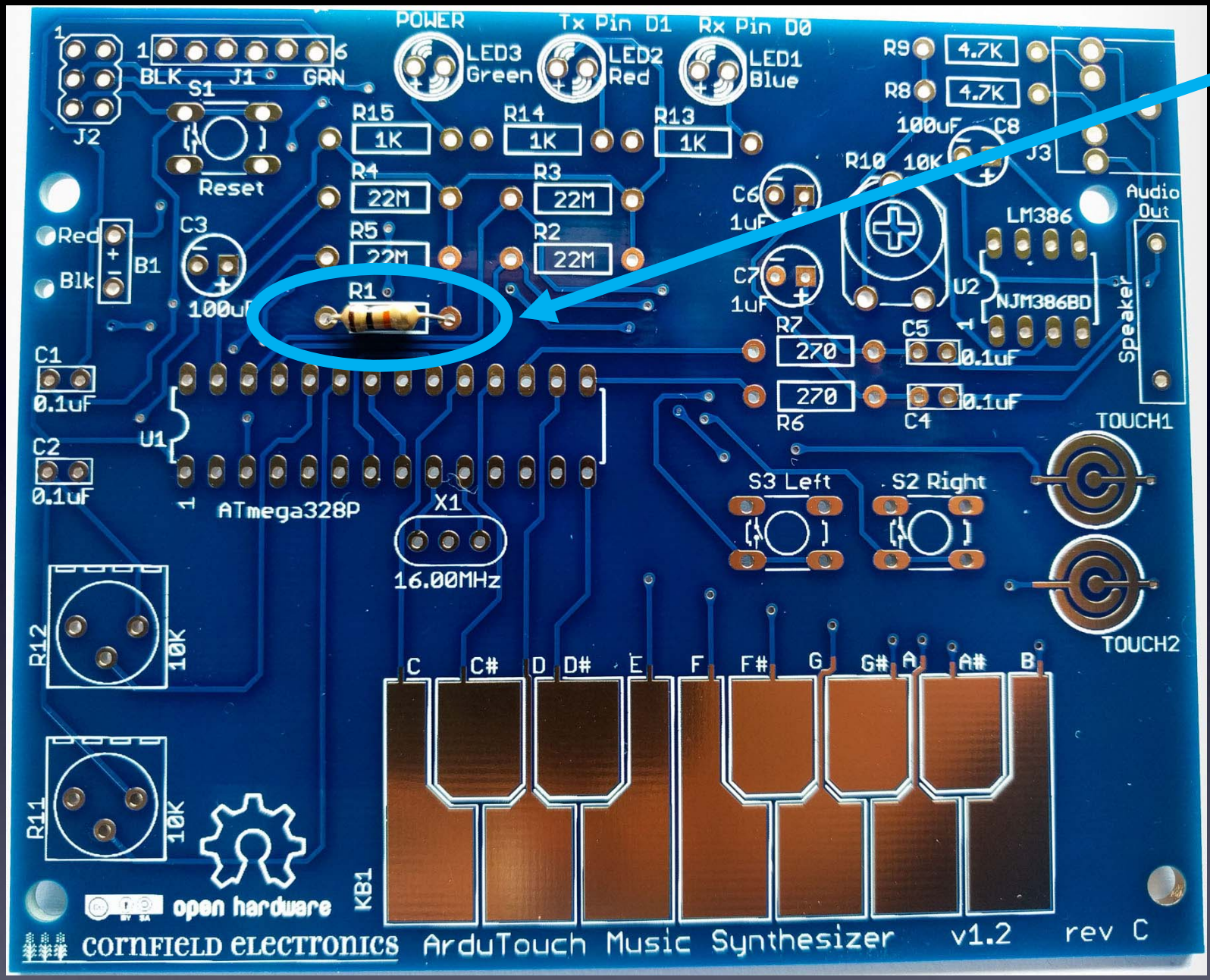
One part at a time

Till all the parts are soldered



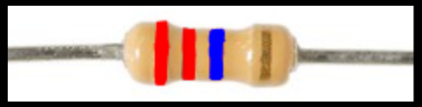
And it will look like this when you're done.

Let’s start!



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

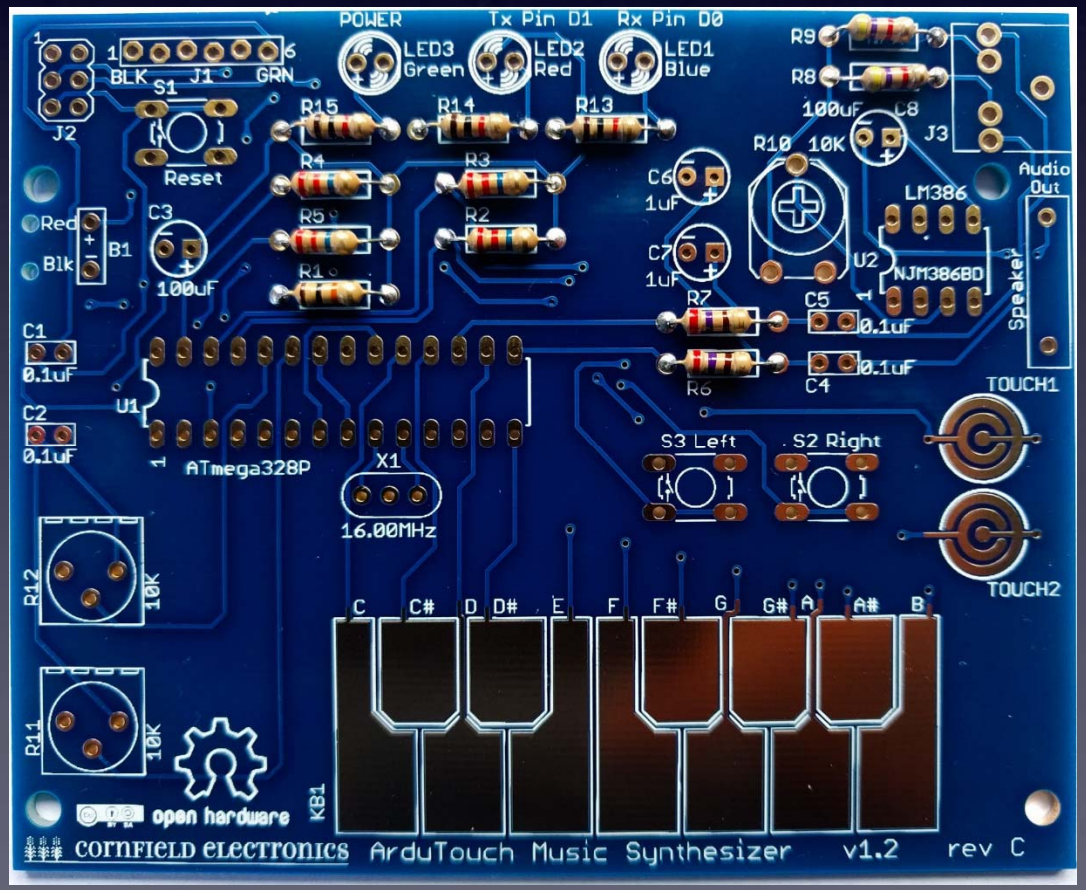
R1:  10K: Brown, Black, Orange

R2, R3, R4, R5:  22M: Red, Red, Blue

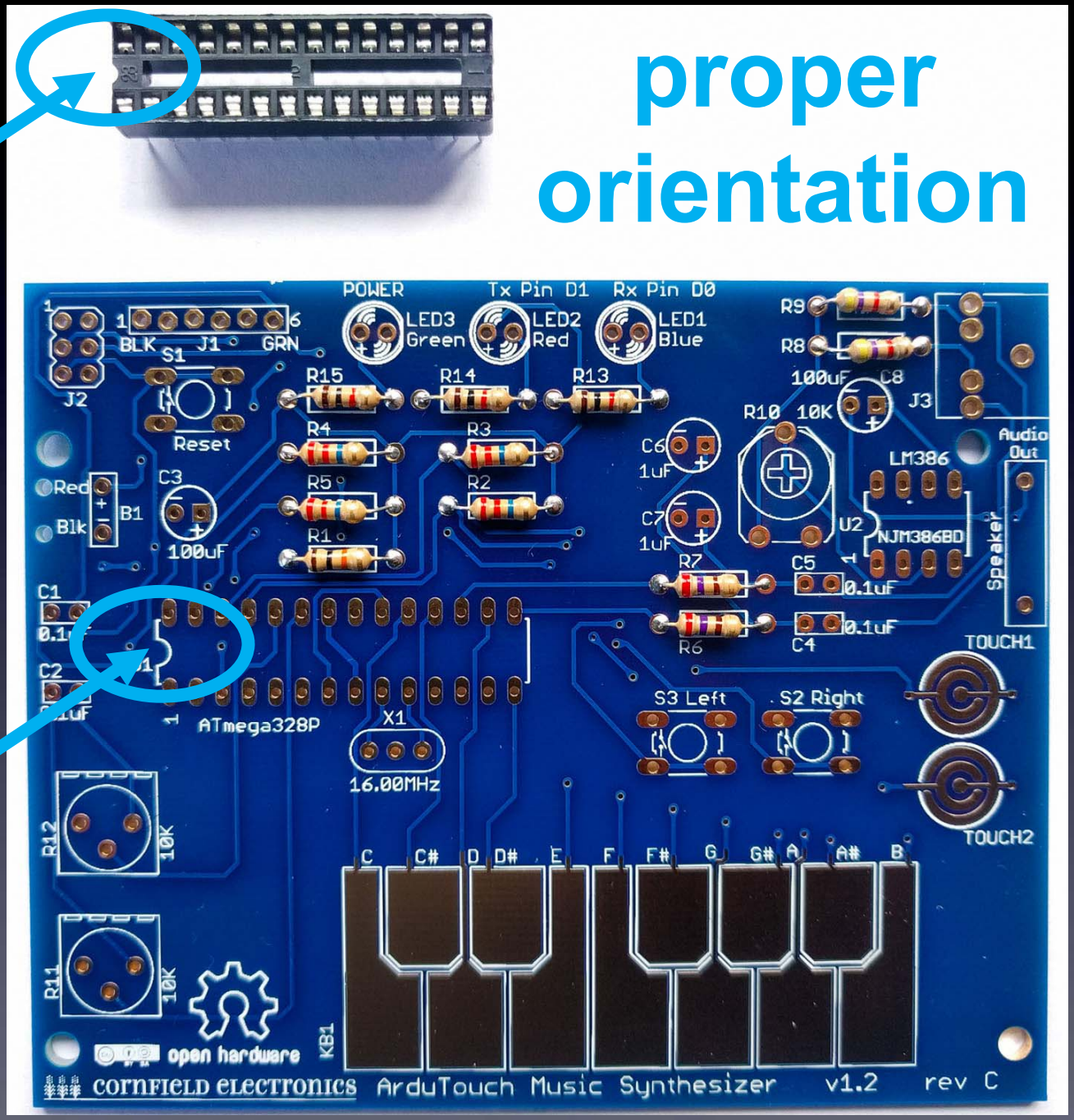
R6, R7:  270: Red, Violet, Brown

R8, R9:  4.7K: Yellow, Violet, Red

R13, R14, R15:  1K: Brown, Black, Red

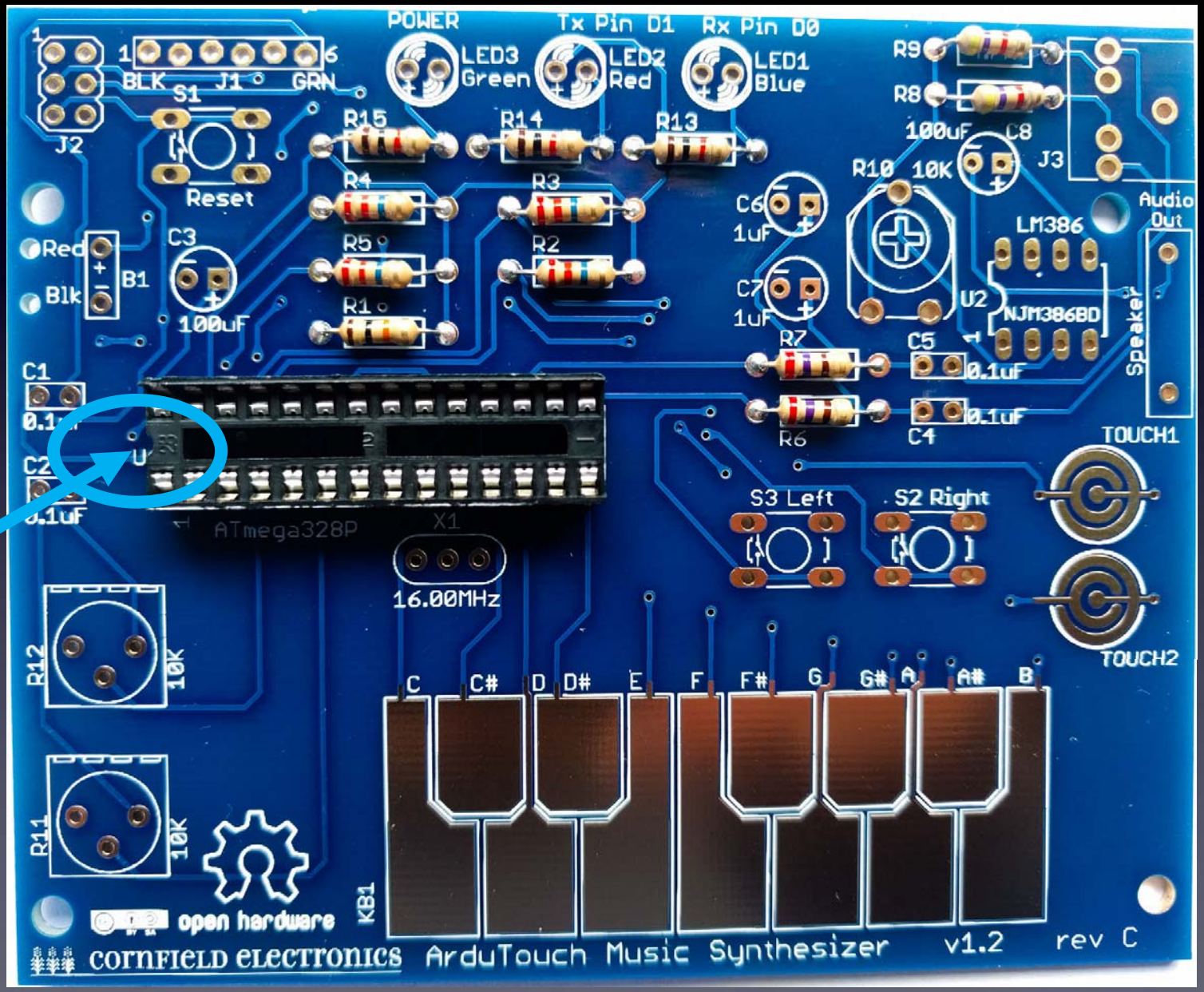


U1: microcontroller socket

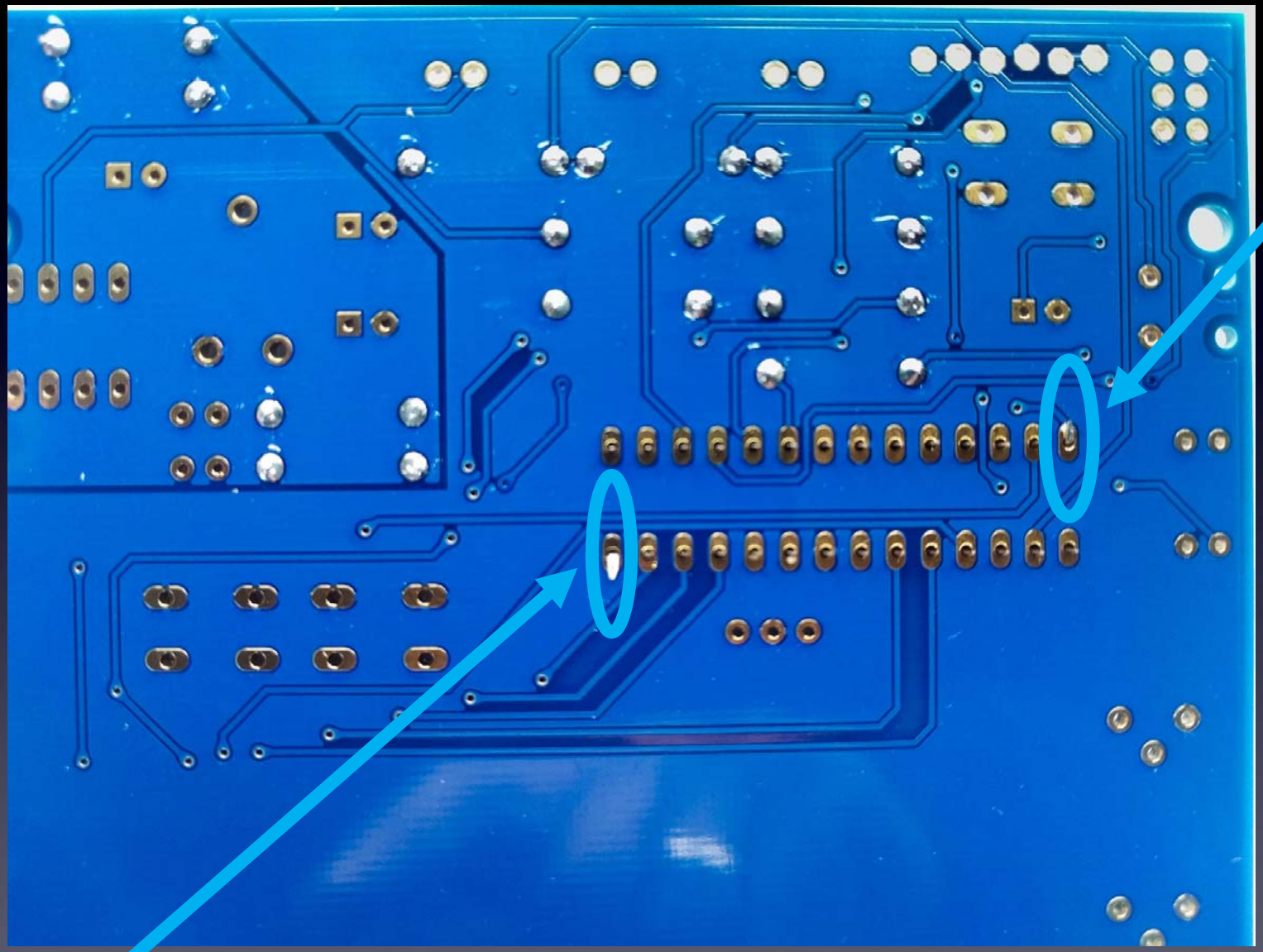


U1: microcontroller socket:

inserted correctly

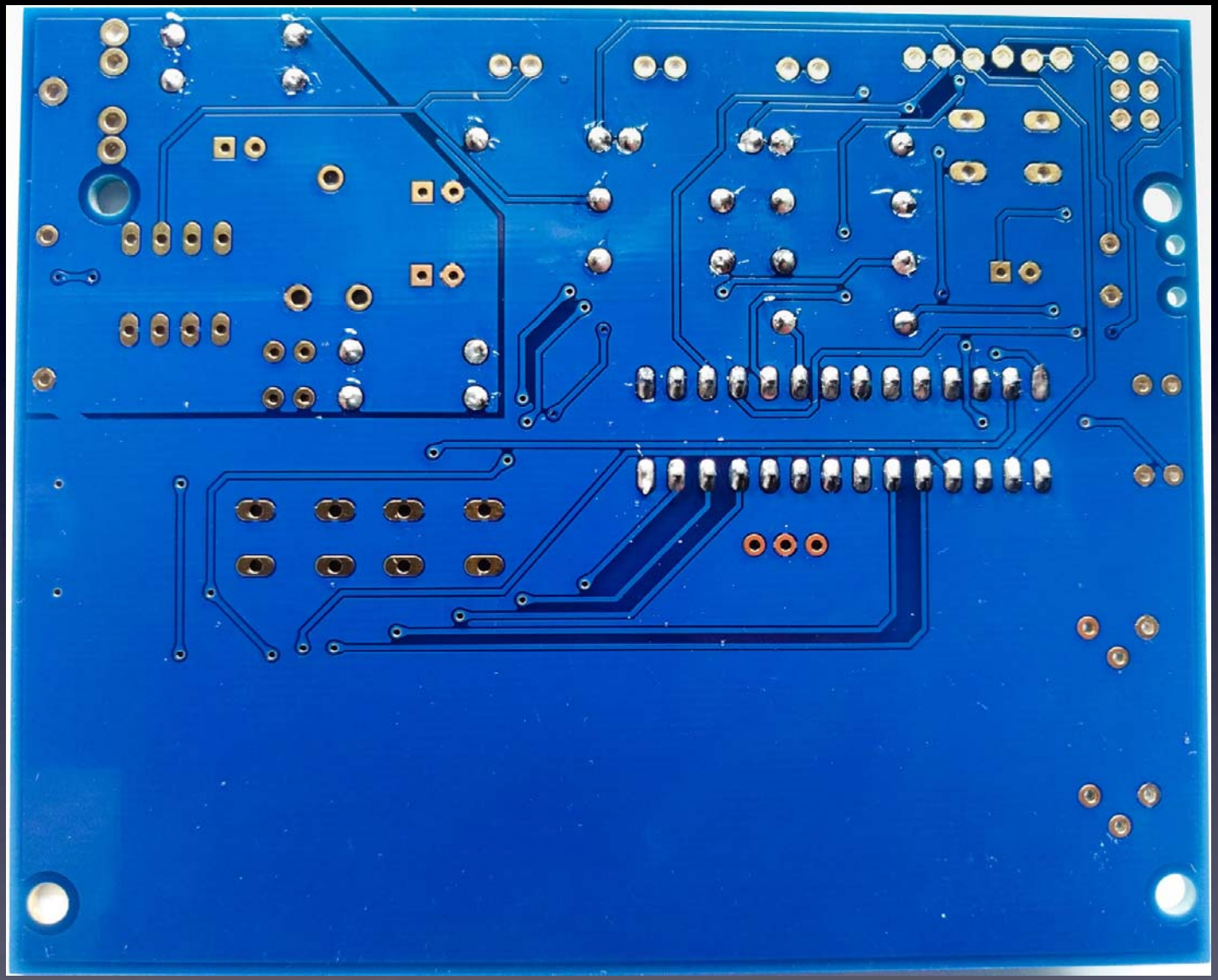


U1: microcontroller socket



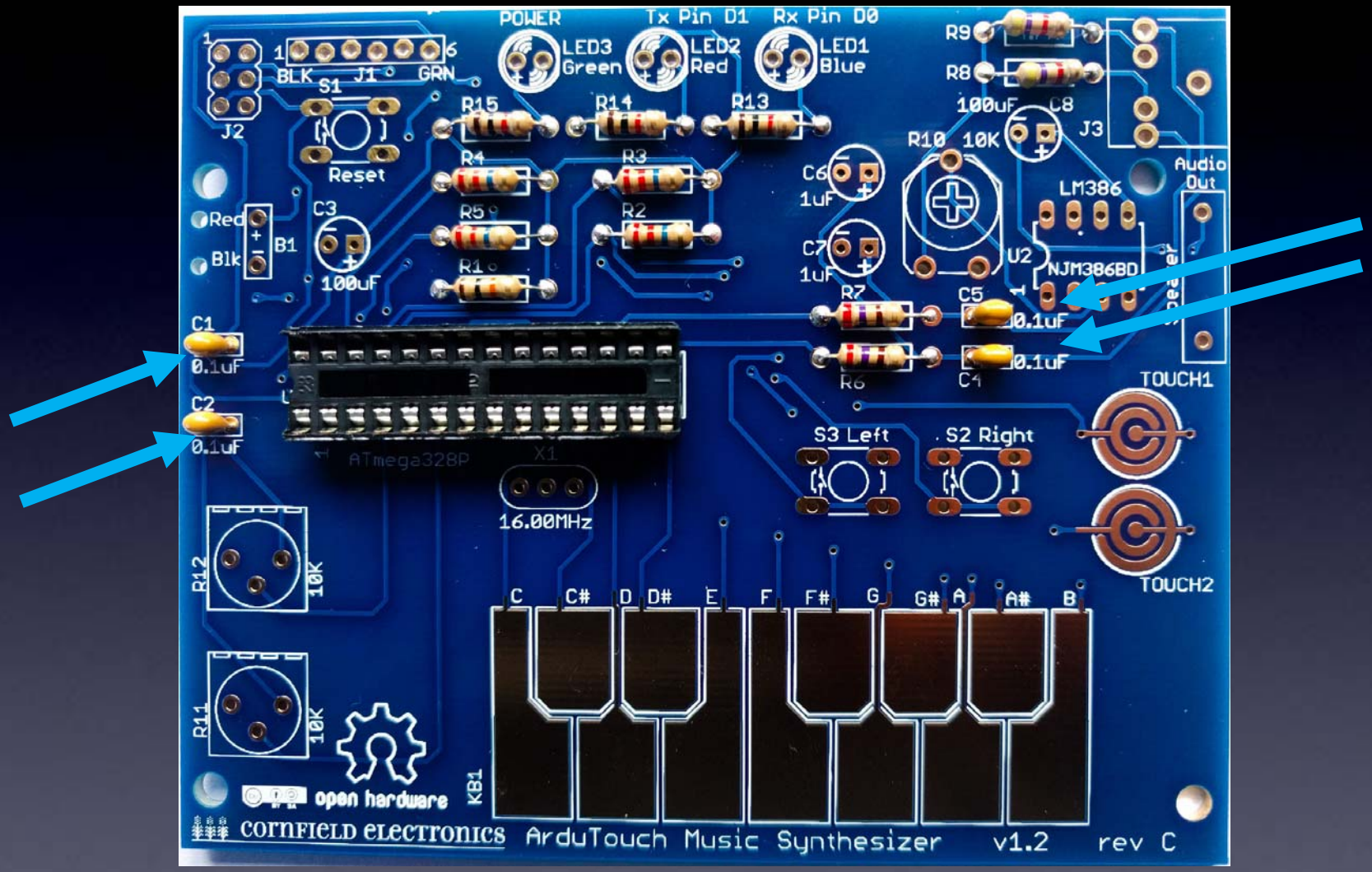
bend pins down on two corners,
and solder all 28 leads to the board

U1: microcontroller socket

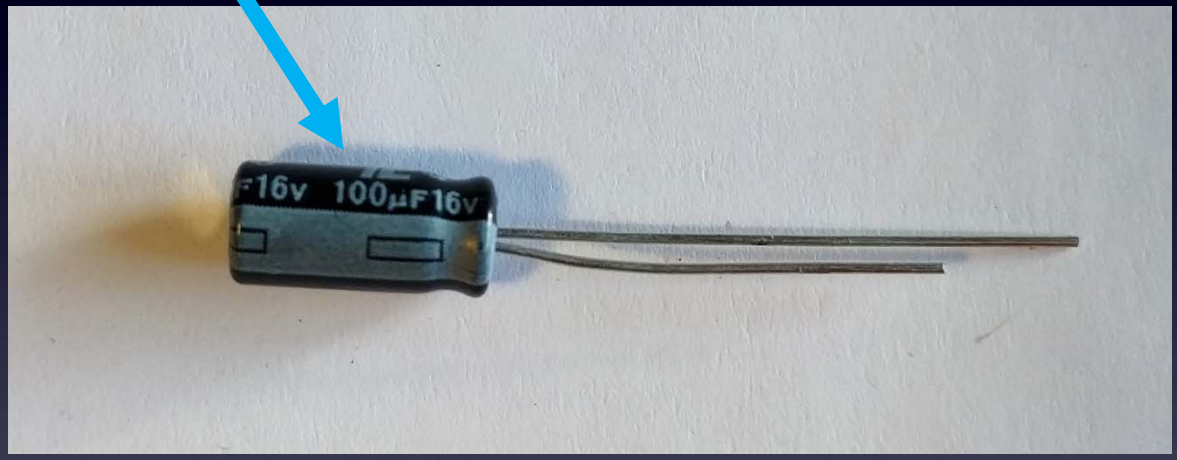


All 28 leads soldered to the board:

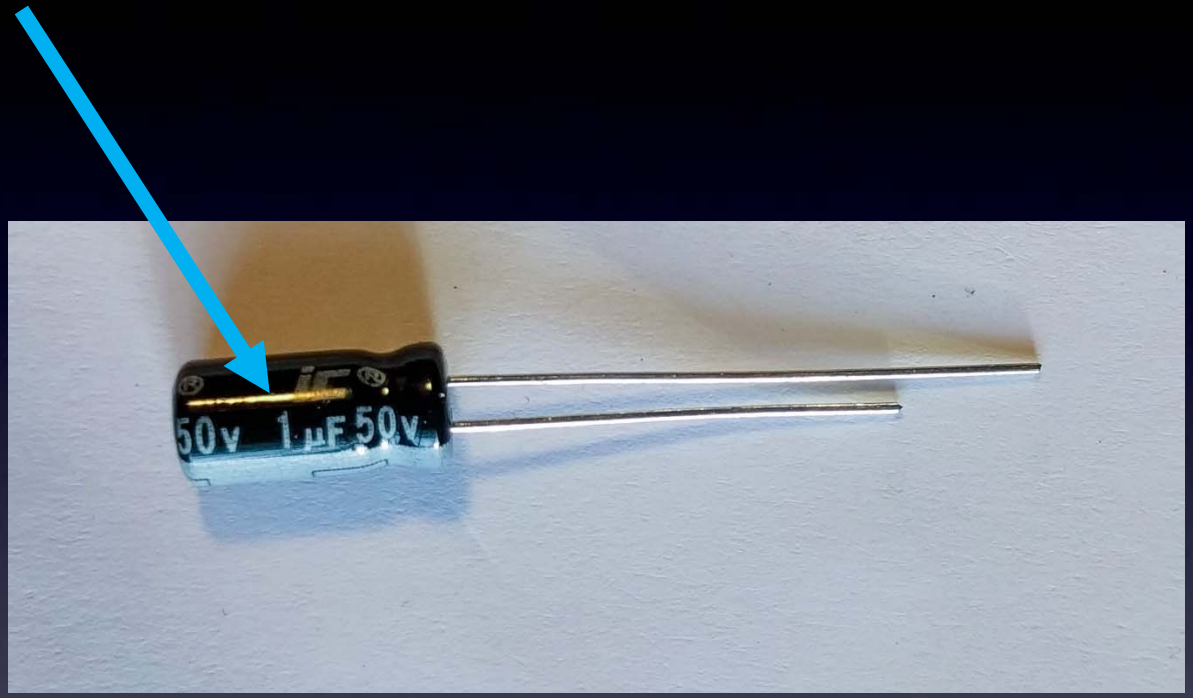
→ Notice that each has a little bump of solder (not flat). ←


POWER
Tx Pin D1
Rx Pin D0
LED3 Green
LED2 Red
LED1 Blue
J1
BLK
GRN
J2
S1
Reset
R15
R14
R13
R4
R3
R5
R2
R1
C3
100uF
Red
Blk
B1
C1
0.1uF
C2
0.1uF
ATmega328P
X1
16.00MHz
R12
10K
R11
10K
open hardware
KB1
CORNFIELD ELECTRONICS
ArduTouch Music Synthesizer
v1.2
rev C
C
C#
D
D#
E
F
F#
G
G#
A
A#
B
R9
R8
100uF
C8
J3
R10
10K
C6
1uF
C7
1uF
U2
LM386
NJM386BD
Audio Out
R7
C5
0.1uF
R6
C4
0.1uF
S3 Left
S2 Right
TOUCH1
TOUCH2

C1, C2, C4, C5

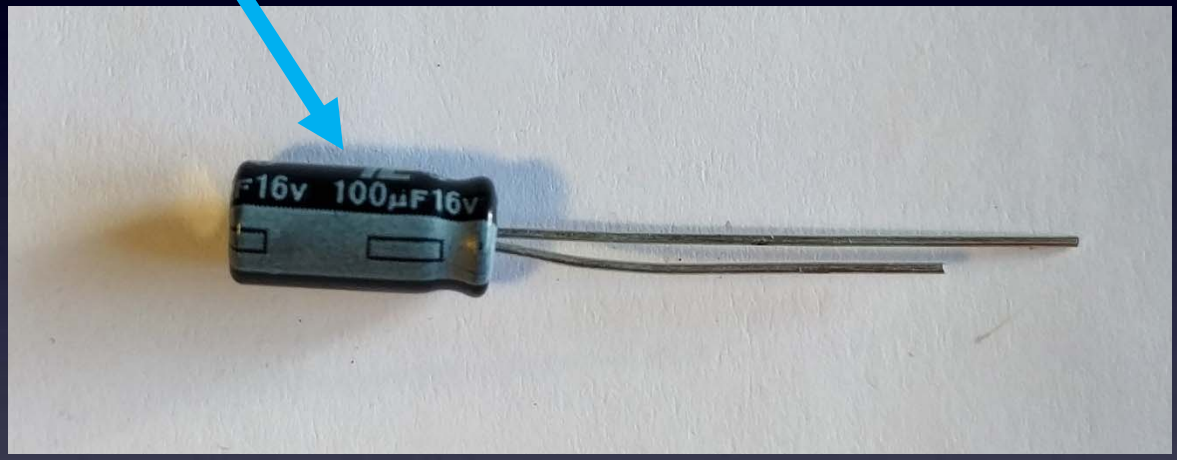


C3, C8: 100uF



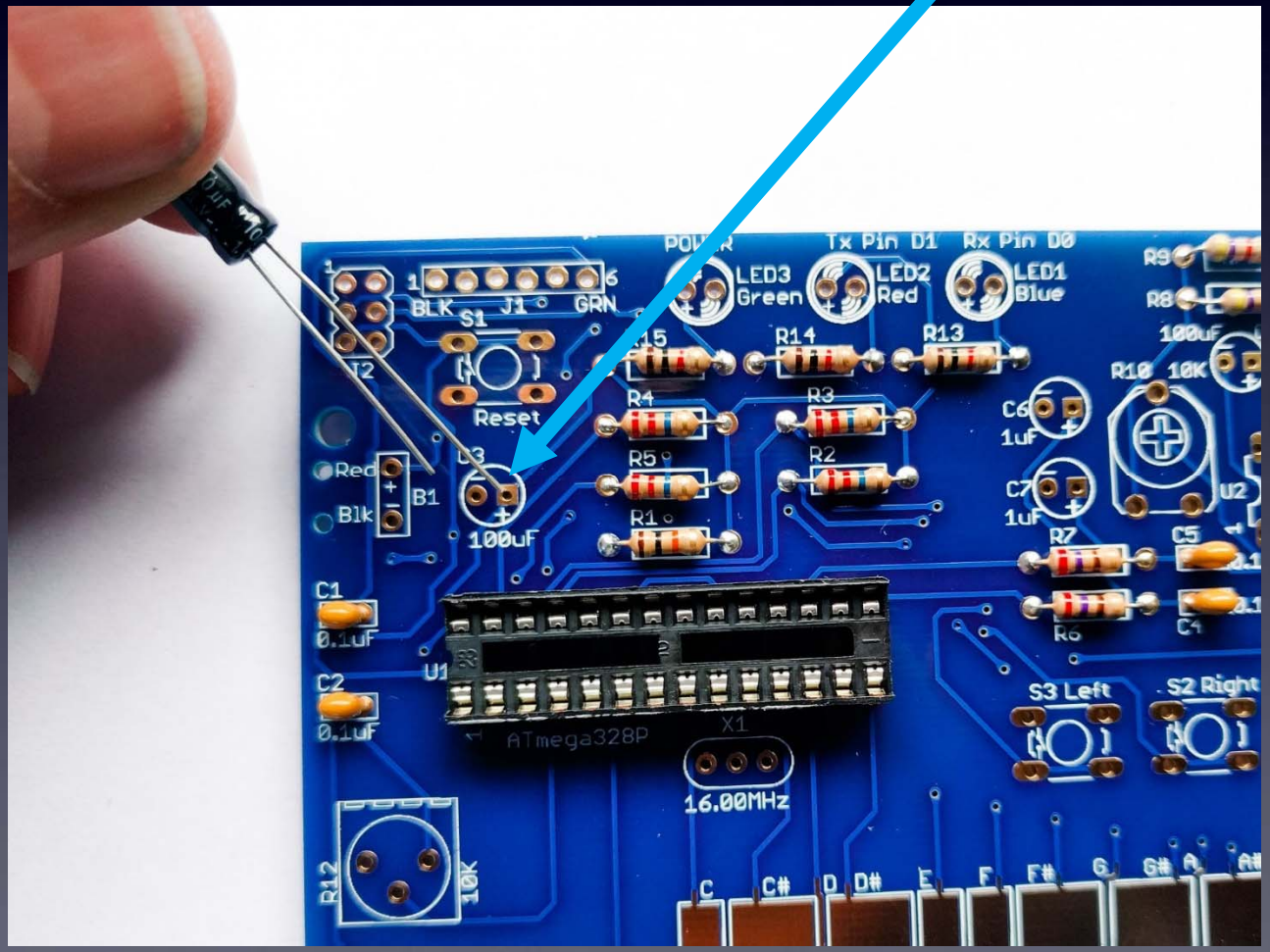
Different than C3, C8 !

C6, C7: 1uF

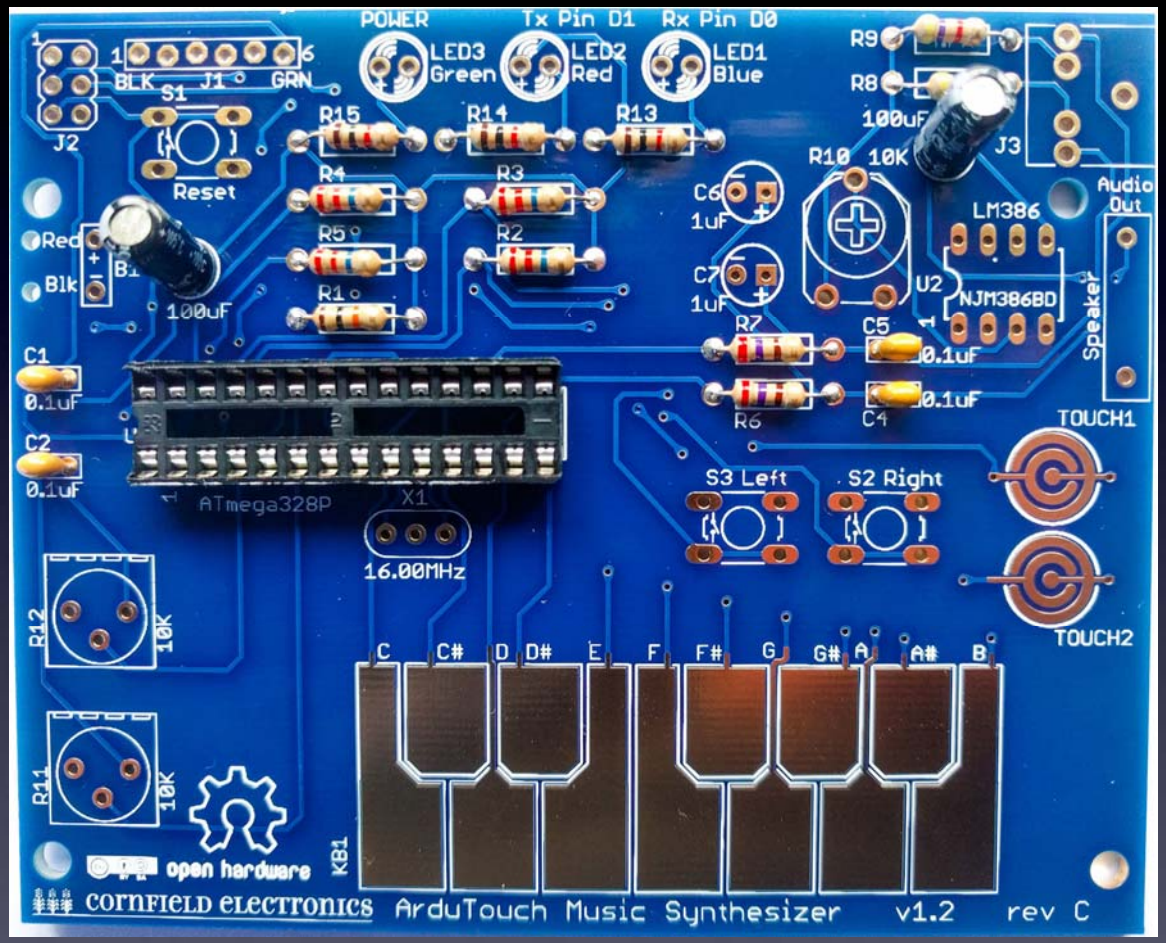


C3, C8: 100uF

C3, C8:
Long Lead “+”

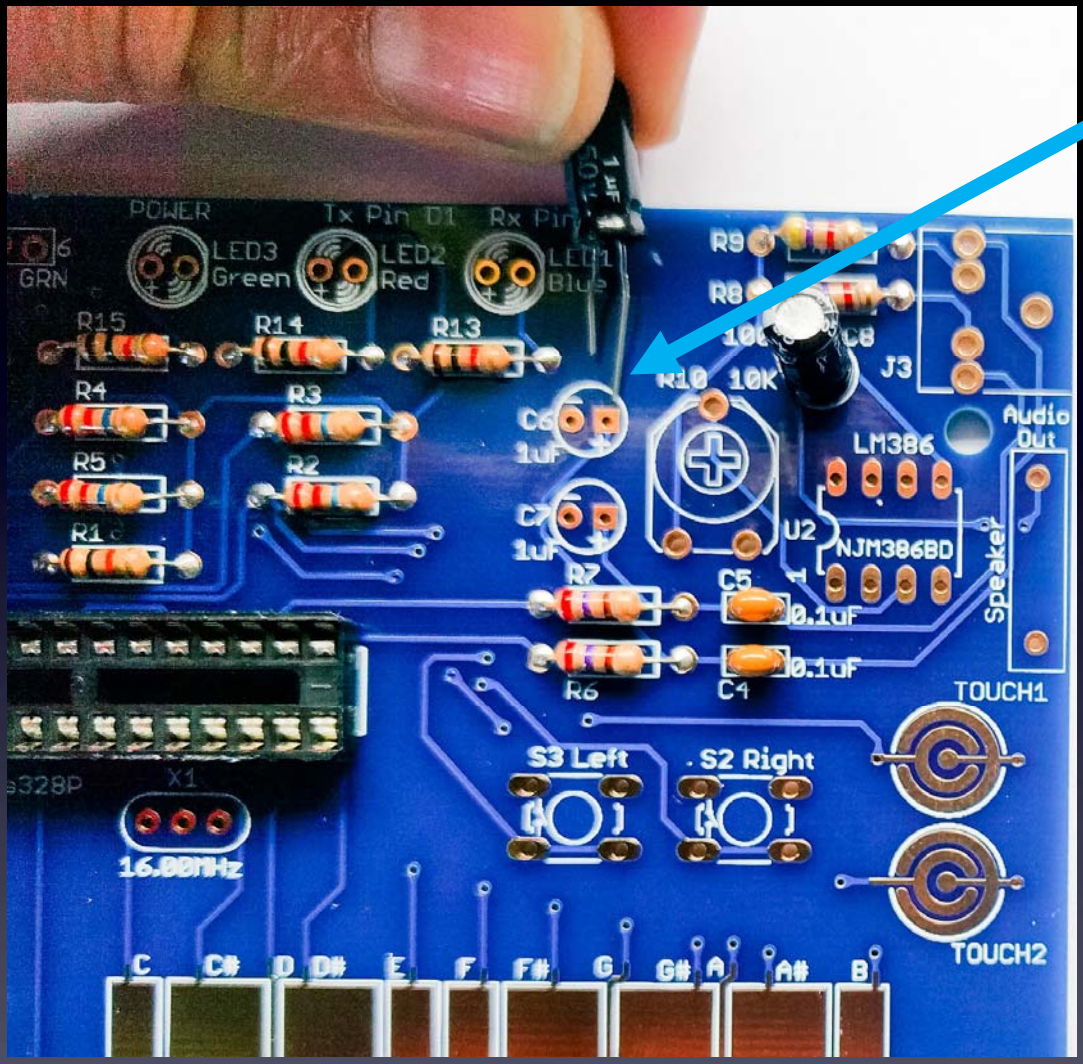


Use 100uF !!



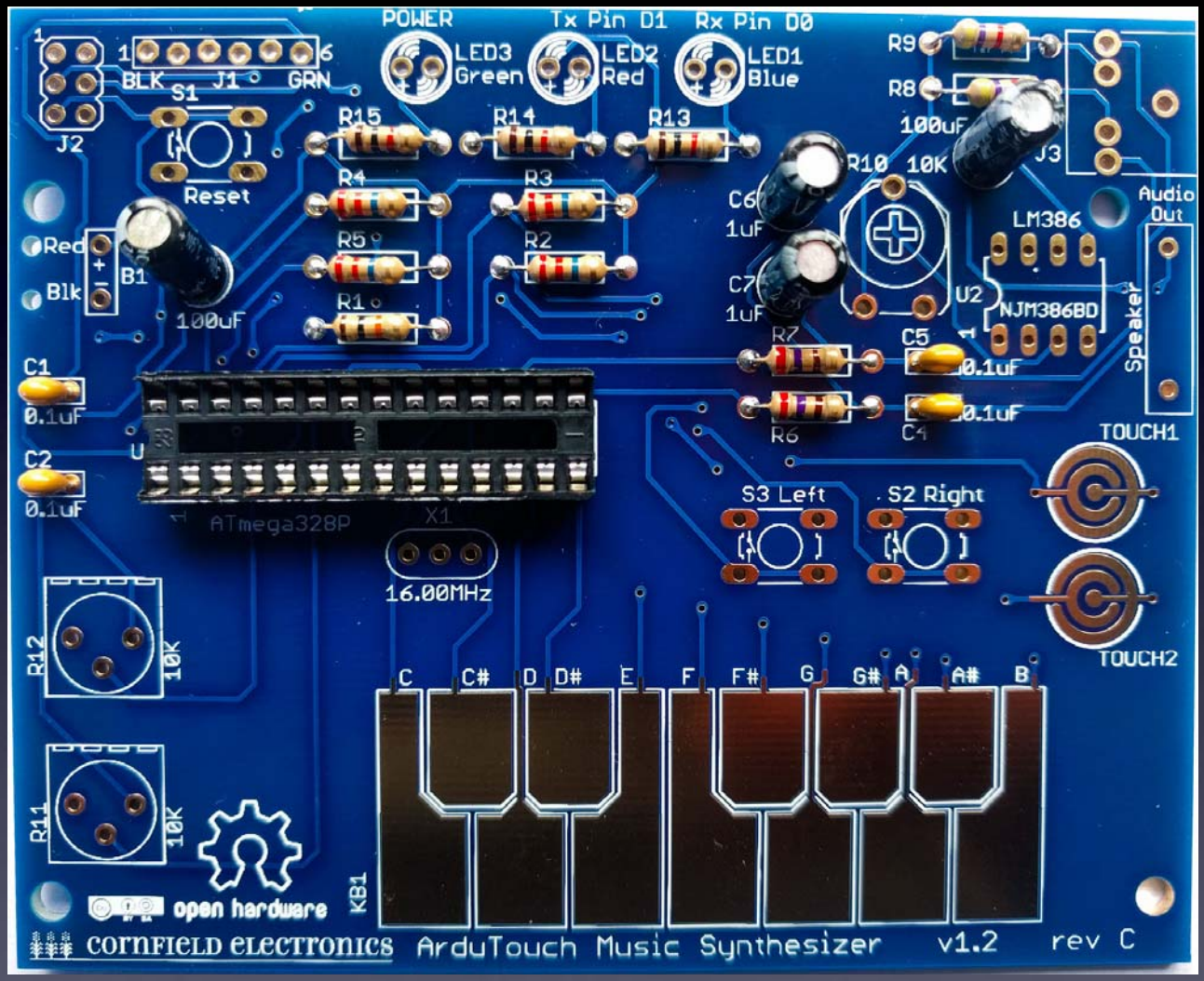
C3, C8: 100uF – soldered to board

C6, C7: 1uF



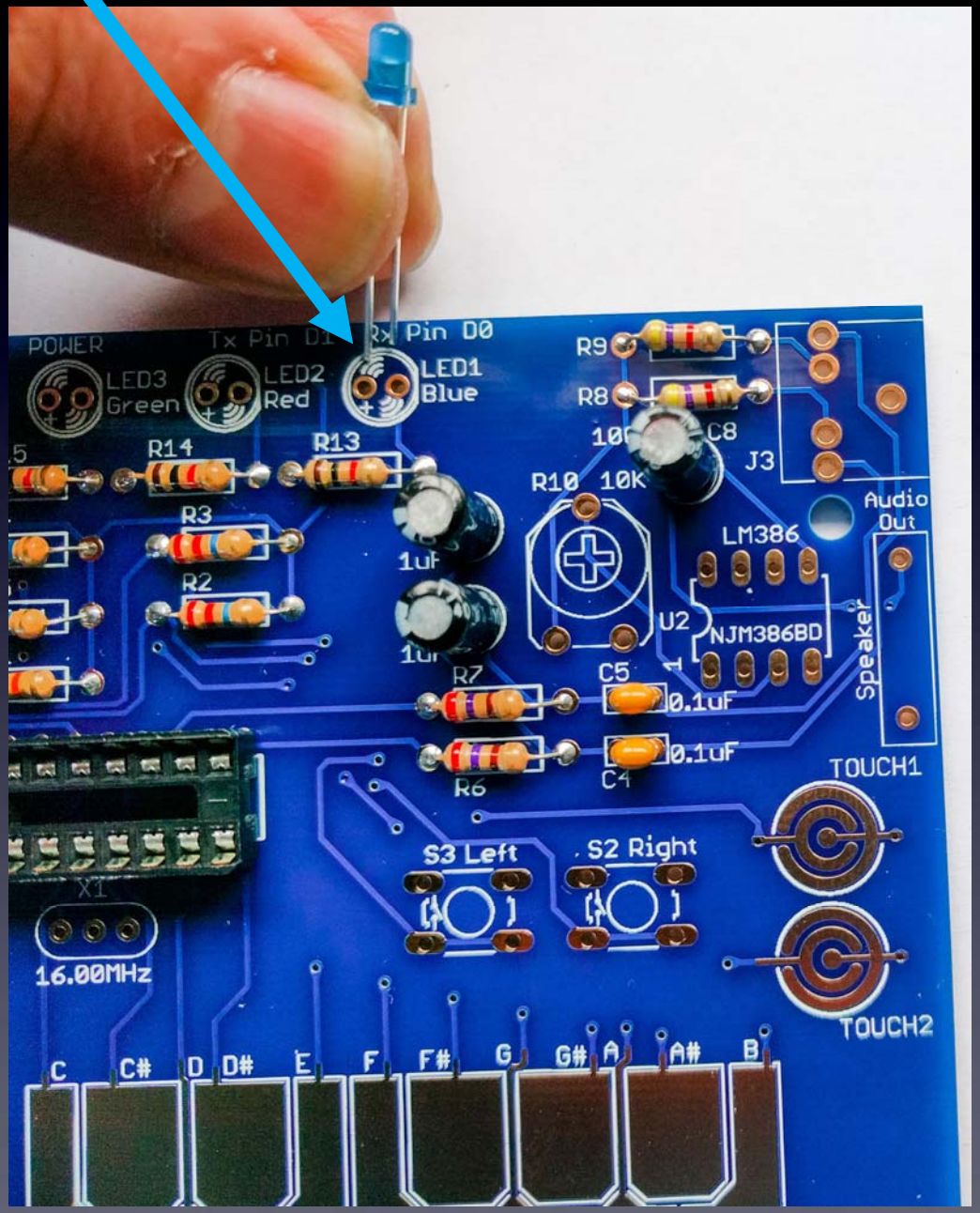
C6, C7: Long Lead “+”

Use 1uF !!



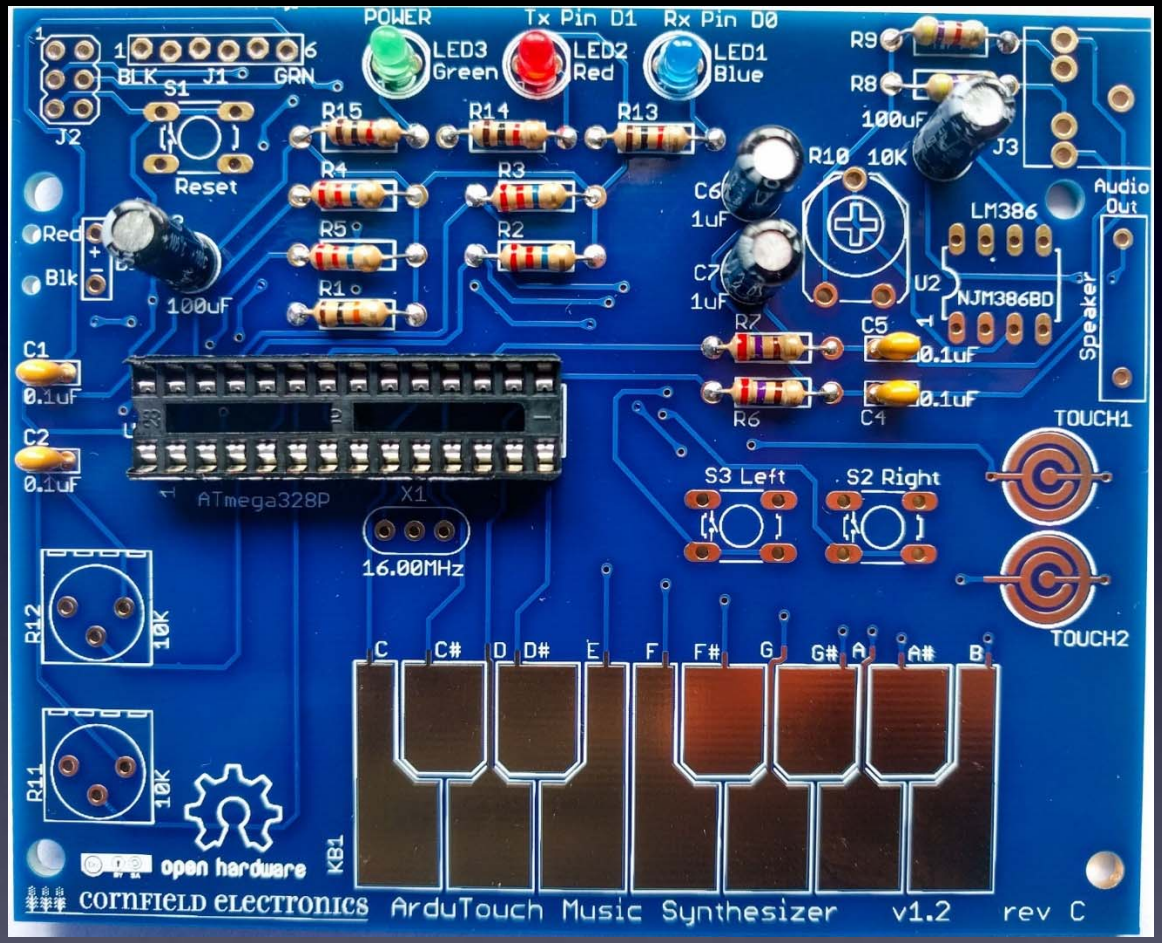
C6, C7: 1uF – soldered to board

LED1, LED2, LED3: Long Lead “+”



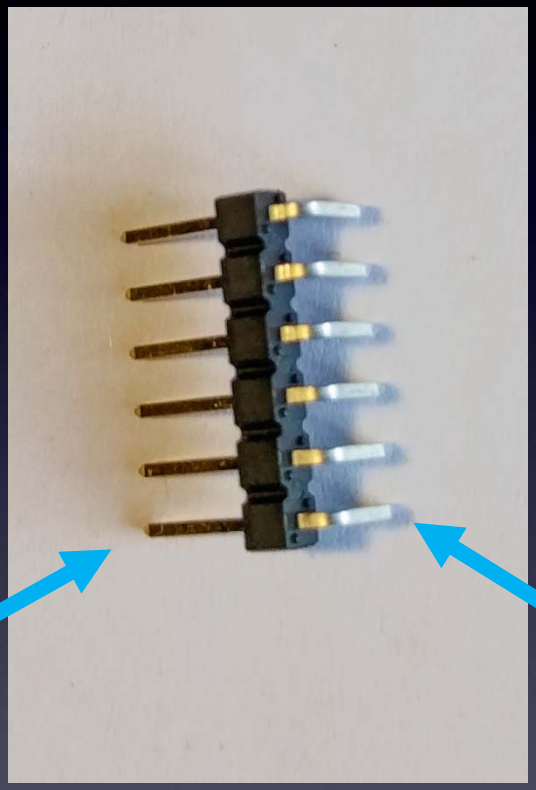
Save these leads

We’ll use them for the speaker



LED1, LED2, LED3

Green, Red, Blue – soldered to board



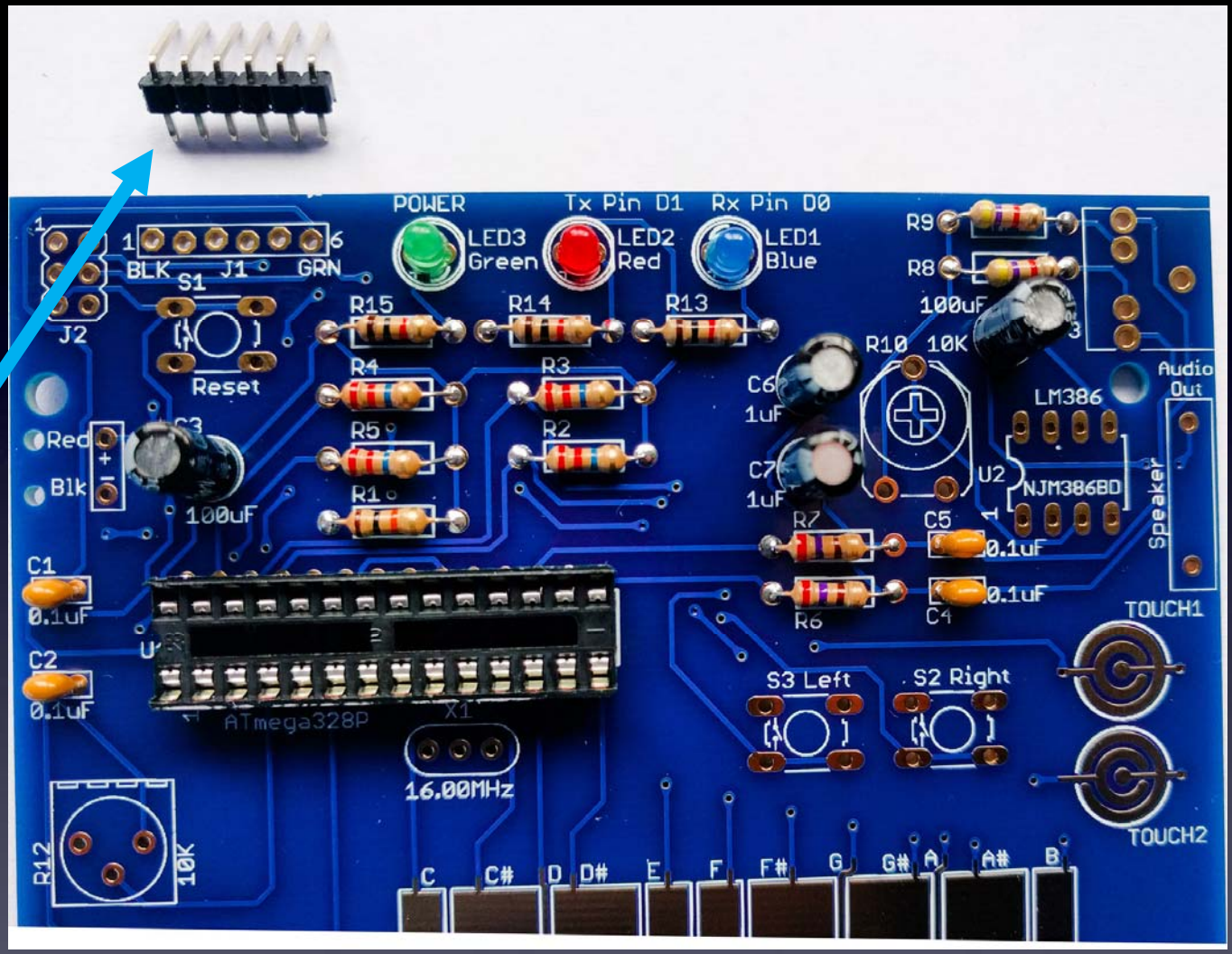
long leads

short leads

J1

Short leads into board

J1

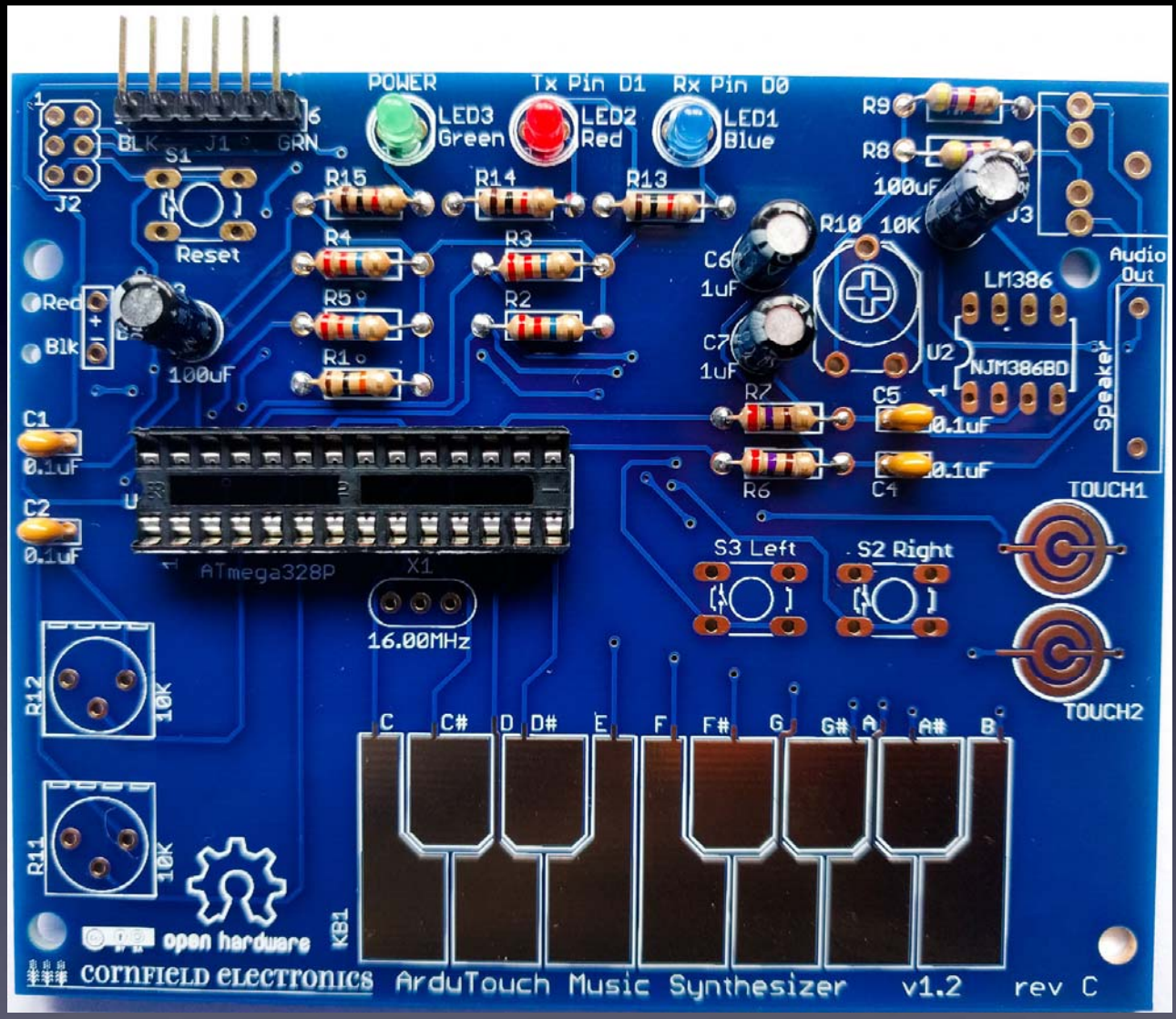


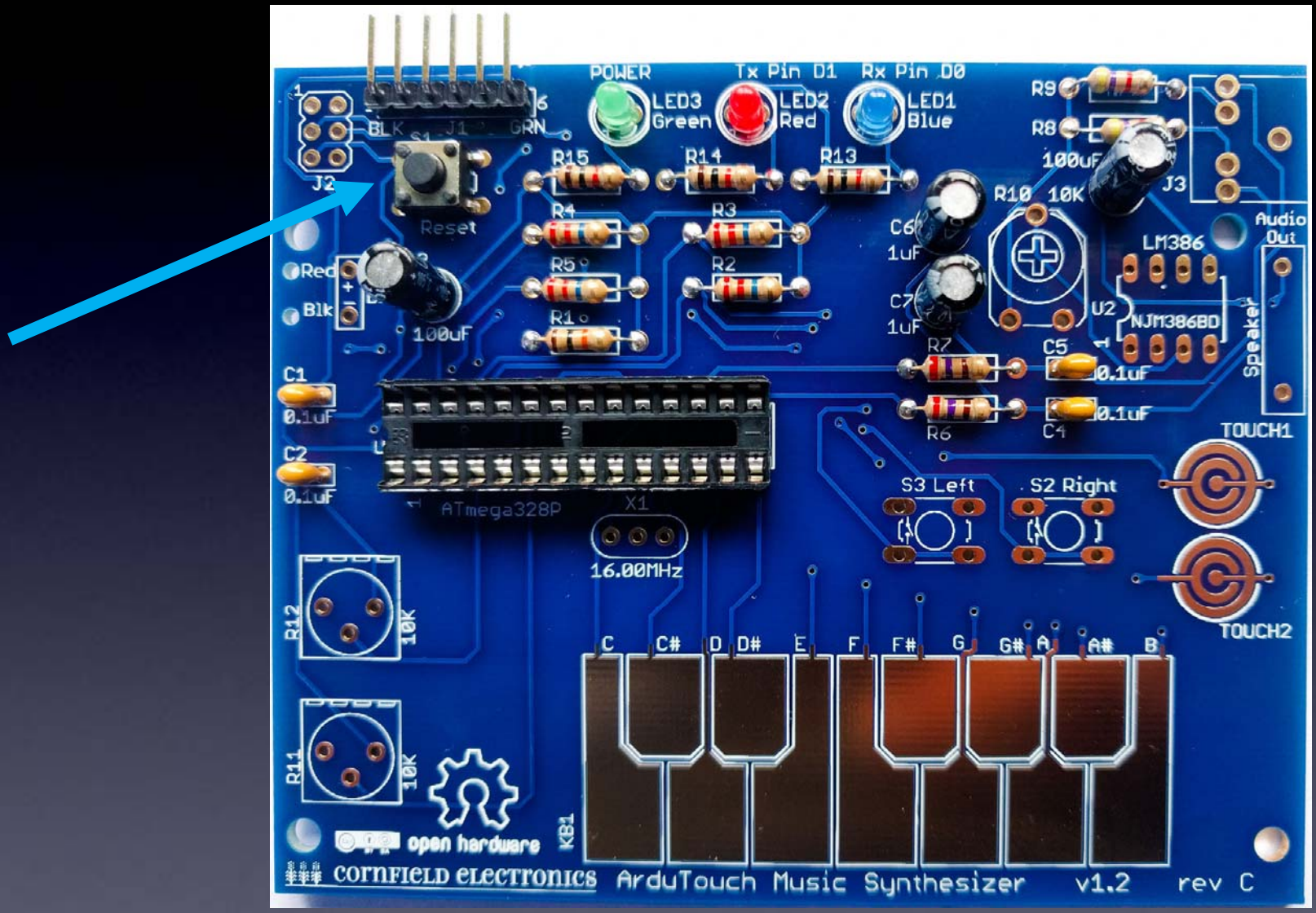
short leads
go into the board

→ long leads sticking out from board

(if it falls out, solder one lead on the top of the board, then turn over the board and solder the other 5 leads)

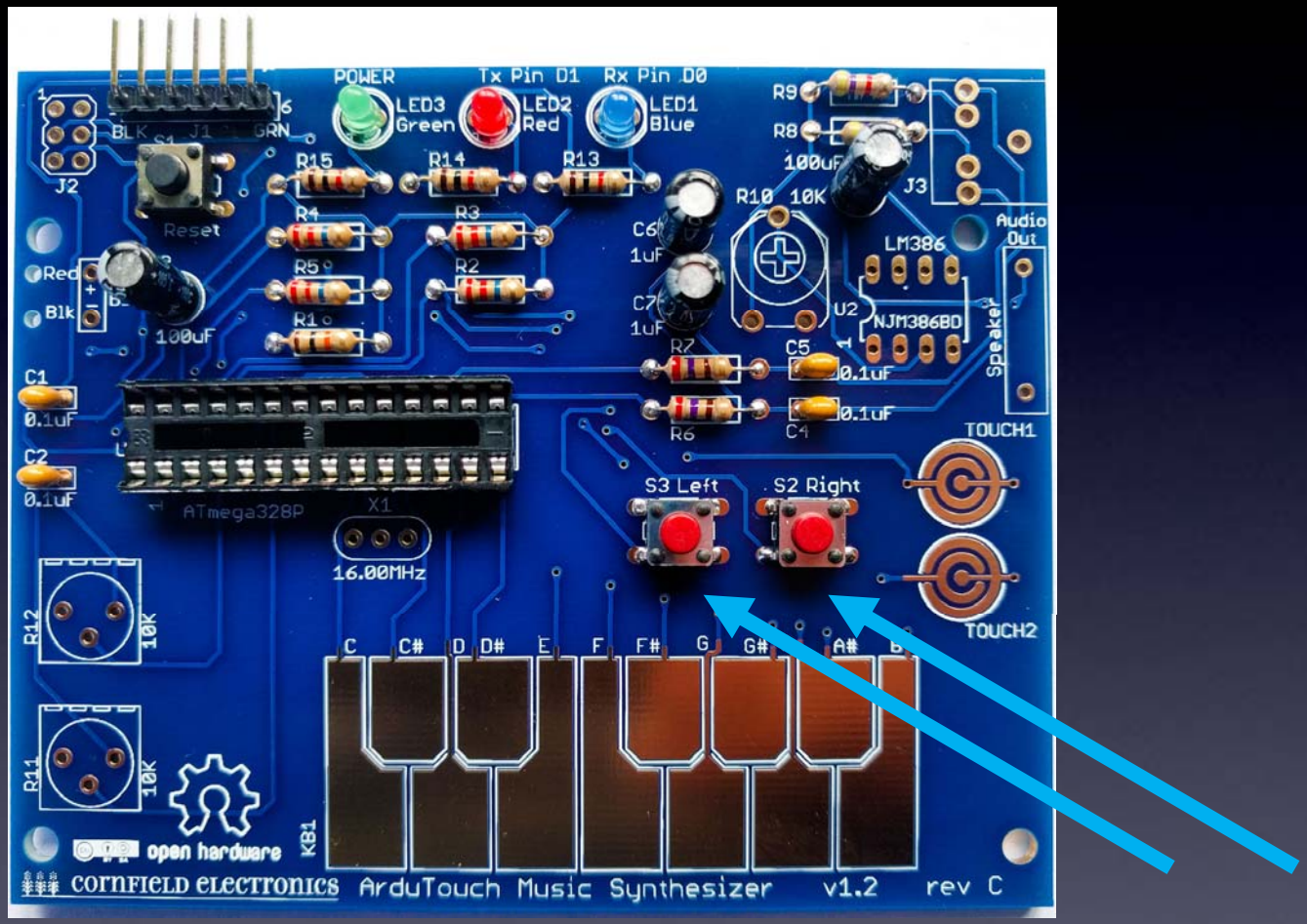
J1

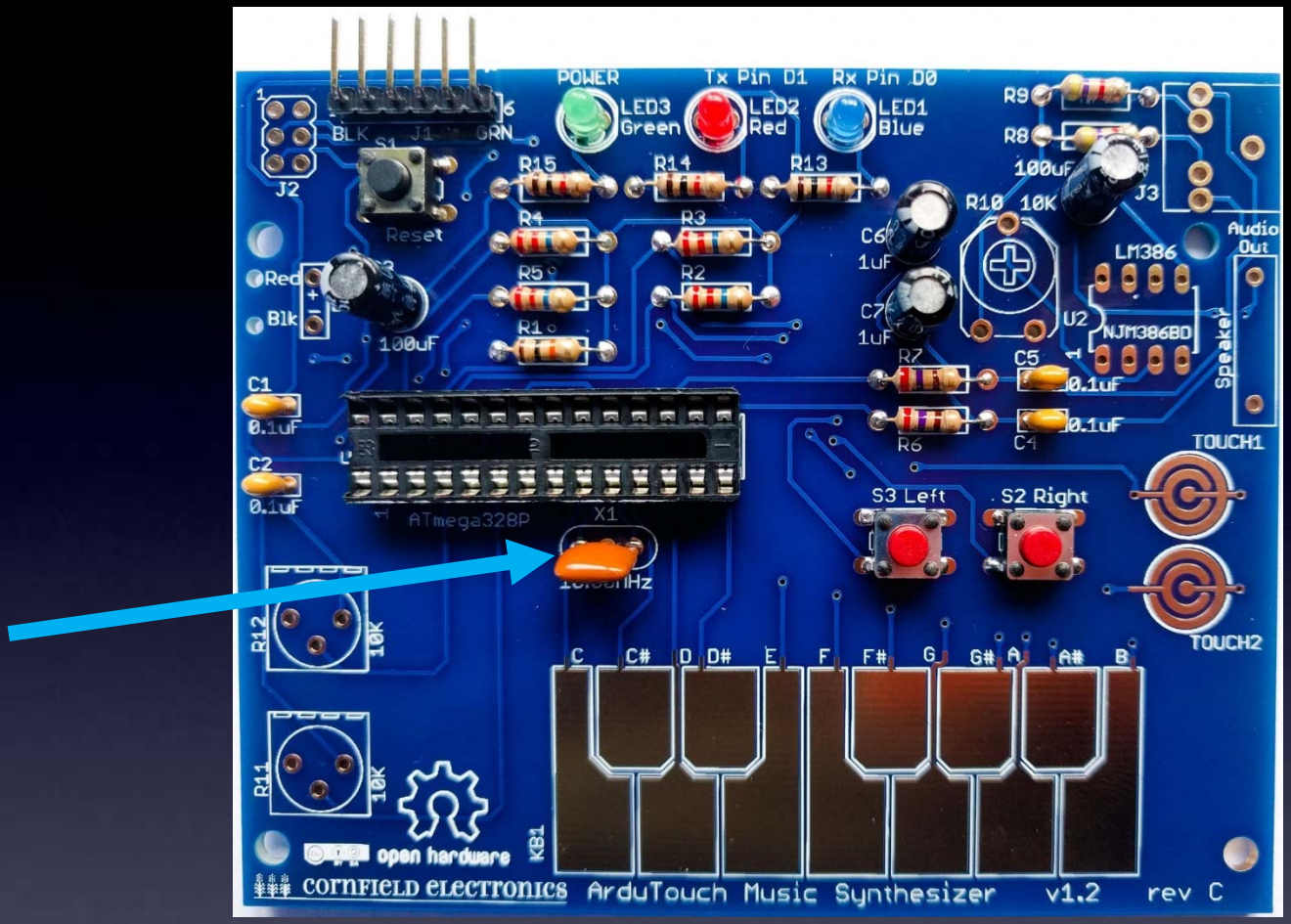




S1: black Reset button

S2, S3: Red buttons



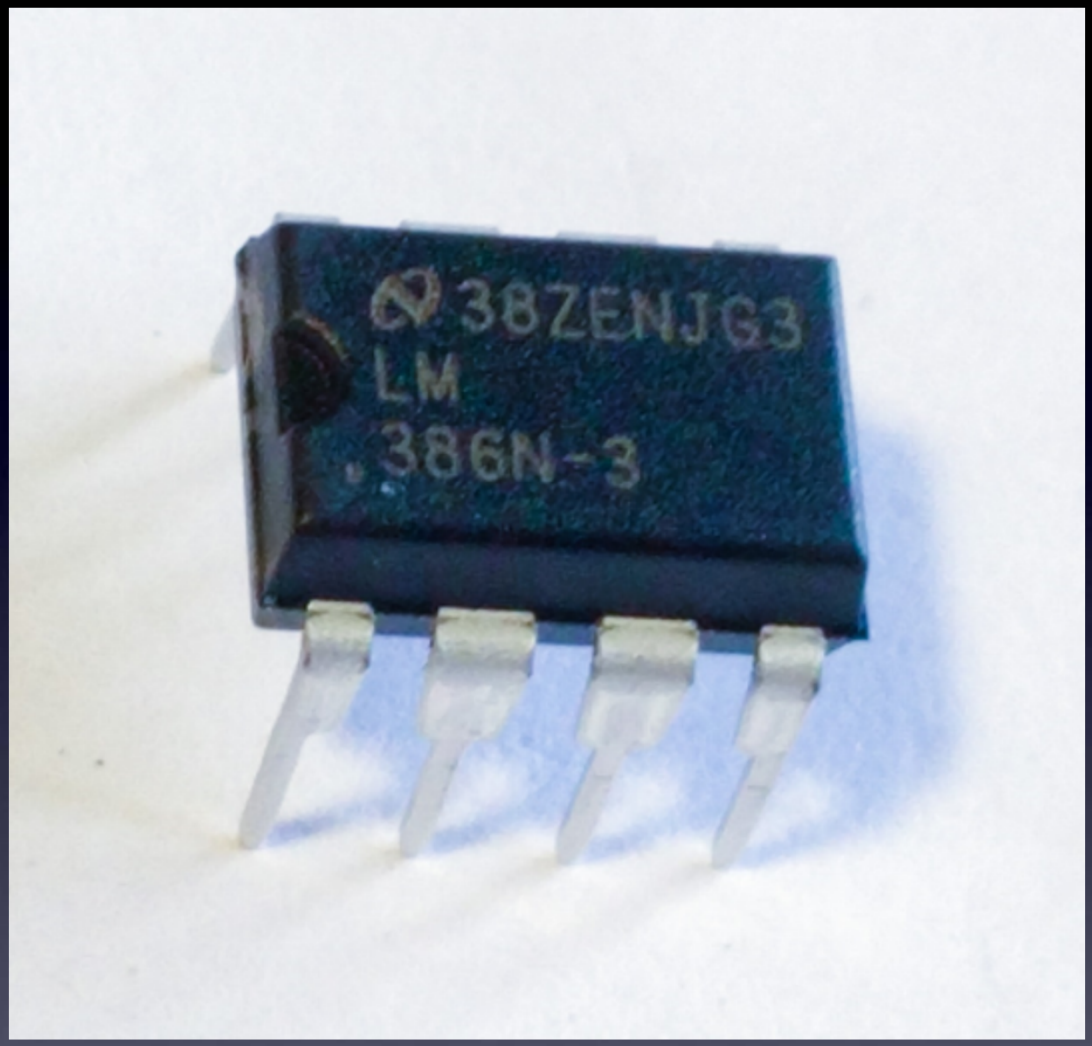


X1

The orientation of X1 does not matter.

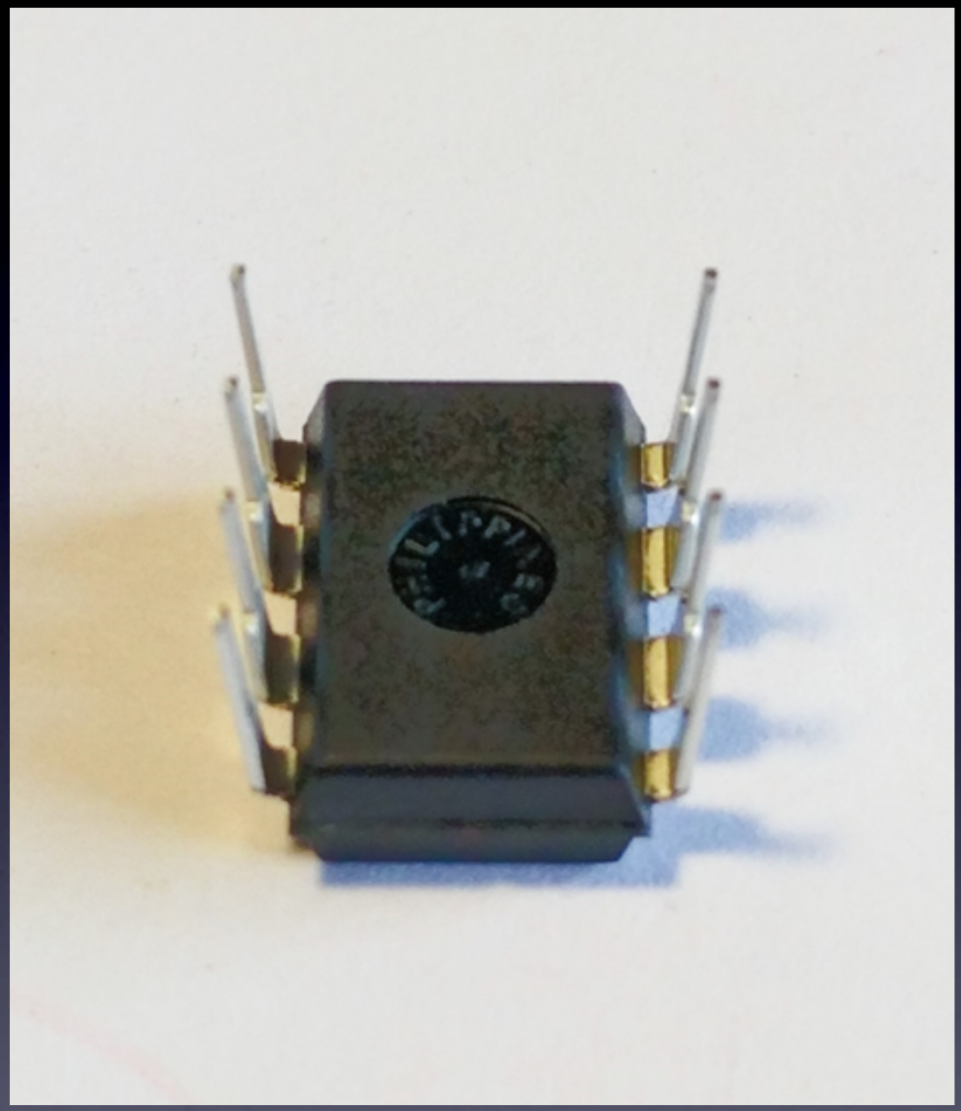
(Note: X1 may be yellow or blue)

U2



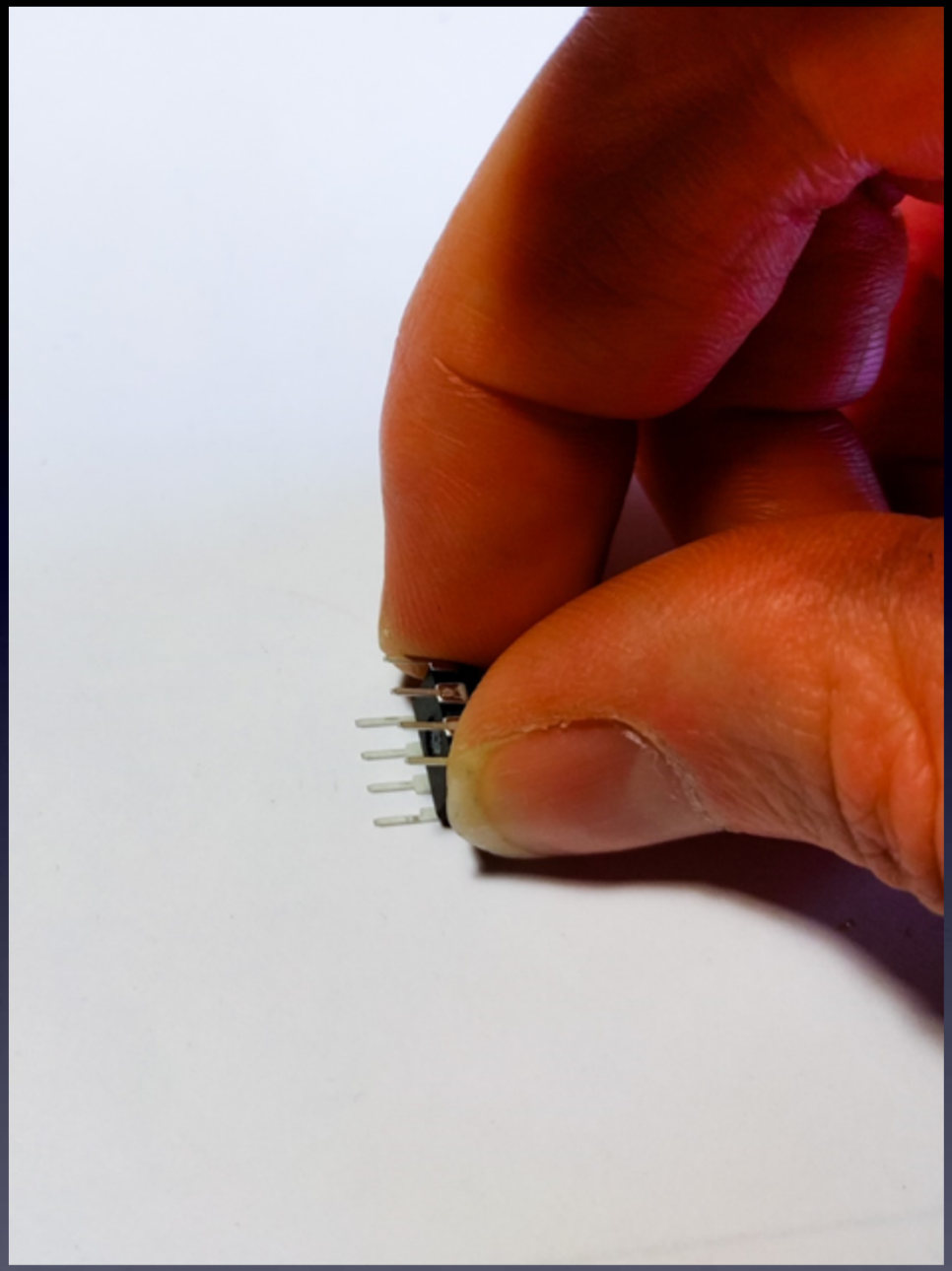
Note: this chip may be marked differently, but “386” will be printed on it somewhere.

U2



When chips are new,
their pins are bent out.

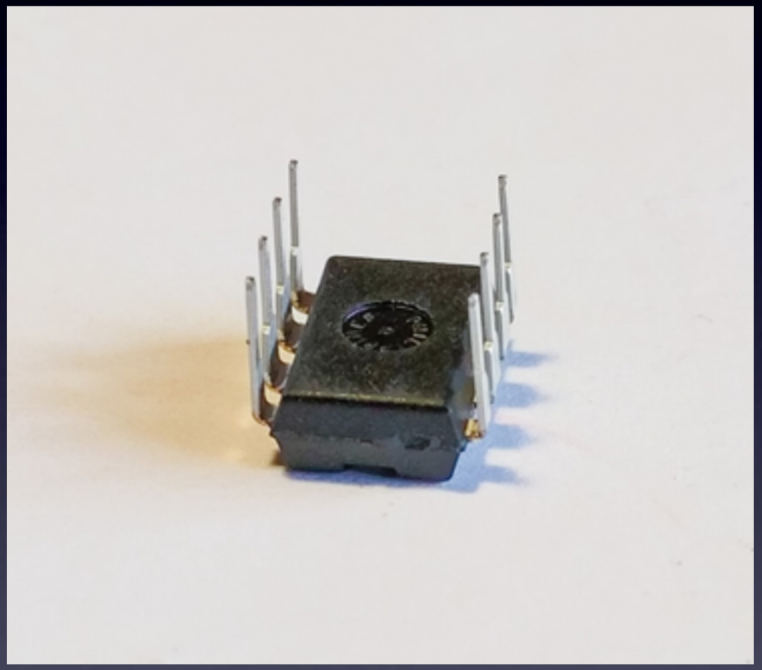
U2

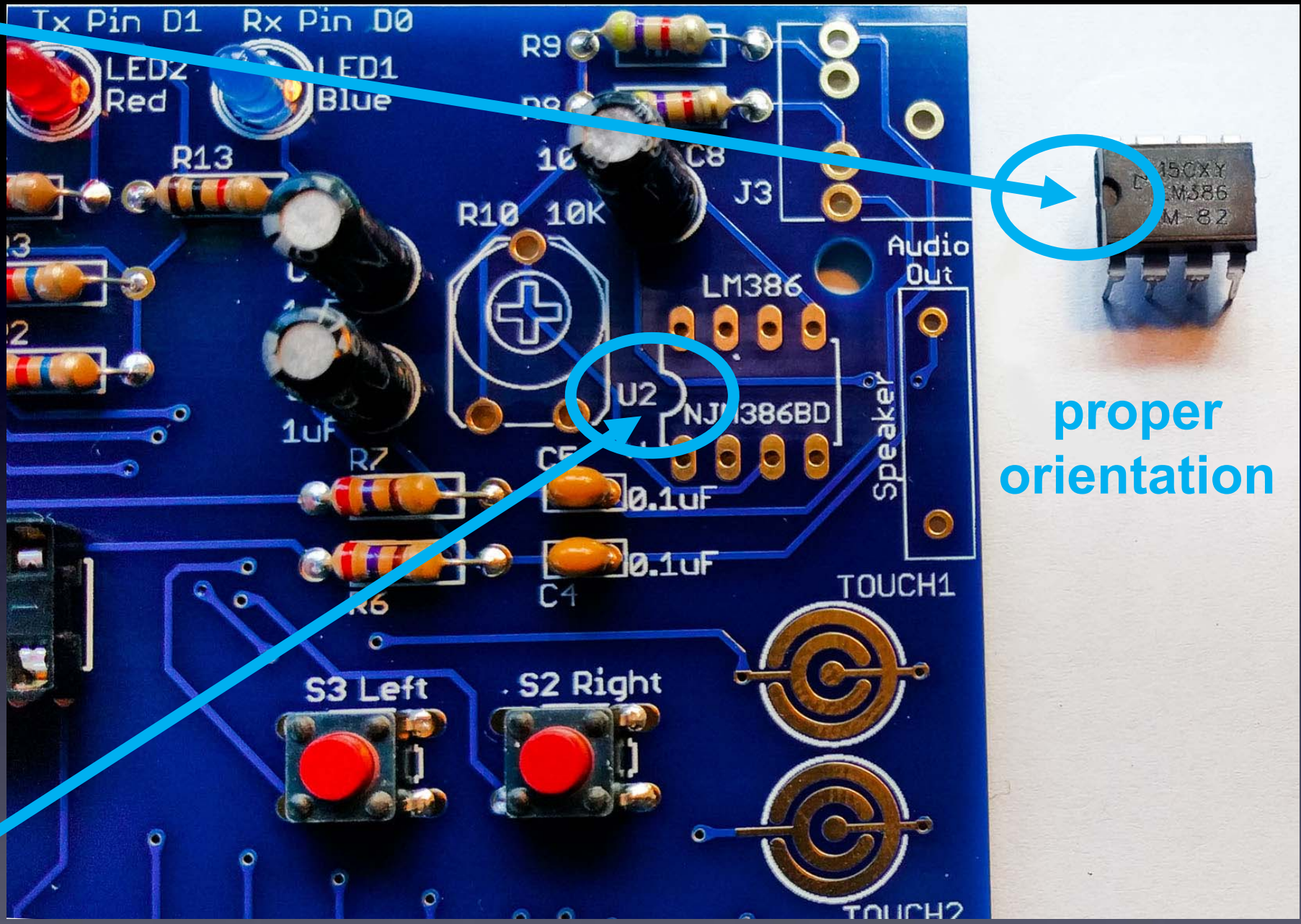


We need the pins bent straight and parallel.
Use your work table to (gently) bend the leads.

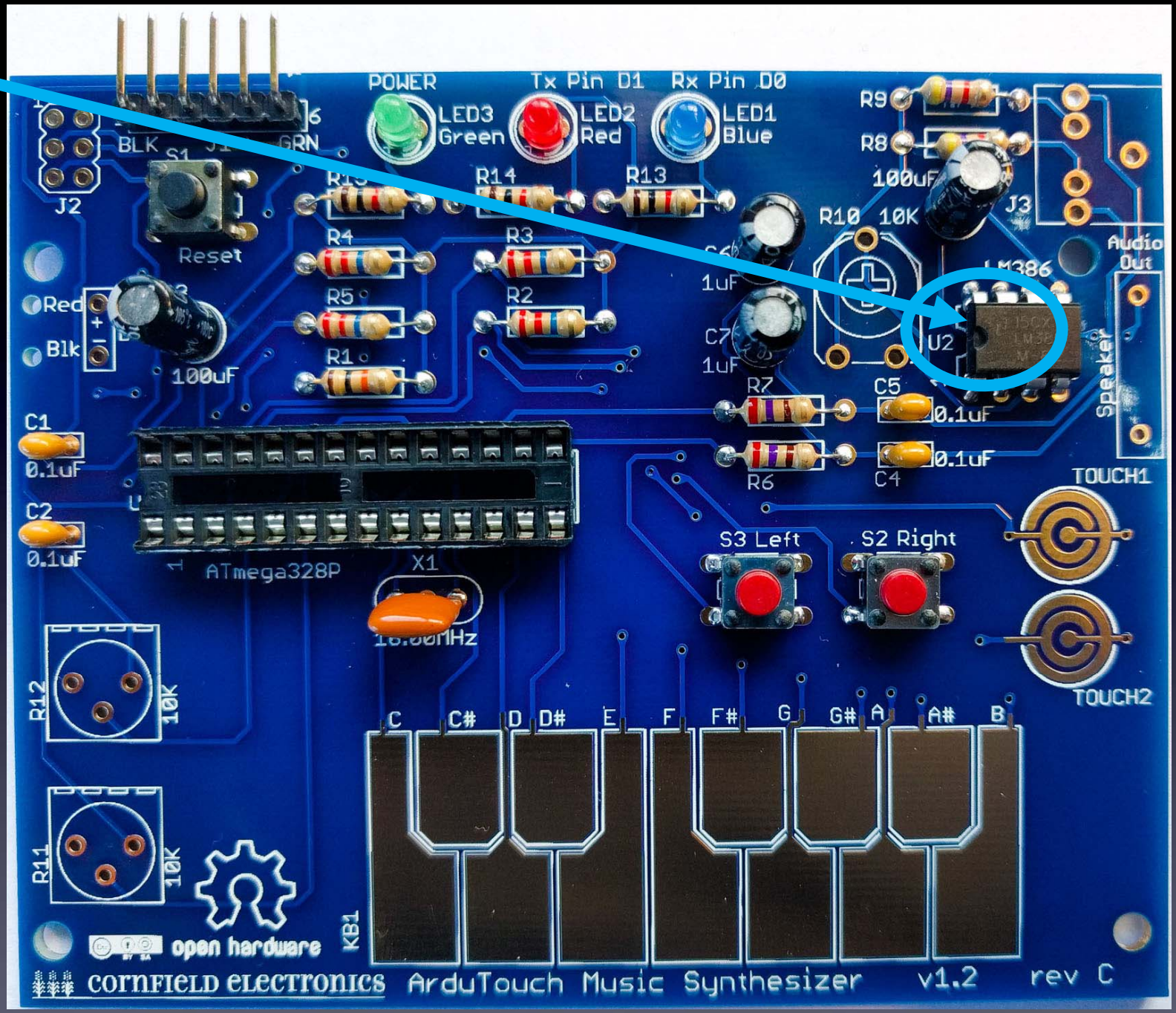
U2

Gently
bend leads
so they’re straight
and parallel

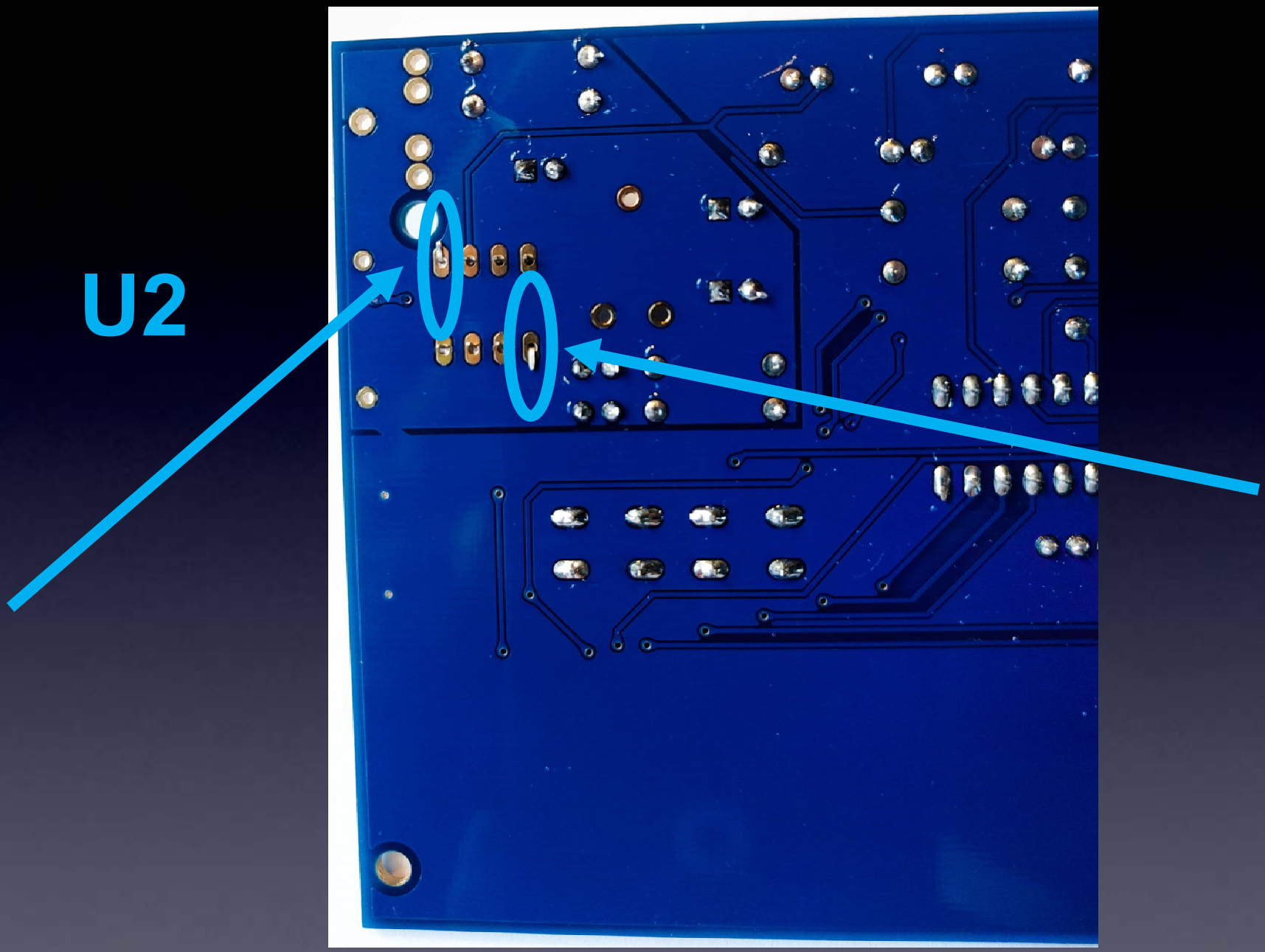




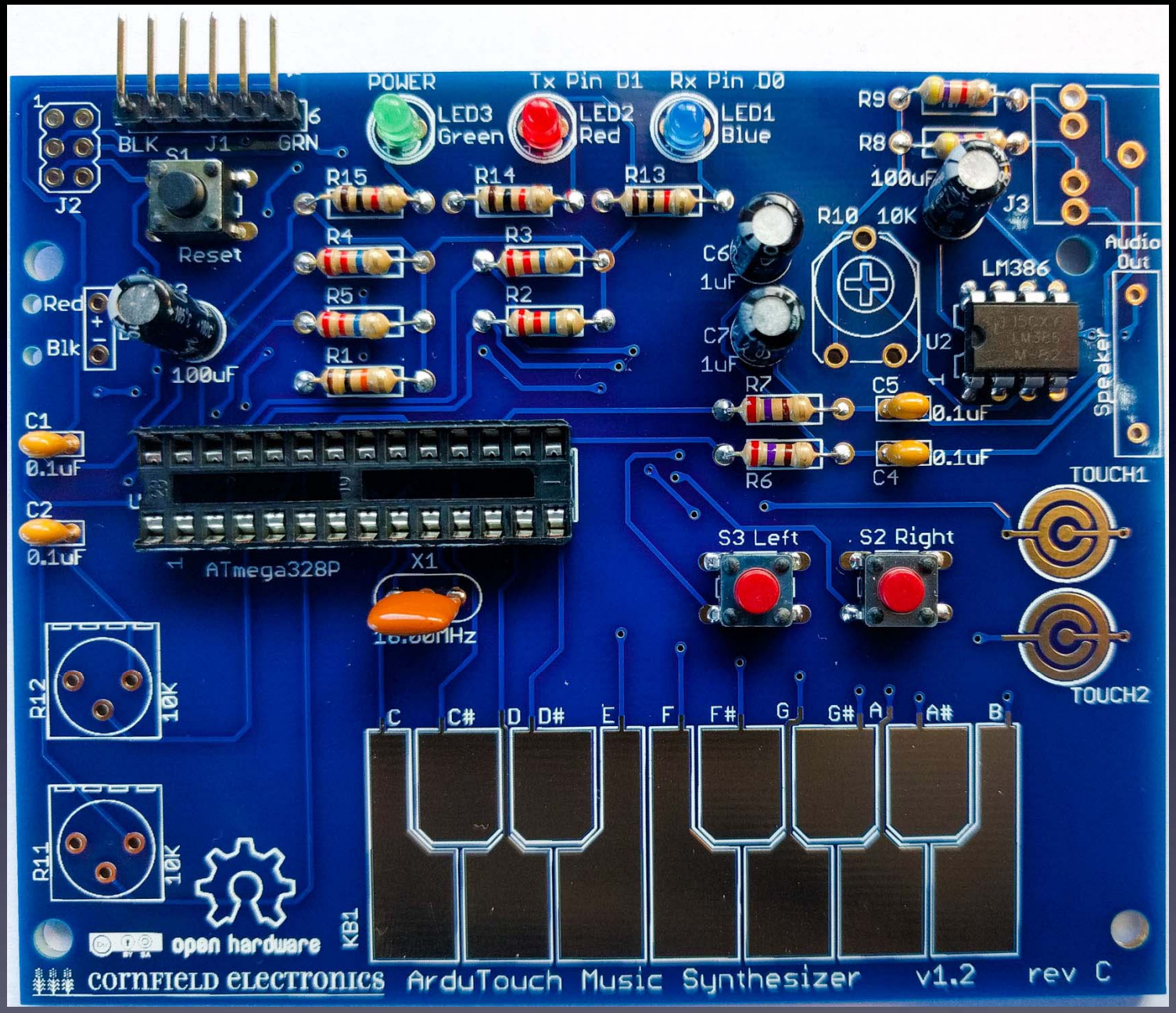
U2: audio amp chip



U2: inserted correctly

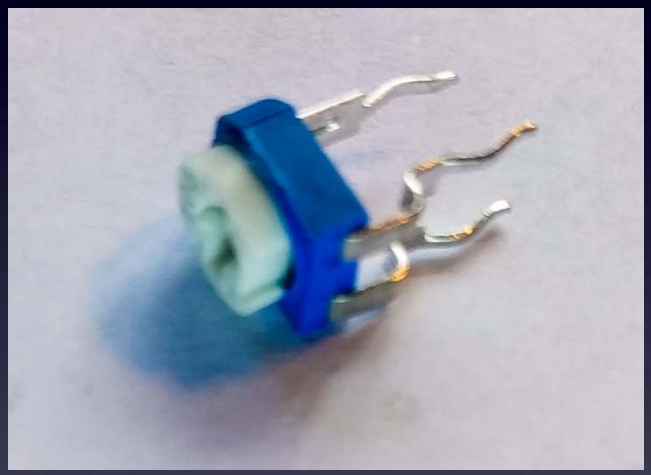


bend pins down on two corners,
and solder all 8 leads to the board



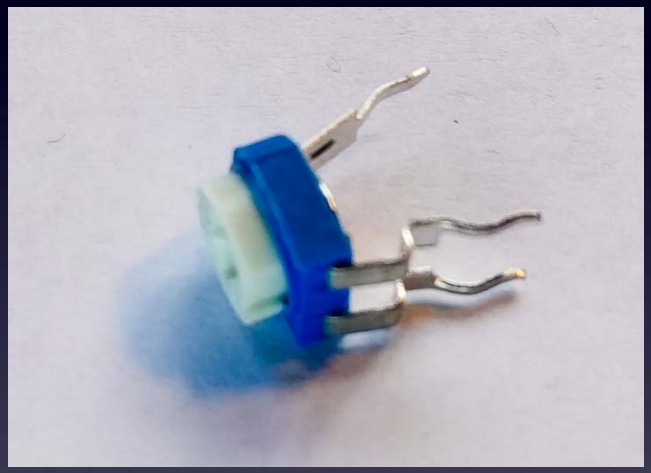
U2 – soldered to board

R10: volume control



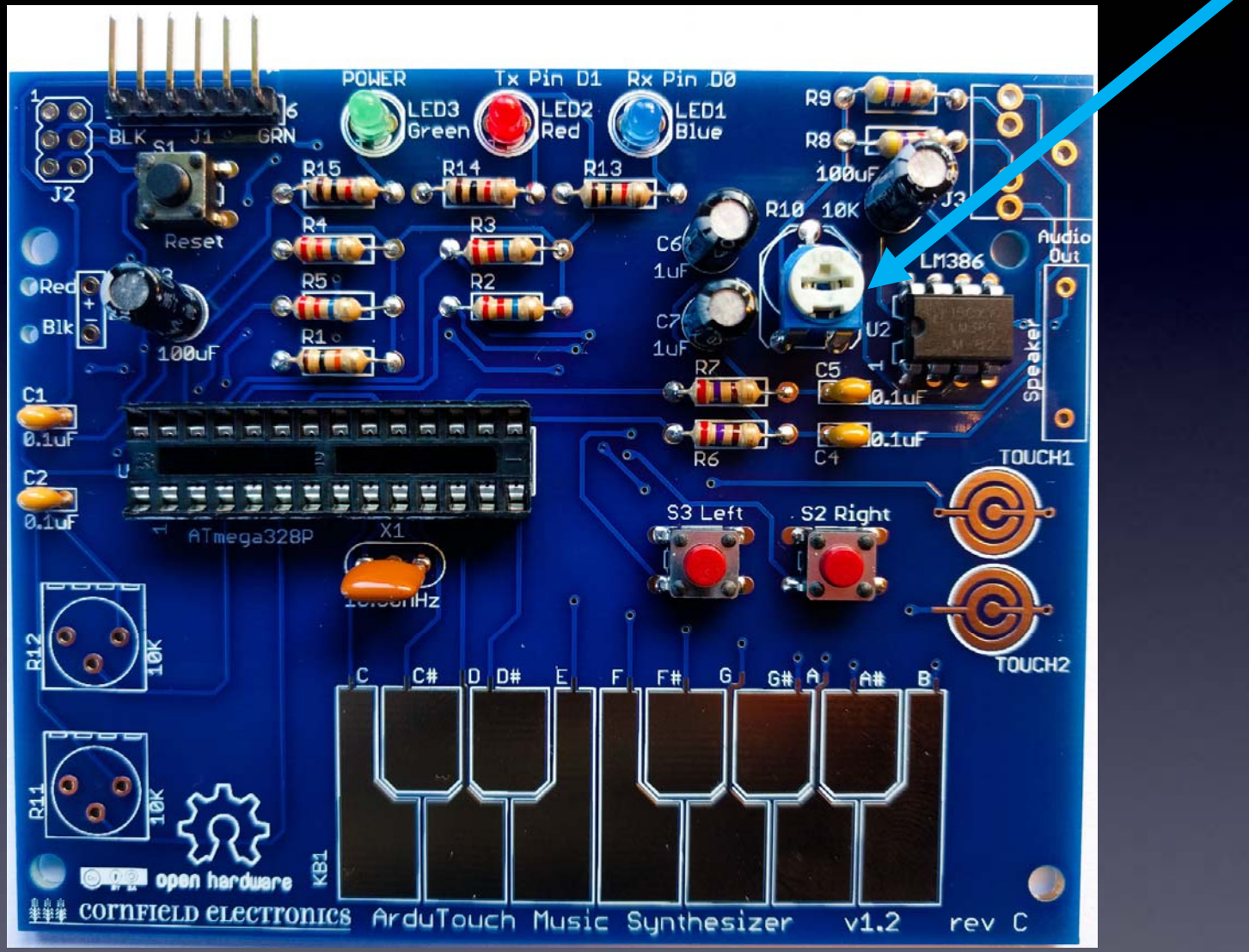
When new, the pins point straight down.

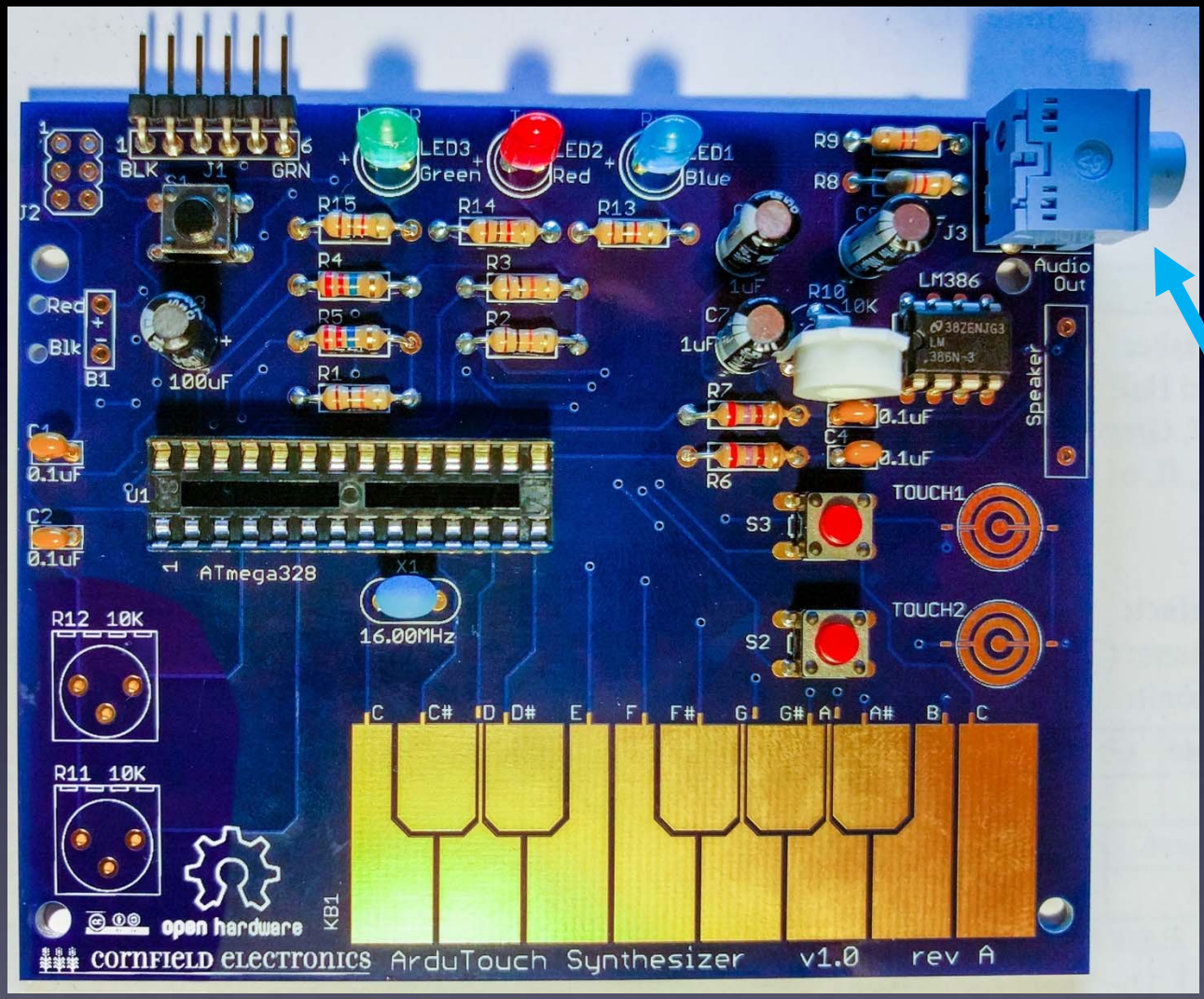
R10: volume control



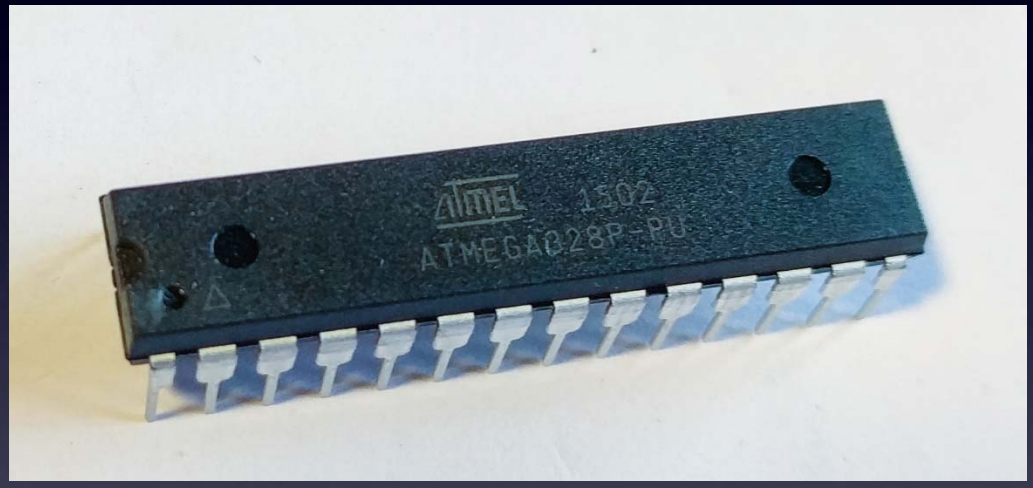
We need to bend them out a little to fit into the board.

R10: volume control





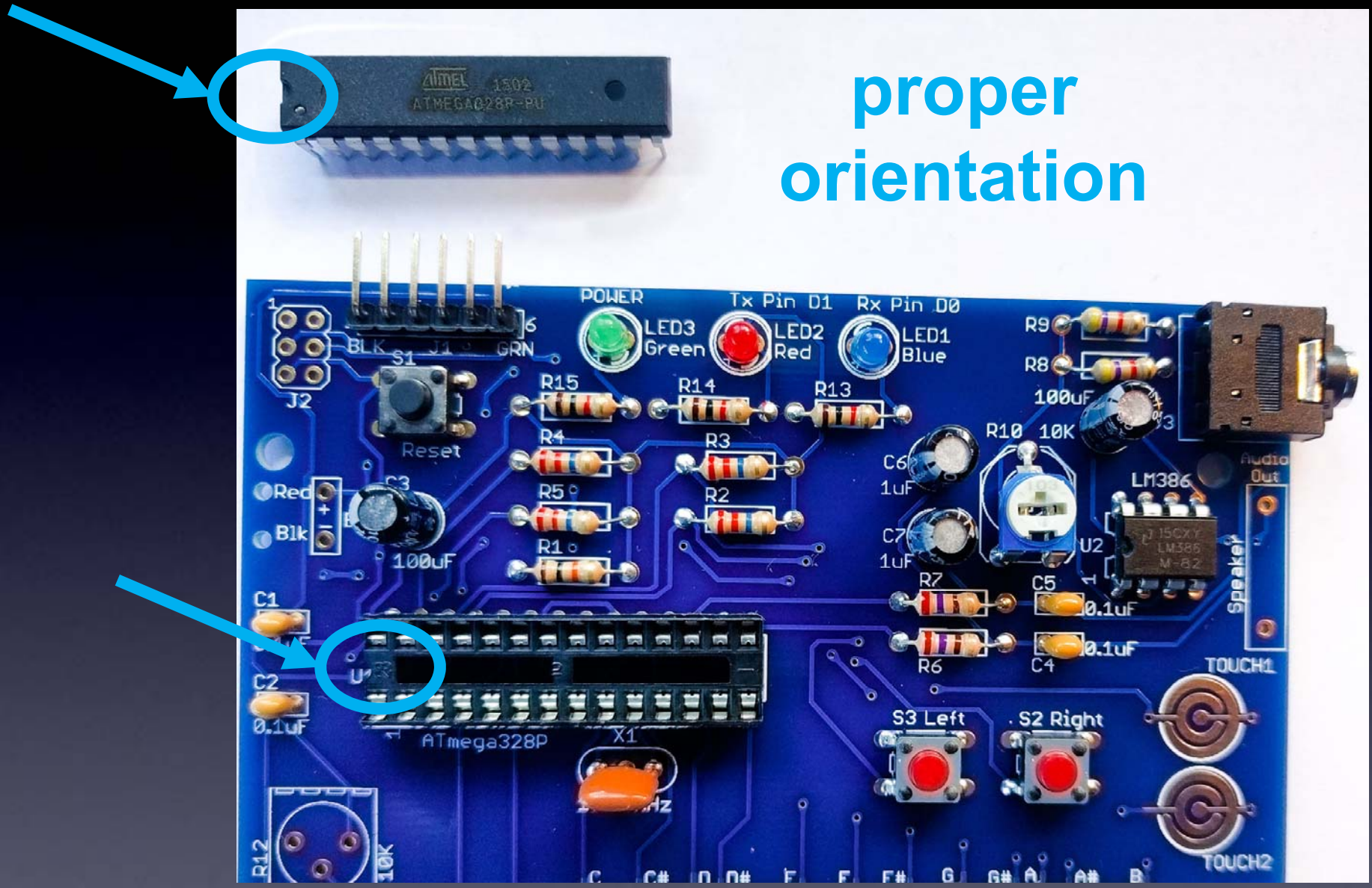
J3: headphone / output jack

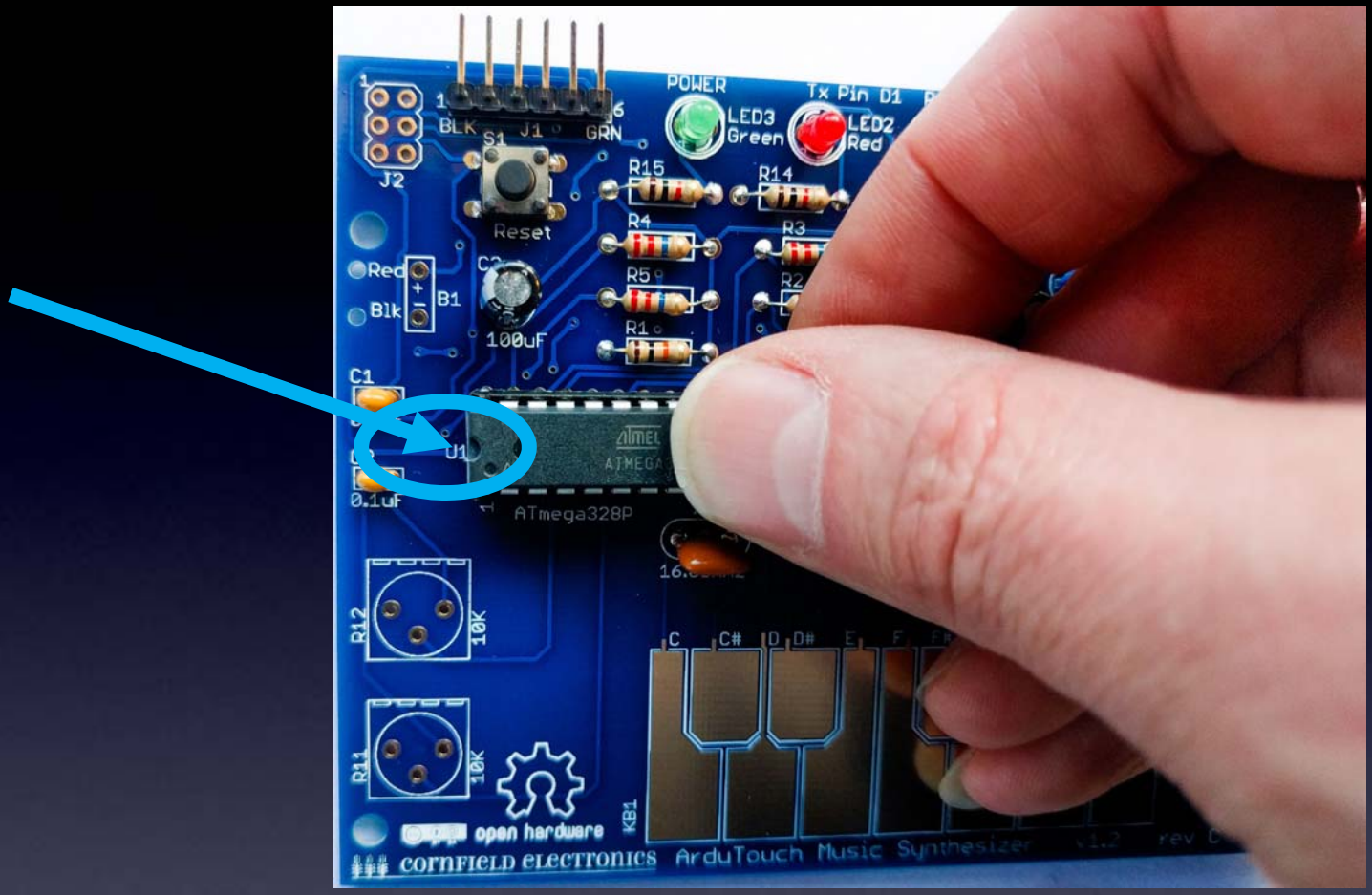


U1: microcontroller

U1: microcontroller

the kit comes with these pins already bent straight and parallel


proper
orientation
POWER
LED3
Green
Tx Pin D1
LED2
Red
Rx Pin D0
LED1
Blue
J2
J1
BLK
GRN
S1
Reset
R15
R14
R13
R4
R3
R5
R2
R1
C3
100uF
Red
Blk
C1
C2
0.1uF
U1
ATmega328P
X1
R12
10K
R9
R8
100uF
C6
1uF
C7
1uF
R10
10K
U2
LM386
Audio
Out
Speaker
R7
R6
C5
0.1uF
C4
0.1uF
TOUCH1
TOUCH2
S3 Left
S2 Right
C C# D D# E F F# G G# A A# B
U1: microcontroller



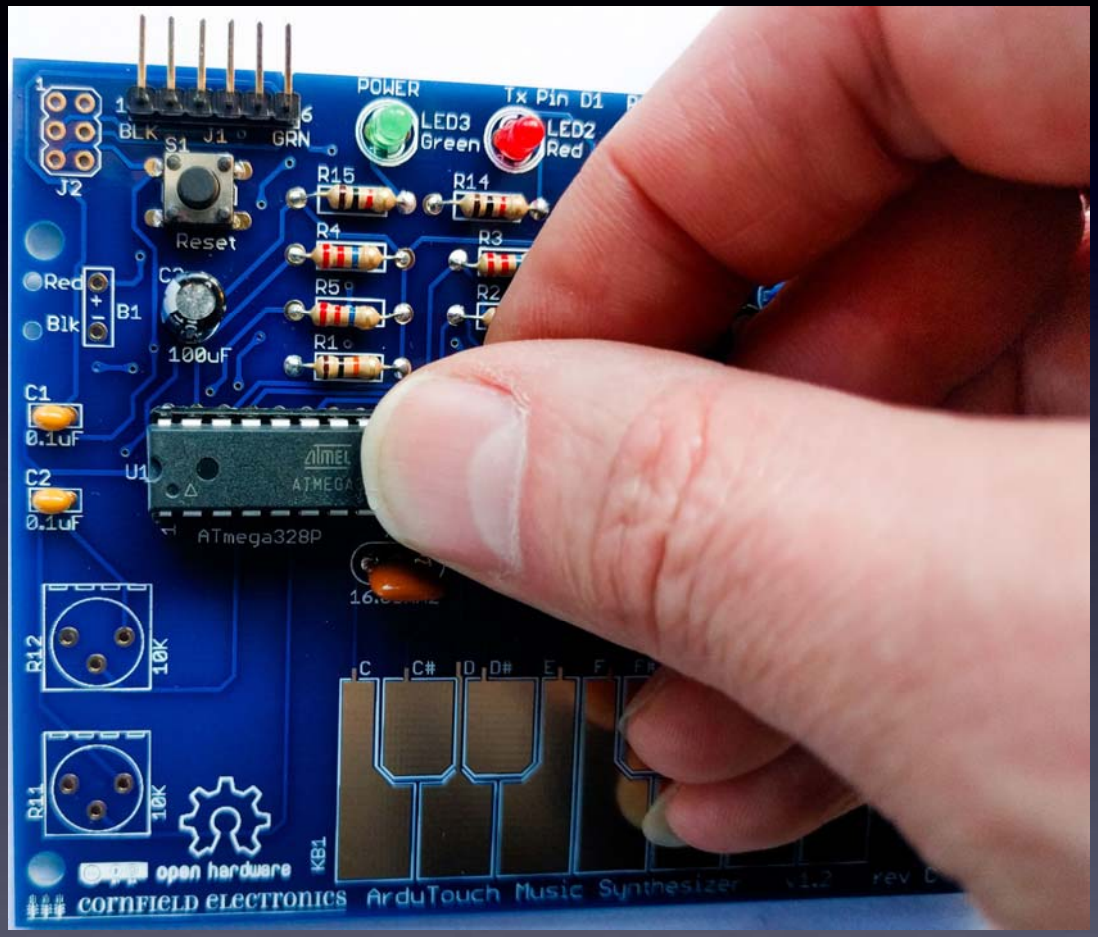
U1: microcontroller

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

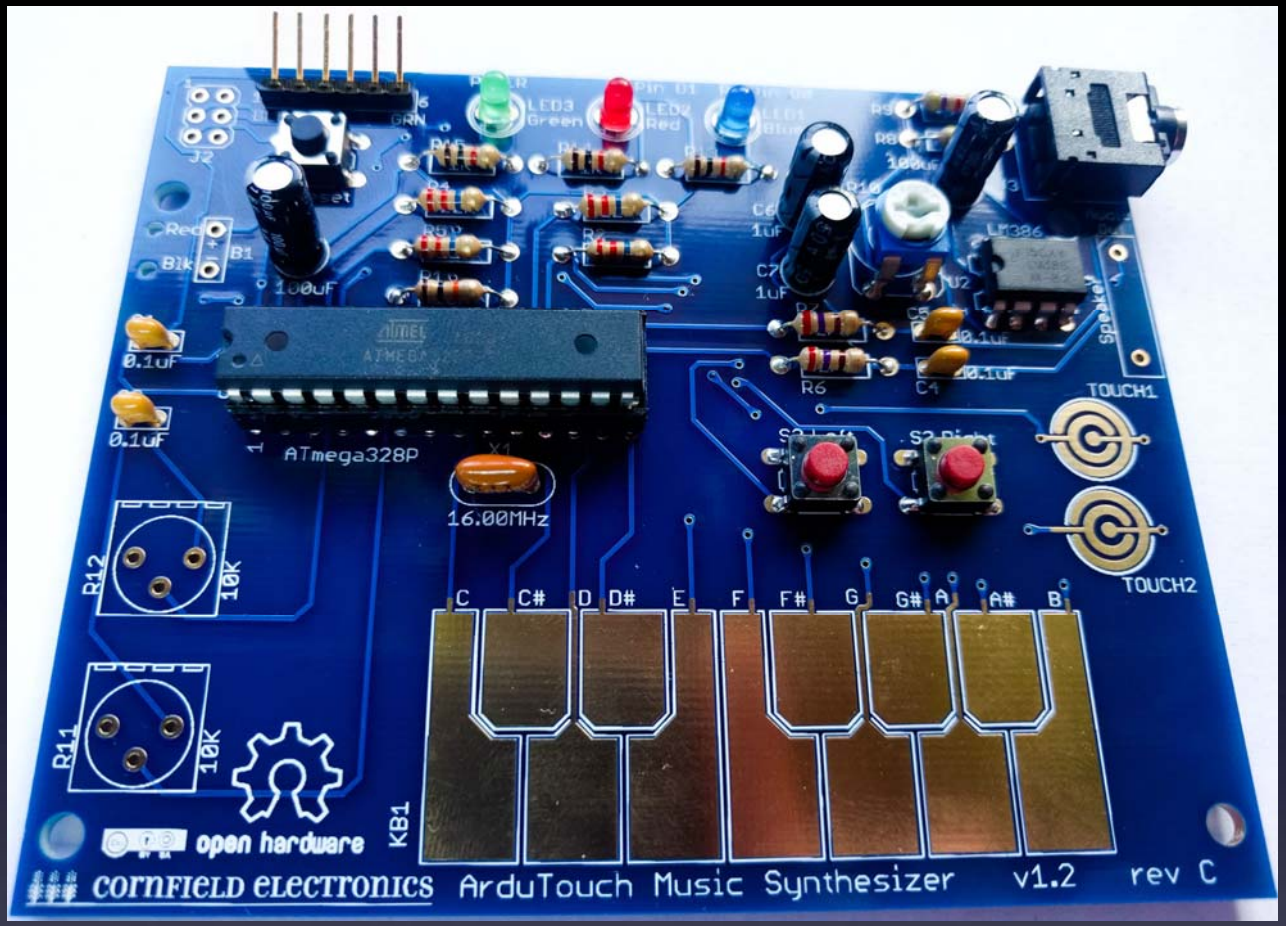
Use two thumbs to push microcontroller into the socket

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

(This is actually way easier with 2 thumbs.)



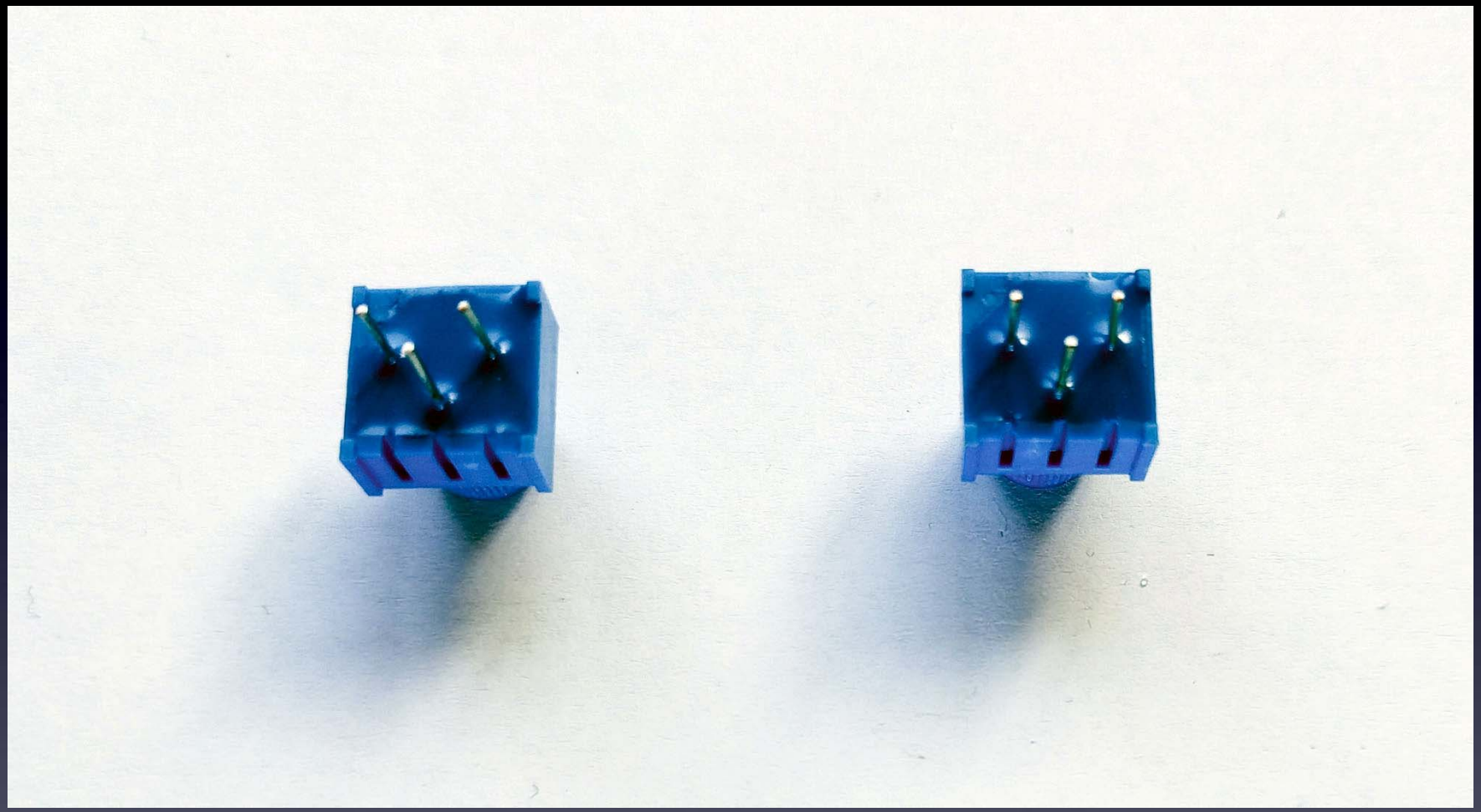
U1: microcontroller



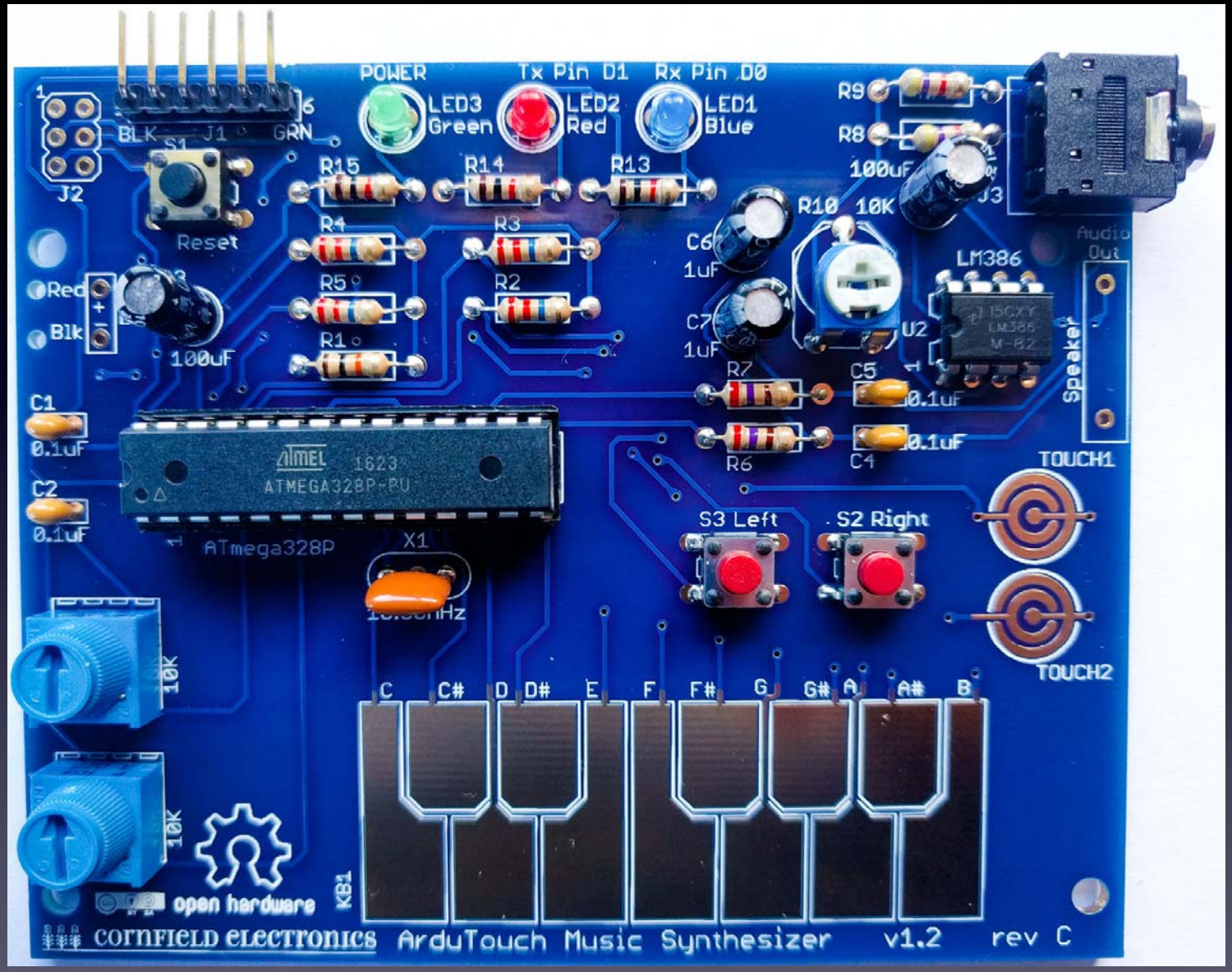
U1: microcontroller

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.



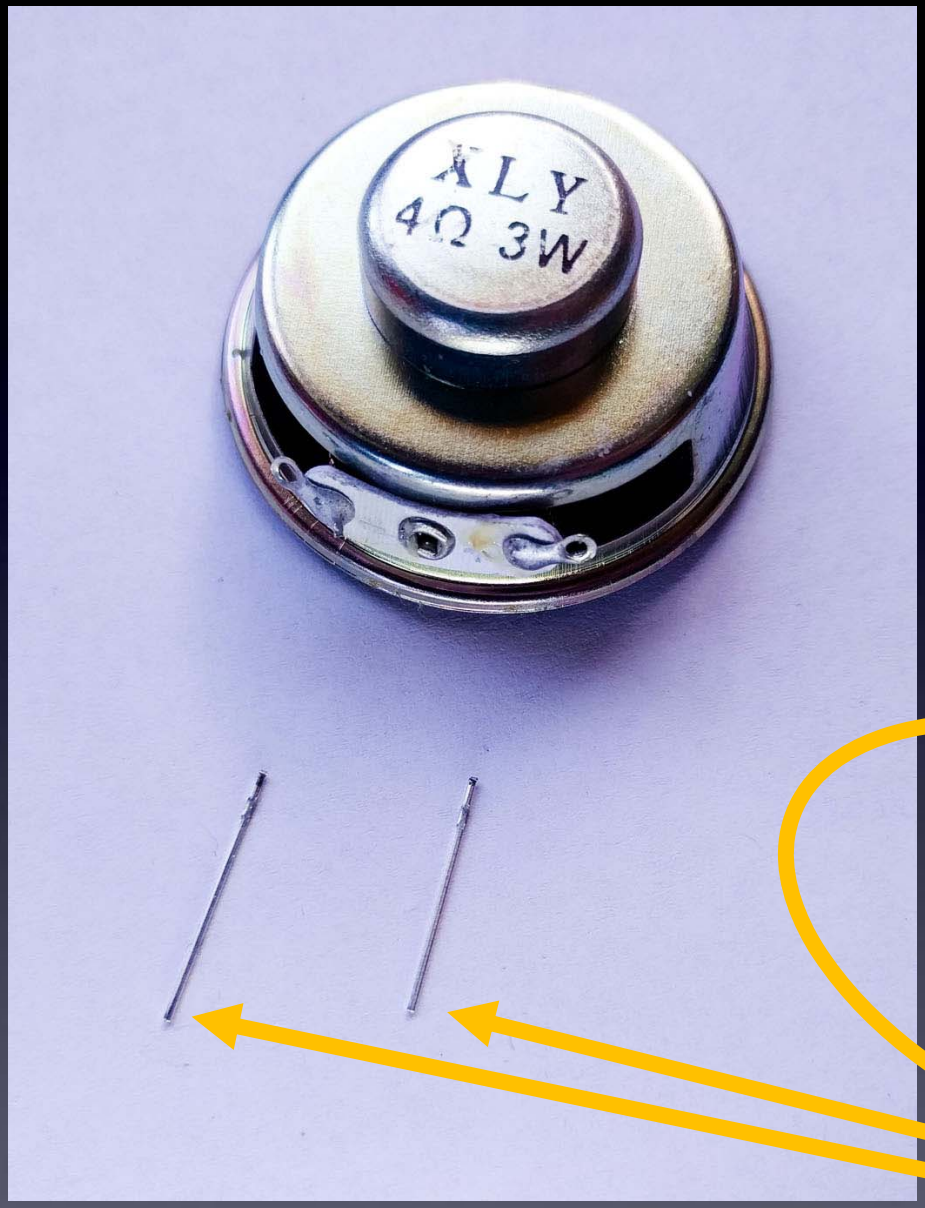
R11 & R12: potentiometers



R11 & R12: potentiometers

Speaker

We'll add leads to the speaker



Saved leads from the LEDs

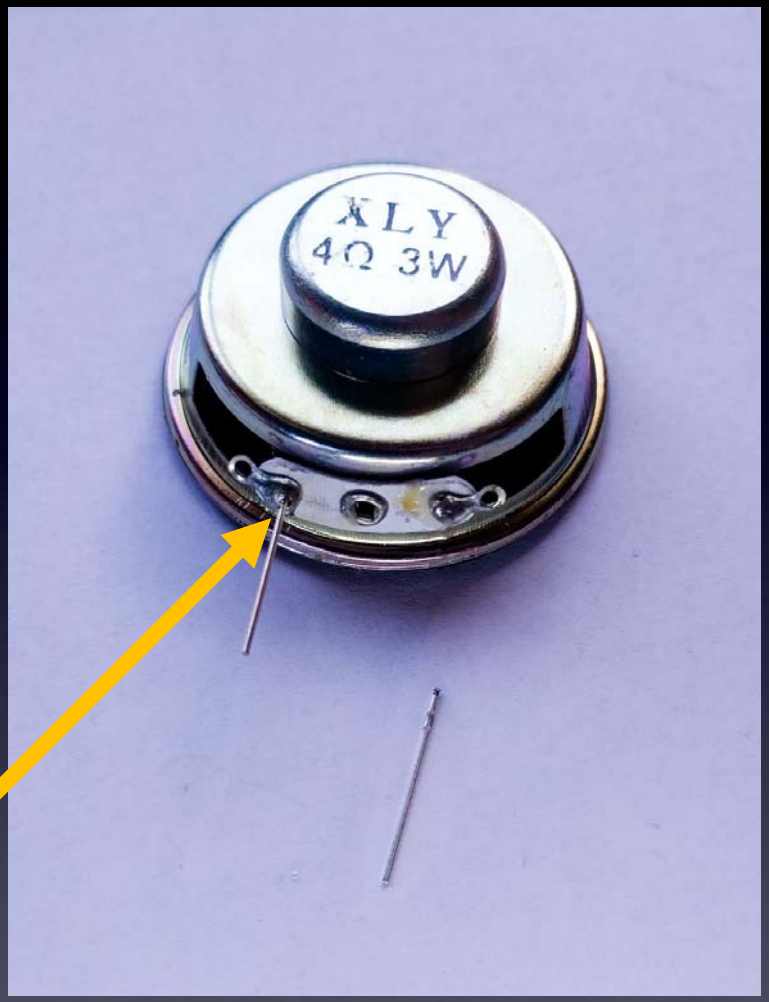
Speaker

Tin one side of each lead

(i.e., cover with thin film of melted solder)

Speaker

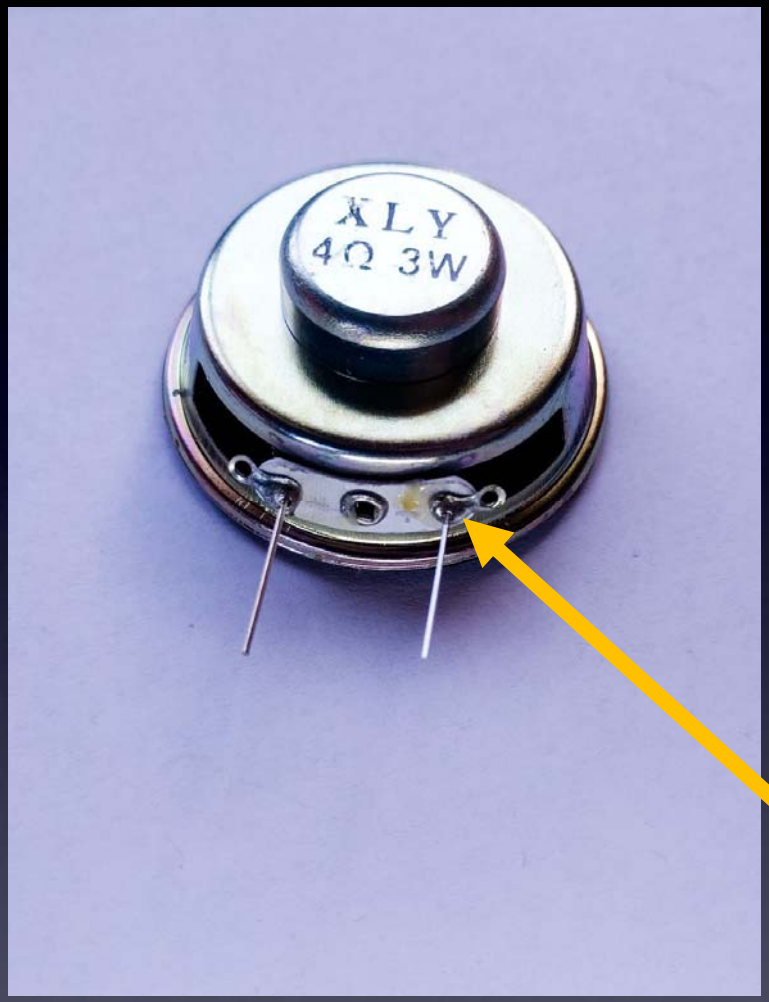
Solder one lead
to speaker



Notice the
correct place
to solder the wire

Speaker

Solder next lead
to speaker

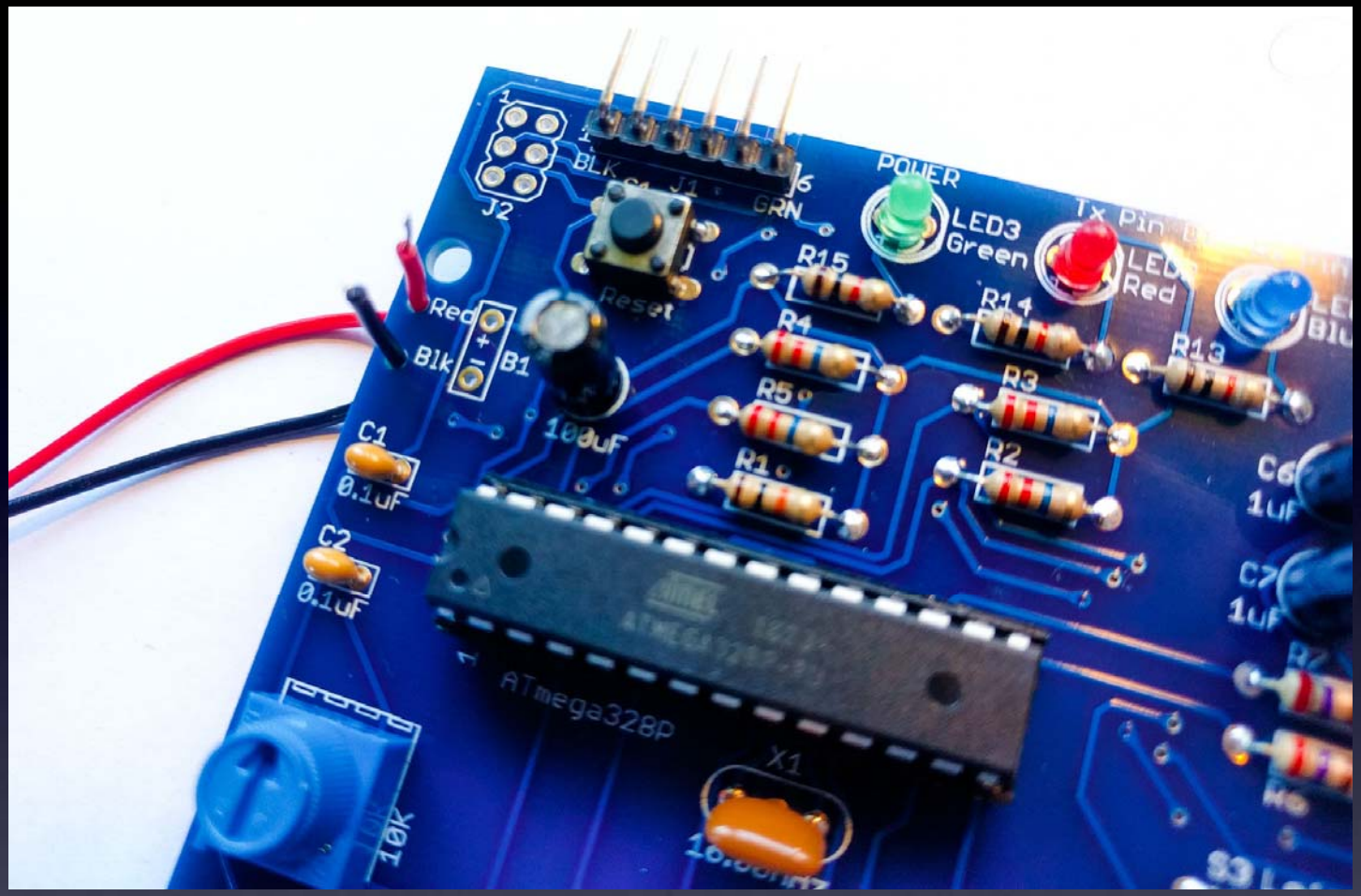


Notice the
correct place
to solder the wire

Speaker

Insert
speaker into board
and solder
both leads to board.

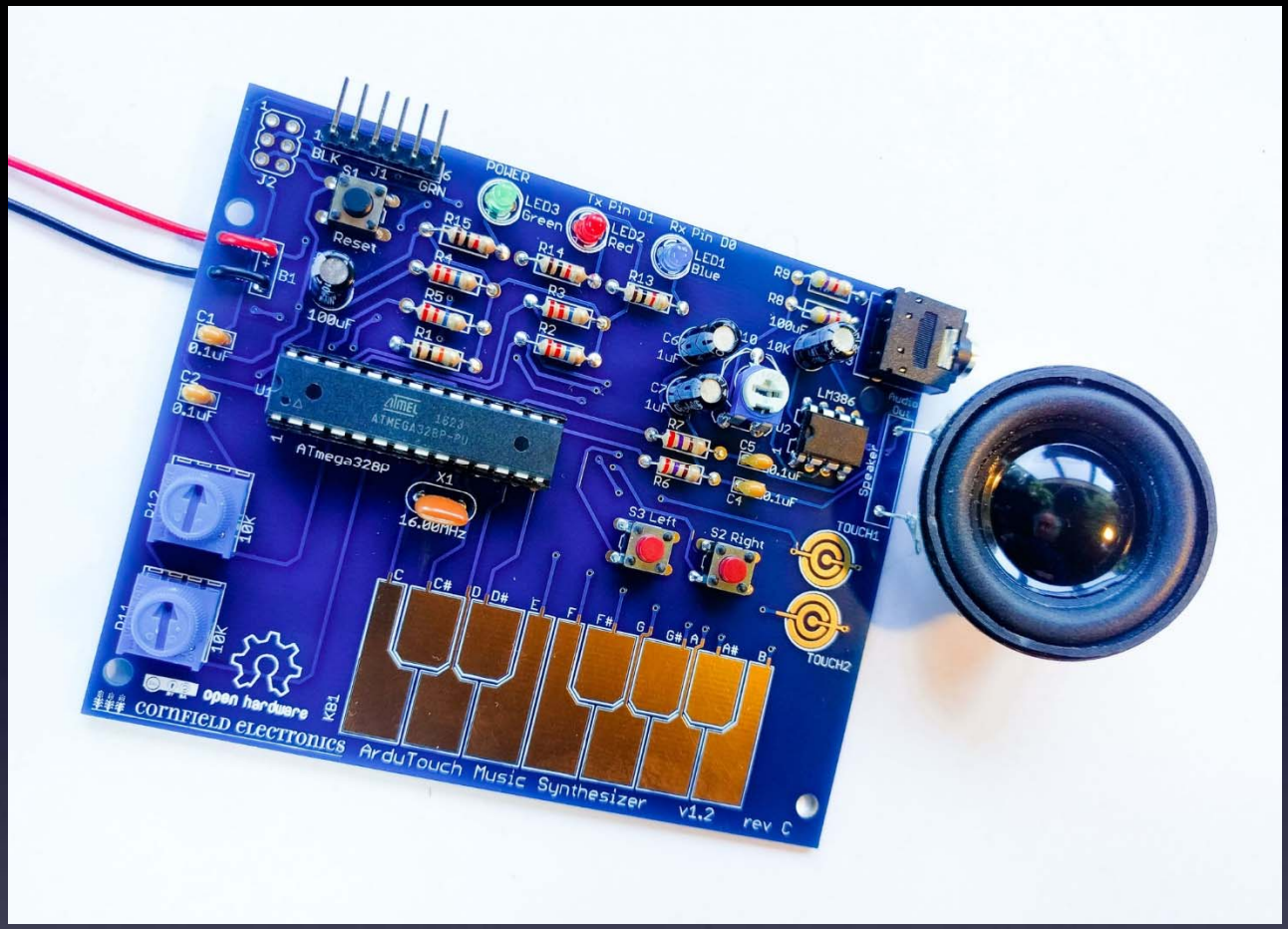
Speaker



Push battery pack leads through holes.

Make sure Red and Black go through their correct holes!

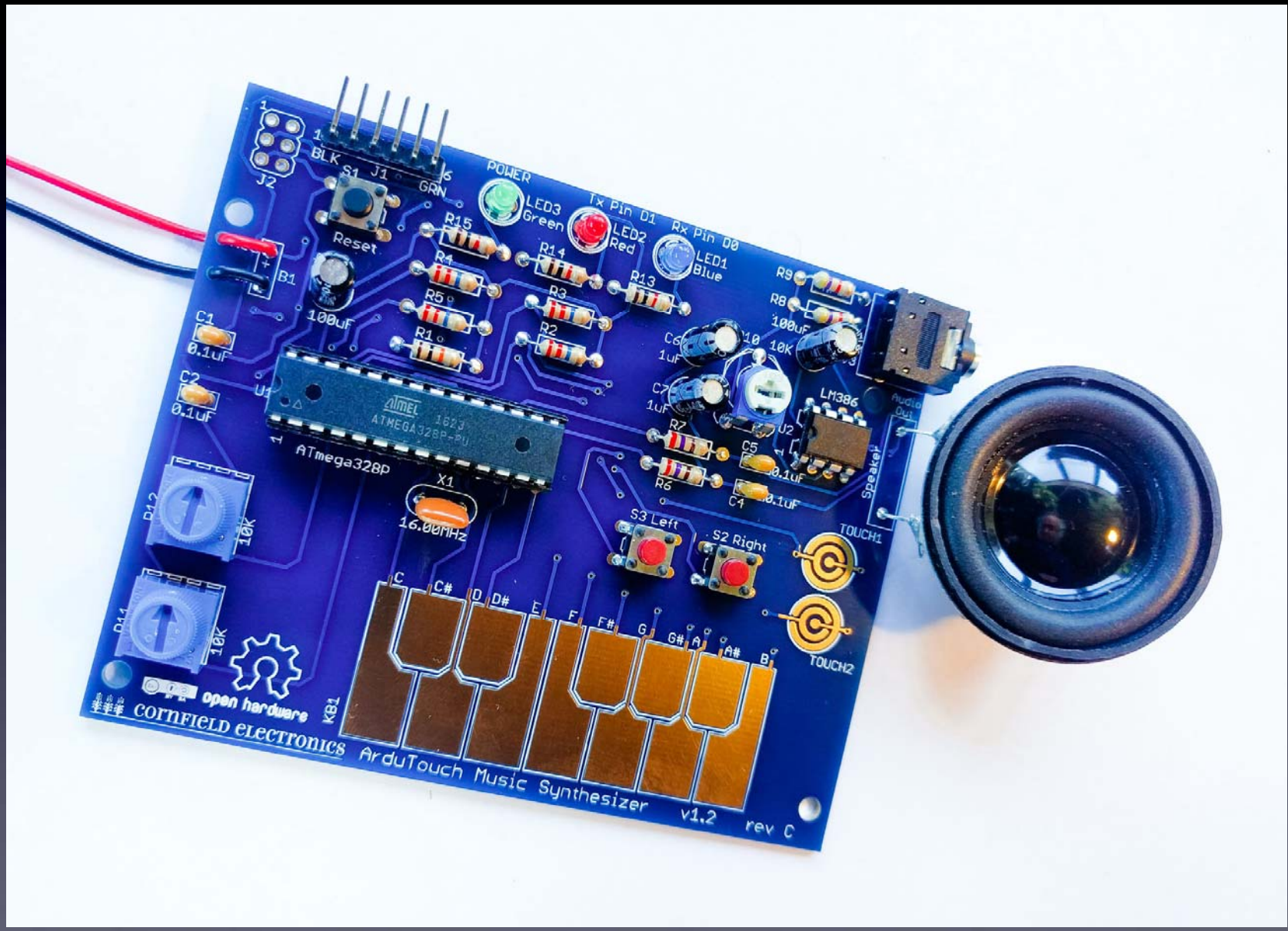
Battery pack



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

Battery pack

Done!


POWER
LED3 Green
Tx Pin D1
LED2 Red
Rx Pin D0
LED1 Blue
Reset
ATmega328p
16.00MHz
LM386
TOUCH1
TOUCH2
S3 Left
S2 Right
open hardware
CORNFIELD ELECTRONICS
ArduTouch Music Synthesizer
v1.2
rev C

Let’s make noise!