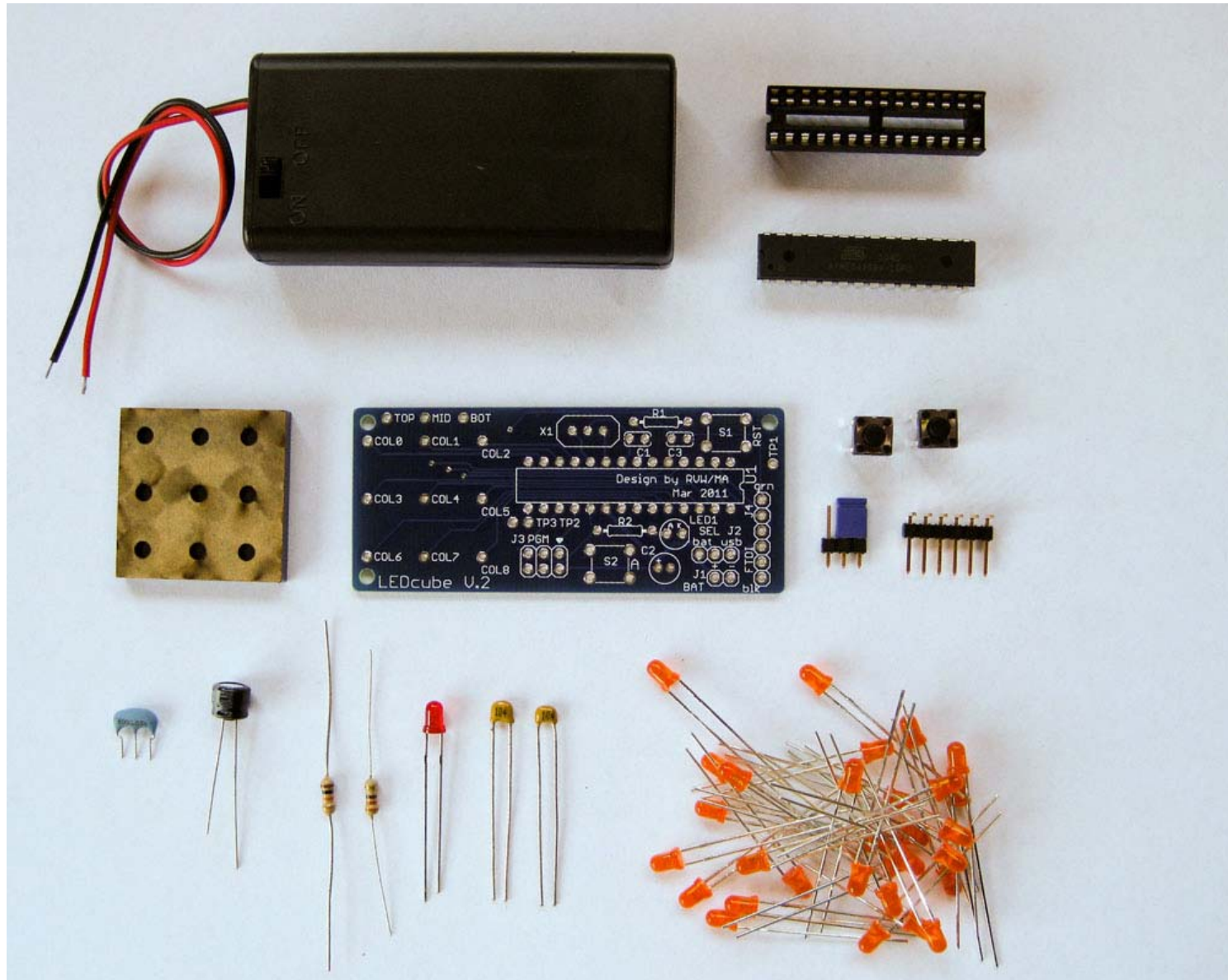


# Parts



# Tools

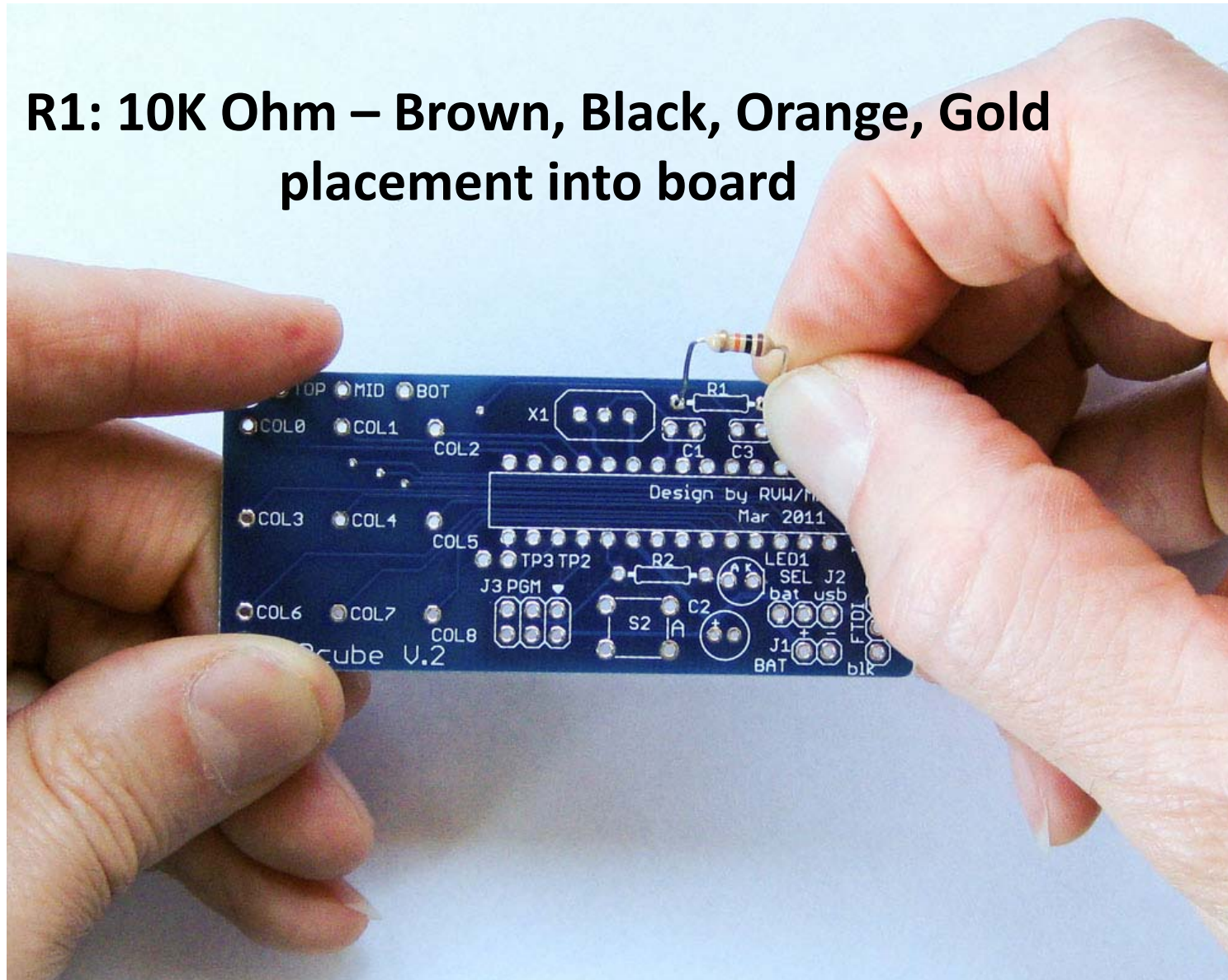




**R1: 10K Ohm – Brown, Black, Orange, Gold  
bend leads**

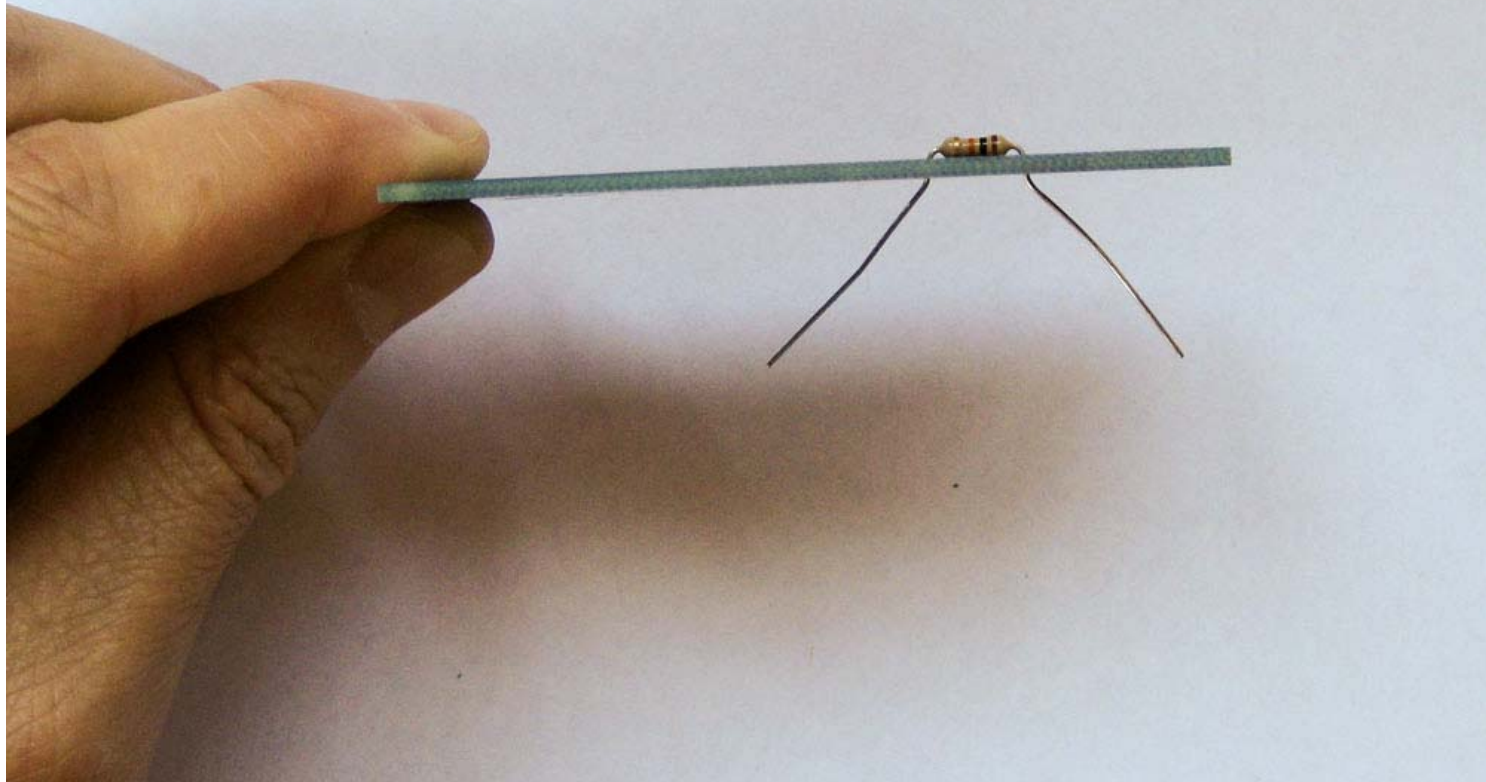


**R1: 10K Ohm – Brown, Black, Orange, Gold  
placement into board**

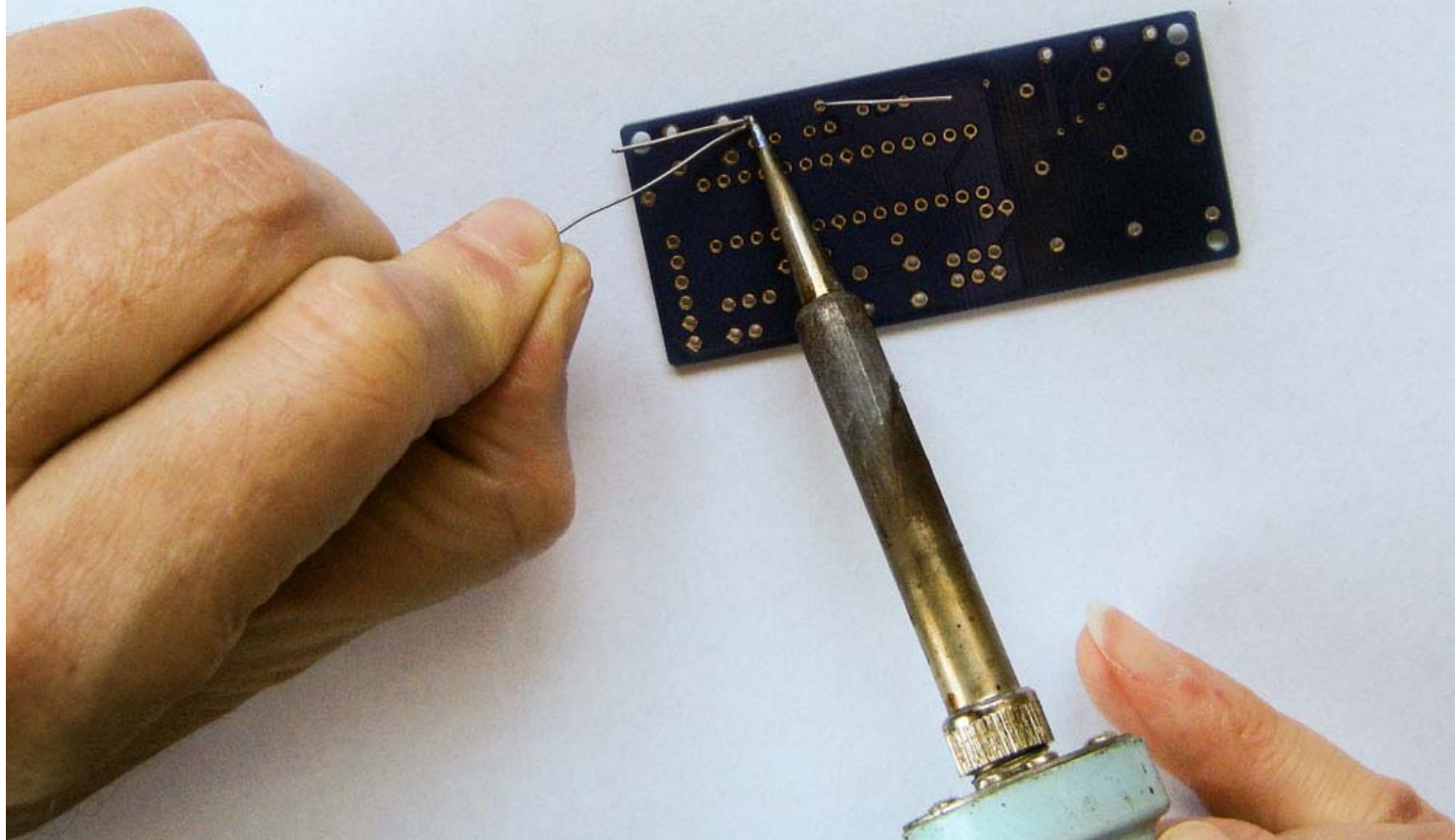




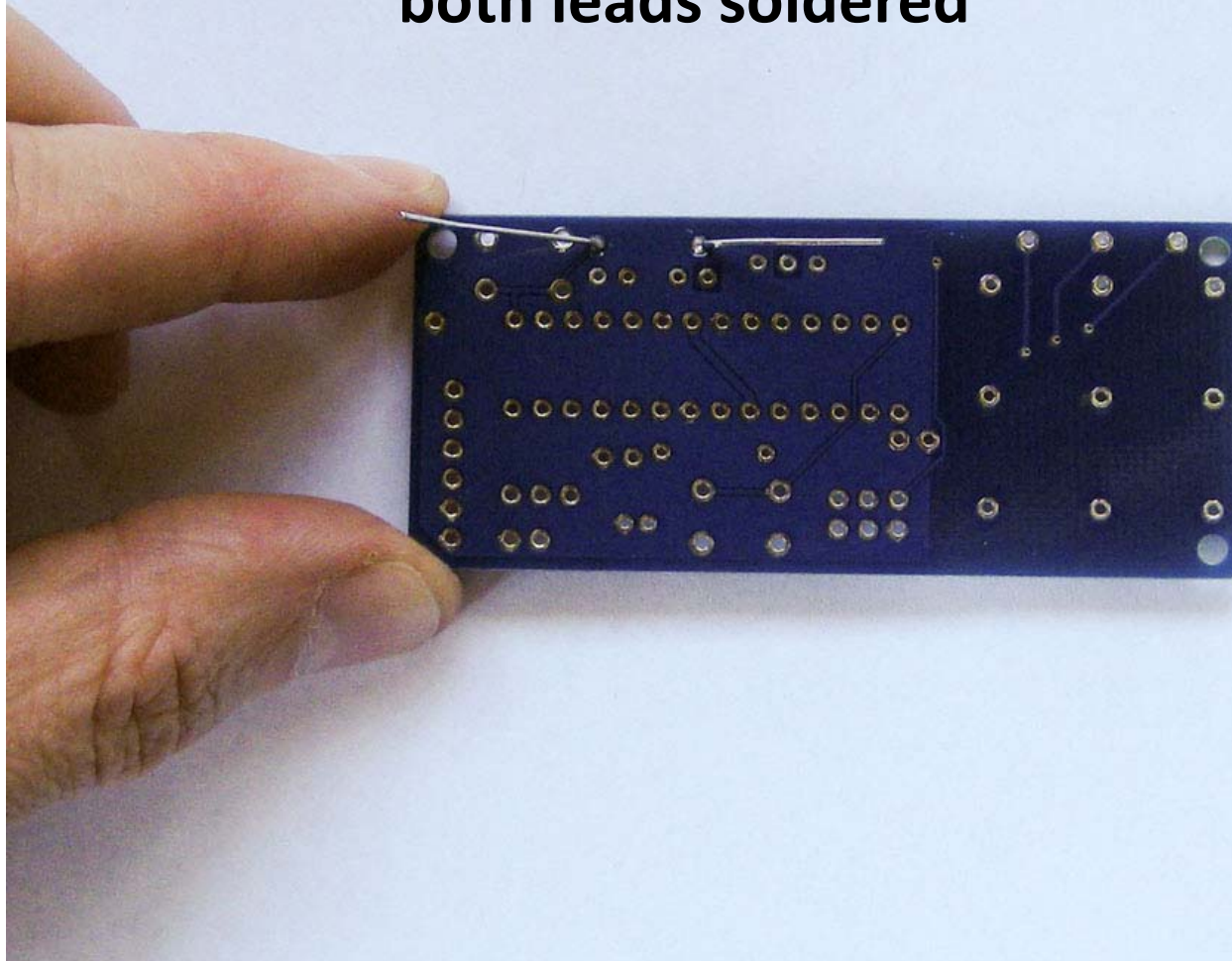
**R1: 10K Ohm – Brown, Black, Orange, Gold  
placed in board  
leads bent out**



**R1: 10K Ohm – Brown, Black, Orange, Gold  
solder both leads to their pads**



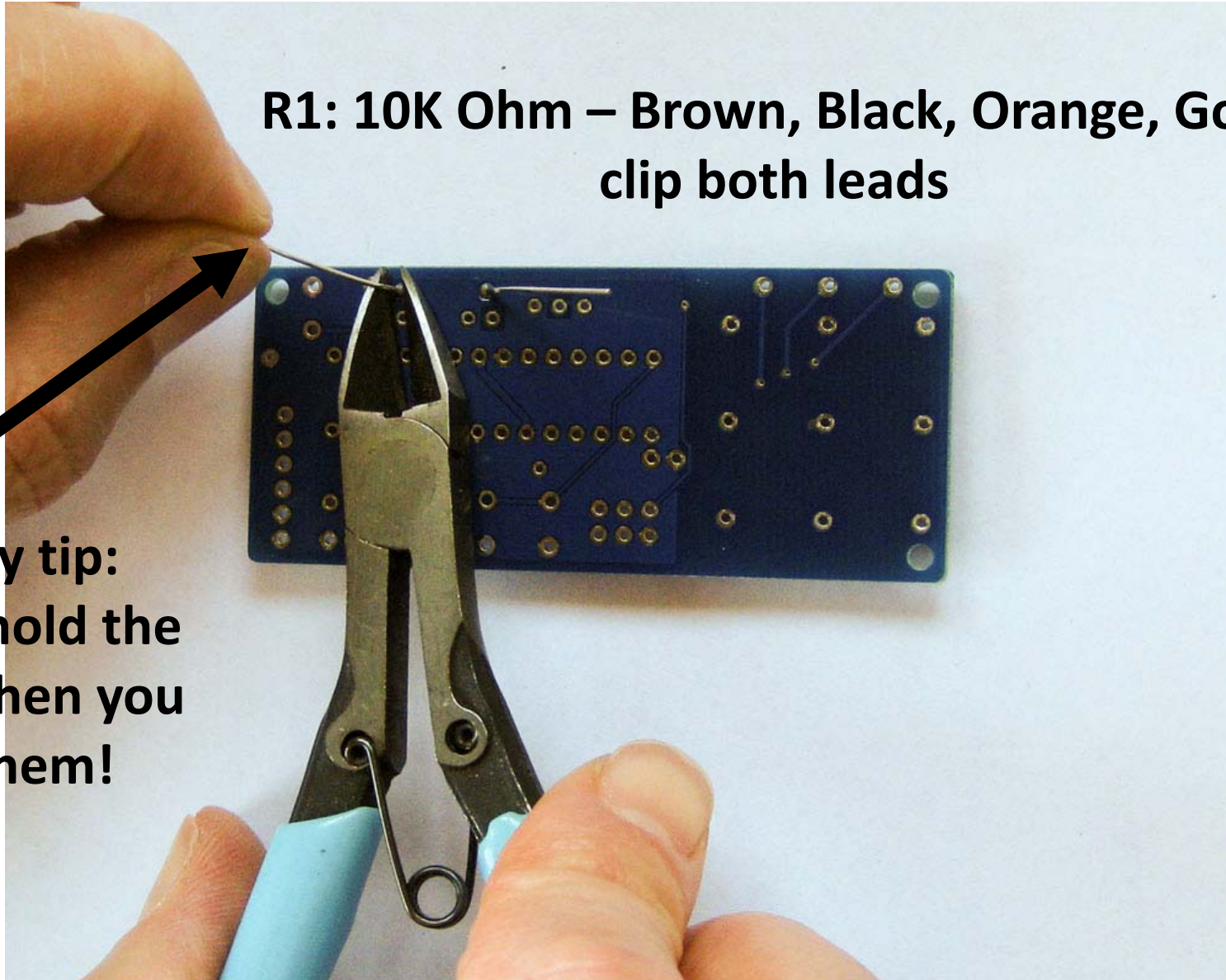
**R1: 10K Ohm – Brown, Black, Orange, Gold  
both leads soldered**





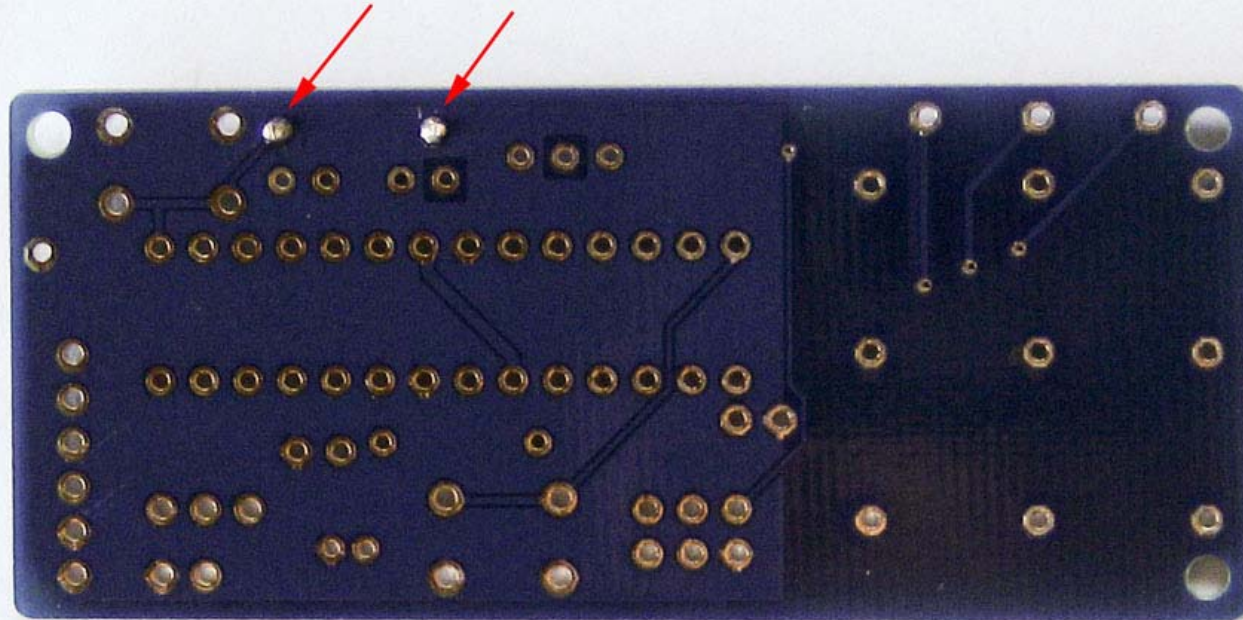
**R1: 10K Ohm – Brown, Black, Orange, Gold  
clip both leads**

**Safety tip:  
Please hold the  
leads when you  
cut them!**

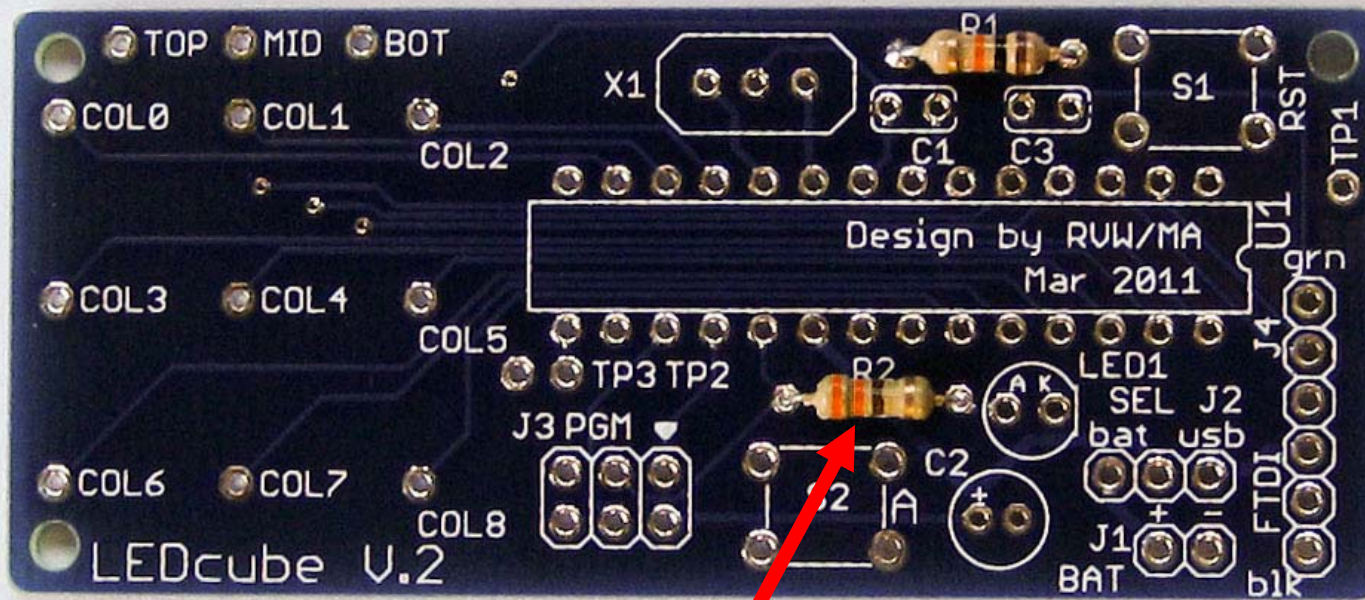




**R1: 10K Ohm – Brown, Black, Orange, Gold  
both leads soldered and clipped**

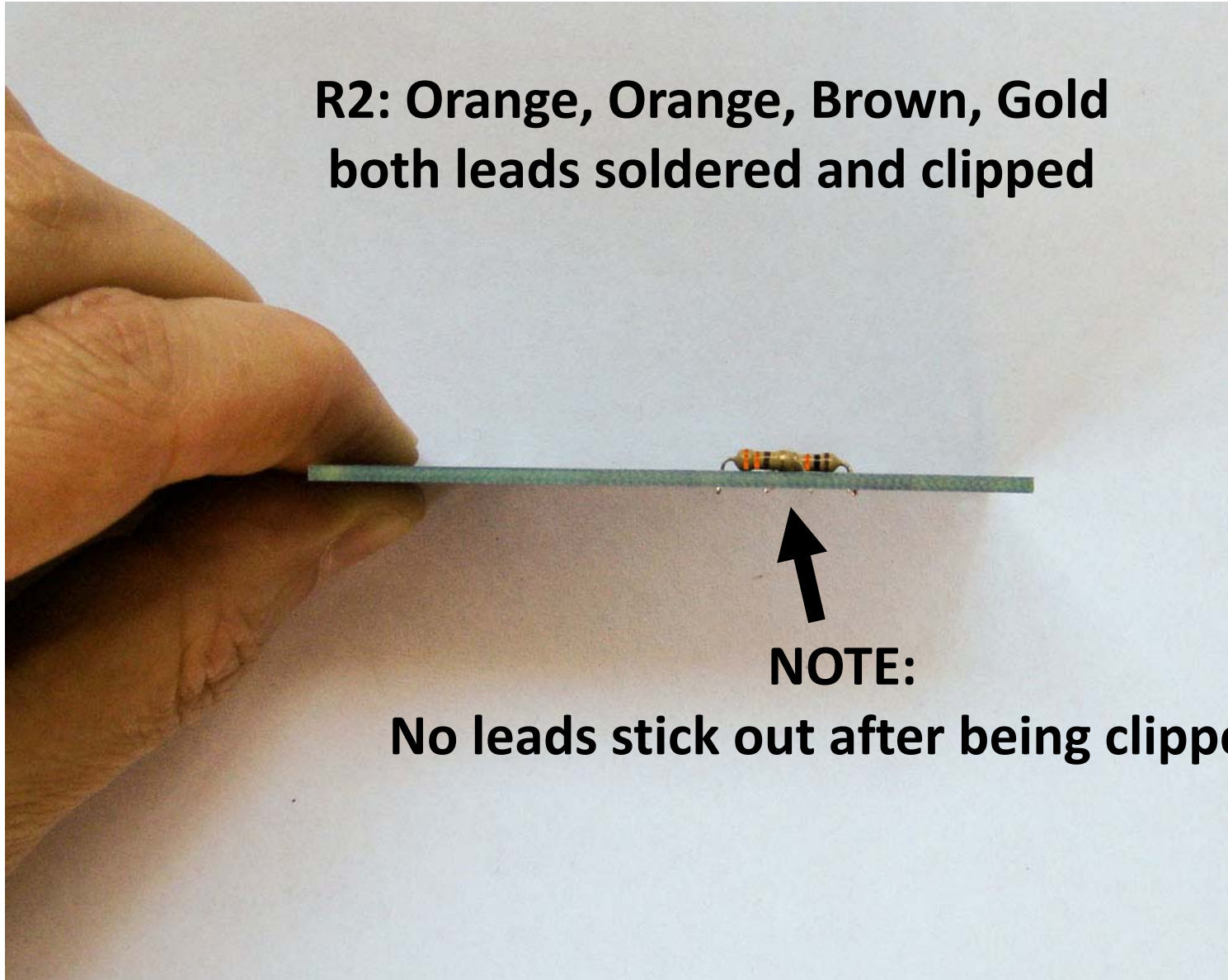


**R2: 330 Ohm – Orange, Orange, Brown, Gold  
both leads soldered and clipped**





**R2: Orange, Orange, Brown, Gold  
both leads soldered and clipped**

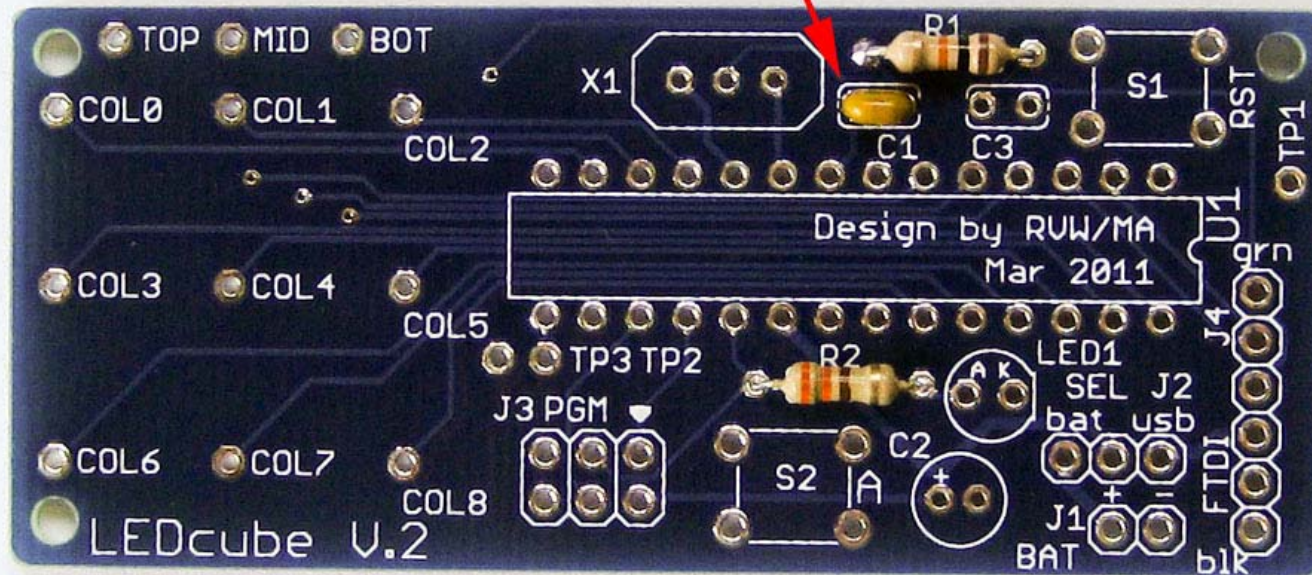


**NOTE:**

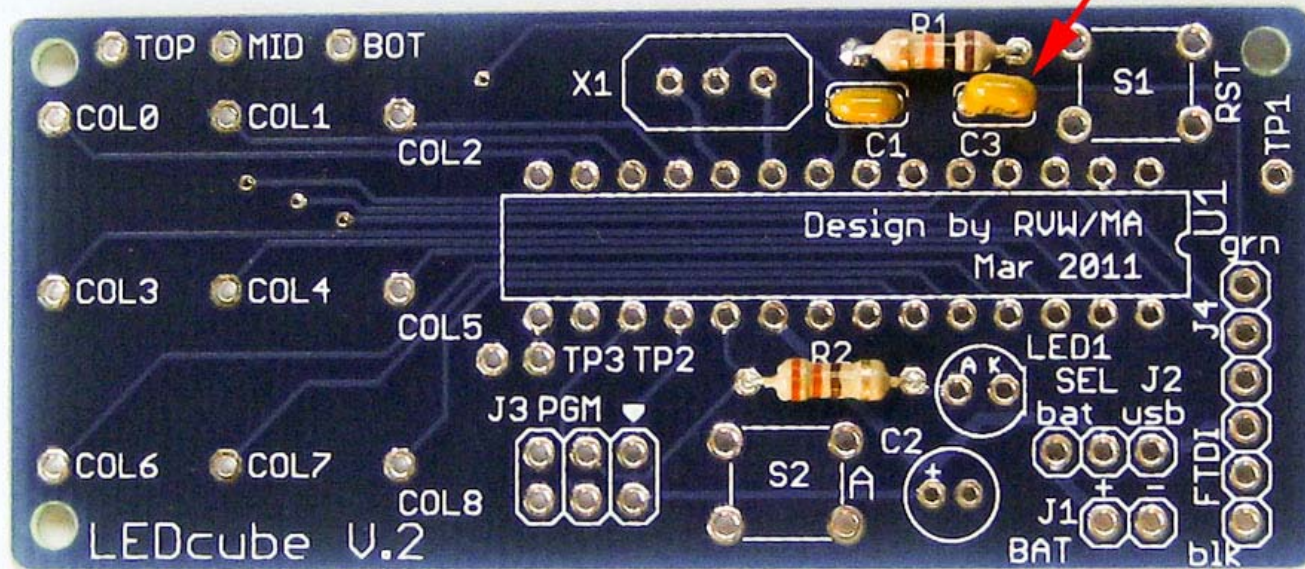
**No leads stick out after being clipped.**



**C1: 0.1uF**

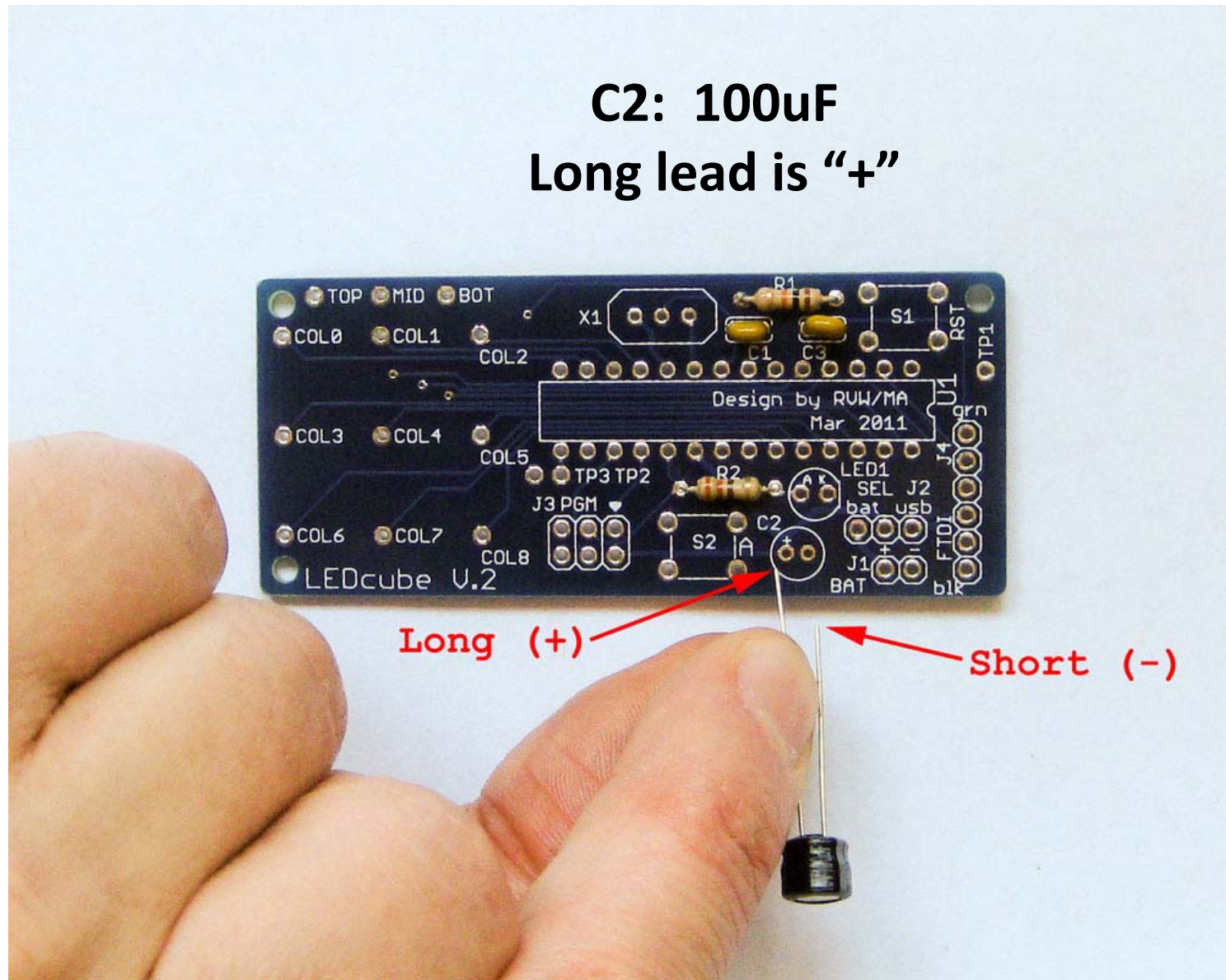


**C3: 0.1uF**



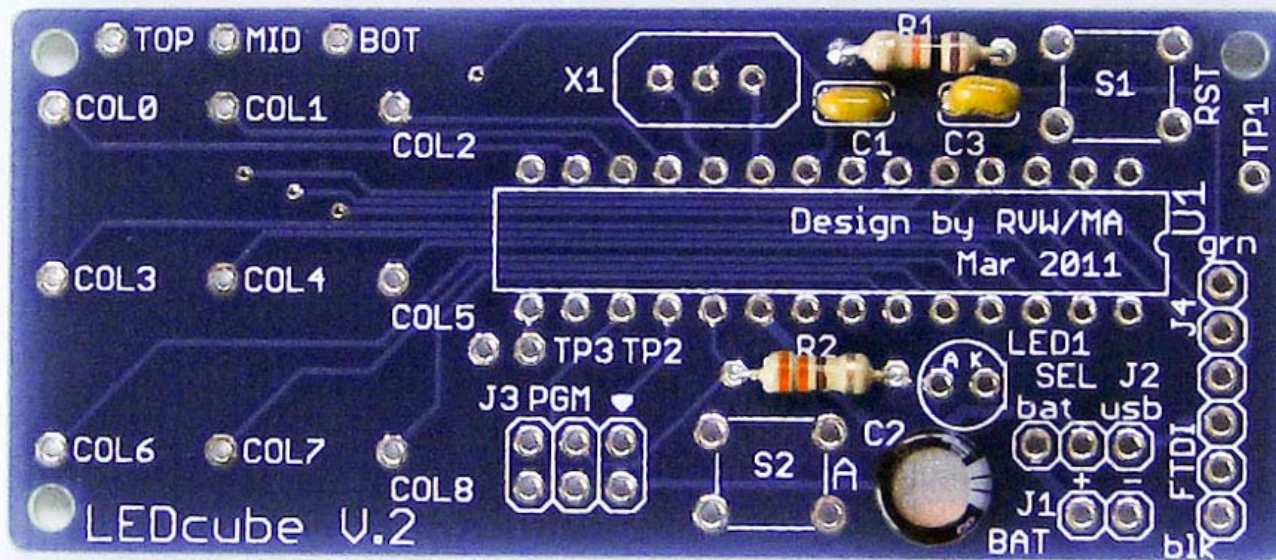


**C2: 100uF**  
**Long lead is “+”**

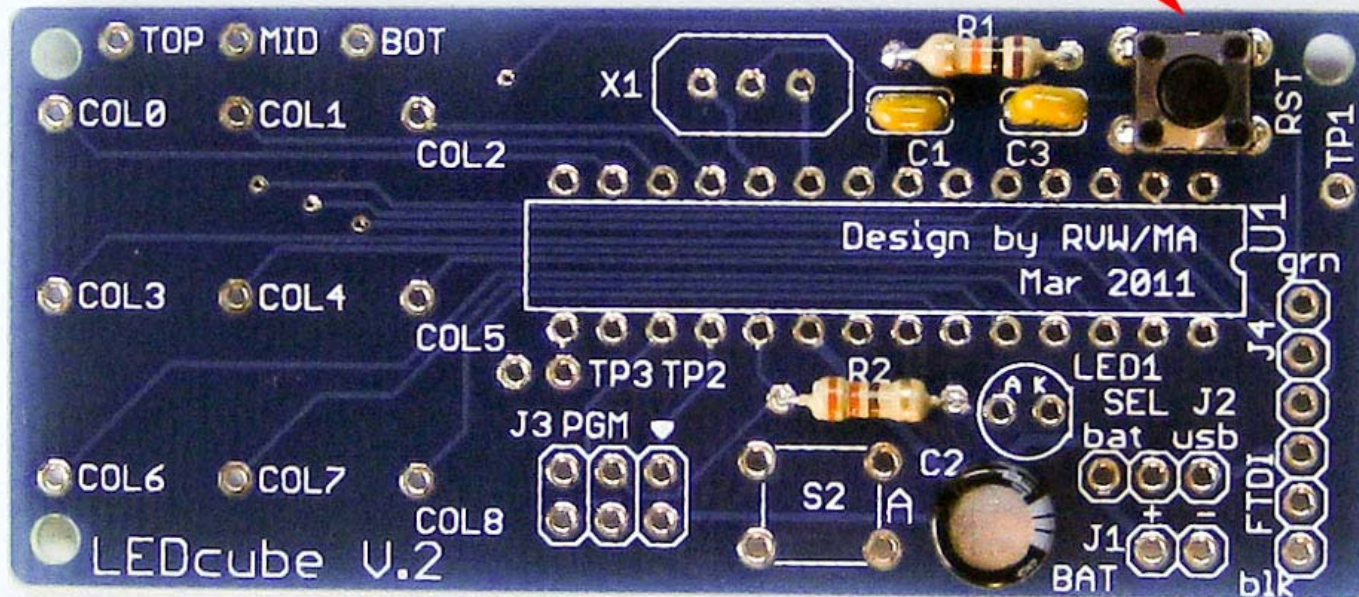




**C2: 100uF  
soldered, with leads clipped**

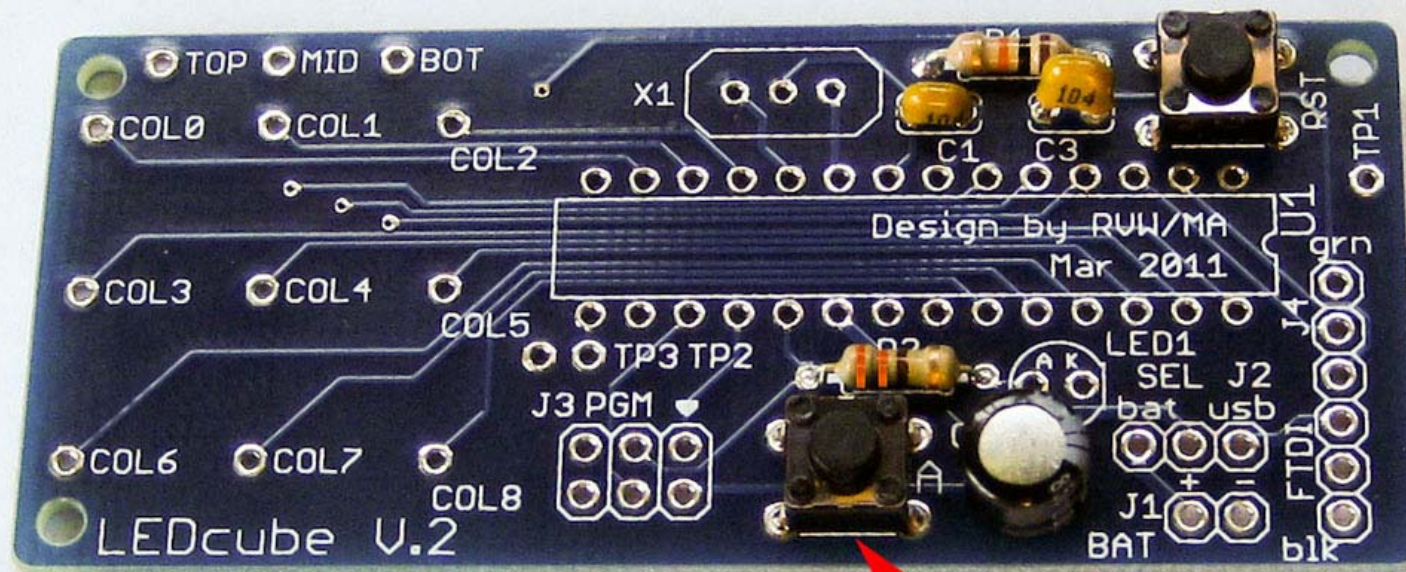


**S1**  
**soldered (no need to clip leads)**

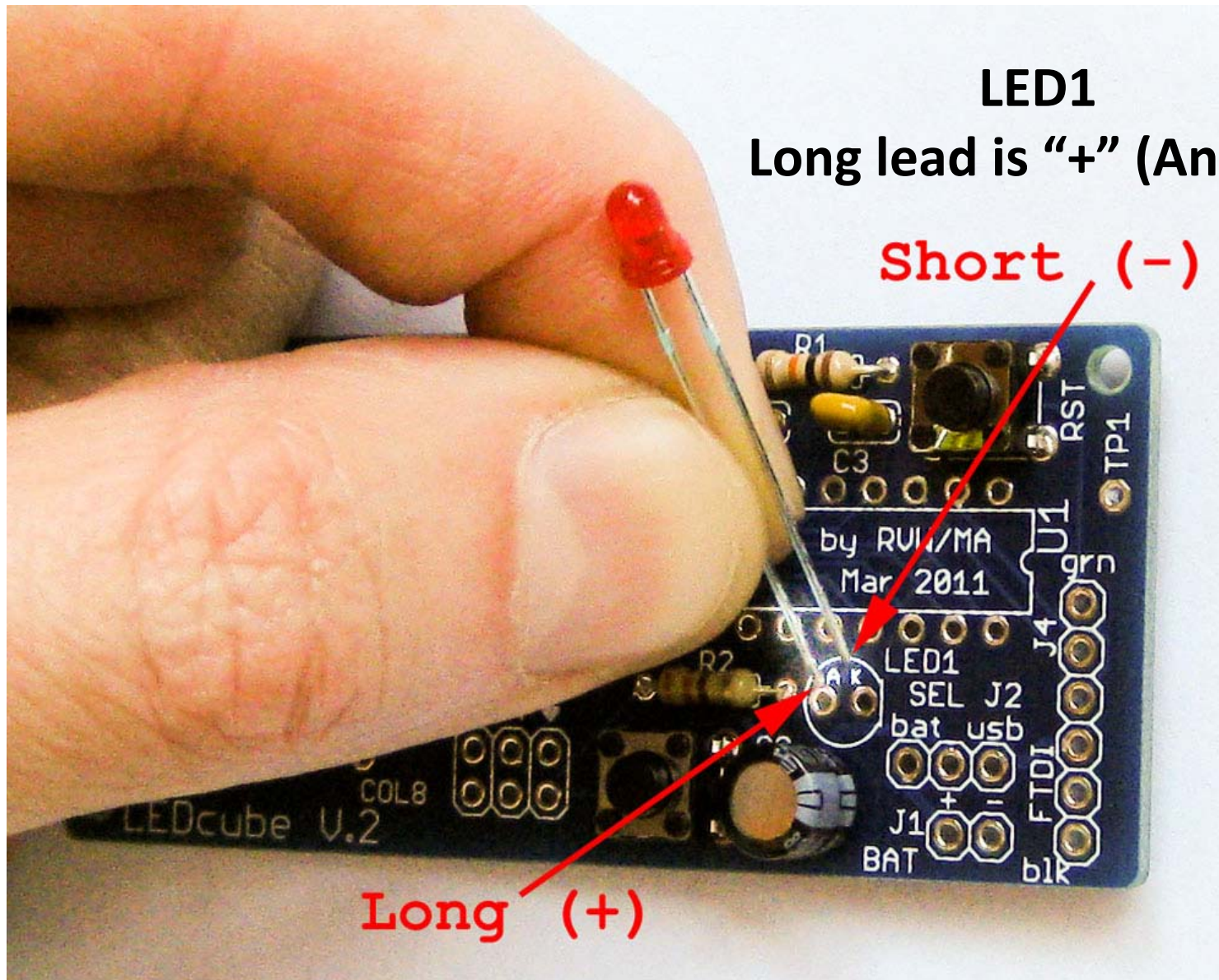




**S2**  
**soldered (no need to clip leads)**







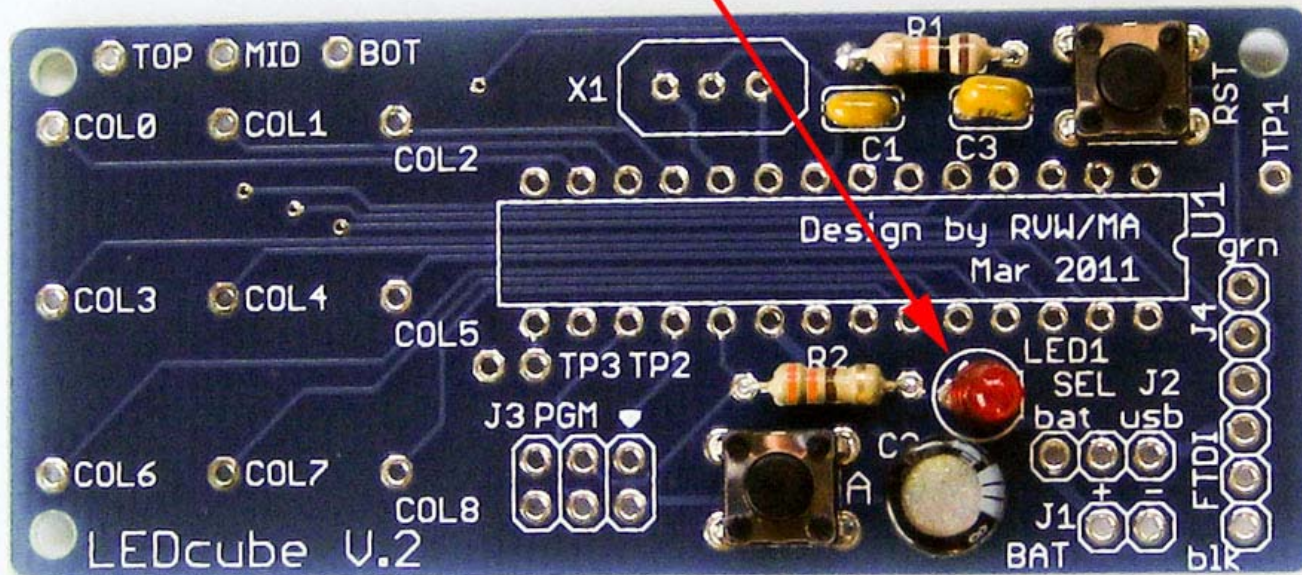
**LED1**

**Long lead is "+" (Anode)**

**Short (-)**

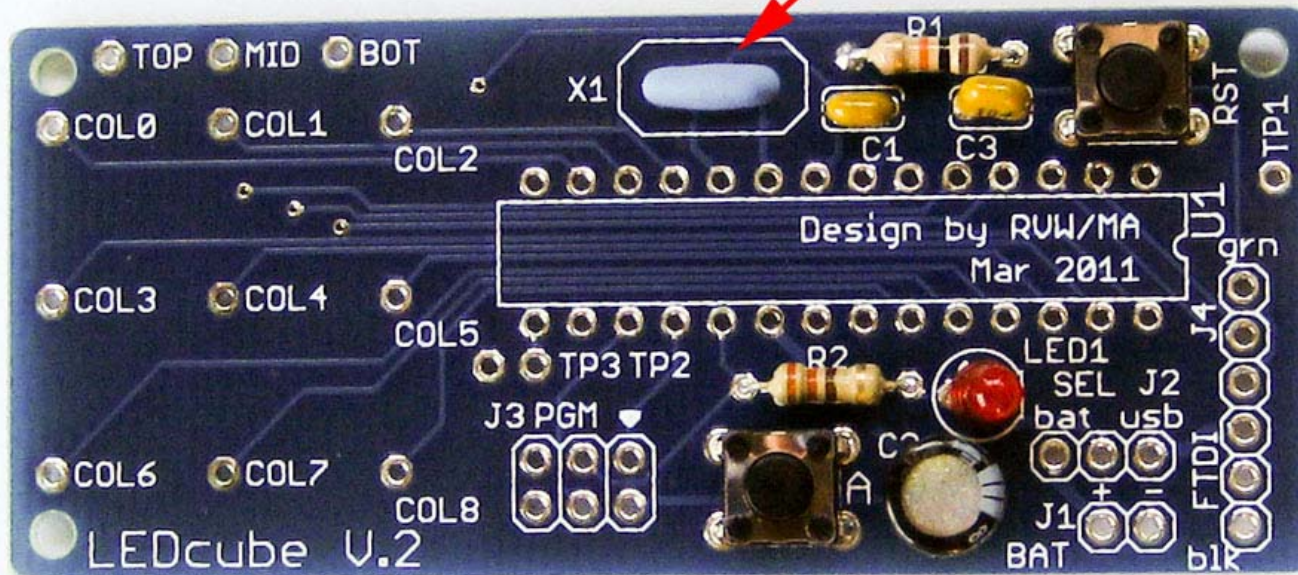
**Long (+)**

**LED1**  
**soldered, leads clipped**



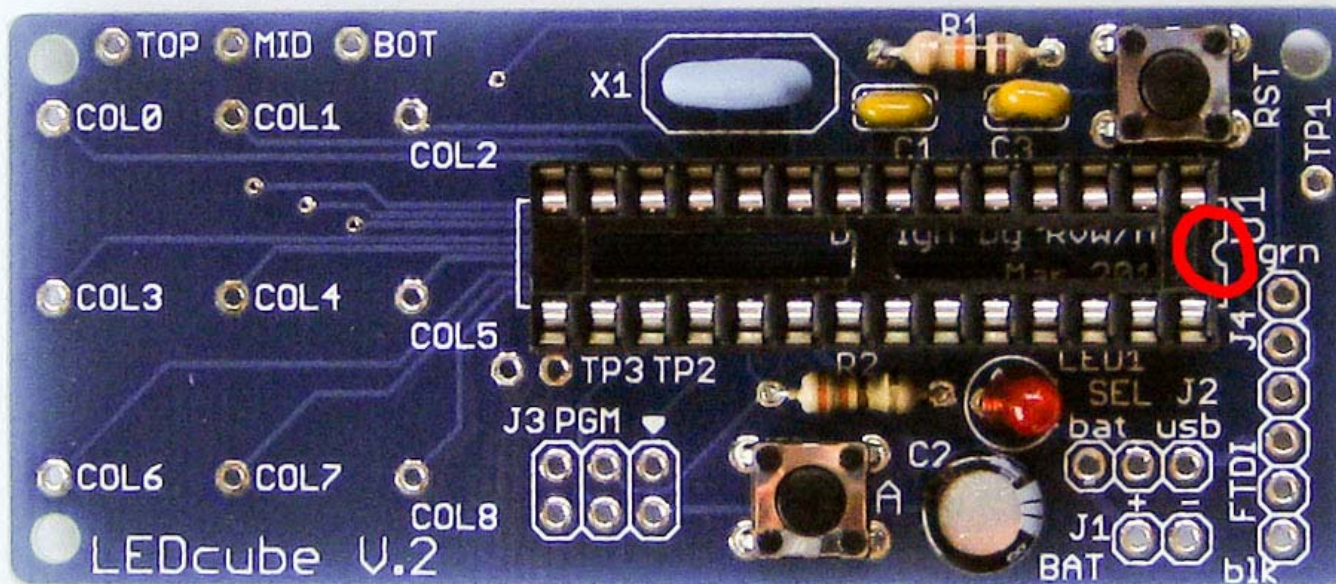


**X1**  
**soldered, leads clipped**

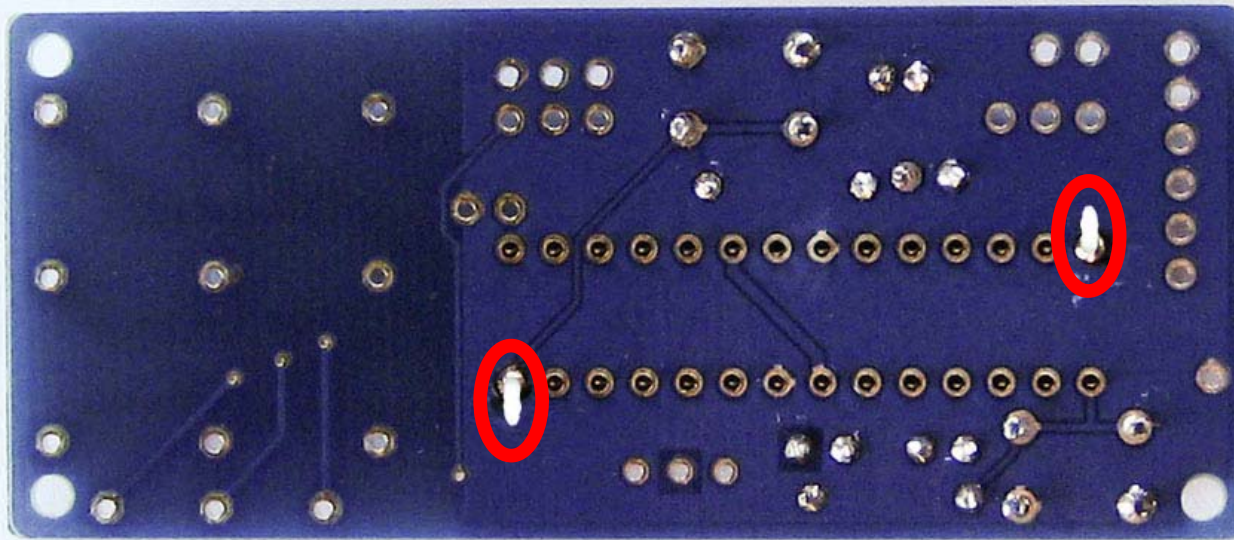




**U1 socket**  
**Match the half circle notch**  
**with the same shape on the board**

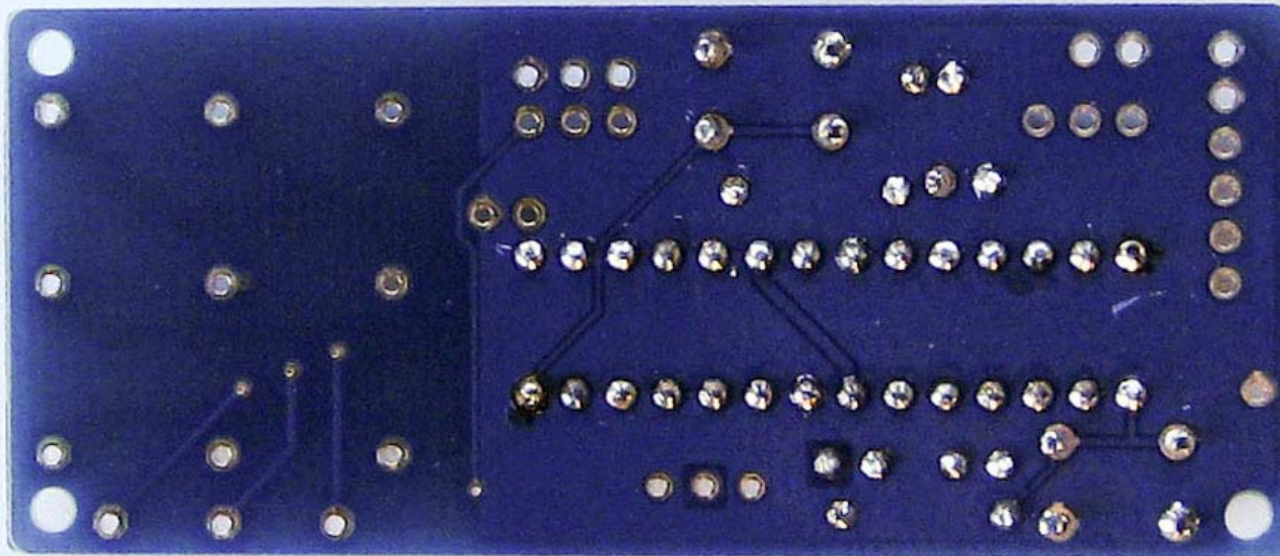


**U1 socket**  
**pins on opposite corners bent out**

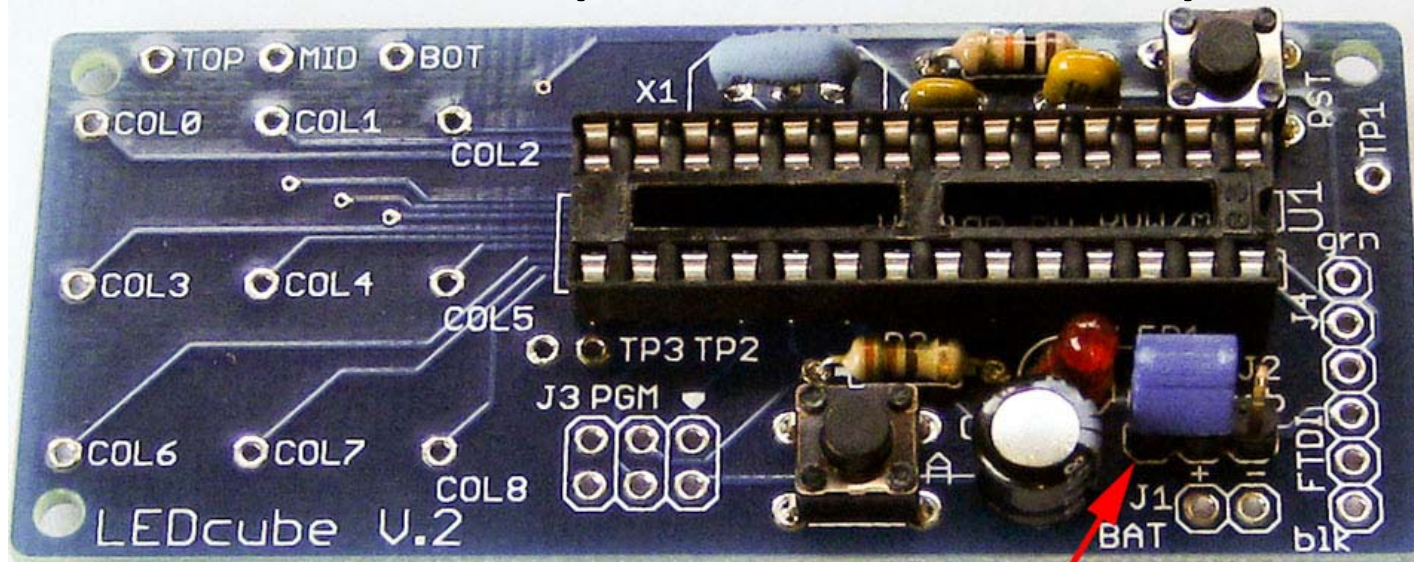




**U1 socket**  
**all pins soldered (no need to cut leads)**

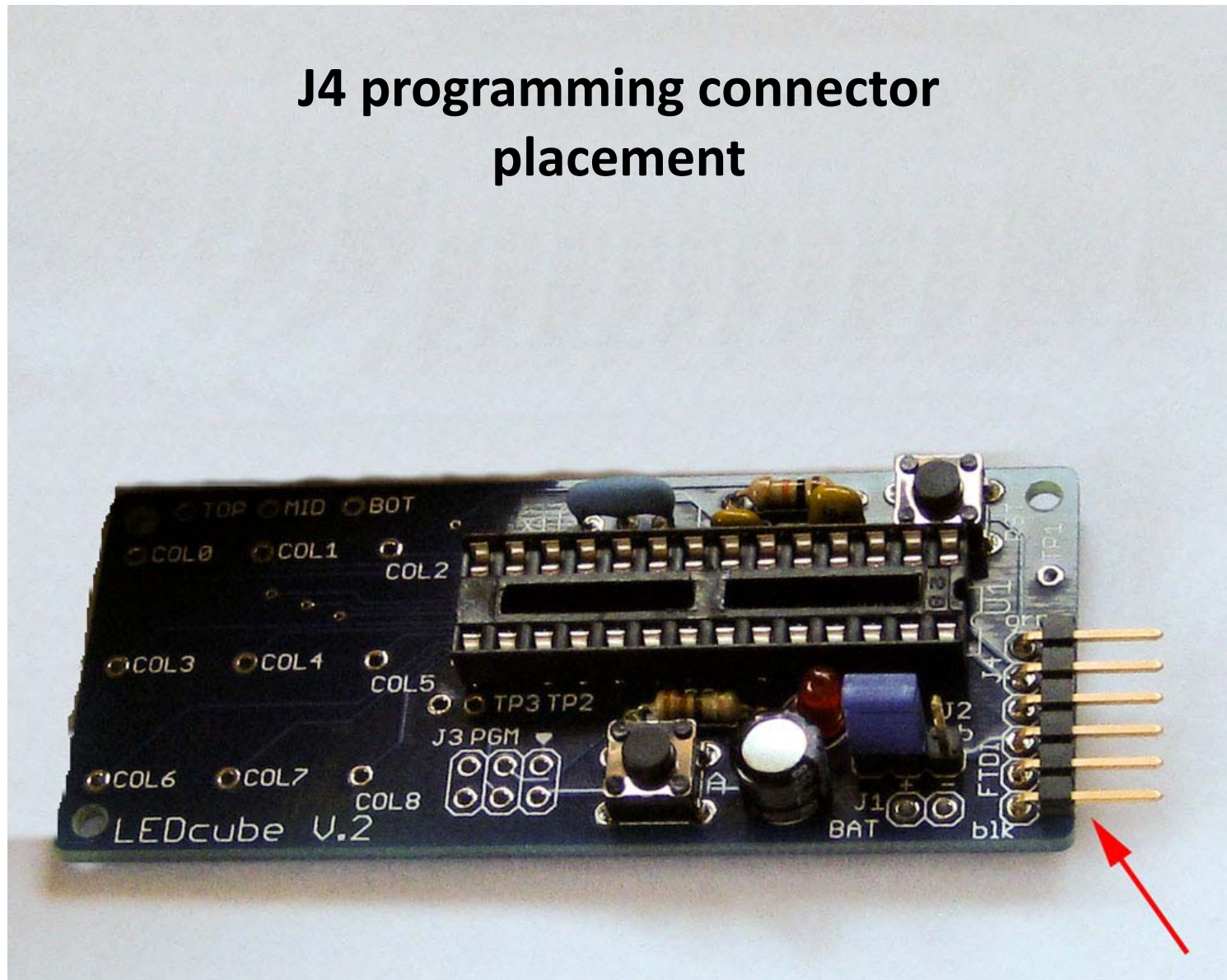


**J2 jumper with jumper block  
soldered (no need to cut leads)**

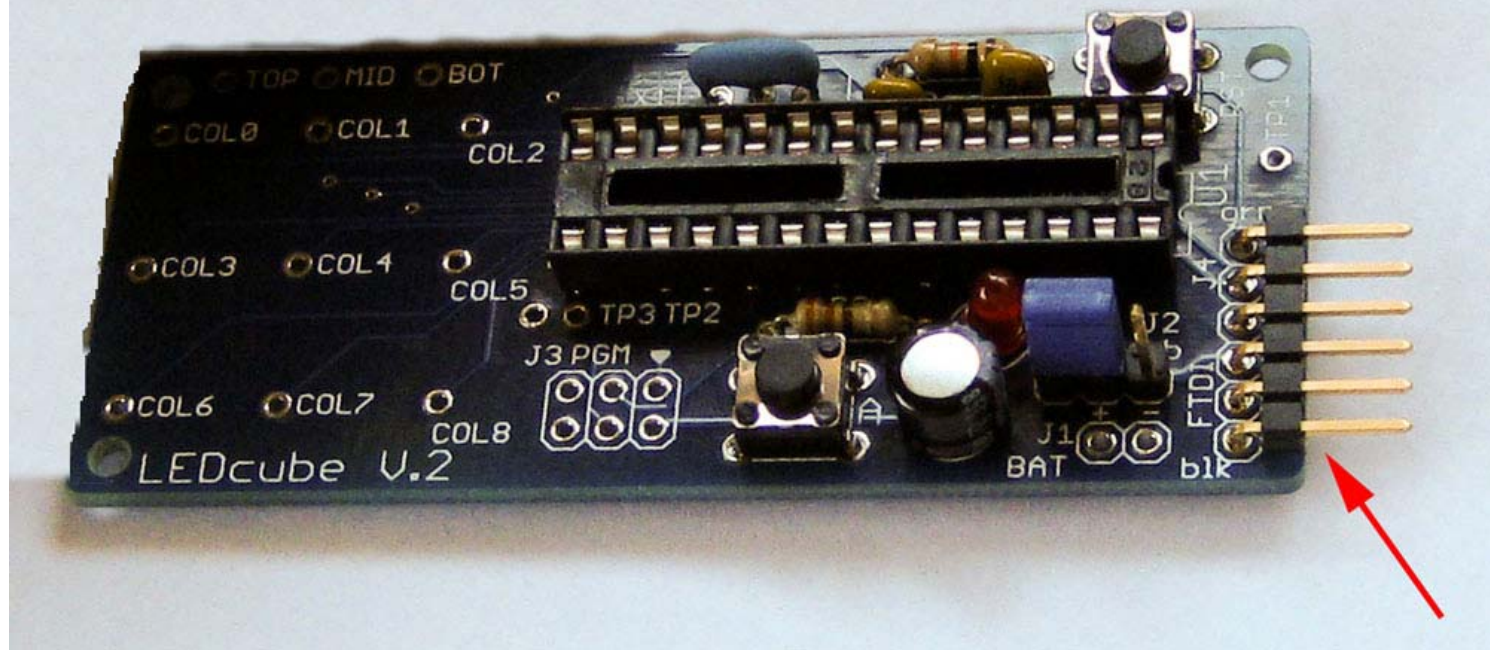




## J4 programming connector placement

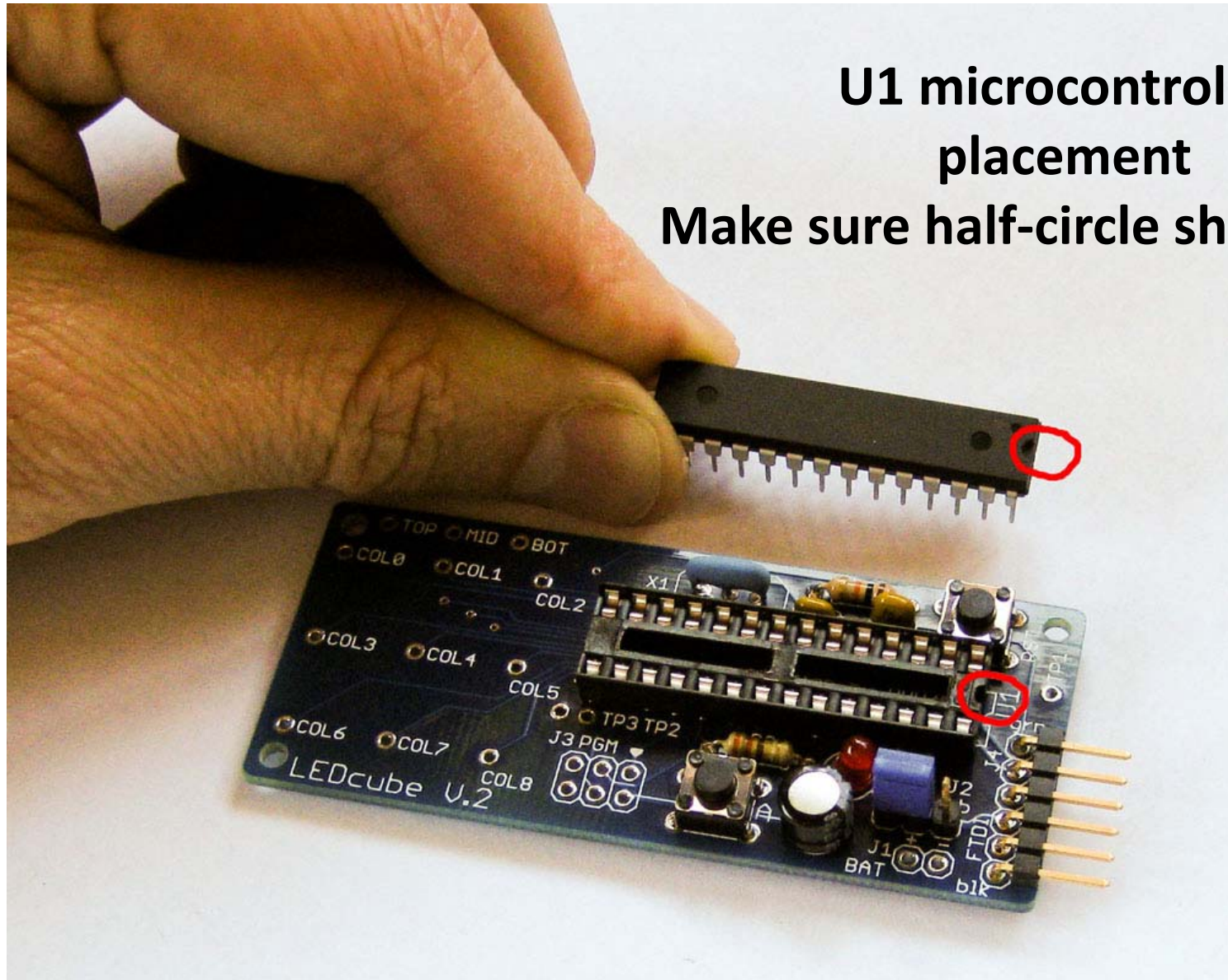


**J4 programming connector**  
**Solder all of these pins from the top**  
**(since it will fall out if you try it from the bottom)**

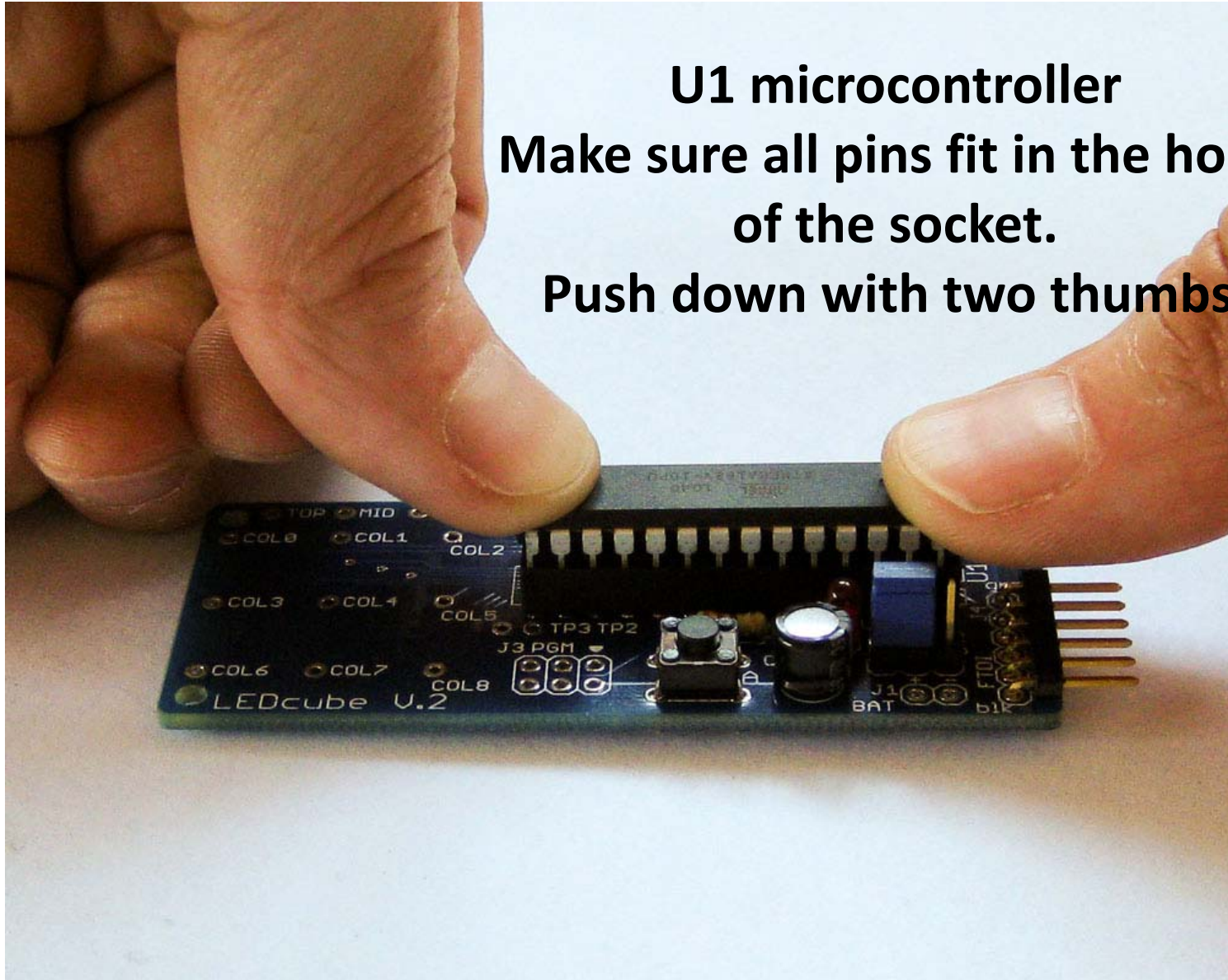




**U1 microcontroller  
placement  
Make sure half-circle shapes align**

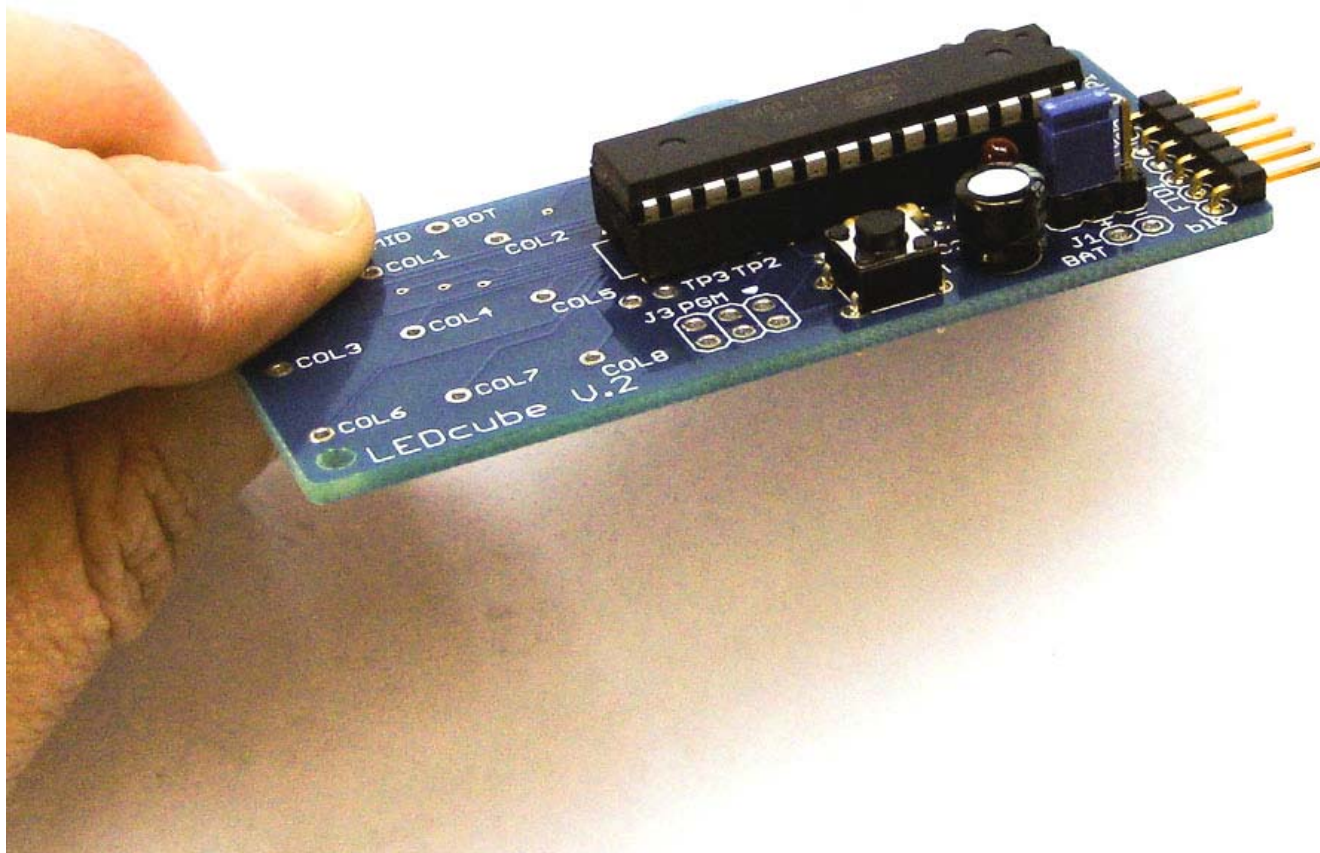


**U1 microcontroller**  
**Make sure all pins fit in the holes**  
**of the socket.**  
**Push down with two thumbs.**

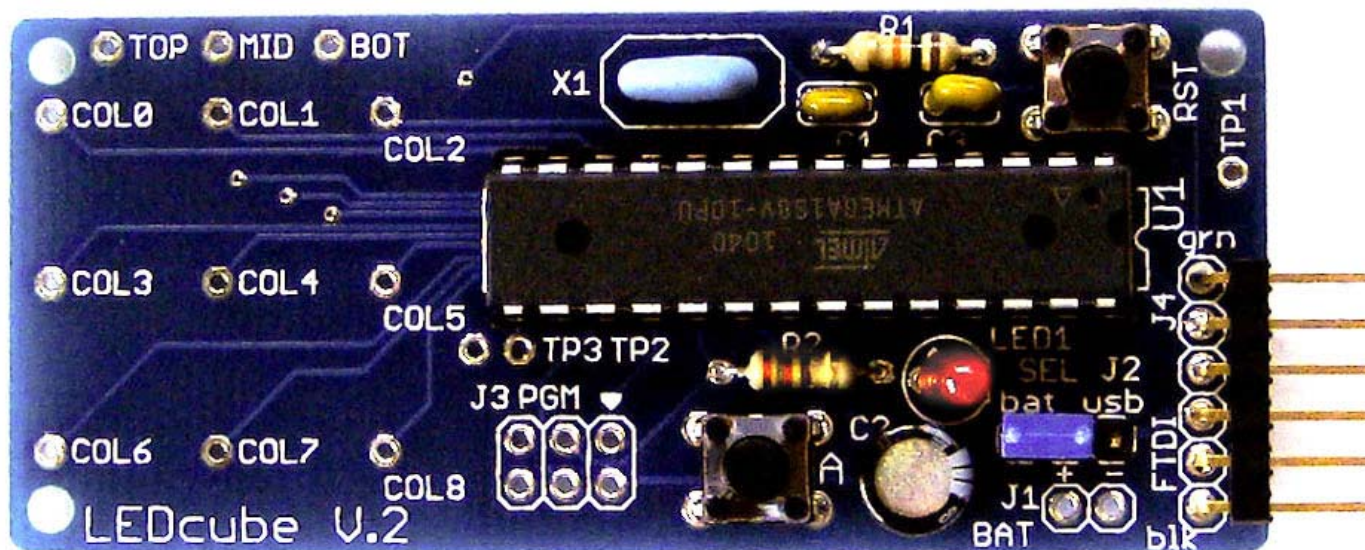




**U1 microcontroller  
properly inserted**

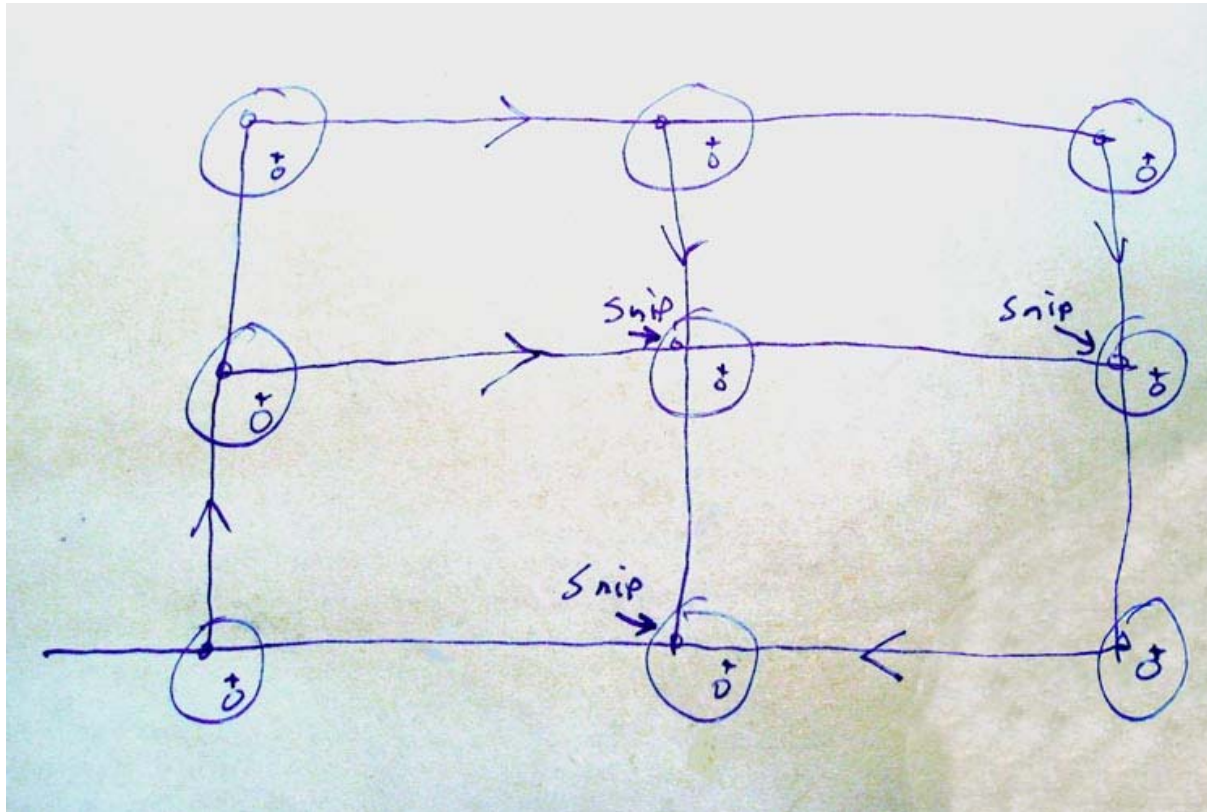


**PCB is now complete!**



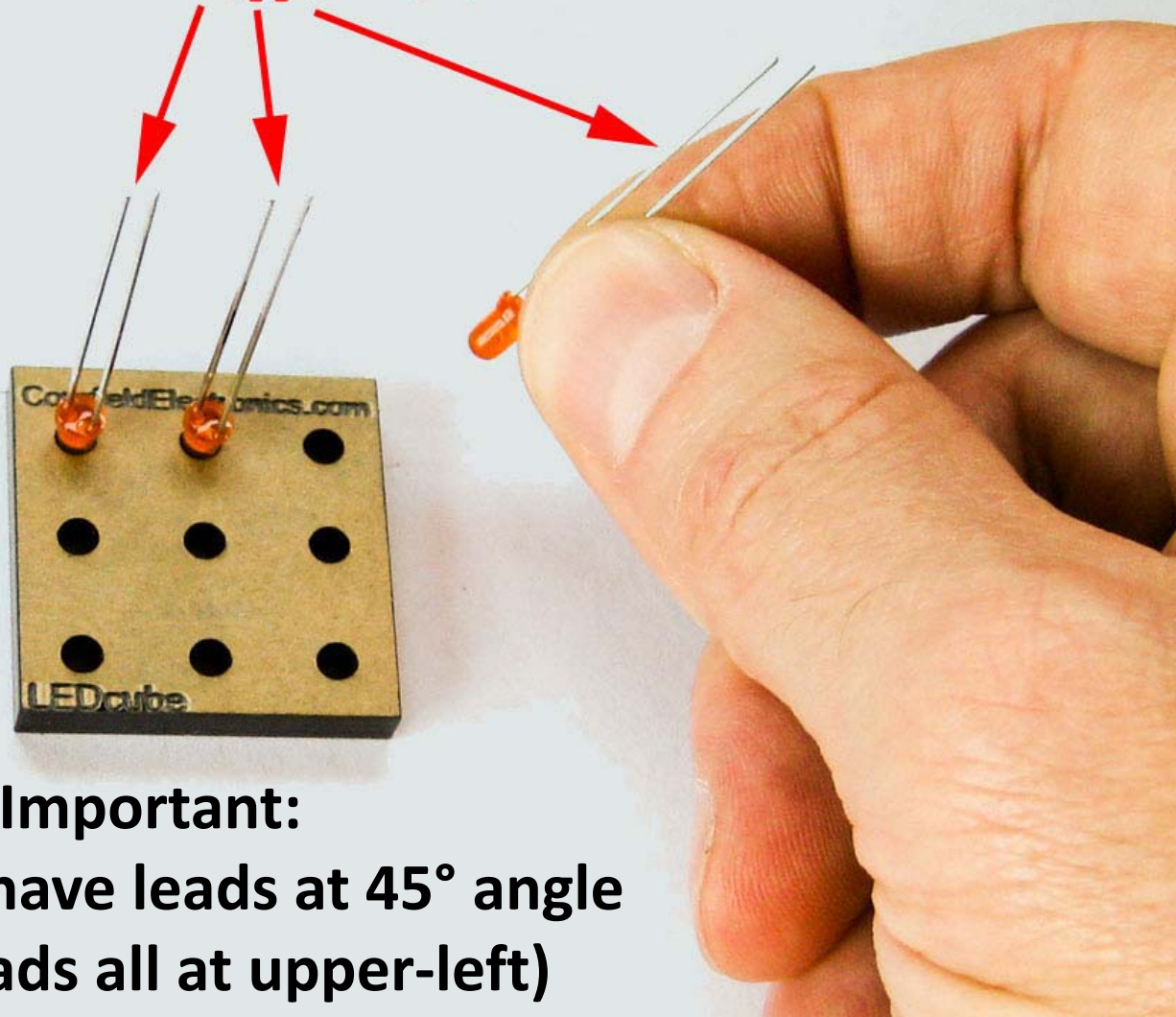


## Reference drawing for one plane of LEDs in LEDcube



Short leads (-)  
go towards upper-left

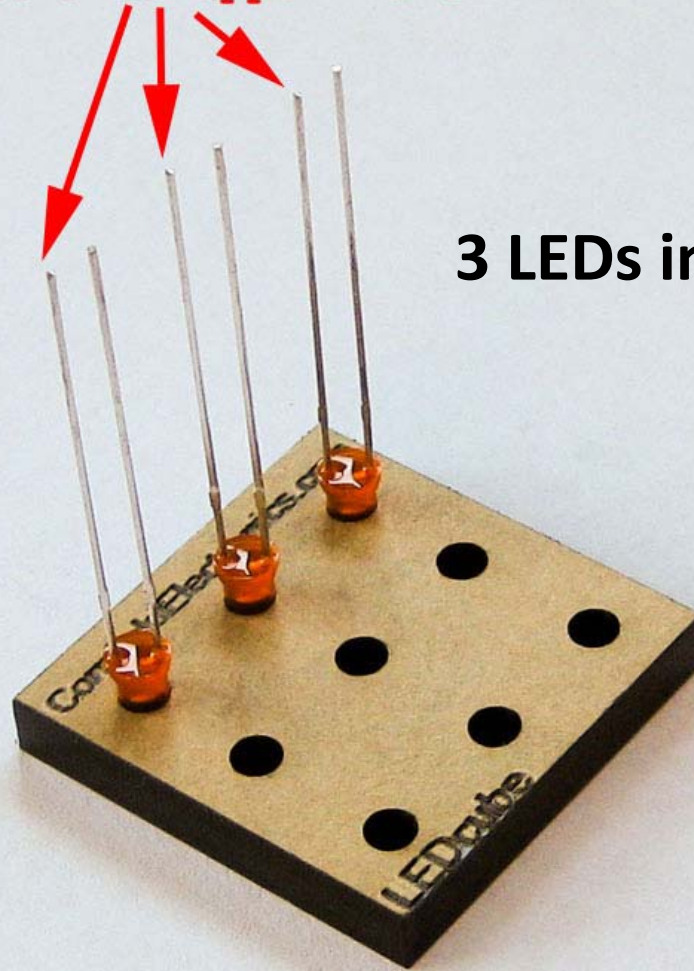
Insert 3 LEDs into LED jig



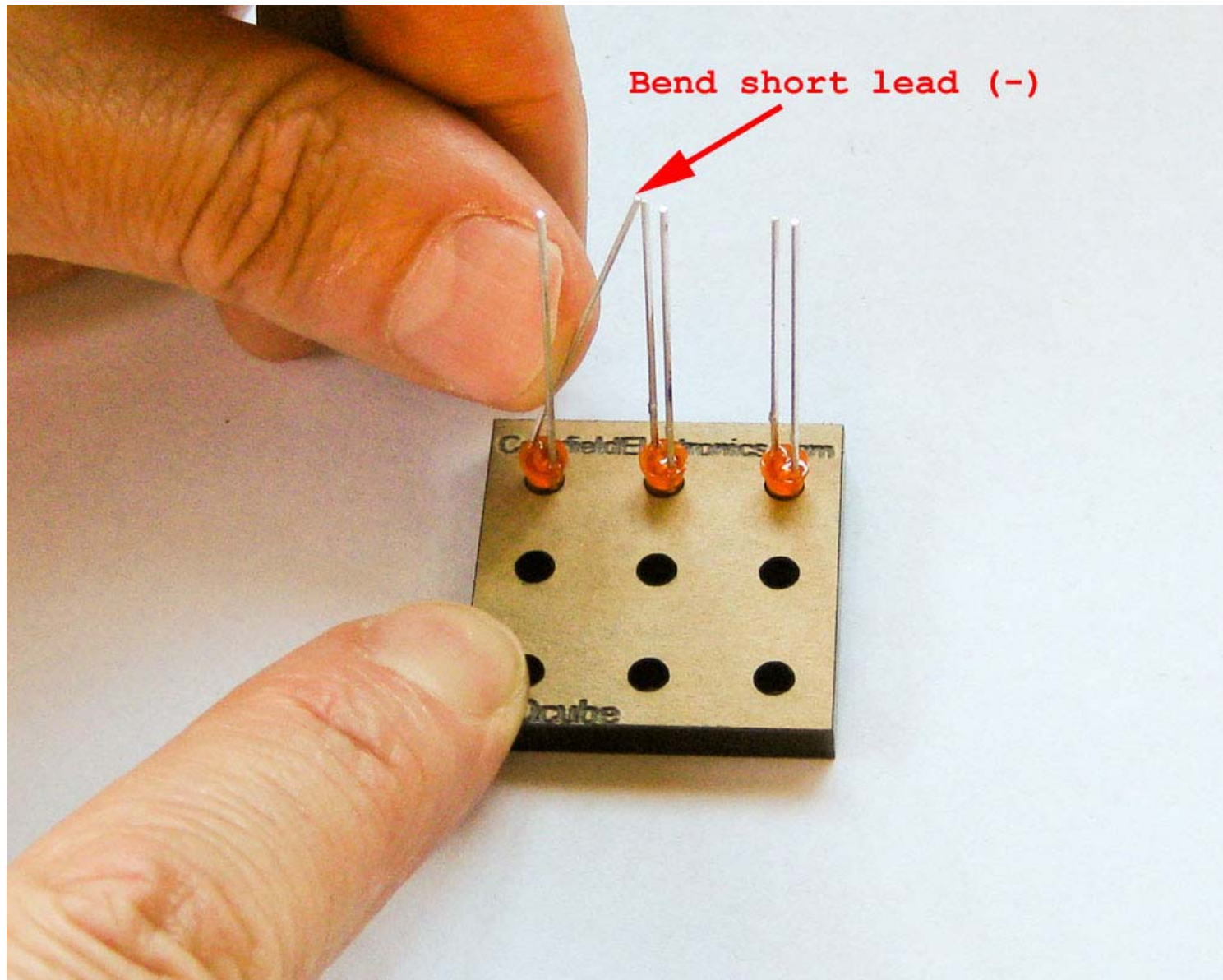
**Important:**  
LEDS must have leads at 45° angle  
(short leads all at upper-left)



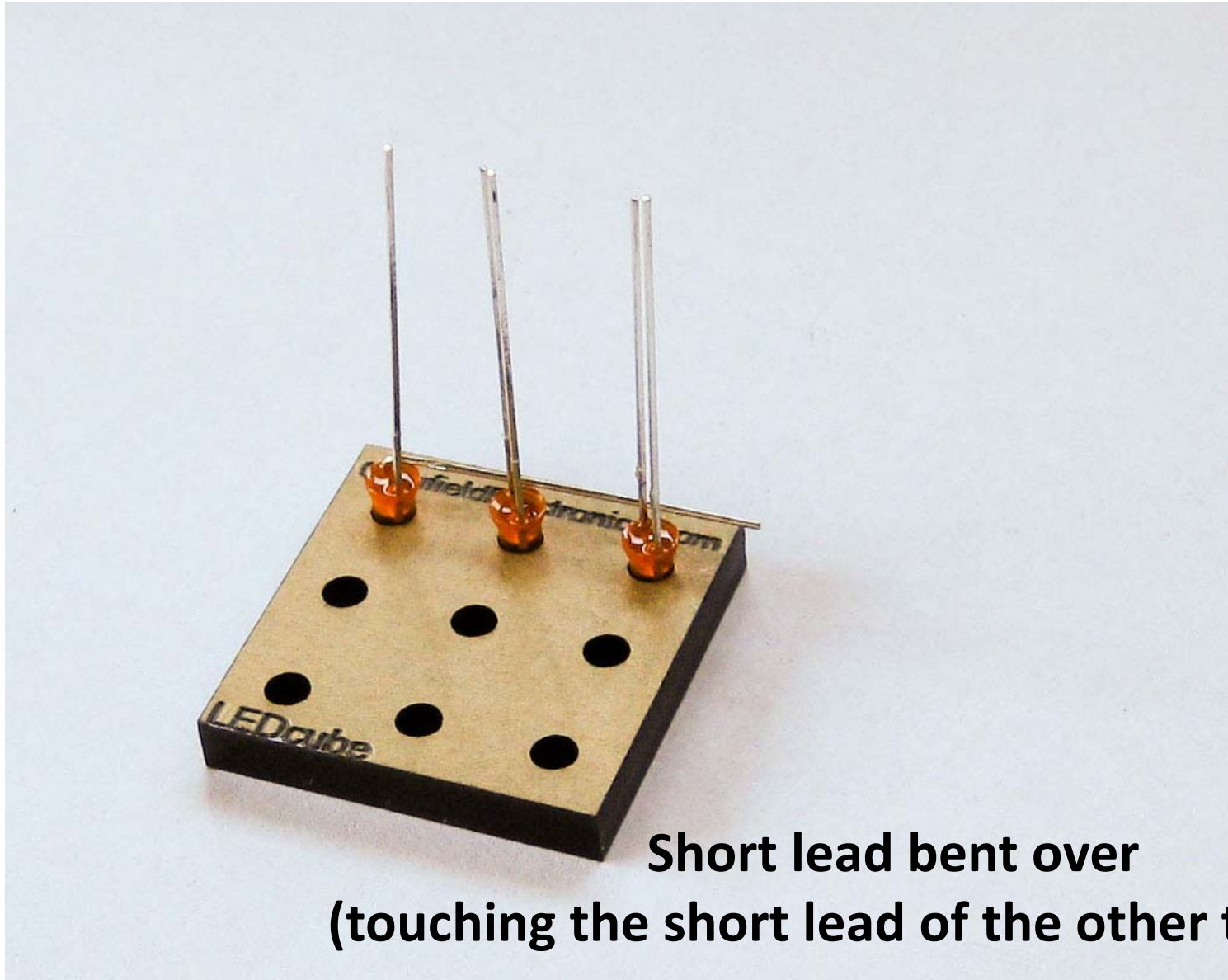
The short leads (1)  
go towards upper-left



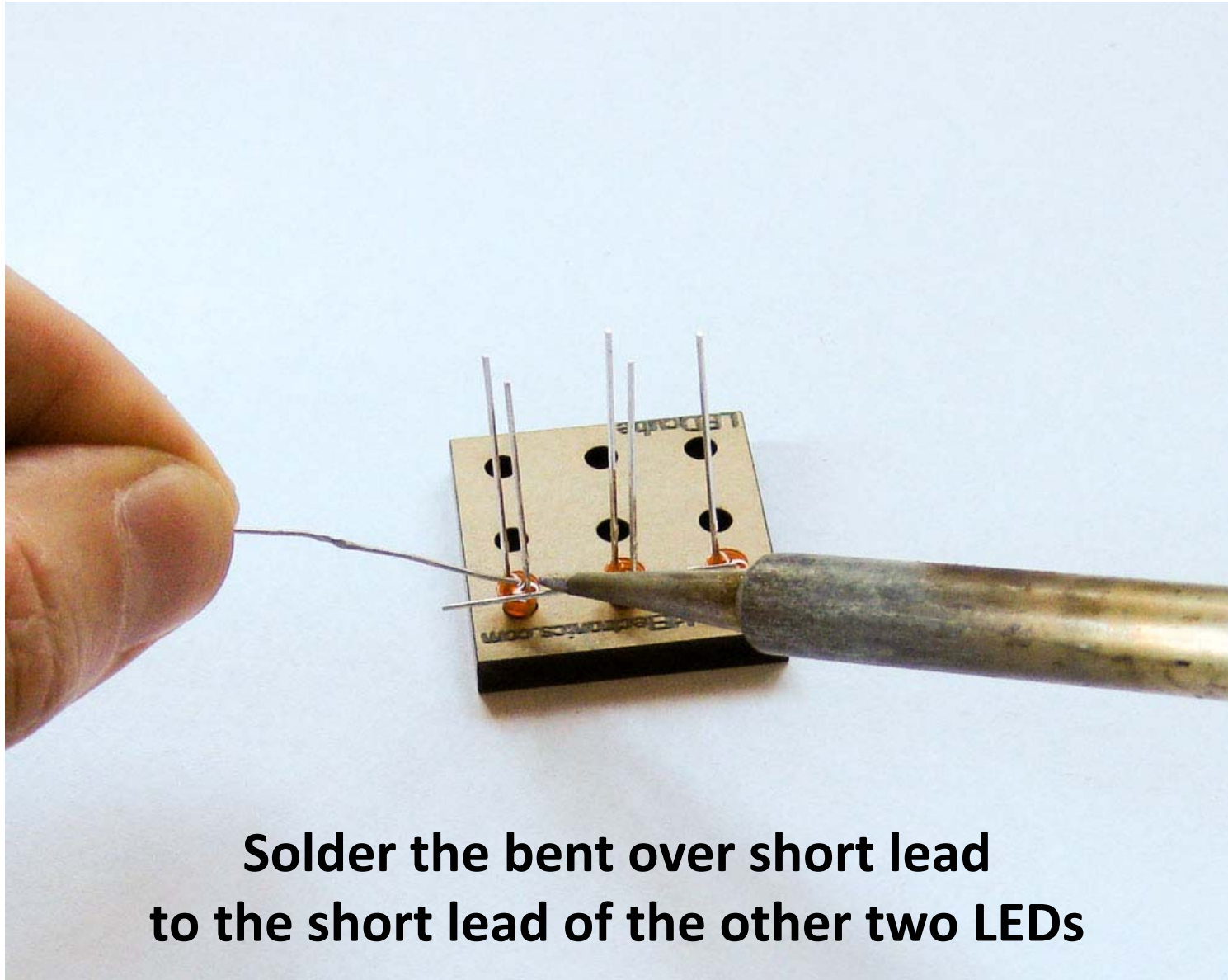
3 LEDs inserted into LED jig





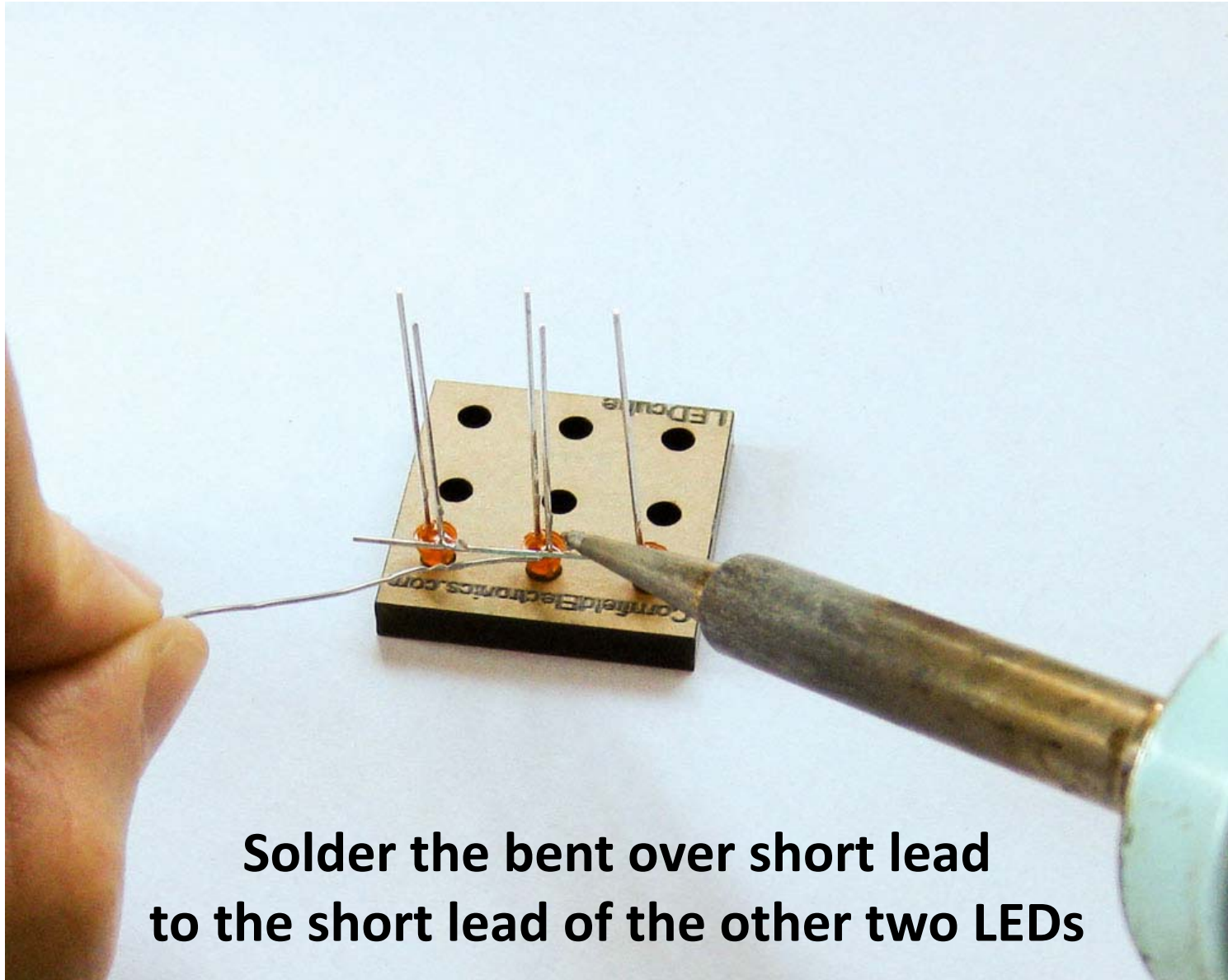


**Short lead bent over  
(touching the short lead of the other two LEDs)**



**Solder the bent over short lead  
to the short lead of the other two LEDs**





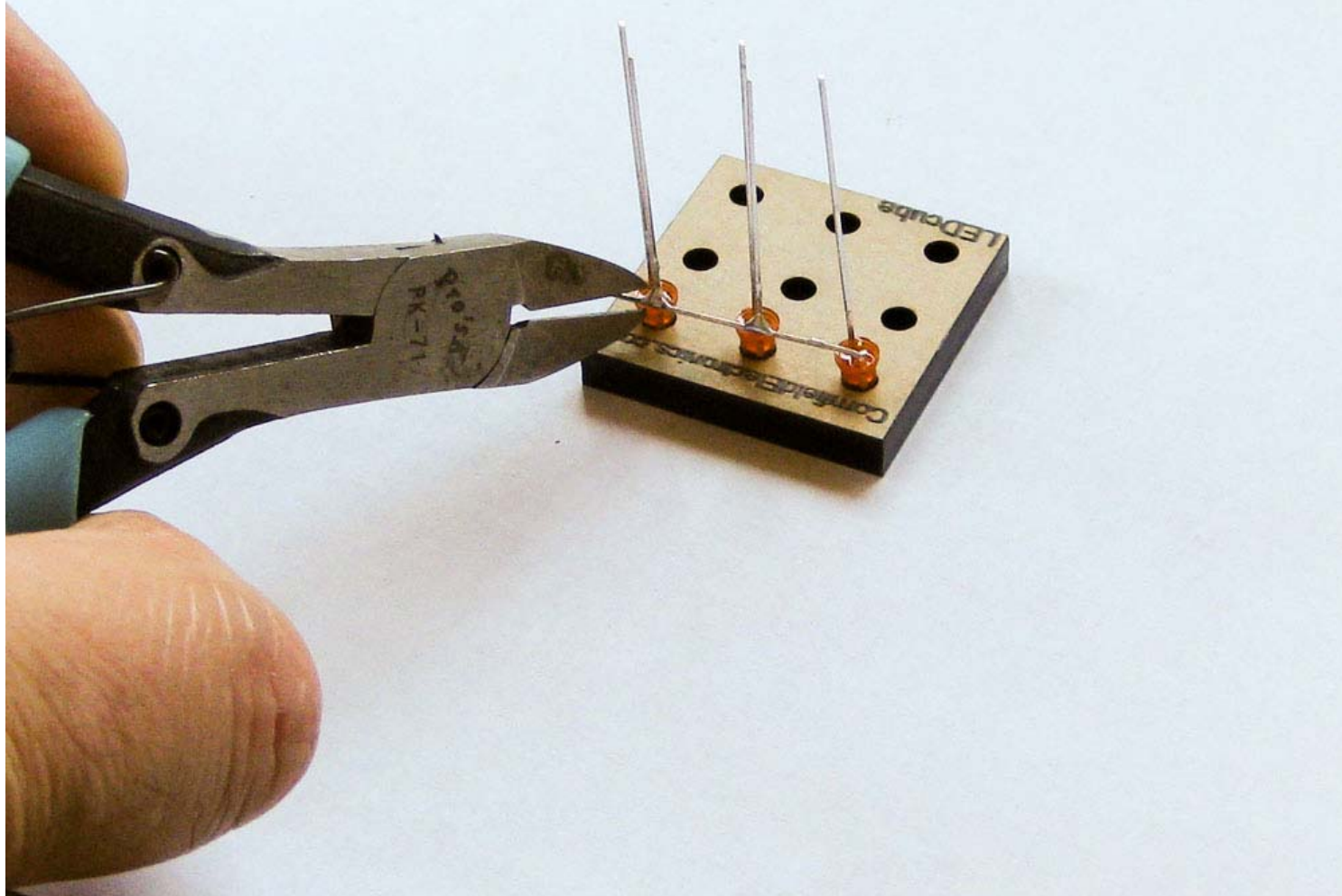
**Solder the bent over short lead  
to the short lead of the other two LEDs**



**The first row is now soldered**



**Clip the excess lead sticking out**

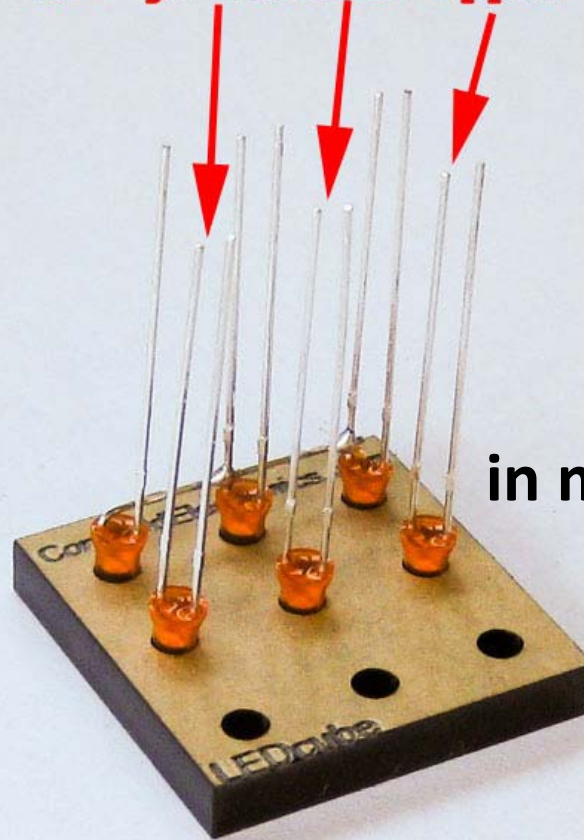


Short leads (-)  
all go towards upper-left

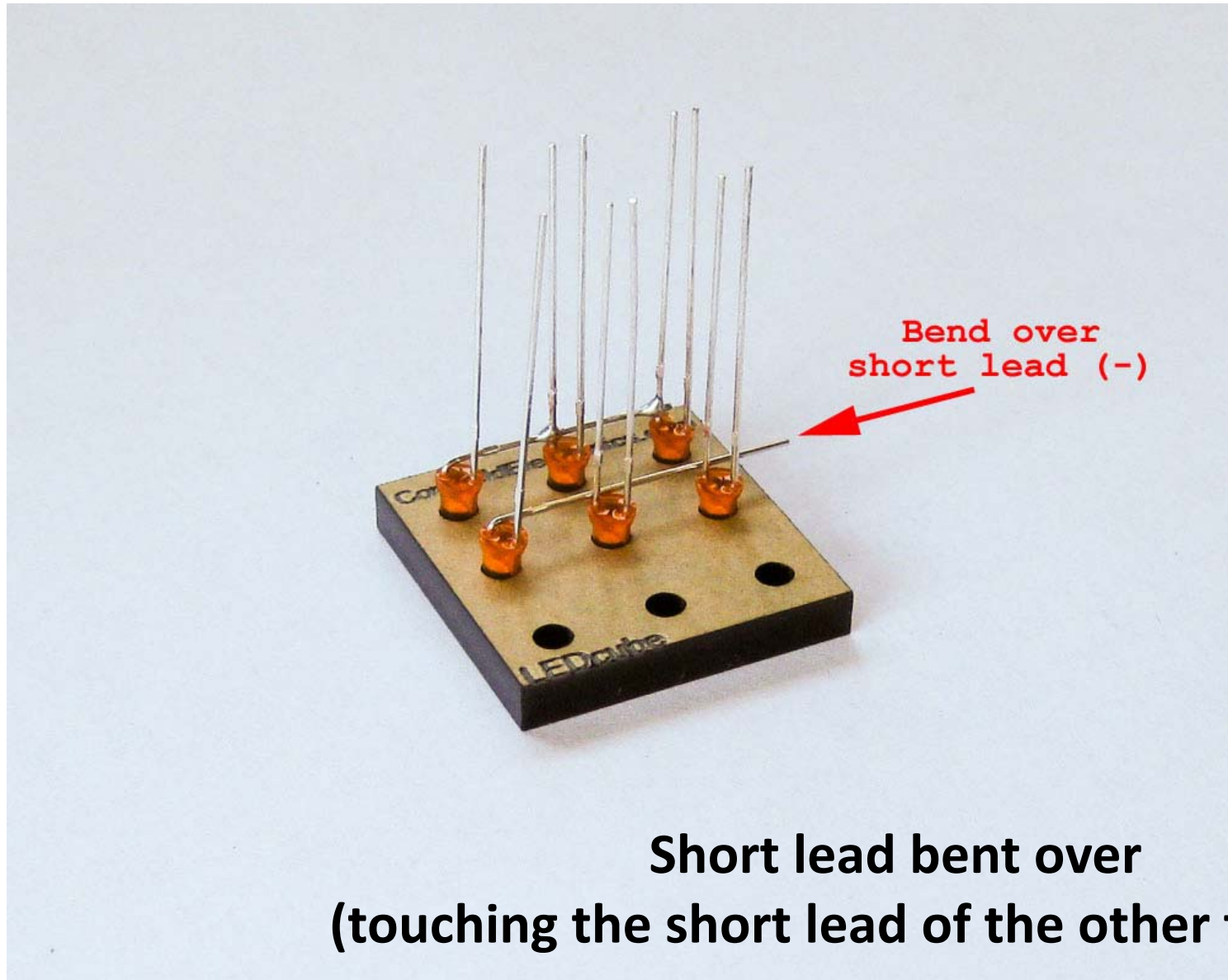
Insert 3 LEDs  
in middle row of LED jig

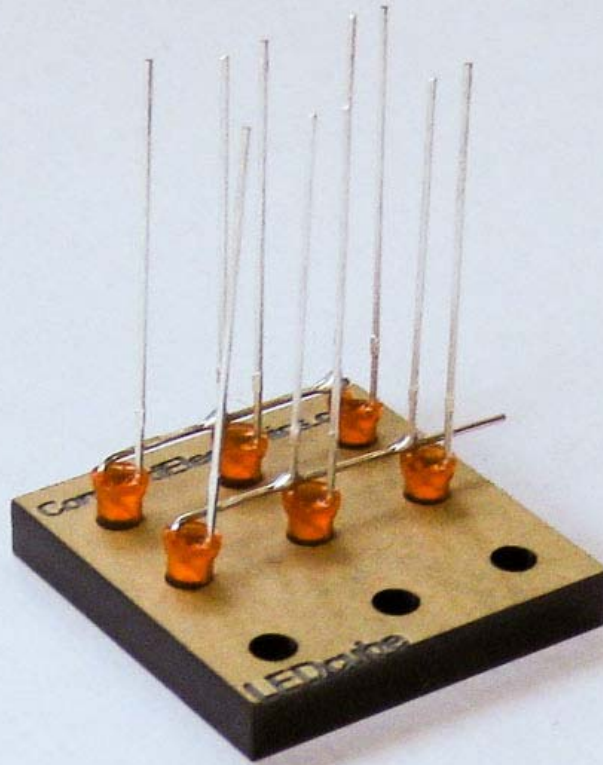
**Important:**

**LEDs must have leads at 45° angle  
(short leads all at upper-left)**





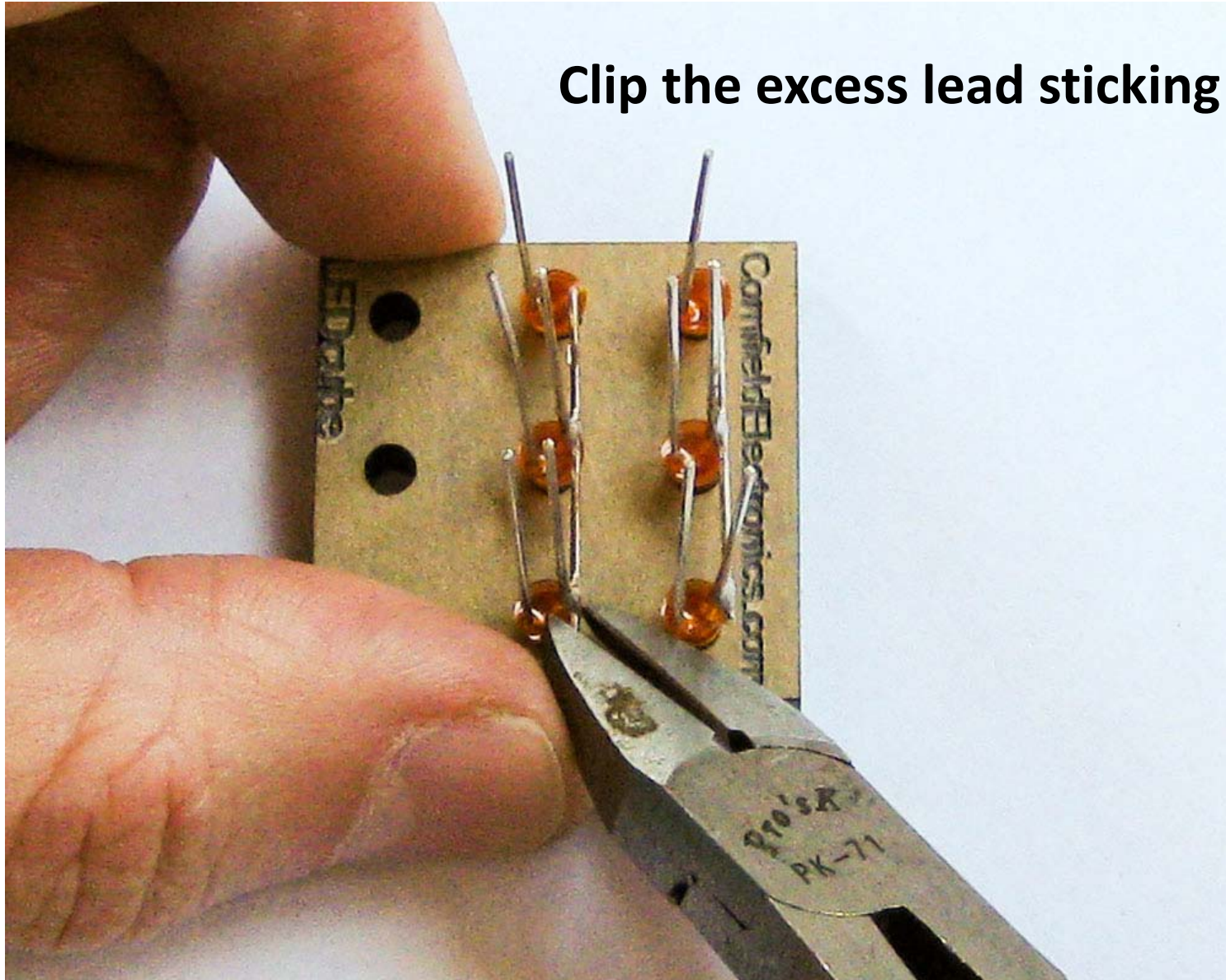


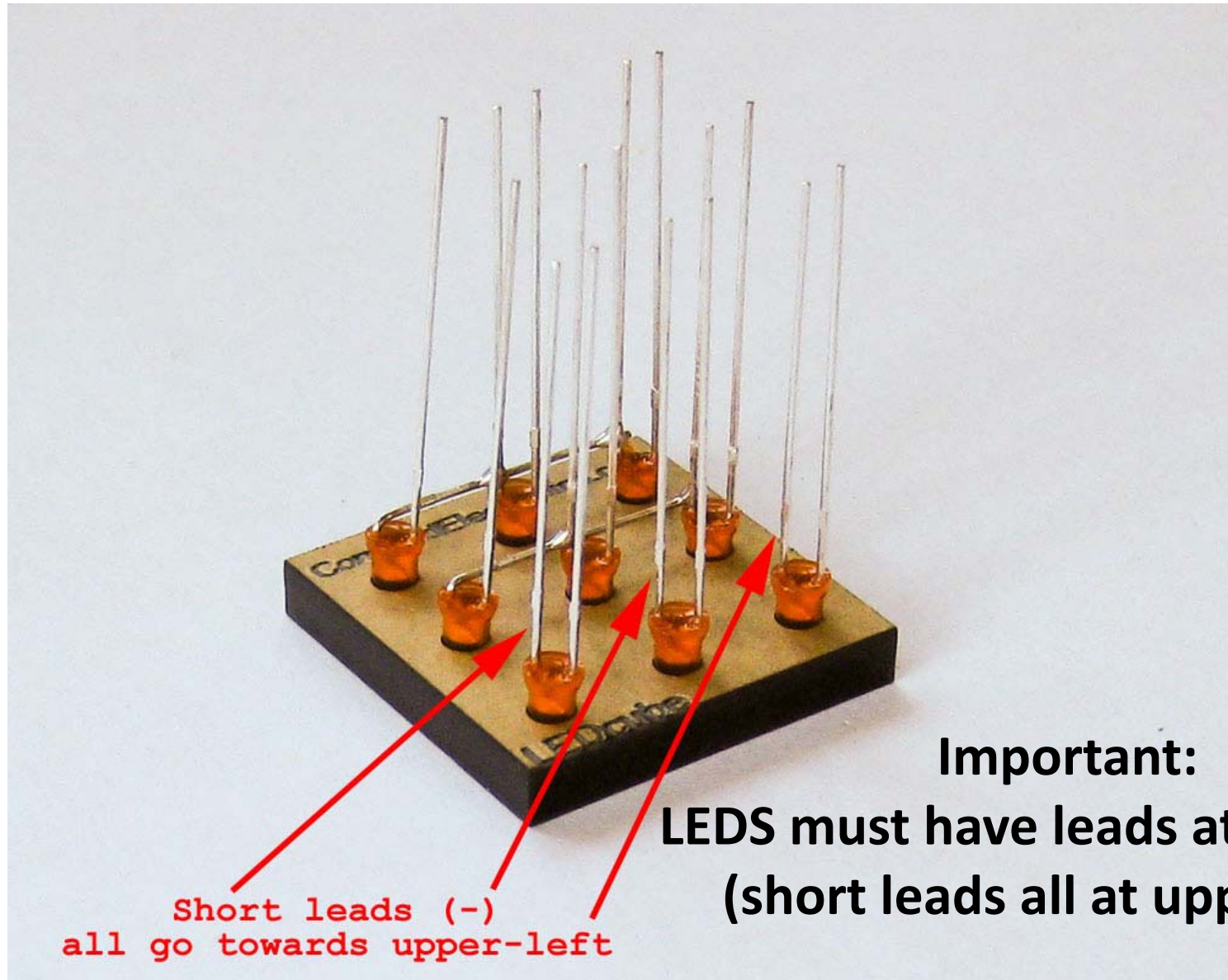


**The middle row is soldered  
(bent over short lead soldered to the other two LEDs' short leads**



**Clip the excess lead sticking out**

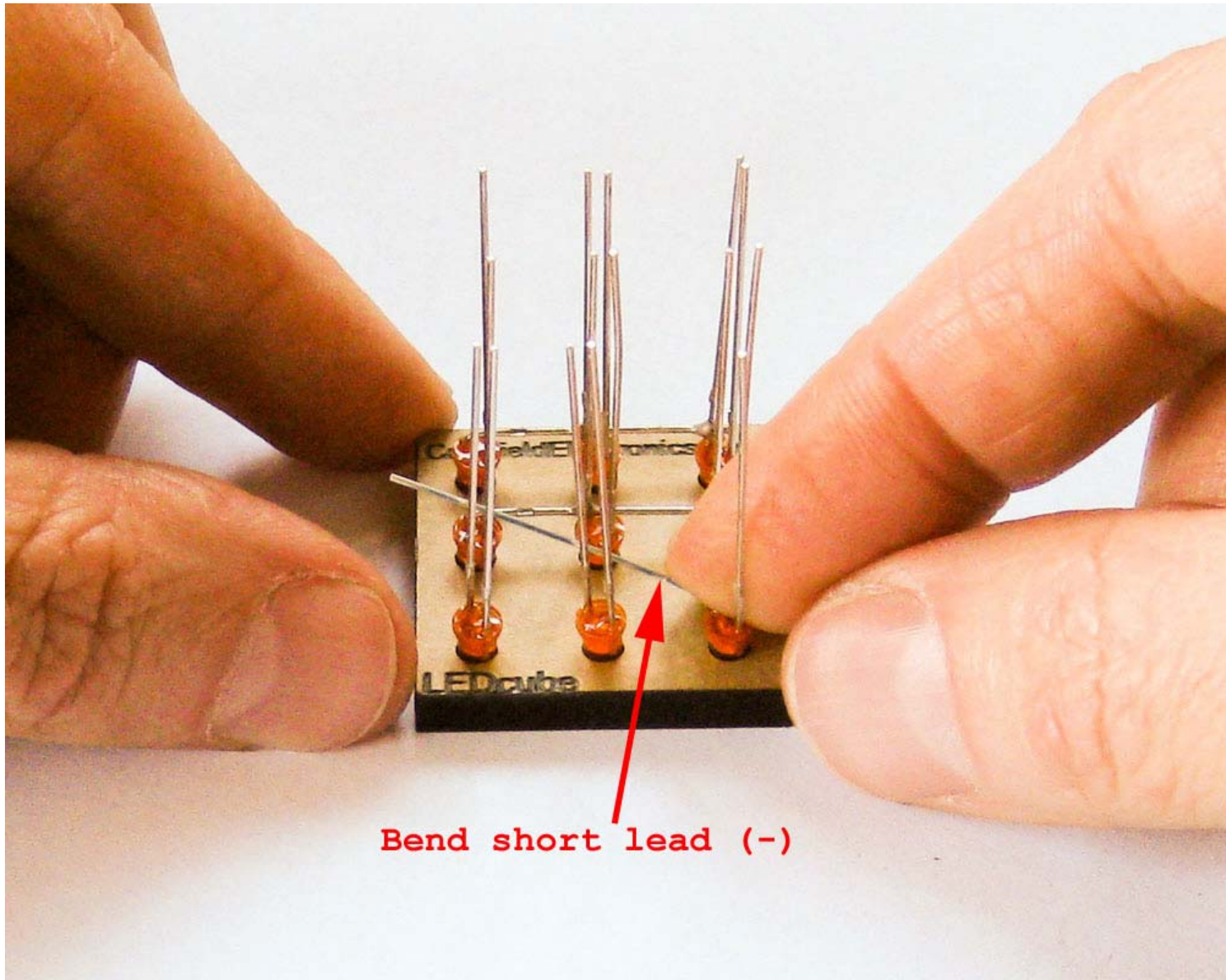




Short leads (-)  
all go towards upper-left

**Important:**  
**LEDs must have leads at 45° angle**  
**(short leads all at upper-left)**



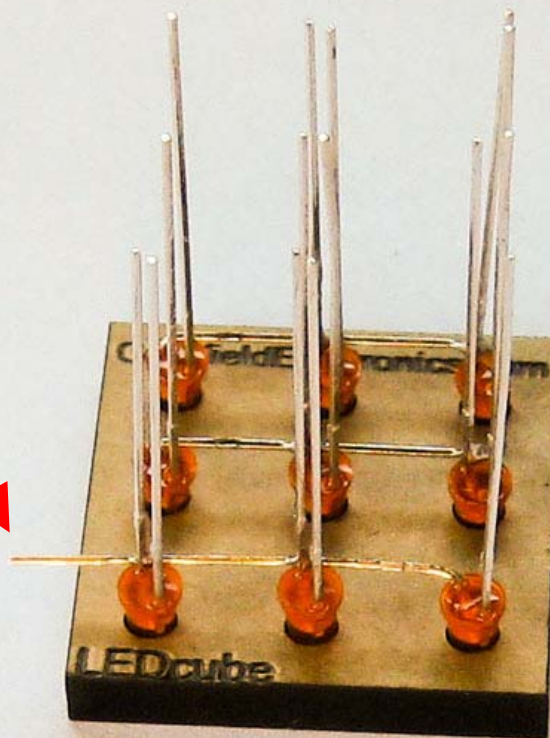


**IMPORTANT:**

**Note the direction of the bend  
of the short lead!**

**IMPORTANT:**

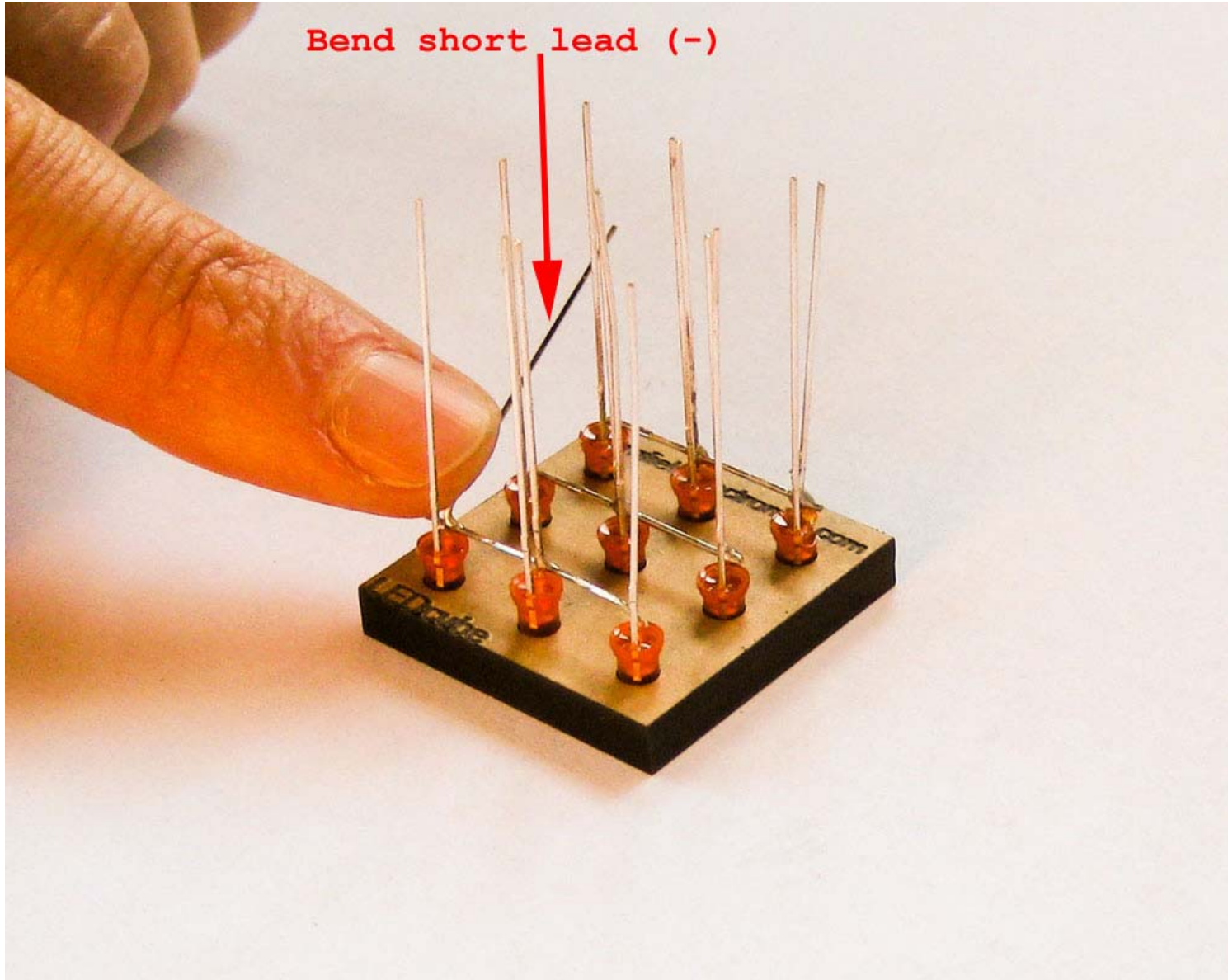
**DO NOT  
cut this lead**

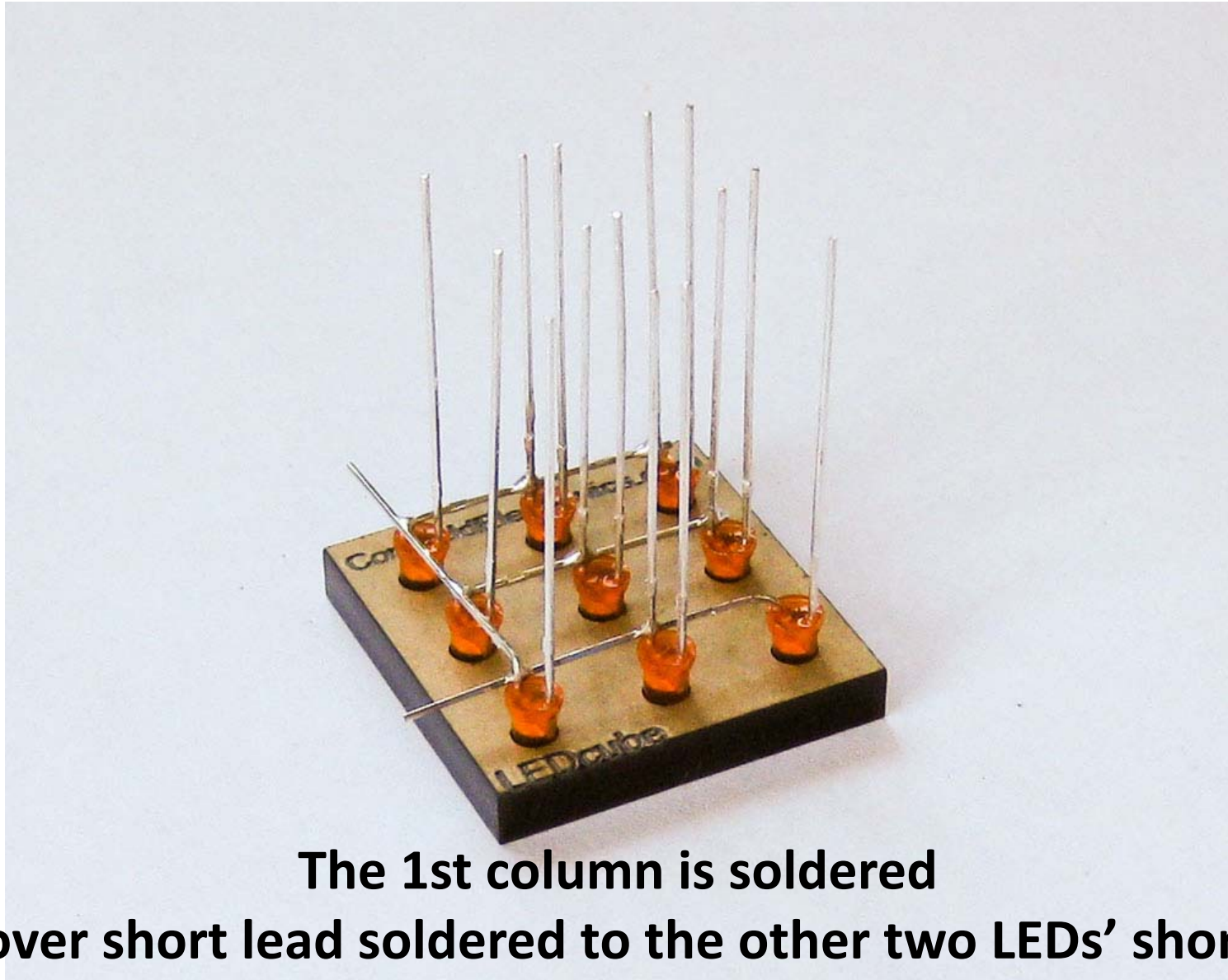


**The 3rd row is soldered  
(bent over short lead soldered to the other two LEDs' short leads**



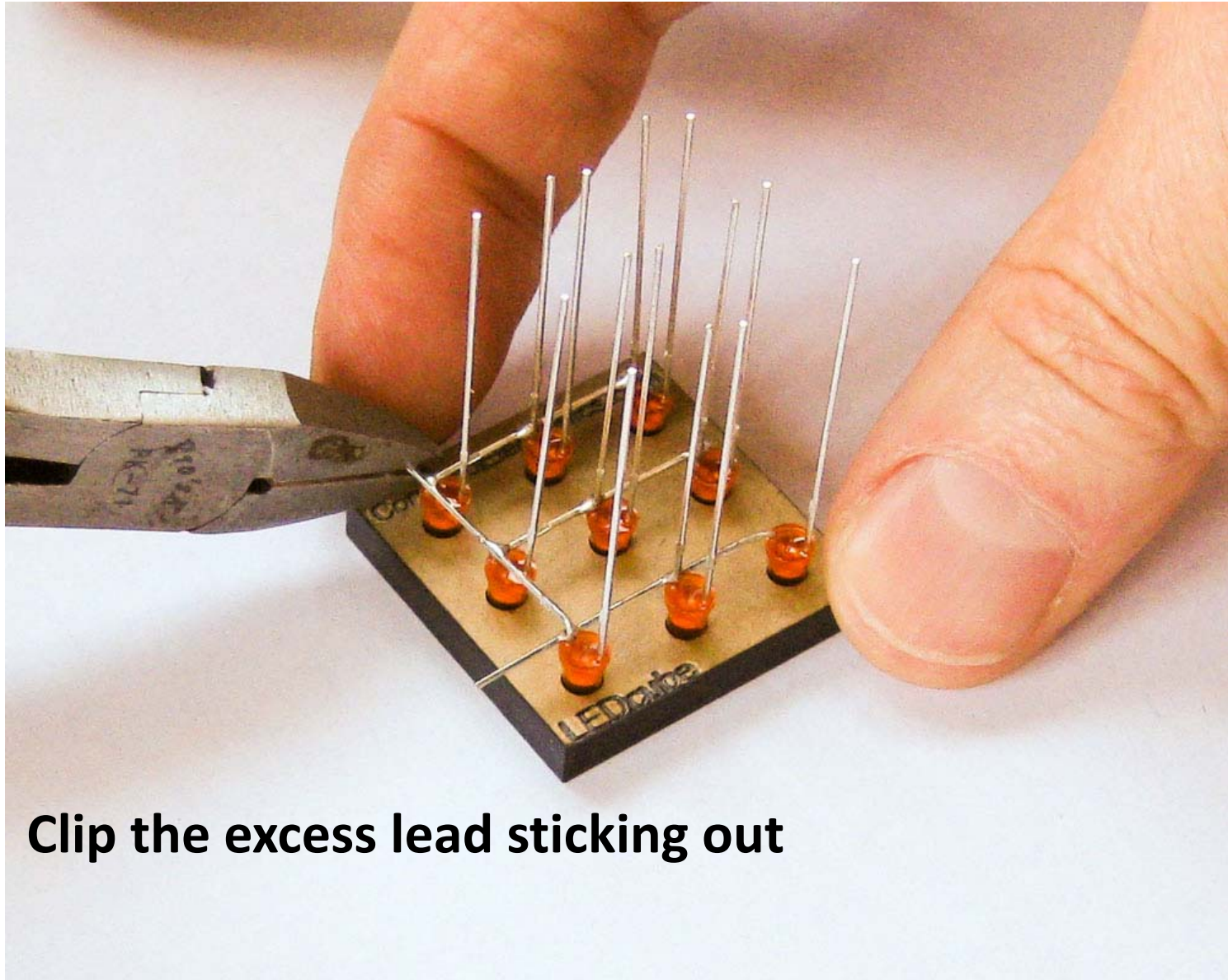
Bend short lead (-)





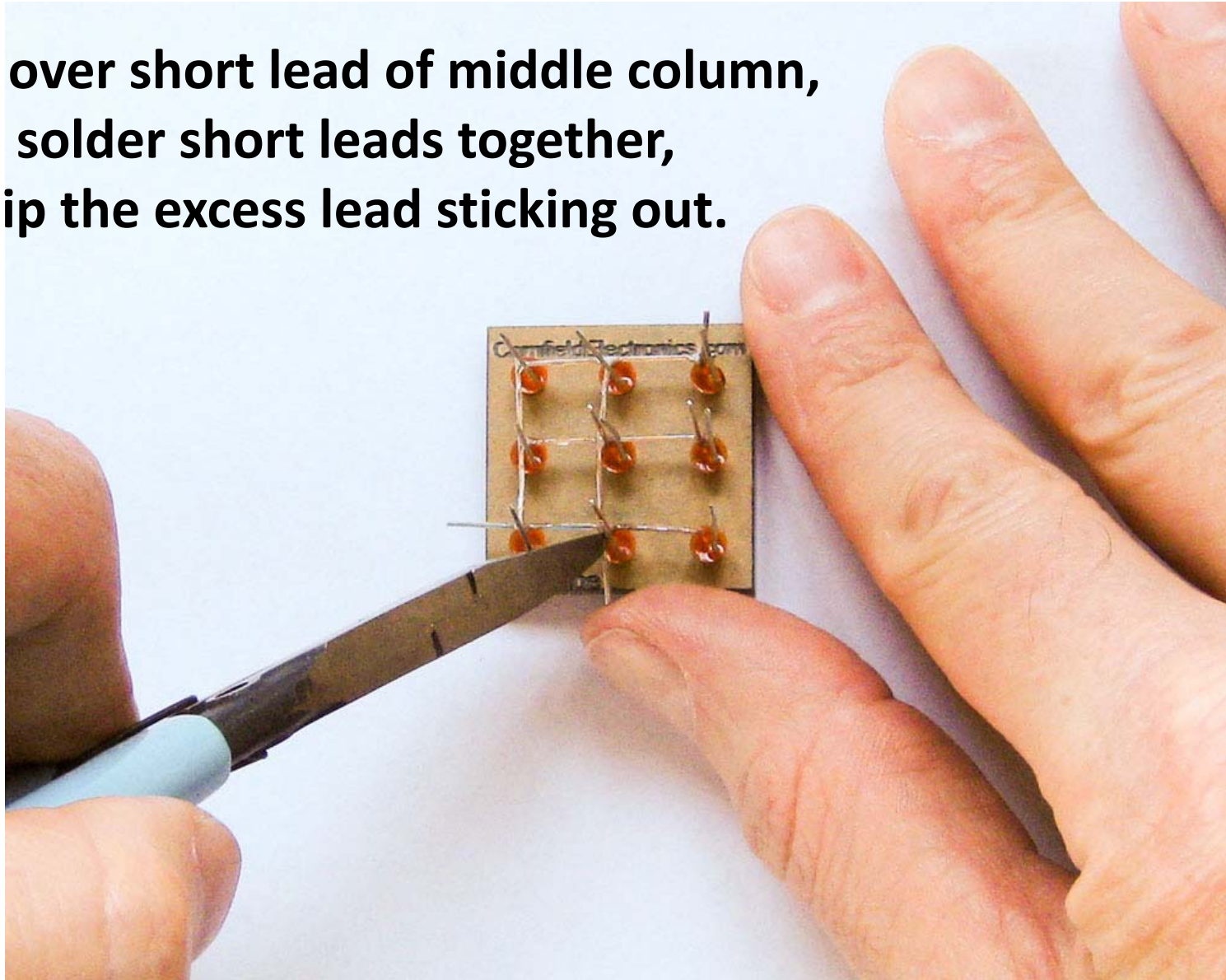
**The 1st column is soldered  
(bent over short lead soldered to the other two LEDs' short leads**





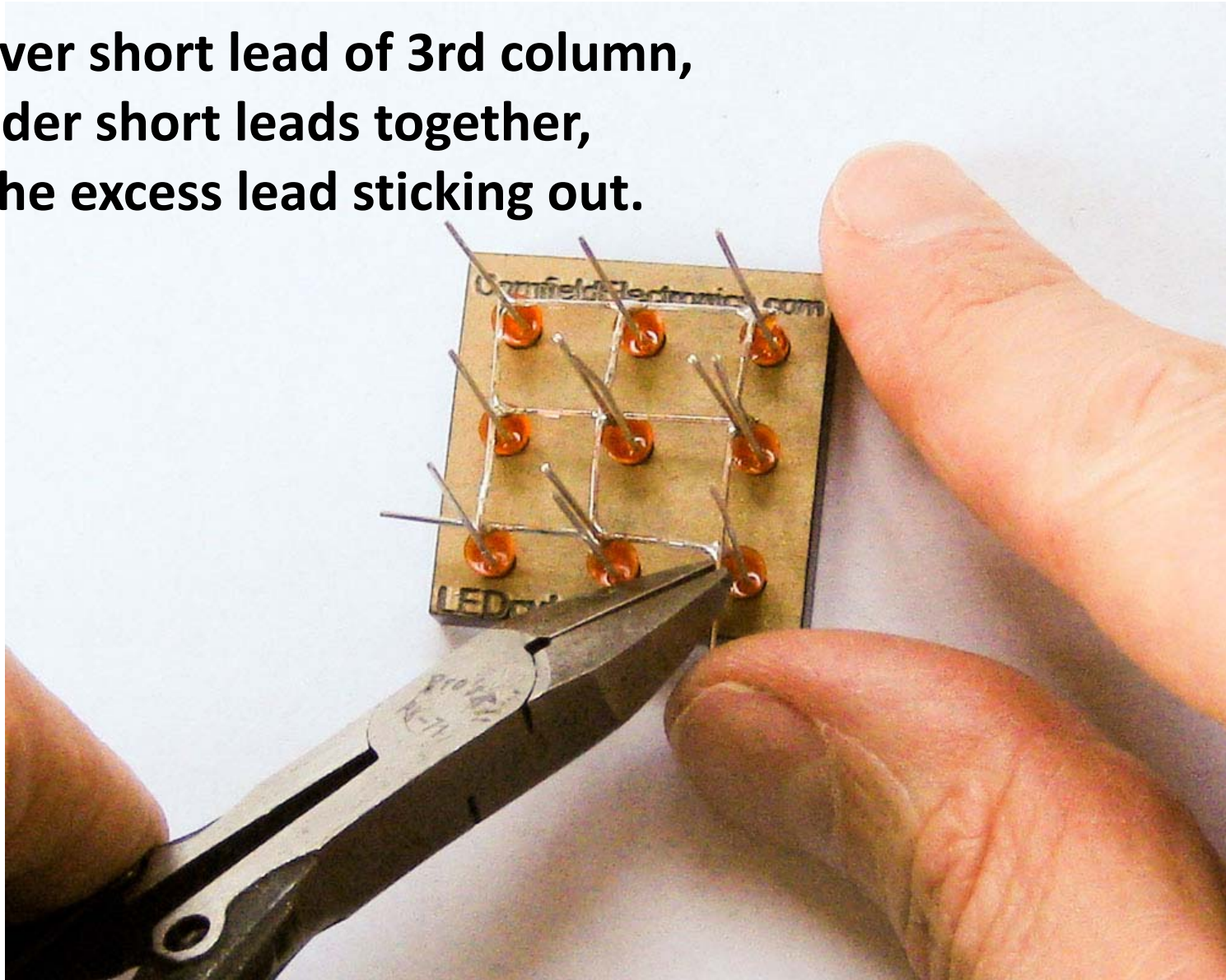
**Clip the excess lead sticking out**

**Bend over short lead of middle column,  
solder short leads together,  
clip the excess lead sticking out.**



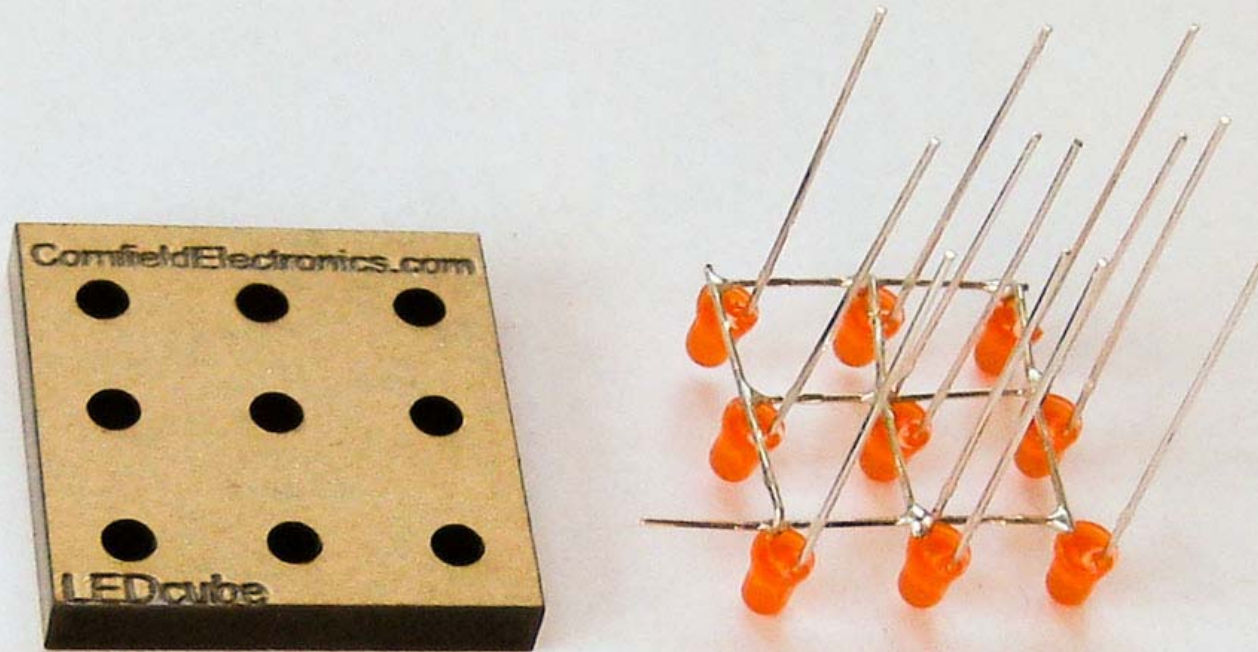


**Bend over short lead of 3rd column,  
solder short leads together,  
clip the excess lead sticking out.**



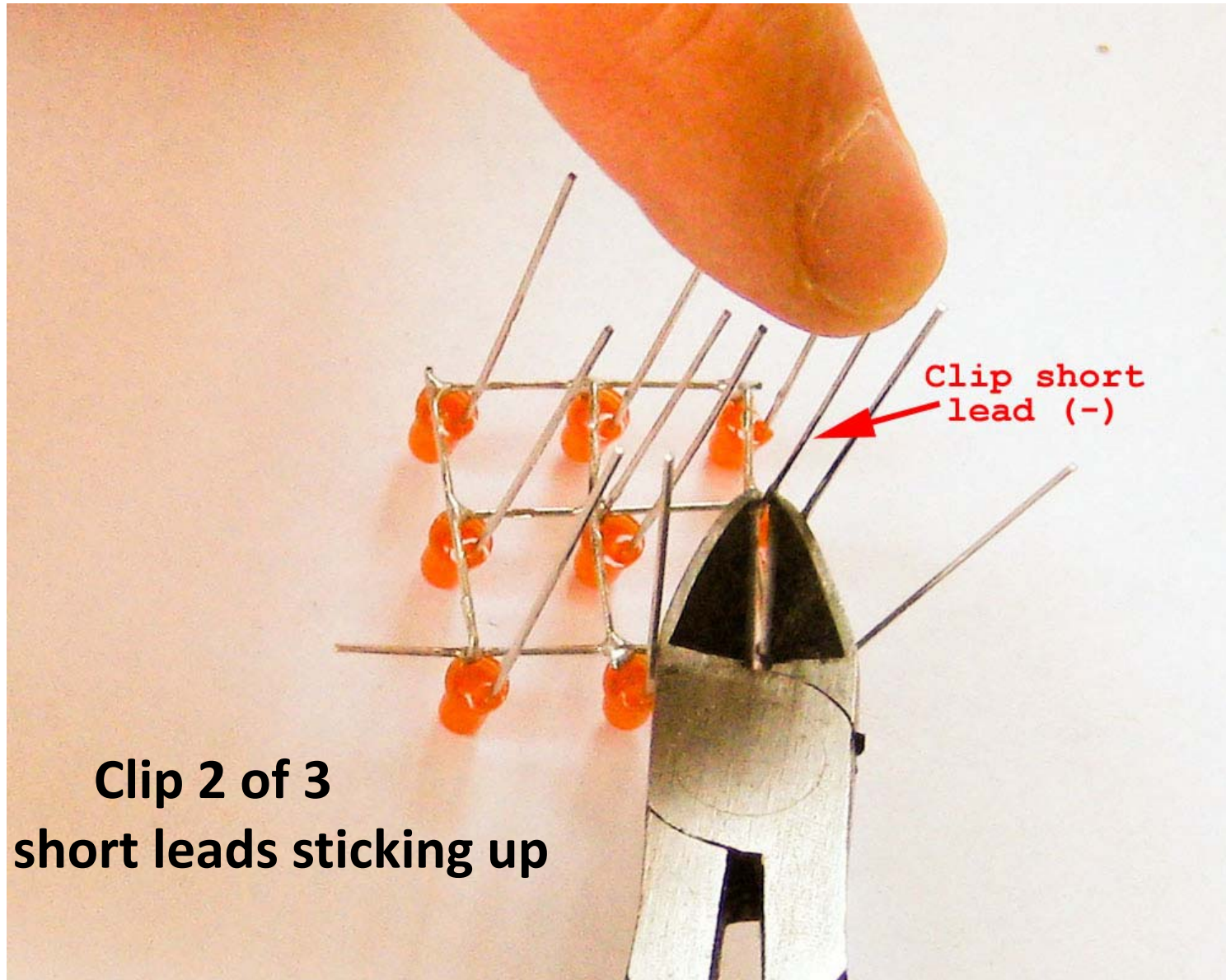


**Carefully remove this 1<sup>st</sup> plane from the LED jig**



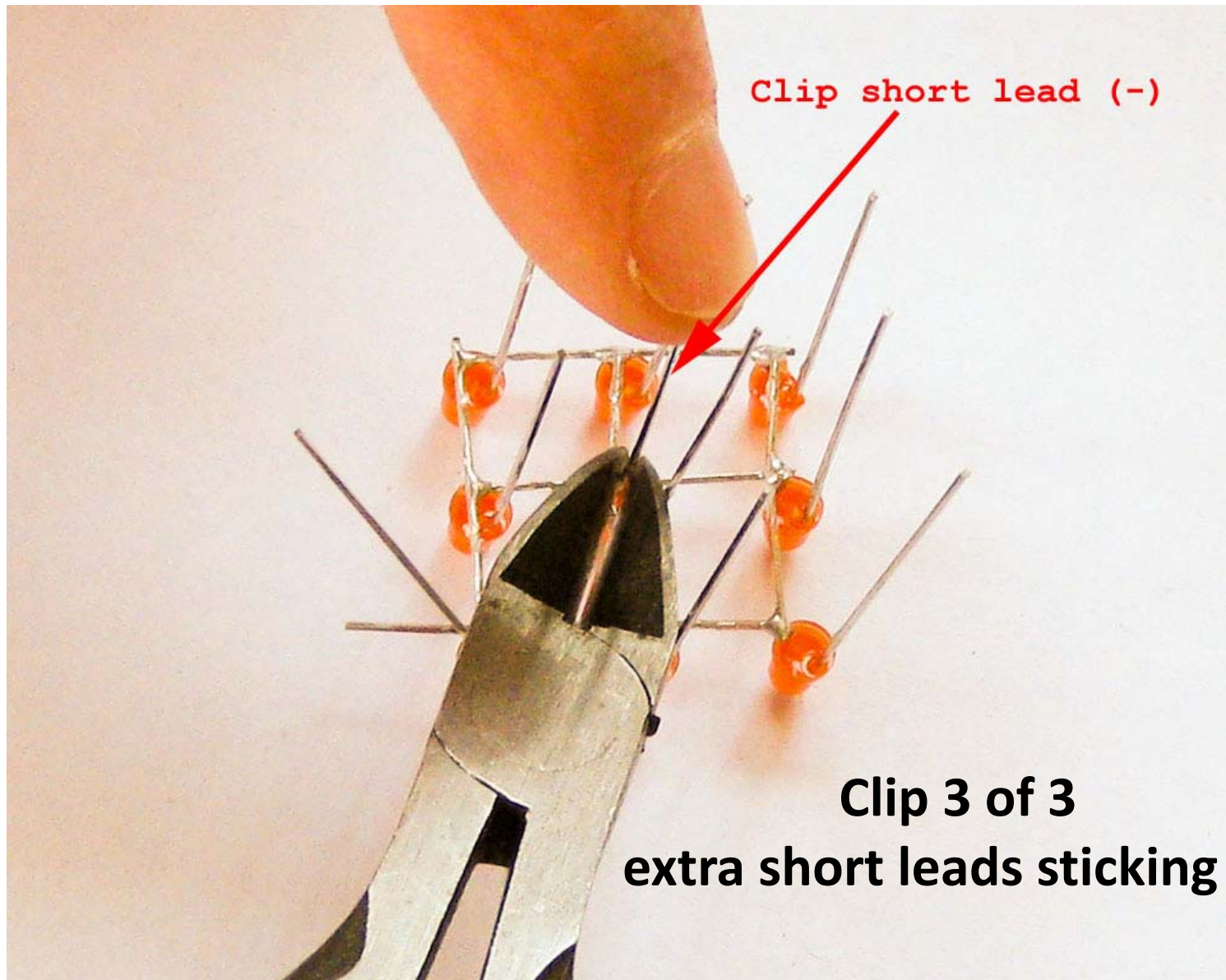


**Clip 1 of 3  
extra short leads sticking up**



**Clip 2 of 3  
extra short leads sticking up**

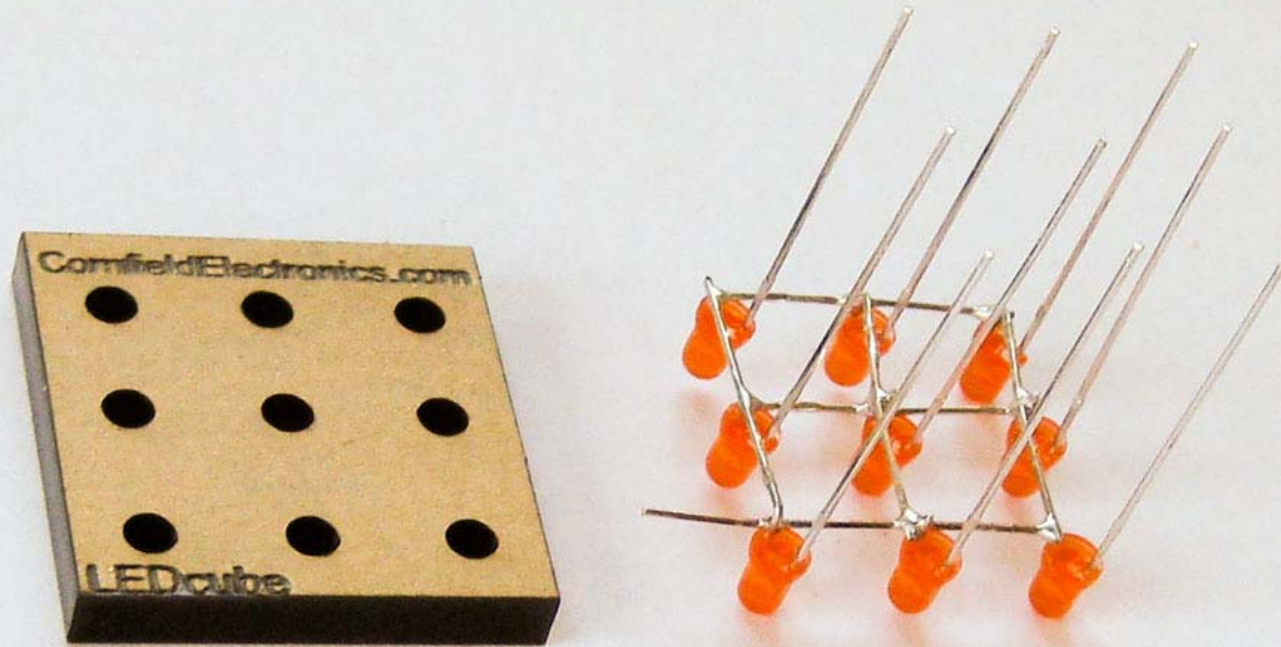




Clip short lead (-)

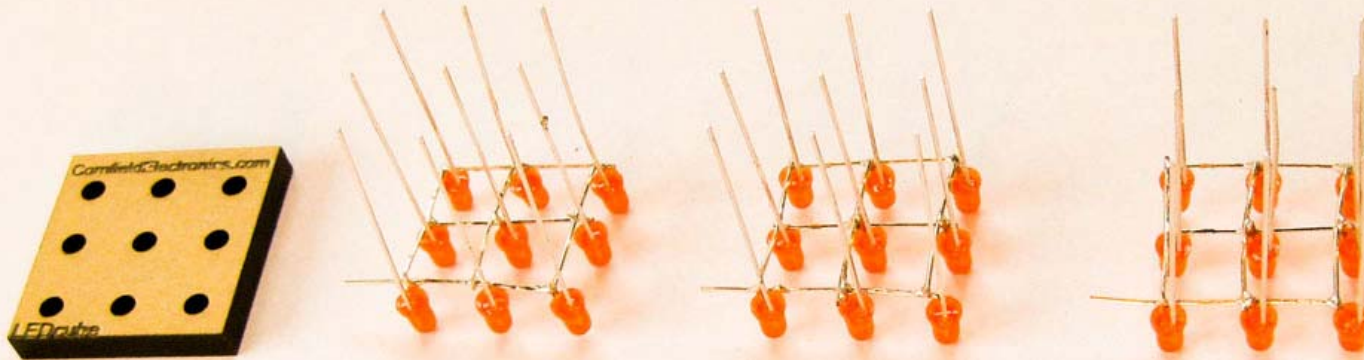
**Clip 3 of 3**  
**extra short leads sticking up**

## Completed LED plane

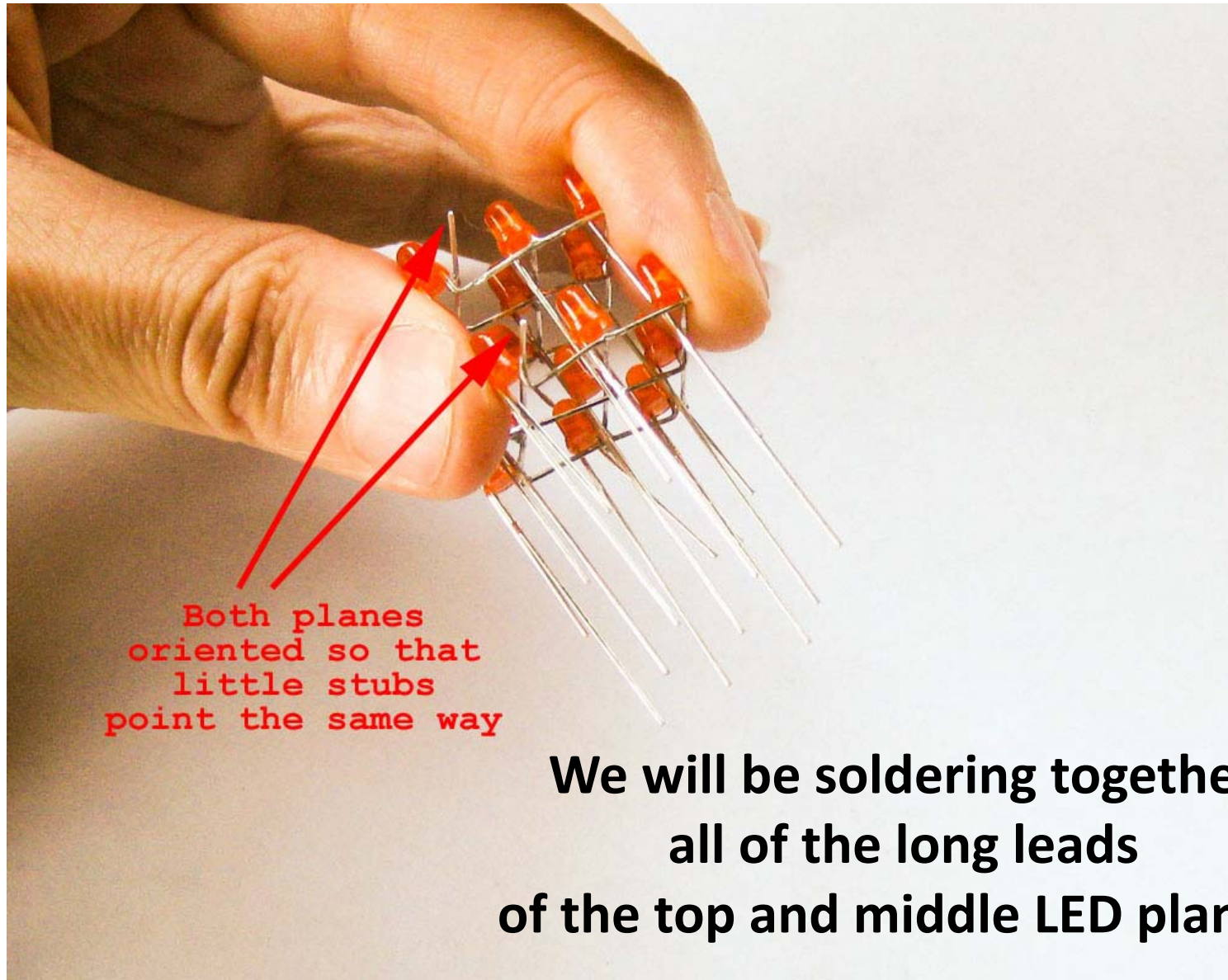


(9 long leads sticking up)

**Repeat previous steps  
to create 3 identical LED planes**

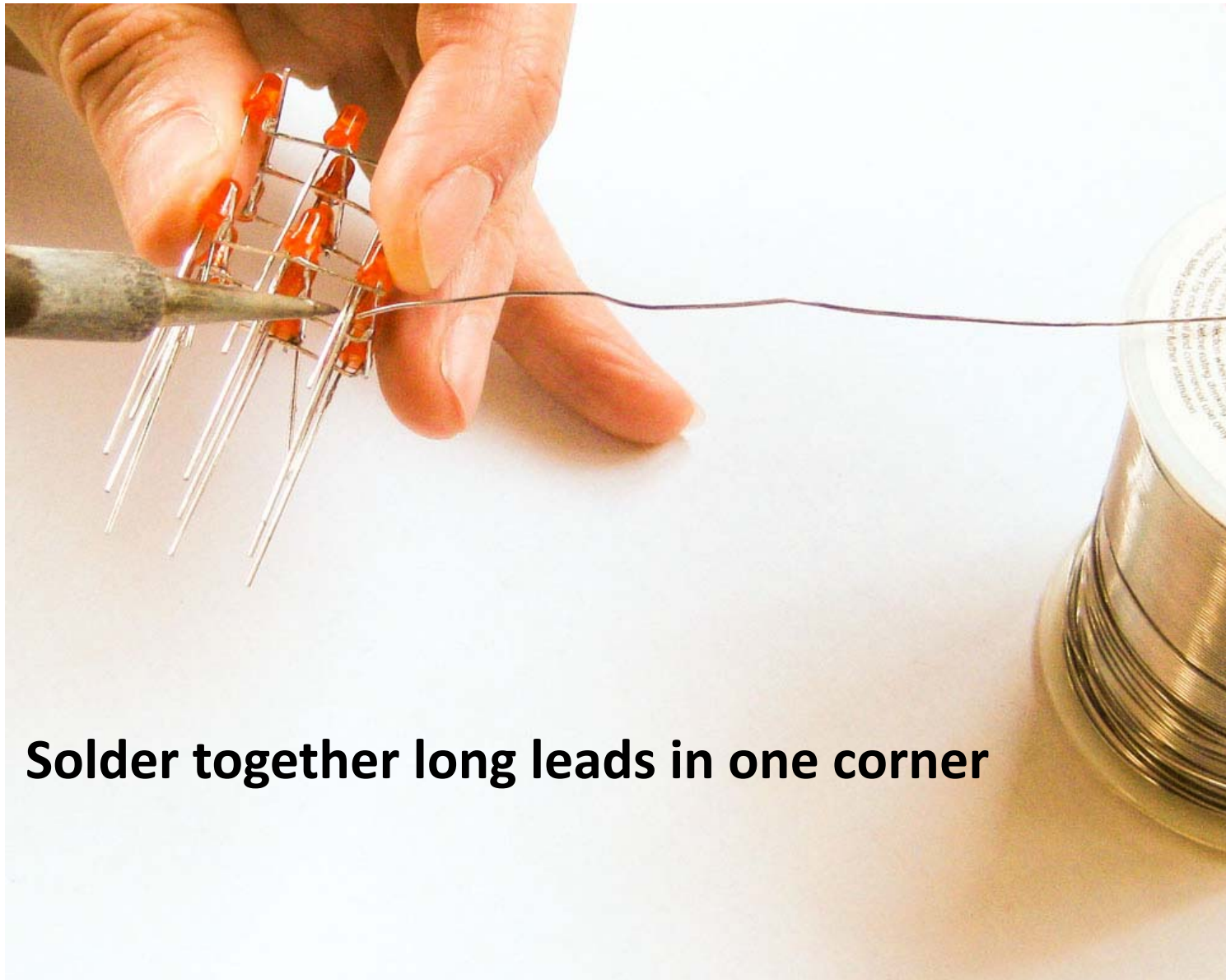




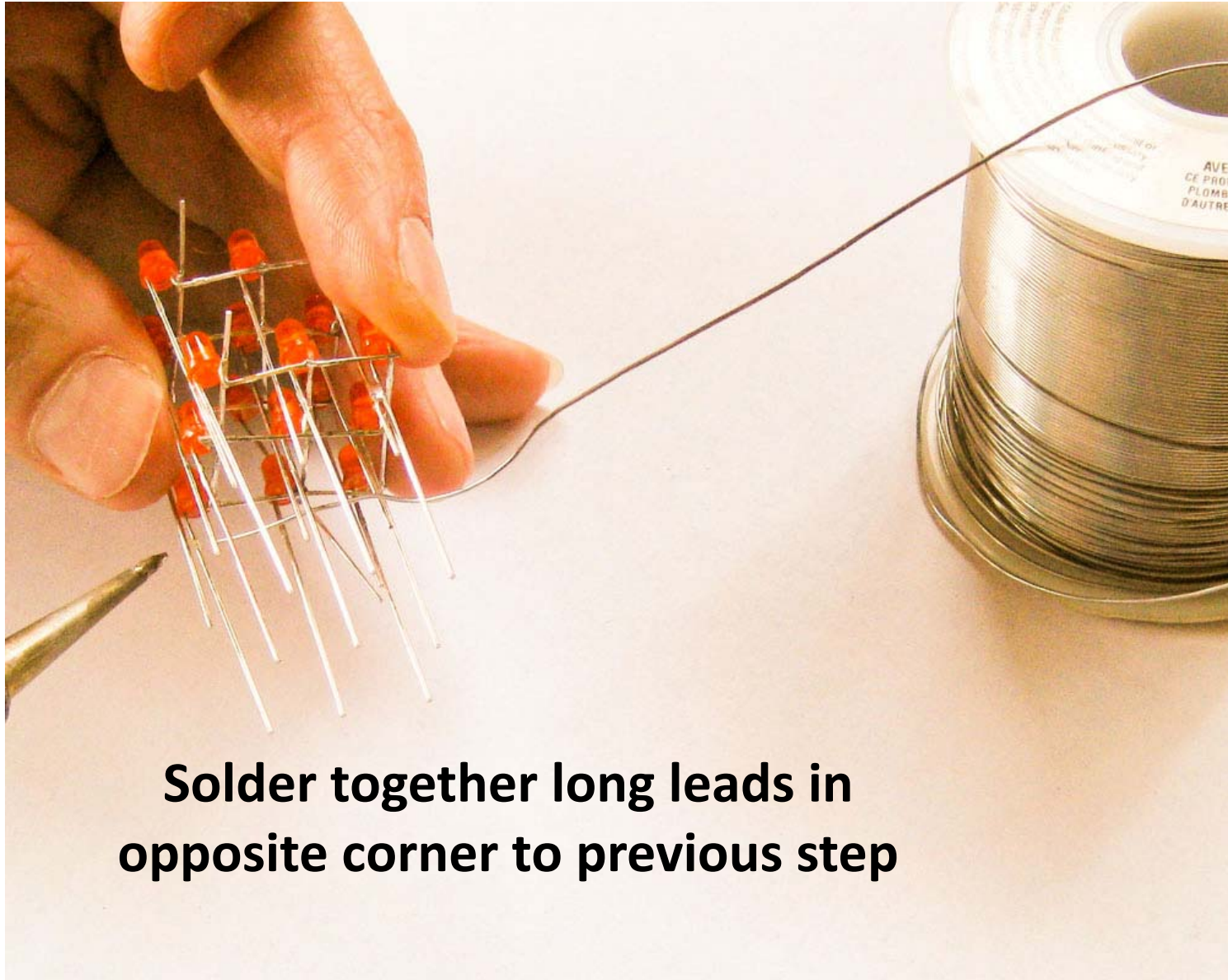


Both planes  
oriented so that  
little stubs  
point the same way

**We will be soldering together  
all of the long leads  
of the top and middle LED planes.**

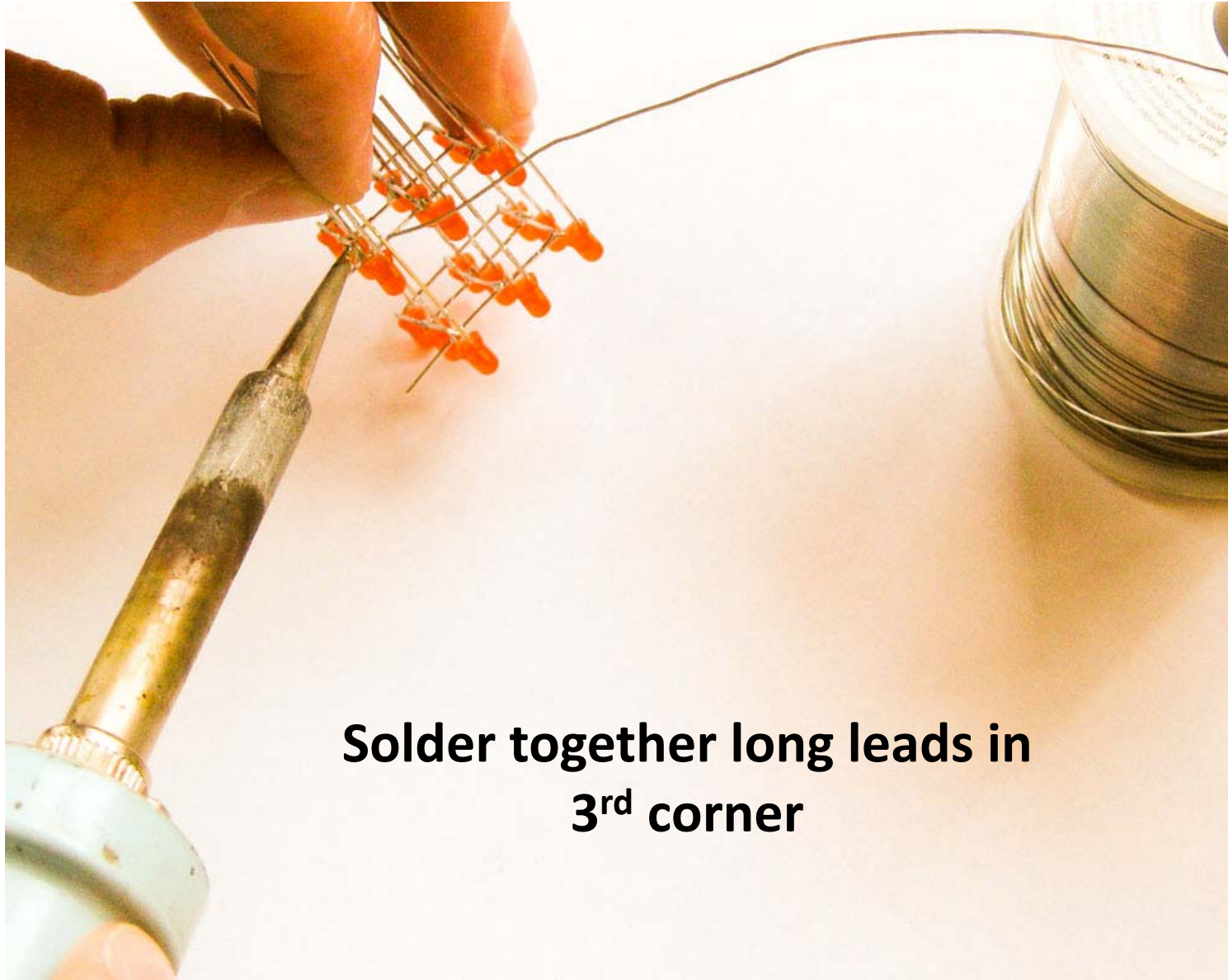


**Solder together long leads in one corner**

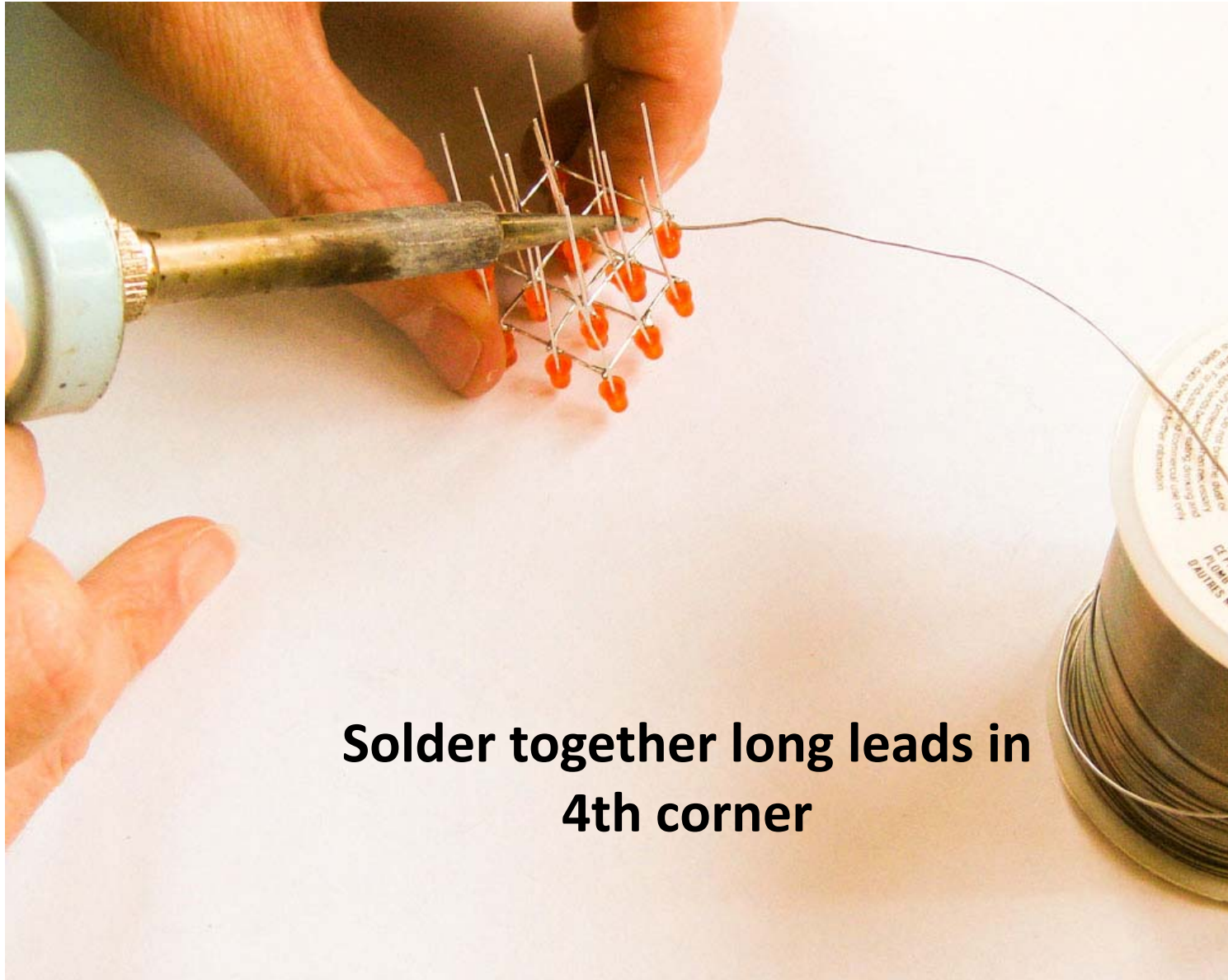


**Solder together long leads in  
opposite corner to previous step**



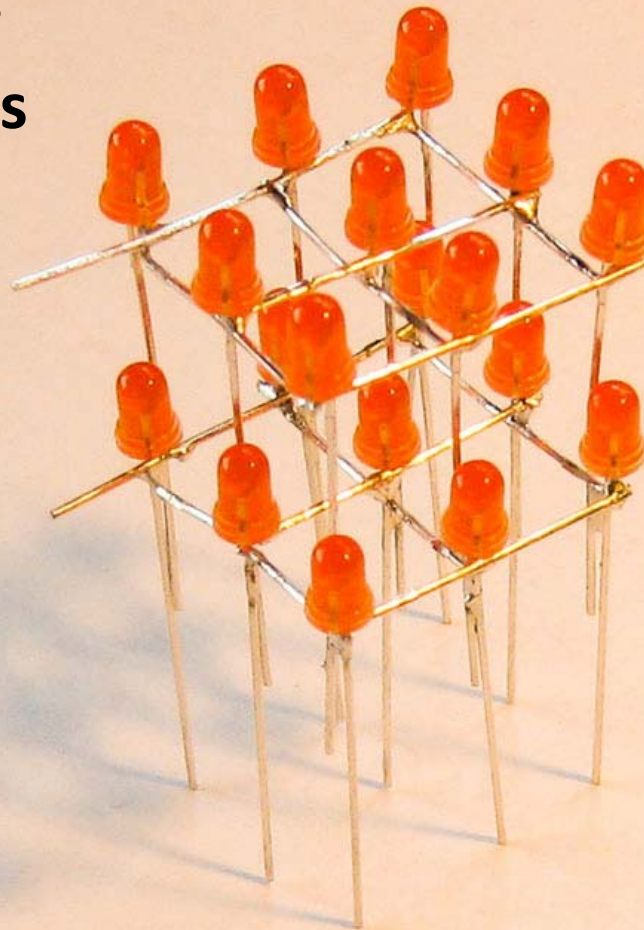


**Solder together long leads in  
3<sup>rd</sup> corner**



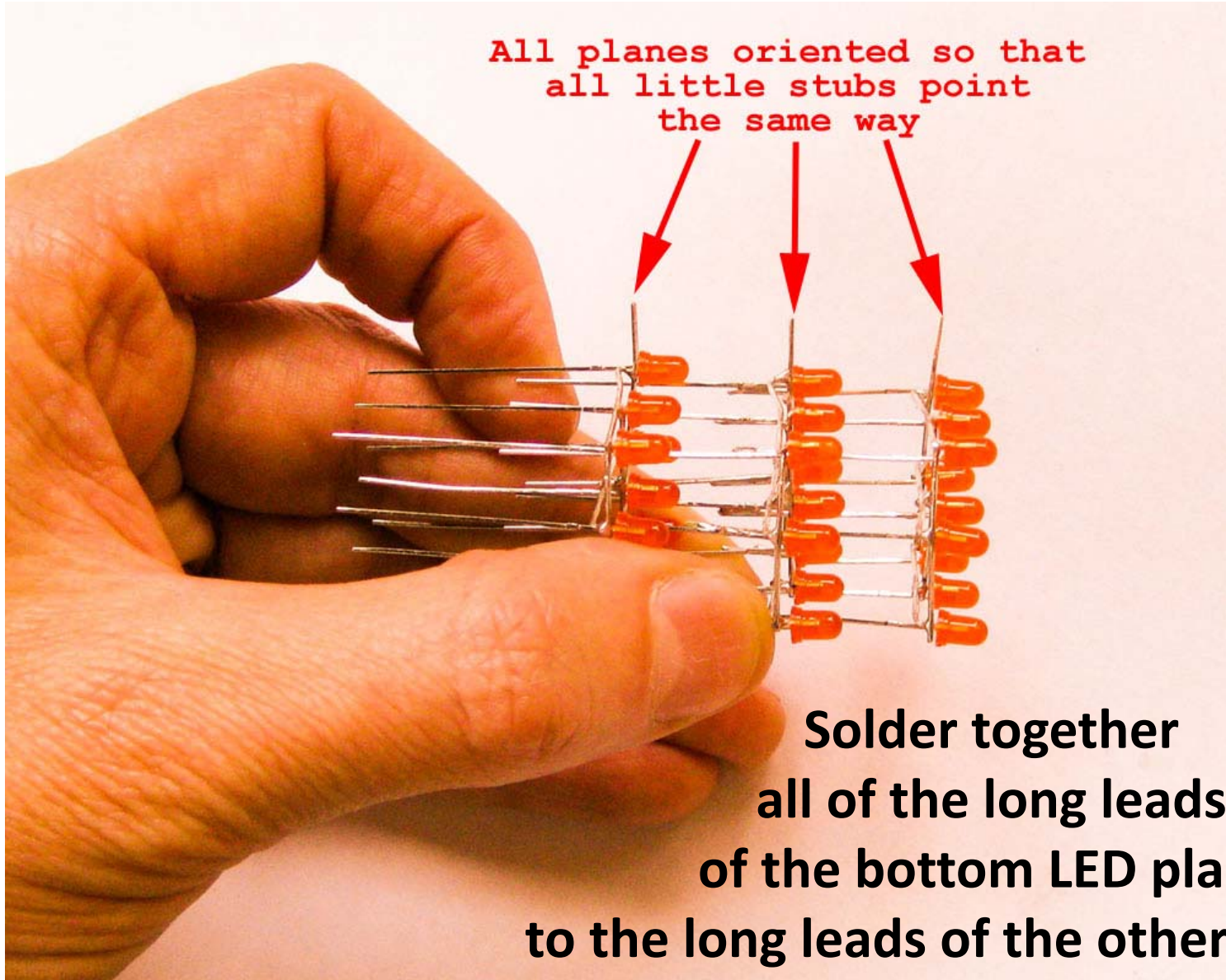
**Solder together long leads in  
4th corner**

**Solder together  
remaining  
5 long leads**



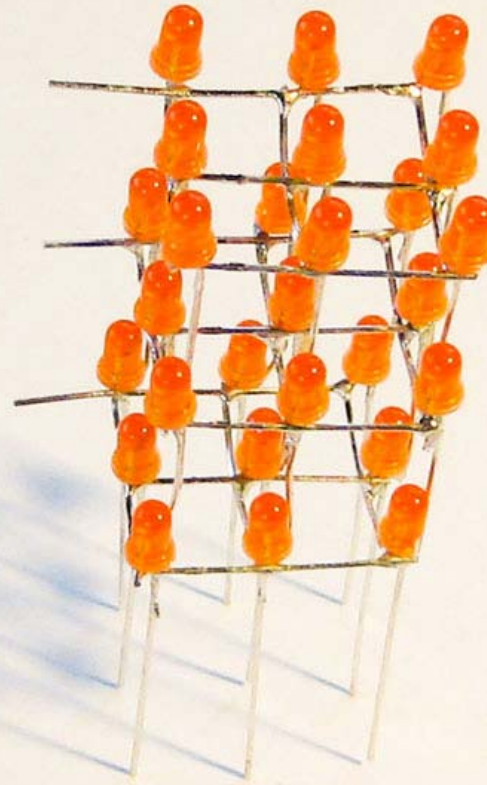


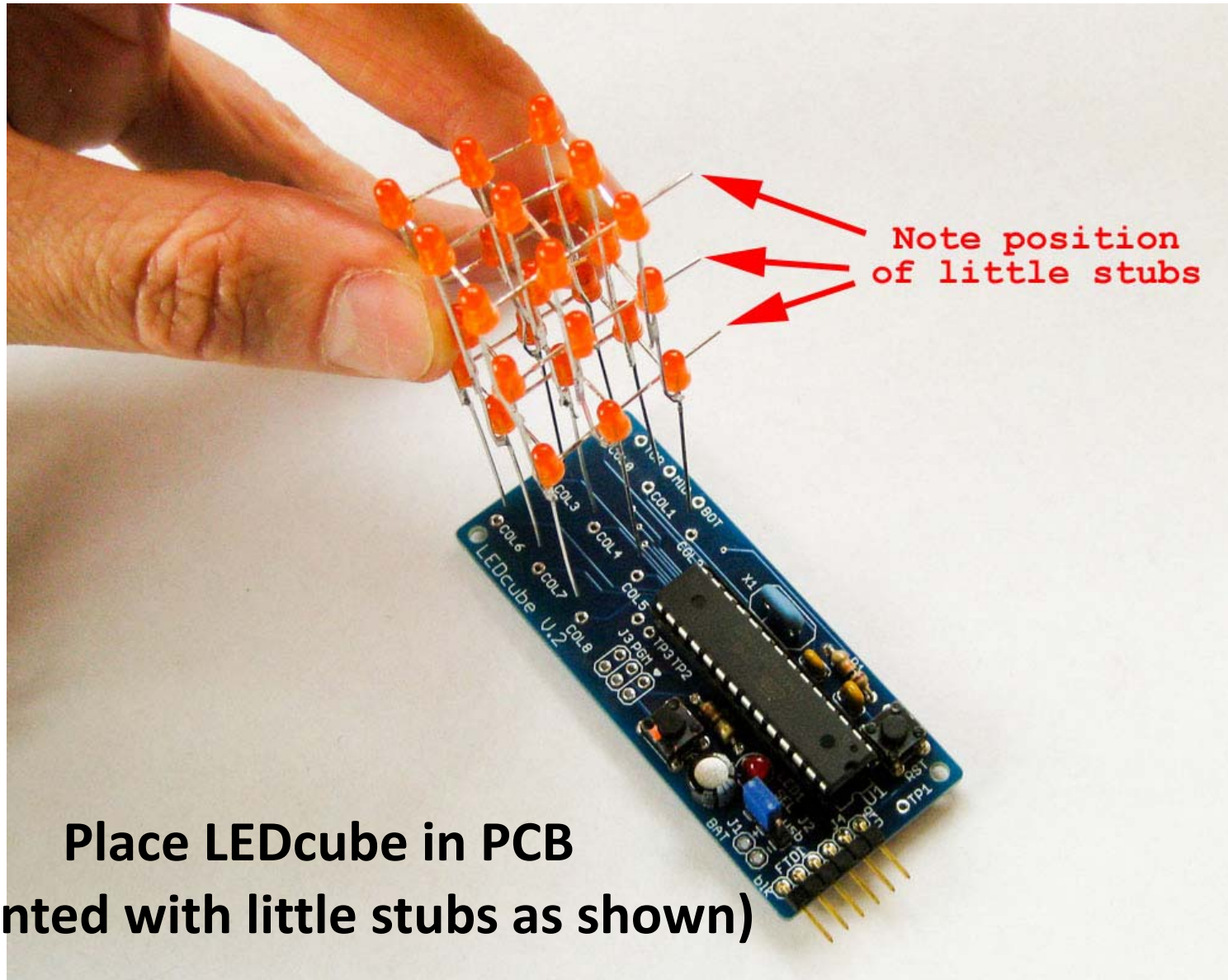
All planes oriented so that  
all little stubs point  
the same way



Solder together  
all of the long leads  
of the bottom LED plane  
to the long leads of the other 2 planes.

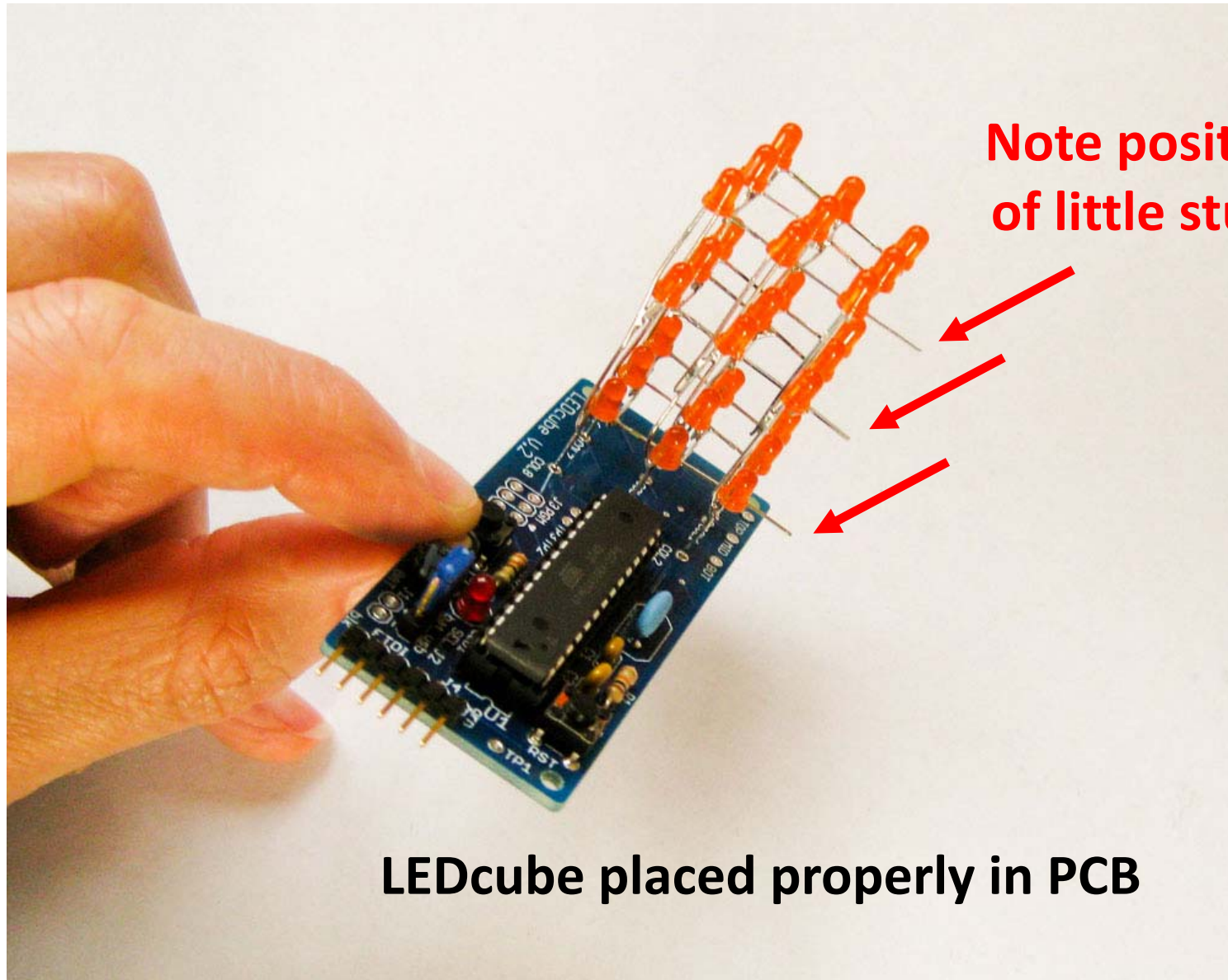
**LEDcube is complete!**





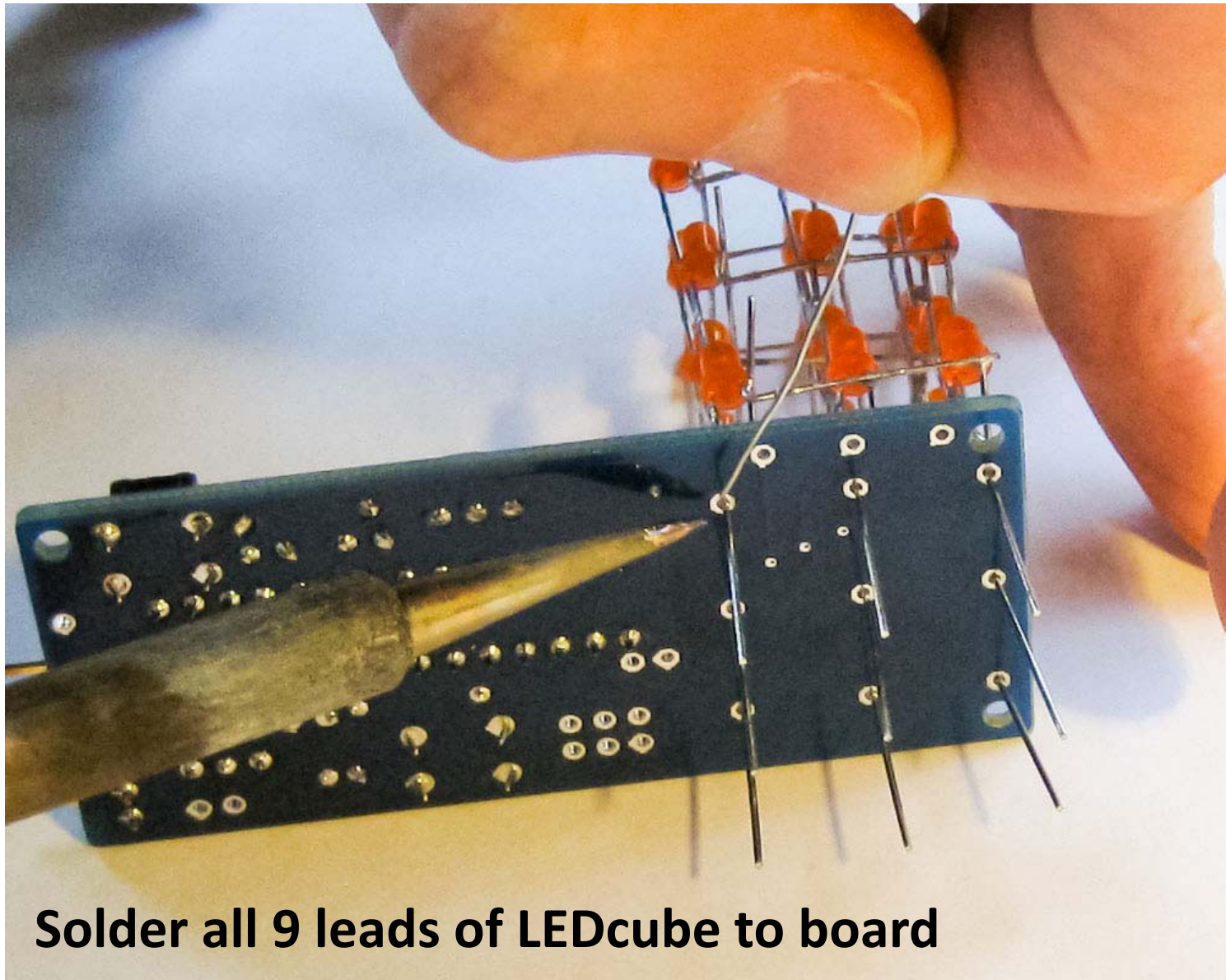
**Place LEDcube in PCB  
(oriented with little stubs as shown)**





**Note position  
of little stubs**

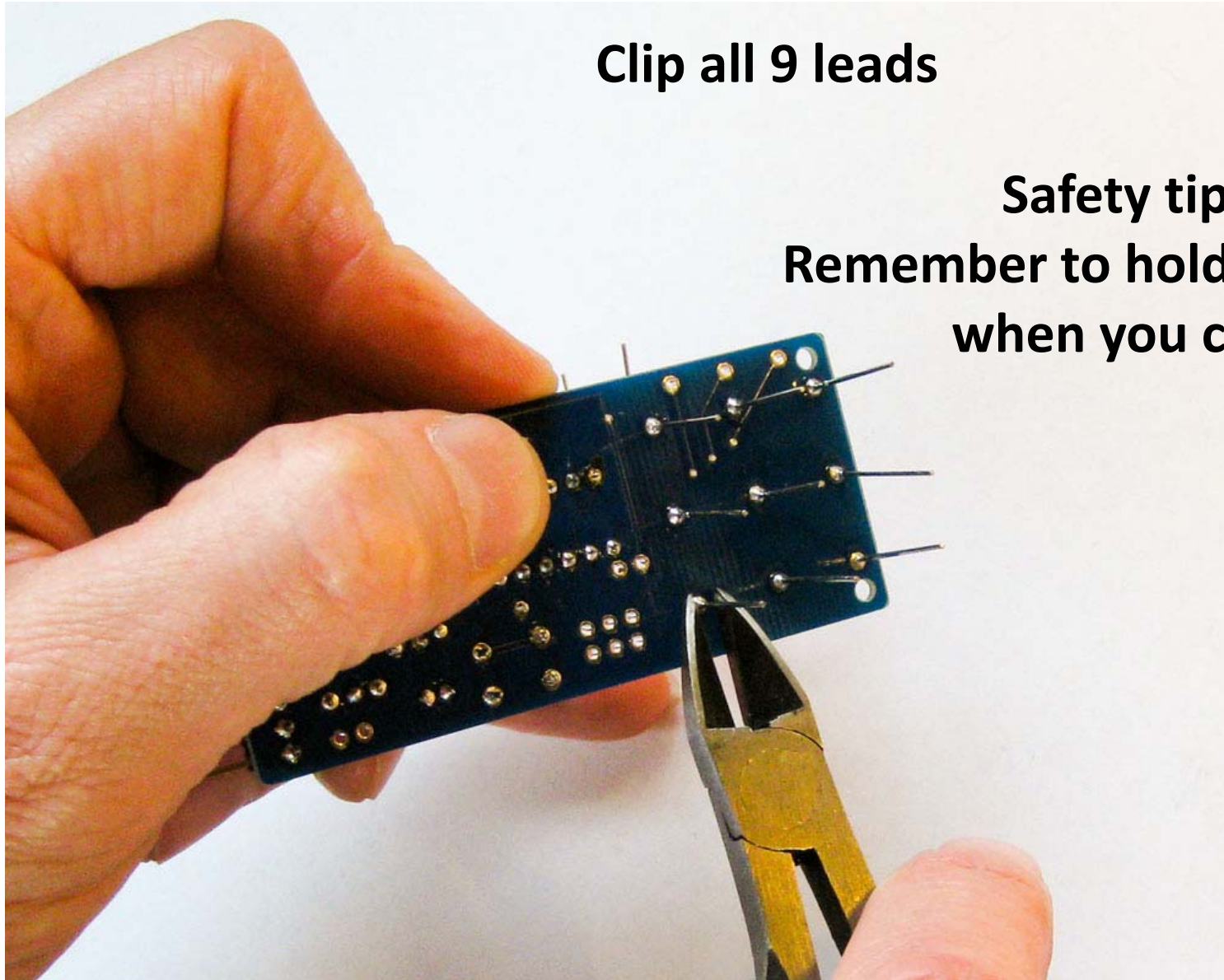
**LEDcube placed properly in PCB**





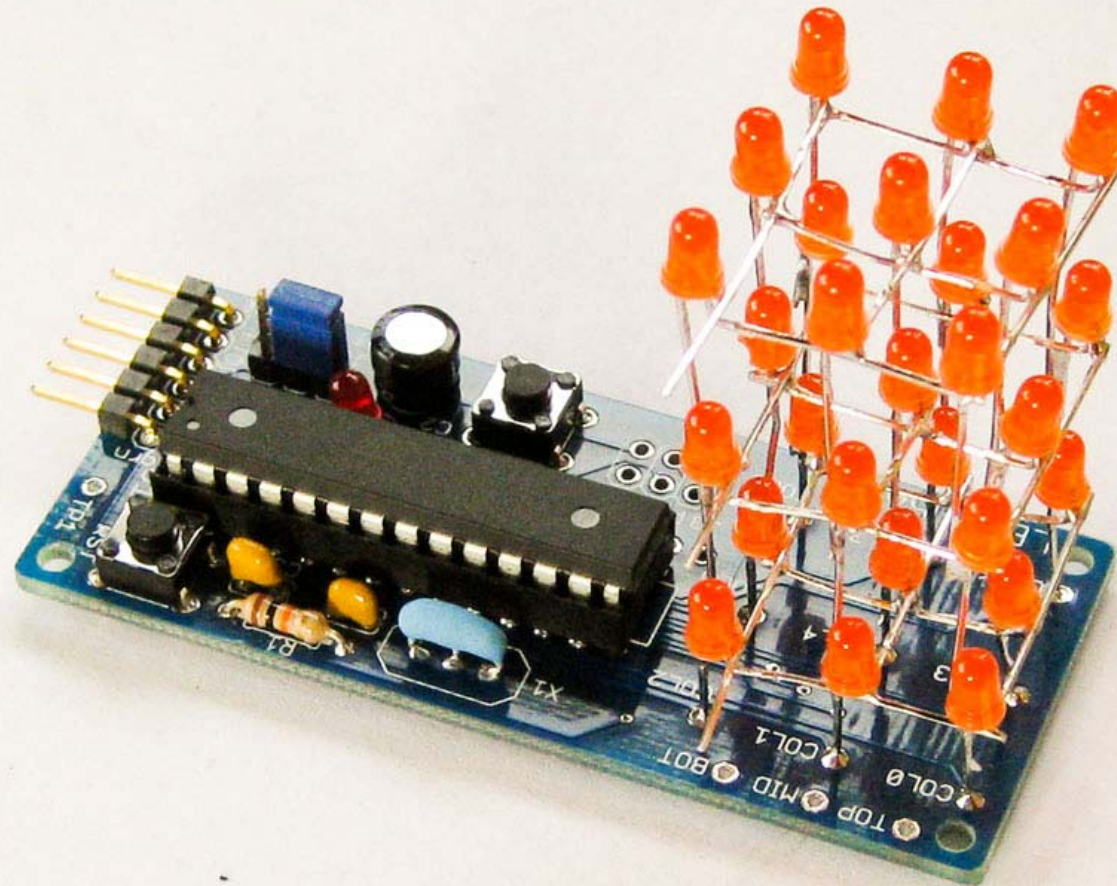
**Clip all 9 leads**

**Safety tip:  
Remember to hold the leads  
when you cut!**

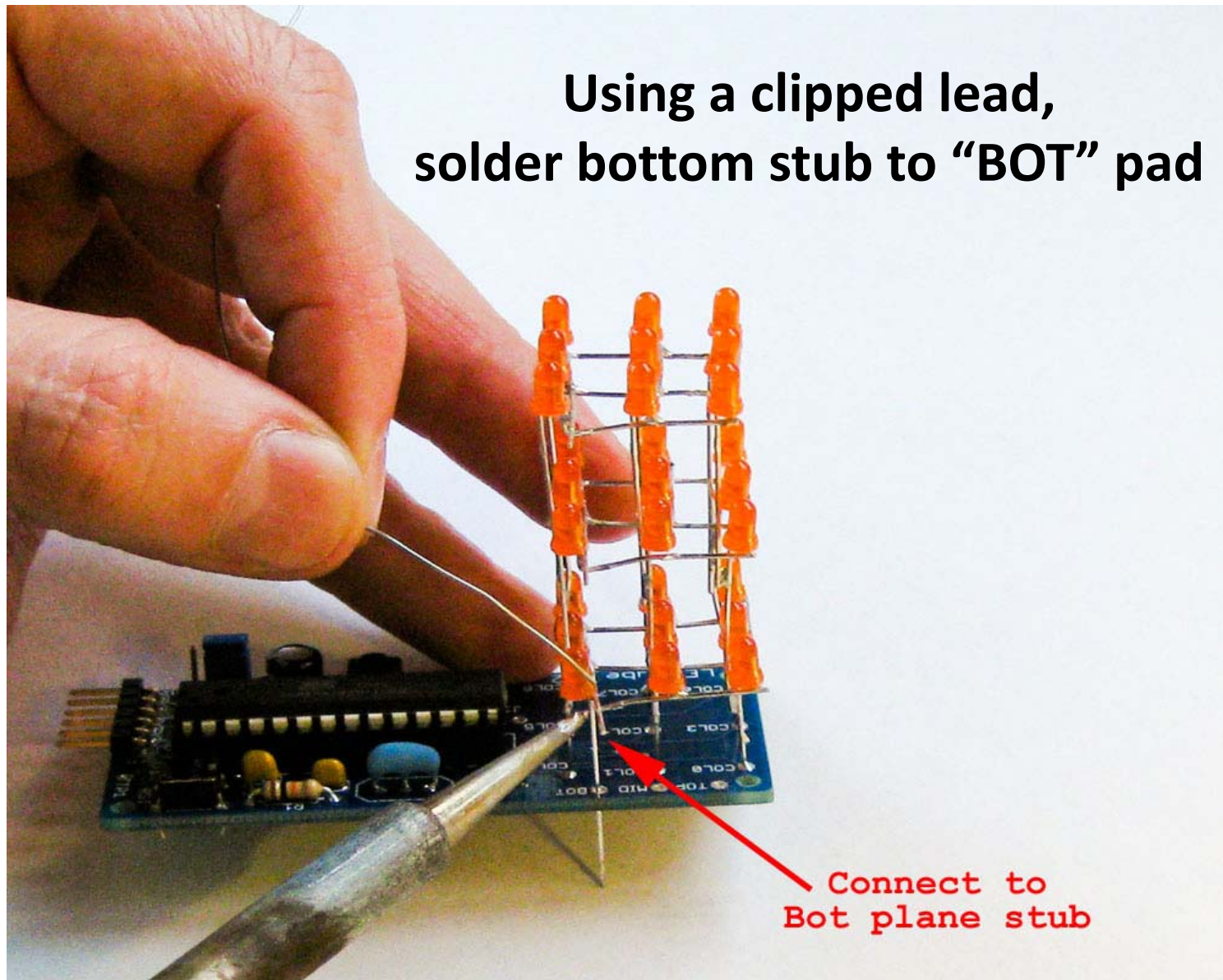




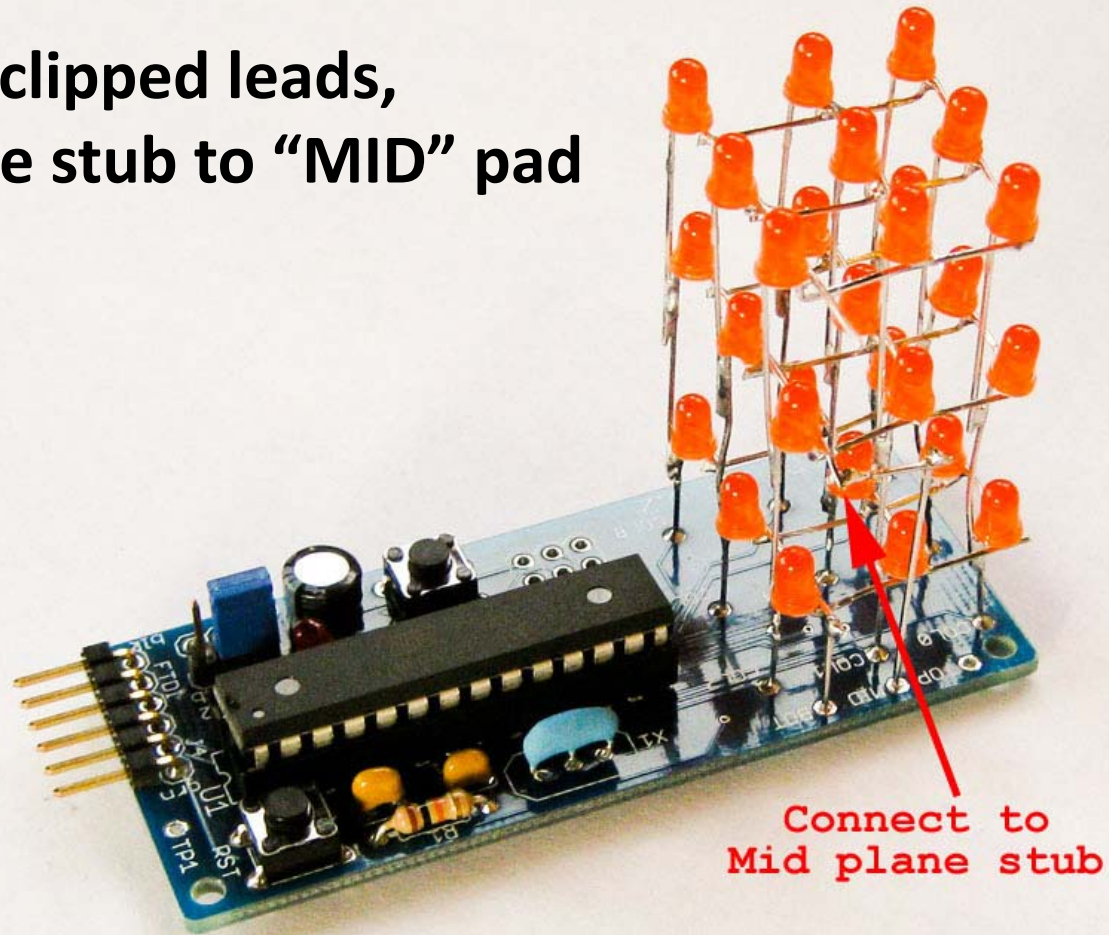
## LEDcube soldered in board



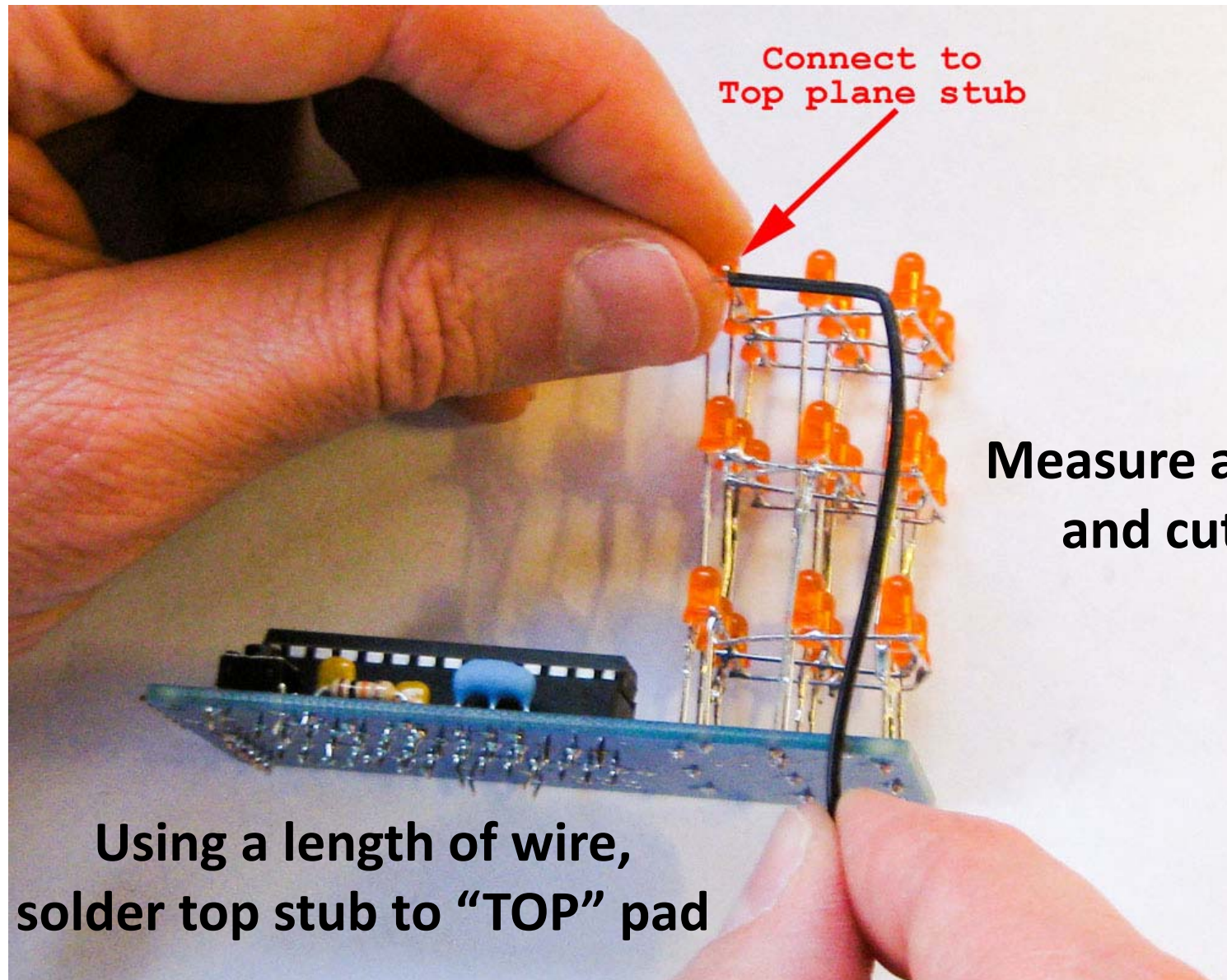
**Using a clipped lead,  
solder bottom stub to “BOT” pad**



**Using clipped leads,  
solder middle stub to “MID” pad**





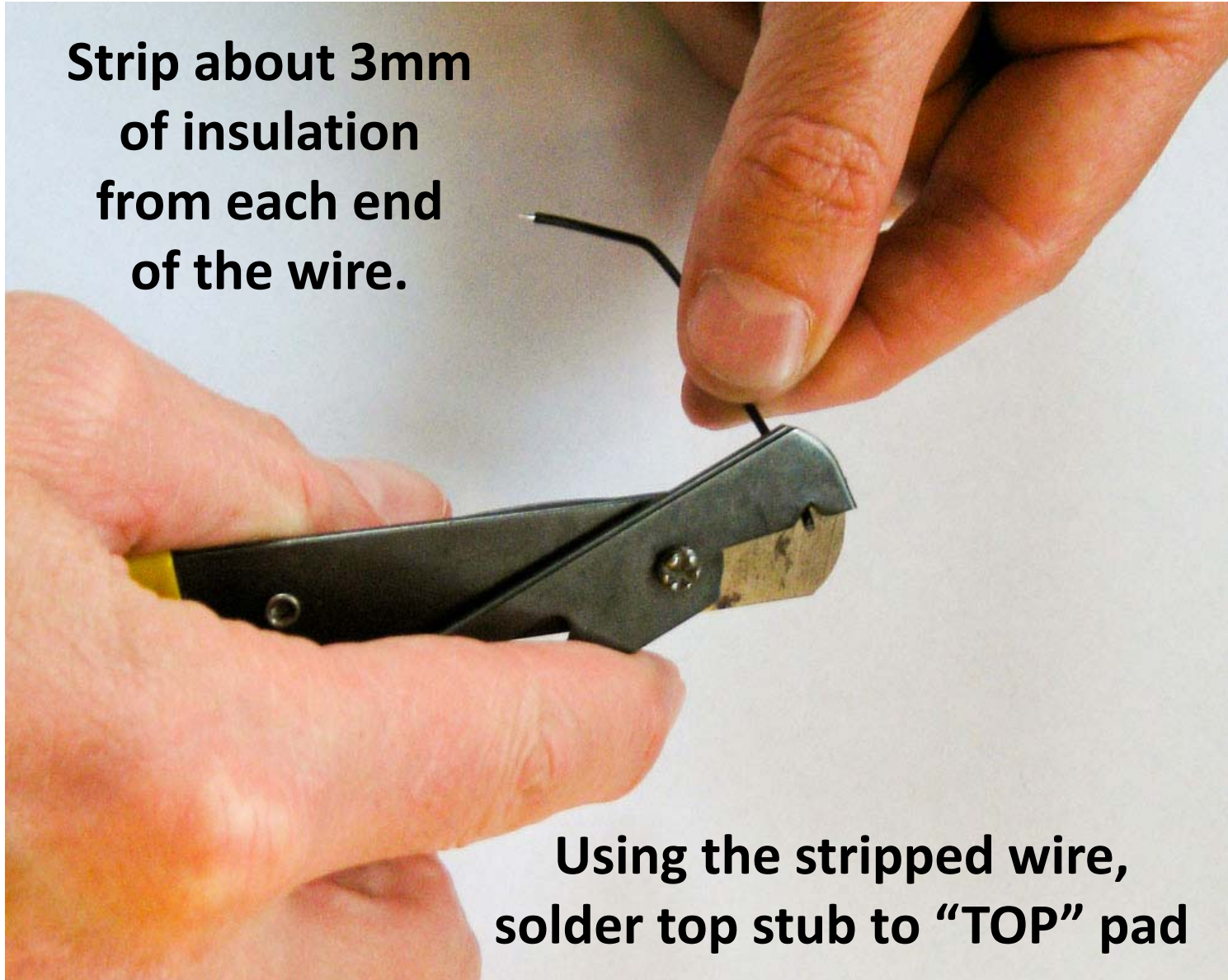


Connect to  
Top plane stub

Measure and bend  
and cut wire

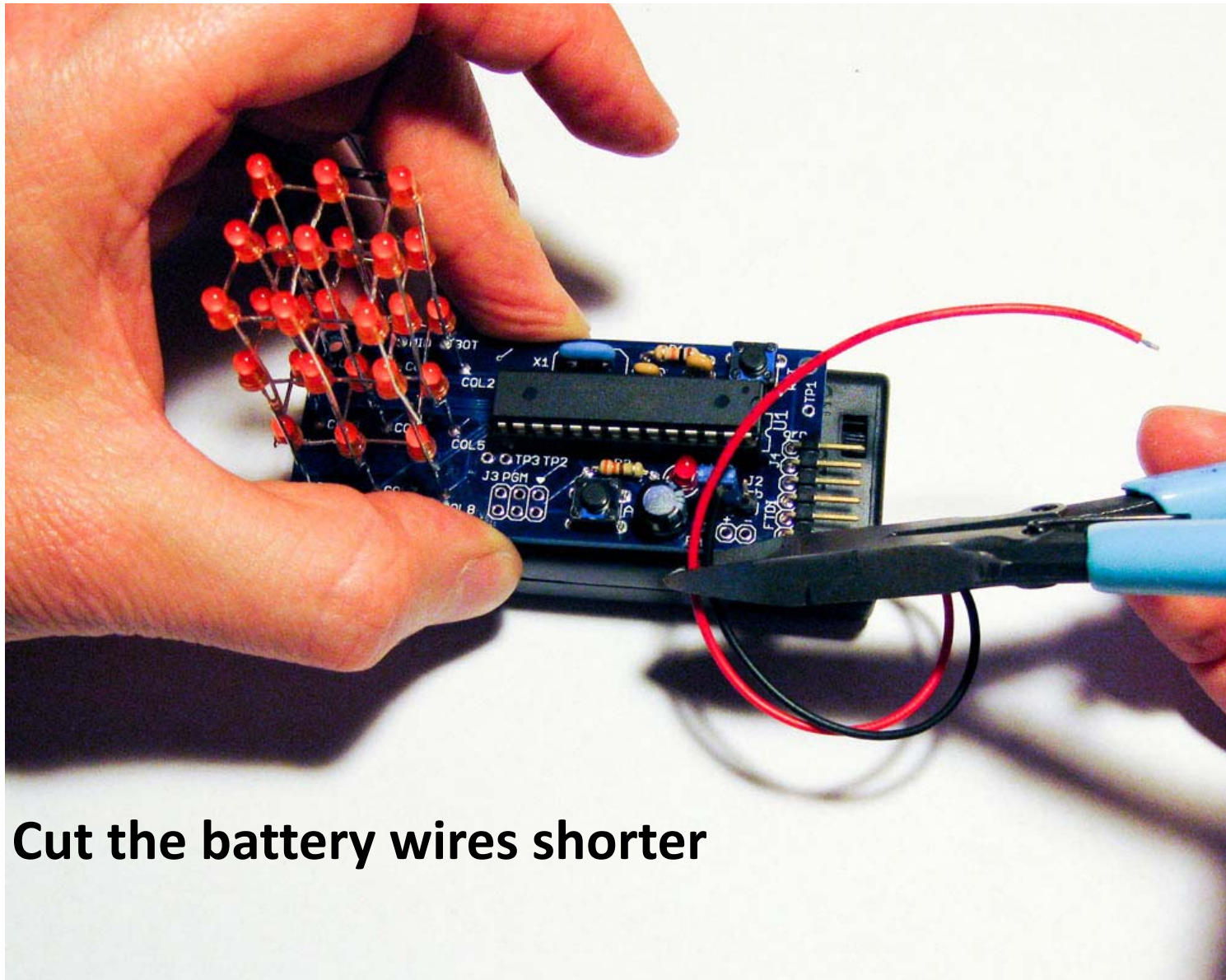
Using a length of wire,  
solder top stub to "TOP" pad

**Strip about 3mm  
of insulation  
from each end  
of the wire.**



**Using the stripped wire,  
solder top stub to "TOP" pad**

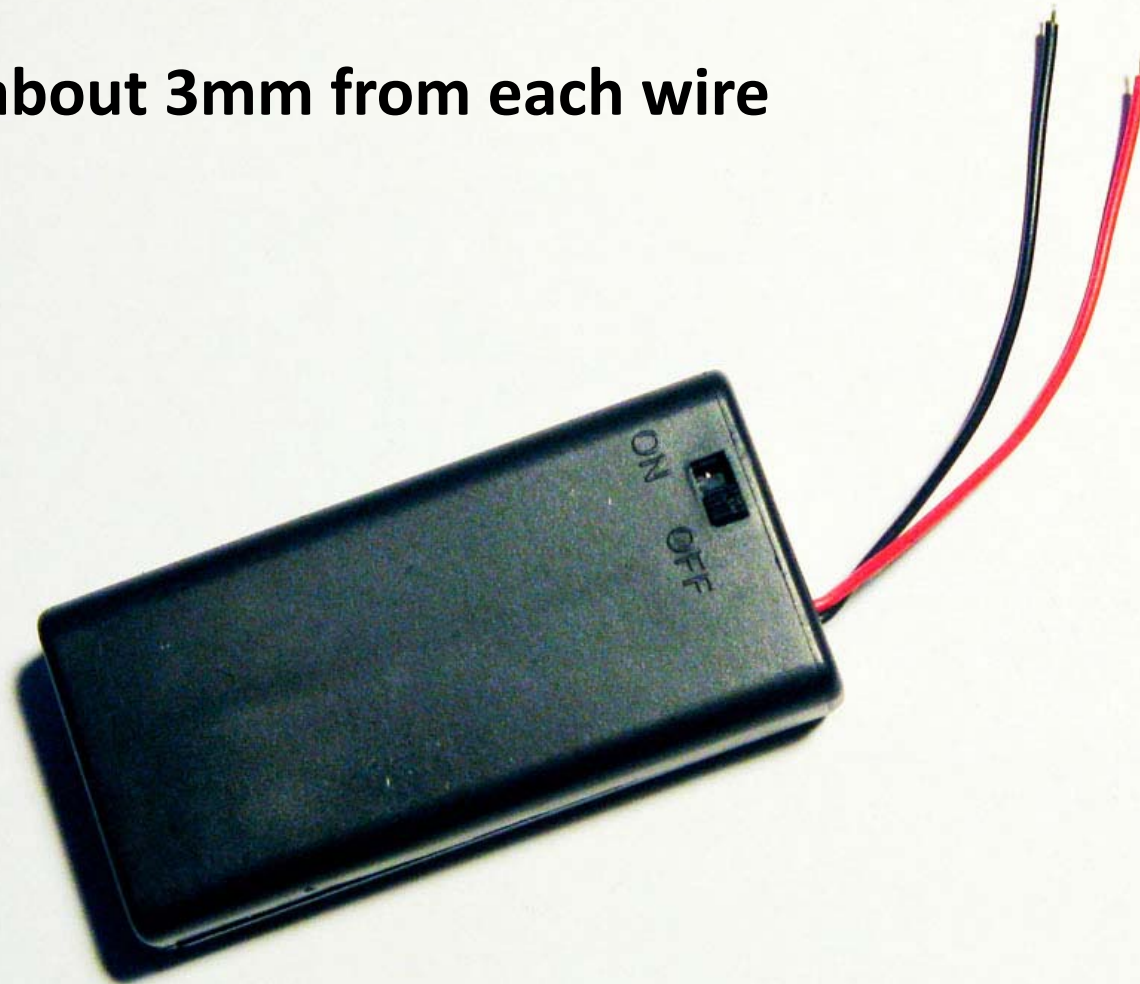




**Cut the battery wires shorter**



**Strip about 3mm from each wire**

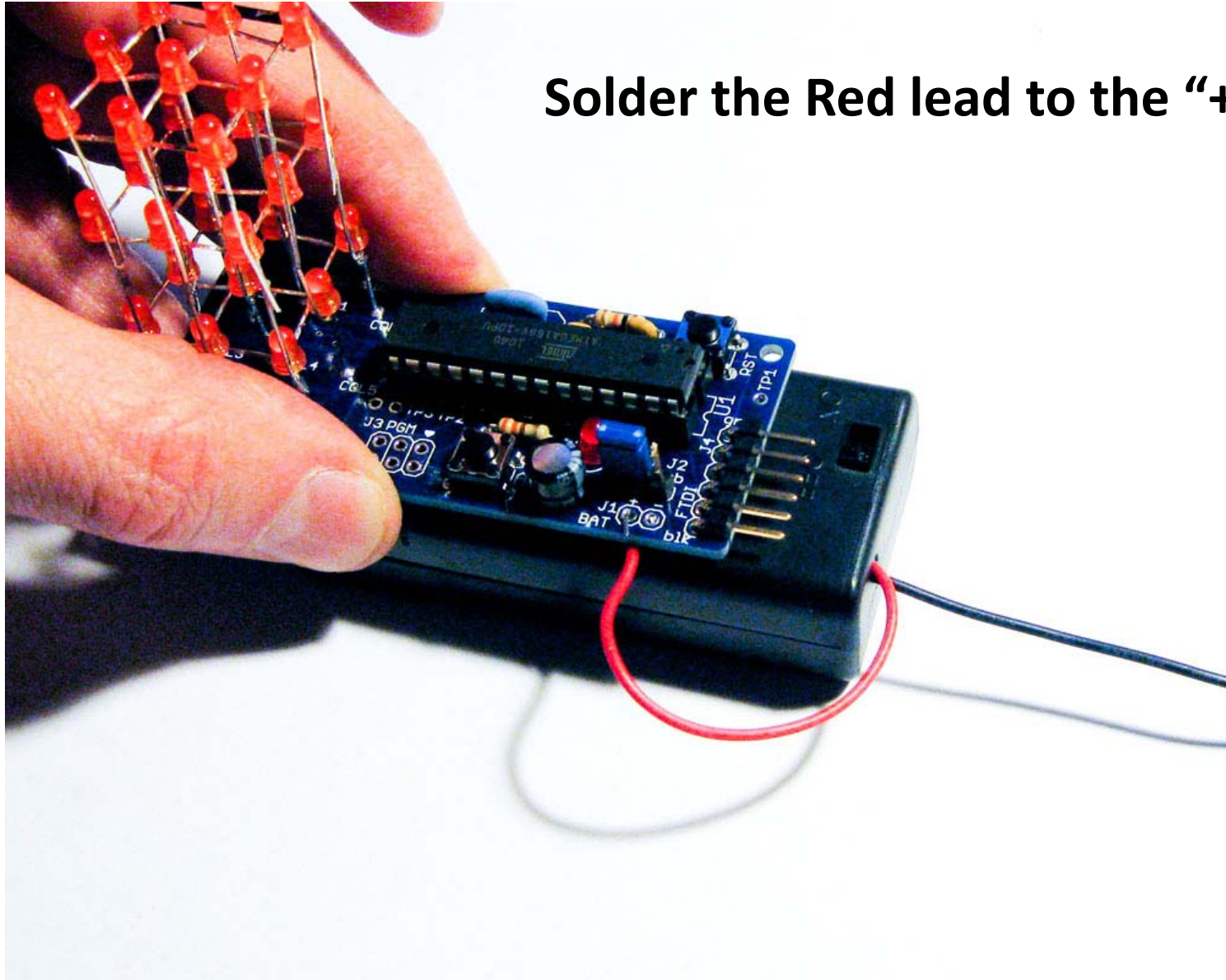




**Tin both exposed leads**

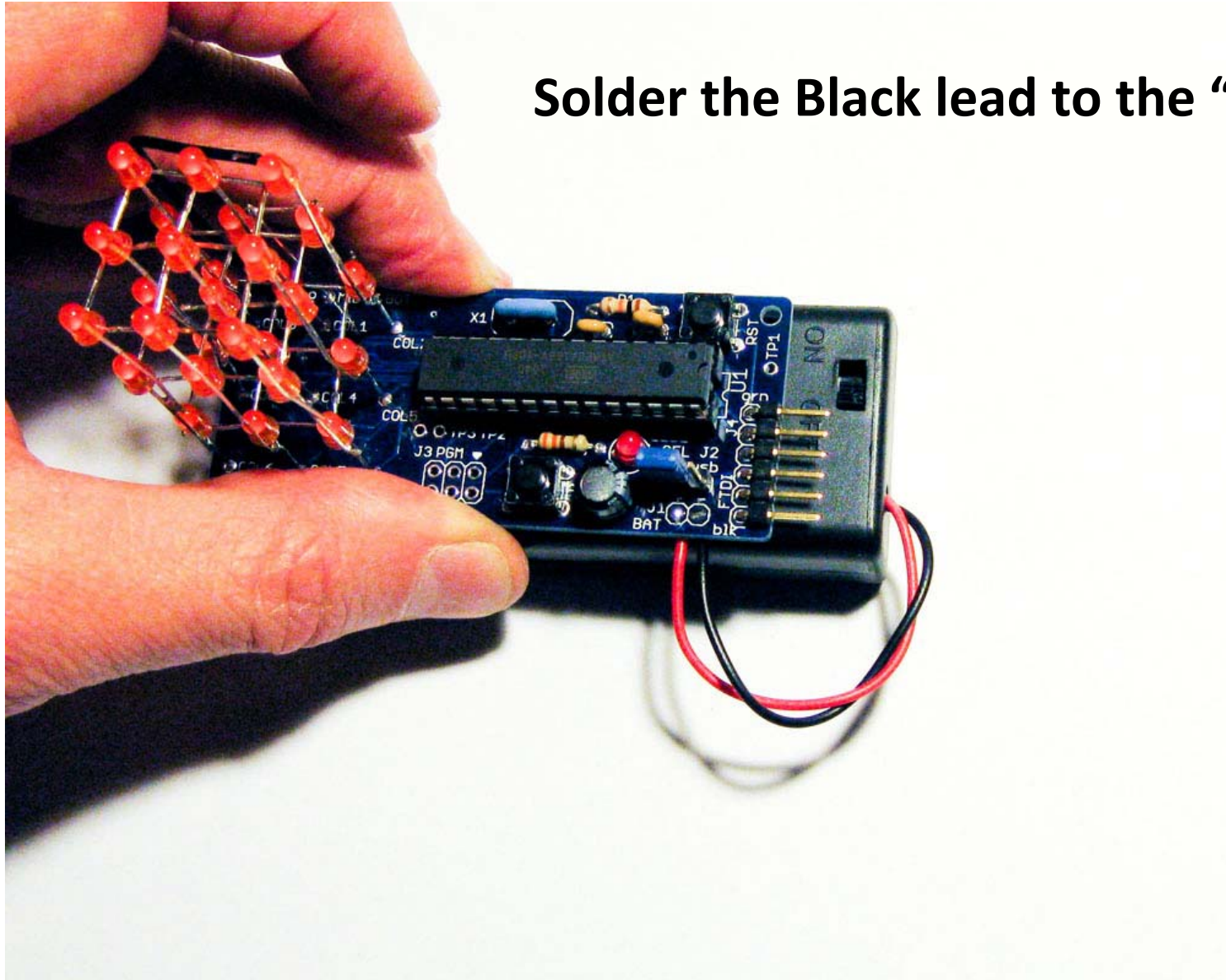
**Tinning means:  
thinly coat with melted solder**

**Solder the Red lead to the “+” pad**





**Solder the Black lead to the “-” pad**



**Done!**

