Geiger Muller
Counter Kit GC10

Assembling Instructions

Last revised on 11/27 2011

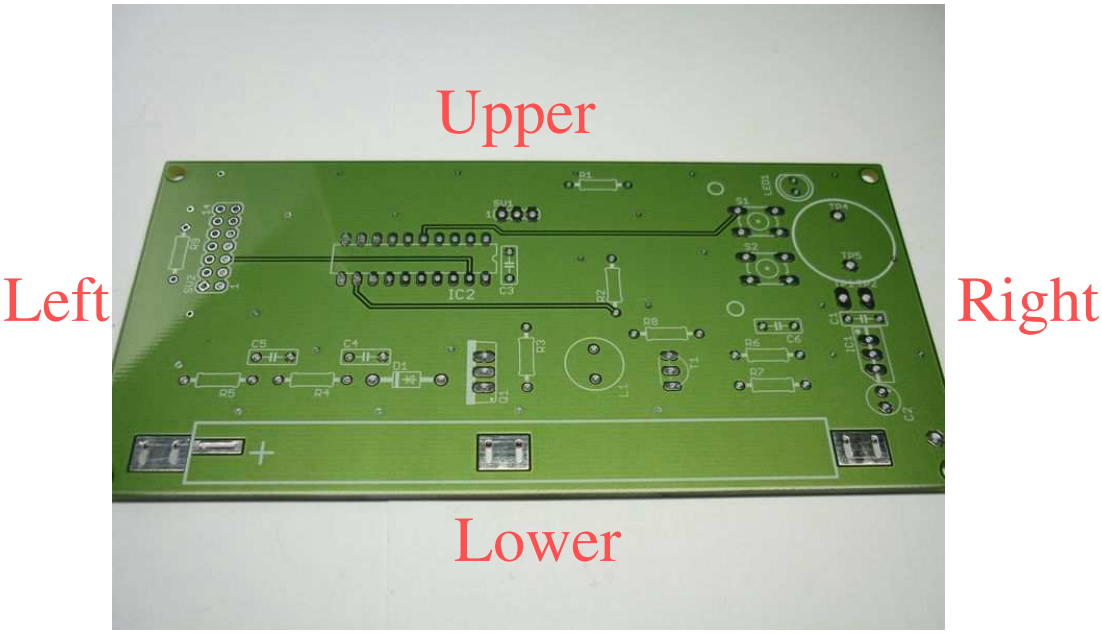
Features

- **Sensitive to gamma-rays and high-energy beta-rays**
- **High contrast LCD**
- **Easy to build**
- **Quick response display algorithm (useful for finding hot spot)**
- **PC connectable via USB module (requires USB connection module)**

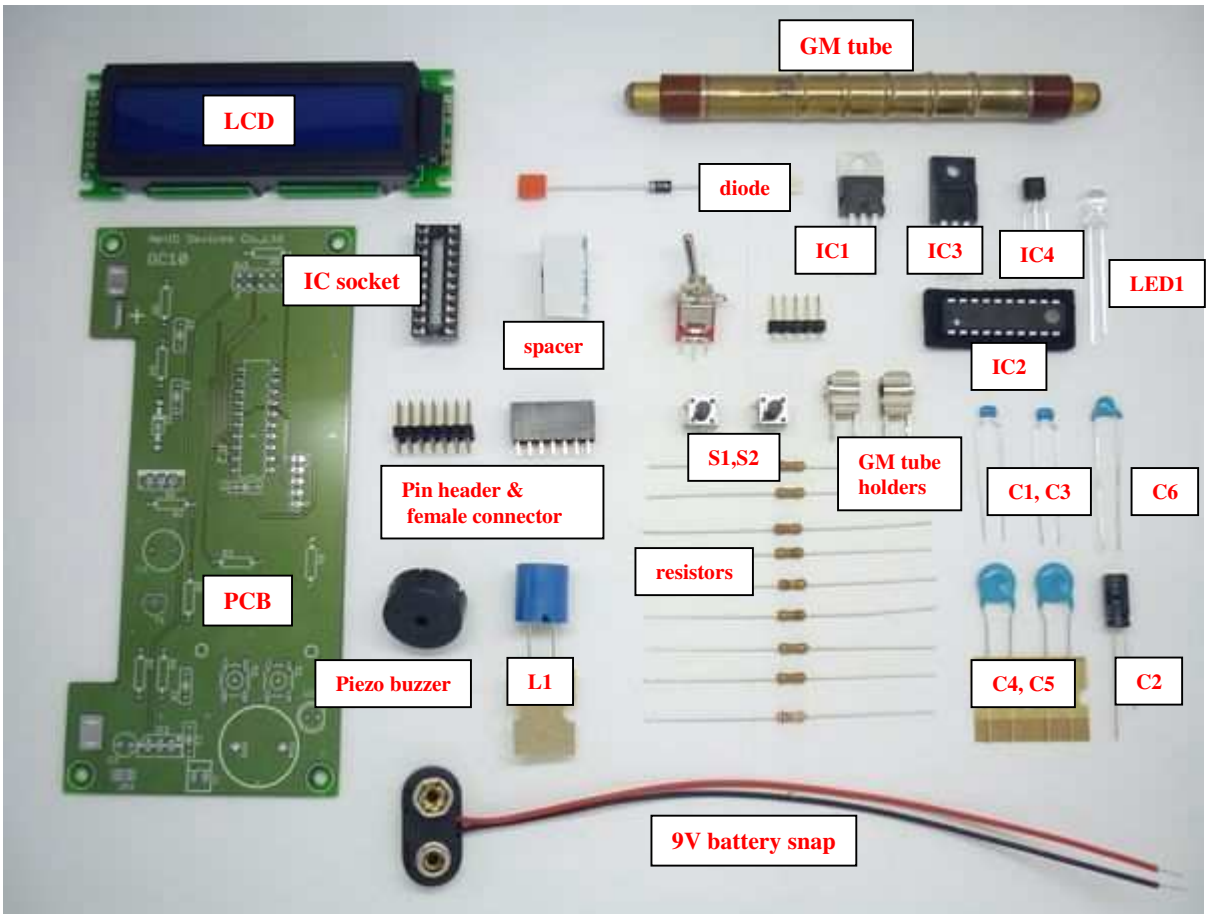
1. Parts list

Component	Symbol	Type or Value	Description
PCB	-	GC10PCB	-
GM tube	-	SBM-20	“+ SBM-20” mark indicats anode
resister	R1	1k Ohm	x 1
	R2	330 Ohm	x 1
	R3	120 Ohm	x 1
	R4	1M Ohm	x 1
	R5, R7	5.1M Ohm	x 2
	R6	100k Ohm	x 1
	R8	47k Ohm	x 1
	R9	2.2k Ohm	x 1
capacitor	C1, C3	0.1 uF	104
	C2	33 uF	electrolytic capacitor
	C4, C5	4700 pF	-
	C6	100 pF	101
inductor	L1	8.2mH	-
diode	D1	UF4007	Fairchild
LED	LED1	-	5mm LED
IC	IC1	L7805CV	-
	IC2	ATtiny4313	-
	IC3(Q1)	IPAN70R900P7SXKSA1	-
	IC4	2SC1815	-
switch	S1, S2	-	-
connector & header	16 pin connector	-	PCB side
	16 pin header	-	LCD side
etc	LCD		-
	IC socket	-	-
	Pin socket	5pin right angle	-
	Piezo buzzer	PKM17EPP-4001-B0	-
	GM tube holder		x 2
	9V battery snap	-	-
	LCD spacer	-	x 3

2. Preparation

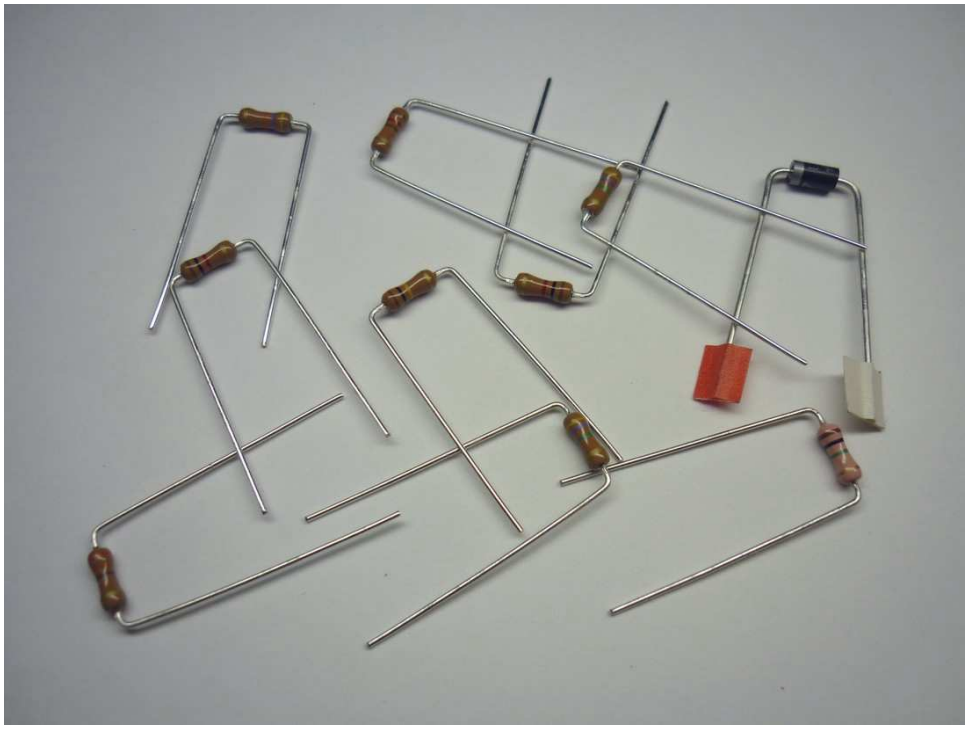


Now we define the absolute direction(position) for the instructions.

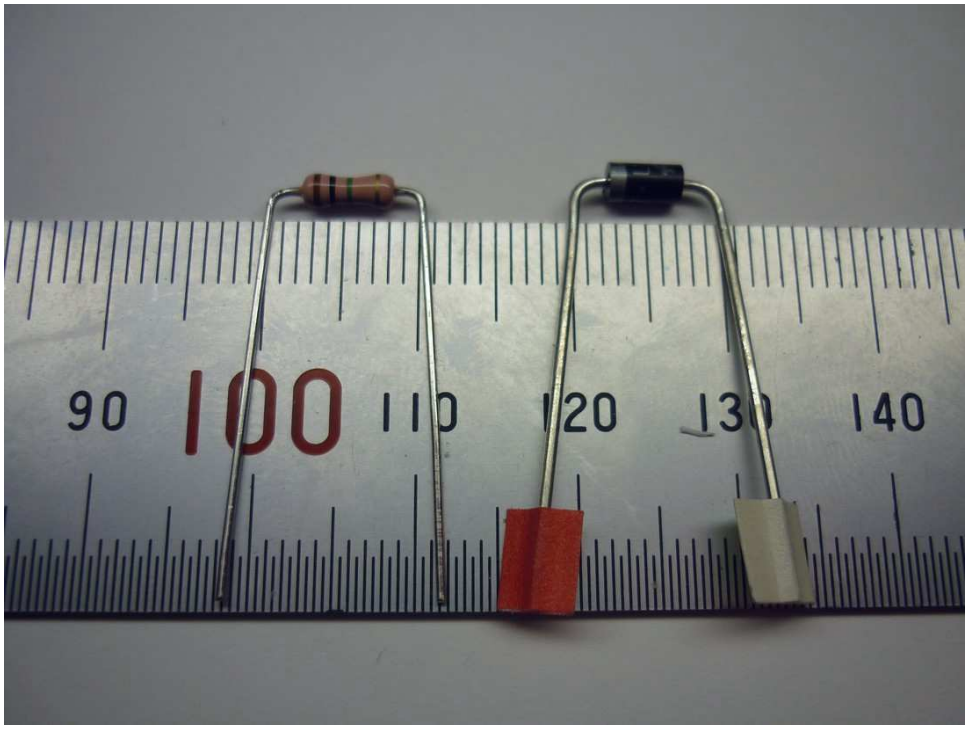


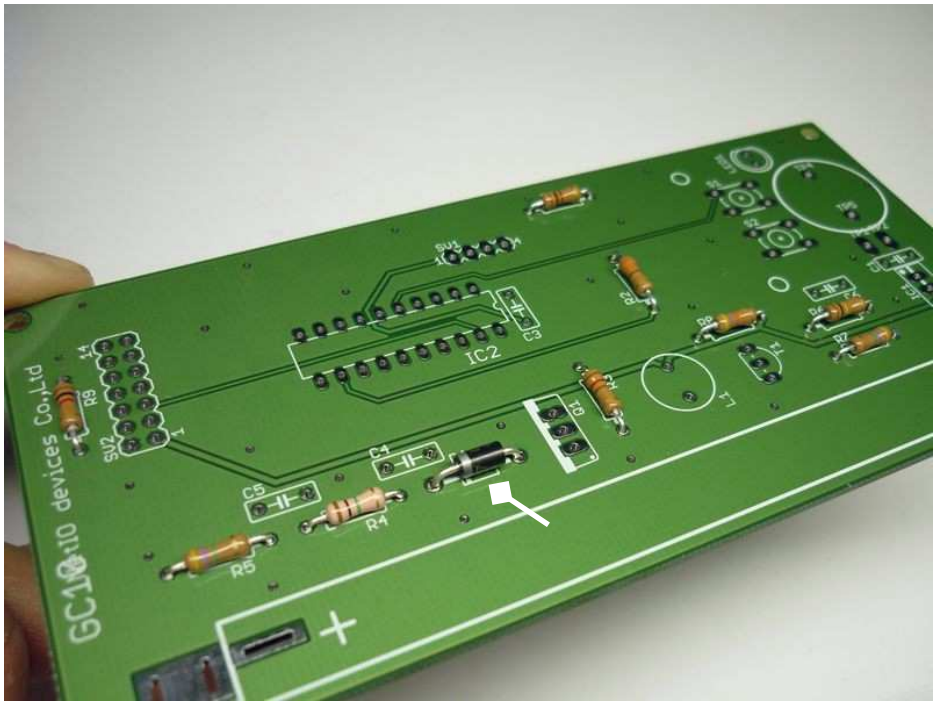
All components

3. Soldering

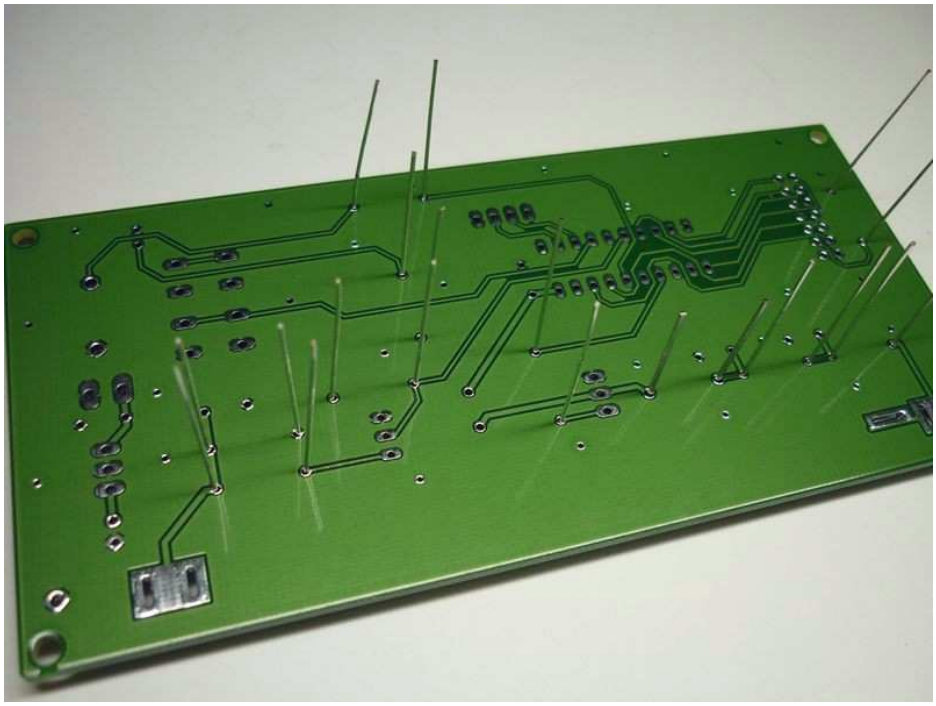


To build effectively, bend all resistors and diode D1 to be same pitch (about 10mm).

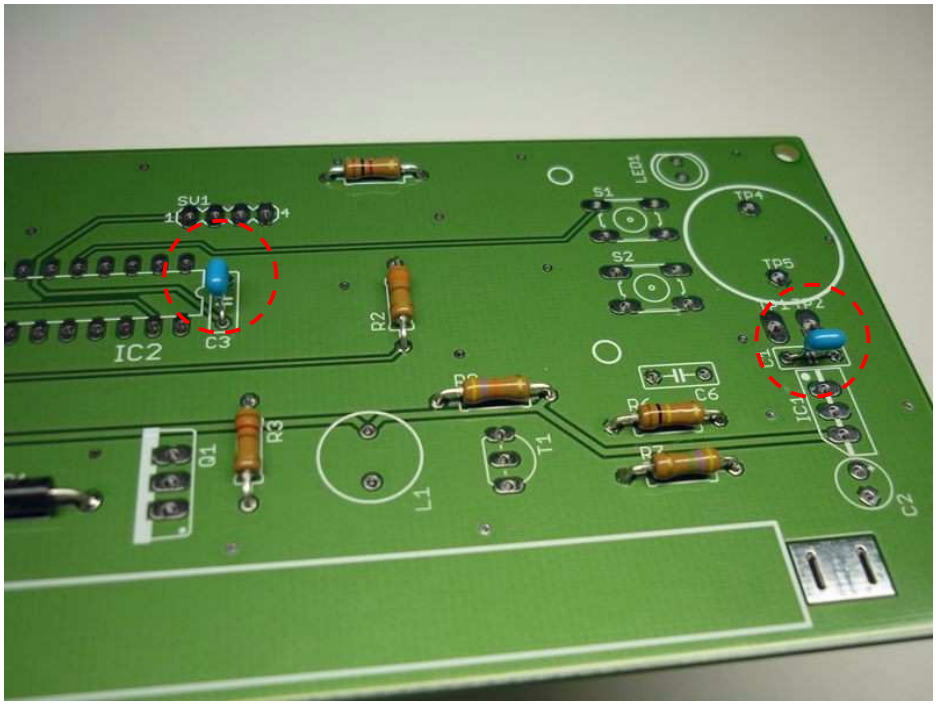




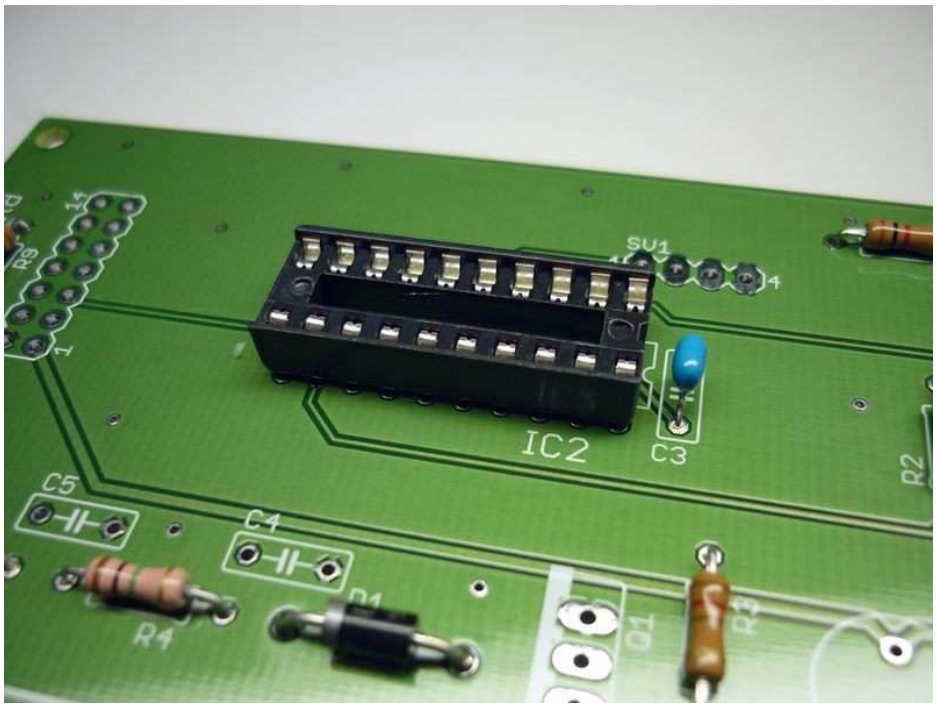
Insert all resistors and diode D1 on its place on the PCB.
Be careful of the insert direction of the diode D1.



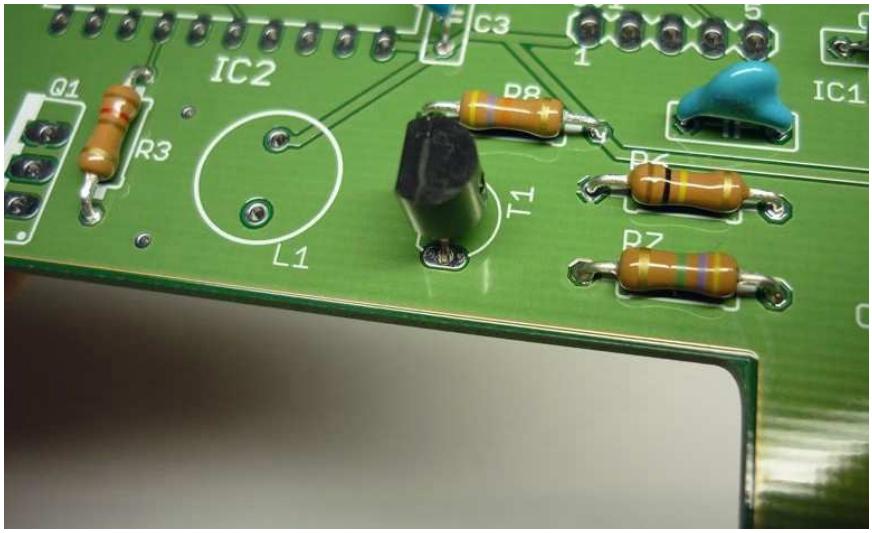
Then flip over and solder all pads. Then cut all rest lead lines.



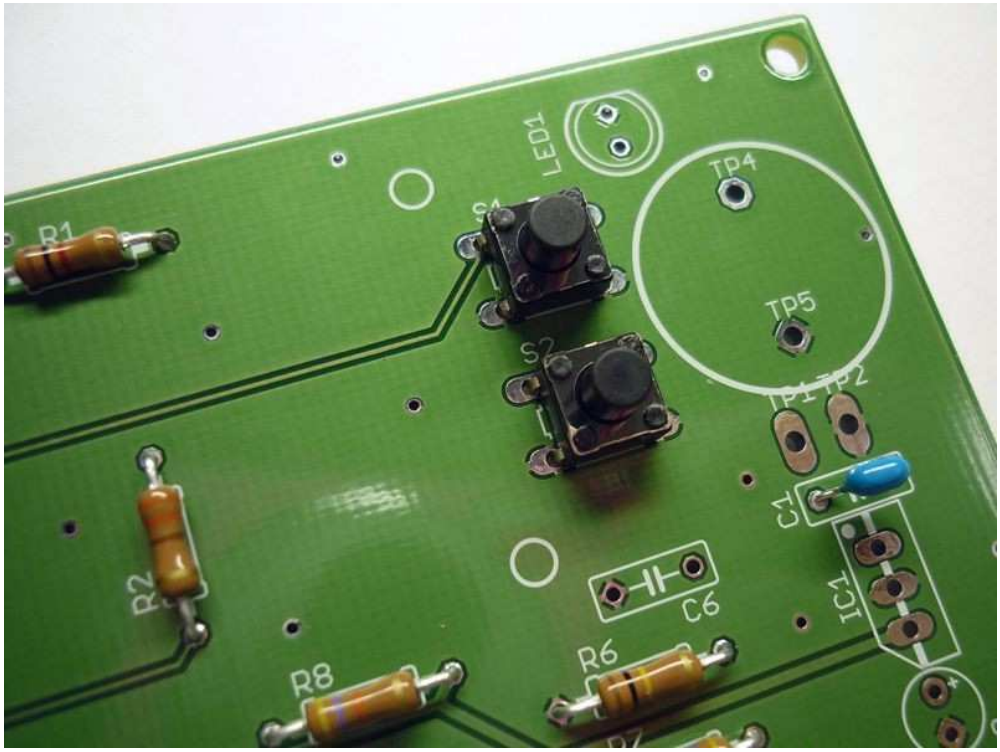
Next, insert C1 and C3 on its place. and solder them.
The marking of C1 and C3 is 104.



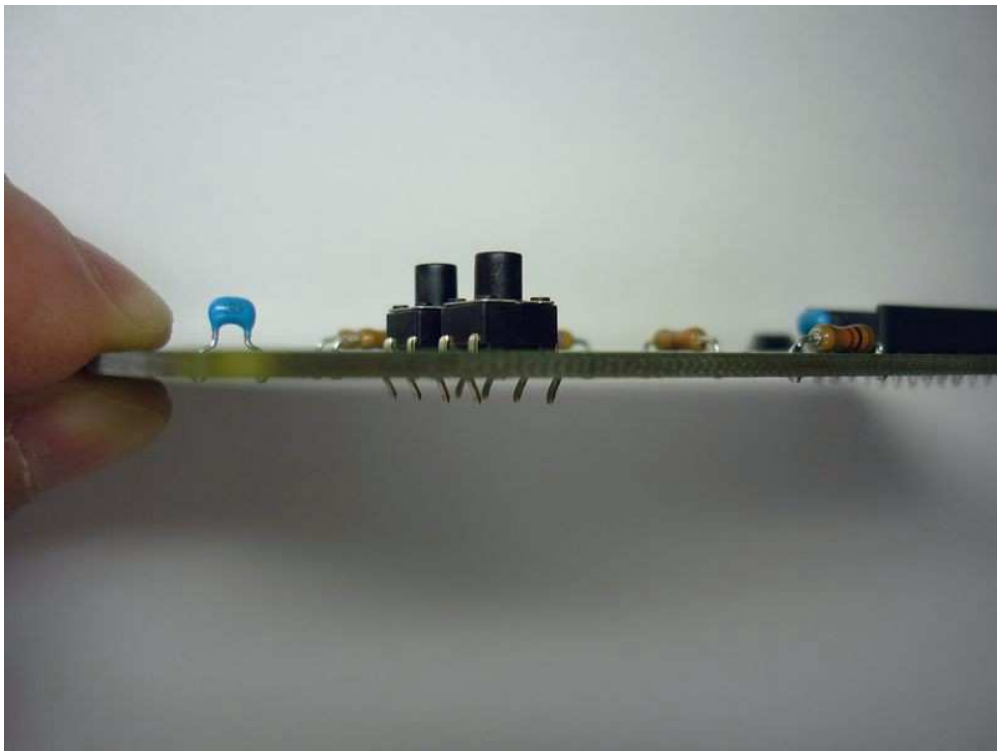
Next, insert a IC socket on the place marked IC2. And solder the pads.

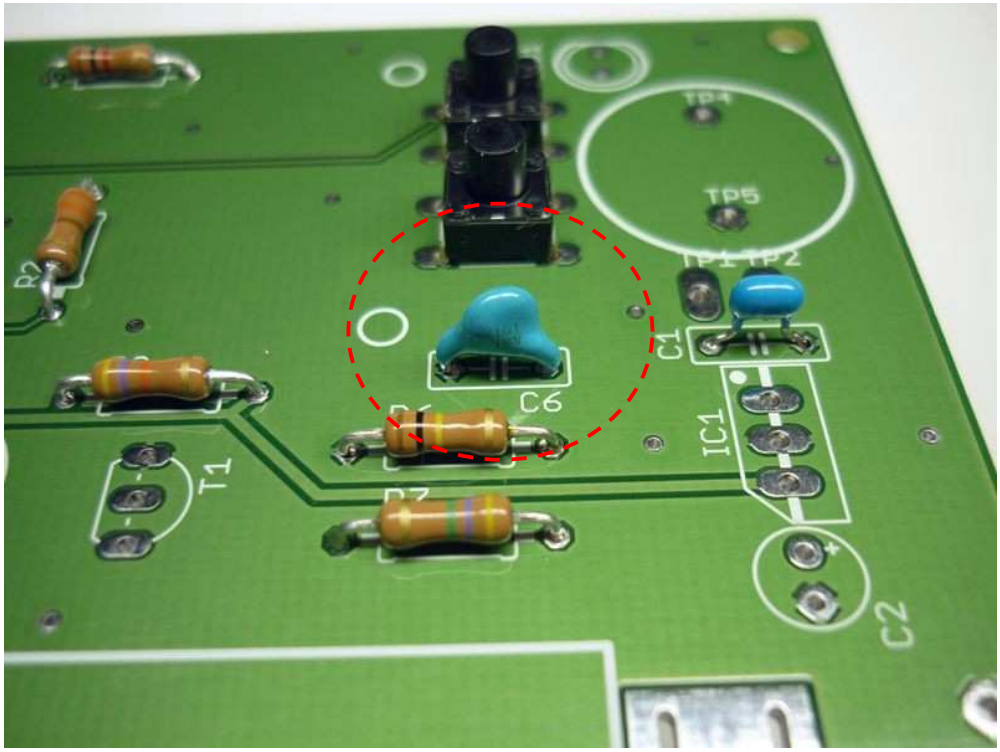


Insert T1 flat side faces left, and solder it.

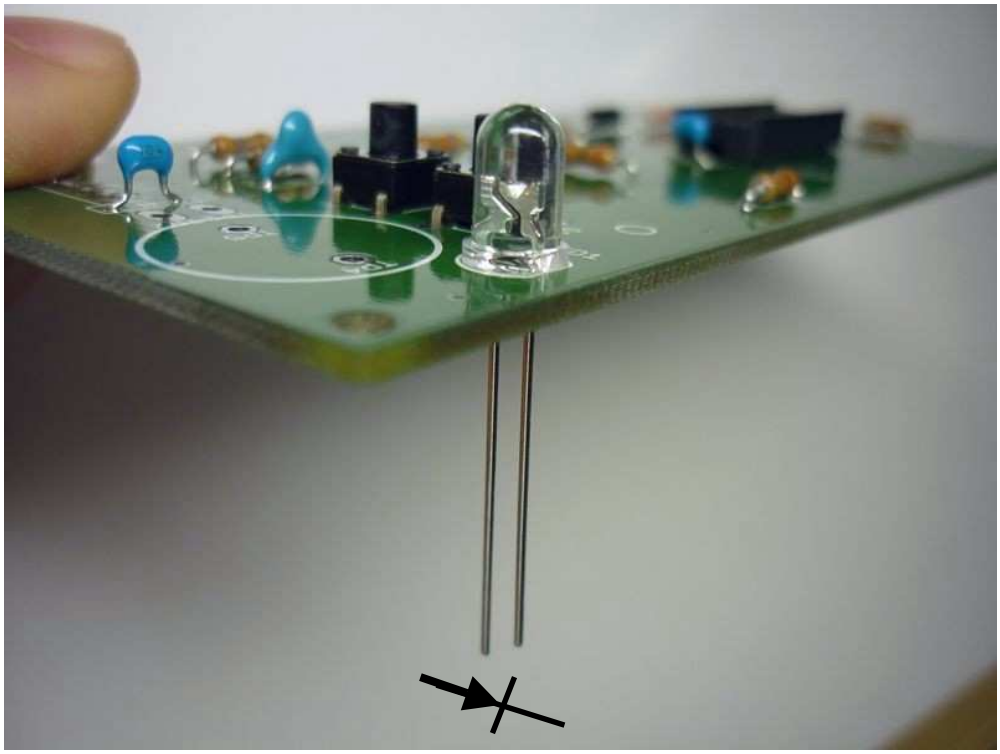


Mount 2 tactile switch. It may be tight to attach.
Push harder until contacting the bottom base on the board, then solder them.

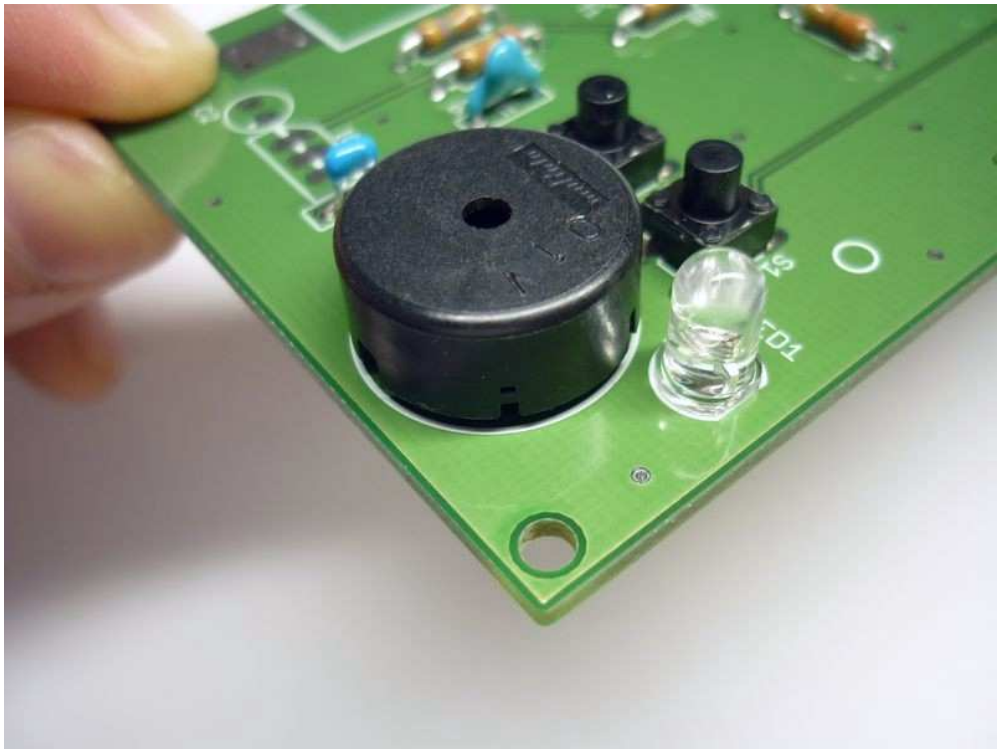




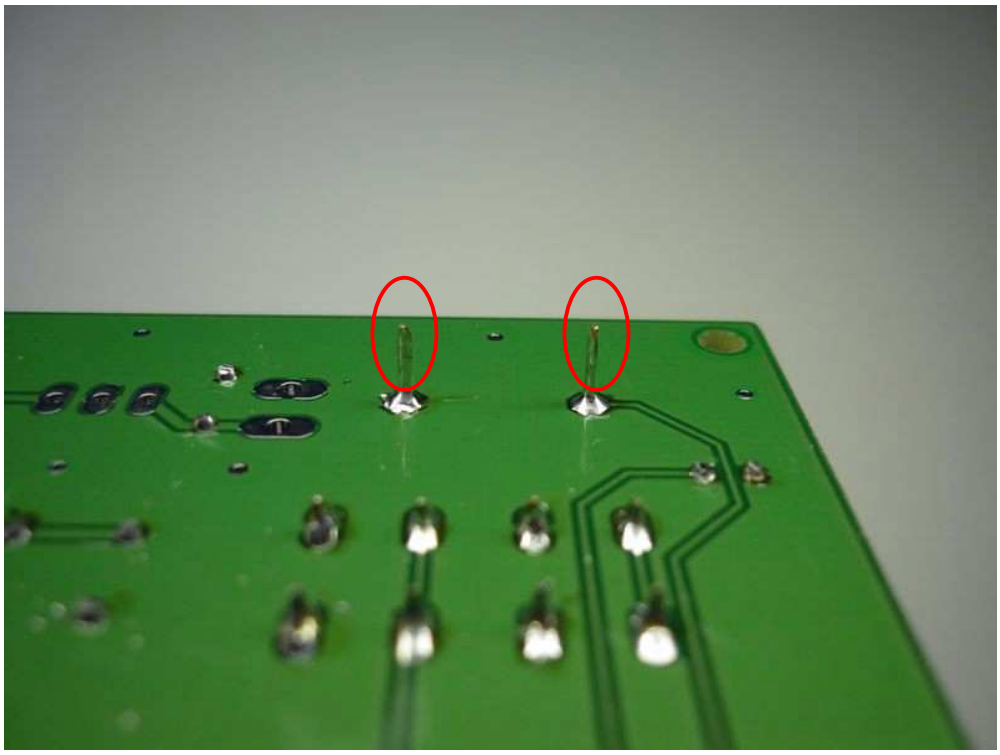
Next, solder C6 capacitor. No polarity. Value marking is 101.



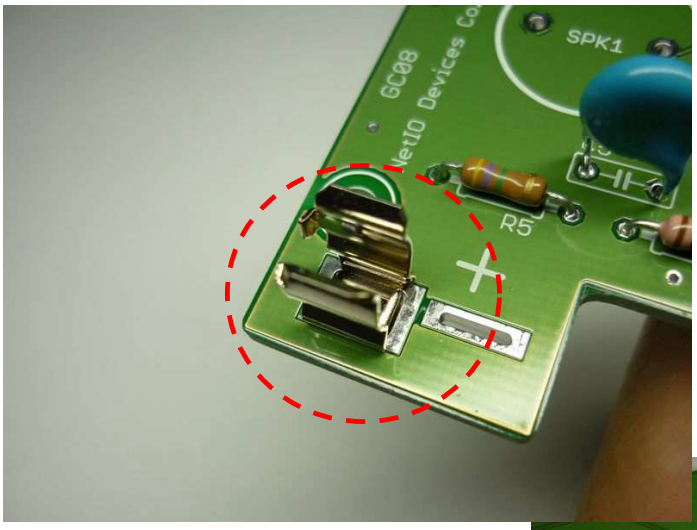
Solder LED D1. Led has polarity, so be careful for the insert direction.

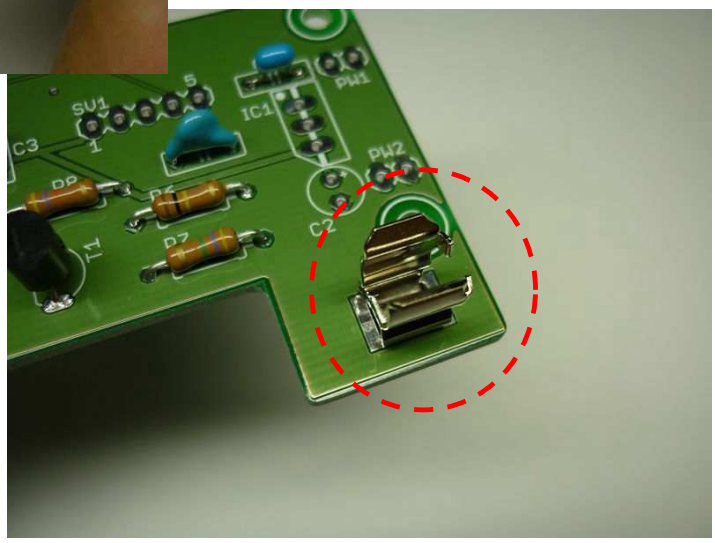


This is piezo buzzer. No polarity.

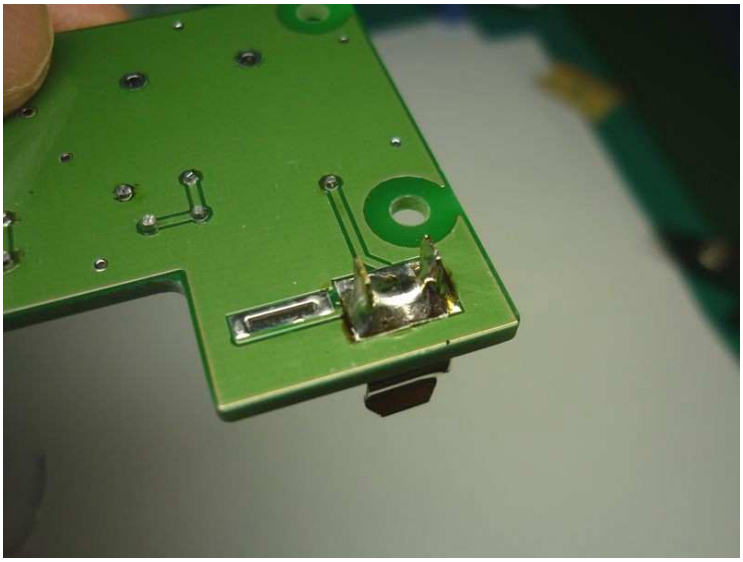


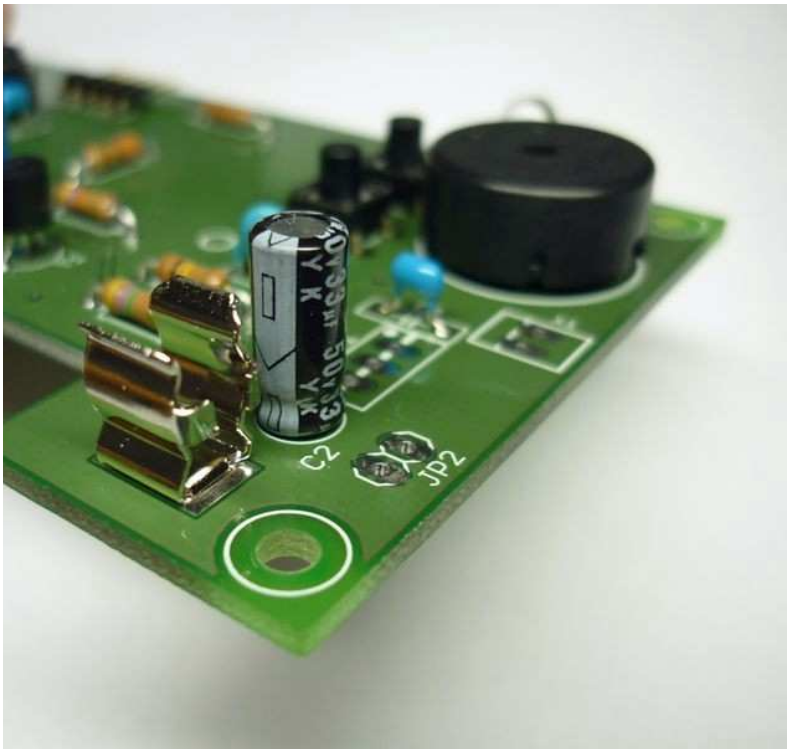
It would be better to cut long rest lead like this to avoid trivial troubles.



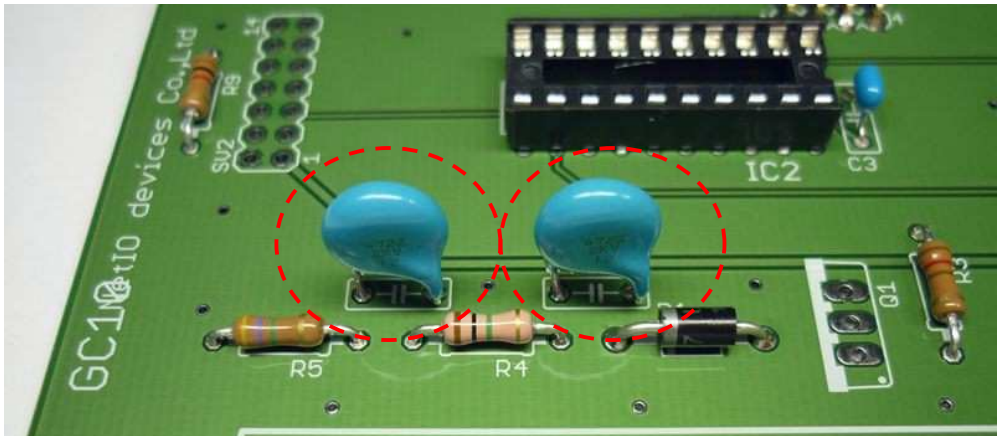


Solder GM tube holders. Take care for its direction. Both “open end” side must faced inside. Otherwise you can’t insert GM tube on the board.

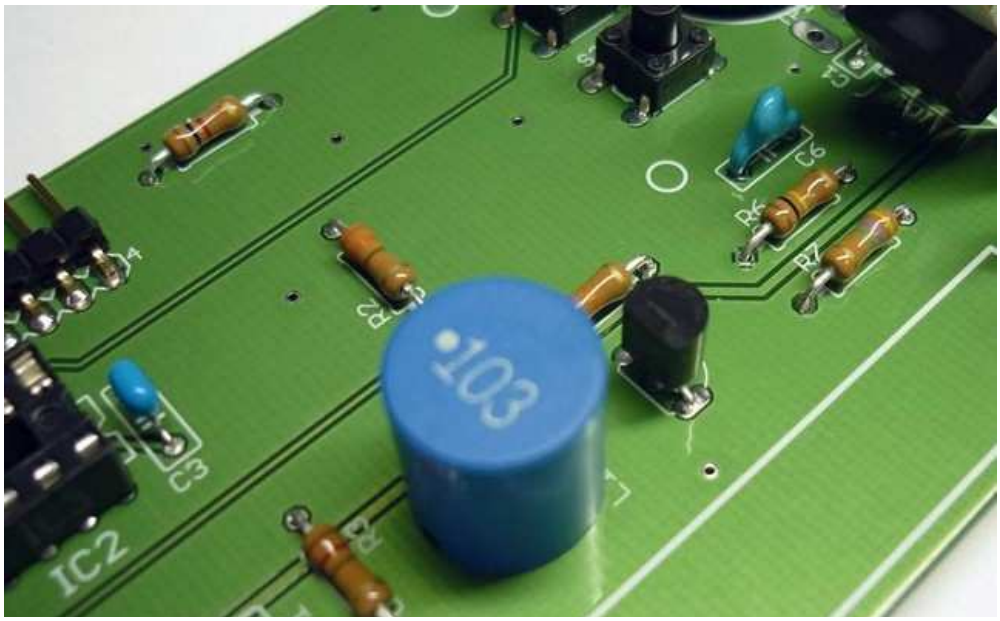




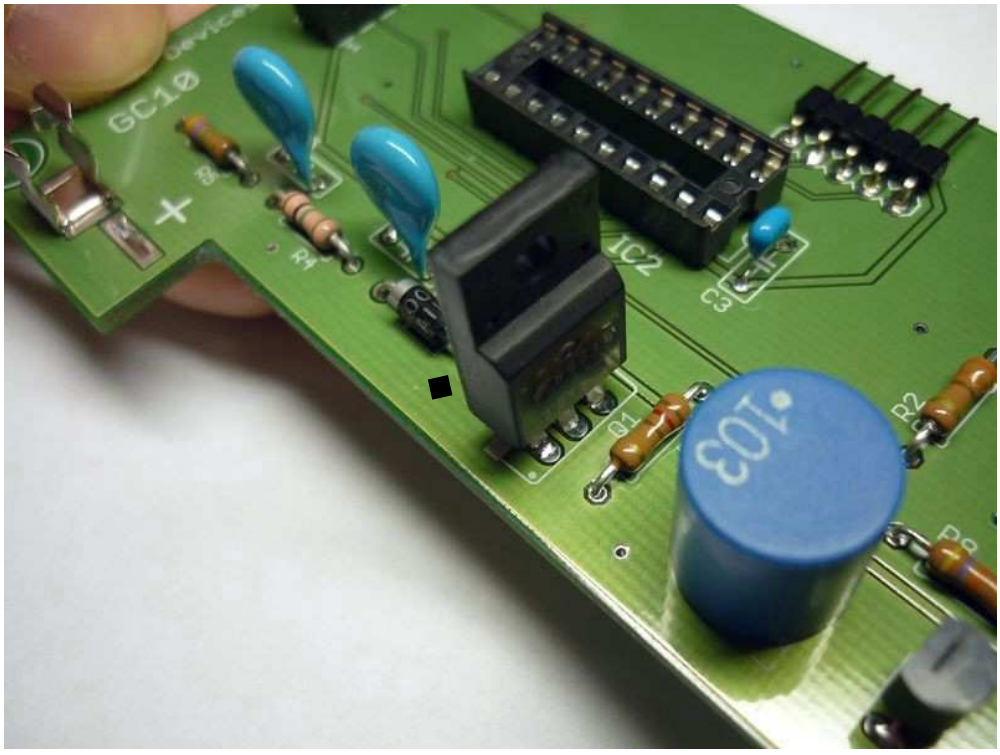
Next, solder C2. It has polarity.



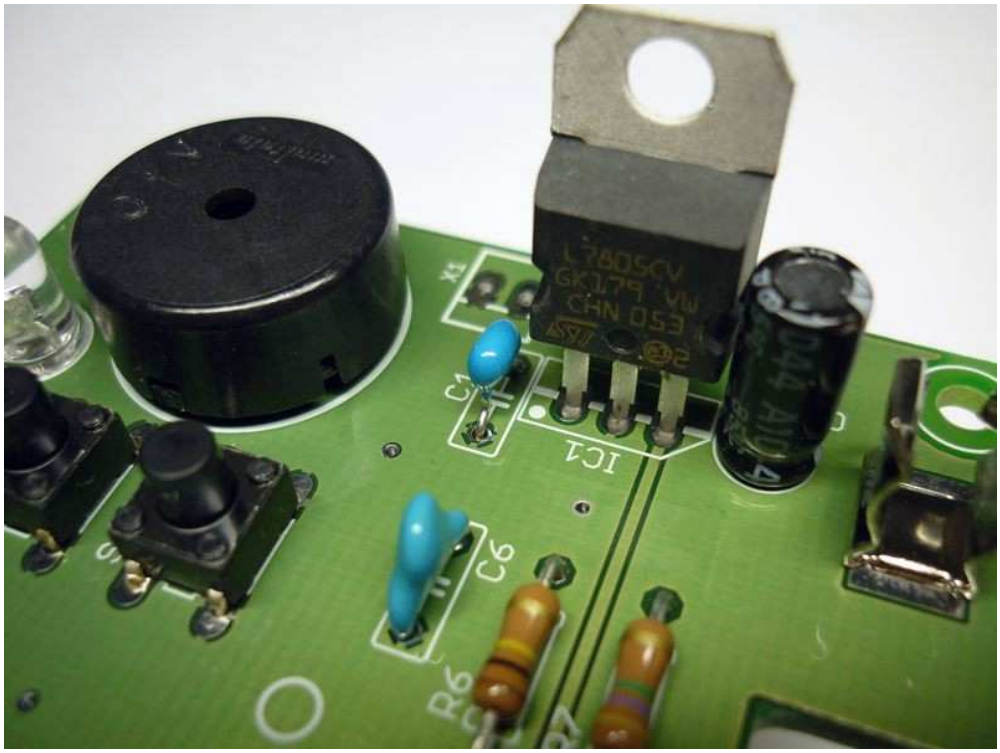
Next, solder C4, and C5. these are same capacitance and the value marking is 472. No polarity.



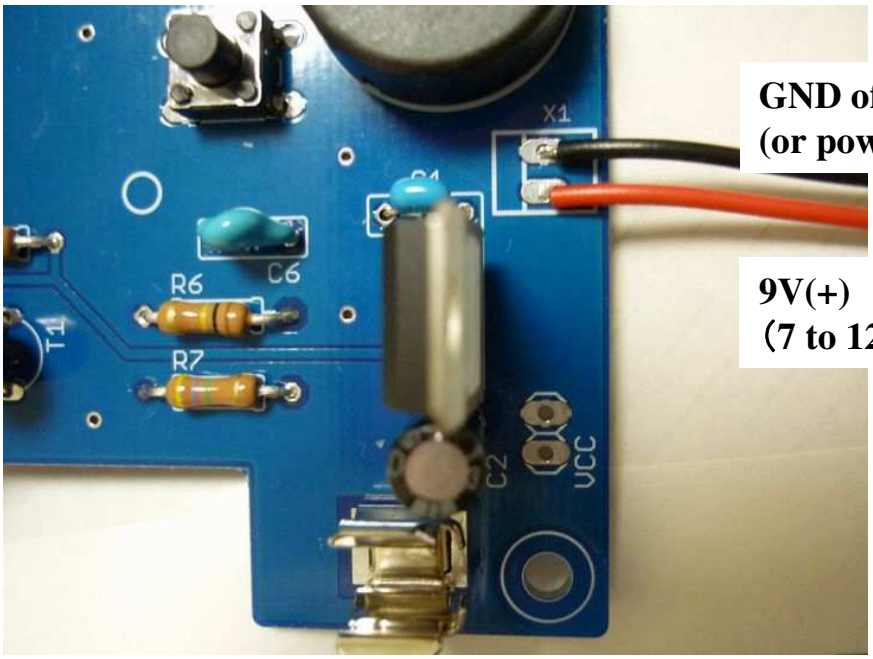
Solder inductor L1. It has a polarity mark but you don't need to care for it on this board.



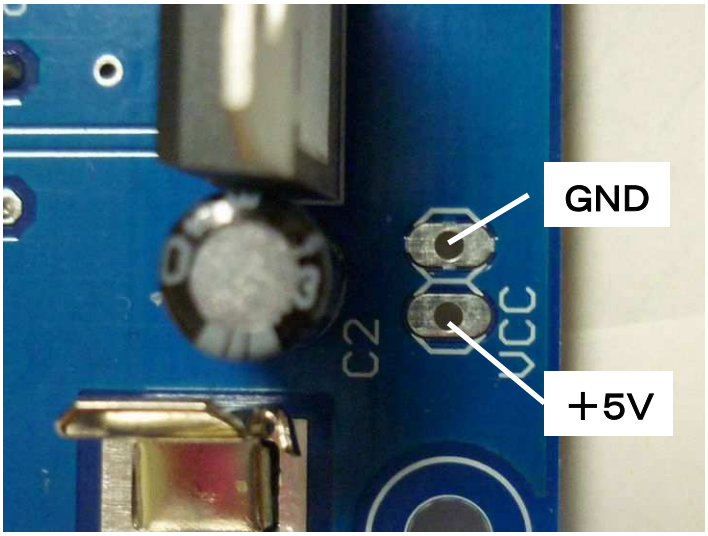
Solder FET IC3(Q1). Insert flat side faces left of the board.



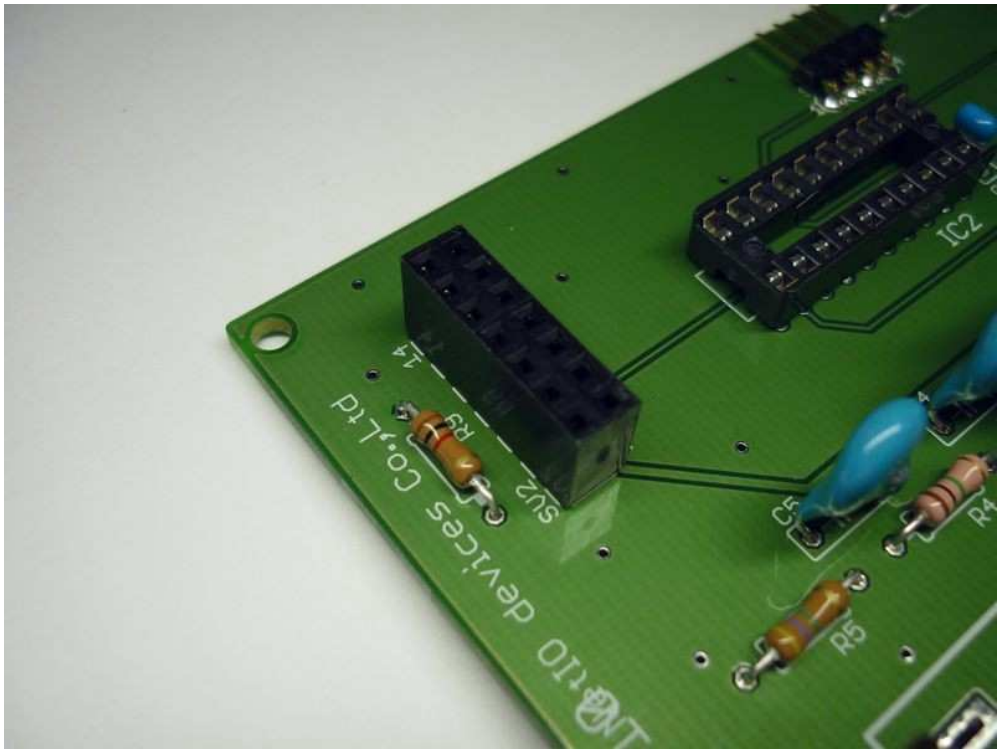
Next, solder regulator IC1. Insert marking side faces inside. Marking is like “L7805CV”.



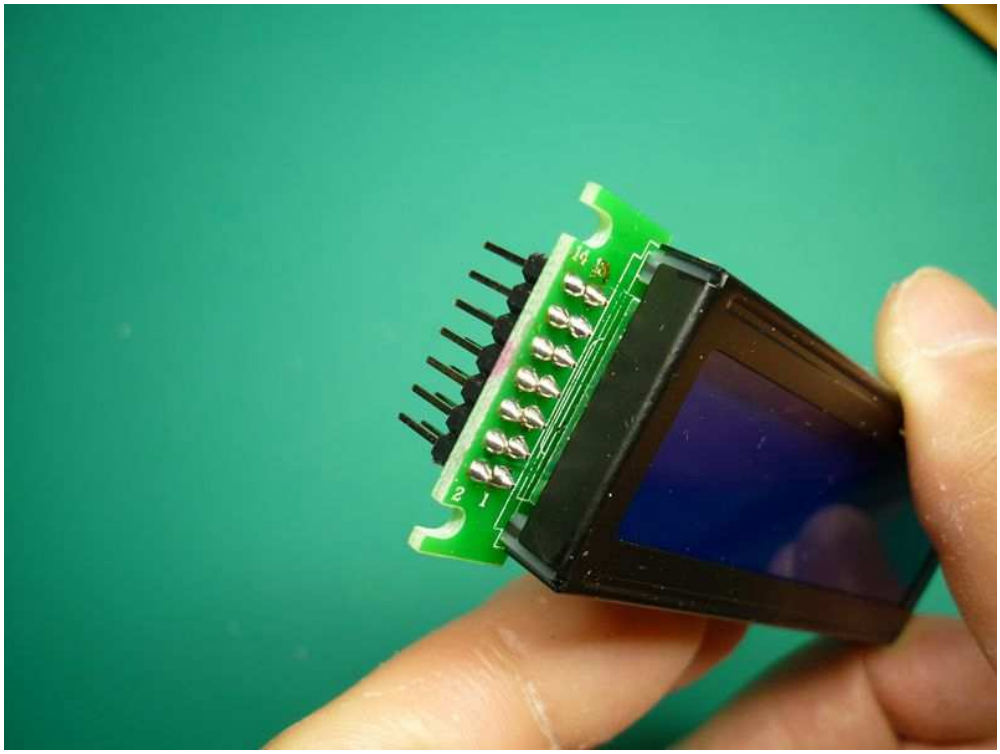
Solder 9V battery terminal cap.
You can you AC adapter that can feed 7 ~ 12V.



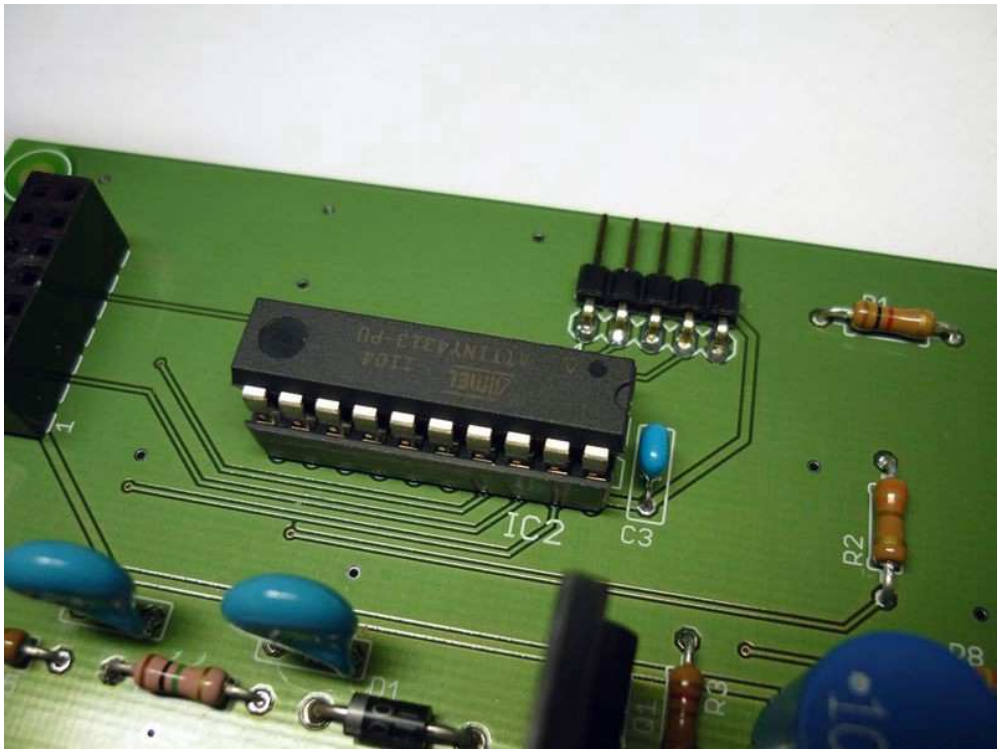
If you have regulated 5V power unit. You can use lower power terminal.



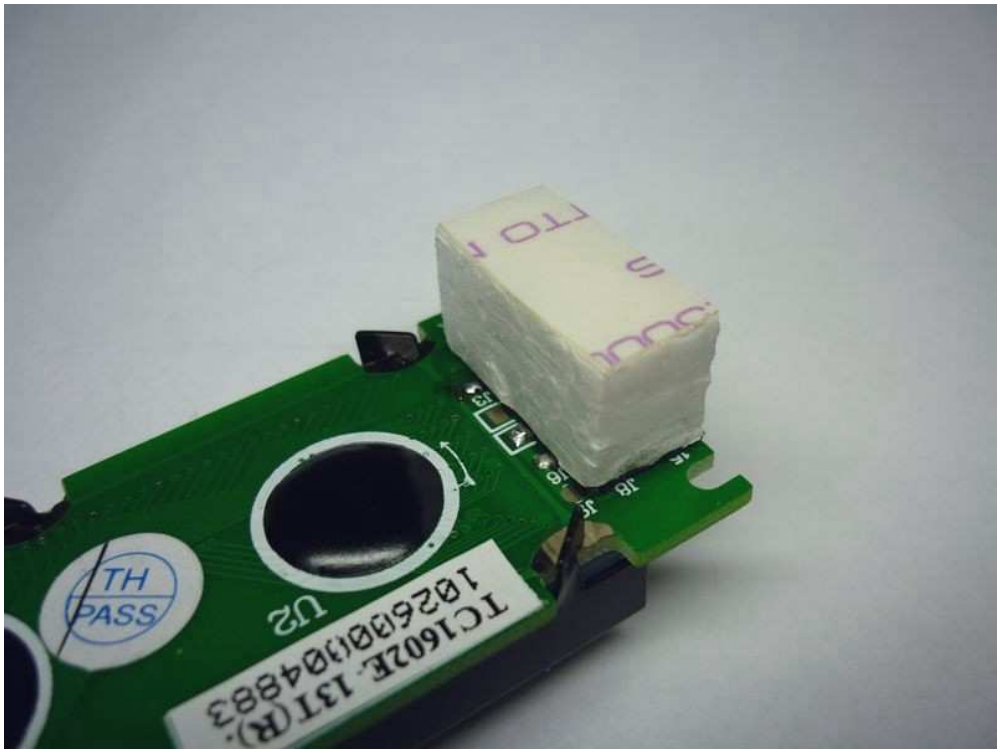
Next, solder LCD connector



and also LCD pin header.

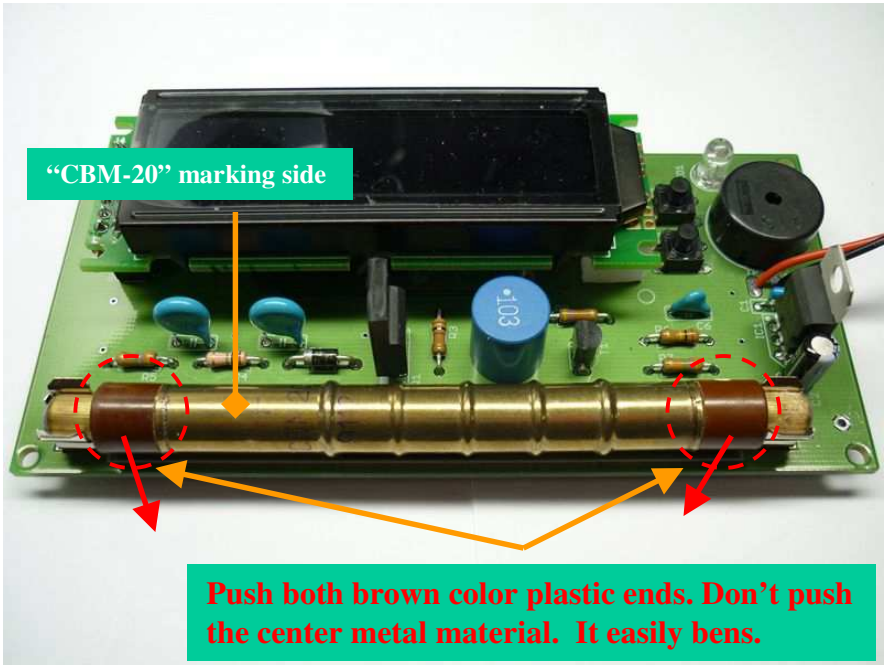


Insert IC2 on the IC socket. Take care for the direction.



Attach LCD spacers.

And then mount the LCD unit.



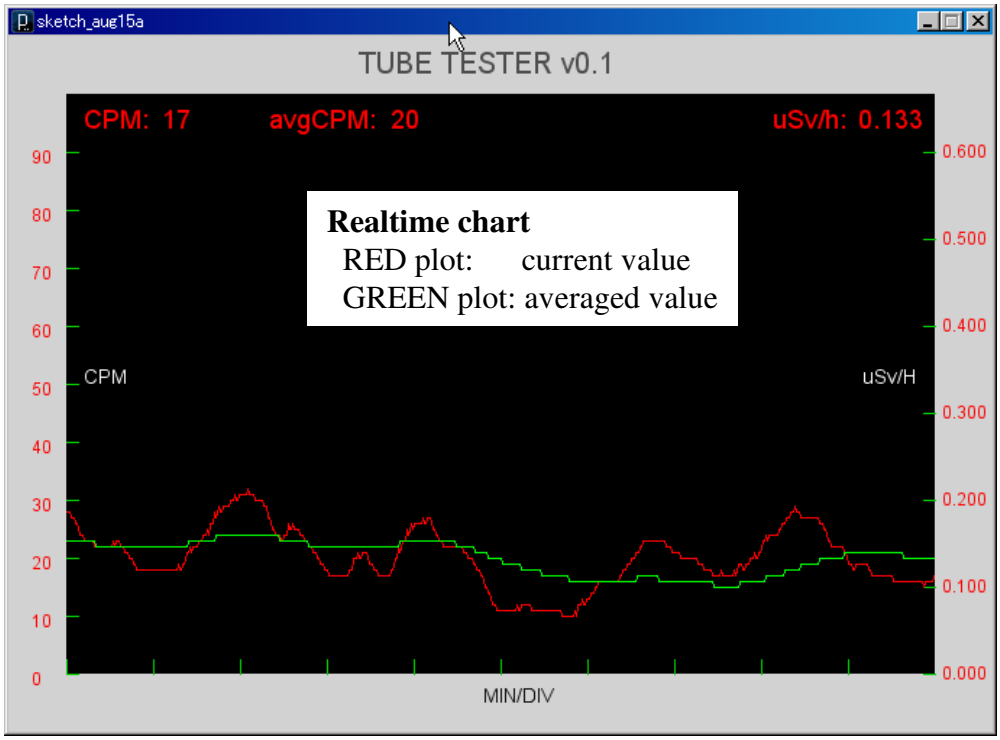
Insert GM tube on the holder, it's the last assemble process, Congrats for yor build and have a break for next test process!!!

4. Operation Test

By powering on, the system program code immediately starts.
LED flashes at every radioactive detection and increments the internal counter.
CPM(Counts Per Minute) value will be updated in real time.

Due to LCD's display area space limitation. uSv actually means uSv/H.

If you had radiation source material, place it close to GM tube.
CPM and Total value will increase.



5. Example of improvement

This is an example applied plastic enclosure for mobile operation.
As for this measurement tool, in some cases, the enclosure may be easily contaminated by adhesion of radioactive material.
this causes biased spurious measurement value.

So cheap washable, disposal plastic case would be good choice.

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