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ASSEMBLY MANUAL

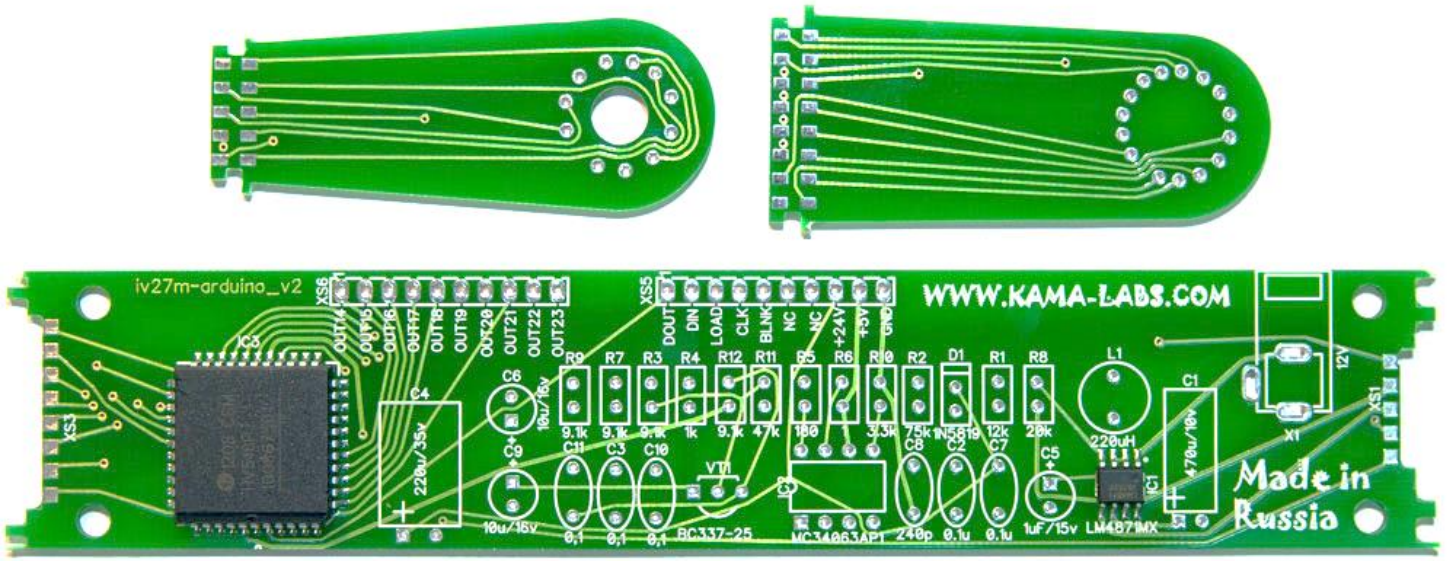
for

KAMATECH IV-27

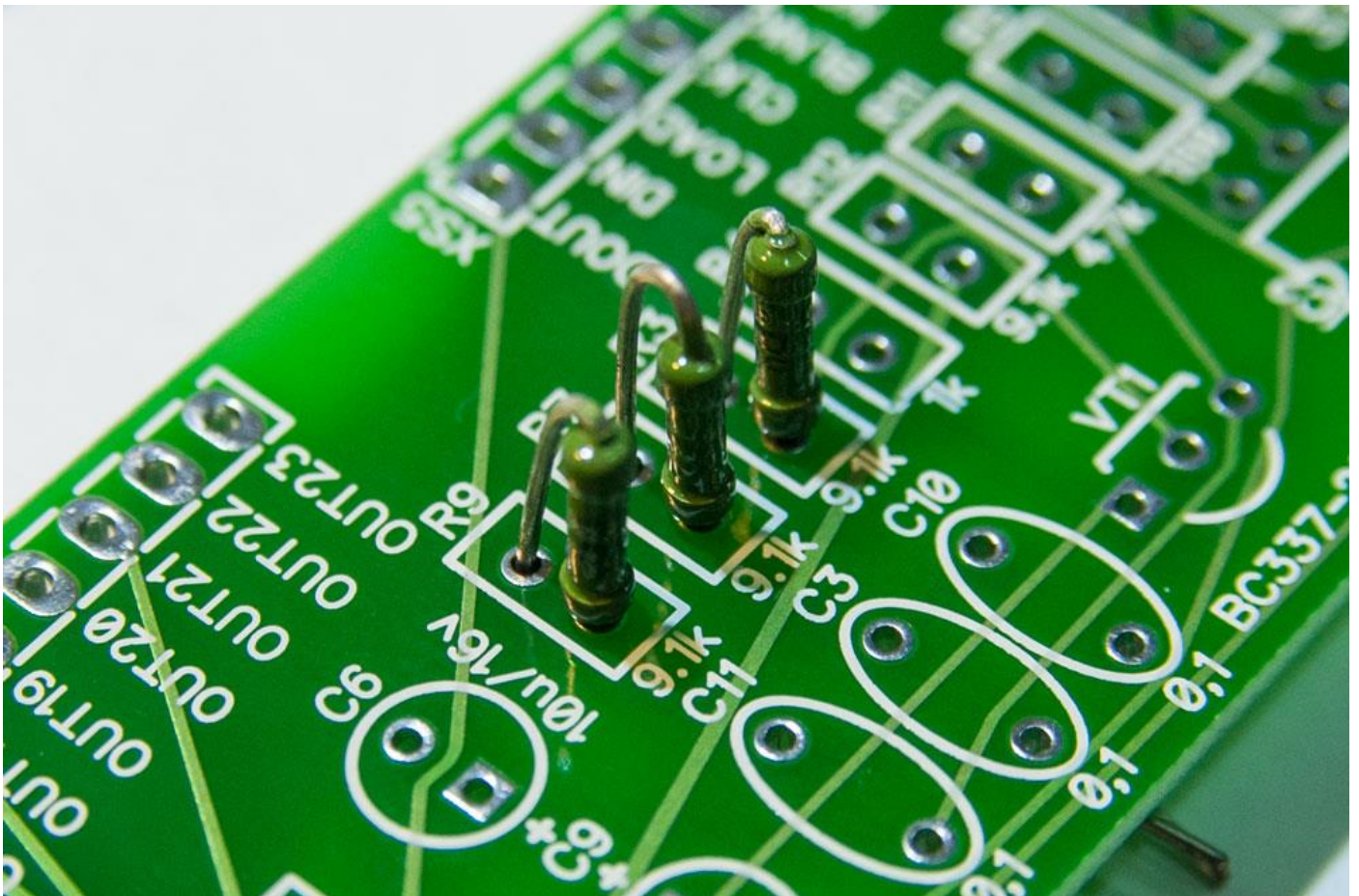
Arduino module

Be very careful with static electricity. If clock not work after build its mean that they been damaged by static electricity in process of assemble. OR you did something wrong.

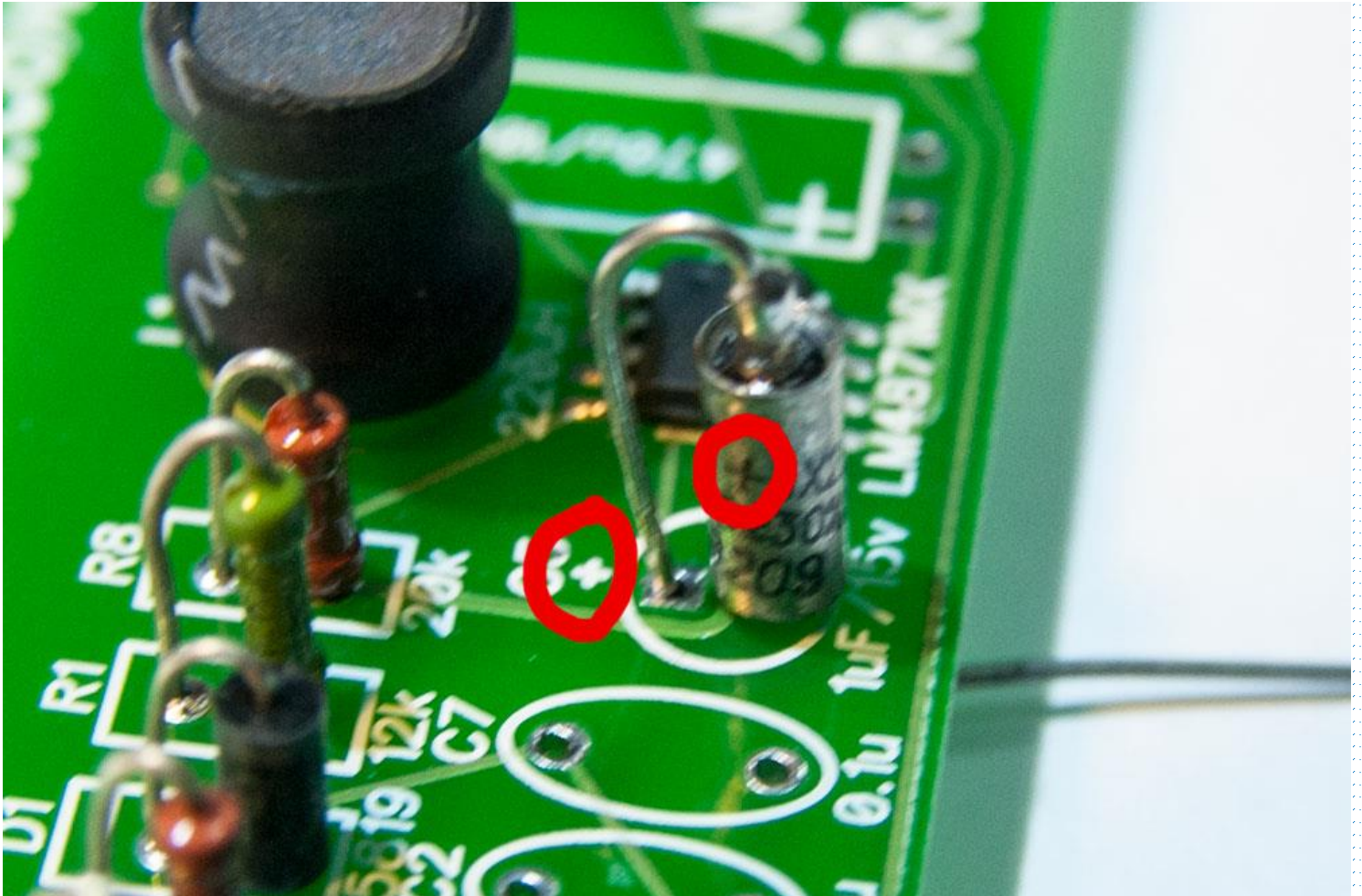
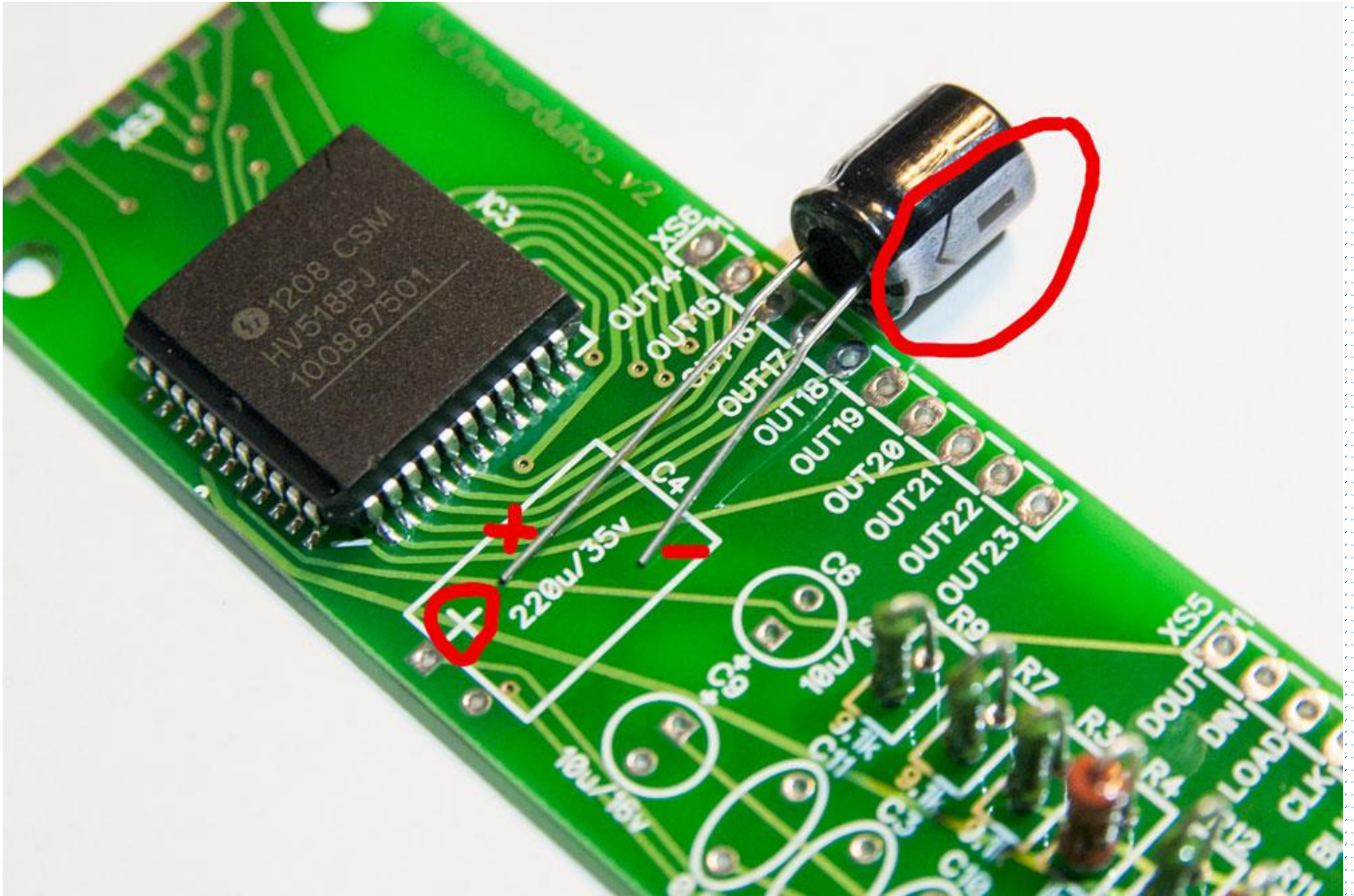
1) You have a PCB with ICs:

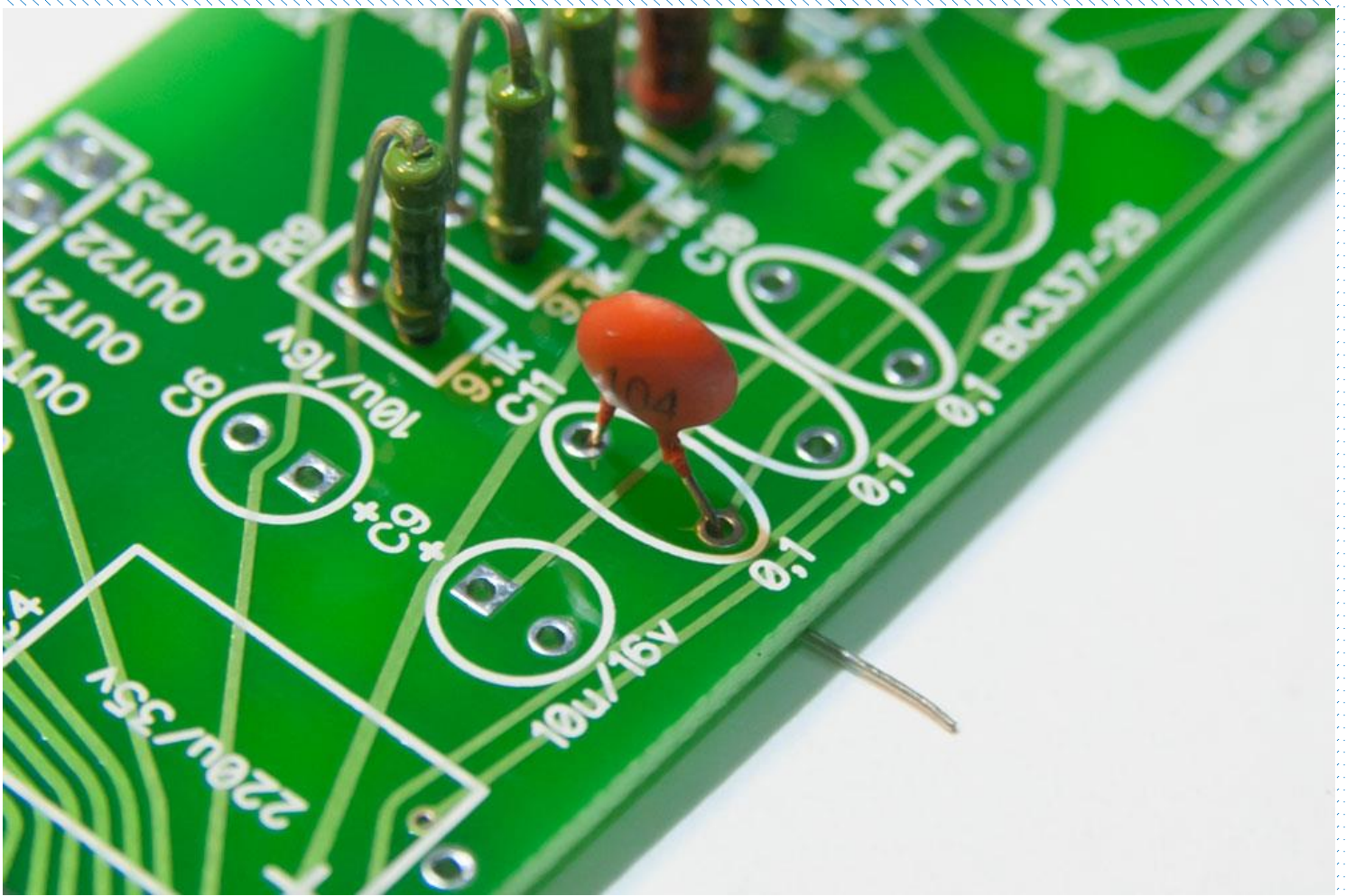


2) Place all resistors vertical:

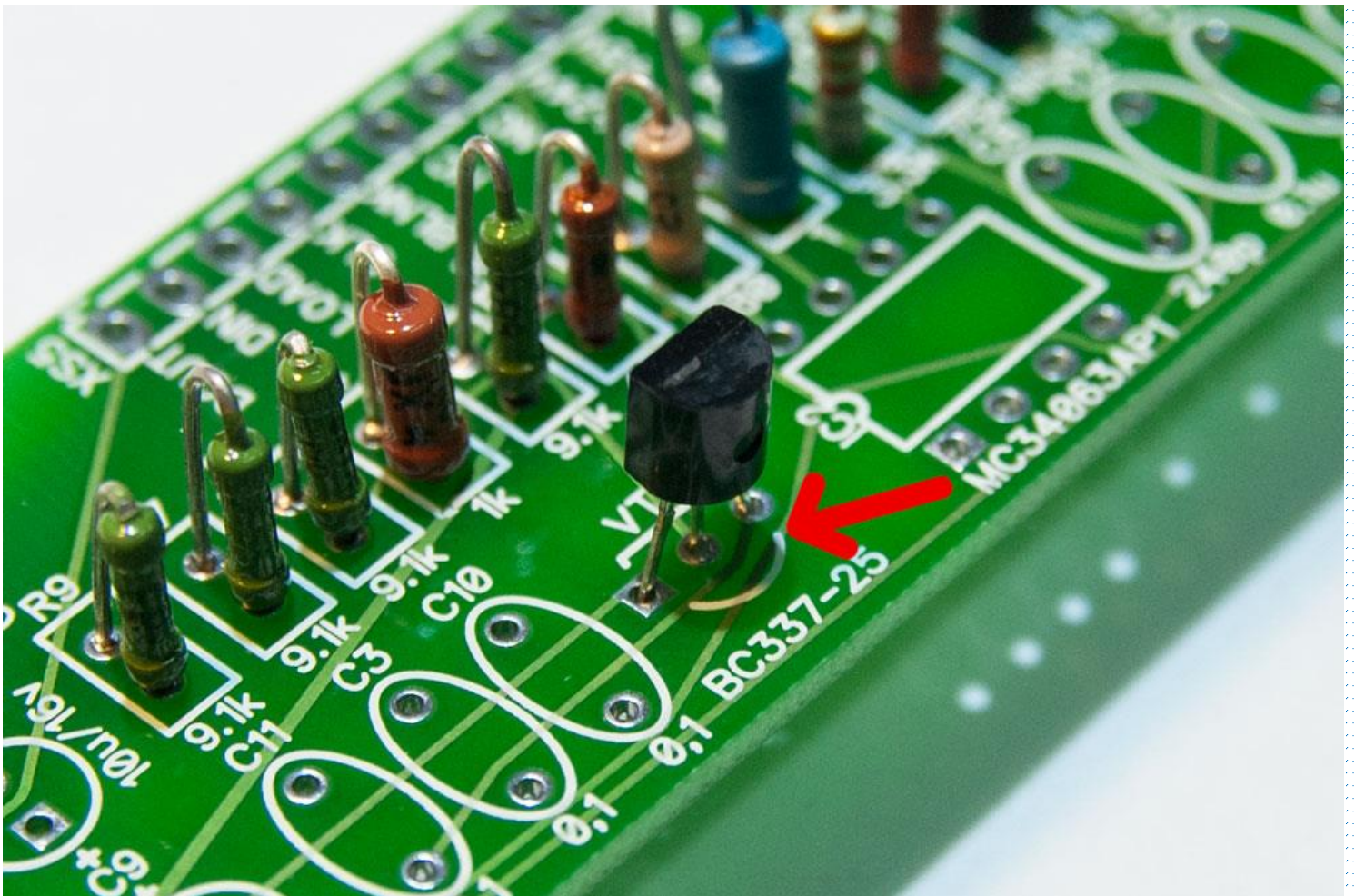


3) Place all capacitors. Be careful with polarity!

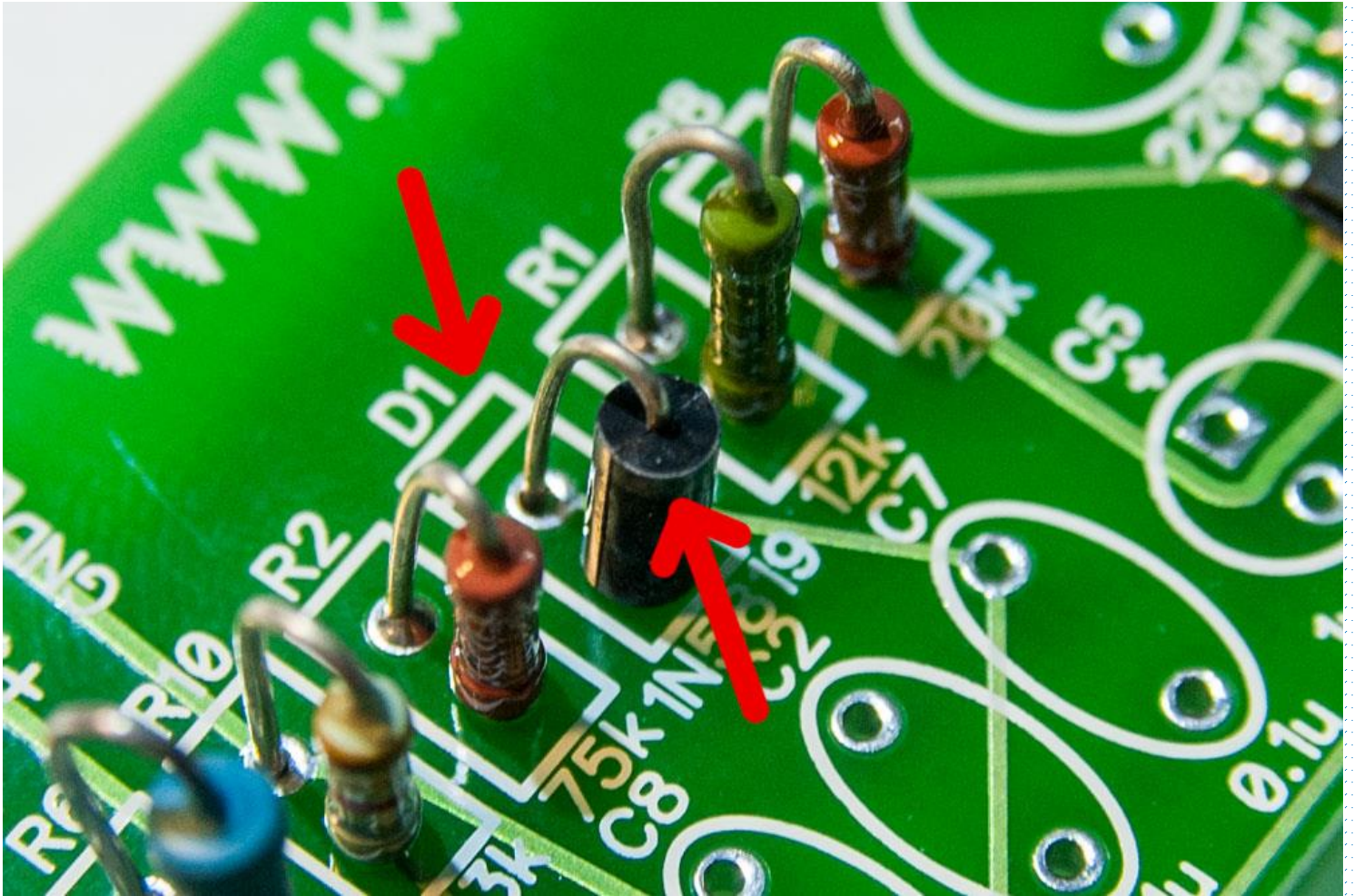




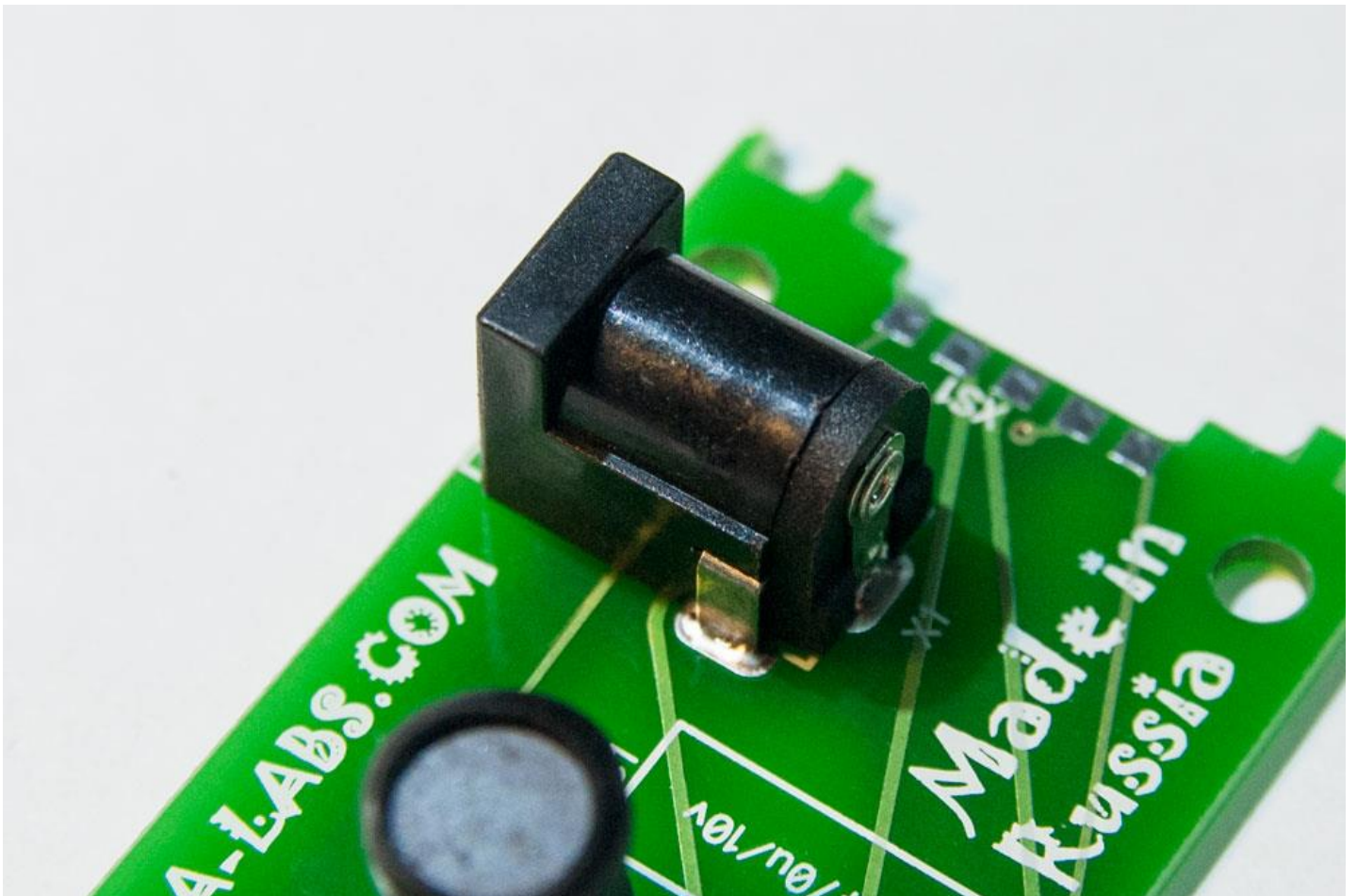
4) Place transistor:



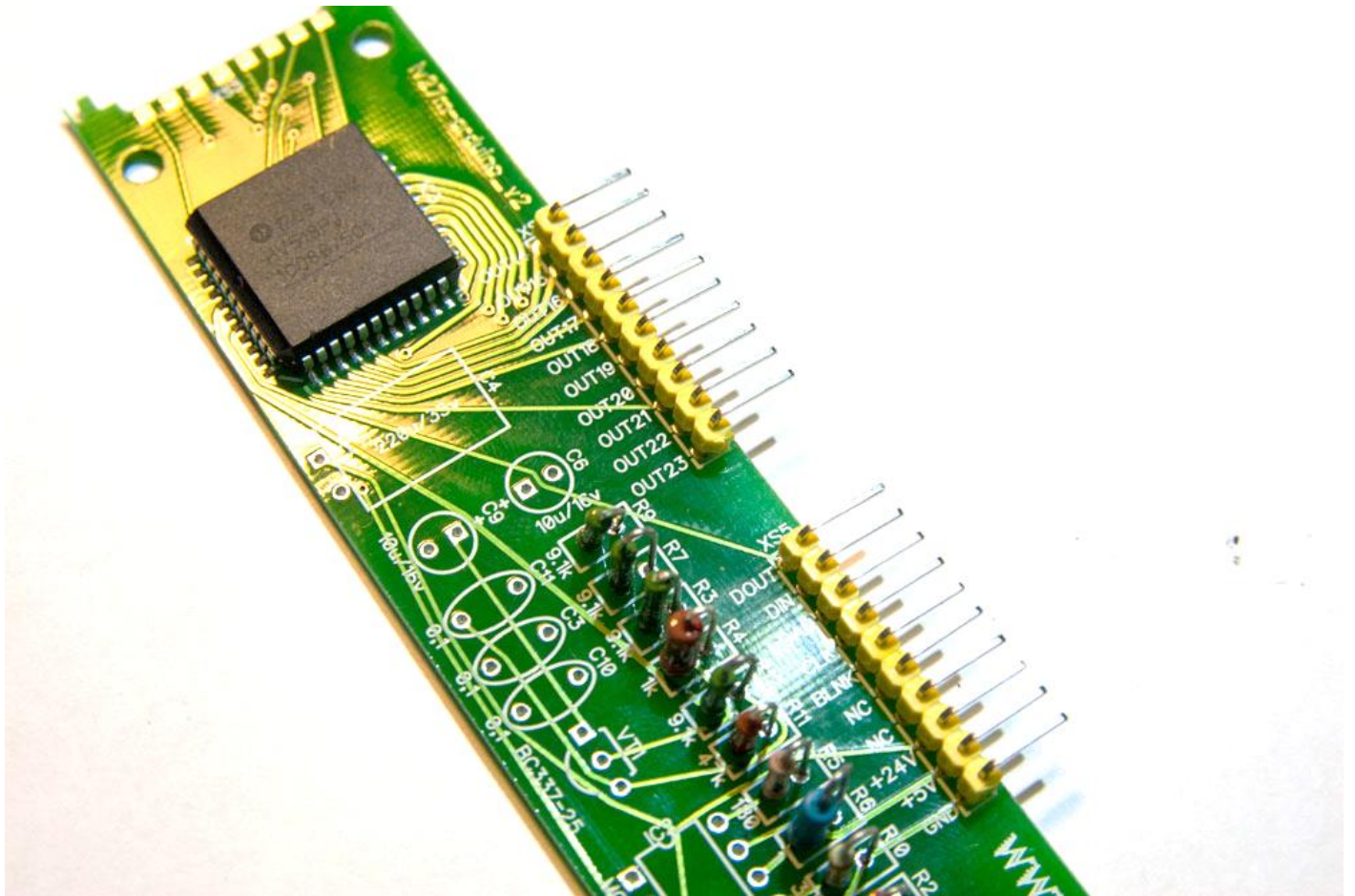
5) Place diode and be careful with polarity:



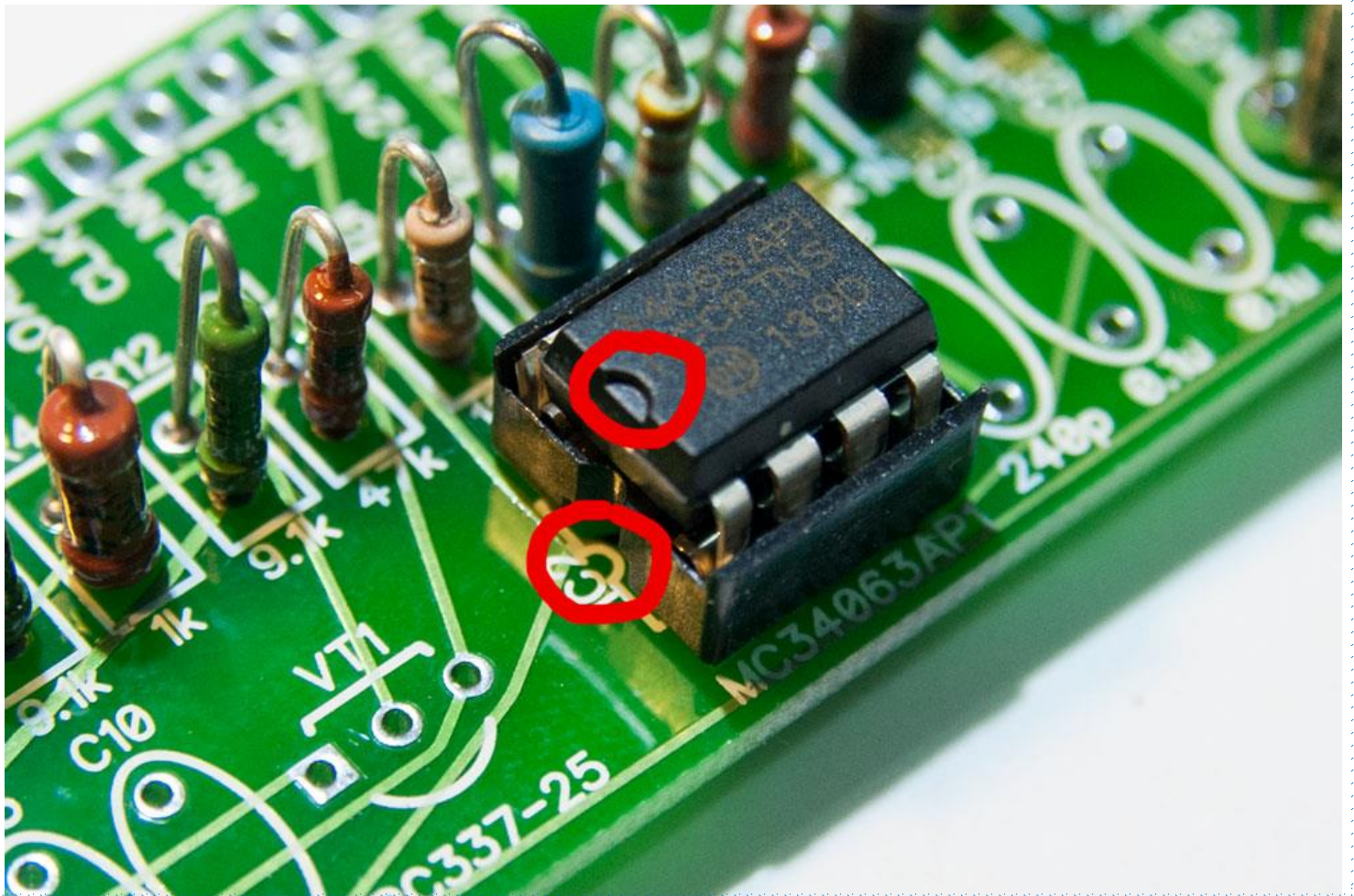
6) Place power plug:



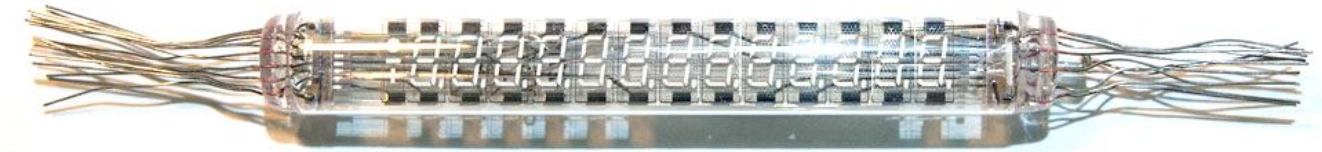
7) Place sockets:



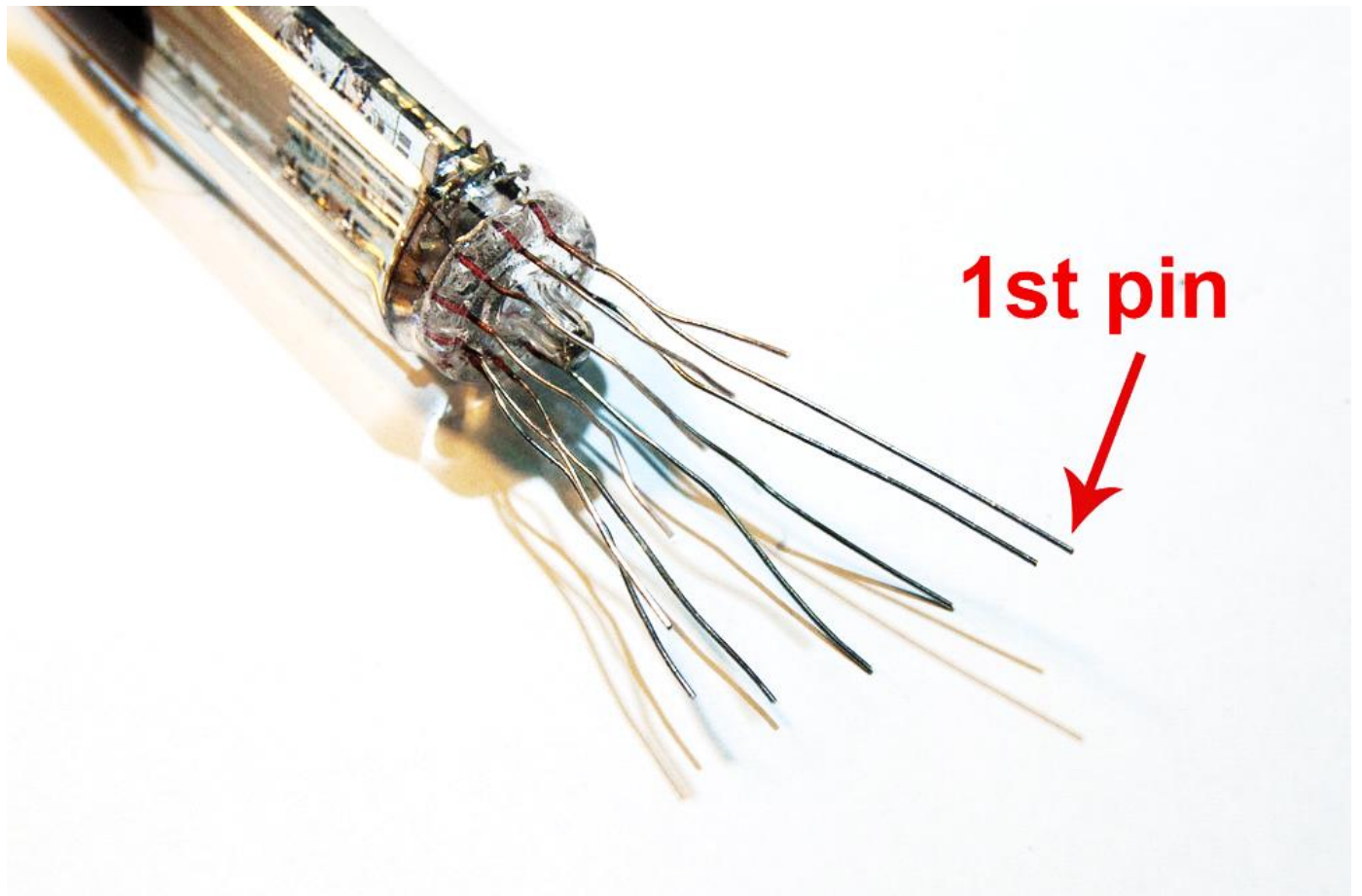
8) Place socket for IC:

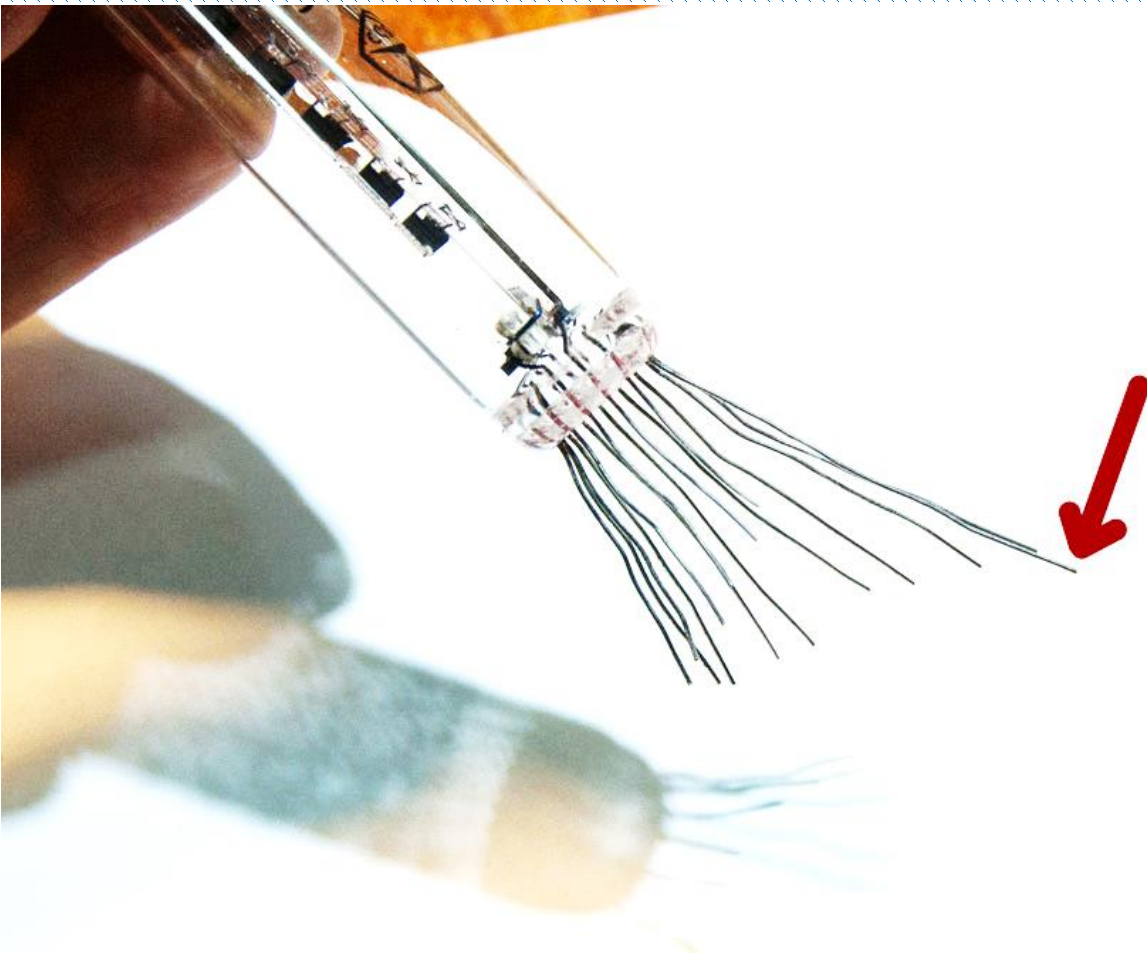


9) Now, I see the IV-27 tube:

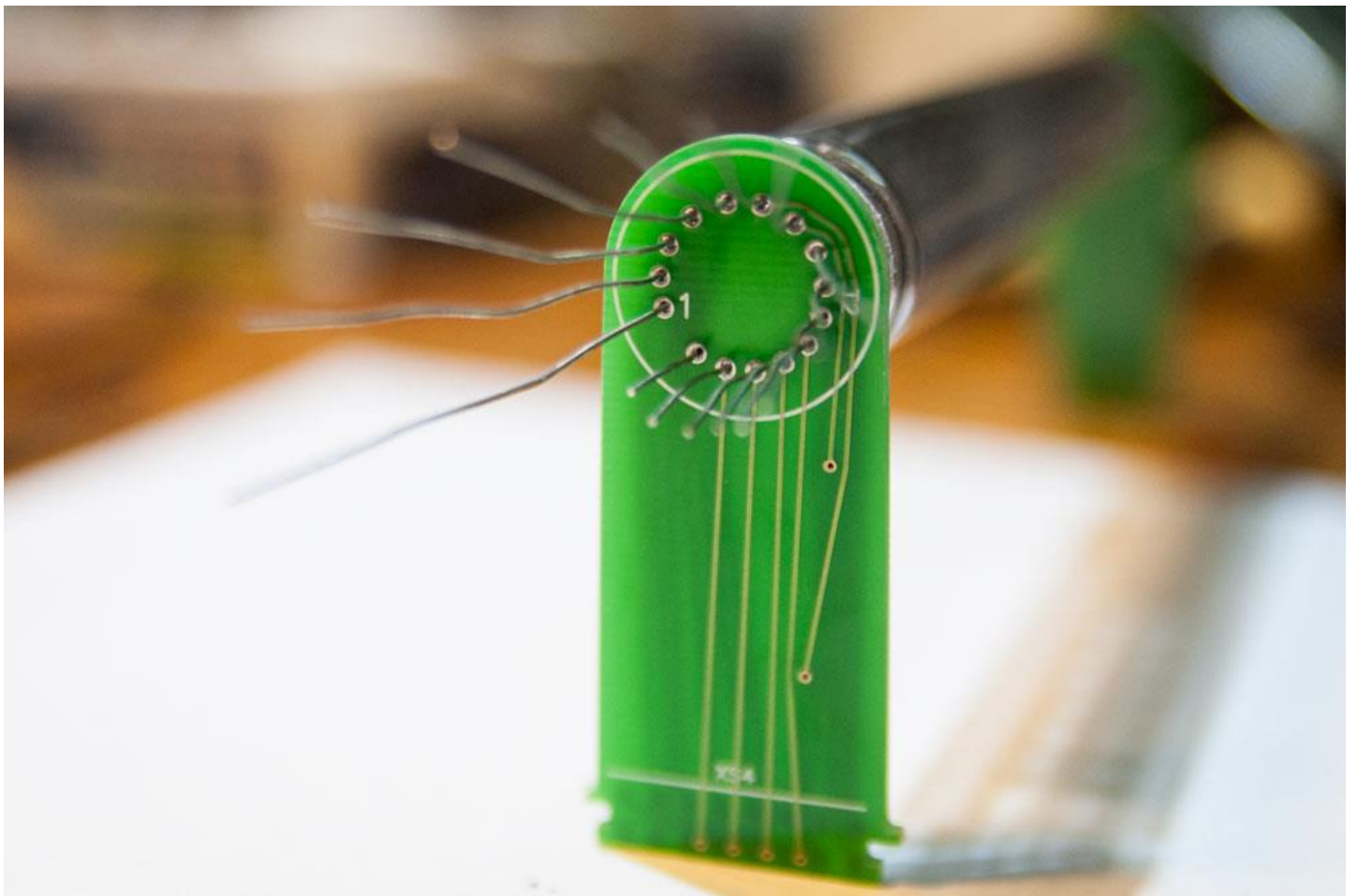


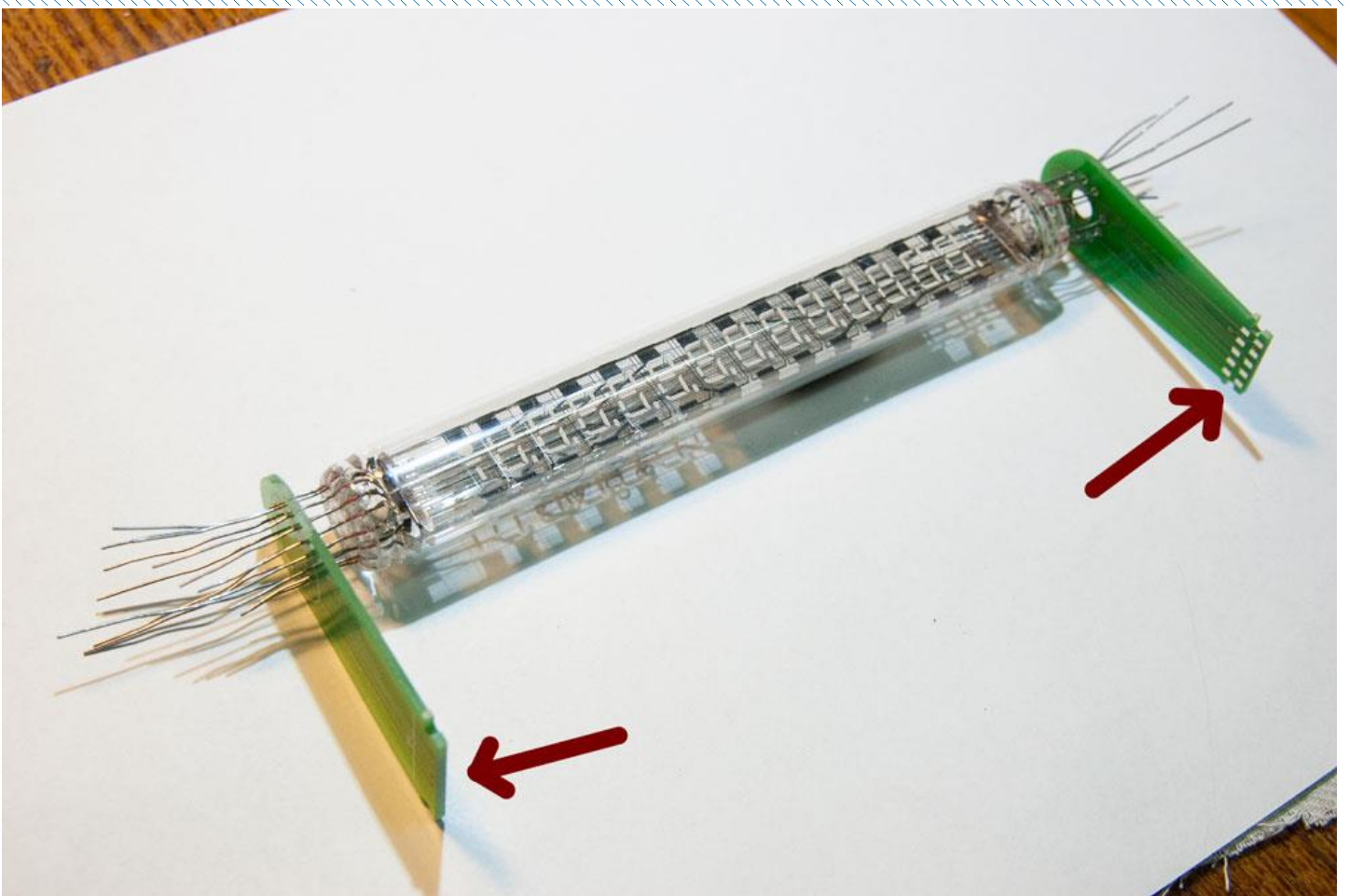
You can see that I already cut pins by spiral. The first pin of tube – the longest pin (on both sides of tube).



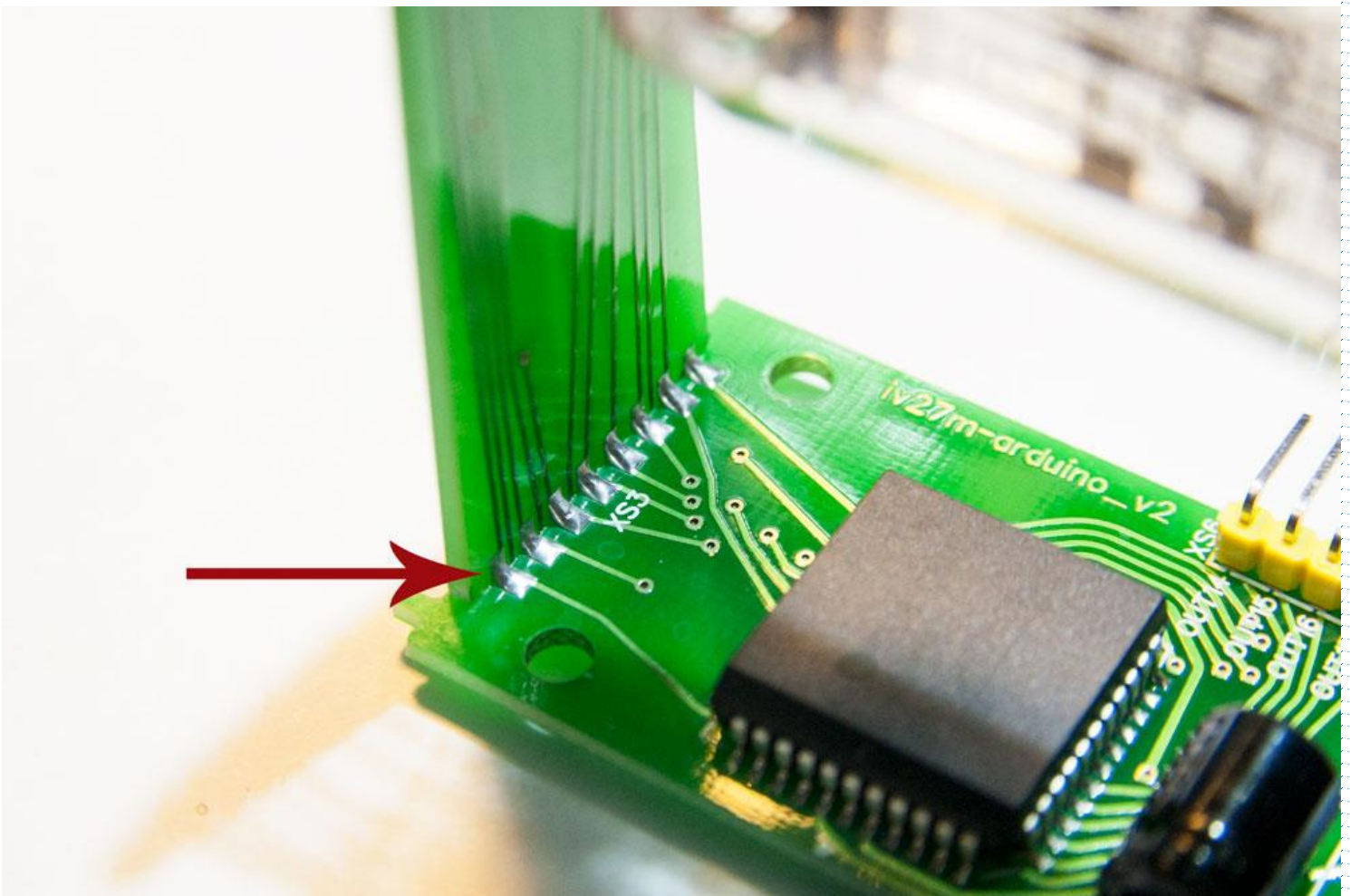


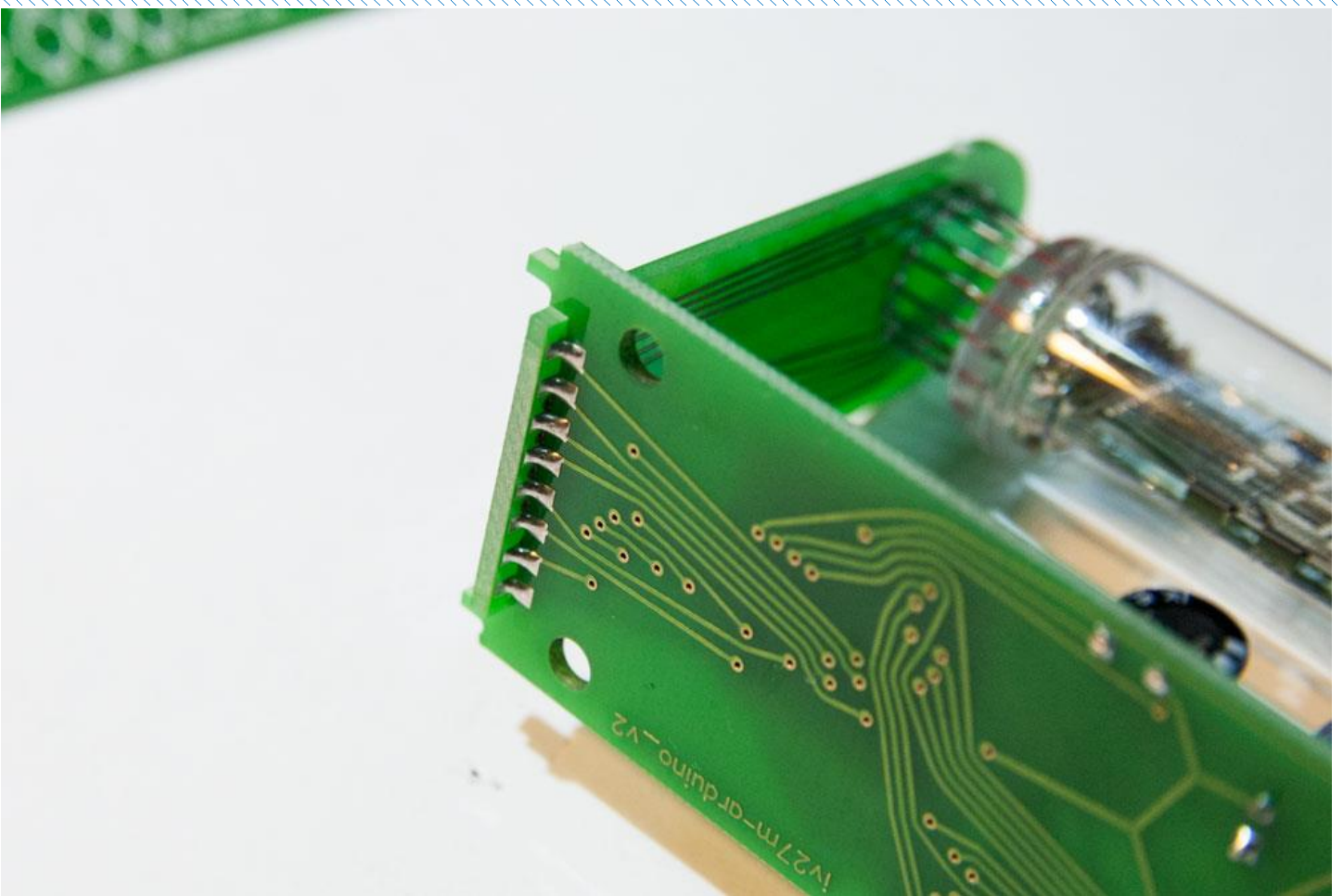
10) Now, insert pins into holes of small PCBs. The first pin on PCBs marks as “1”. The pads on PCB should ‘look’ inside.



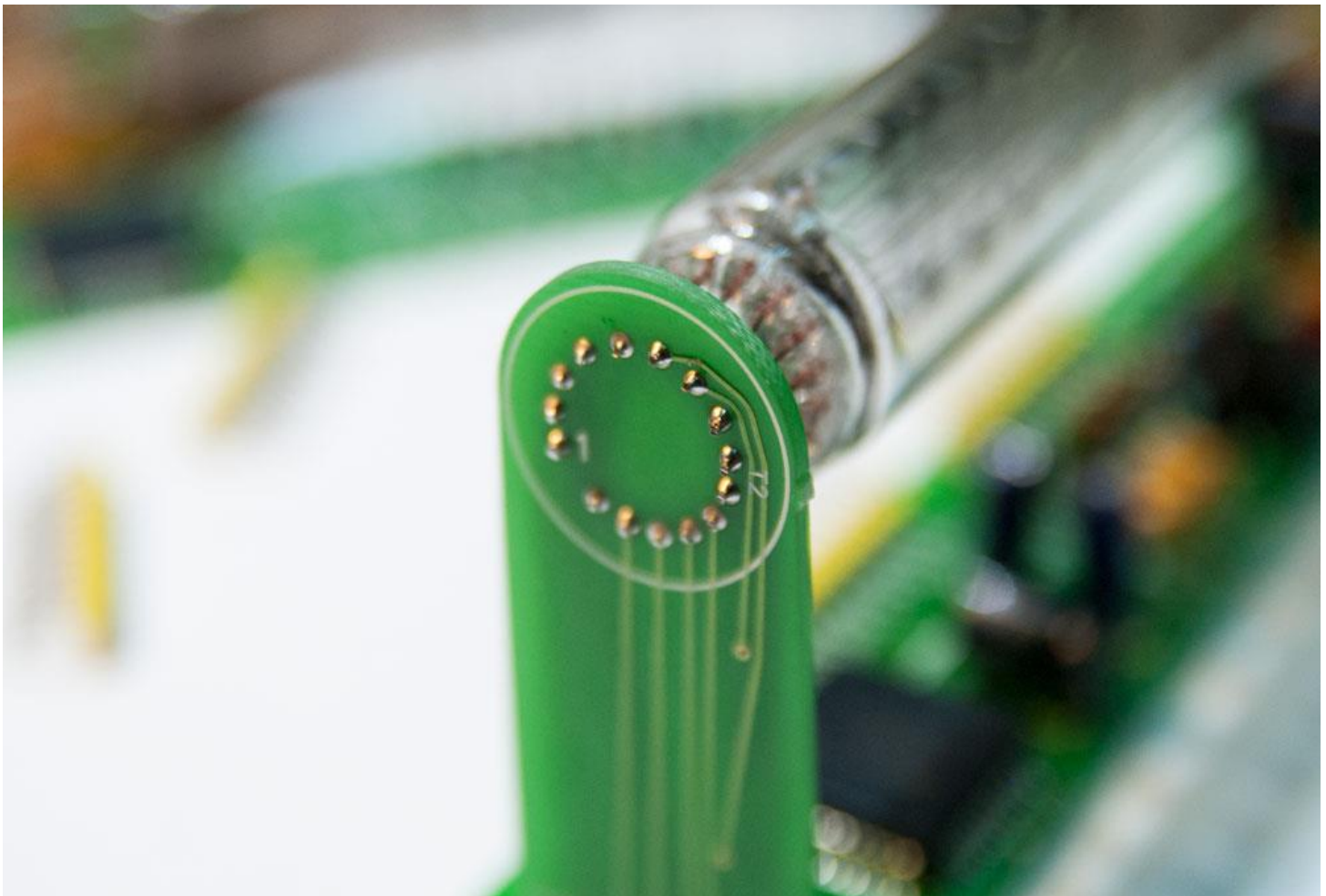


11) Make side PCBs vertically and solder to main PCB on top and bottom sides.



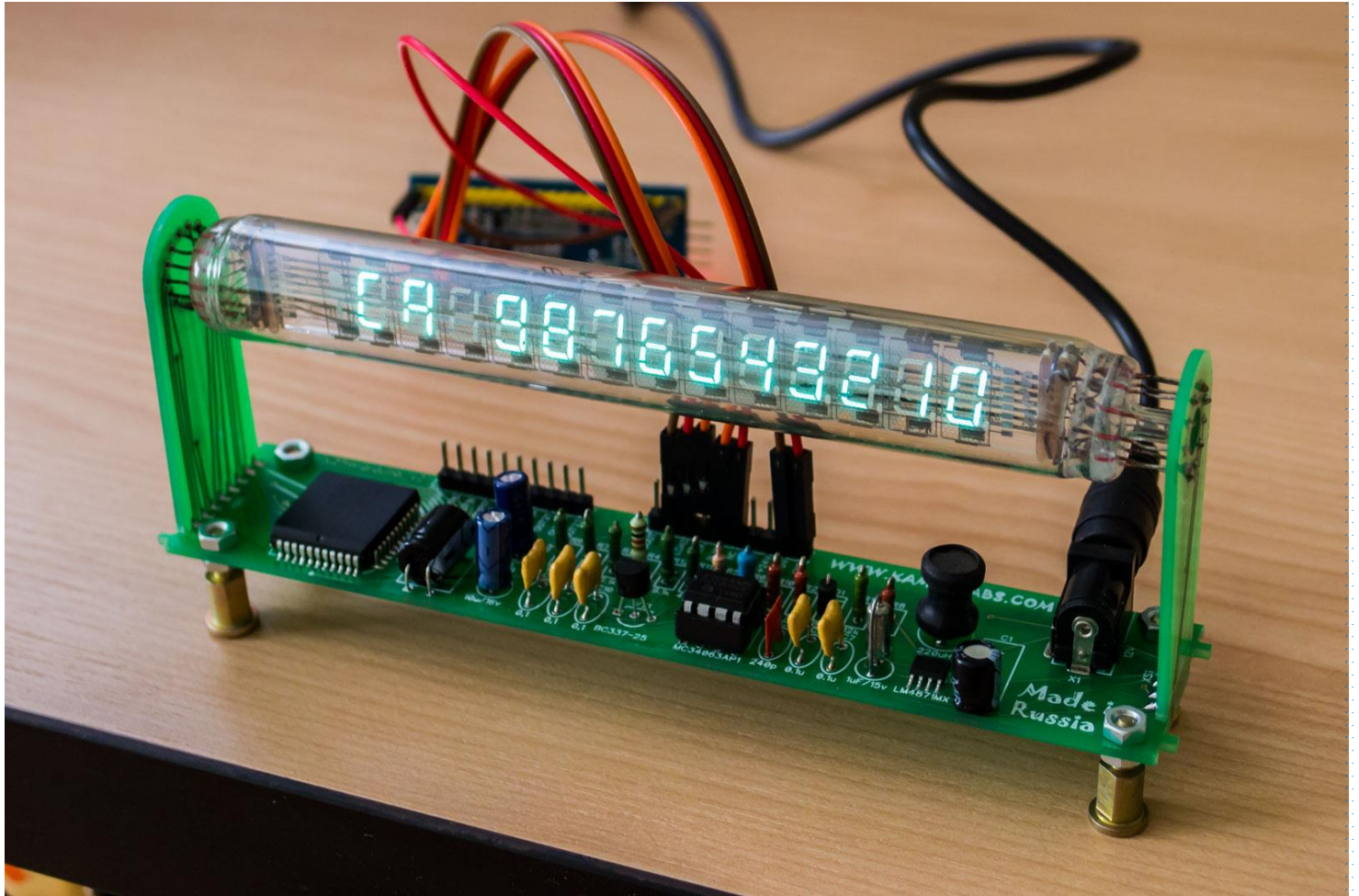


12) At last, you can solder all pins of IV-27 tube to side PCBs.



CONGRATULATIONS!

Now, all works fine.

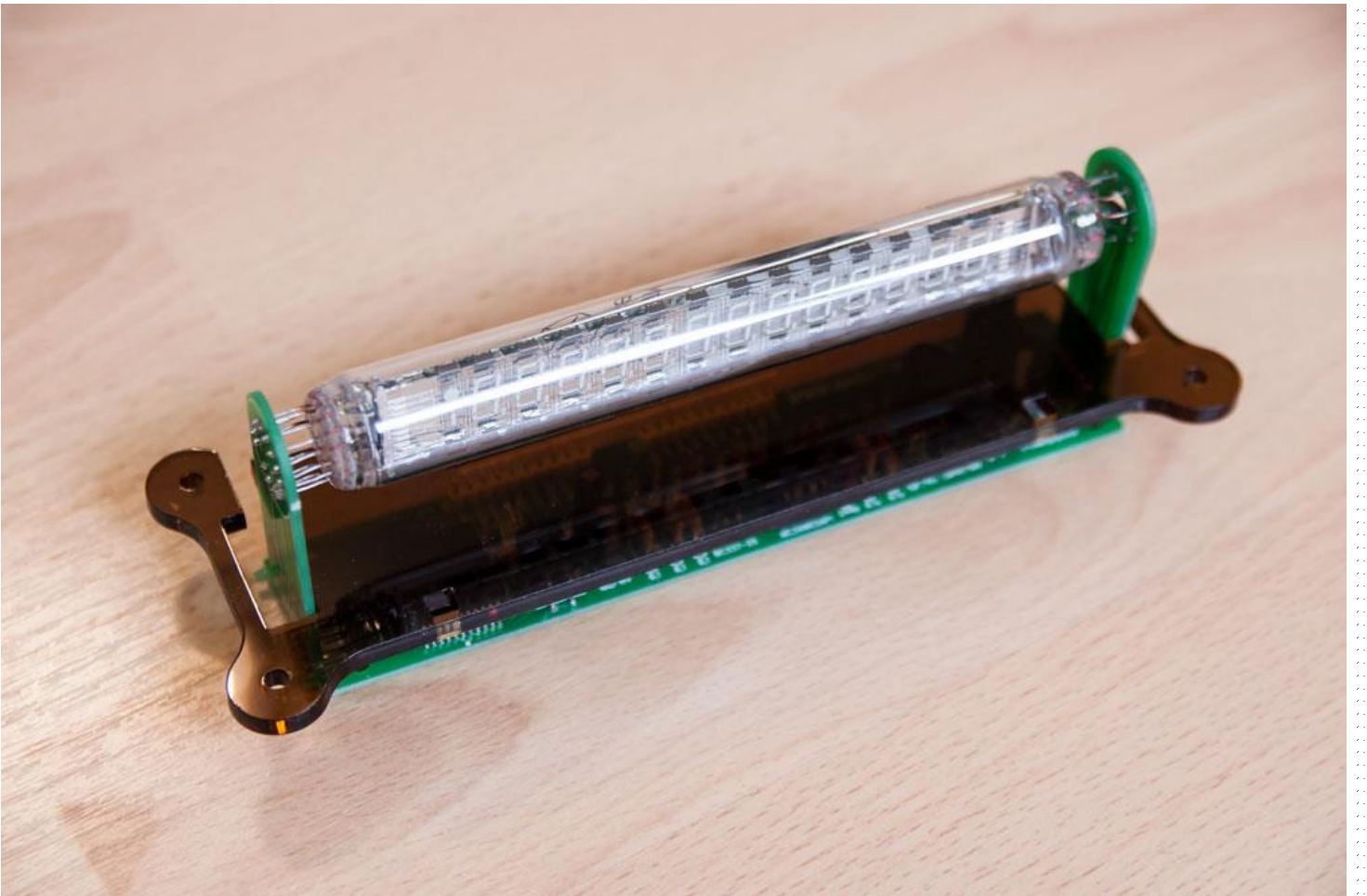


How to assemble plastic case?

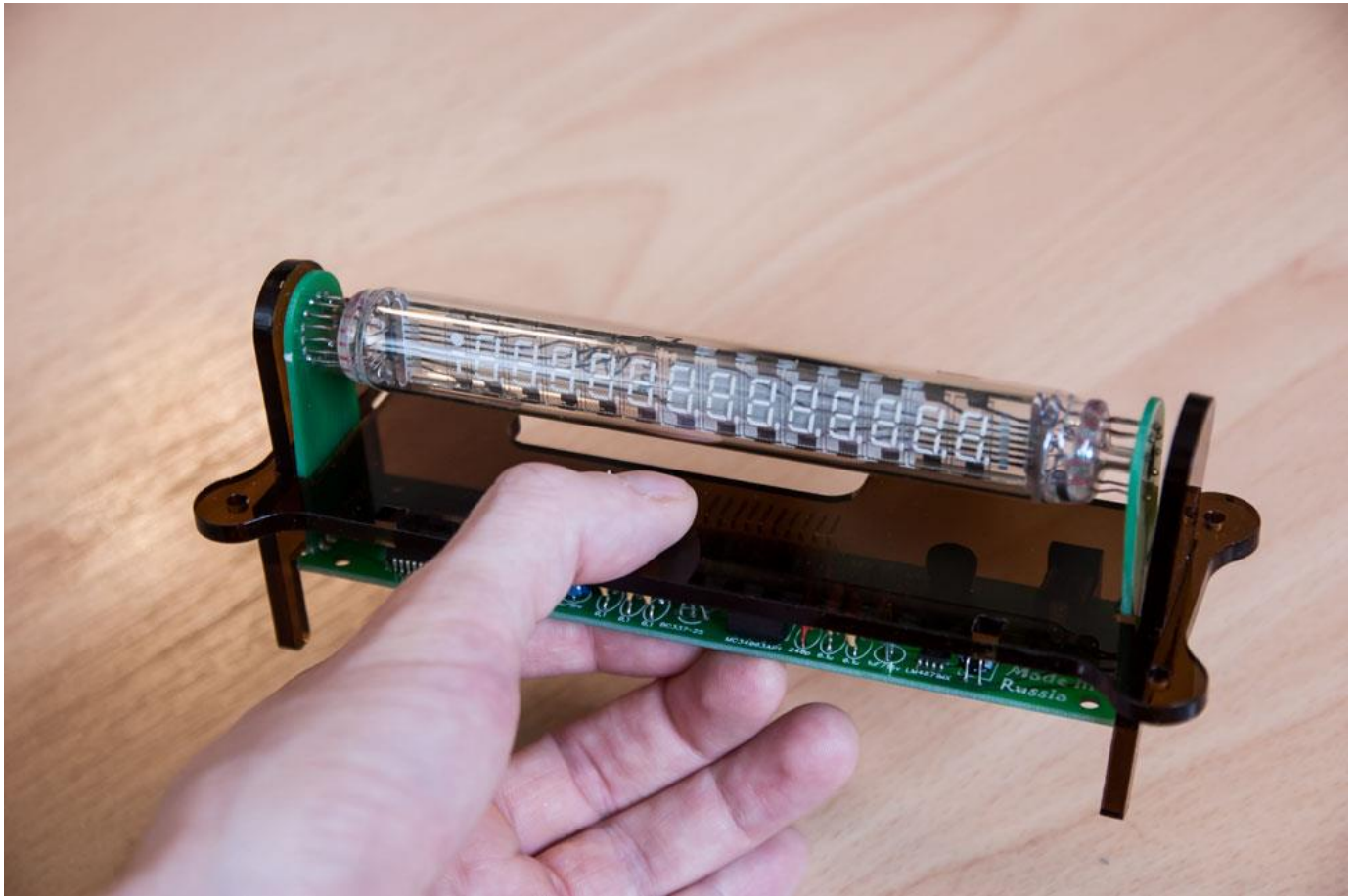
- 1) Remove protective films from all plastic parts:



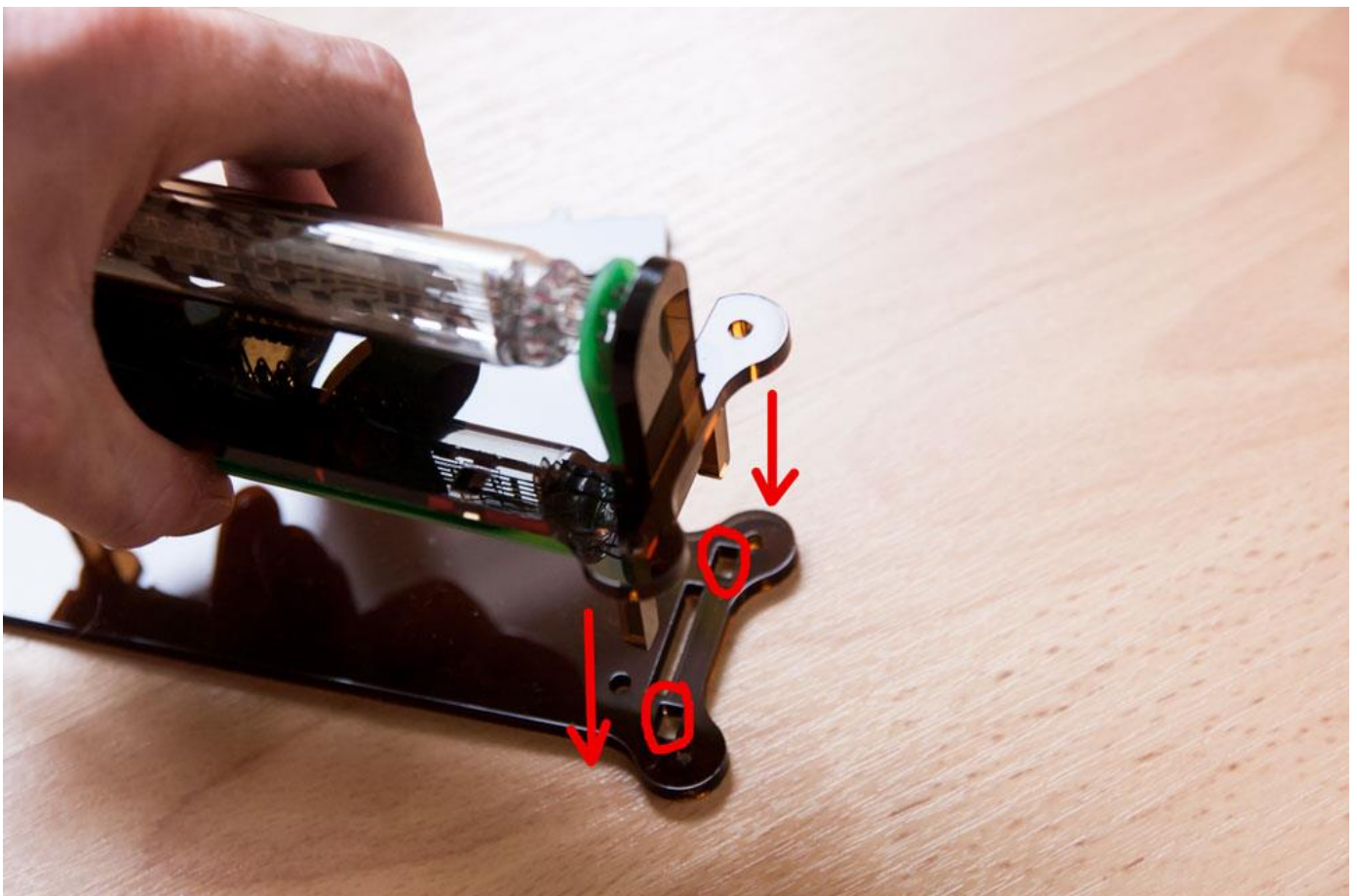
2) Take top plastic panel and place it like on photo:



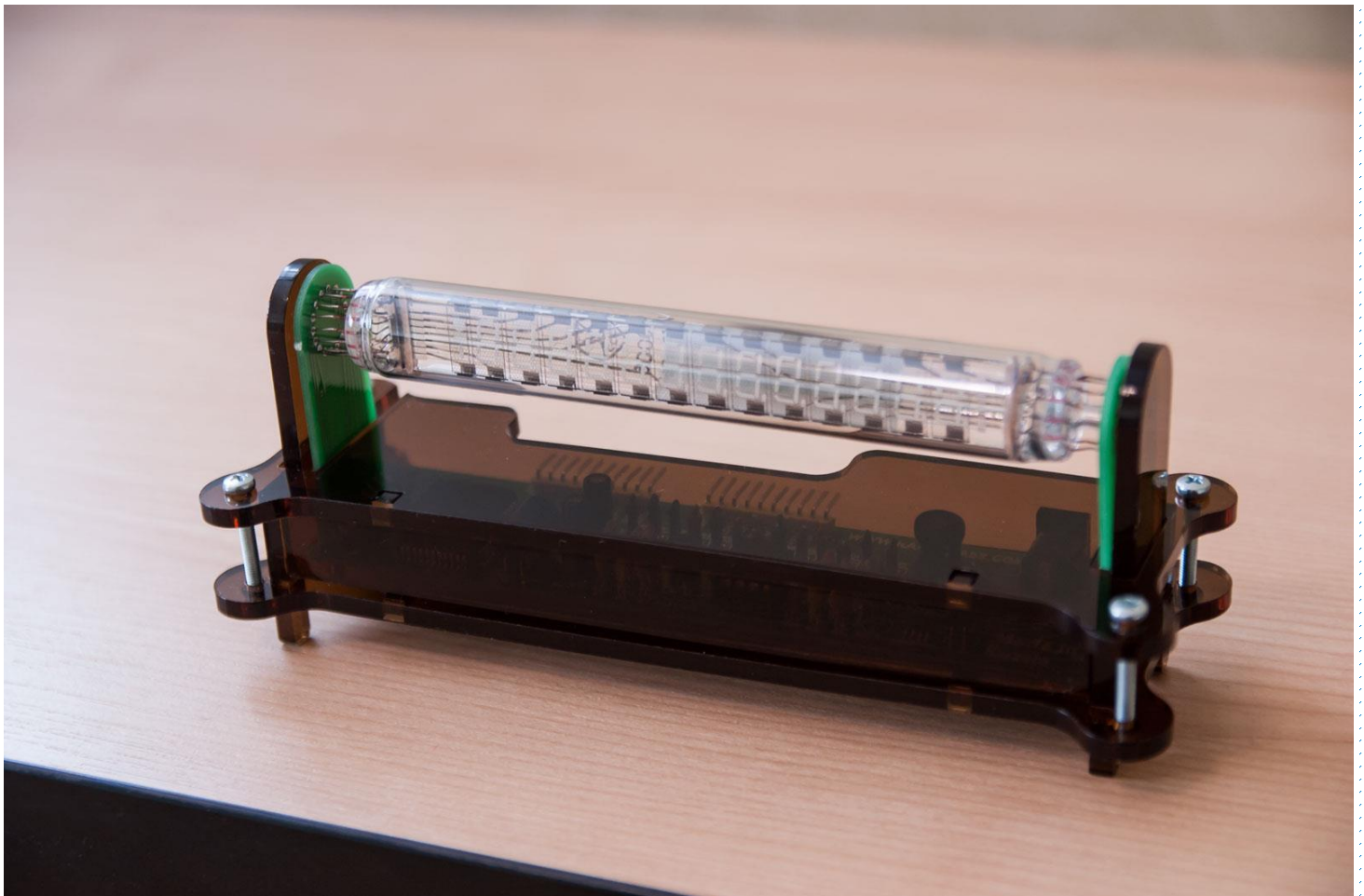
- 3) Take Kamatech in your hand and insert side panels in top panel, like on photo:



- 4) Insert legs of side panels into holes on bottom plastic part:

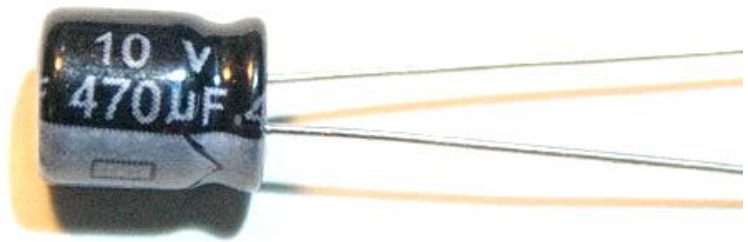
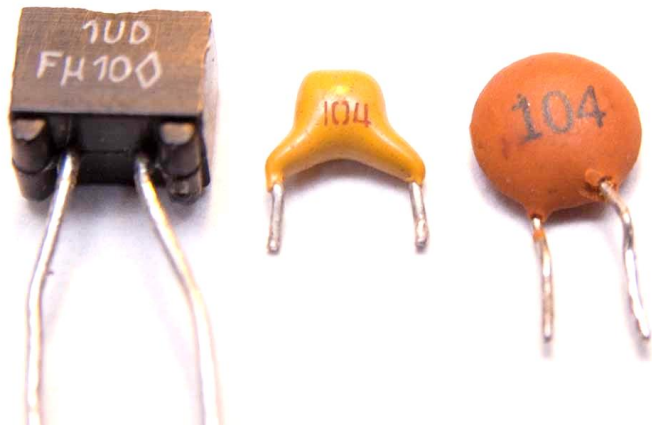
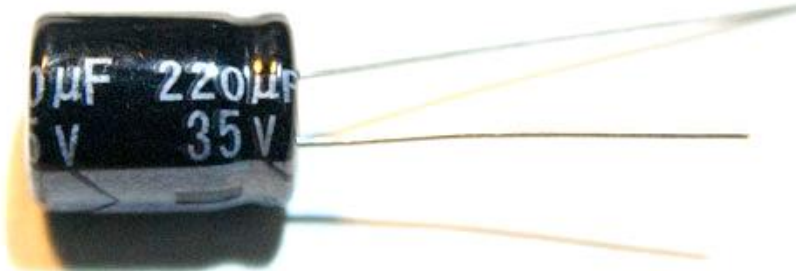





5) Insert front panel and use the screws to fix all parts together:







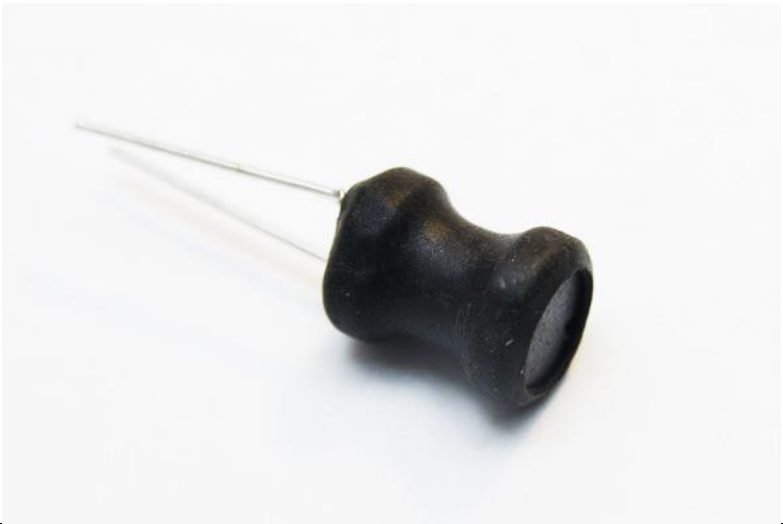


SPECIFICATION




Please note, that elements in kit can be a little different. If you doubt value of element check it with multimeter.




Label	Value	Photo
C1	470u/10v	
C2, C3, C7, C10, C11	0.1uF	
C4	220u/35v	


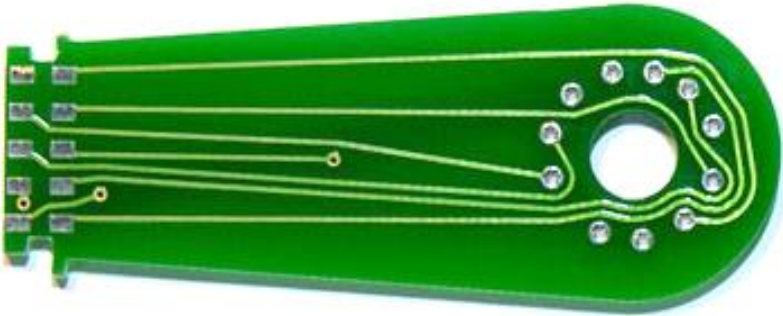
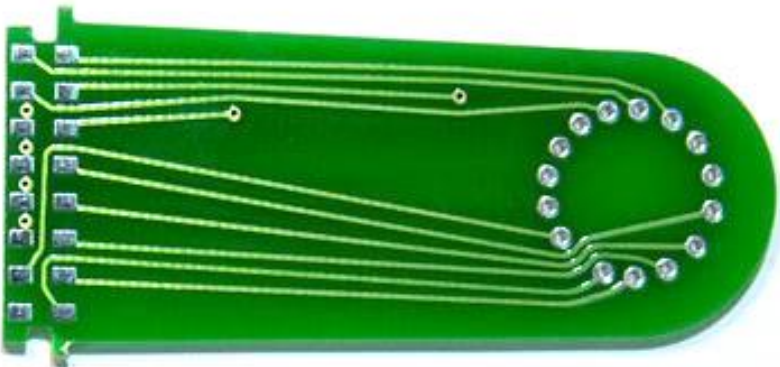

C5	1uF/15v	
C6, C9	10u/16v	
C8	240p	

D1	1N5819	
IC1	LM4871MX	
IC2	MC34063AP1	
IC3	HV518	

L1	220uH	
R1	12k	
R2	75k	

<p>R3, R7, R9, R12</p>	<p>9.1k</p>	
<p>R4</p>	<p>1k</p>	
<p>R5</p>	<p>180</p>	

R6	1	
R8	20k	
R10	3.3k	

R11	47k	
T1	First side PCB	
T2	Second side PCB	
VT1	BC337	

X1	Power plug 5v	
XS5, XS6	Sockets	
Screws		

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KAMATECH

Assembled my own hands 😊

Thanks for purchase!!!

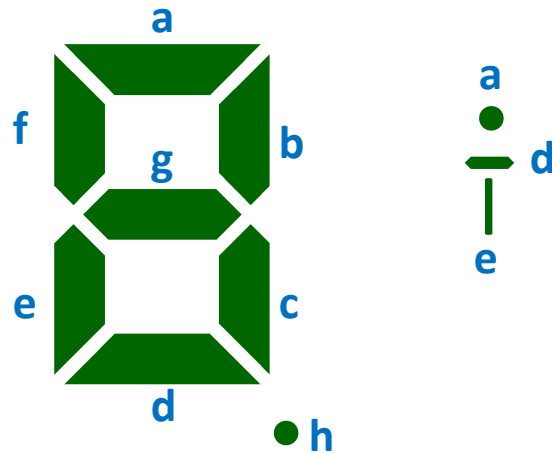
Features:

- * VFD 7-segment IV-27 display (made in 1988)
 - * 13 digits
 - * Height of digit - 8mm
 - * Smooth PCB routing
- * Power source - DC 5V barrel plug 5.5mm/2.1mm ("+" inside, "-" outside)
 - * Consuming current - no more 200mA
 - * Dimensions - 153mm x 30mm x 55mm.

Output bits HV518

31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
8	7	6	5	4	3	2	1	h	g	f	e	d	c	b	a	10	9	G14	G13	G12	G11	G10	G9	G8	G7	G6	G5	G4	G3	G2	G1

XS6 pins	Segments	XS6	Grids
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Pin of HV818	Socket XS5	
	PIN of XS5	Description
2	1 DOUT	Digital OUT of HV518
43	2 DIN	Digital IN of HV518
24	3 LOAD	Load pin of HV518
23	4 CLK	Clock pin of HV518
21	5 BLNK	Blank pin of HV518
	6 NC	NC
	7 NC	NC
1	8 +24V	+24V Output
44	9 +5V	+5V Output
22	10 GND	Ground

Socket XS6	
Pin of XS6	Description
1 OUT24	For external devices. +24V output
2 OUT25	
3 OUT26	
4 OUT27	
5 OUT28	
6 OUT29	
7 OUT30	
8 OUT31	
9 OUT14	
10 OUT15	

Digit	h	g	f	e	d	c	b	a	Dec
0	0	0	1	1	1	1	1	1	63
1	0	0	0	0	0	1	1	0	6
2	0	1	0	1	1	0	1	1	91
3	0	1	0	0	1	1	1	1	79
4	0	1	1	0	0	1	1	0	102
5	0	1	1	0	1	1	0	1	109
6	0	1	1	1	1	1	0	1	125
7	0	0	0	0	0	1	1	1	7
8	0	1	1	1	1	1	1	1	127
9	0	1	1	0	1	1	1	1	111
=	0	1	0	0	1	0	0	1	73
A	0	1	1	1	0	1	1	1	119
C	0	0	1	1	1	0	0	1	57
!	0	1	0	1	0	0	0	1	81

Example of source code:

program IV_27m;

```
var    load:sbit at GPIOB_ODR.B12;    //Load pin
      text_out_lo,text_out_hi:word; //variables for SPI
      din_digit :byte;
      const digits: array[23] of word = (63,6,91,79,102,109,125,7,127,111,0,119,57);
      const mas_din_digit: array[13] of word = (1,2,4,8,16,32,64,128,256,512,1024,2048,4096);
```

procedure Timer_out();

begin

```
    delay_us(100);
    inc(din_digit);
    if din_digit > 12 then din_digit:=0;
    text_out_lo:=mas_din_digit[din_digit];
    text_out_hi:=digits[din_digit];
    SPI1_Write(text_out_hi);
    SPI1_Write(text_out_lo);
```

```
    load:=0;
    load:=1;
    load:=0;
```

end;

begin

```
GPIO_Digital_Output(@GPIOB_BASE, _GPIO_PINMASK_ALL);           // Set PORTB as digital output
GPIO_Alternate_Function_Enable(@_GPIO_MODULE_SPI2_PB13_14_15); // Set SPI to the port B. Pins 13 14 15
GPIO_Alternate_Function_Enable(@_GPIO_MODULE_SWJ_JTAGDISABLE);  // Disable JTAG
SPI1_Init_Advanced(_SPI_FPCLK_DIV64, _SPI_MASTER or _SPI_16_BIT or _SPI_CLK_IDLE_LOW or _SPI_FIRST_CLK_EDGE_TRANSITION or _SPI_MSB_FIRST or
_SPI_SS_DISABLE or _SPI_SSM_ENABLE or _SPI_SSI_1, @_GPIO_MODULE_SPI1_PA567);
SPI_Set_Active(@SPI1_Read, @SPI1_Write);
din_digit:=1;
```

////////// Main cycle //////////

while true do

begin

Timer_out;

end;

end.

