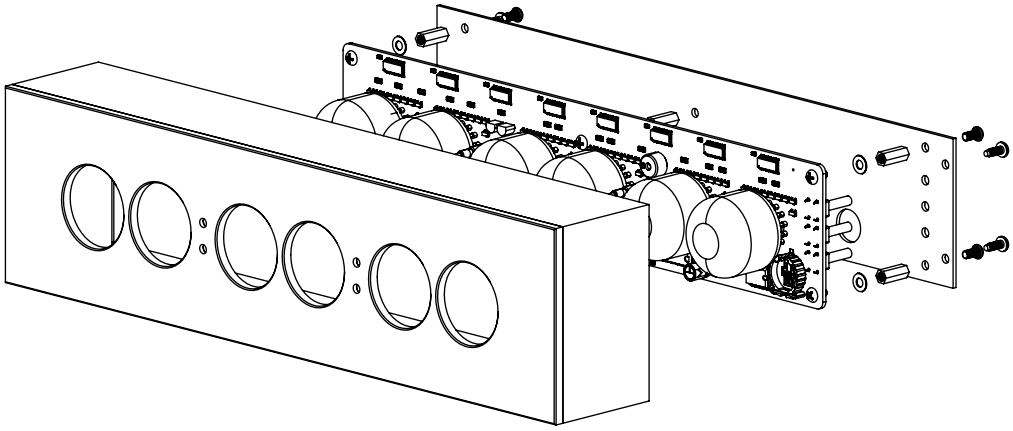
Black & Wood Nixie tube clock

Assembly instructions v1.0.0



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NIXIE CLOCK HOME | 辉光钟之家
YanZeyuan's DIY Studio

Attention

- Attention: All components are through-hole or DIP parts. Please solder carefully.
- Warning: When powered, a high voltage of 170V is present on the PCB board. Do not touch the board until the power is disconnected.
- Warning: Make sure all components are pressed completely down on the PCB otherwise the assembled clock will not fit in the housing.
- Warning: Before soldering, check the polarity of each component.
- Warning: Please disconnect the power immediately if testing shows any unexpected results. Check for component placement mistakes, component polarity and that no solder bridges occurred during assembly.

Catalogue

Part list

Before getting started, please check the contents of the package. If any are missing, please contact the seller.

No.	Name	Description	Designator	Footprint	Qty	Value
1	IC	Programmed		DIP20	1	STC12C5628
2	IC socket		MCU	DIP20	1	
3	Resistor		R1, R2, R3, R4, R5, R6	R-1/8C	6	20K
4	Capacitor		C15, C18	C-102L	2	22pF
5	Polarized Capacitor		C14, C22	C-6.3X8L	2	220uF/16v
6	Polarized Capacitor		C20	C-8X11L	1	4.7uF/250v
7	Polarized Capacitor		C24	C-8X11L	1	470uF/25V
8	Diode		D2	DO-41	1	1N4007
9	Transistor		Q63, Q67	TO-92	2	A42
10	MOSFET		Q64	TO-220WS	1	IRF630
11	Inductor		L1	I-10x20	1	150uH
12	Power socket		DC 12V	DC5.5-2.1-3	1	DC5.5-2.1-3
13	GPS socket		PS/2 Port	PS2-1	1	PS/2 Port
14	Crystal oscillator		Y2	XTAL	1	22.1184MHz
15	Fuse		Fuse	3.6x10	1	250V/1A
16	Buzzer		Buzzer	9mm	1	5V Active
17	LED		LED1 - LED12	3mm	12	Ocean blue
18	Neon bulb		DOT1, DOT2, DOT3, DOT4	3mm	4	
19	Tactile switch		Button 1, Button 2, Button 3	6mm x 6mm	3	L = 17 mm

Housing parts and accessories

No.	Name	Description	Quantity
20	Neon spacer	Φ4 x 20mm	4
21	Steel round head screw	PM3x6mm	11
	Nut	M3	1
	Washer	M3	5
	Self tapping pan head screw	PWA2.6x8mm	4
	Spacer	M3x12mm	5
22	Tube socket pins	φ1mm	80
23	PCB board	Semi-finished board	1
24	Nixie tubes		6
25	Wood enclosure	287mm x 75mm x 49mm	1
26	Aluminium alloy back plate	269mm x 57mm x 1mm	1
27	Foam rubber		3
28	Silicon bumper	φ8 x 1mm	4
*29	Cell battery	CR1220	1
30	Power adapter	12V 1A	1

***Notice: CR1220 cell battery may not included because of transportation regulations.**

Assembling electronic components

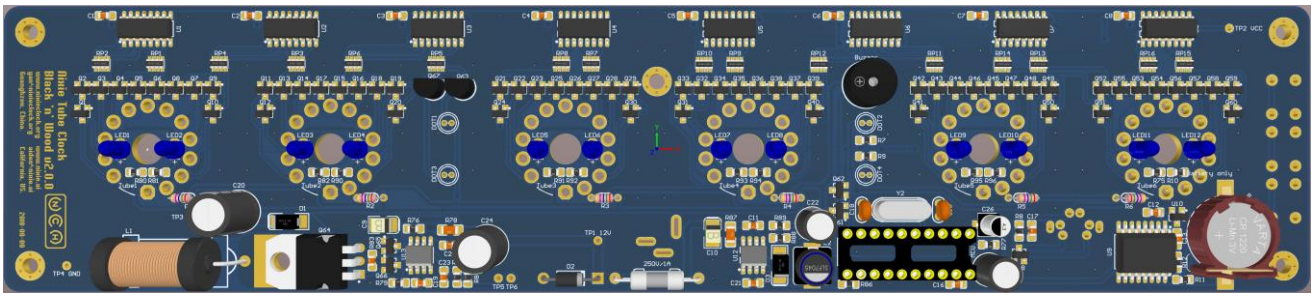
Assembly of electronic parts

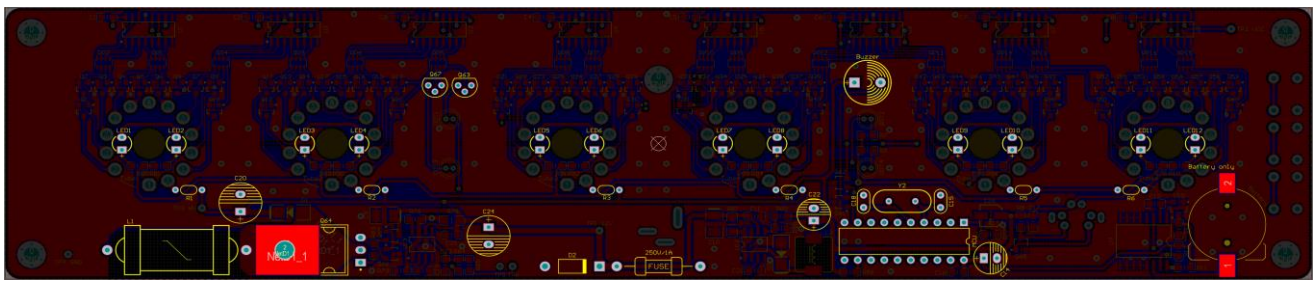
Notice: Please read through the whole document before soldering.

The following components are needed:

No.	Name	Designator	Footprint	Qty	Value	Polarity
2	IC socket	MCU	DIP20	1		YES
3	Resistor	R1, R2, R3, R4, R5, R6	R-1/8C	6	20K	NO
4	Capacitor	C15, C18	C-102L	2	22pF	NO
5	Polarized Capacitor	C14, C22	C-6.3X8L	2	220uF/16v	YES
6	Polarized Capacitor	C20	C-8X11L	1	4.7uF/250v	YES
7	Polarized Capacitor	C24	C-8X11L	1	470uF/25V	YES
8	Diode	D2	DO-41	1	1N4007	YES
9	Transistor	Q63, Q67	TO-92	2	A42	YES
10	MOSFET	Q64	TO-220WS	1	IRF630	YES
11	Inductor	L1	I-10x20	1	150uH	NO
14	Crystal oscillator	Y2	XTAL	1	22.1184MHz	NO
15	Fuse	Fuse	3.6x10	1	250V/1A	NO
16	Buzzer	Buzzer	9mm	1	5V Active	YES
17	LED	LED1 - LED12	3mm	12	Ocean blue	YES
29	Cell battery	CR1220		1		YES

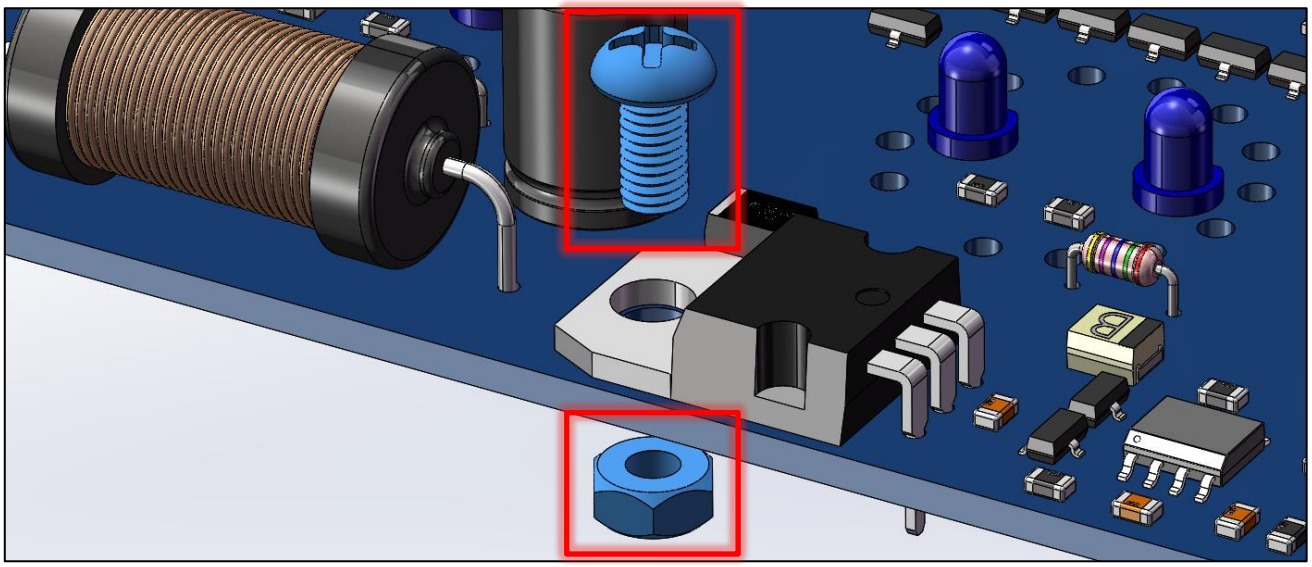
Solder all above listed parts to the PCB according to the silkscreen markings on the board. The polarity of the components must match the print on the board. The result should now look like this:





The following components are needed. Use screw and nut to fix MOSFET on the board:

No.	Name	Description	Quantity
21	Steel round head screw	PM3x6mm	1
	Nut	M3	1

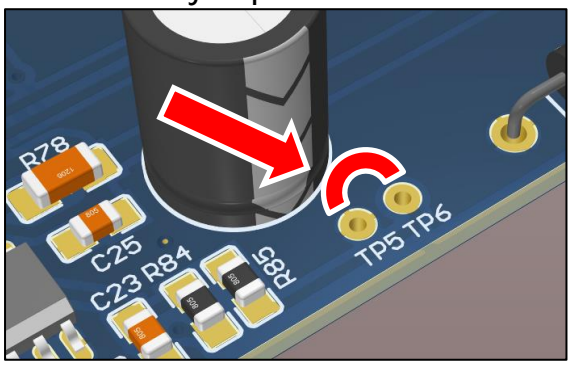


The following components are needed. Solder the power socket on the board following the picture bellow:

No.	Name	Description	Designator	Footprint	Qty	Value
12	Power socket		DC 12V	DC5.5-2.1-3	1	DC5.5-2.1-3

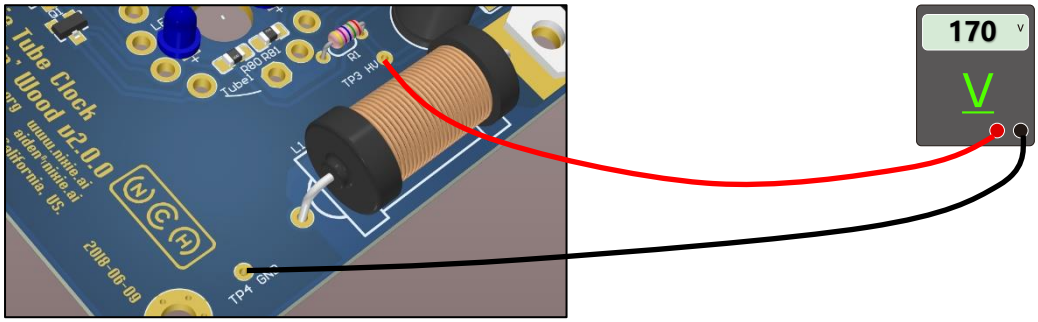
Check the high voltage output

Place a wire jumper between TP5 and TP6 as shown below:



Connect the power adapter. The voltage measured between TP3 and TP4 should be about 170 VDC.

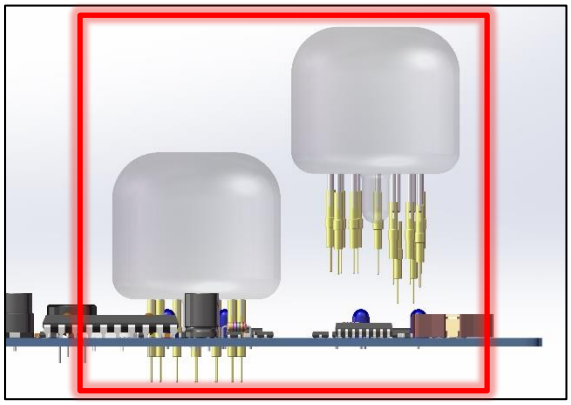
Please **remove the jumper** between TP5 and TP6 after measuring the voltage.



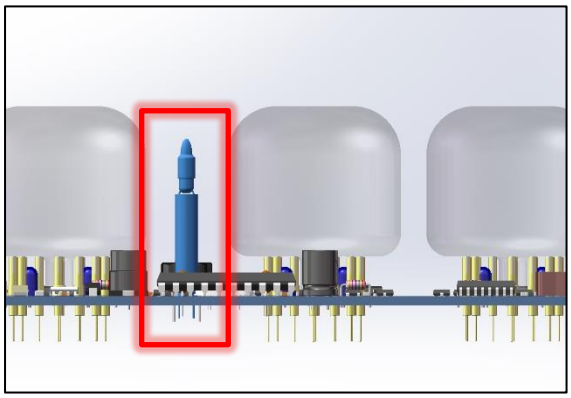
Assembly of Nixie tubes and rest parts

The following components are needed:

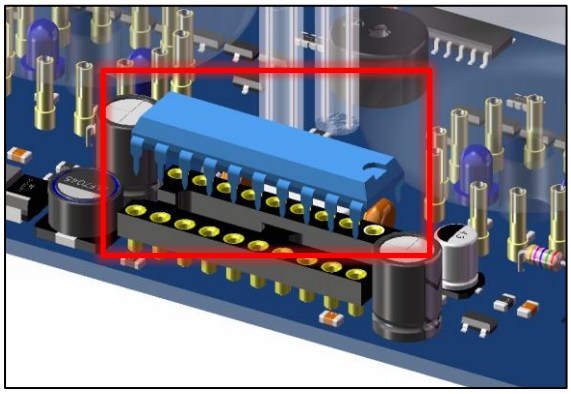
No.	Name	Description	Designator	Footprint	Qty	Value
1	IC	Programmed		DIP20	1	STC12C5628A
13	GPS socket		PS/2 Port	PS2-1	1	PS/2 Port
18	Neon bulb		DOT1, DOT2, DOT3, DOT4	3mm	4	
19	Tactile switch		Button 1, Button 2, Button 3	6mm x 6mm	3	L = 17 mm
20	Neon spacer	φ4 x 20mm			4	
22	Tube socket pins	φ1mm	Tube1 – Tube6	B13B	78	
24	Nixie tube		Tube1 – Tube6	B13B	6	



Insert the tubes one by one with the tube socket pins into the holes of the board and align the tubes parallel to the board surface. Solder the socket pins carefully from the bottom side. Do not use too much solder, otherwise the solder may flow into the inner side of the pins. **Cut Only the thin parts of the pins.**

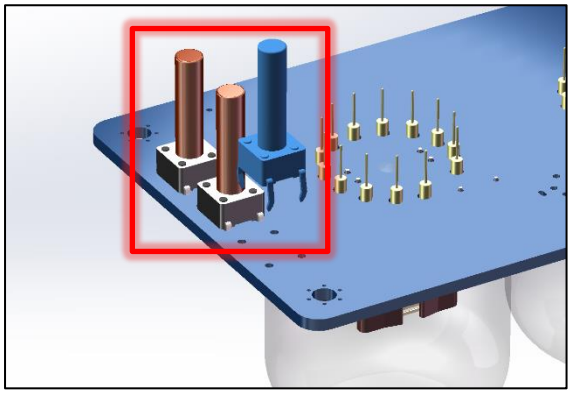


Put the neon spacer over the neon bulb leads and solder them to the PCB. The two small holes in the spacers must point to the neon bulb. Cut off the excess pins.

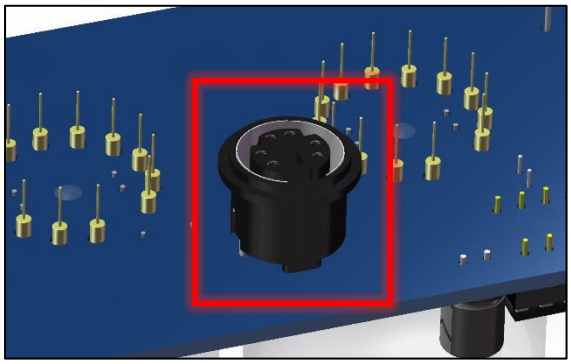


Put MCU into the IC socket.

Please watch the direction of the chip.



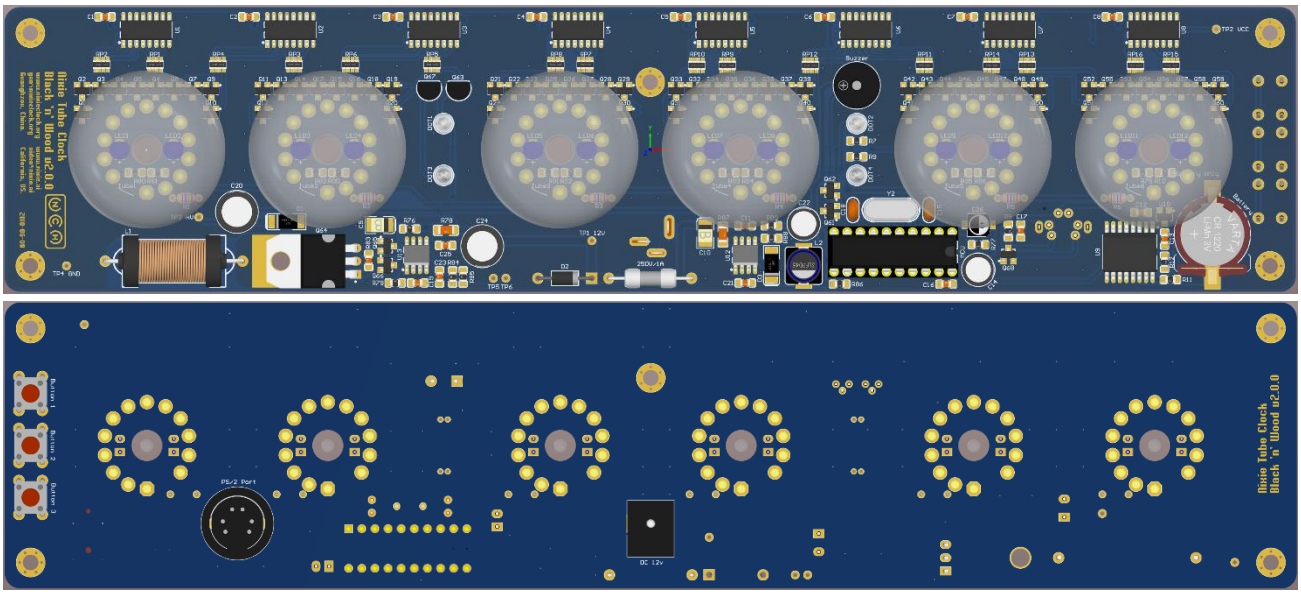
Put three tactile switchs into the board from the bottom side, then solder them.



Put GPS socket into the board from the bottom side, then solder it.

Finally your circuit board is now completed. Please power it up and check the display and functions following the user manual.

Warning: DO NOT touch any part of the board when it is energized! Turn off the power before further operations!

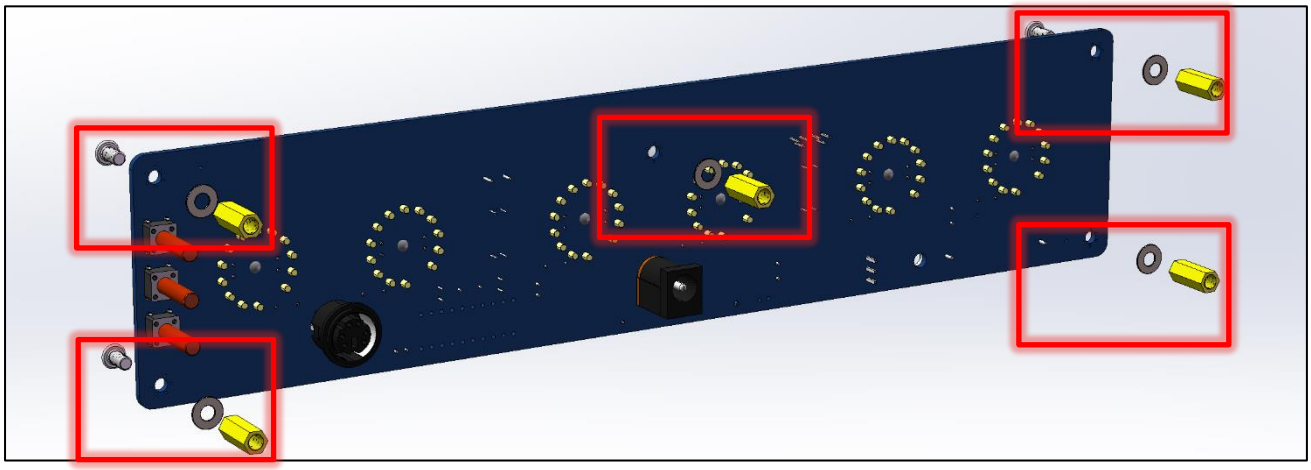


Assembling housing

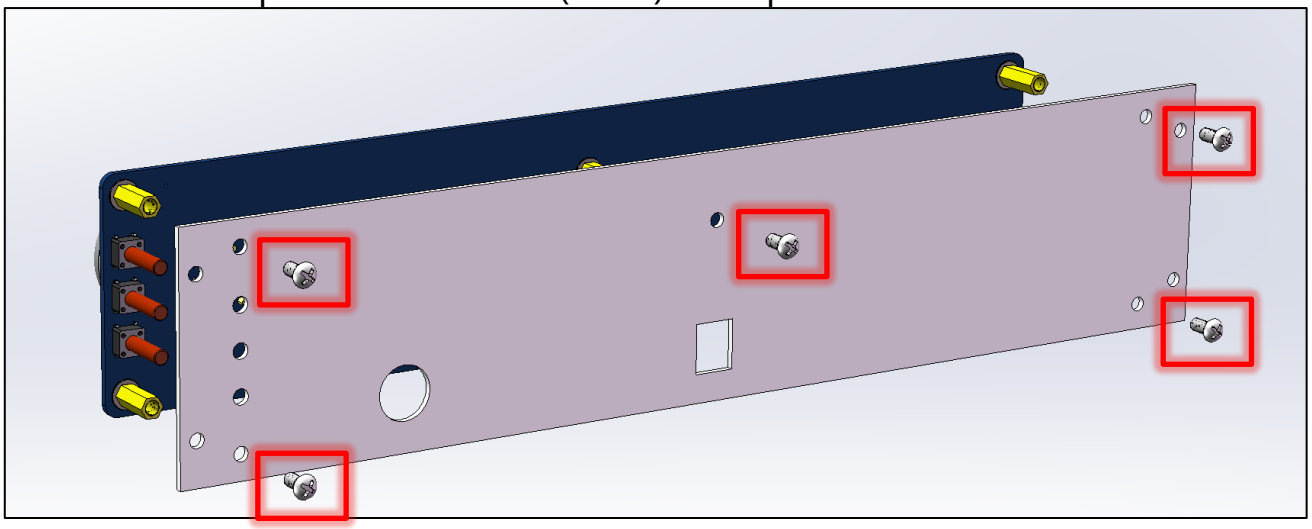
Fix the circuit board

The following parts are needed. Mount the 5 spacers (M3x12) with 5 screws (M3x6) and 5 washers between PCB and spacer on the PCB.

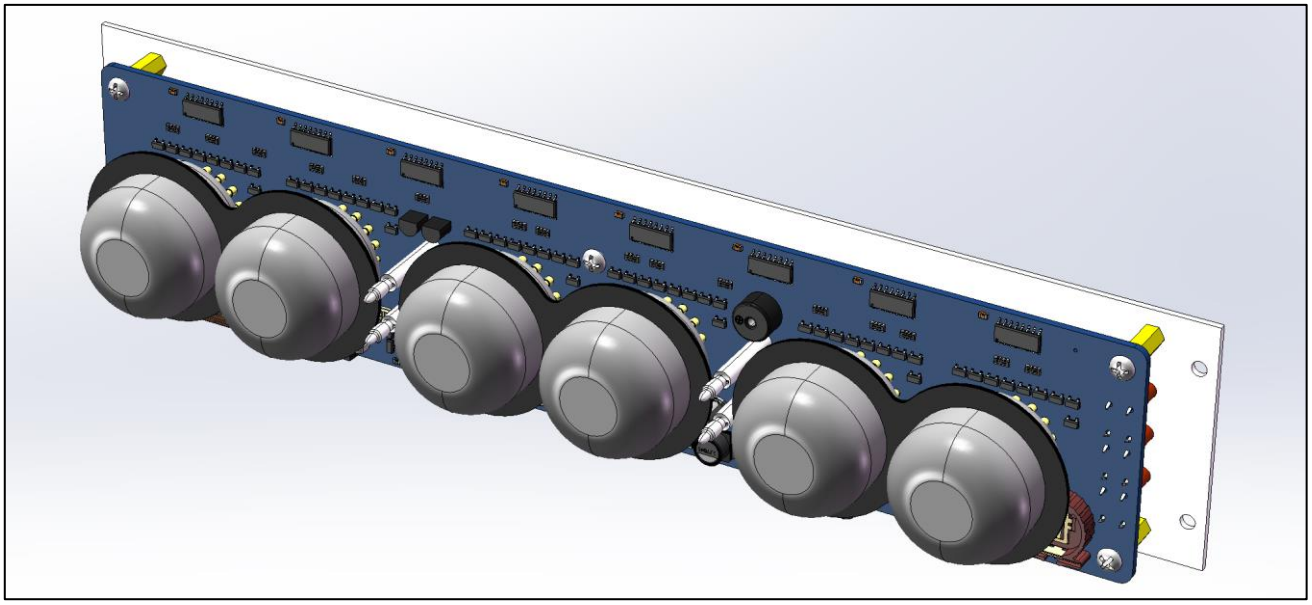
No.	Name	Description	Quantity
21	Steel round head screw	PM3x6mm	10
	Washer	M3	5
	Spacer	M3x12mm	5
26	Aluminium alloy back plate	269mm x 57mm x 1mm	1
27	Foam rubber		3



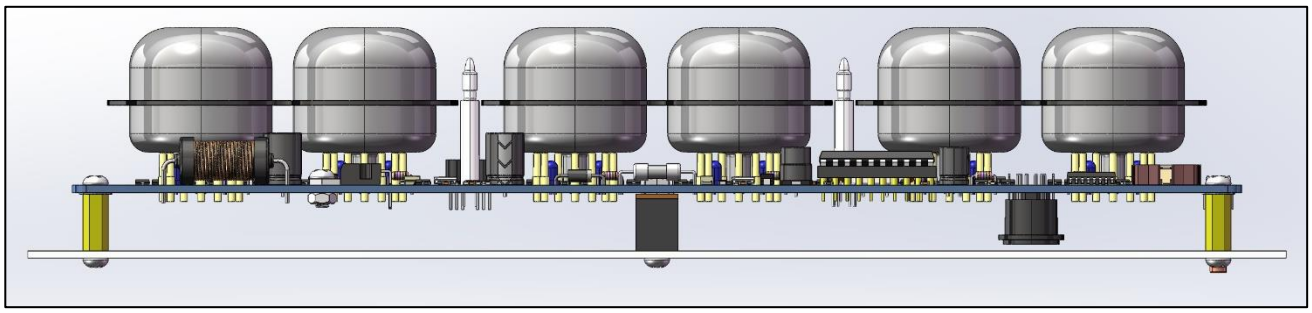
Mount the back plate with 5 screws (M3x6) on 5 spacers.



Put three "8" -shaped foams over the tubes, but put it as close as possible to the front of the tubes, so that the foams will be pushed into place automatically when inserting the assembly later into the case.



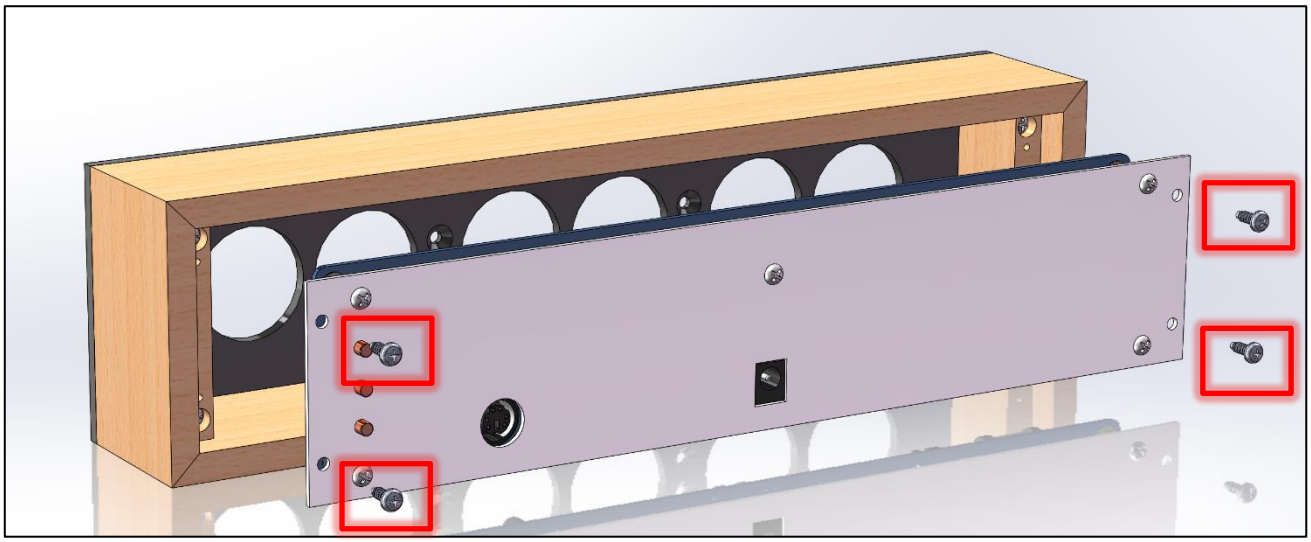
The result should now look like this:



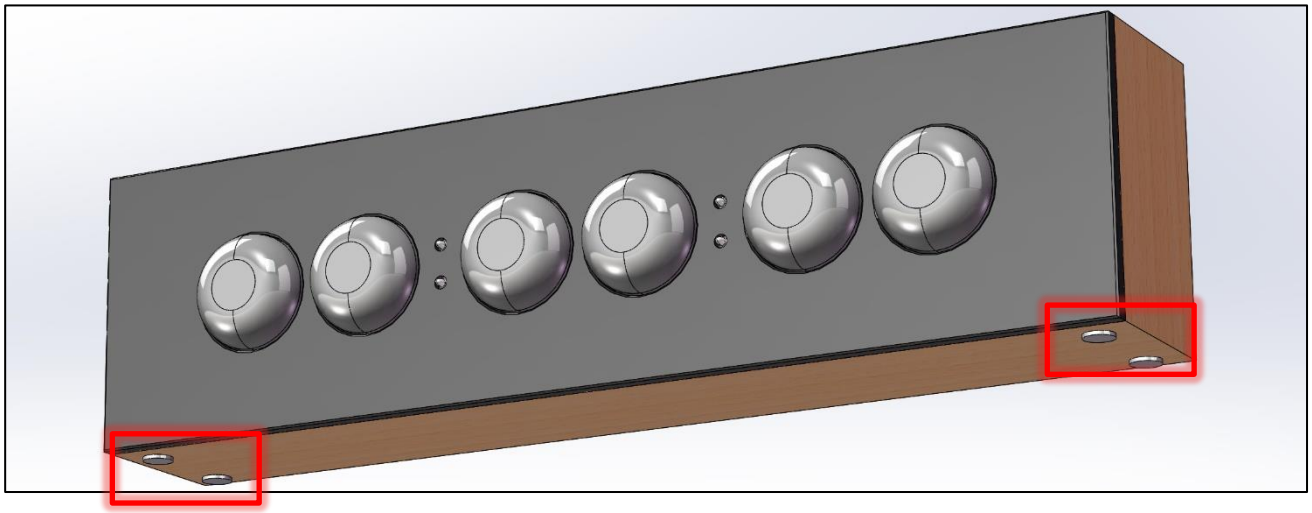
Assembly of the housing

The following parts are needed. Mount the PCB assembly with 4 self tapping pan head screws on the wooden frame:

No.	Name	Description	Quantity
21	Self tapping pan head screw	PWA2.6x8mm	4
25	Wood enclosure	287mm x 75mm x 49mm	1
38	Silicon bumper	φ8 x 1mm	4



Put 4 silicon bumpers on the bottom of wooden frame. The clock should now look like this:



Congratulations! You have successfully completed the assembly!
Any problems during assembly, please contact us.

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