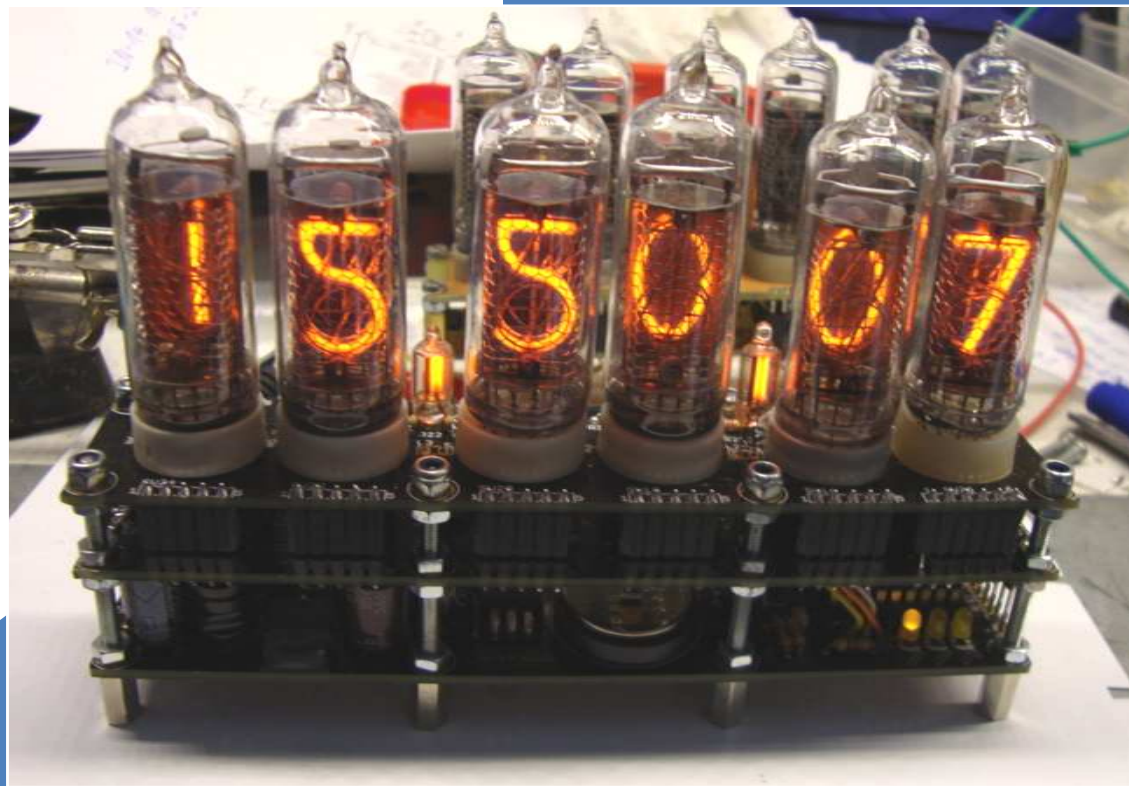


IN-14 Nixie Clock - Build Description

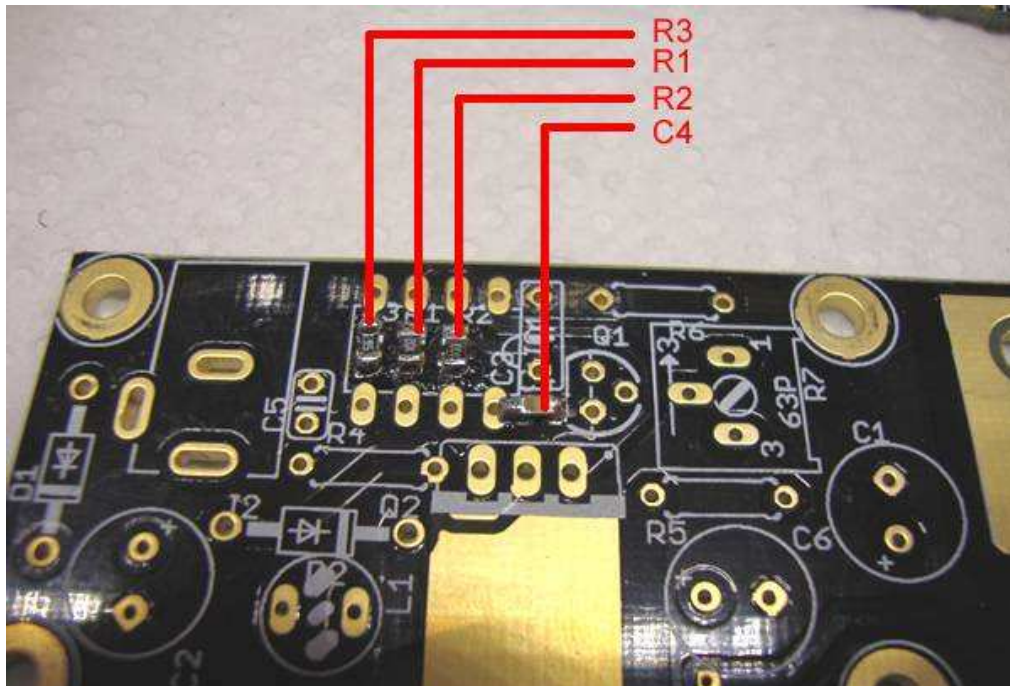


Bottom PCB

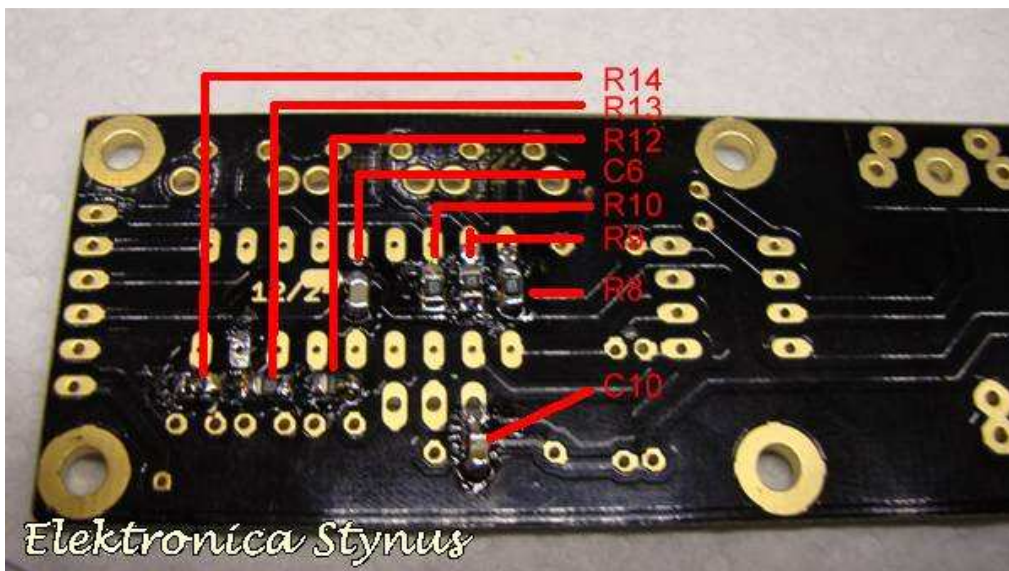
Part list

Parts	Value	Extra info
R1, R12, R13, R14	1K	SMD 0805
R2, R8, R9, R10	10K	SMD 0805
R3	56K	SMD 0805
R4	2K2	
R5	220K	
R6	470R	
R11, R61, R62	4K7	
R7	1K	Potentiometer
C1, C2	220 μ F 25V	3.5mm pitch 8mm diameter
C4, C7, C8, C9, C10	100nF	SMD 0805
C3	2.2nF	5mm pitch
C5	2.2nF	2.5mm pitch
C6	4.7 μ F 250V	3.5mm pitch 8mm diameter
C12	100nF	5mm pitch
D1	1N4007	
D2	UF4007	Or
Q1	BC547	BC547
Q2	IRF740	IRF740
Q3	32,768KHz	CRYSTALTC38H
LED1, LED2, LED3	LED3MM	
S1, S2, S3	Push button	Angled 90°
L1	100 μ H Coil	
IC1	LM555	Dip 8
IC2	7805	+bolt and nut
IC3	PIC16F628	Needs programming
IC4	DS18B20	
IC12	DS1307	
J2	DC jack	
SV13	6 pin header	Long leads
G1	CR2032 coin cell holder	+ CR2032 Cell

Surface mount parts

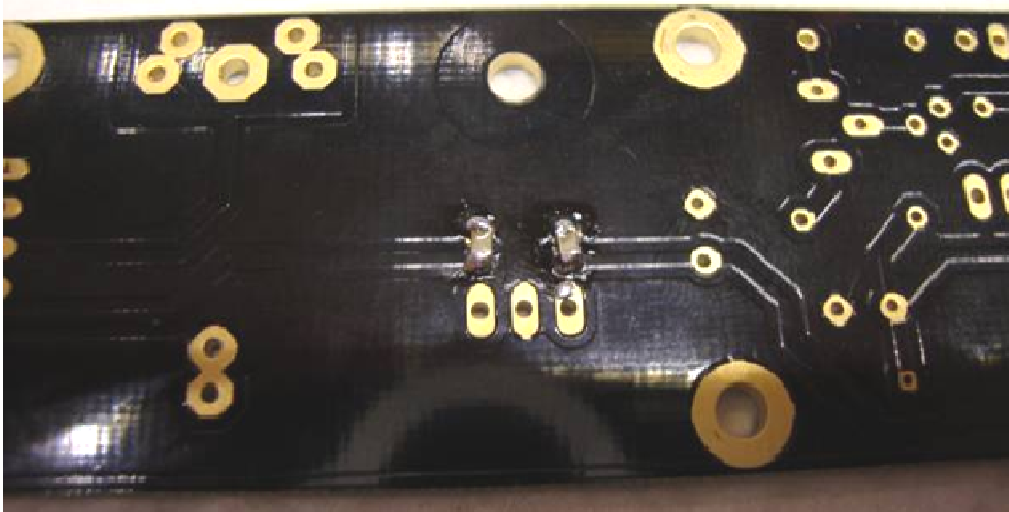


- R3 = 56K (563)
- R1 = 1K (102)
- R2 = 10K (103)
- C4 = 100nF



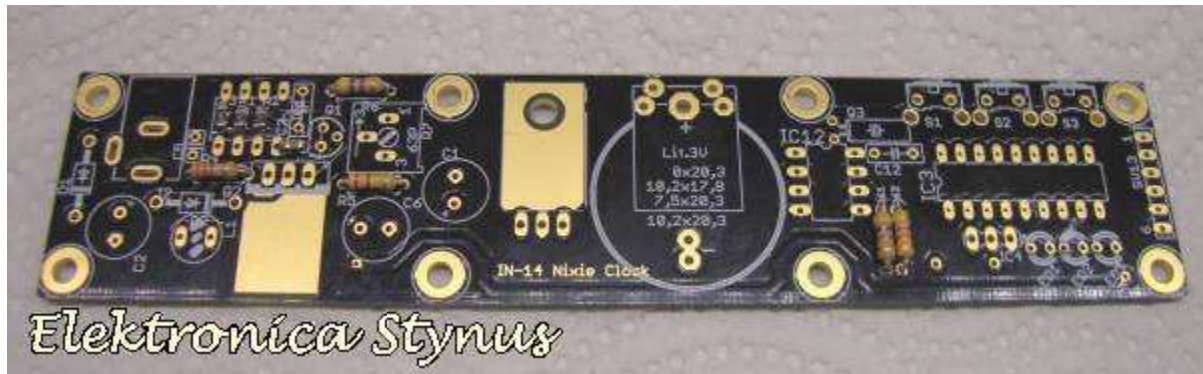
- R14 = 1K (102)
- R13 = 1K (102)
- R12 = 1K (102)
- C6 = 100nF
- R10 = 10K (103)
- R9 = 10K (103)
- R7 = 10K (103)
- C10 = 100nF

IN-14 Nixie Clock - Build Description



C7 = 100nF
C8 = 100nF

Trough hole parts

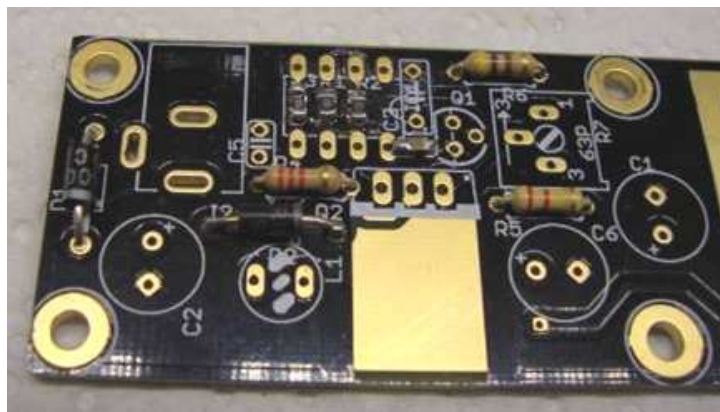


R4 = 2K2 (Red Red Red)

R5 = 220K (Red Red Yellow)

R6 = 470R (Yellow Purple Brown)

R61, R62 = 4K7 (Yellow Purple Red)

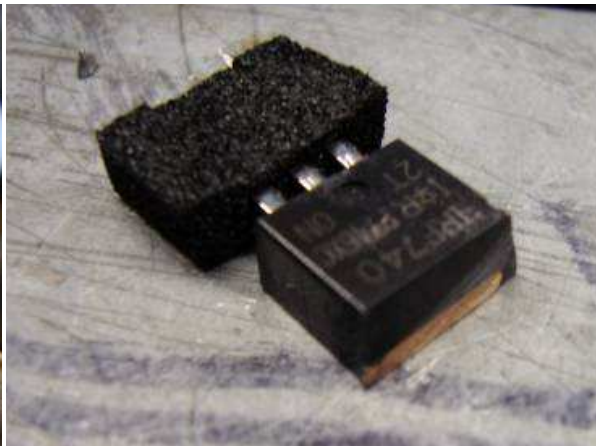


D1 = 1N4007

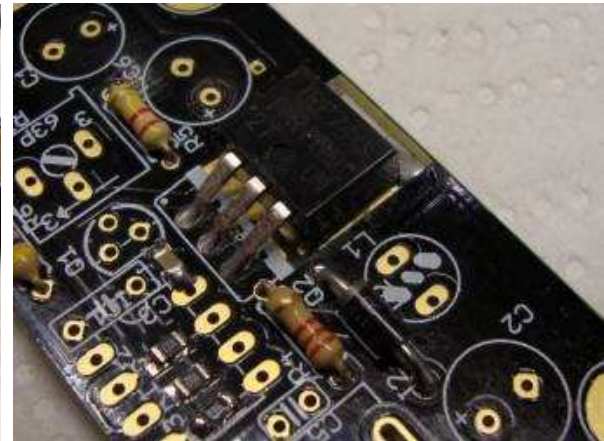
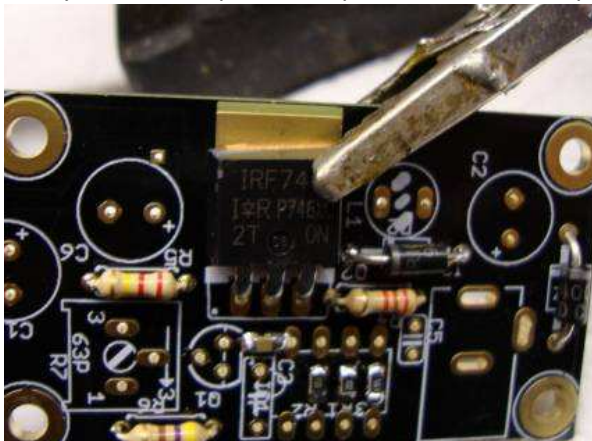
D2 = UF4007 Or

⚠ Watch the polarity! ⚠

For the next step we have to remove the tab from the mosfet. It is best to clamp it with the tab in a vice and saw it off. (You can skip this if you don't mind the mosfet extending out from the side.)



Now you can clamp it to the pcb and solder it in place.

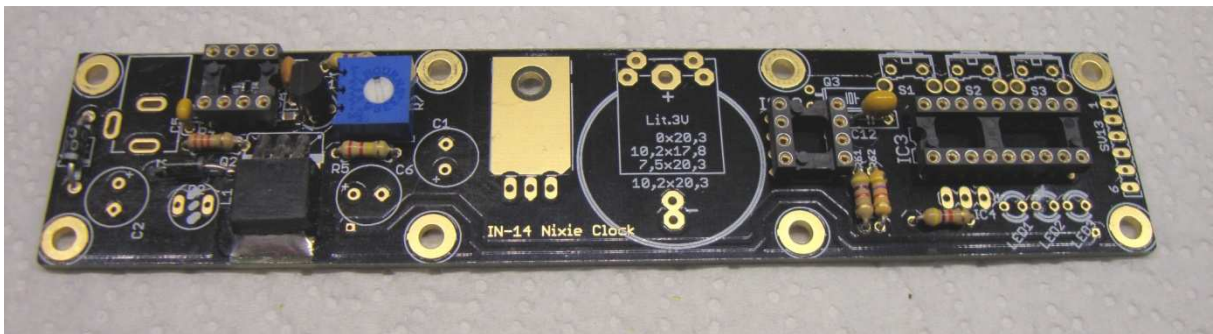


IN-14 Nixie Clock - Build Description



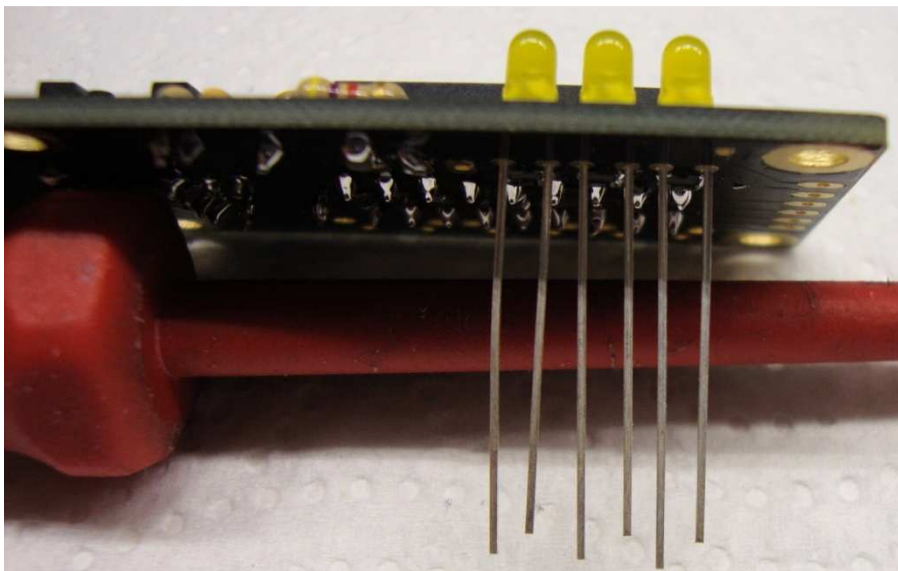
R7 1K potentiometer (102)
IC1, IC12 8 pin IC socket
IC3 18 pin IC socket

⚠ Watch the polarity! ⚠



C3 2,2nF (221)
C5 2,2nF (221)
C12 100nF (103)
Q1 BC547

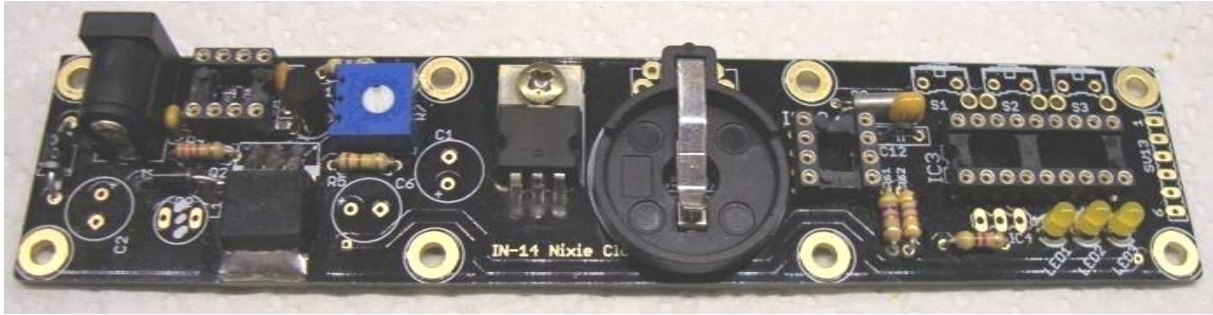
⚠ Watch the polarity! ⚠



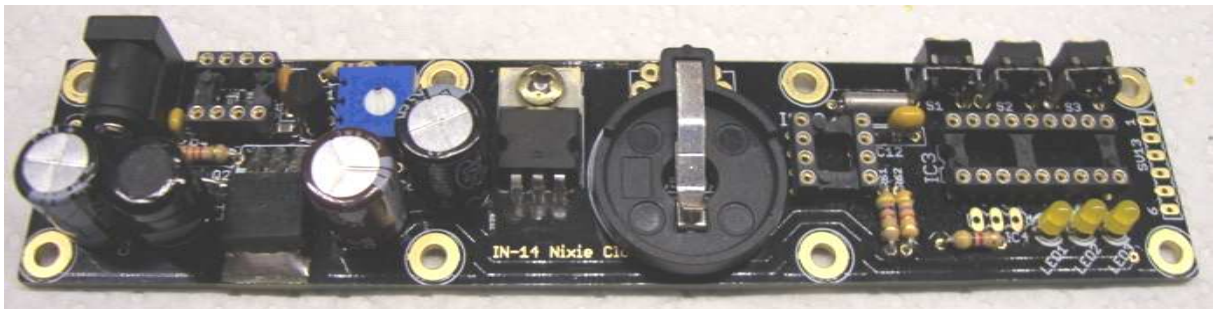
LED1, LED2, LED3 3mm Led

⚠ Watch the polarity! ⚠

IN-14 Nixie Clock - Build Description



- J2 DC Jack
- IC2 7805 +bolt and nut (Screw first, then solder)
- G1 CR2032 coin cell holder
- Q3 32,768KHz crystal



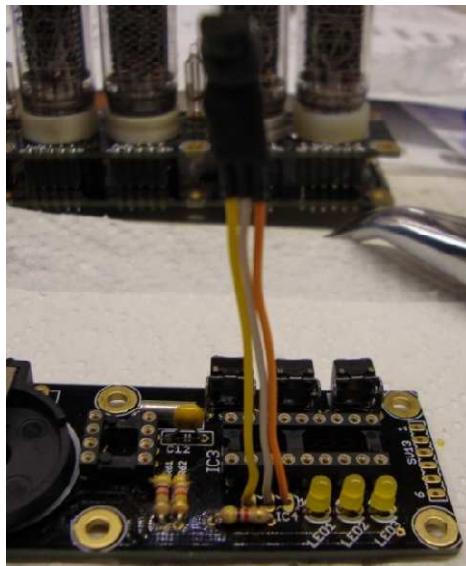
- C1, C2 220µF 25V
- C6 4.7µF 250V
- L1 100µH Coil
- S1, S2, S3 Push button

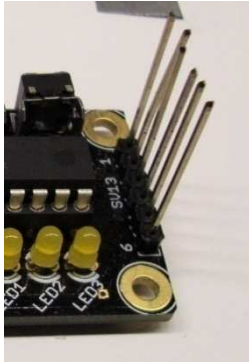


- IC4 DS18B20

This component is the temperature sensor. It can be mounted direct to the pcb, but that way you measure the temperature inside the case, so it is recommended to solder it to some 5cm long wires en mount it on the outside of the case.

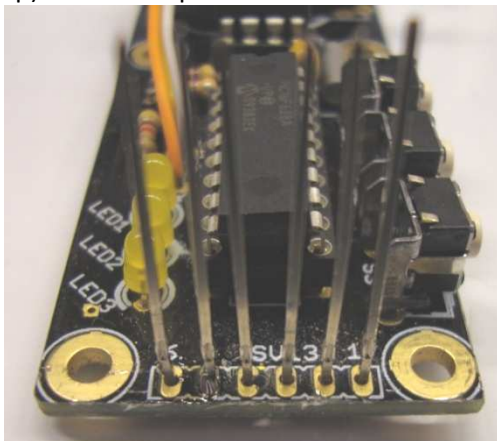
⚠ Watch the polarity! ⚠





SV13 6 pin header

Solder it to the bottom side of the pcb, then remove the plastic from the header (or push it a few mm up) and solder pin 5 from the above.



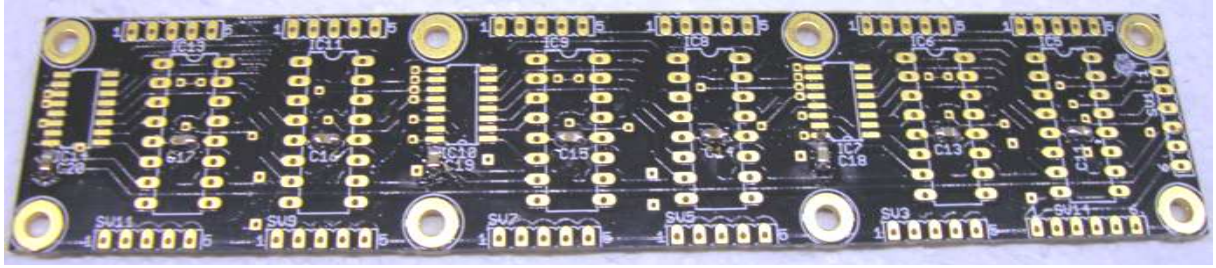
Now you can insert the IC1 in the socket, the IC3 and IC12 must be left out until the testing step.

Middle PCB

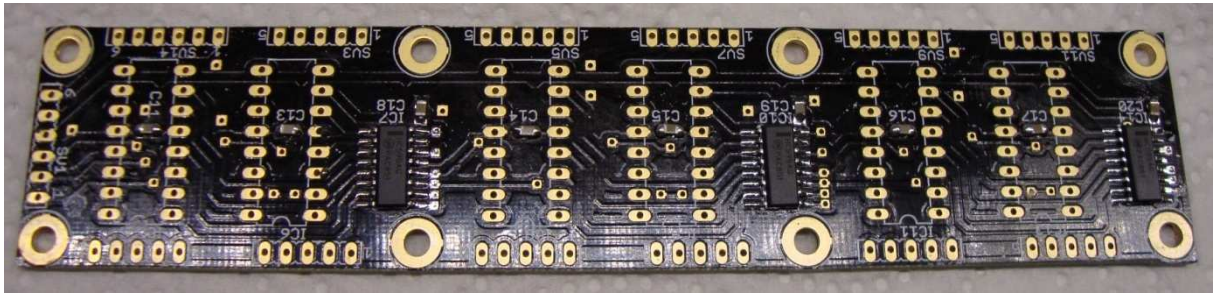
Part list

Parts	Value	Extra info
C11, C13, C18, C14, C15, C16, C17, C20, C19	100nF	SMD 0805
IC14, IC10, IC18	74HC595	SMD
IC5, IC6, IC8, IC9, IC11, IC13	74141	
SV1	6 pin female header	
SV14	6 pin male header	
SV2, SV3, SV4, SV5, SV6, SV7, SV8, SV9, SV10, SV11, SV12	5 pin male header	

Surface mount parts



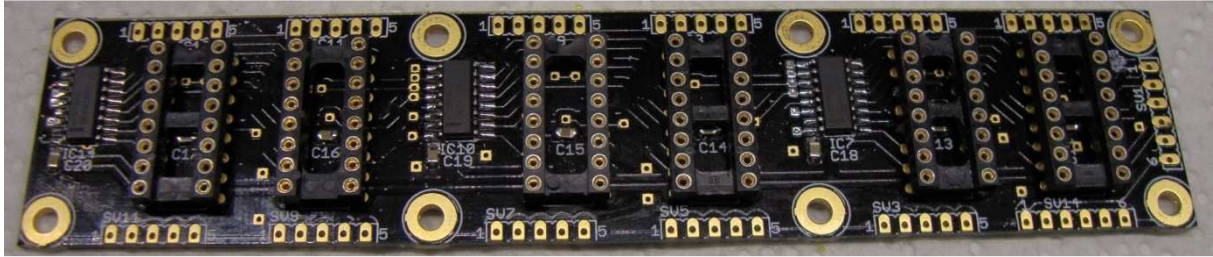
C11, C13, C18, C14, C15, C16, C17, C20, C19 100nF



IC14, IC10, IC18 74HC595

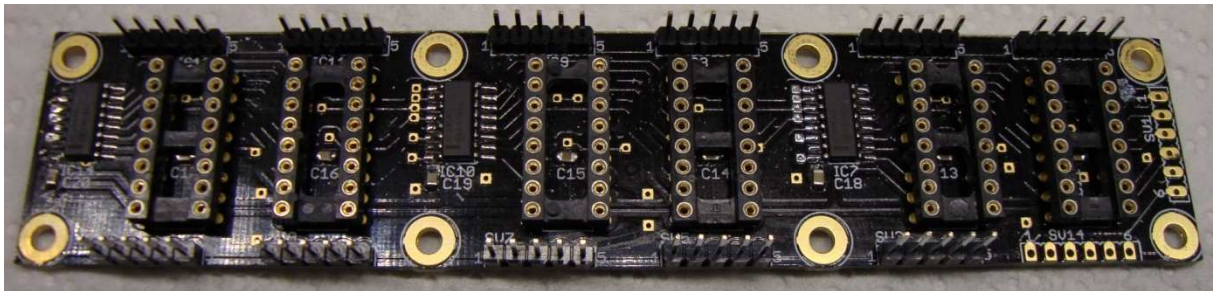
⚠ Watch the polarity! ⚠

Trough hole parts

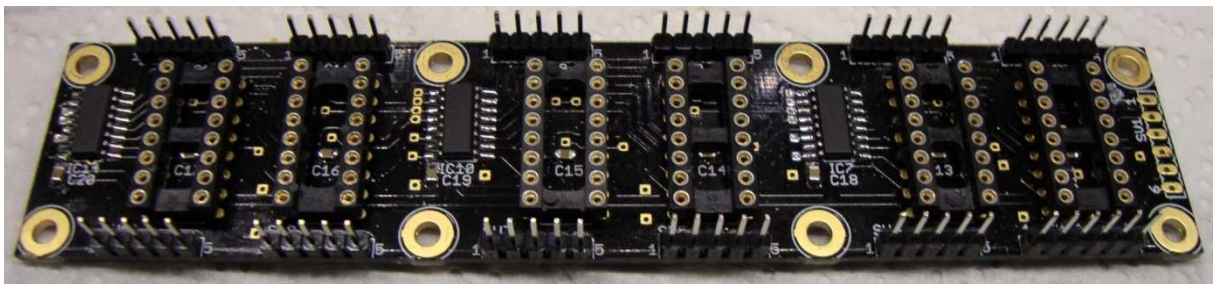


IC5, IC6, IC8, IC9, IC11, IC13 16 pin IC socket

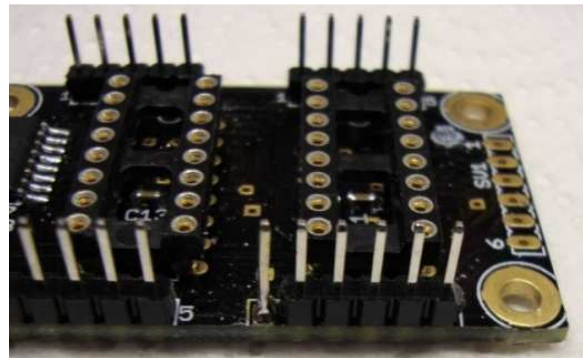
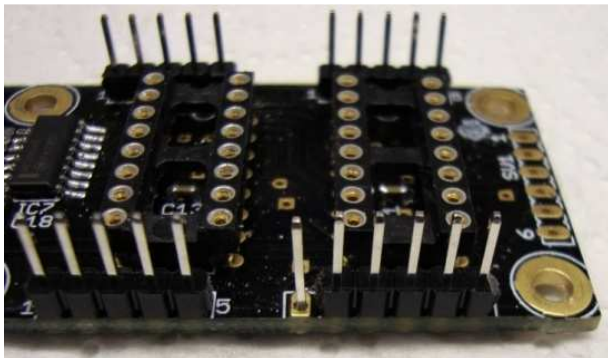
⚠ Watch the polarity! ⚠



SV2, SV3, SV4, SV5, SV6, SV7, SV8, SV9, SV10, SV11, SV12 5 pin header

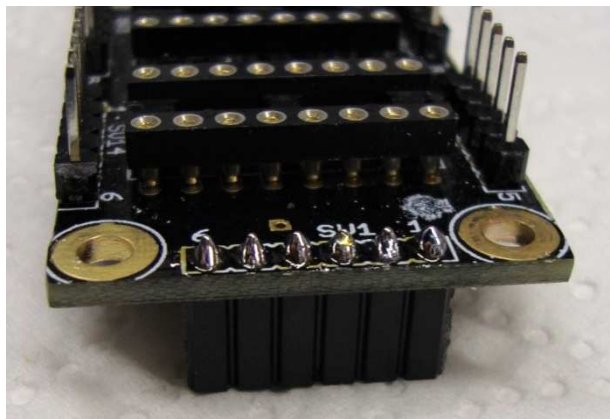


SV14 6 pin header

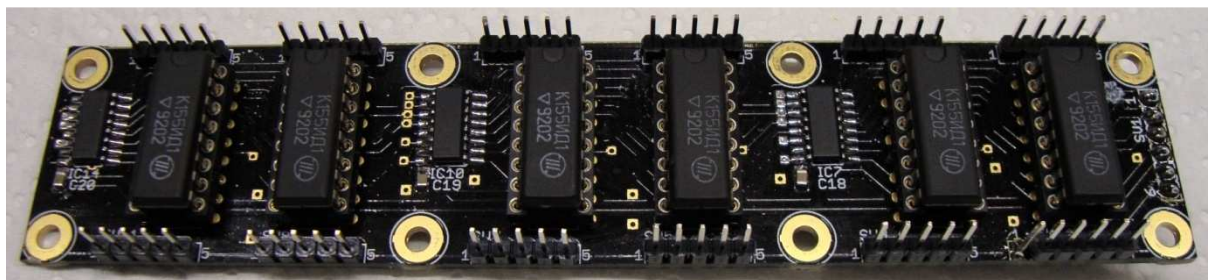


Solder the bottom of SV14, then remove the plastic from pin 1 of sv14, and solder it from the top.

IN-14 Nixie Clock - Build Description



6 pin female header



Insert IC1, IC2, IC4, IC5, IC7, IC8 74141

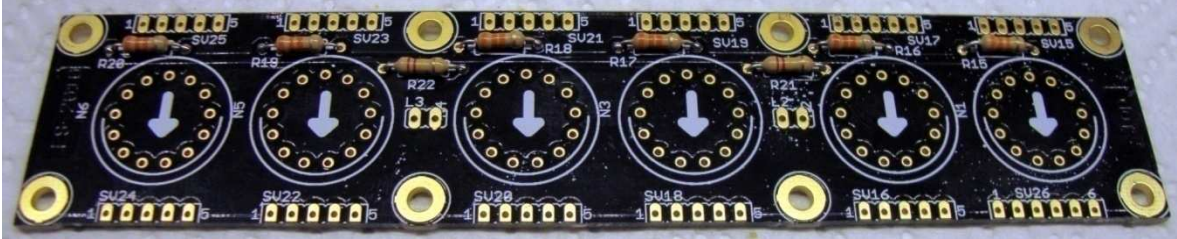
⚠ Watch the polarity! ⚠

Top PCB

Part list

Parts	Value	Extra info
R15, R16, R17, R18, R19, R20	33K	
R21, R22	220K	
N1, N2, N3, N4, N5, N6	IN-14	
L2, L3	NEON	
SV26	6 pin female header	
SV15, SV16, SV17, SV18, SV19, SV20, SV21, SV22, SV23, SV24, SV25	5 pin female header	

Trough hole parts

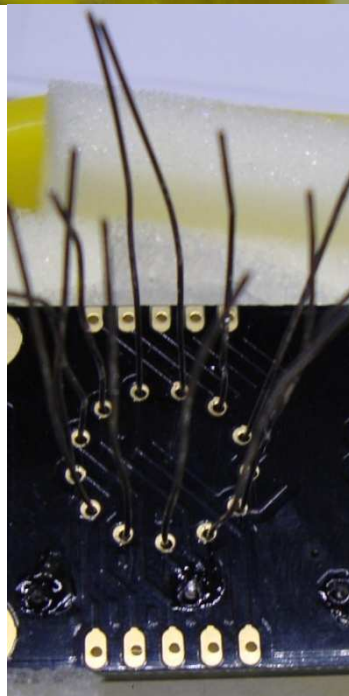
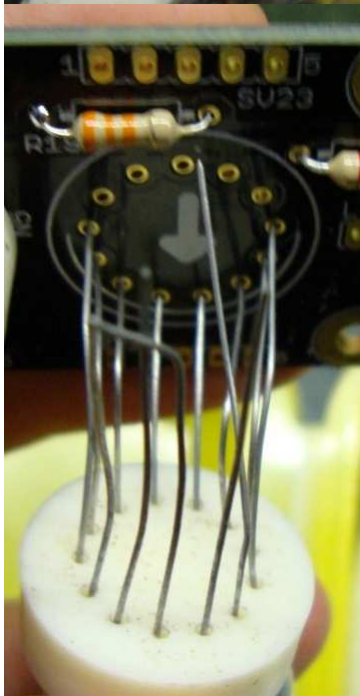
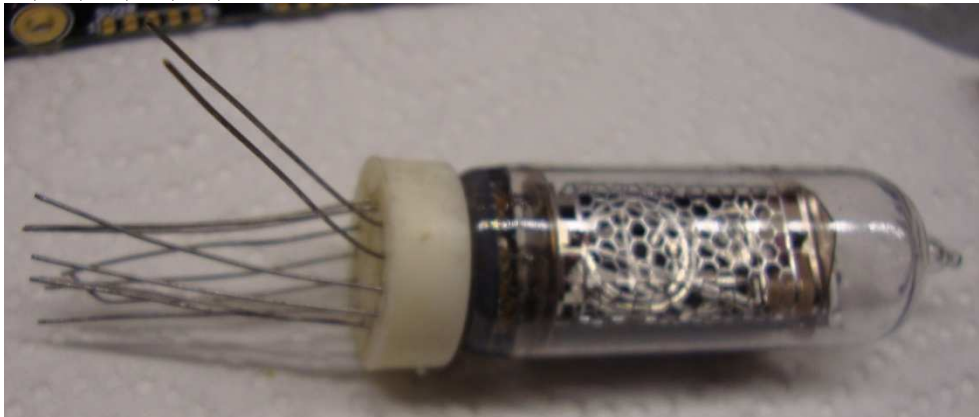


R15, R16, R17, R18, R19, R20 33K
R21, R22 220K

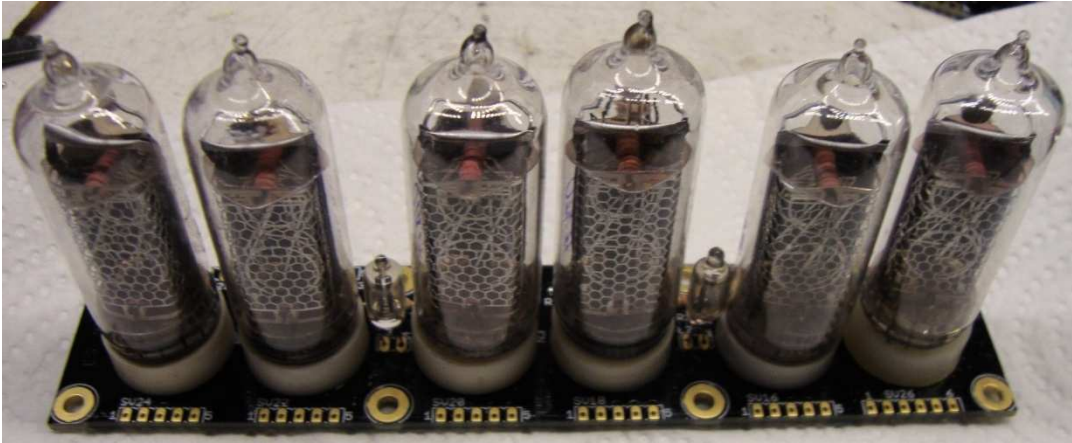
Now it is time to insert the nixie tubes. I find it the easiest if I bend the first wire 90° and insert it. Then bend the rest of the wires and insert them 1 at the time.

N1, N2, N3, N4, N5, N6

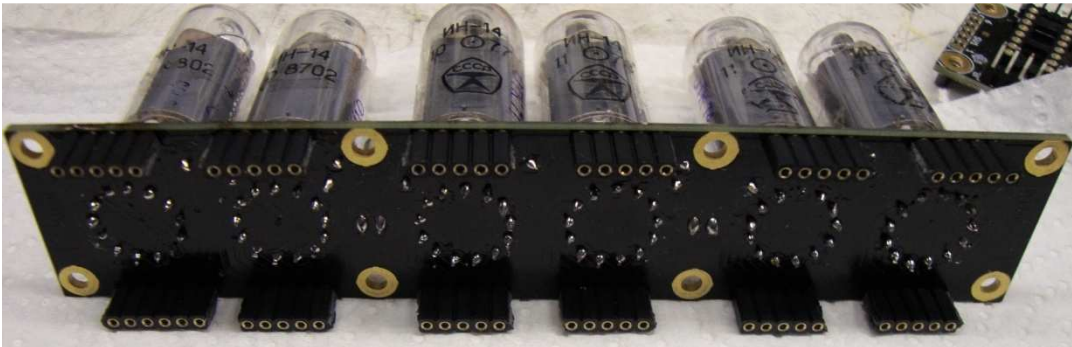
IN-14



IN-14 Nixie Clock - Build Description



L2, L3 NEON



SV26
SV15, SV16, SV17, SV18, SV19, SV20,
SV21, SV22, SV23, SV24, SV25

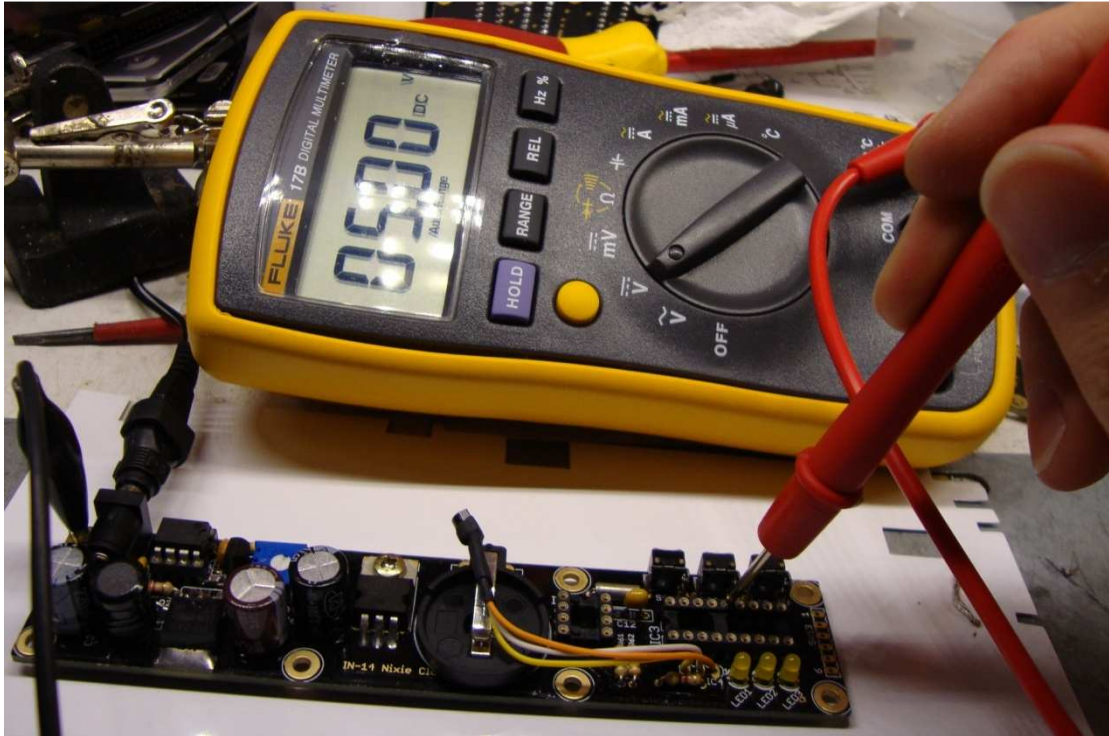
6 pin female header
5 pin female header

Testing

First we are going to test the power supplies from the bottom pcb. Make sure that the IC3 and IC12 are not in their sockets.

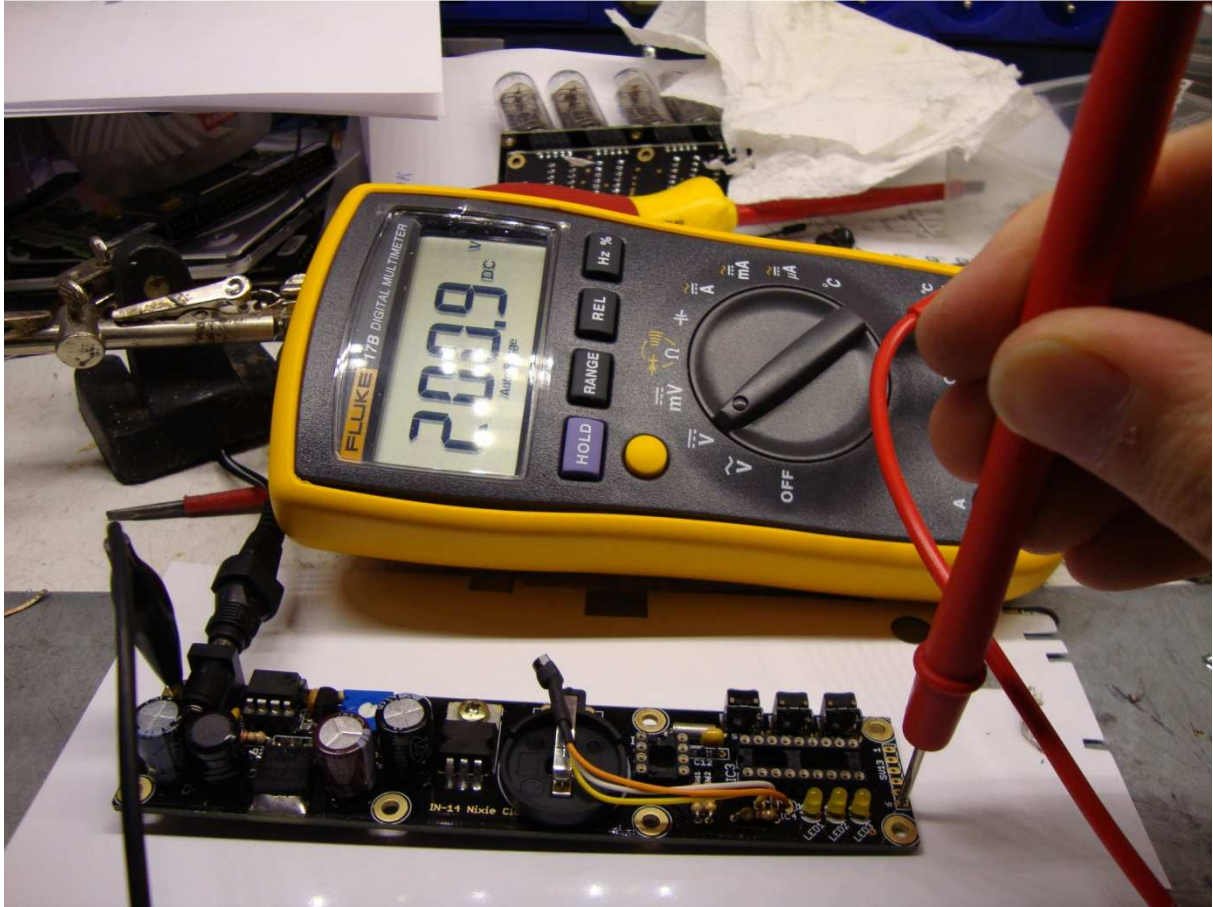
Connect the 12V power supply and measure if the 5V voltage regulator gives the right voltage. It is easy to measure on pin 14 of the ic socket from IC3. You can take a mounting hole as ground point.

The voltage should be between 4,75 and 5,25V



IN-14 Nixie Clock - Build Description

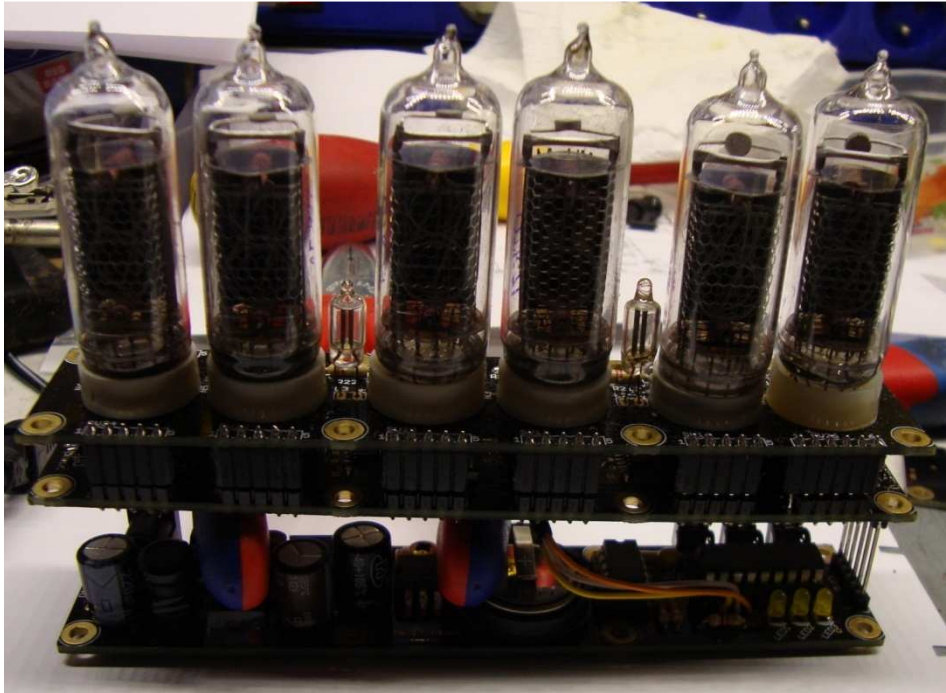
Now measure on pin 6 of sv13 and calibrate the voltage to about 200V with R7.



Now the ic's and the battery can be inserted

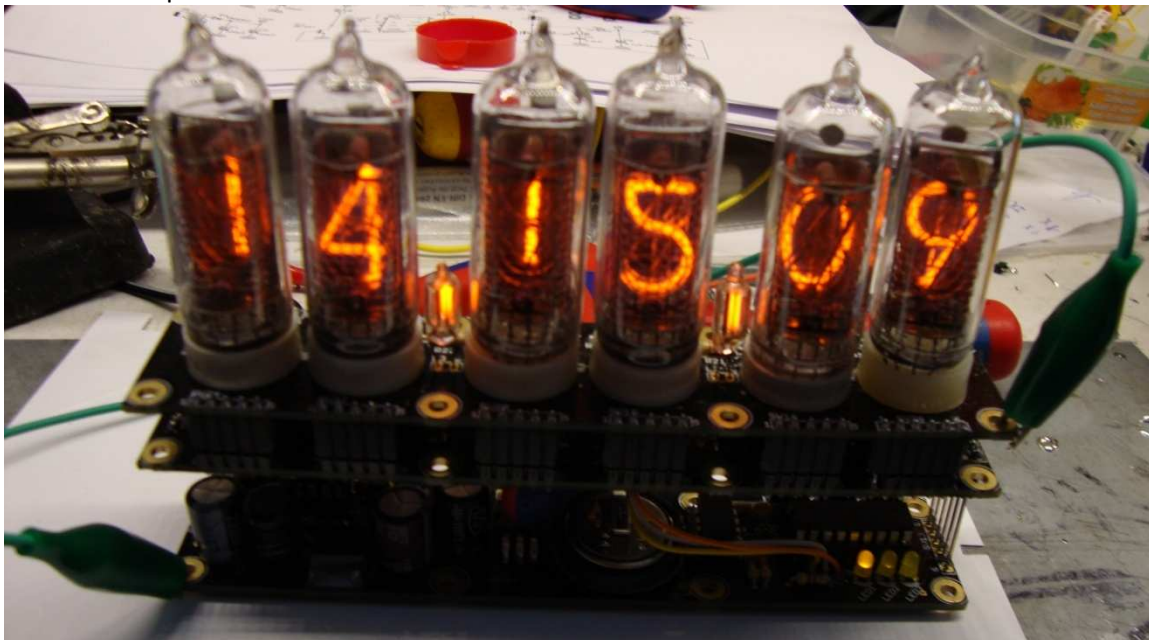
- IC3 16F628A (With software)
- IC12 DS1307
- G1 CR2032 Cell

Now it is time to test the clock. It is best to do this before you insert the screws. For this you need to put something isolating between the pcb's. (For example the handle's from a isolated pliers)



There is one problem with testing it this way: there is no ground connection between the top 2 pcb's. You can insert 1 screw to make this, or use a piece of wire with crocodile clips between the mounting holes

Now turn the power on.



(In this picture you can also see the crocodile clips wire)

At first the clock will not run. After pressing a button to correct the time it will start. (This is only at the first startup)

IN-14 Nixie Clock - Build Description

Now you can insert the screws or threaded rods.



Time/Date adjust

To adjust the time:

When the clock is in time mode you can change the hour with S1, the minutes with S2 and the seconds with S3.

To adjust the date:

When the clock is in date mode you can change the day with S1, the month with S2 and the year with S3.

After a few seconds the clock will go back to the normal display mode.

Troubleshooting

If you have any problems with the nixie clock please don't hesitate to contact me. I prefer that this is done by posting a question on the forum (<http://forum.elektronicastynus.be/>), but you may also email me at info@elektronicastynus.be