

IV-18 (NB-18) VFD Tube Clock

Energy Pillar

Kit Assembly Instructions

v1.2.0

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Component Details - Before starting, please familiarize yourself with the components.

Name	Description	Notes	Picture
Connector (Female)	P1	Non-polarized	
Connector (Male)	P2	Non-polarized	
Temperature sensor	TEMP	TO-92 footprint. When viewing the flat face, the left lead wire is Pin 1	
IR receiver	U3	When viewing the raised-round face, the left lead wire is Pin 1	
Buzzer	Buzzer	The longer lead wire is the anode	
Mercury Switch	LP	Non-polarized	
Photo Resistor (LDR)	R8	Non-polarized	
Circuit Boards	Sub-Board (left) & larger Main Board (right) Shown connected by manufacturing strips that are to be detached before assembly.		

Attention

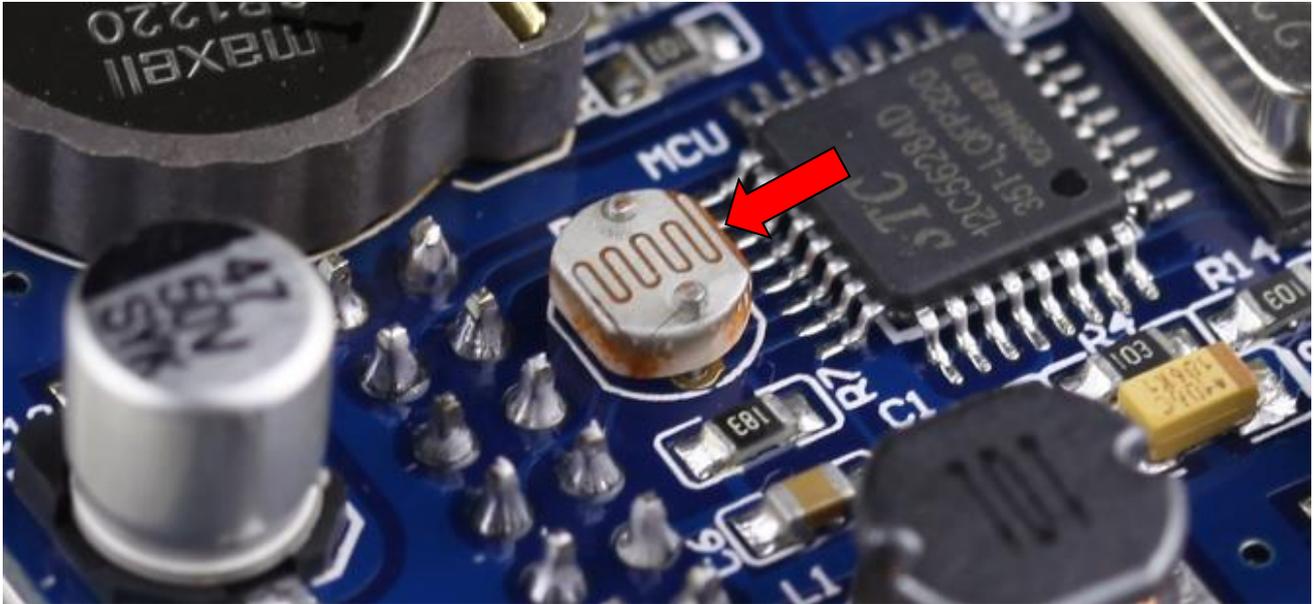
1. PCB is provided with all SMD parts properly mounted. Please do not disturb any SMD! Separate boards by using small pliers and snap off top and bottom strips along scored line.
2. Before soldering, observe the correct polarity of all components;
3. On final power-up test, please immediately remove power if assembled unit doesn't operate. Check for mistakes in soldering or solder bridges between circuit pads.

Step 1. Solder the Photoresistor (LDR)

The photoresistor (LDR) is non-polarized and may be installed in either rotation on the top of the main board.

Note: Avoid possible damage. Do not over-heat the photoresistor.

The result should now look like this:

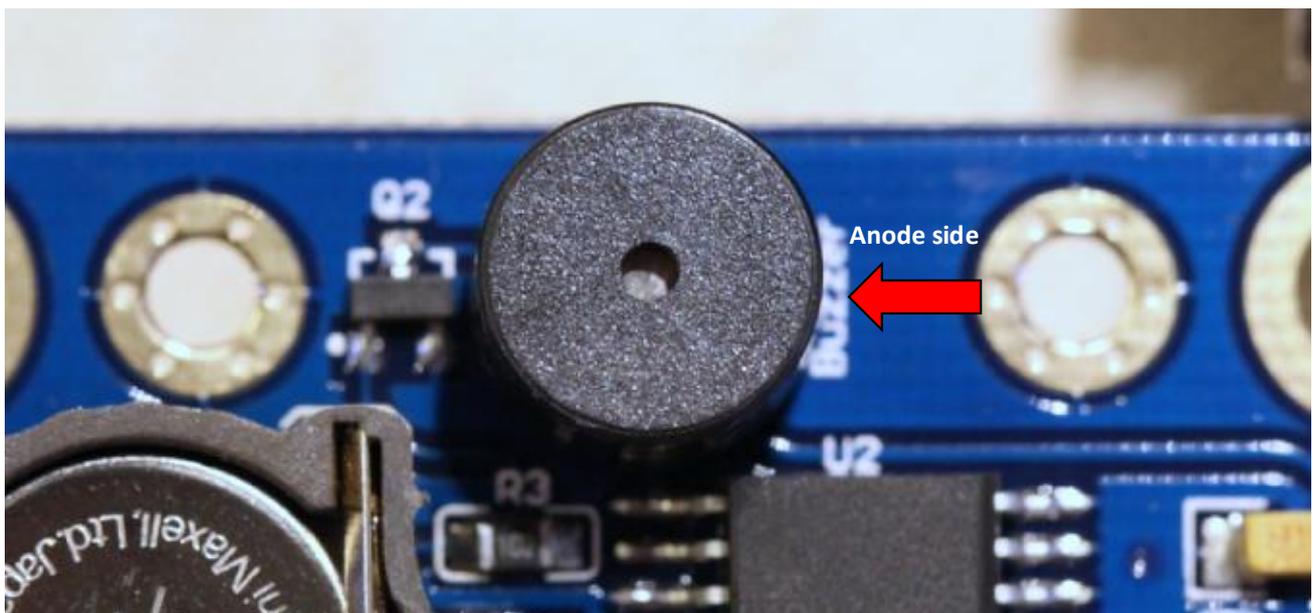


Step 2. Solder the Buzzer

Solder the buzzer on the top of the main board. Please observe correct orientation.

Note: the longer lead is the anode and is soldered to the pad without the printed pattern.

The result should now look like this:

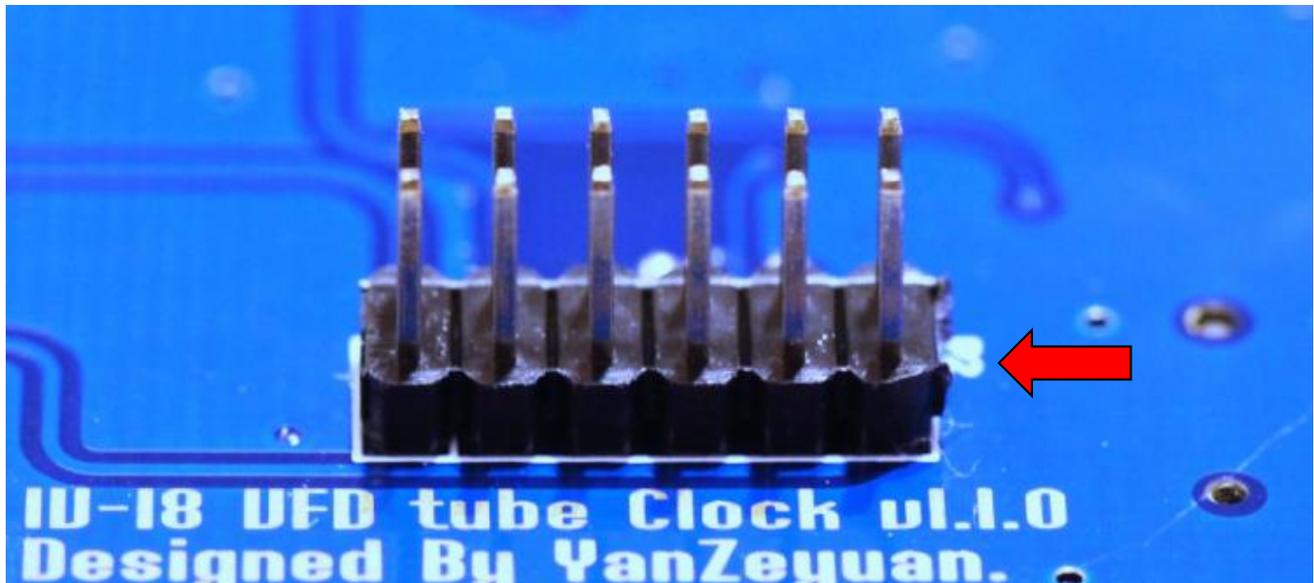


Step 3. Solder the Connector (male)

Solder the connector on the back side of the main board;

Note: please press the socket flush to the PCB and then solder.

The result should now look like this:

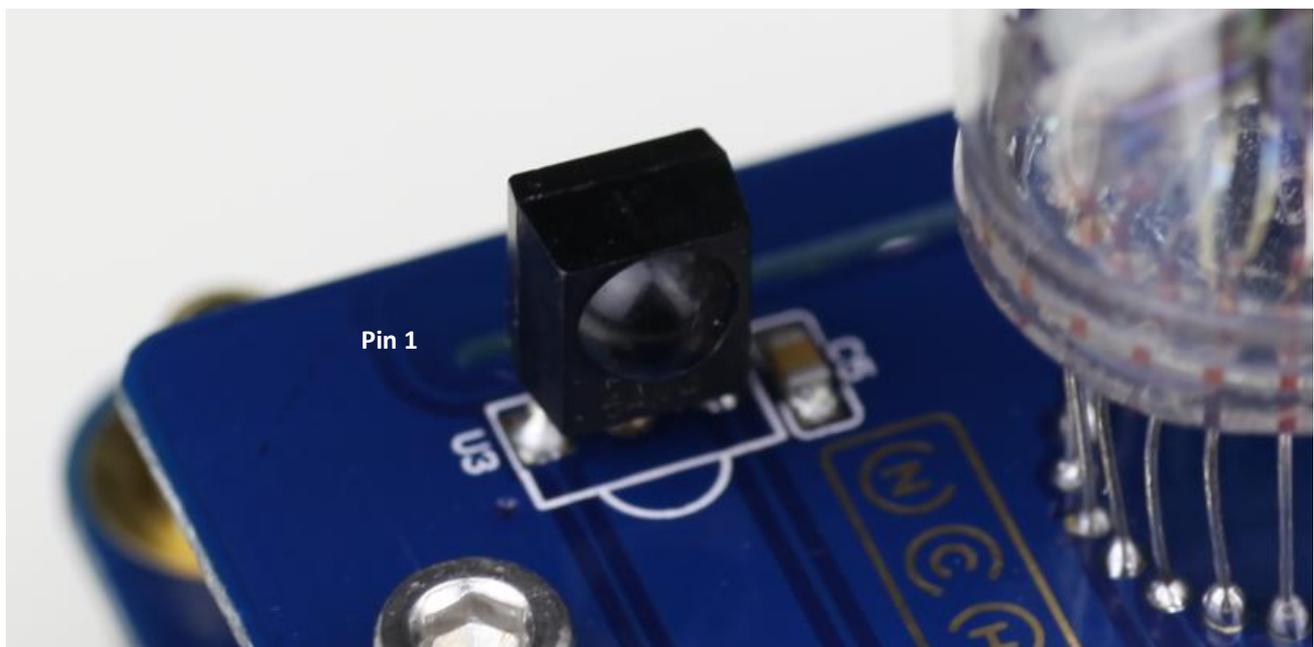


Step 4. Solder the IR Receiver

Solder the IR receiver on the top of the sub-board, Pin 1 is next to the U3 marking.

Note: Avoid possible damage. Do not over-heat the IR Receiver.

The result should now look like this:

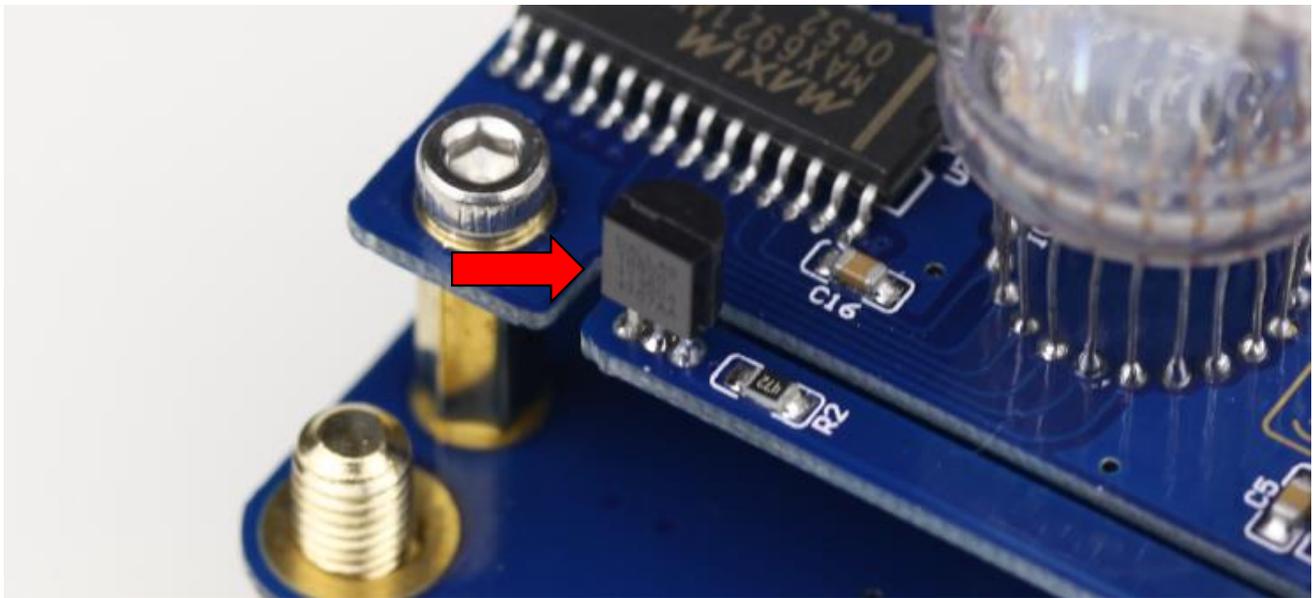


Step 5. Solder the Temperature Sensor

Solder the temperature sensor on the sub-board.

Note: please keep 2-3mm between sensor and the PCB. Check to make sure that pads are not shorted by excess solder.

The result should now look like this:

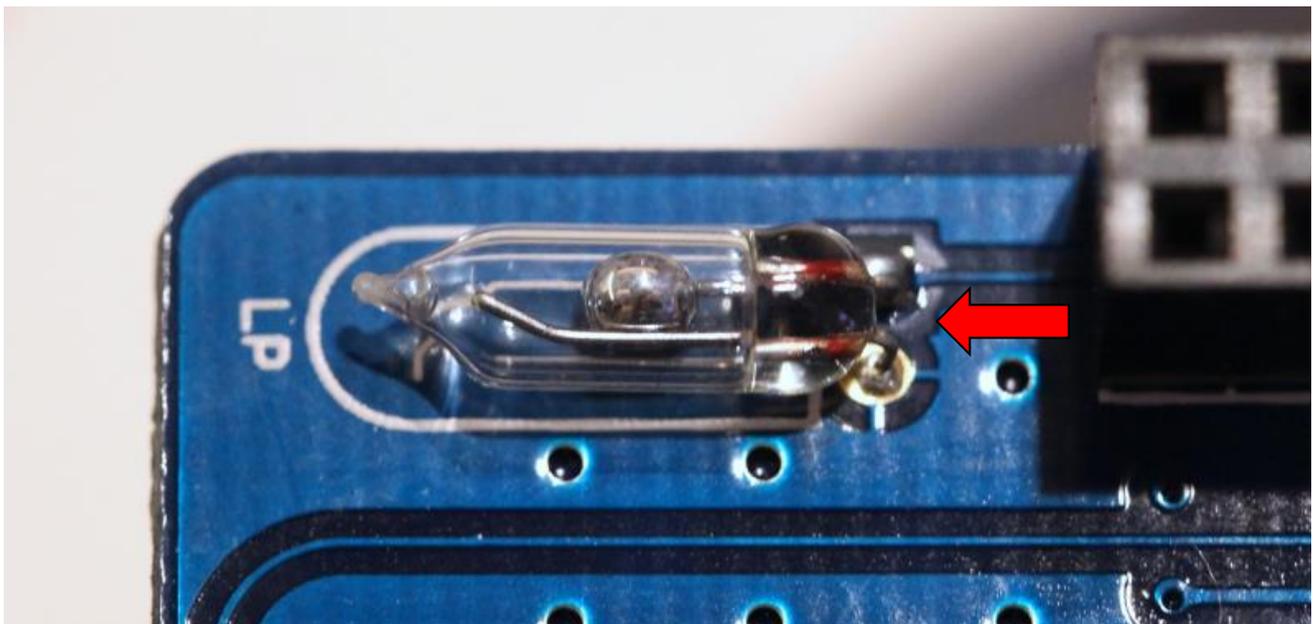


Step 6. Solder the Mercury Switch

Bend the wires of the mercury switch at 90° (see picture below) and solder it on the sub board. The Mercury Switch is non-polar and may be mounted in either orientation;

Note: Avoid possible damage. Do not over-heat the Mercury Switch.

The result should now look like this:

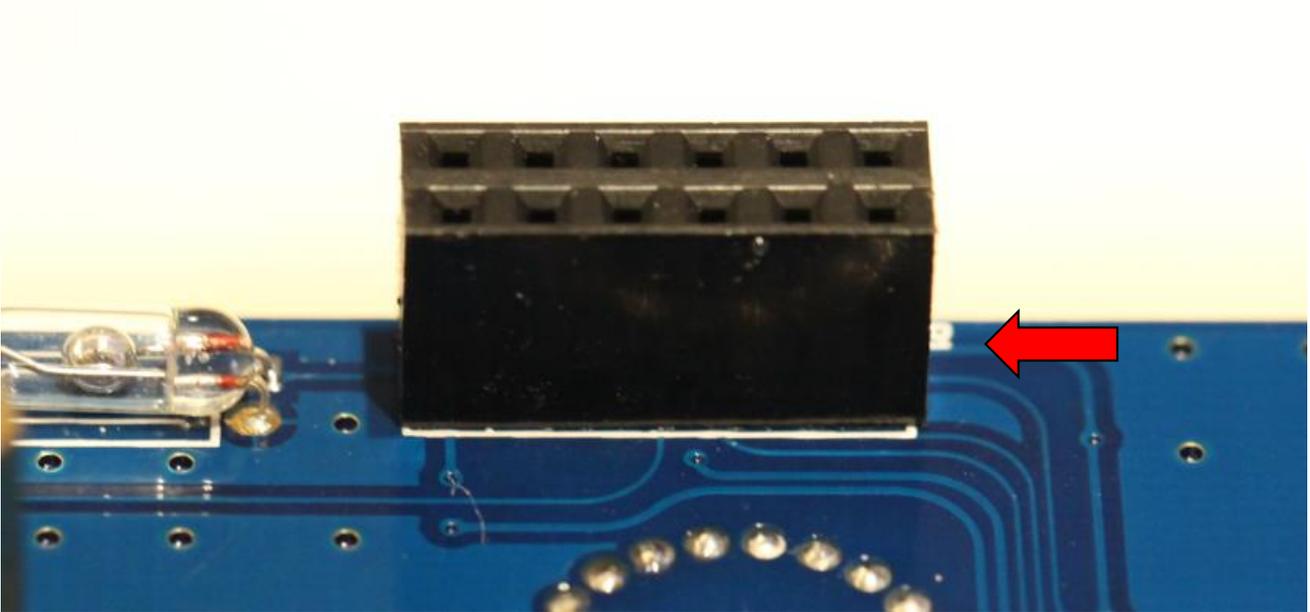


Step 7. Solder the Connector (female)

Solder the connector on the sub board;

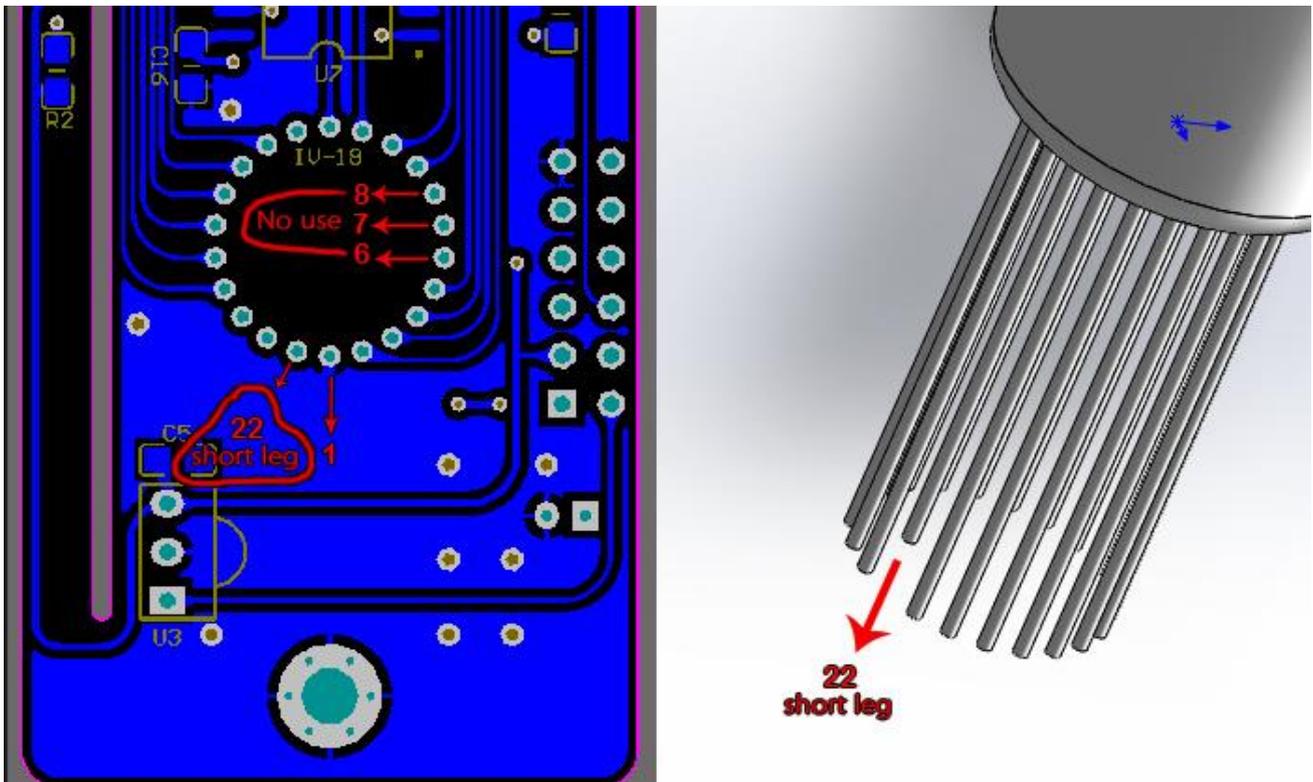
Note: please press the socket flush to the PCB and then solder.

The result should now look like this:

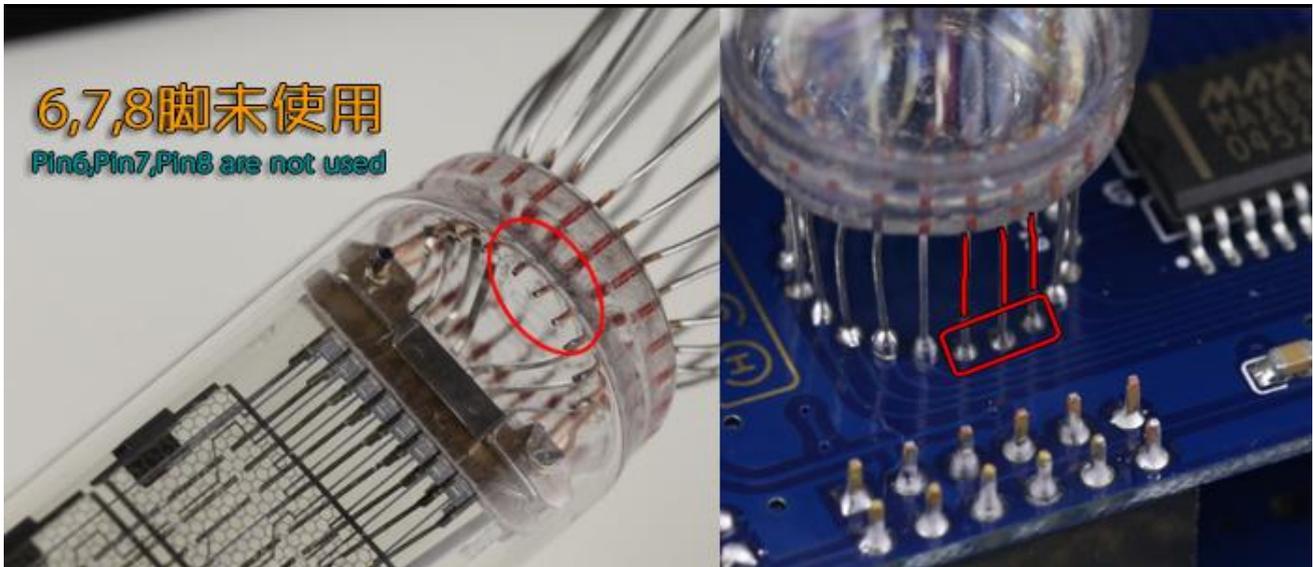


Step 8. Solder IV-18 VFD Tube

Locate the short pin (Pin 22 of tube) and insert the short pin into the hole as shown in the picture below. Observe the picture for proper orientation of the pins:



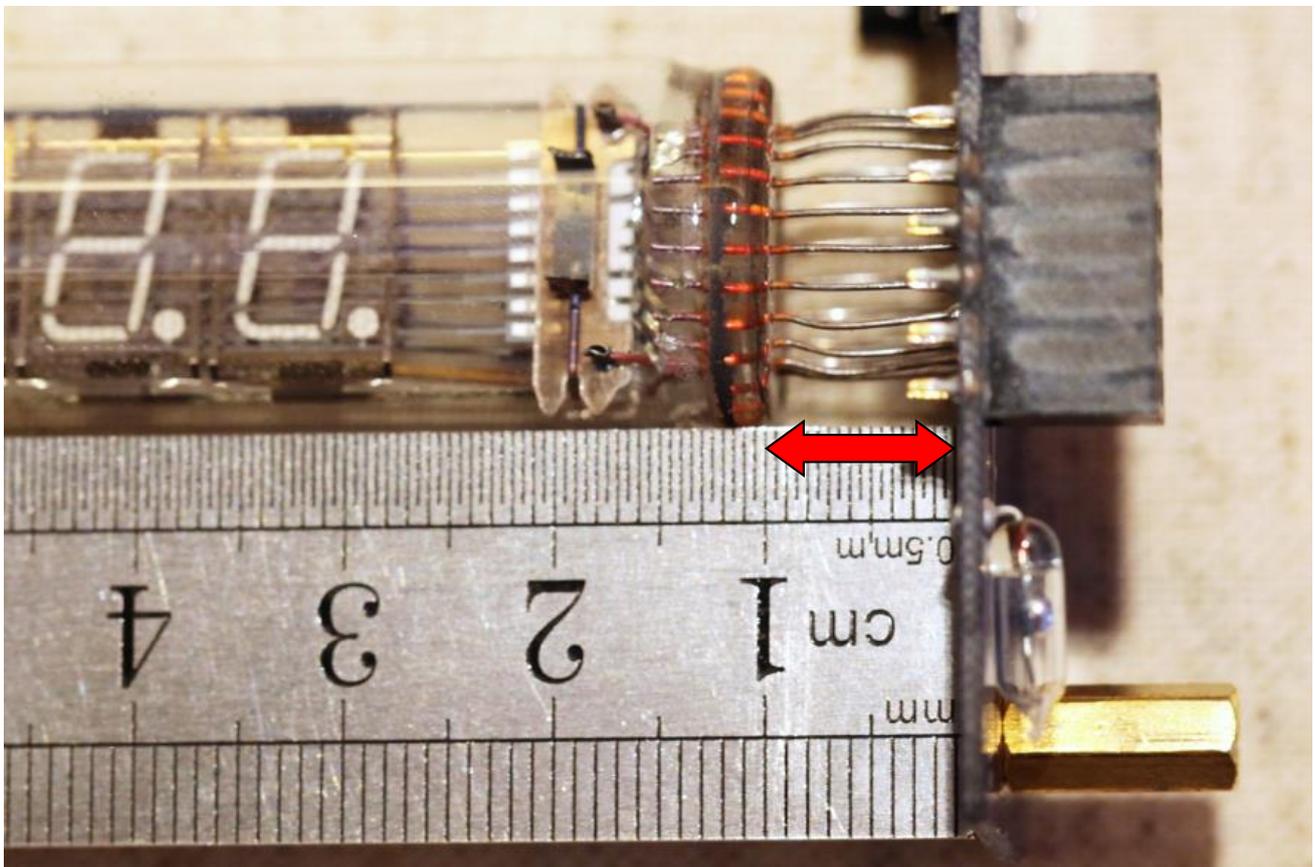
Confirm the orientation and placement of the pins and holes by locating the three pins of tube which are not used internally. You can see this by examining the tube where the pins enter the glass. Put these three pins into the holes of PCB by observing the picture below. (the photo on the left shows the detail of the pins that are not internally connected)



Then insert the other pins into holes individually, one at a time.

Note: the digits should face toward the black connector. Before soldering the tube, make sure keep 10mm space between the glass bottom of the tube and PCB board.

The result should now look like this:



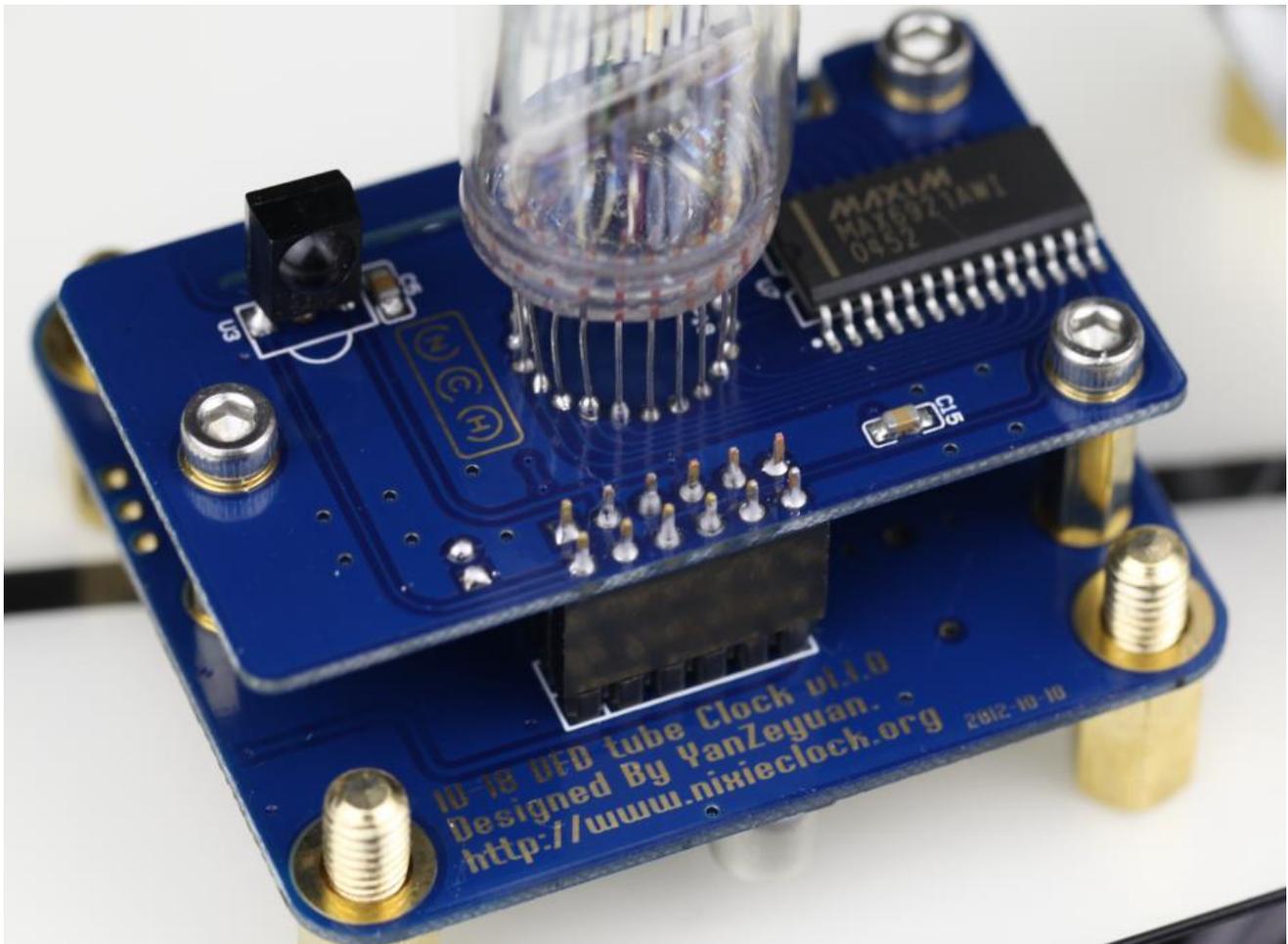
Secure the tube by soldering three pins of tube separated by ~120 degree angle (forms a triangle). Then make a final adjustment to the tube to be straight and perpendicular to the PCB board. This step is important as it is difficult to reposition the display tube after soldering. Once you are satisfied with the alignment, solder all remaining unsoldered pins of the tube.

Note: Avoid possible damage. Do not over-heat the pins leading to the tube. Check to make sure that adjacent pads are not shorted by excess solder.

If you discover the tube is not completely perpendicular to the PCB board after soldering, please hold the top of tube with your fingers and adjust it very gently. Do not squeeze the tube too hard to avoid breaking the glass and possible injury.

Step 9. Power-On Test

Once all parts are assembled, connect the mainboard and sub-board. The result should look like the picture below:



Connect the Mini USB cable and provide power.

After power is applied, the clock should make a short beep and display "HELLO." This will be followed by a display of the time.

If there is no beep sound, please disconnect the power immediately. Check if the power is

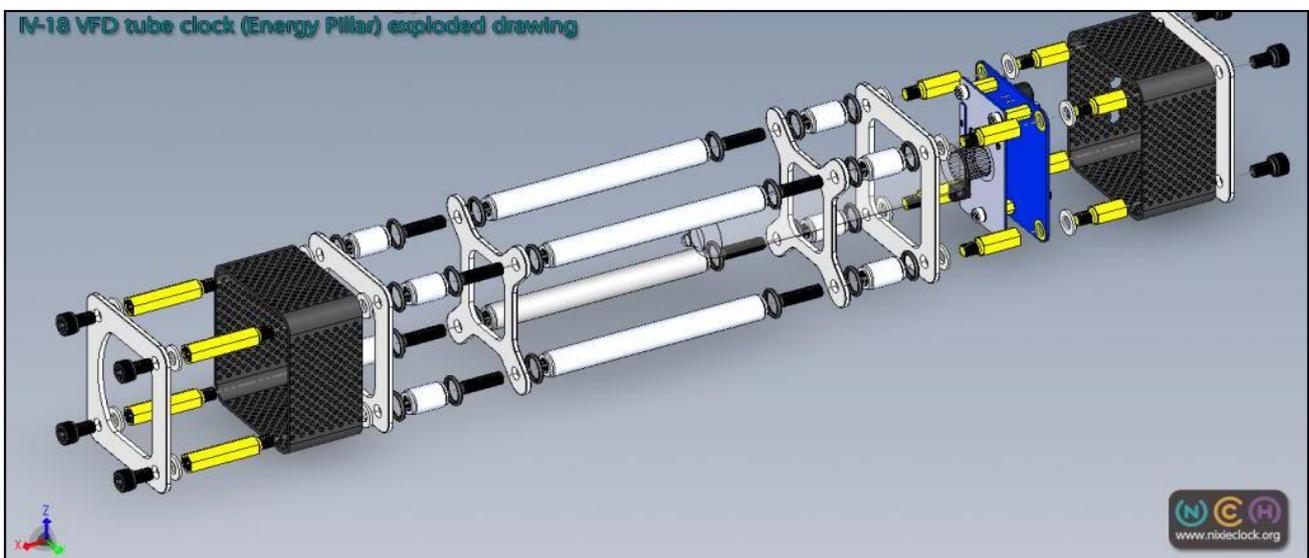
connected and the power adaptor and working properly.

If there is a beep sound but the tube does not display anything, please disconnect the power immediately. Check the orientation of the tube and the solder connections to the PCB. They must be correct to allow the clock to function.

This completes the electrical assembly of your IV-18 Energy Pillar VFD Tube Clock. You may now proceed to the mechanical assembly of the case. Please visit the web site for detailed step-by-step photos.

Step 10. Assembling the Aluminum Alloy Shell.

[Nixieclock.org](http://www.nixieclock.org) has detailed exploded views of all parts in the mechanical assembly for the clock. For many photos and details, please visit: <http://www.nixieclock.org/?p=449>



Please visit our website and check some pictures or video for shell assembly.

- Any questions please contact me, it's my pleasure to answer your question.

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