



Badnixie.com  
Assembly Notes-Version *Z1.01*  
for  
Lumina Upgrade PCB's  
Carl Ott-Designer  
for  
GenV Ziggurat Nixie Clock Bases

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Operators Manual Available @  
[Users Manual](#)

## Mod-Six Z1.01 PCB Assembly Notes:

**WARNING:** This clock utilizes hazardous **High Voltages** to energize the Nixie tubes. This voltage is generated from an offline switching power supply, but proper caution should always be exercised when physically interacting with the clock's circuitry. A proper enclosure should also be used at all times to shield and protect users from the high voltage present.

Here are supplemental notes on assembling the MOD-SIX clock PCBs. It's assumed you are comfortable with assembling electronic circuitry and SMD components. Please seek assistance if you are unsure of your capabilities or lack proper tools.

Primarily you'll be working from the schematics and parts placement drawings included at the end of this document. These notes are just additional hints and techniques to hopefully make the whole construction process easier.

### Some Terminology:

PSU - Power Supply Unit.  
TDU - Tube Driver Unit.  
CPU - Central Processing Unit.  
SMD – Surface Mount Device.  
TH – Through Hole.  
HVPS – High Voltage Power Supply.

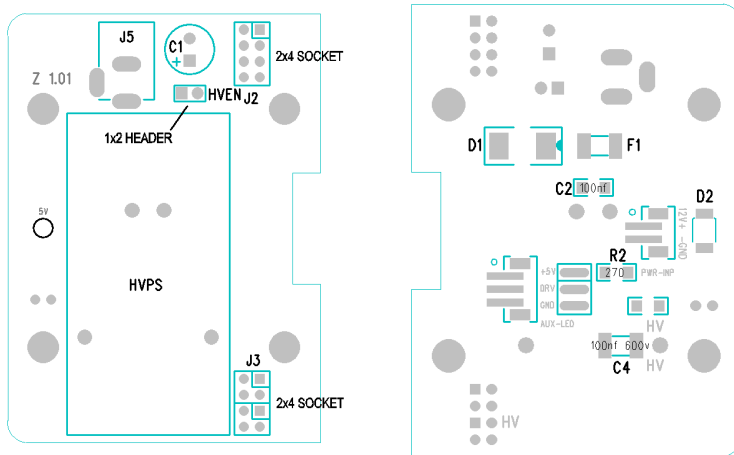
### General Notes:

- You can take advantage of the modular nature of the design to assist in assembly and testing.
- It's easiest to assemble and test the PSU and then the CPU before proceeding onto the TDU.
- After assembling the PSU and verifying voltages, you can then plug it directly into the CPU and test for proper voltages on the CPU board. **Disable** the HV output for these tests.
- You can then assemble a single TDU board and test it in circuit before continuing onto the rest of the clock construction.
- If you've ordered the partially assembled kit, the SMD parts will already be soldered onto the PCBs,

### Detailed notes for each assembly:

- It's easiest to solder the SMD components onto the PCBs before the TH parts.
- There will usually be some extra SMD parts included in the kit bags as spares.

## PSU:



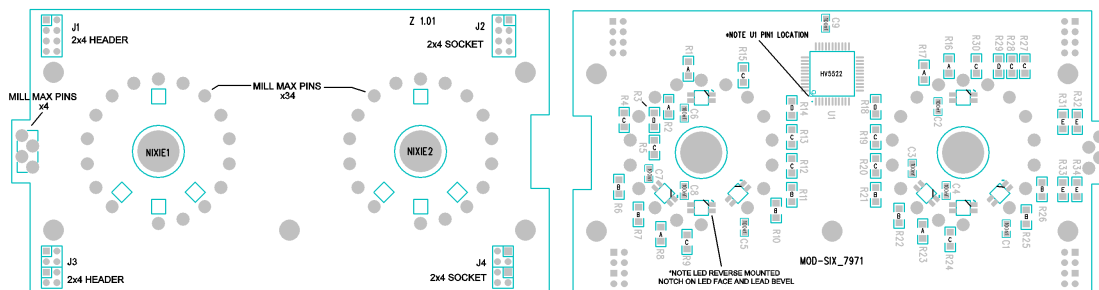
## SMD Component installation notes:

- LED
  - The bottom mounted LED is RED/Green bi-color and intended to shine through the epoxy PCB material. The color that will be visible from the top of the PCB is determined by the orientation of the LED when soldered. If the notch on the LED SMD package is towards the front of the clock the color will be green. If the led notch is towards the clock rear, the color will be red.
  - The PCCC-4 LED package has four leads, but the PCB footprint has two pads. Solder both leads on each led side to the pad so that all four leads are soldered.

## TH Component installation notes:

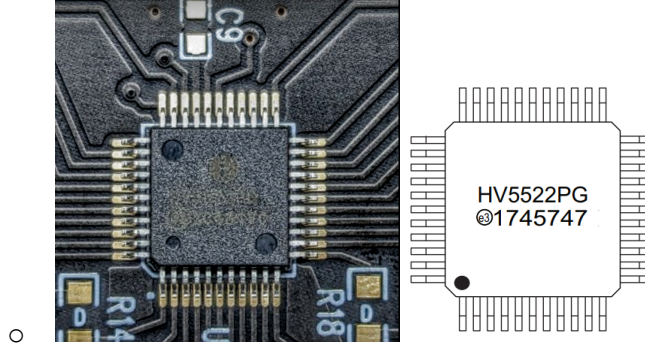
- It's easiest to solder the headers first, and the HVPS module last.
- J2, J3.
  - Ensure these right-angle sockets are mounted straight and flush to the PCB. It may help to first solder two opposing pins to confirm alignment before soldering the rest of the pins.

## TDU:

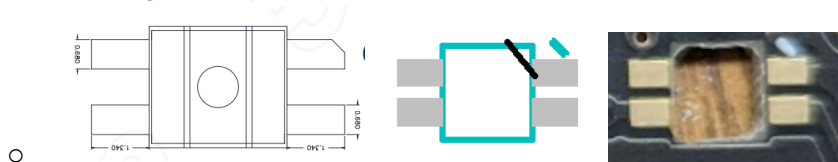


## SMD Component installation notes:

- U1
  - It's important to orient Pin 1 of the IC properly. There are multiple indents on the package. Align U1 pin 1 with the corner DOT marking on the PCB.



- RGB LEDs
  - The RGB LEDs are mounted on the bottom of the PCB.
  - Orient the LED package so the emitter shines up through the PCB.
  - Align the notch on the LED package (and the beveled pin) with the diagonal line marking on the pcb. All the LEDs will orient in the same direction.

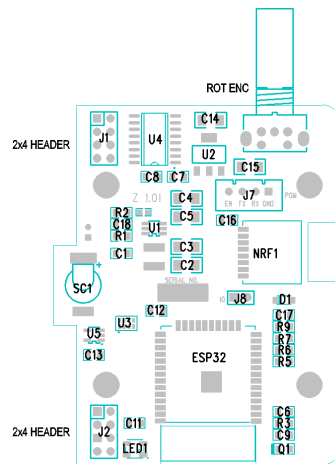


## TH Component installation notes:

- J1, J3.
  - Be sure these right-angle headers are mounted straight and flush to the PCB.
  - It may help to first solder two opposing pins to confirm alignment before soldering the rest of the pins.
- J2, J4
  - Be sure these right-angle sockets are mounted straight and flush to the PCB.
- Tube and Tower Socket Pins
  - Ensure pins are soldered flush and straight to PCB.



## CPU:

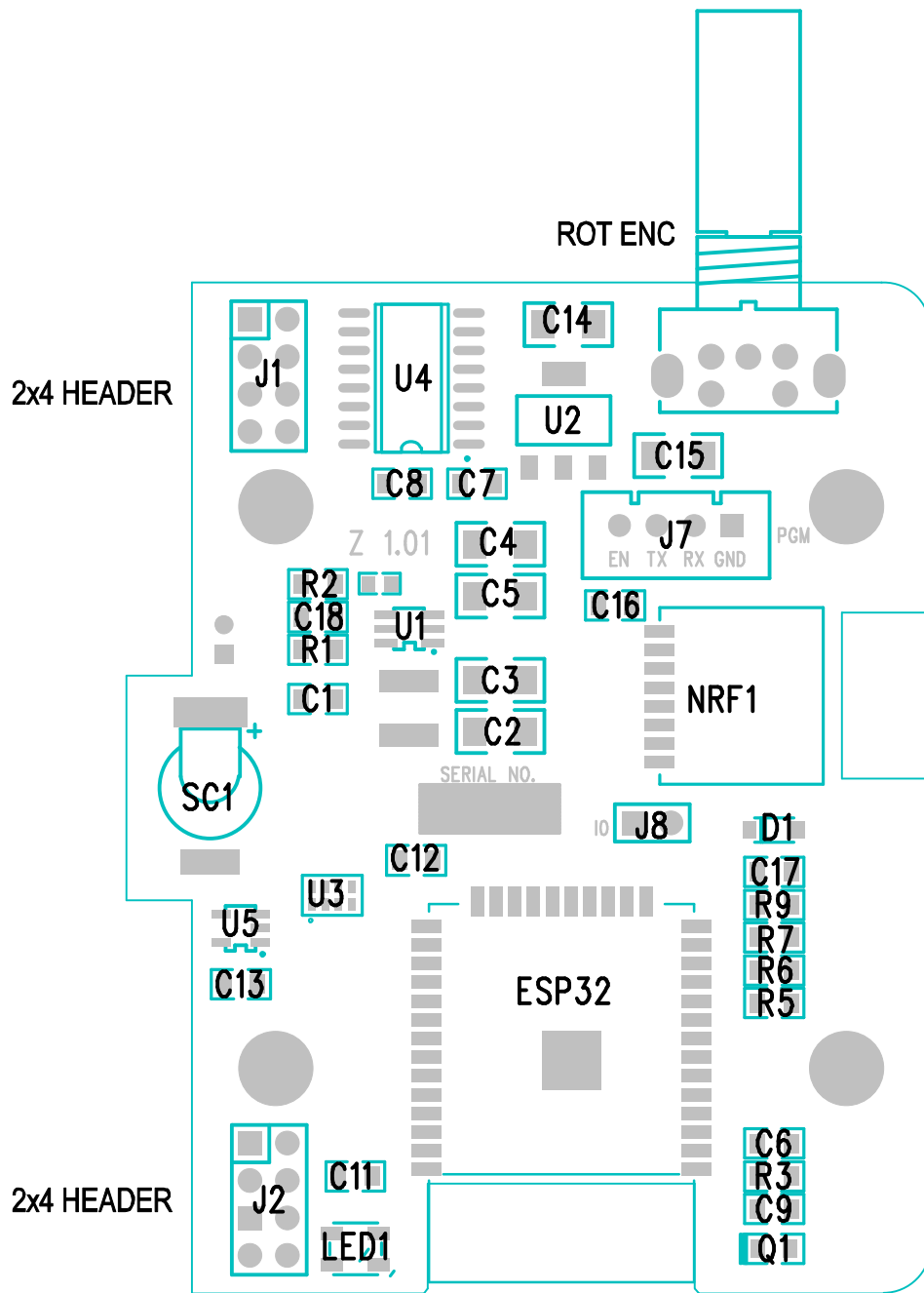


### SMD Component installation notes:

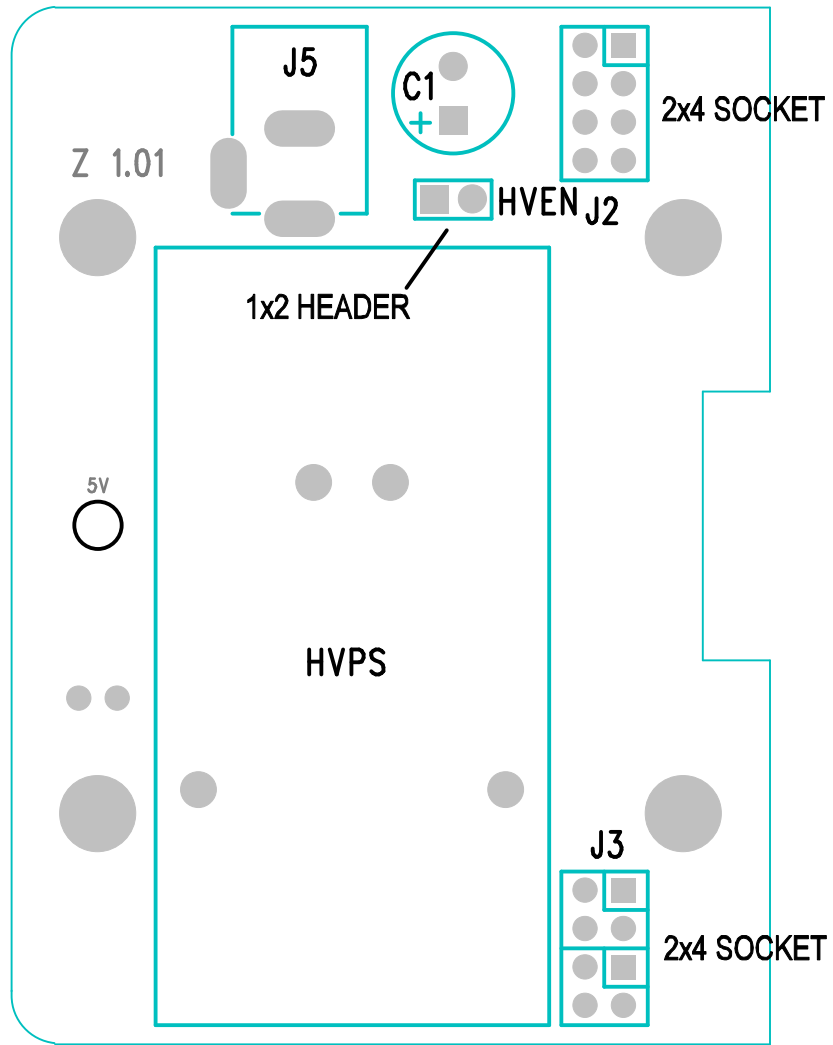
- All SMD parts will be pre-soldered onto CPU PCB.

### TH Component installation notes:

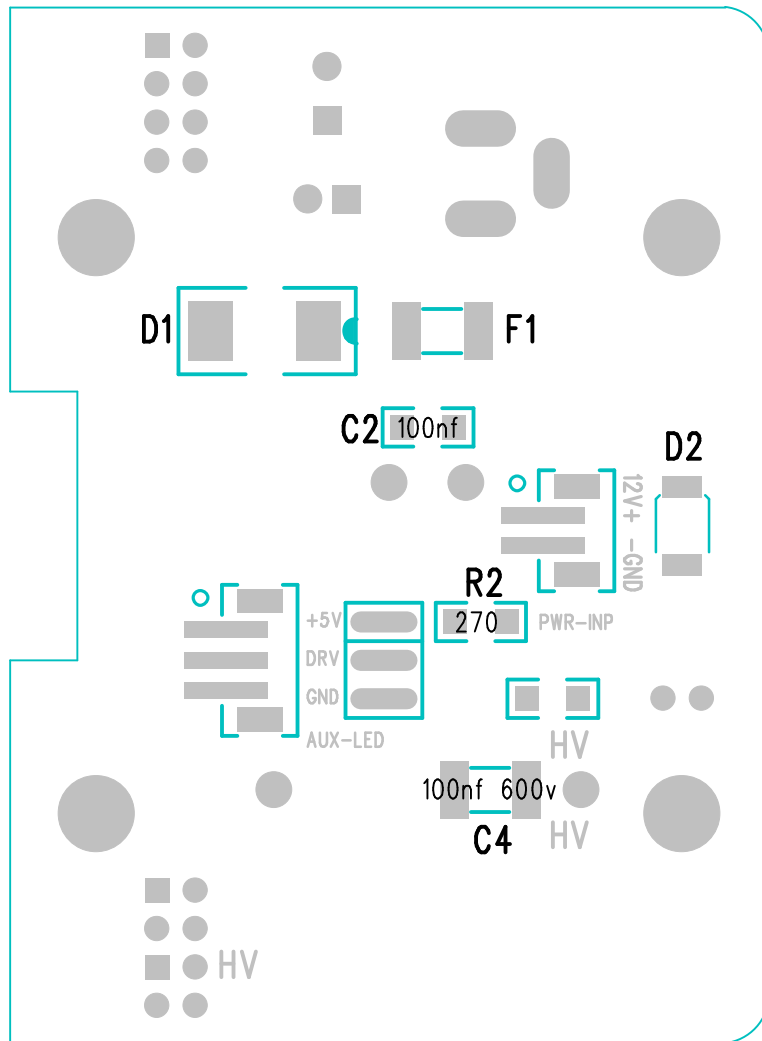
- J1, J2
  - Be sure these right-angle headers are mounted straight and flush to the PCB.
  - It may help to first solder two opposing pins to confirm alignment before soldering the rest of the pins.
- J7
  - Just note orientation.
- Rotary Encoder
  - The inner five signal pins on the rotary encoder are flat and very easily bent. Be certain the pins are first fully aligned into the holes on the PCB before pressing the encoder entirely into the PCB.
  - Flatten the two mounting tabs first.
  - Ensure the encoder is flush and inserted fully into the PCB (and no pins are bent) before final soldering.



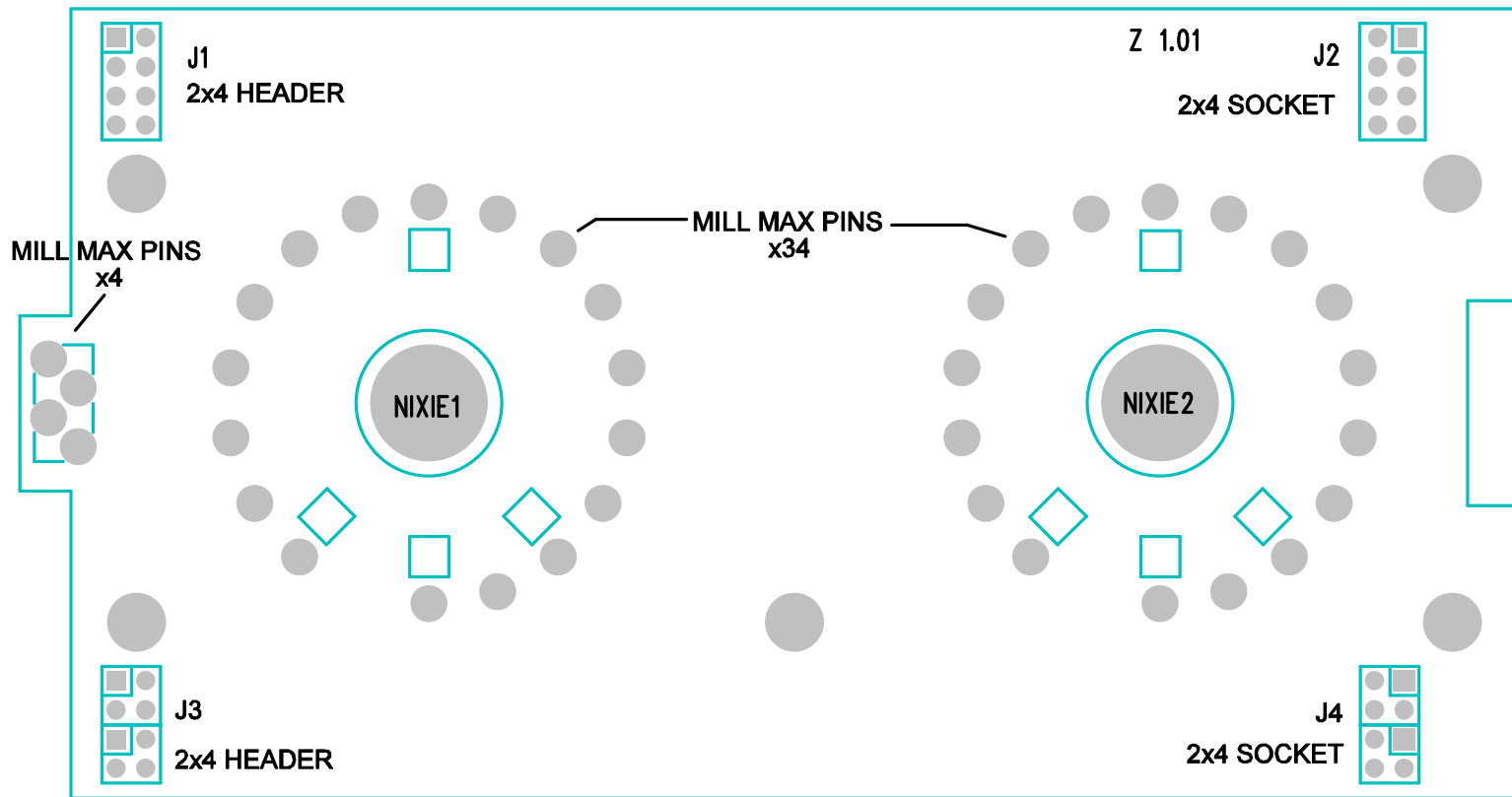
CPU PARTS PLACEMENT TOP



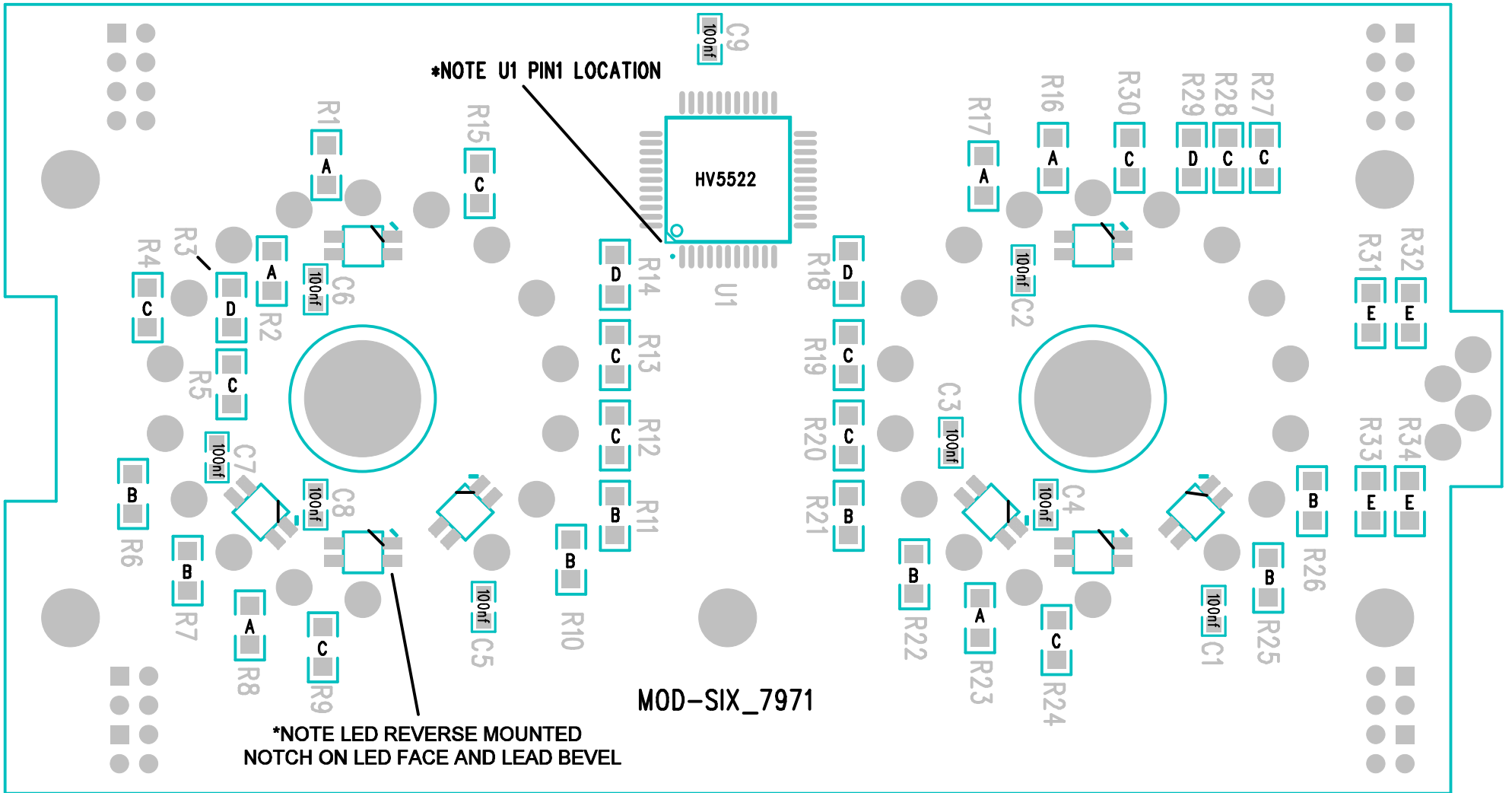
PSU PARTS PLACEMENT TOP



PSU PARTS PLACEMENT BOTTOM

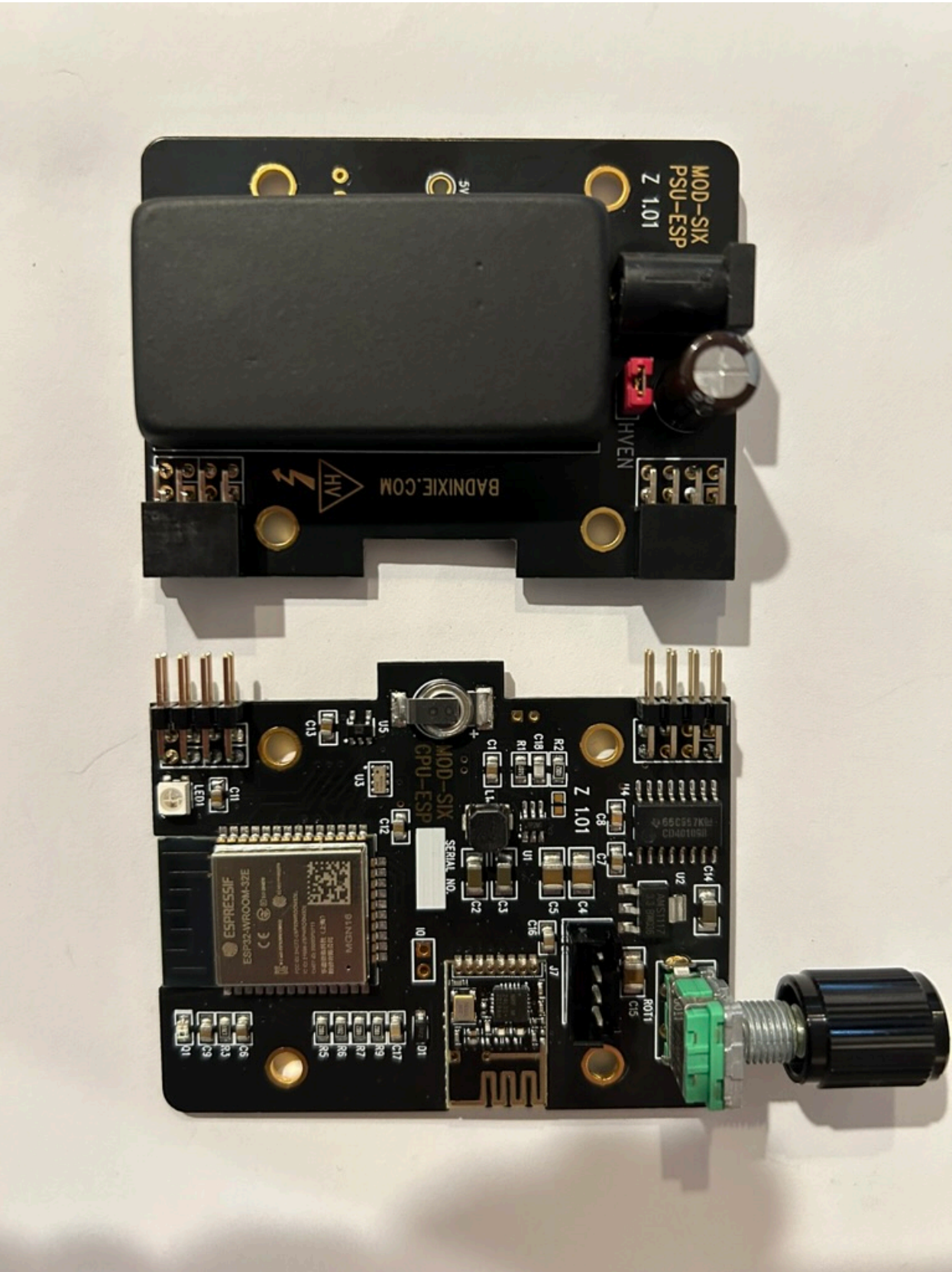


TDU PARTS PLACEMENT TOP

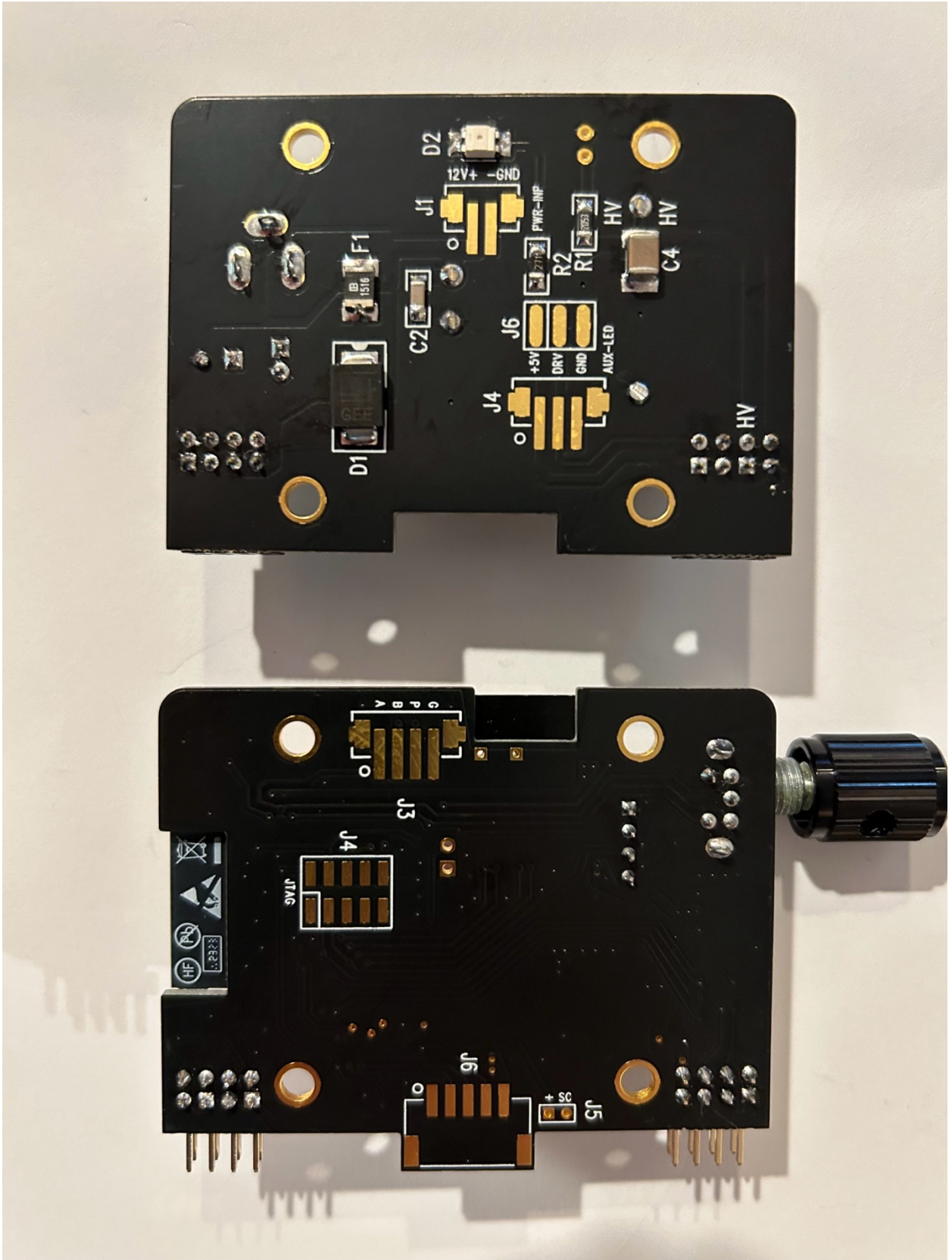


A=22k B=24k C=27k D=33k E=68K

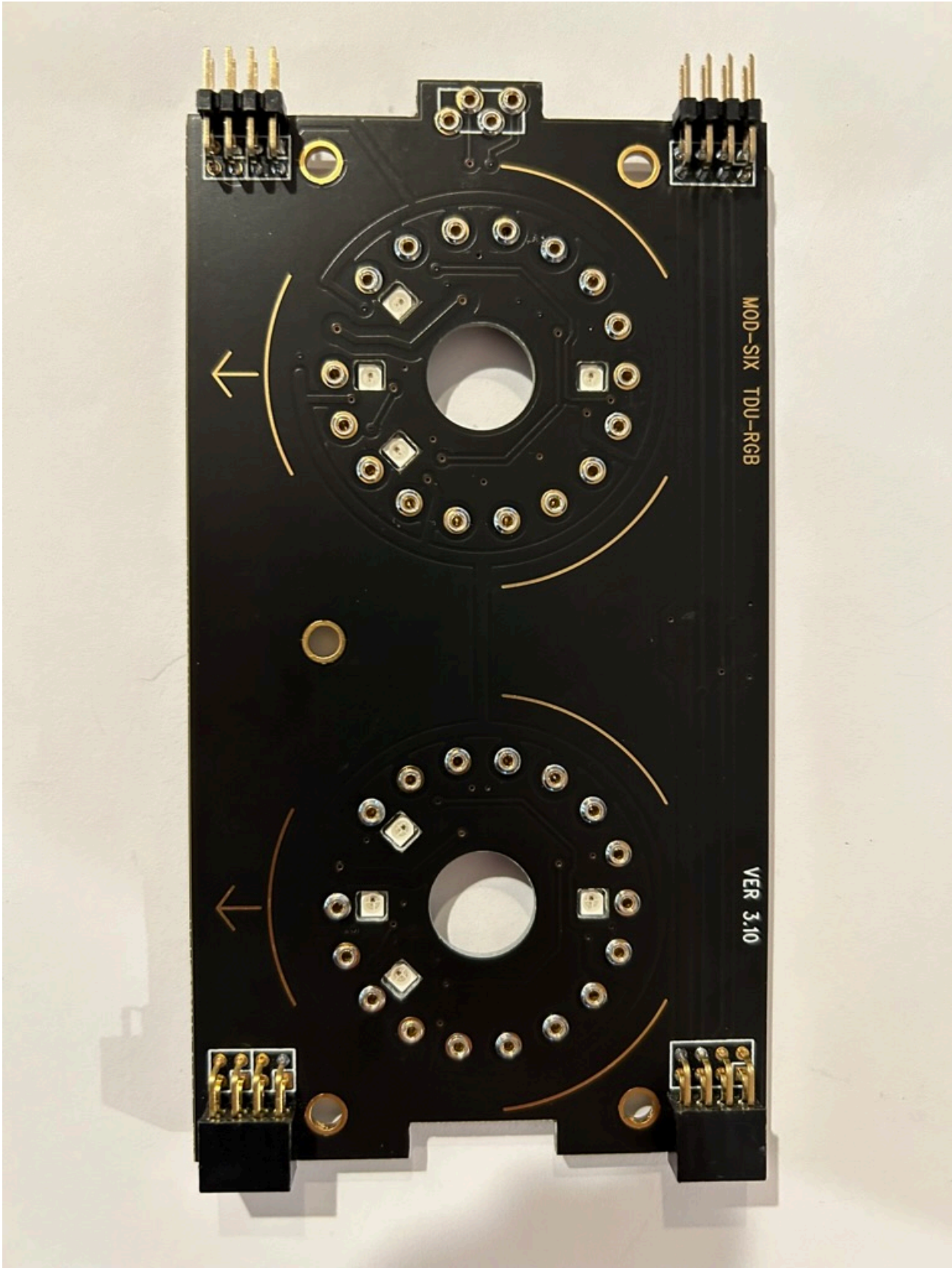
TDU PARTS PLACEMENT BOTTOM





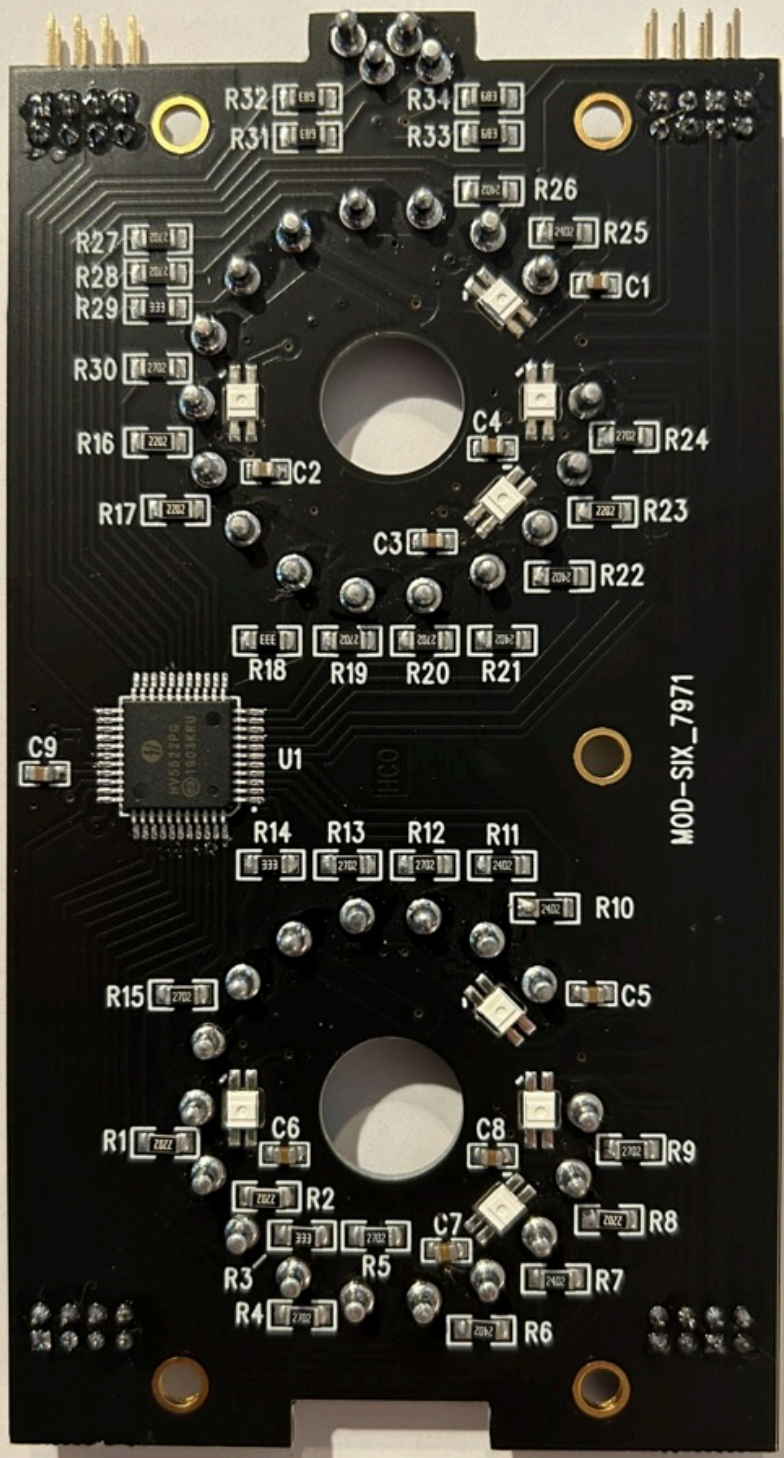






MOD-SIX TDU-RGB

VER 3.10



MOD-SIX\_7971

R32  
R31

R34  
R33

R27  
R28  
R29

R26  
R25  
C1

R30  
R16  
R17

C4  
R24  
R23  
R22

R18  
R19  
R20  
R21

C9

U1

R14  
R13  
R12  
R11

R10

R15

C5

R1

C6  
C8  
R9

R2  
R8

R3  
R5  
R7

R4  
R6

6

5

4

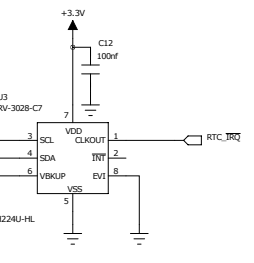
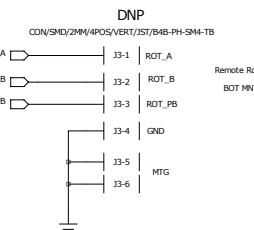
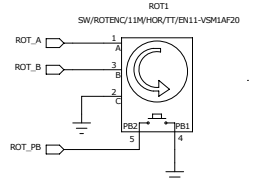
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2

1

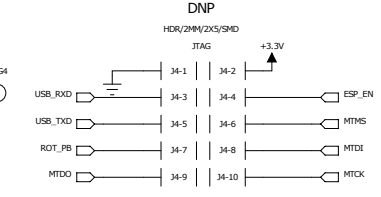
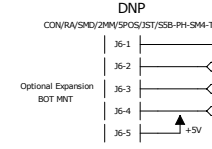
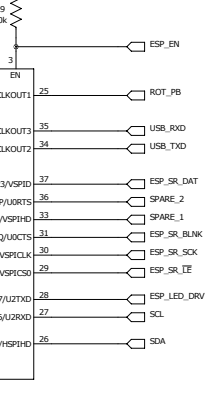
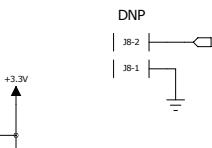
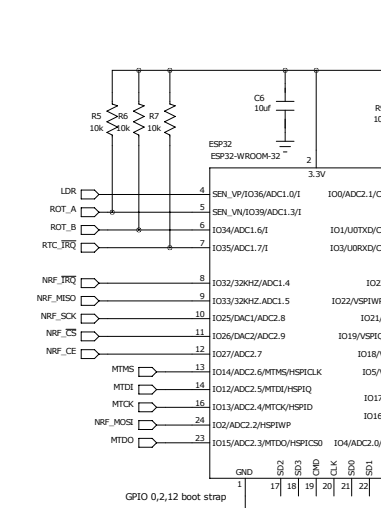
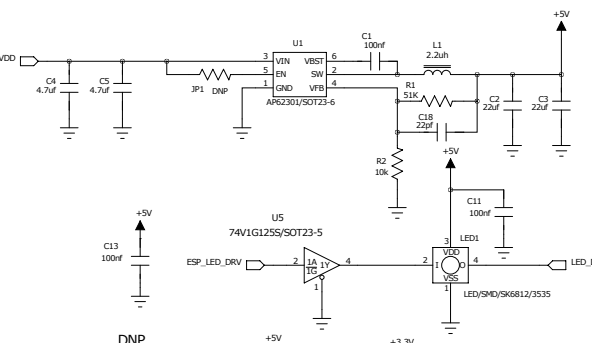
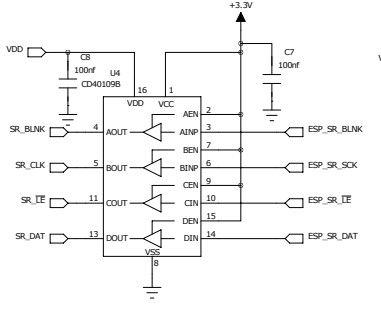
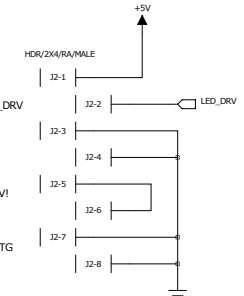
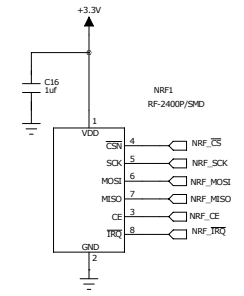
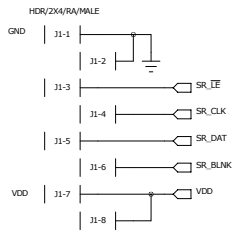
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ASSEMBLY NOTES:



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TITLE: MOD-SIX CPU ESP-Z			
CODE:	SIZE: C	DRAWING NO:	REV: Z1.01
SCALE: N.A.	SHEET: 1 OF 1		

DRAWN: H.C.O.	DATED: MAR-2024
CHECKED:	DATED:
QUALITY CONTROL:	DATED:
RELEASED:	DATED:



D

C

B

A

D

C

B

A

6

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4

3

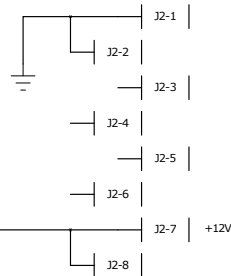
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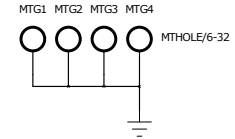
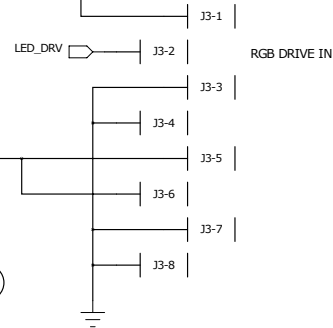
REVISION RECORD			
LTR	ECO NO:	APPROVED:	DATE:

DNP = DO NOT PLACE

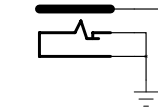
HDR/2X4/RA/FEMALE



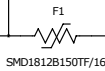
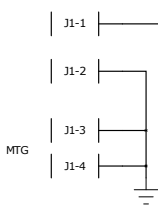
HDR/2X4/RA/FEMALE



J5 CON/RA/PWR/COAX/PWR



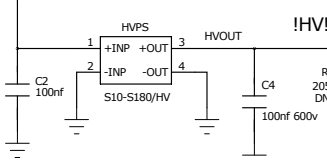
DNP B2B-PH-SM4-TB



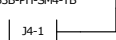
+12V



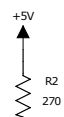
HVEN STRAP



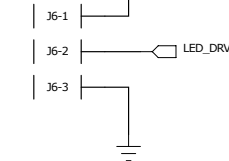
DNP B3B-PH-SM4-TB



AUX LED DRIVE



DNP HDR/100/1X3/SMD



COMPANY: BAD NIXIE

TITLE: MOD-SIX ESP-Z PSU

DRAWN: H.C.O.	DATED: MAR-2024
CHECKED:	DATED:
QUALITY CONTROL:	DATED:
RELEASED:	DATED:

CODE:	SIZE: A	DRAWING NO:	REV: Z1.01
SCALE:		SHEET: 1 OF 1	

D

C

B

A

D

C

B

A

6

5

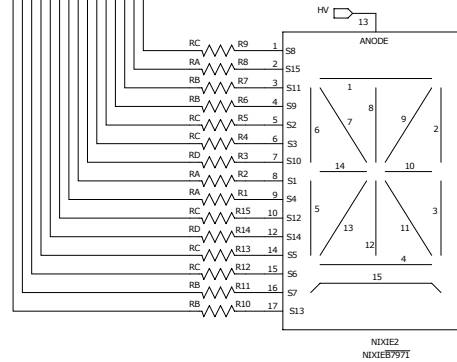
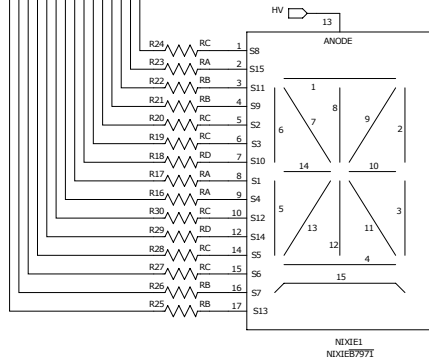
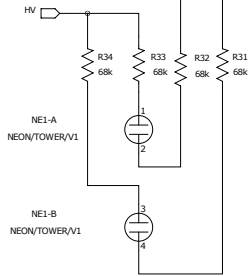
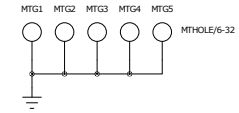
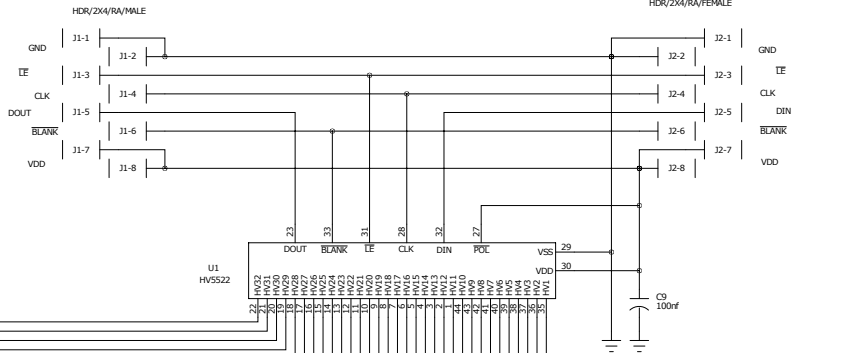
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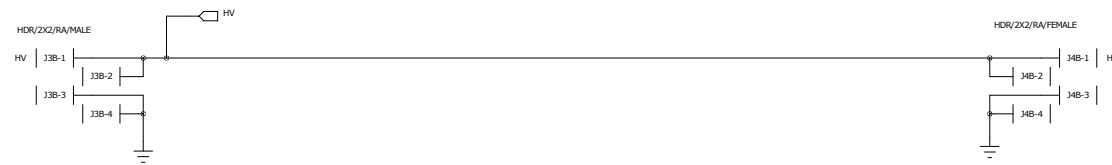
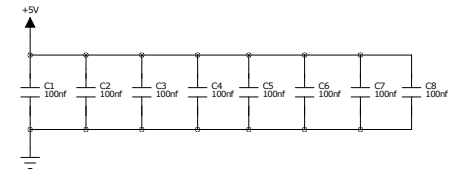
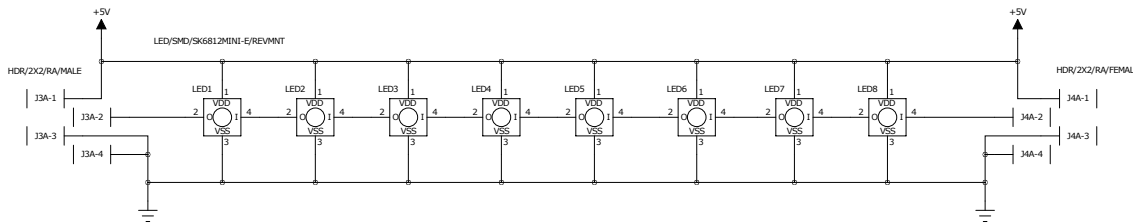
1

REVISION RECORD			
LTR	ECO NO.	APPROVED:	DATE:



Different Nixie segment lengths require different current limiting resistors.

- RA = 22k
- RB = 24k
- RC = 27k
- RD = 33k
- TOWER NEONS
- RE = 68k



COMPANY:		<b>BAD NIXIE</b>			
TITLE:		<b>MOD-SIX TDU RGB ESP-Z</b>			
DRAWN:	DATED:	CODE:	SIZE:	DRAWING NO:	REV:
H.C.O.	MAR-2024		C		Z1.01
CHECKED:	DATED:				
QUALITY CONTROL:	DATED:				
RELEASED:	DATED:				
SCALE:				SHEET: 1 of 1	



## Colon Tower Assembly Notes:

Colons Towers should be assembled as the first step in building your 3 TDU's

Tower Kit Bag Contents:

(5) Ne-2 Bulbs

(2) Tall Main PCB Towers

(1) Short AM/PM PCB Tower

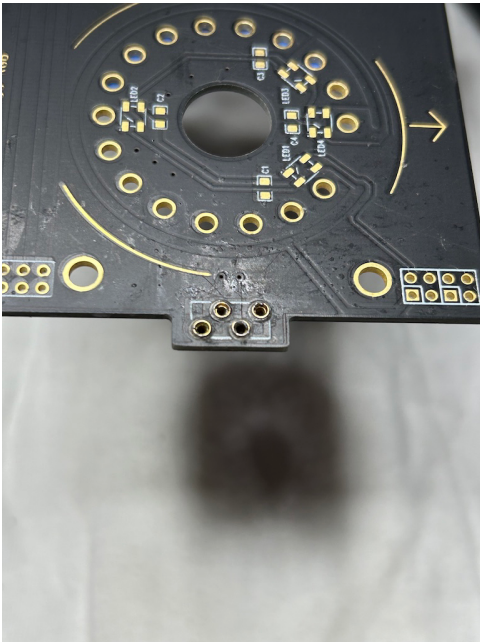
(1) 5.25" length of .038" brass rod



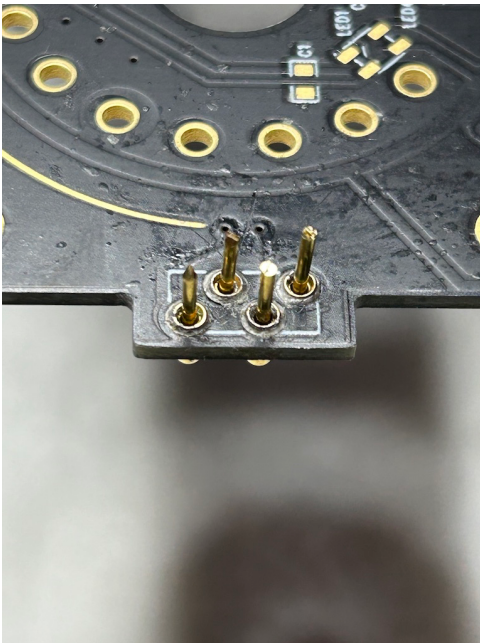
Step 1. Cut 12 each .375" lengths of brass rod:



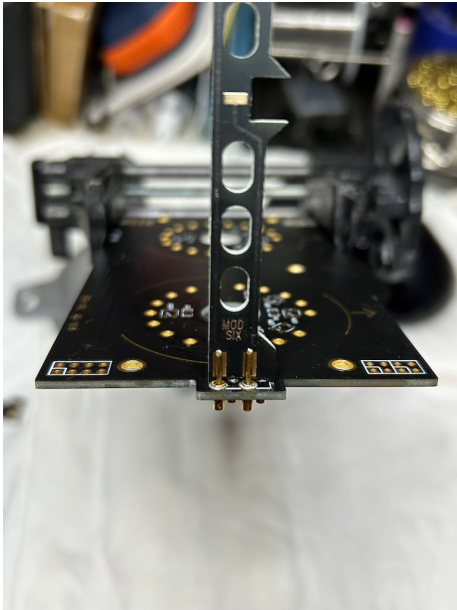
Step 2. Solder 1 set of 4 Millmax sockets in the 'tongue' of 1 TDU. You will use these 4 as a 'jig' to solder all 12 pins to the PCB towers.



Step 3. Insert 4 of the .375" brass rod lengths in Millmax sockets



Step 4. Place one of the main PCB towers so that the solder pads at the base are centered right to left with the .375" pins protruding from the PCB and solder all 4 pins using flux to facilitate bonding to the brass. Take care not to flood this joint with solder as it's possible to bond the pin to the receptacle. Duplicate process for the other main tower and the smaller AM/PM tower.

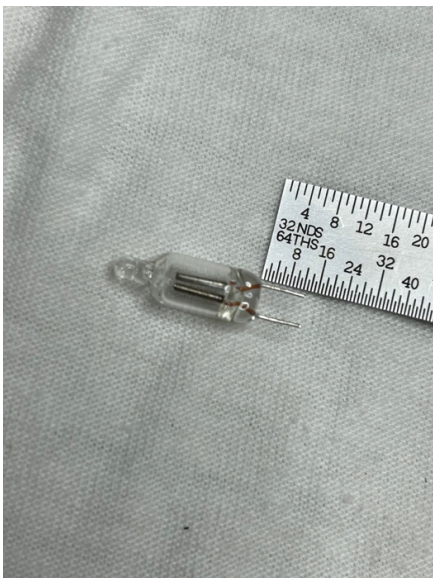


- You may find it easier if you angle the TDU with the tongue end up which will tend to hold the tower in place while soldering the first 2 pins then angle it downward to solder the other 2 pins on the other side.



Step 5. Straighten leads on the 5 NE-2 bulbs then cut both leads to .187" from glass envelope, then form leads per the image below.

Step 6. Fit leads around the tower PCB then solder to both side pads paying attention to the vertical/horizontal alignment of the bulb. Snip off any excess lead overhanging the pad.





Ta Daa!

