

# CleanAMP<sup>2</sup>

## Assembly Guide



Solid State Amplifier  
2 x 20Watts RMS @ 4ohms  
2 x 30Watts RMS @ 8 Ohms

**Required Power:**  
**48V DC @ 2 Amps**

CleanAMP is a Hi-Fi stereo power amplifier based around the LM1875T.

**ubld.it**

Support: <http://ubld.it/cleanamp>



# Tool Checklist

|2|

## 1. Soldering Iron



We recommend the Hakko FX888 or similar iron with a chisel tip.

## 2. Wire Cutters



Small cutters for clipping excess wire leads after soldering.

## 3. Solder



Electronic solder is used for soldering parts to the PCB.

## 4. Multimeter



Multimeter for verifying component values and adjusting the circuit.







# CAUTION

## EYE PROTECTION REQUIRED BEYOND THIS POINT








## STEP 1: Check the BOM

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BOM is short for Bill of Materials. Check each line item as you verify the required quantity of components.





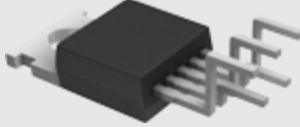

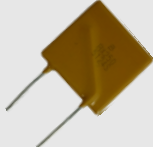
<input checked="" type="checkbox"/>	Line	Designator	Description		Required	Kit Qty
<input type="checkbox"/>	1	C1, C2	4.7uF 50V Electrolytic Capacitor		2	2
<input type="checkbox"/>	2	C10, C11	1uF 50V Electrolytic Capacitor		2	2
<input type="checkbox"/>	3	C3, C12	22uF 50V Electrolytic Capacitor		2	2
<input type="checkbox"/>	4	C4, C5	100pF 50V Disk Capacitor		2	2
<input type="checkbox"/>	5	C6, C7, C14	1000uF 50V Electrolytic Capacitor		3	3
<input type="checkbox"/>	6	C8, C13	100uF 50V Electrolytic Capacitor		2	2

## STEP 1: Check the BOM (continued)



<input checked="" type="checkbox"/>	Line	Designator	Description		Required	Kit Qty
<input type="checkbox"/>	7	C9, C15, C17, C18	.1uF 50V Disk Capacitor		4	4
<input type="checkbox"/>	8	D1	1N4004 Diode		1	1
<input type="checkbox"/>	9	J1	1/8" (3.5mm) Stereo Jack		1	1
<input type="checkbox"/>	10	J2	4 Pole Terminal Block		1	1
<input type="checkbox"/>	11	K1	Relay		1	1
<input type="checkbox"/>	12	Q1, Q2	BC546B NPN Transistor		2	2
<input type="checkbox"/>	13	R1, R2, R3, R12, R16	1K Ohm ¼ Watt Resistor		5	5



## STEP 1: Check the BOM (continued)

<input checked="" type="checkbox"/>	Line	Designator	Description		Required	Kit Qty
<input type="checkbox"/>	14	R10, R11	680 Ohm 1 Watt Resistor		2	2
<input type="checkbox"/>	15	R13	51K Ohm ¼ Watt Resistor		1	1
<input type="checkbox"/>	16	R4, R5, R6, R7, R14, R15	47K Ohm ¼ Watt Resistor		6	6
<input type="checkbox"/>	17	R8, R9	1 Ohm ½ Watt Resistor		2	2
<input type="checkbox"/>	18	U1, U2	TDA2050HV Hi-Fi Power Amplifier		2	2
<input type="checkbox"/>	19	R17	5D-9 In-Rush Limiter (Optional: See final Assembly notes)		1	1
<input type="checkbox"/>	20	F1	PTC Resettable Fuse		1	1

STEP 1: Check the BOM (continued)

<input checked="" type="checkbox"/>	Line	Designator	Description		Required	Kit Qty
<input type="checkbox"/>	14	J4	Terminal Block		1	1
<input type="checkbox"/>	15	N/A	4 Pole Screw Terminal Block (Requires Modification)		1	1

## STEP 2: Inserting the first component

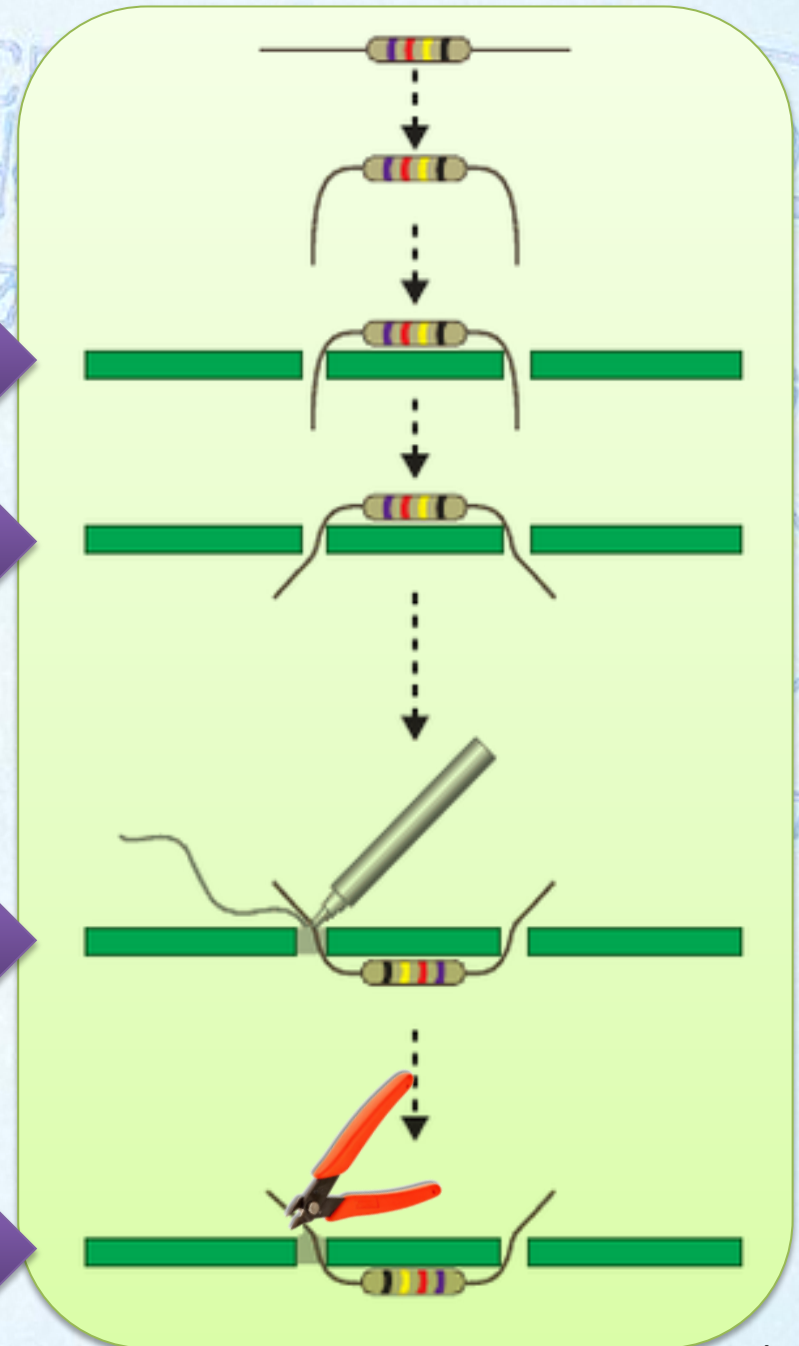
Before we locate the first component let's take a minute to review the proper way to insert and solder the components to your circuit board.

Insert the components into the circuit board.

Bend the component leads to hold the component in place while soldering.

Flip the board and solder the component leads.

Trim the component leads at the top of the solder joint.

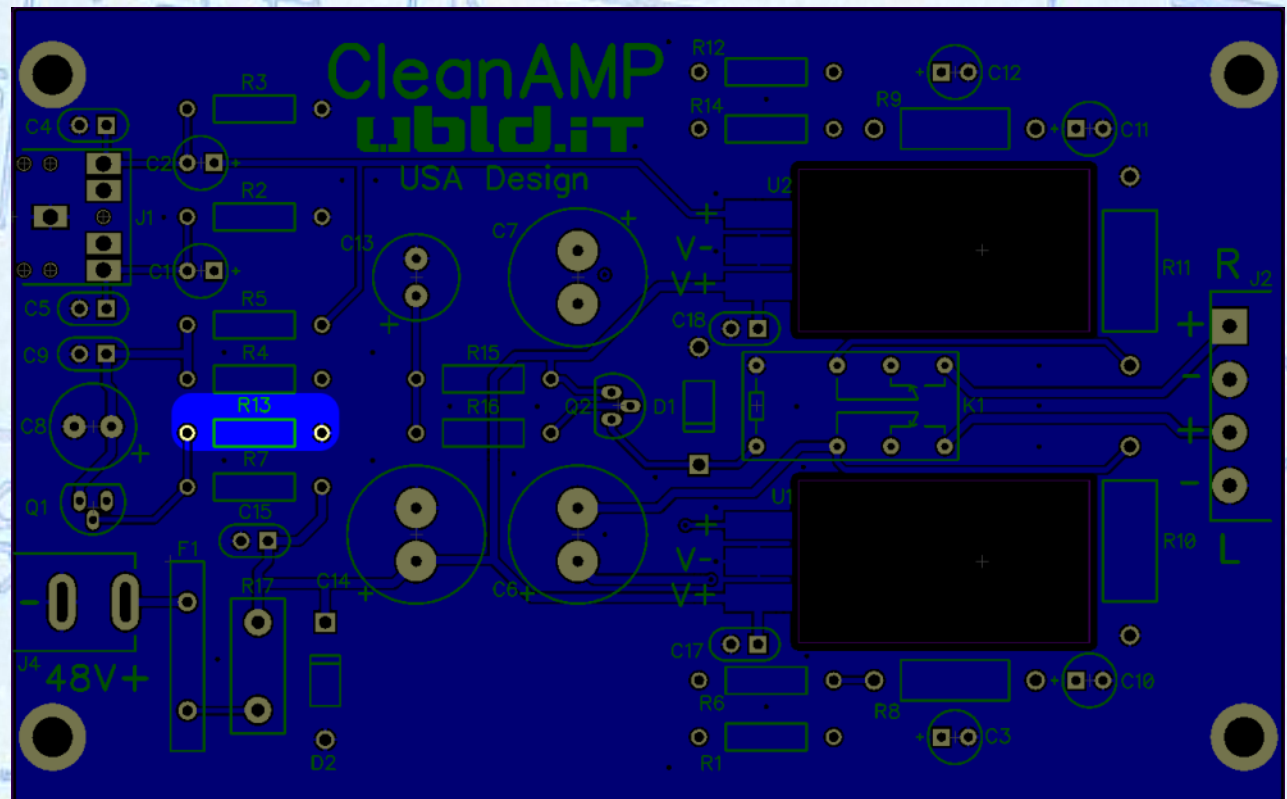




## STEP 2b: Inserting the first component

Solder 51K Ohm ¼ Watt Resistor into R13

The first components to locate is one 51K Ohm ¼ Watt Resistor.  
(line #15).



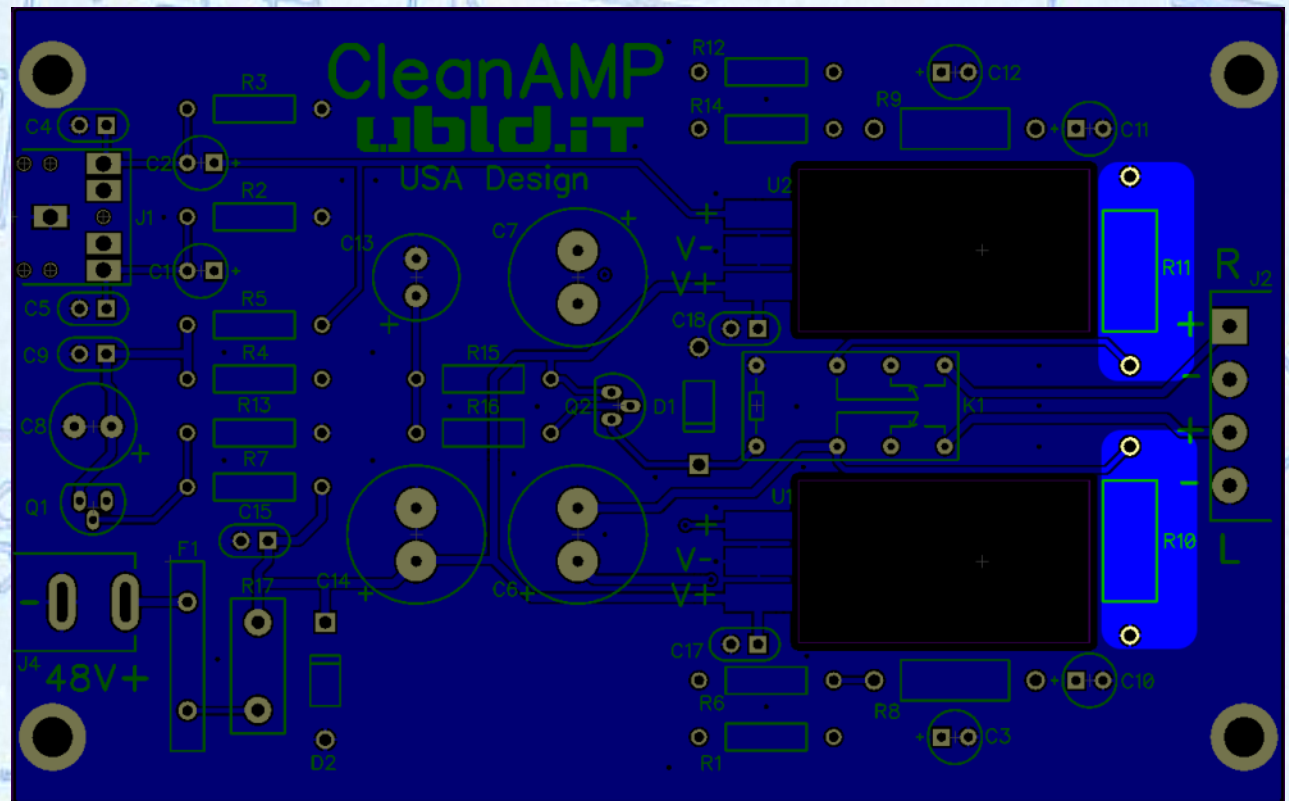
Axial Lead Resistors such as the ones used in this kit are color coded. Compare the resistor you are installing to the images shown in each step. Also double check the values with a multimeter on the ohm setting.



### STEP 3: Insert the 680 Ohm Resistors

Solder the 680 Ohm 1 Watt Resistors into R10, and R11.

Locate two 680 Ohm 1 Watt Resistors (line #14).



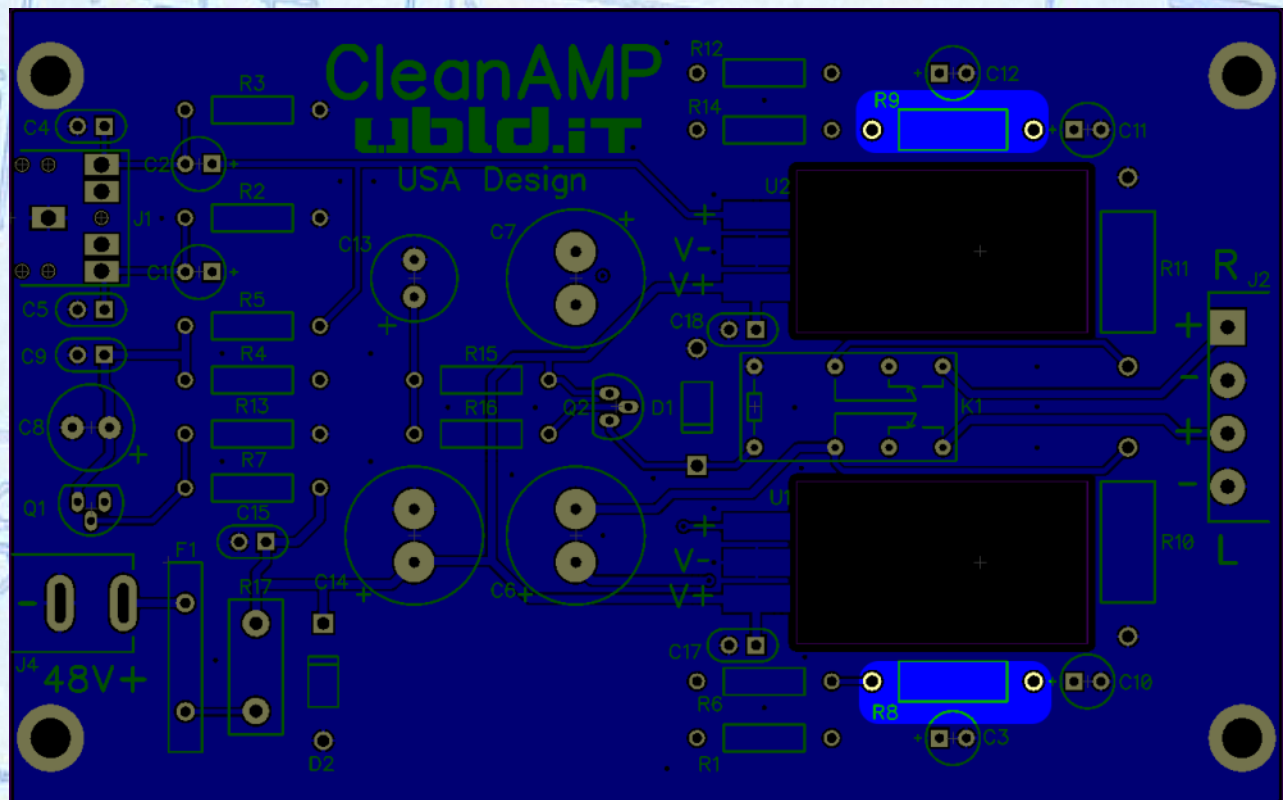
Take pride in your work. This is a show piece so make sure you take your time to bend all the components leads to 90 degree angles using needle nose pliers.

## STEP 4: Insert the 1 Ohm Resistors

Locate two 1 Ohm  $\frac{1}{2}$  Watt Resistors (line #17).



Solder the 1 Ohm  $\frac{1}{2}$  Watt Resistors into R8 and R9.



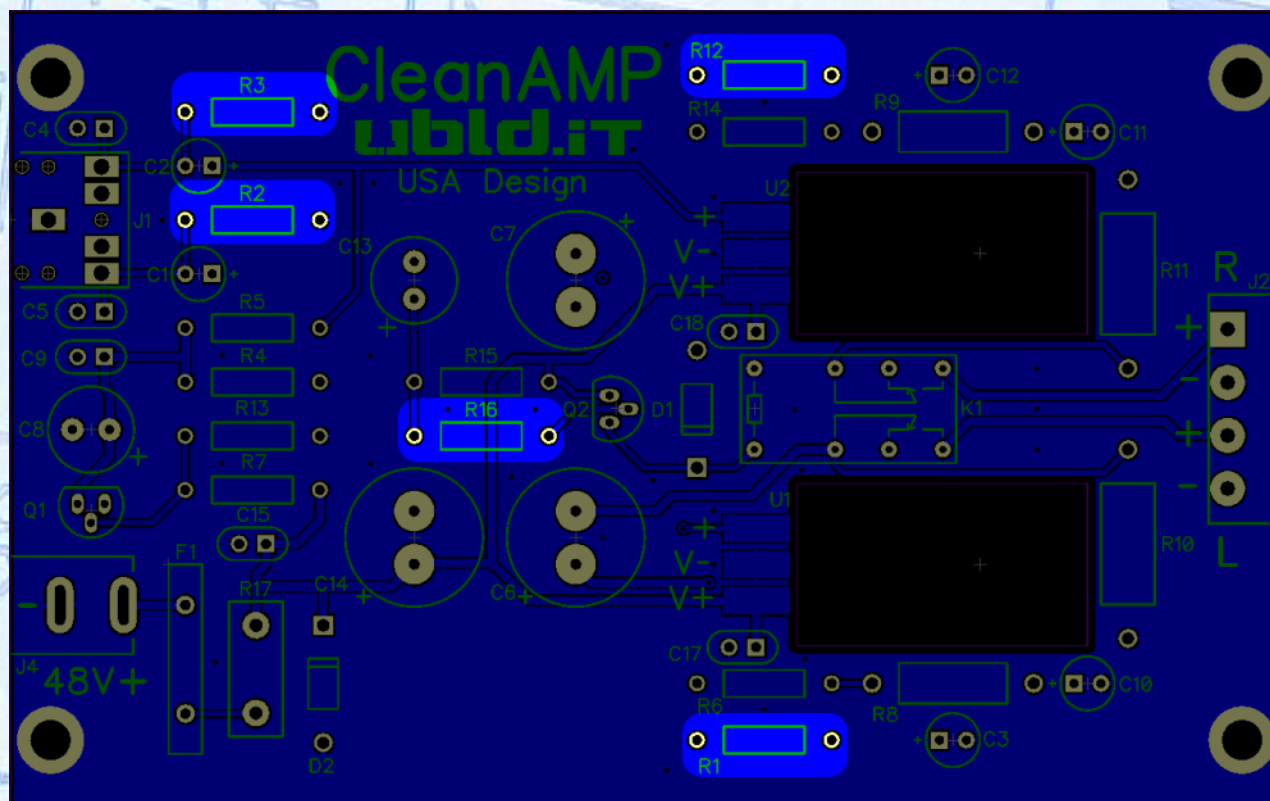
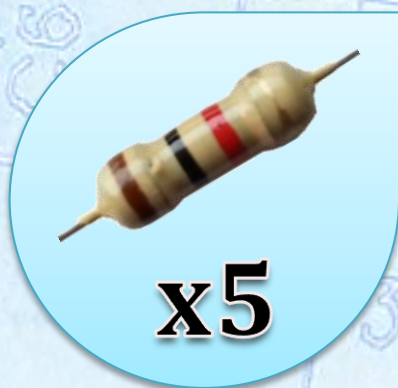
It's not necessary for resistors, but inserting them all in the same direction will make your board look that much better. Use the last band (tolerance band) as a reference for the orientation.



## STEP 5: Insert the 1K Ohm Resistors

Solder the 1k Ohm ¼ Watt Resistors into R1, R2, R3, R12, and R16.

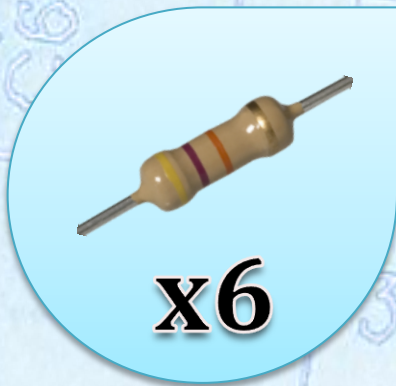
Locate five 1k Ohm ¼ Watt Resistors (line #13).



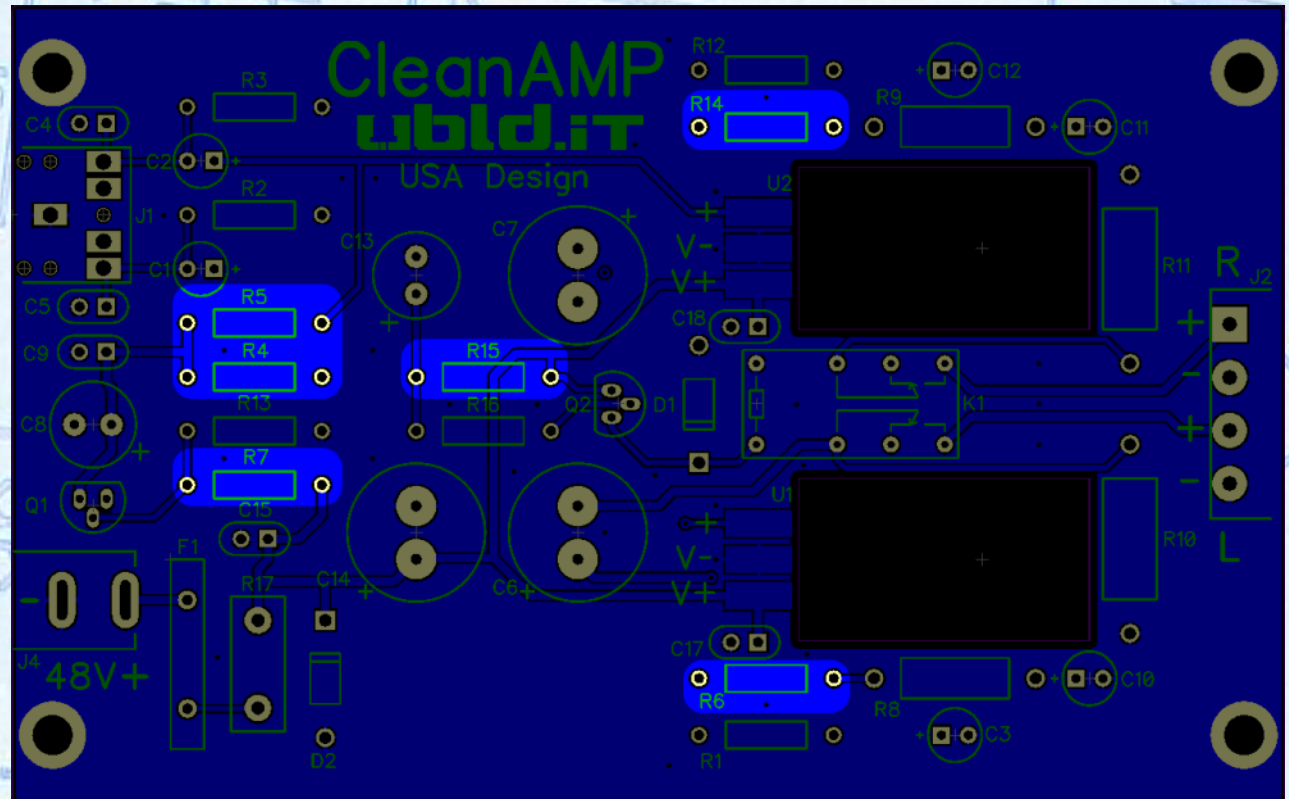
For better looking solder joints use Kester #2331-ZX water soluble flux pen on every pad before applying solder. Flux removes oxidation and allows heat to transfer from your iron to the pad.

## STEP 6: Insert the 47K Ohm Resistors

Locate six 47K Ohm  $\frac{1}{4}$  Watt Resistors (line #16).



Solder the 47K Ohm  $\frac{1}{4}$  Watt Resistors into R4,R5,R6,R7,R14, and R15.



A resistor limits the flow of electrons. The flow of electrons is called the current (Amps). Therefore, a resistor is known as a current limiting device.

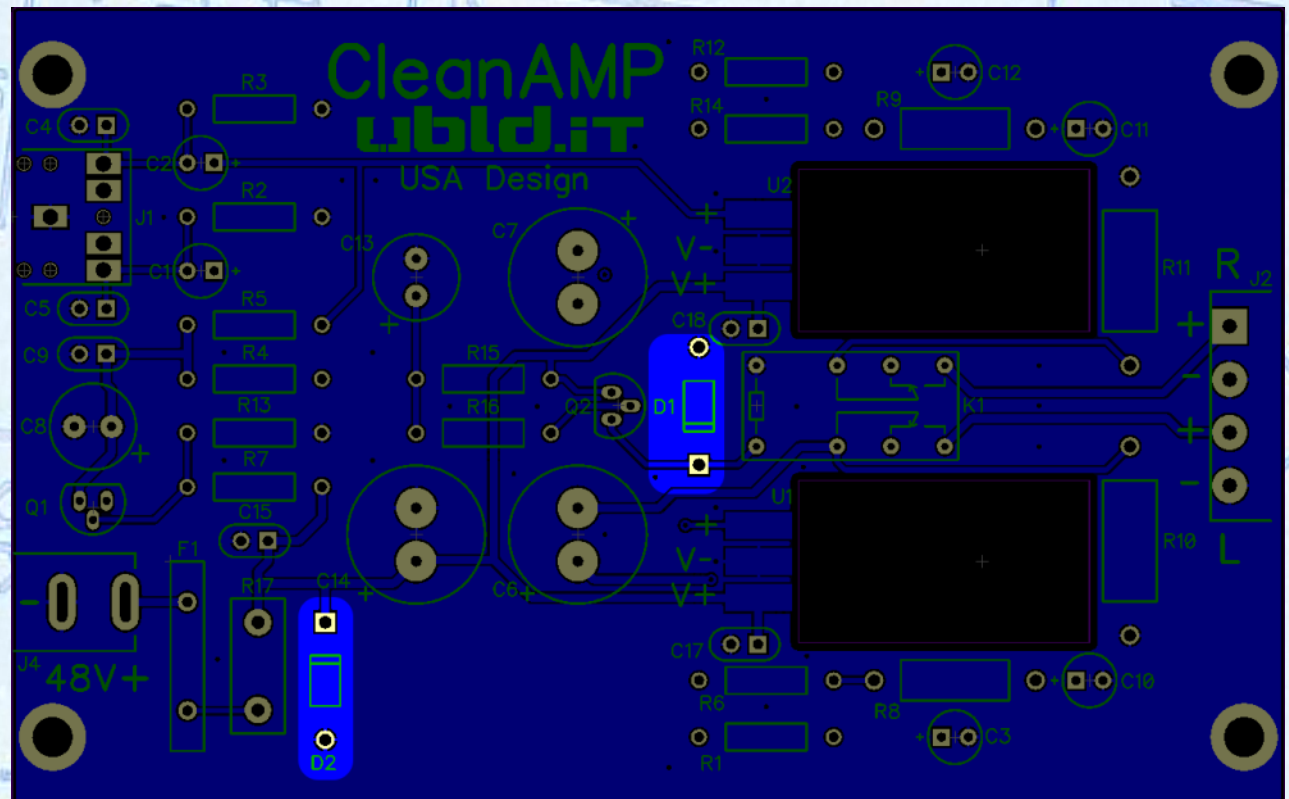


## STEP 7: Insert the 1N4004 Diode

Locate one 1N4004 Diode (line #8).



Solder the 1N4004 Diode into D1.



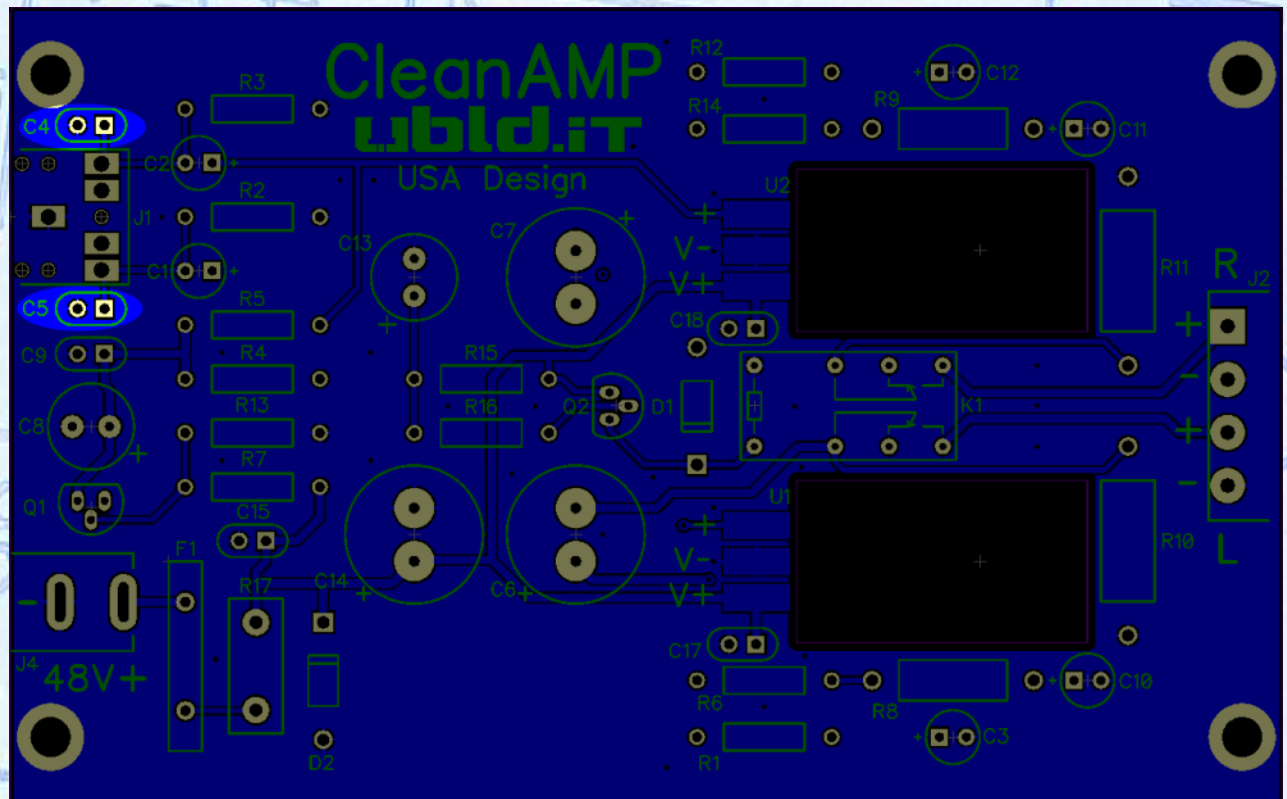
**Warning: Diodes are polarized. Match the stripe on the components with the stripe on the silkscreen.**

## STEP 8: Insert the 100pF Disk Capacitors

Locate two 100pF 50V Disk Capacitors  
(line # 4).



Solder the 100pF 50V Disk Capacitors into C4 and C5.



You don't have to be an expert in math to learn electronics but you do need to understand Ohms law and Watts law. ( $E = I * R$  and  $P = I * E$ ). Take the time to learn the difference between Voltage, Current, Power, and Resistance.

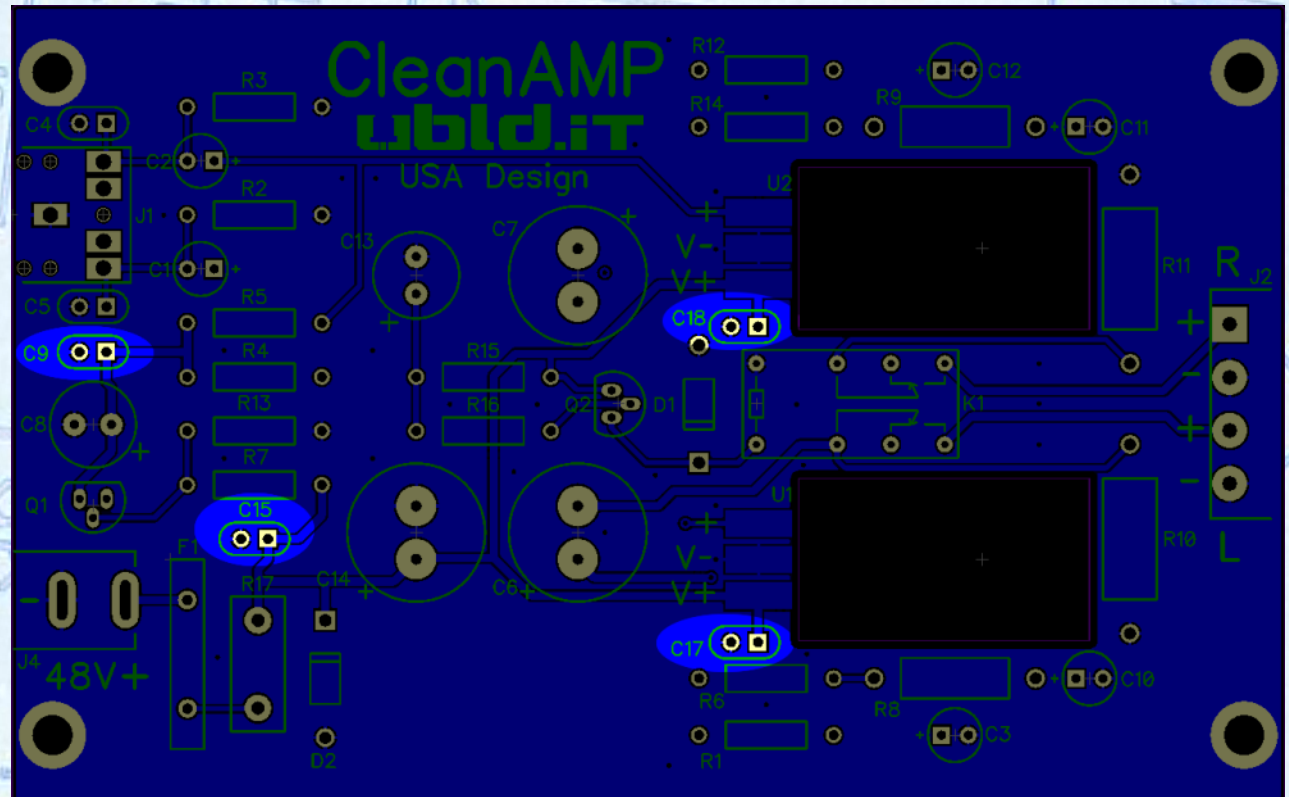
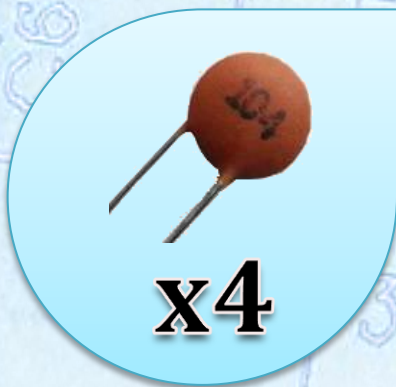
difference between Voltage, Current, Power, and Resistance.



## STEP 9: Insert the .1uF Disk Capacitors

Solder the .1uF 50V Disk Capacitors into C9, C15, C17 and C18.

Locate four .1uF 50V Disk Capacitors (line # 7).

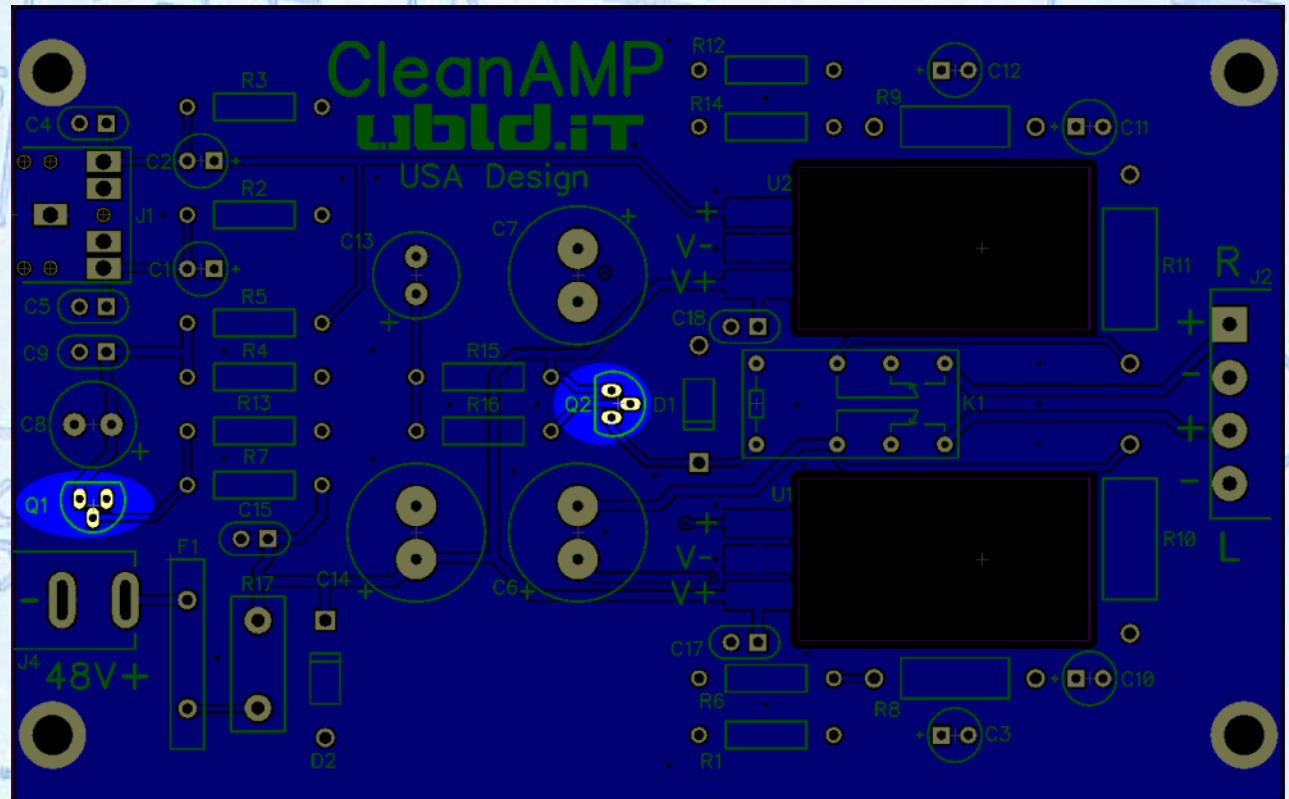
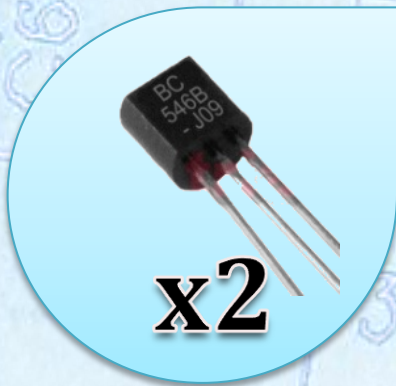


Capacitors store an electrical charge much like your body builds and stores static. It's also good to know that since a capacitor takes time to charge and discharge it's said that it opposes changes in voltage.

## STEP 10: Insert the BC546B NPN Transistors

Solder the BC546B NPN Transistors into Q1 and Q2

Locate two BC546B NPN Transistors  
(line #12).



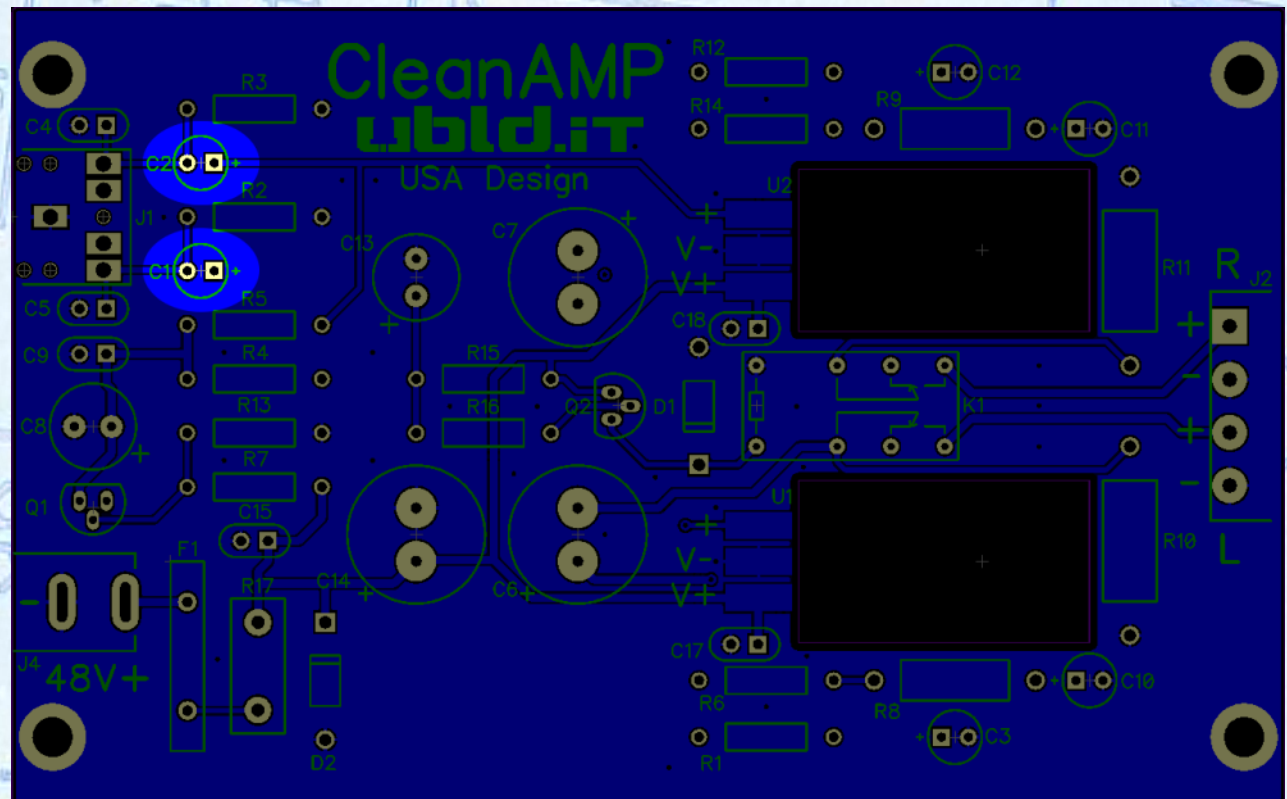
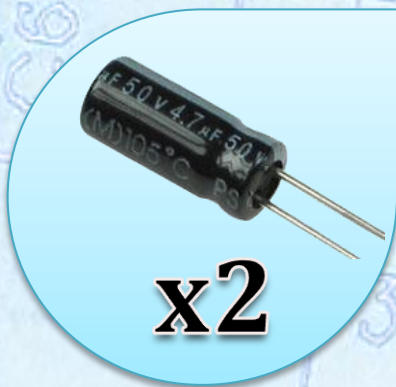
Transistors are used for signal amplification and switching. In the case of the CleanAMP it's used as a switch to enable the K1 relay.



## STEP 11: Insert the 4.7uF Capacitor

Solder 4.7uF 50V Electrolytic Capacitor into C1 and C2.

The first components to locate are two 4.7uF 50V Electrolytic Capacitors (line # 1).



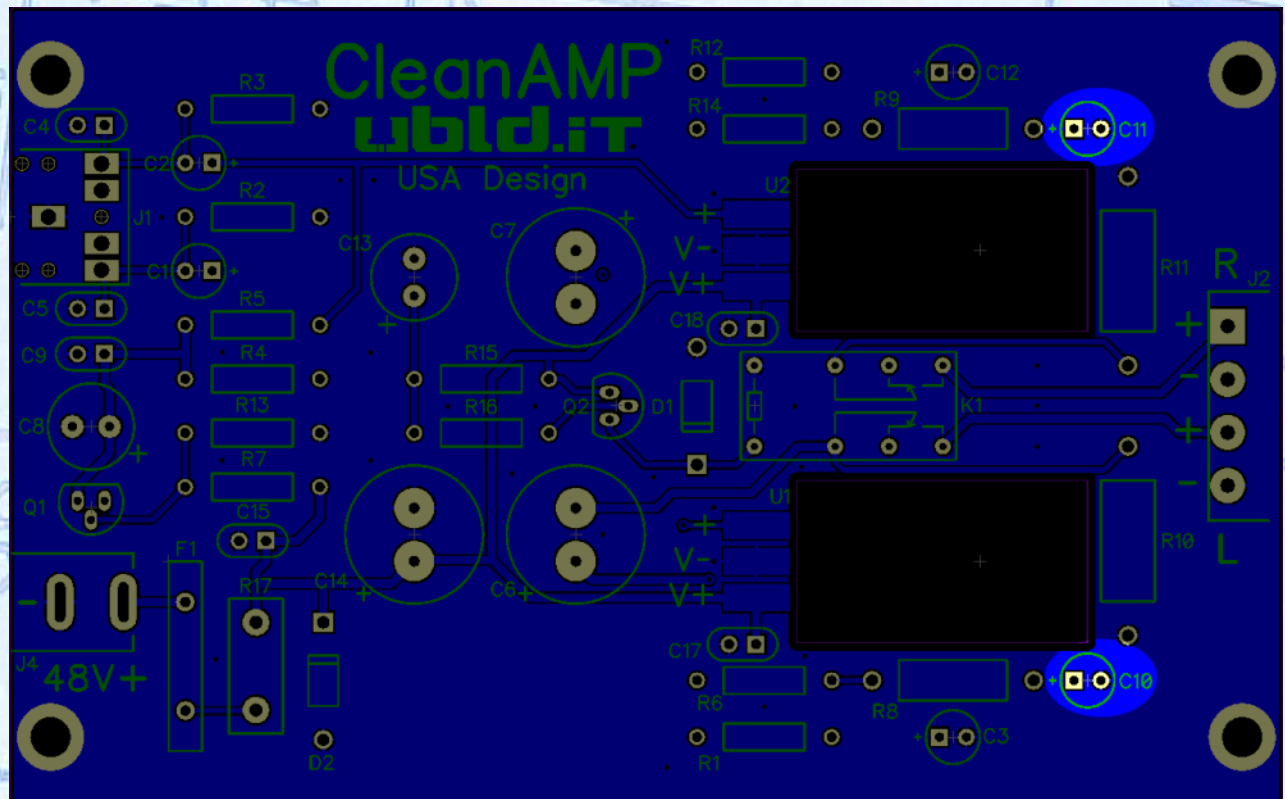
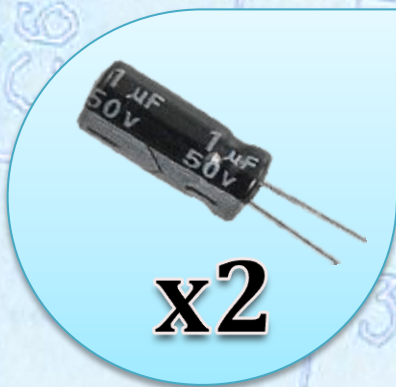
Electrolytic Capacitors have a specific orientation. They are said to be polarized. The stripe indicates the negative side. The + symbol on the silkscreen should be aligned with the positive side of the capacitor.

with the positive side of the capacitor

## STEP 12: Insert the 1uF Capacitors

Solder the 1uF 50V Electrolytic Capacitors into C10 and C11.

Locate two 1uF 50V Electrolytic Capacitors (line # 2).



Capacitors look like an open circuit to Direct Current(DC).

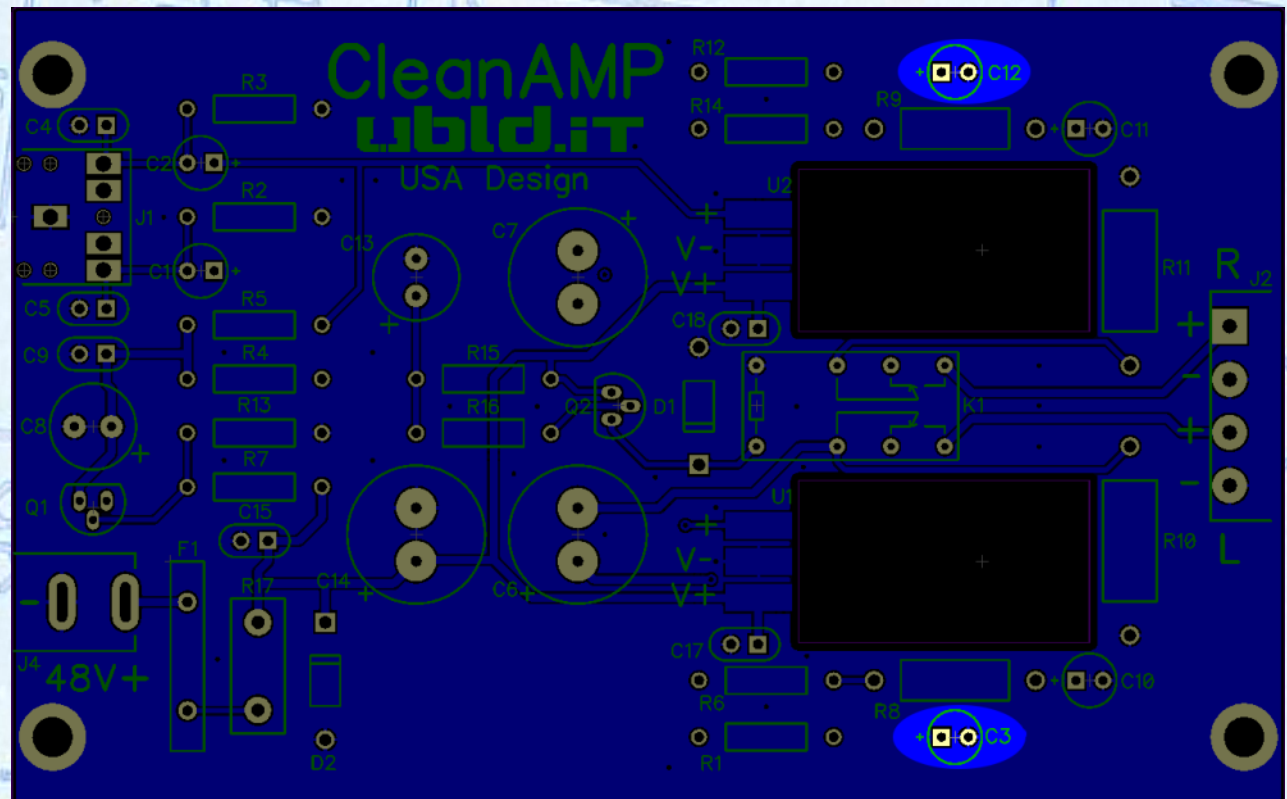


## STEP 13: Insert the 22uF Capacitors

Locate two 22uF 50V Electrolytic Capacitors (line # 3).



Solder the 22uF 50V Electrolytic Capacitors into C3 and C12.



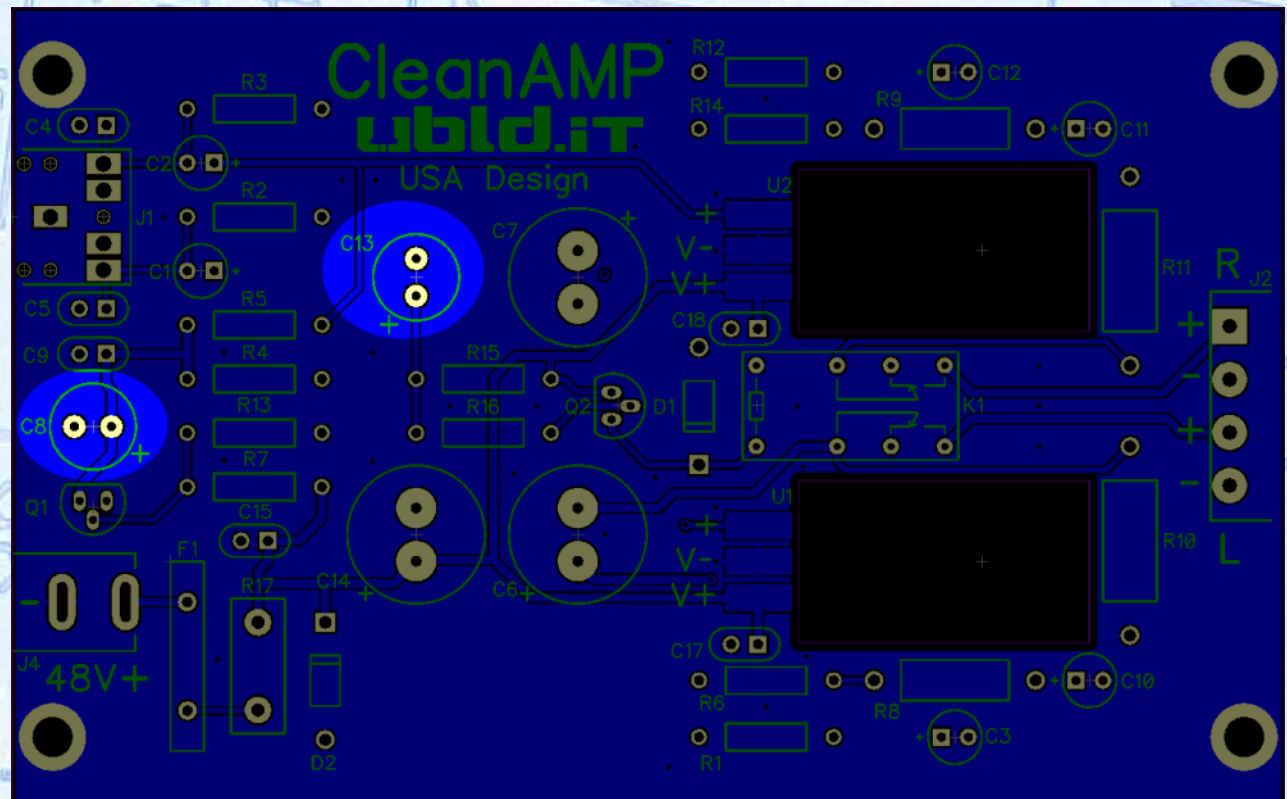
**Warning:** Inserting any of the polarized capacitors backwards will cause them to explode violently. Double check the polarity for all electrolytic capacitors.

## STEP 14: Insert the 100uF Capacitors

Locate two 100uF 50V Electrolytic Capacitors (line #6).



Solder the 100uF 50V Electrolytic Capacitors into C8 and C13.



**Warning:** Inserting any of the polarized capacitors backwards will cause them to explode violently. Double check the polarity for all electrolytic capacitors.

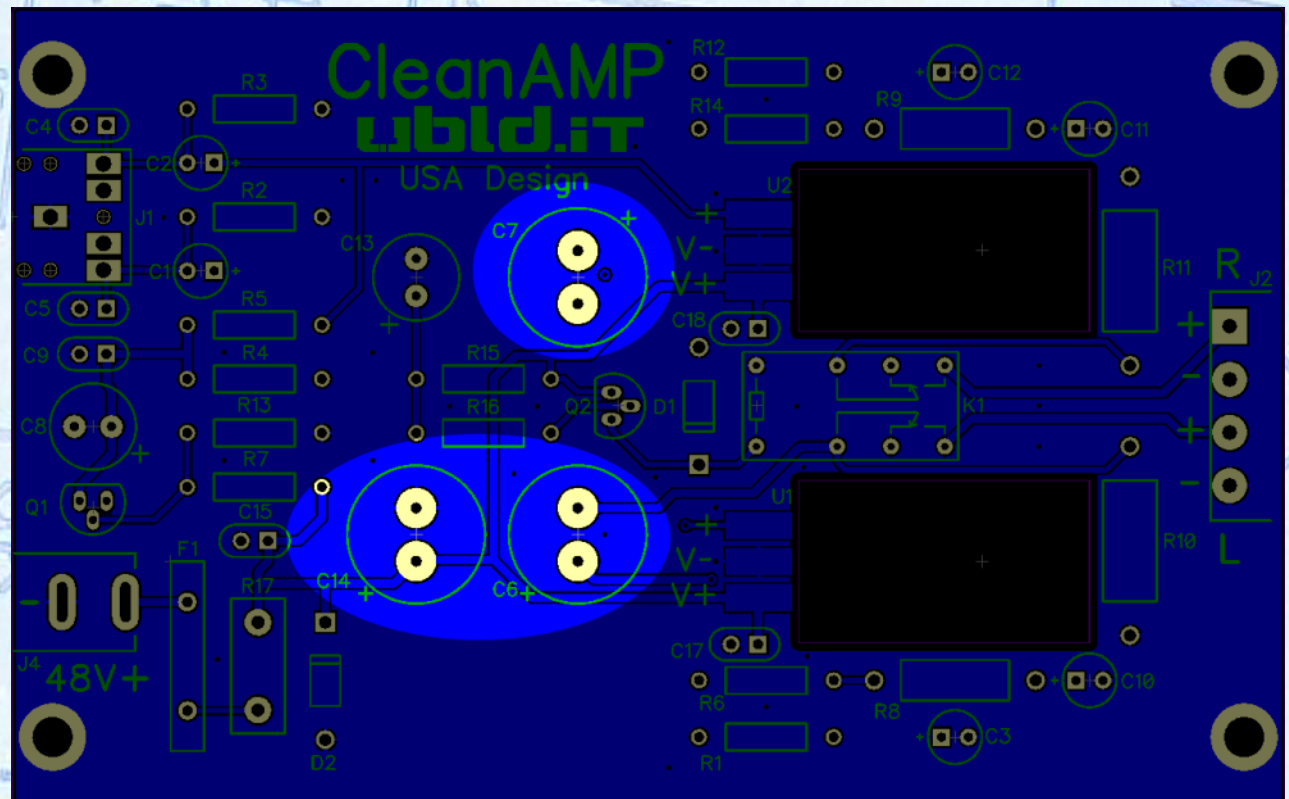


## STEP 15: Insert the 1000uF Capacitors

Locate three 1000uF 50V Electrolytic Capacitors (line #5).



Solder the 1000uF 50V Electrolytic Capacitors into C6, C7 and C14.

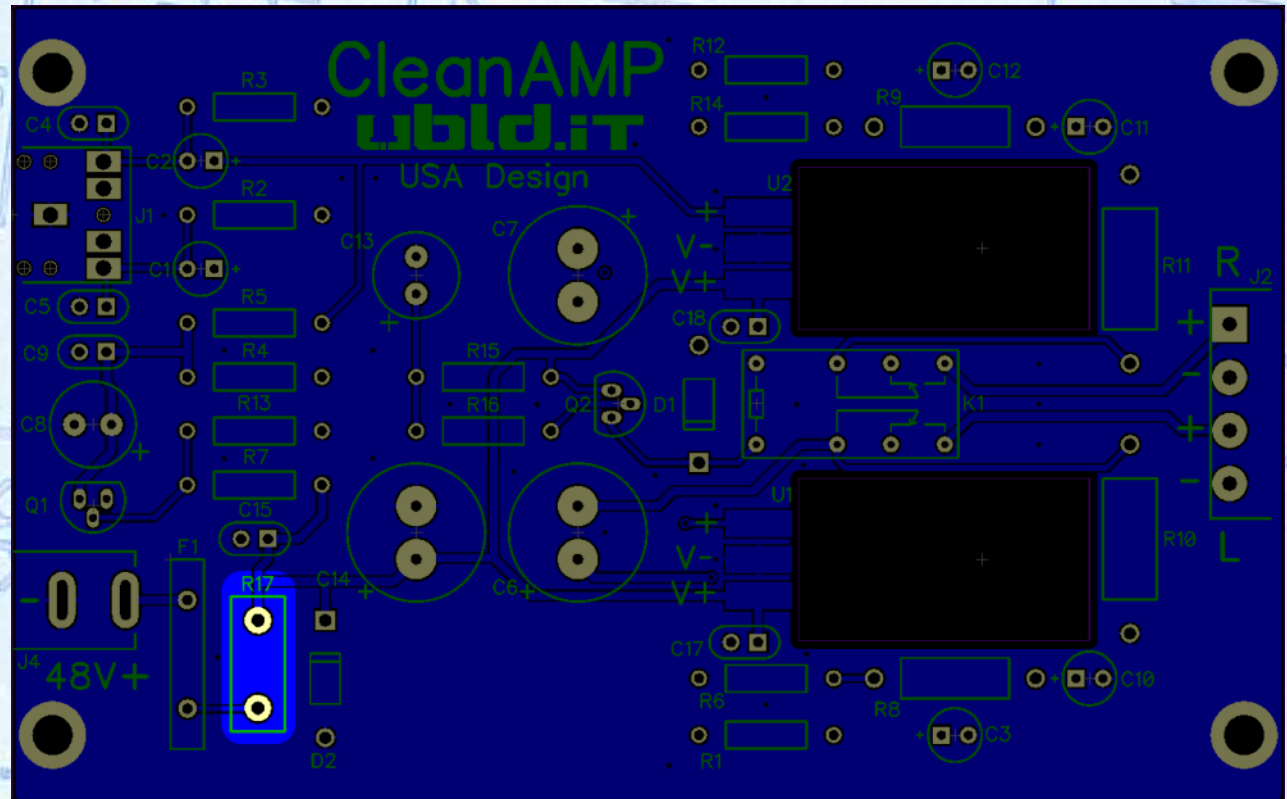


**Warning:** Inserting any of the polarized capacitors backwards will cause them to explode violently. Double check the polarity for all electrolytic capacitors.

## STEP 16: Insert the 5D-9 Thermistor

Locate one thermistor  
(line #19).

Solder 5D-9 thermistor into R17



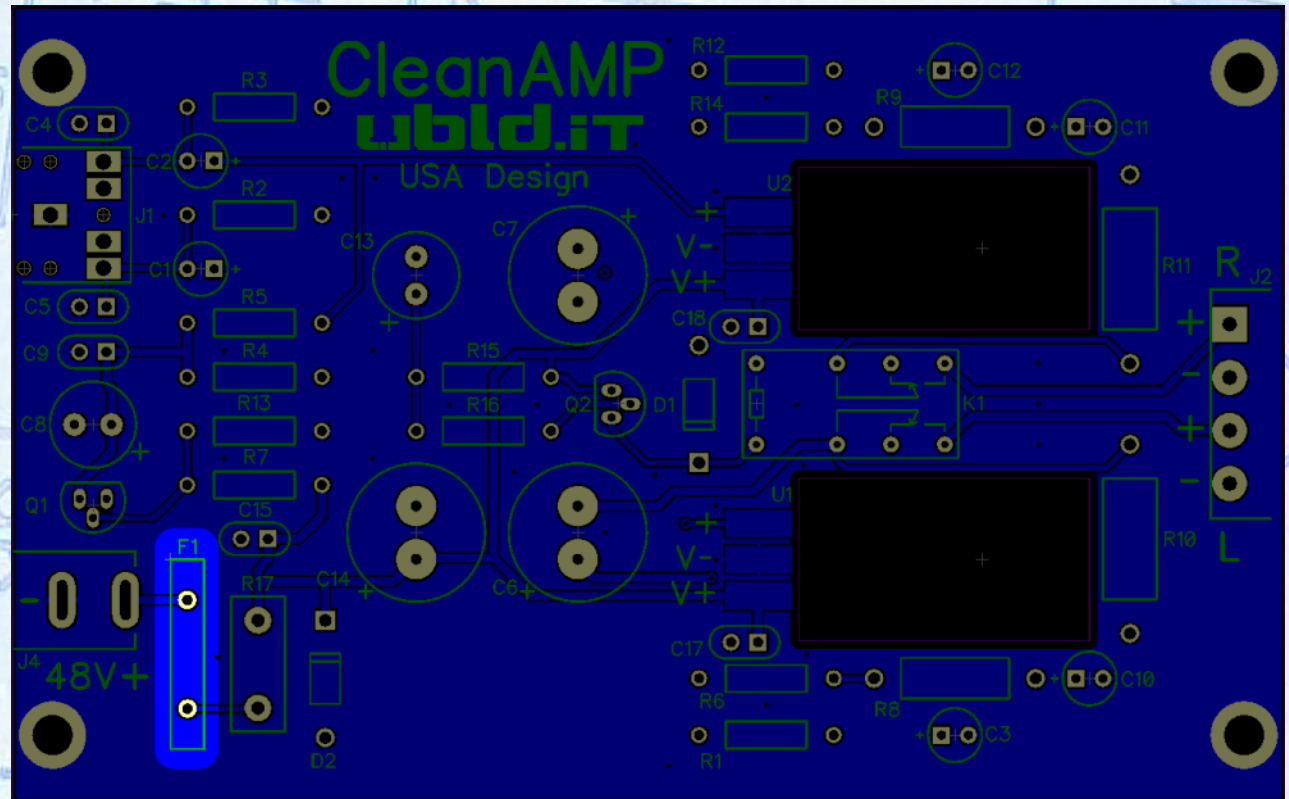
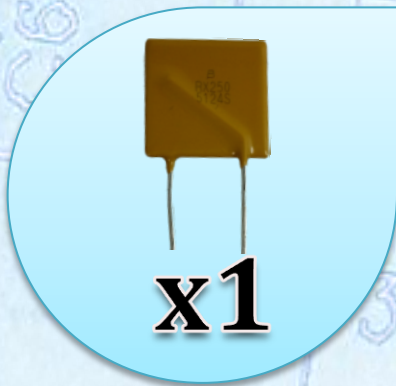
The 5D-9 thermistors acts as a inrush limiter which should prevent arcing when you plug in your power supply.



## STEP 17: Insert the PTC Resettable Fuse

Solder the PTC Resettable Fuse in F1

Locate one PTC Resettable Fuse (line #20).



A positive temperature coefficient (PTC) fuse is a resettable fuse which has high resistance under a fault condition. In this case the fuse will trigger at 2.5 Amps. To reset the fuse first power off the amp and fix the cause of the fault. Then allow the fuse to cool before applying power.

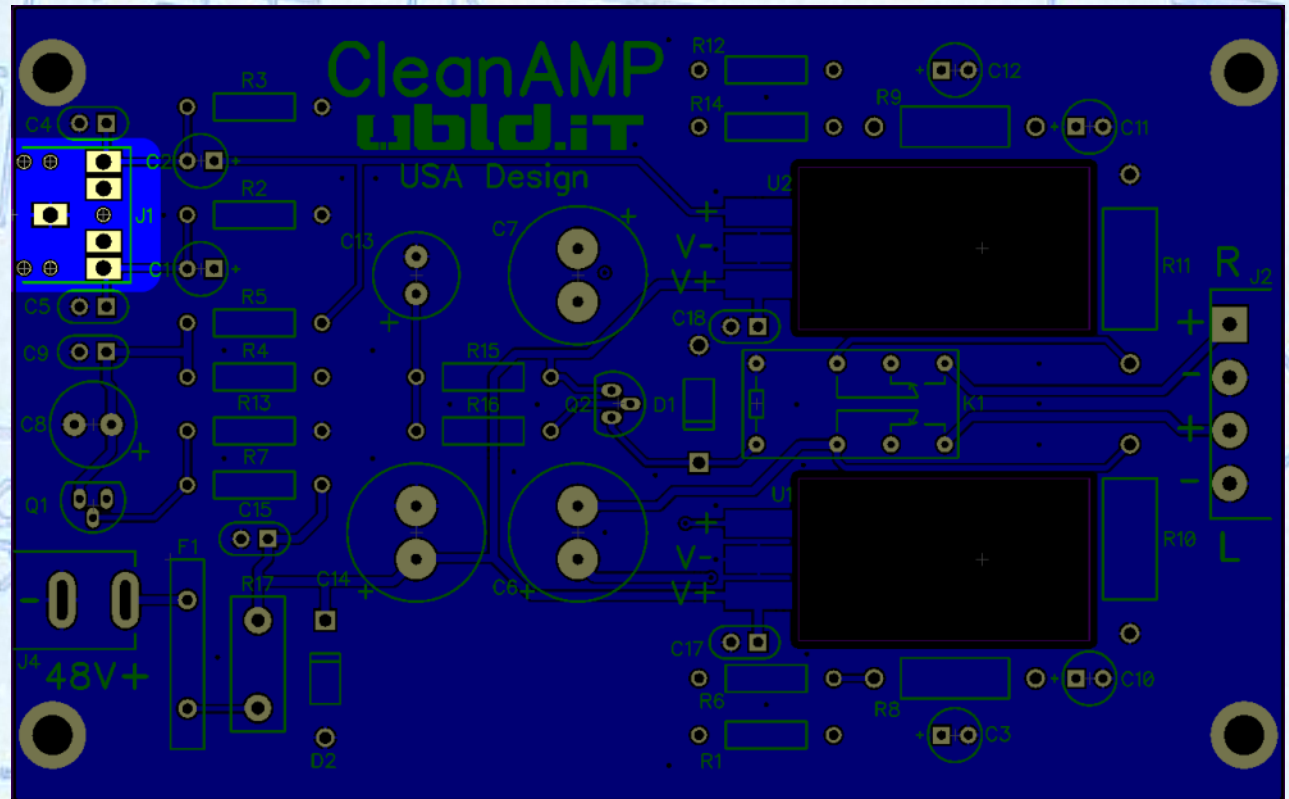
## STEP 18: Insert the 1/8" (3.5mm) Stereo Jack

Solder the 1/8" (3.5mm) Stereo Jack into J1

Locate one 1/8" (3.5mm) Stereo Jack (line # 9).



**x1**



J1 is where you will plug in your audio source such as your cell phone, iPod or MP3 Player.



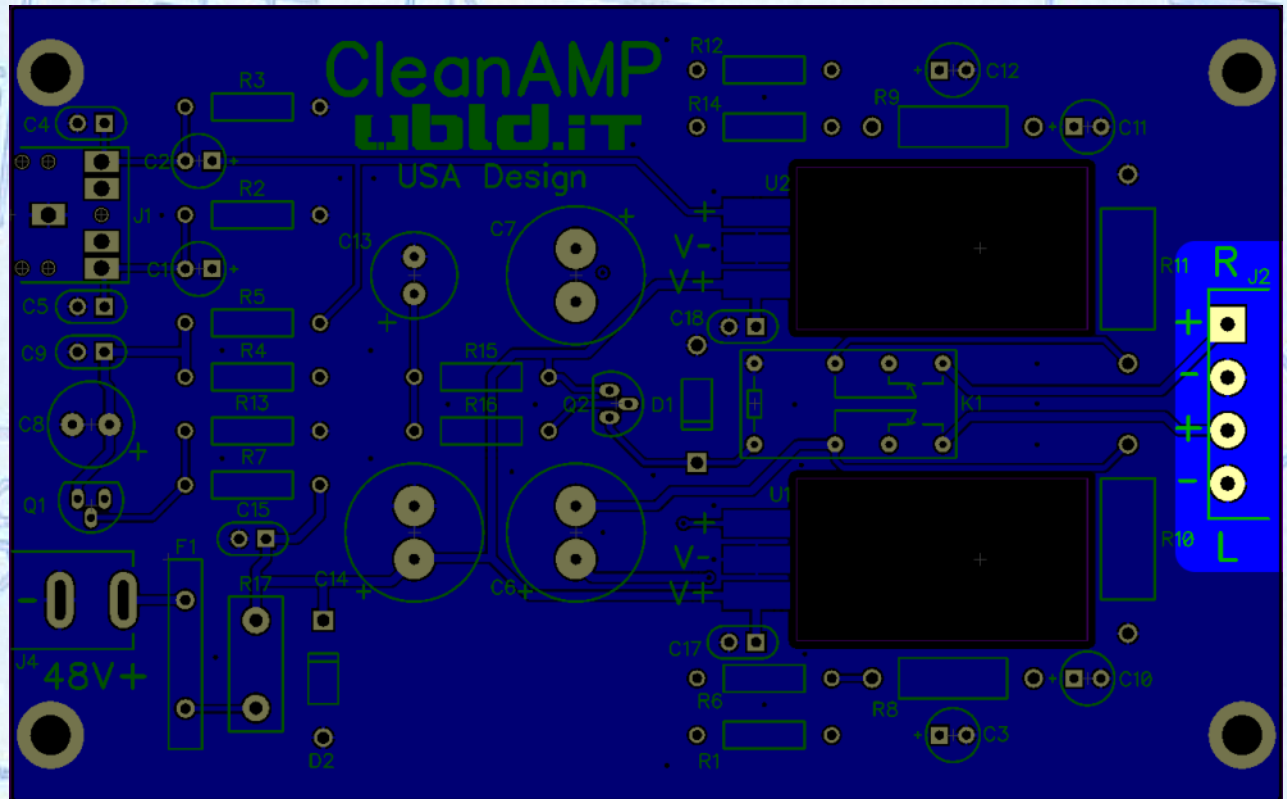
## STEP 19: Insert the 4 Pole Connector

Locate one 4 pole connector (line # 10).



**x1**

Solder the 4 Pole Connector into J2



J2 is where you connect your speakers to the CleanAmp.

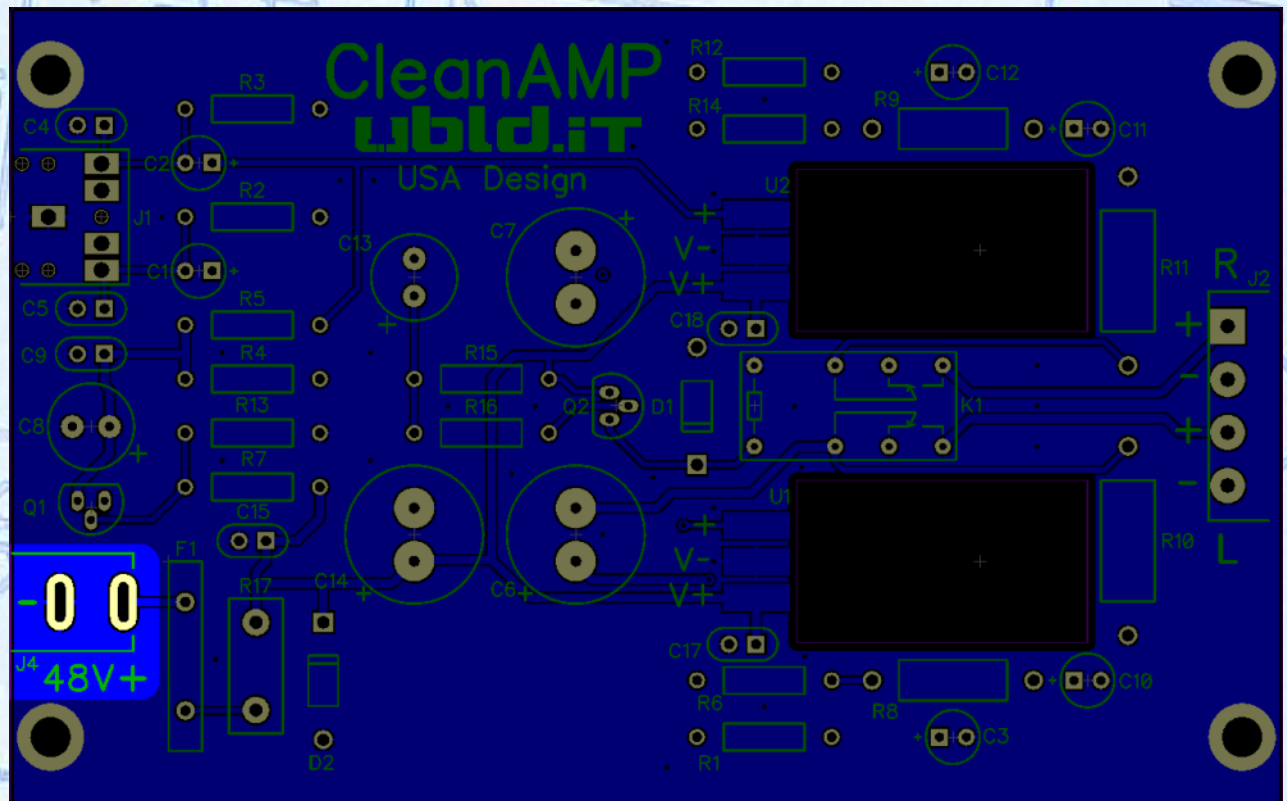
## STEP 20: Insert the DC Power Jack

Locate one DC power Jack.  
(line #14).



**x1**

Solder the DC Power Jack into J4.



48V DC from the DC Jack (J4) is routed through a resettable PTC fuse (F10 for circuit protection and through a thermistor (R17) to limit in-rush current as the system first powers up.



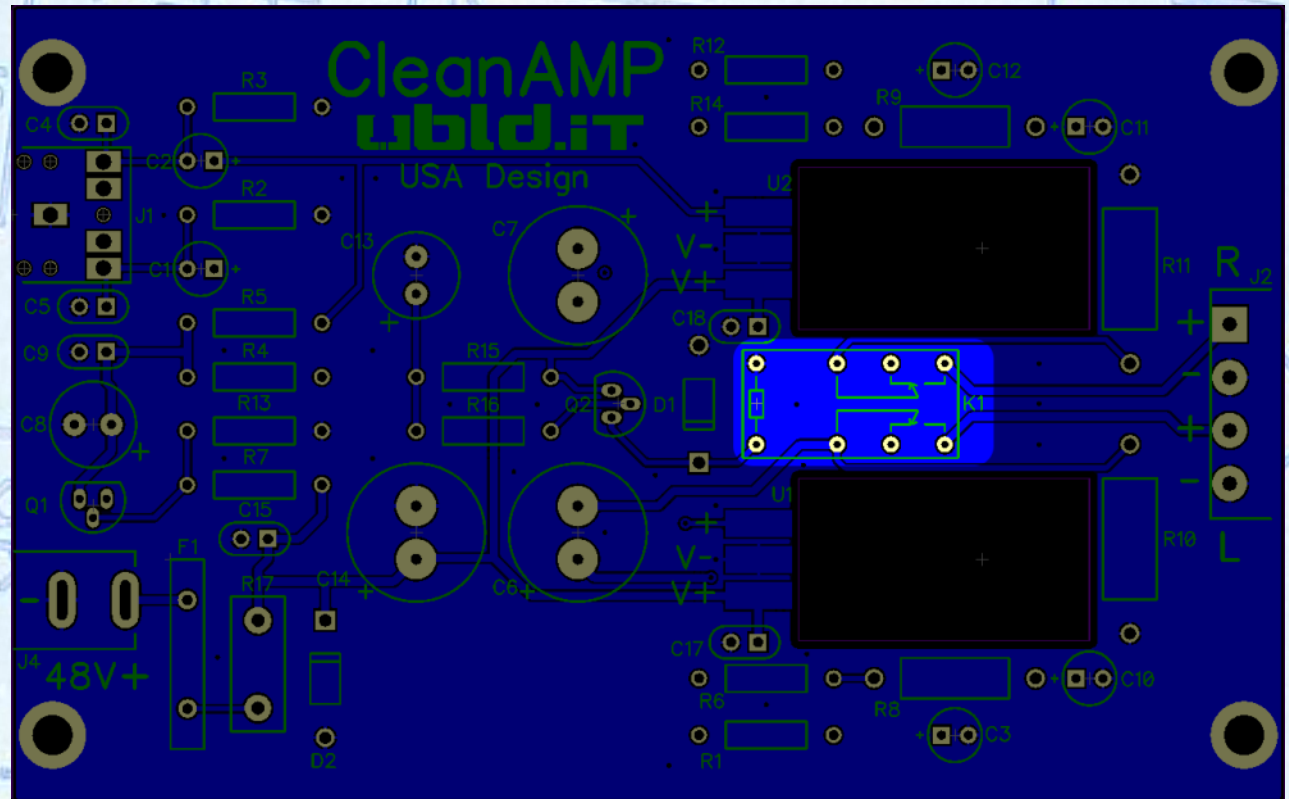
## STEP 21: Insert the Relay

Locate one Relay  
(line #11).



**x1**

Solder the Relay into K1

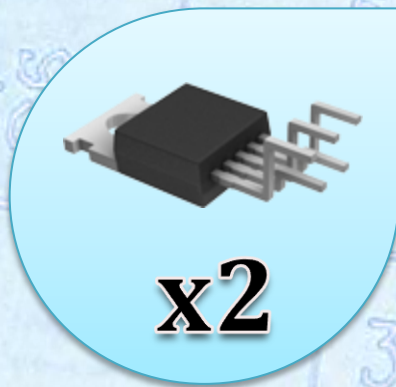


The relay is used as an Anti-Thump relay.

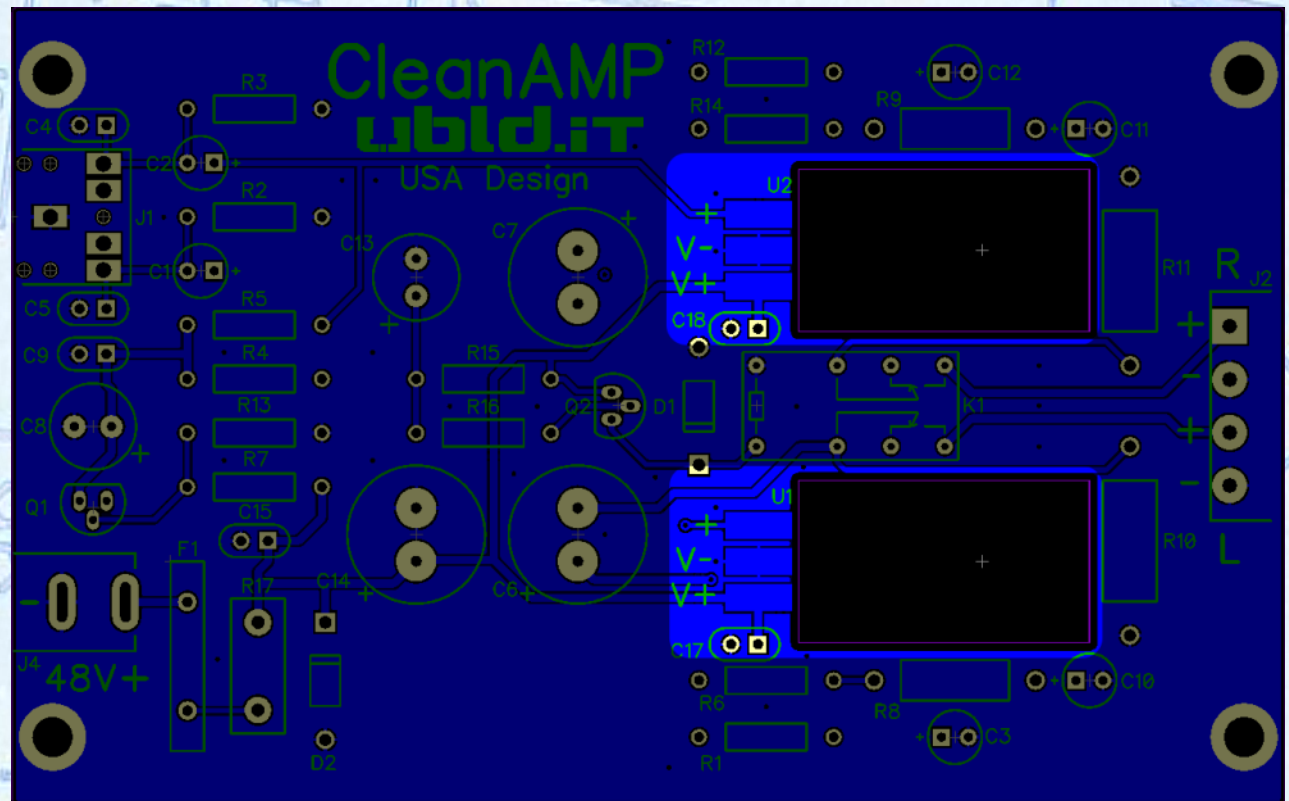
## STEP 22: Insert the LM1875T Power Amplifier

Solder the LM1875T Power Amplifiers into U1 and U2.

Locate two LM1875T  
Hi-Fi Power Amplifiers  
(line #18).



Note: This component  
straddles both sides of  
the PCB. Solder the top  
three pins then the  
bottom two pins.



The LM1875T MUST be mounted to a heatsink. Failure to do so will damage the part and cause a potential safety hazard. Approximately 50 Square Inches of surface area is required for the heatsink.



## Final Assembly

Visit the Community Support Forums:  
<http://ubld.it/cleanamp>

**Required Powered:**  
**48V DC @ 2 Amps**



Your final assembly should look like this. Double check all polarized components.



## (Optional) Install in Enclosure

Insert your assembled board into a Hammond 1455K1201 enclosure, mark and drill the enclosure at the LM1875T amplifier for hole appropriate for your mounting hardware. The mounting hardware is not included with this kit. Then mount the LM1875T amplifier to the case using heatsink compound to ensure good thermal conduction.





## Recommended Parts

Description	Manufacturer	Part Number	Supplier
48V 3A Power Supply	SMAKN	B016ZE6ADU	<a href="http://amzn.to/2dQU9Nk">http://amzn.to/2dQU9Nk</a>
Enclosure	Hammond	1455K1201	<a href="http://a.co/0FtJ9pN">http://a.co/0FtJ9pN</a>
#6-32 Enclosure Screws	Unknown	B00GE1I718	<a href="http://a.co/9P6rf2e">http://a.co/9P6rf2e</a>

### Alternate Enclosure Suppliers:

- Mouser Electronics
- DigiKey
- Arrow Electronics

