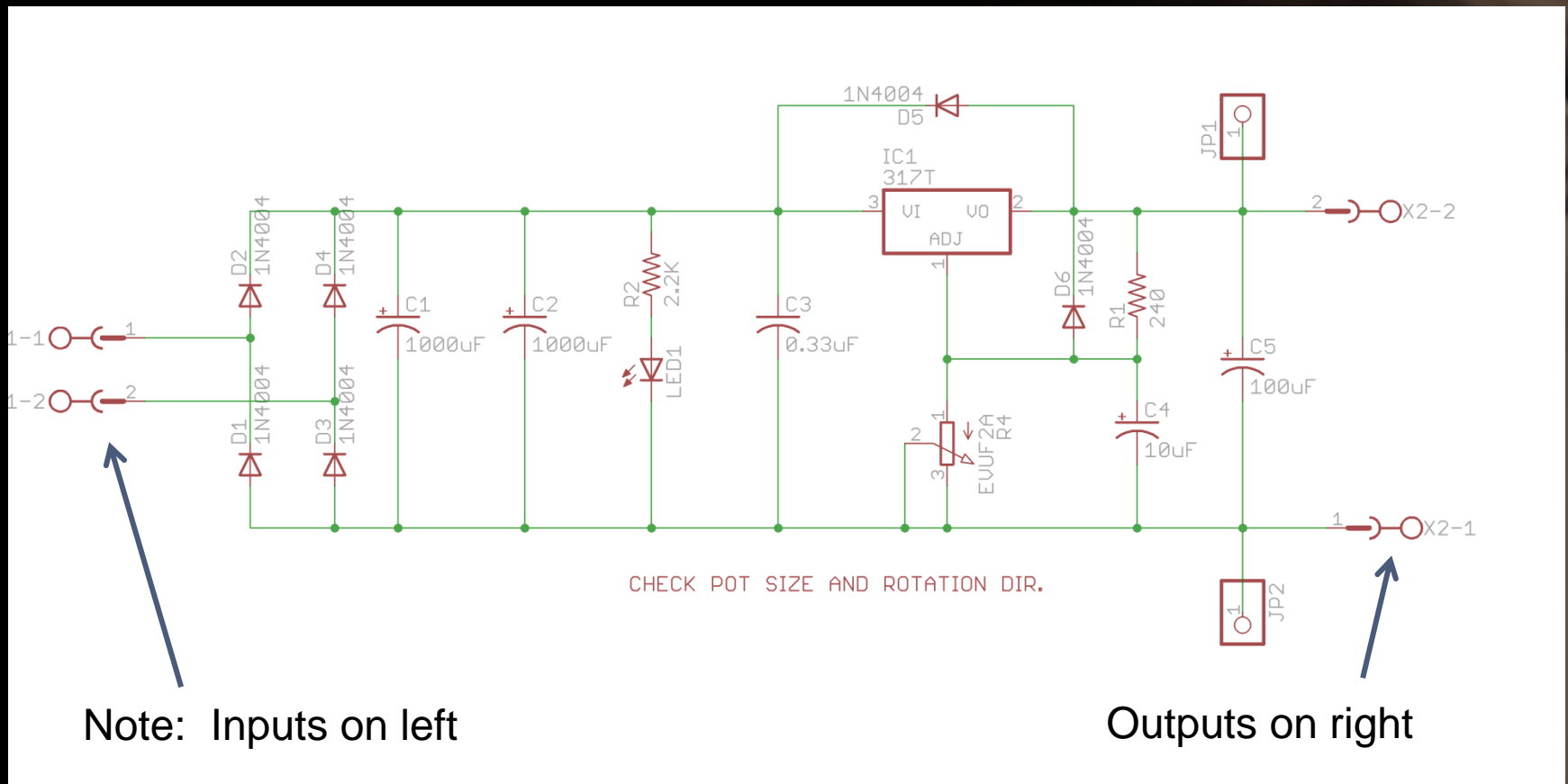


# *Board Layout using Eagle*

# Basic Component placement – start with the schematic as a guide...



# Why?

Examples:

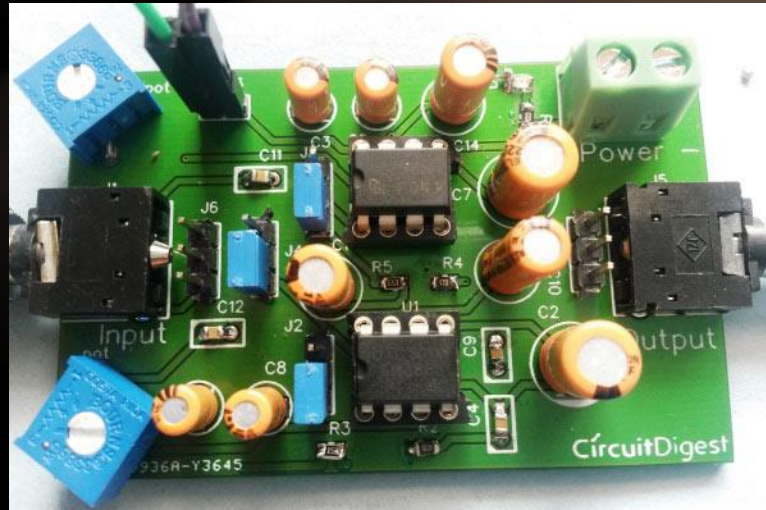
## Power supply:

We want to isolate the higher voltage / higher currents from low voltage outputs

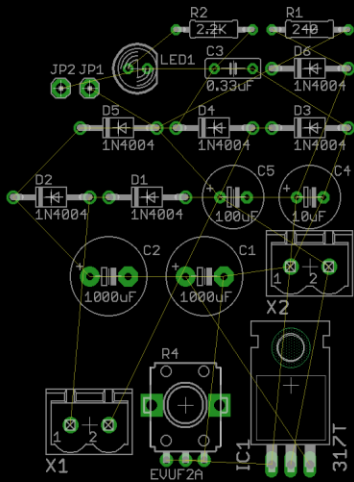
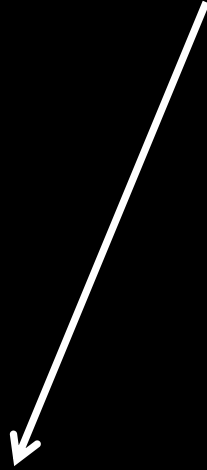


## Audio Amplifier:

Separate low level signal levels from high power outputs

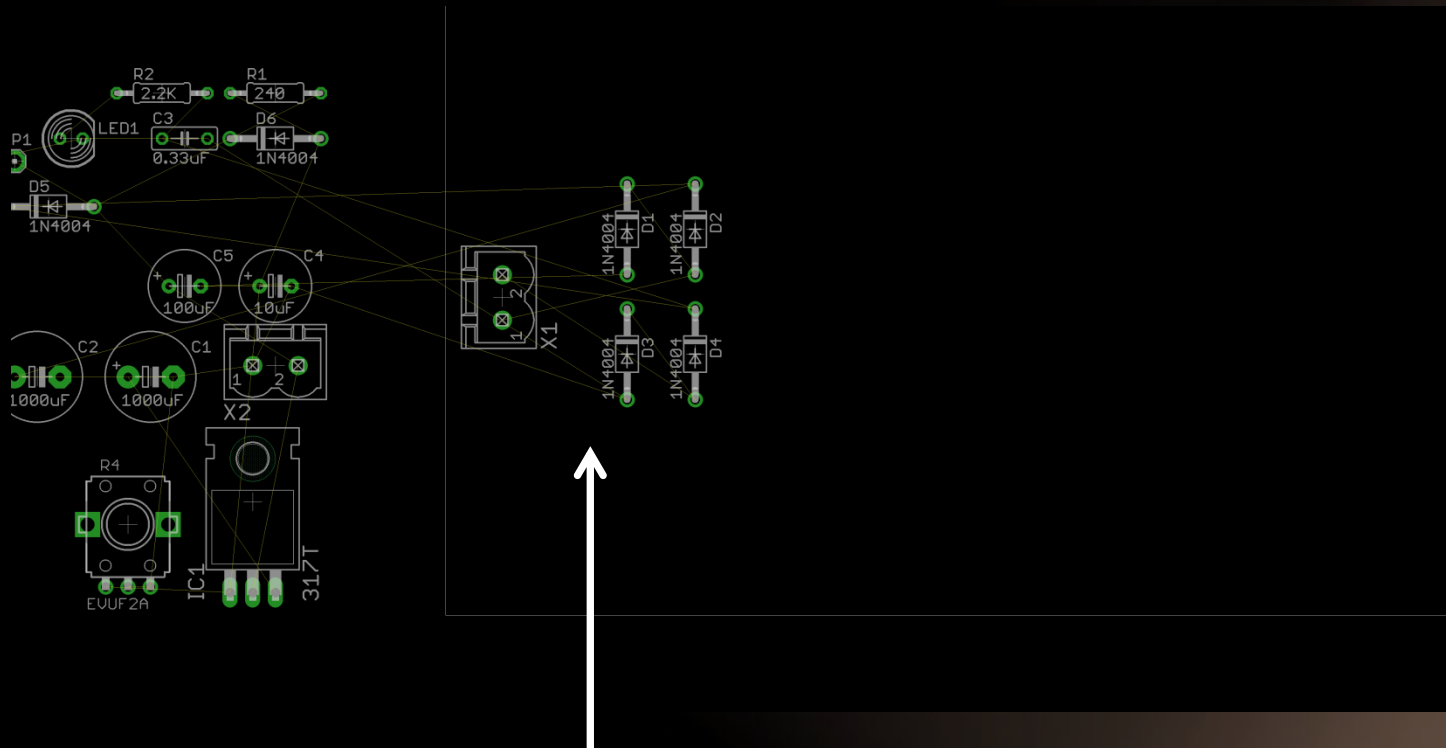


# Components are all grouped in left corner by default



Default Board area

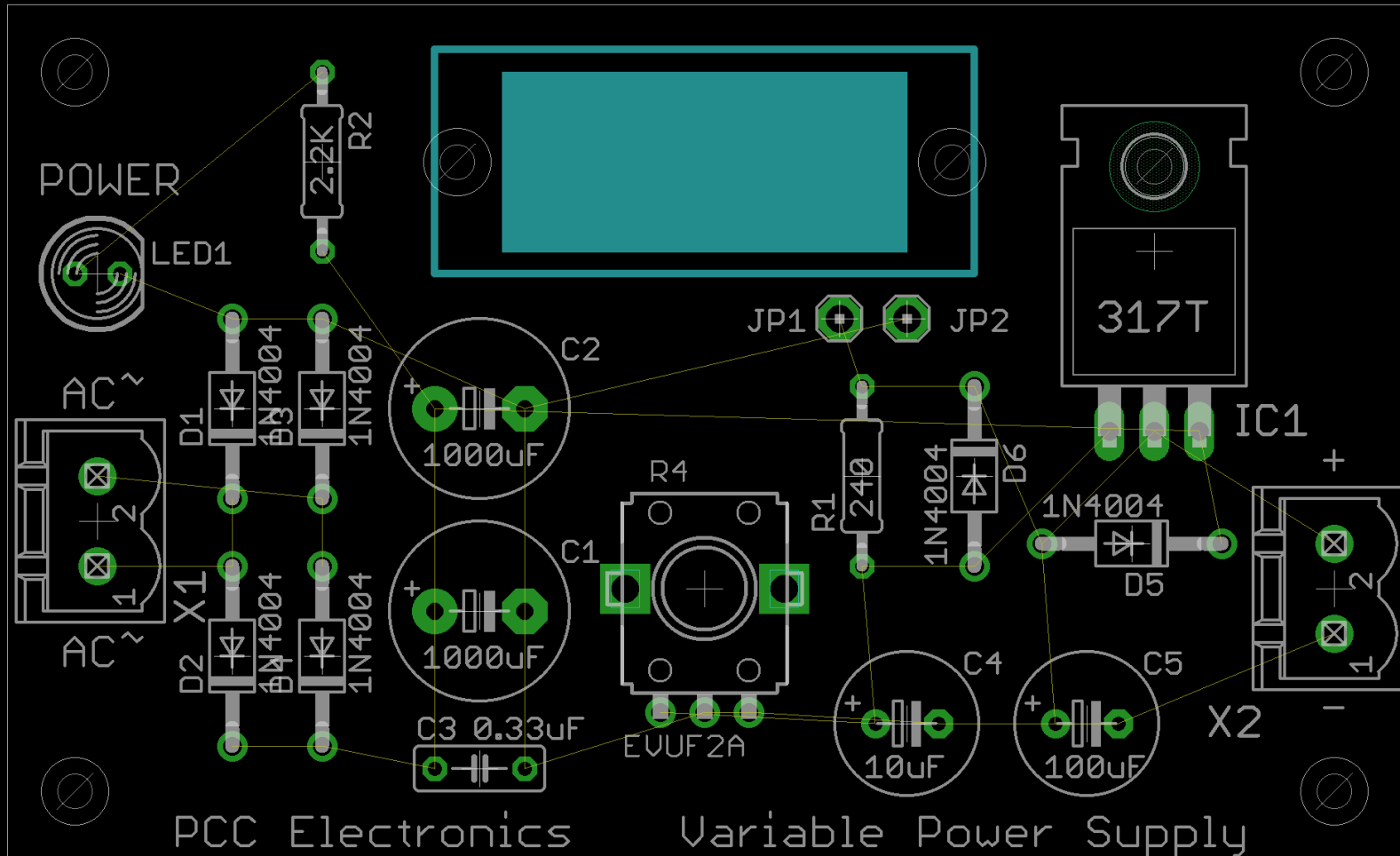
# Start layout...



Note: Inputs on left

# Completed Layout:

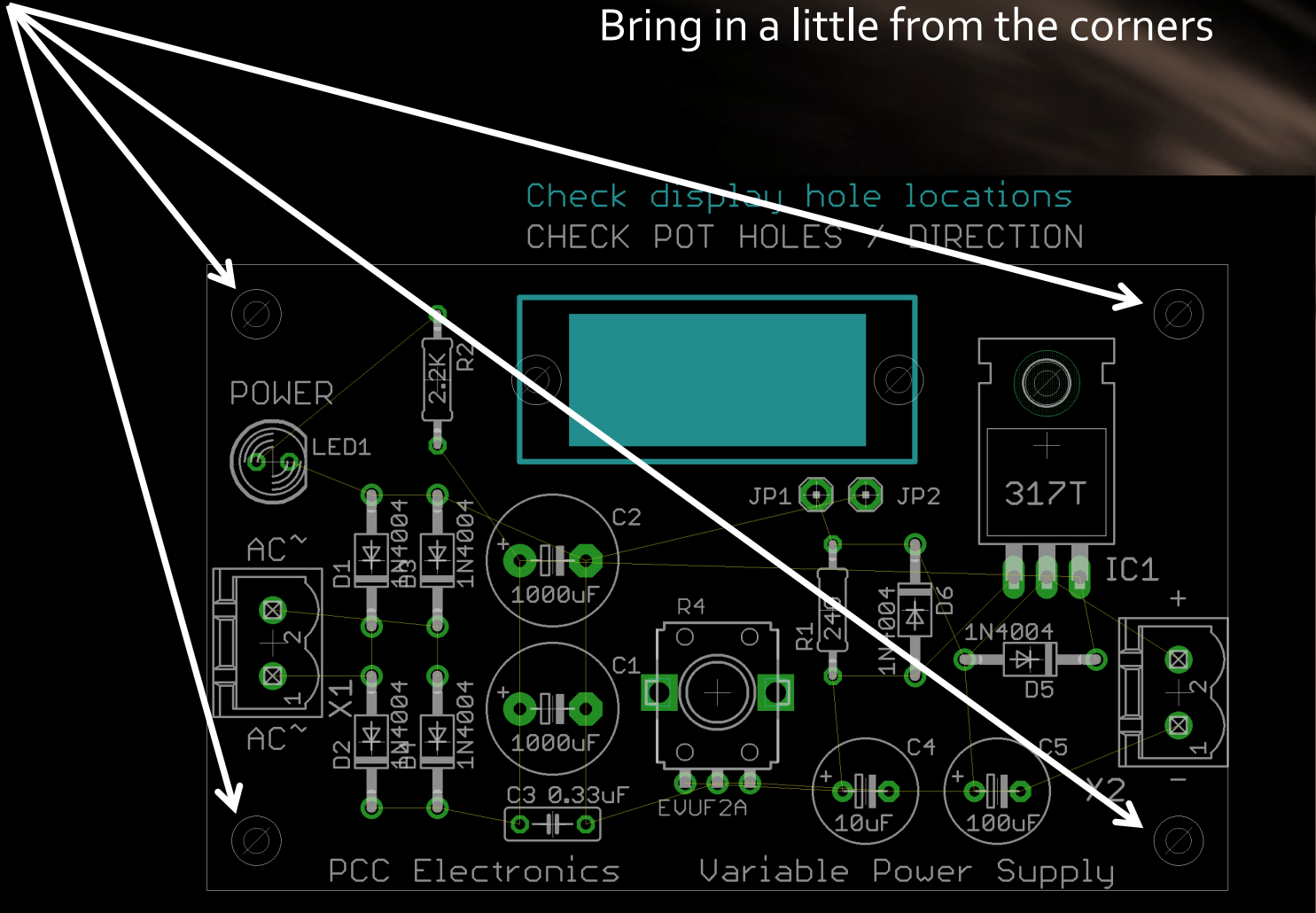
Check display hole locations  
CHECK POT HOLES / DIRECTION



# Mounting holes:

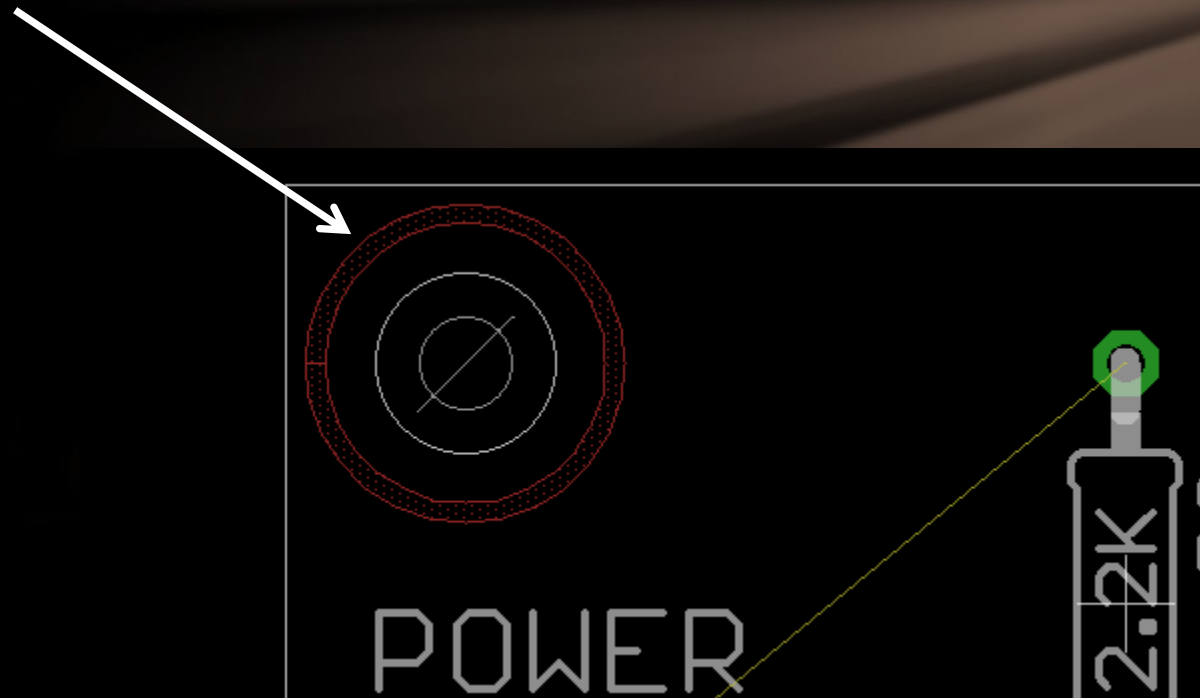
Use the "Hole" command in Eagle. Typically 0.150 diameter

Bring in a little from the corners



# Restricted areas: Preventing metal parts from overlapping traces

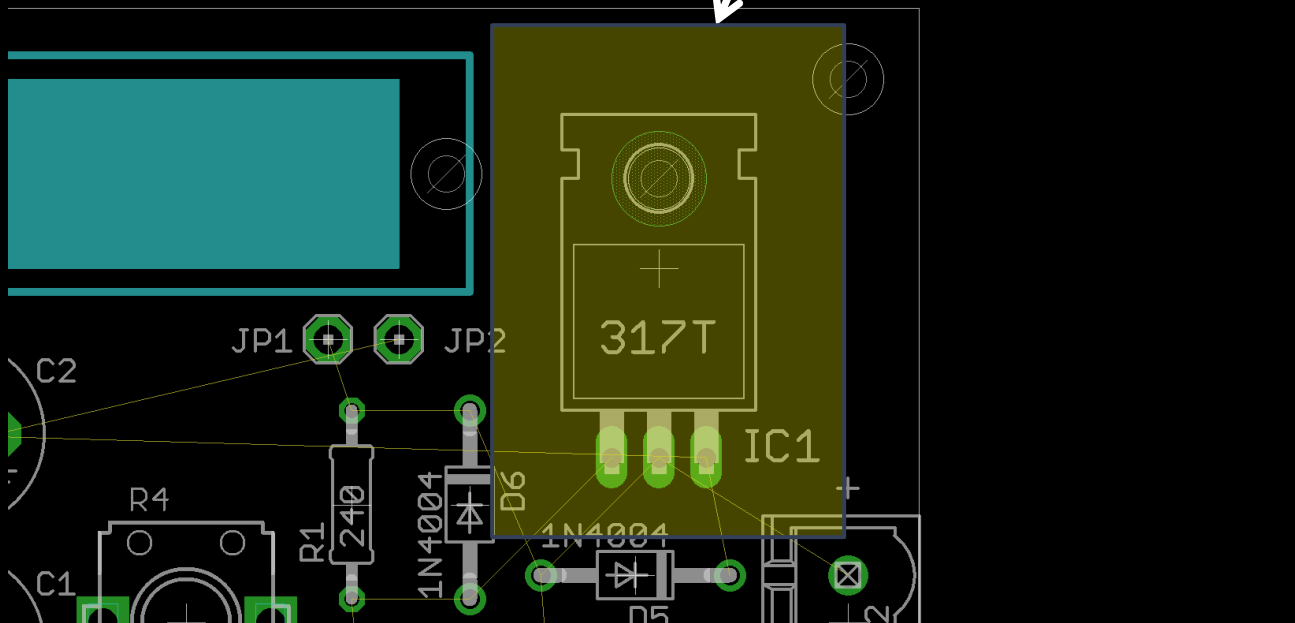
Place a circle and select layers 41 and 42 to keep traces out:





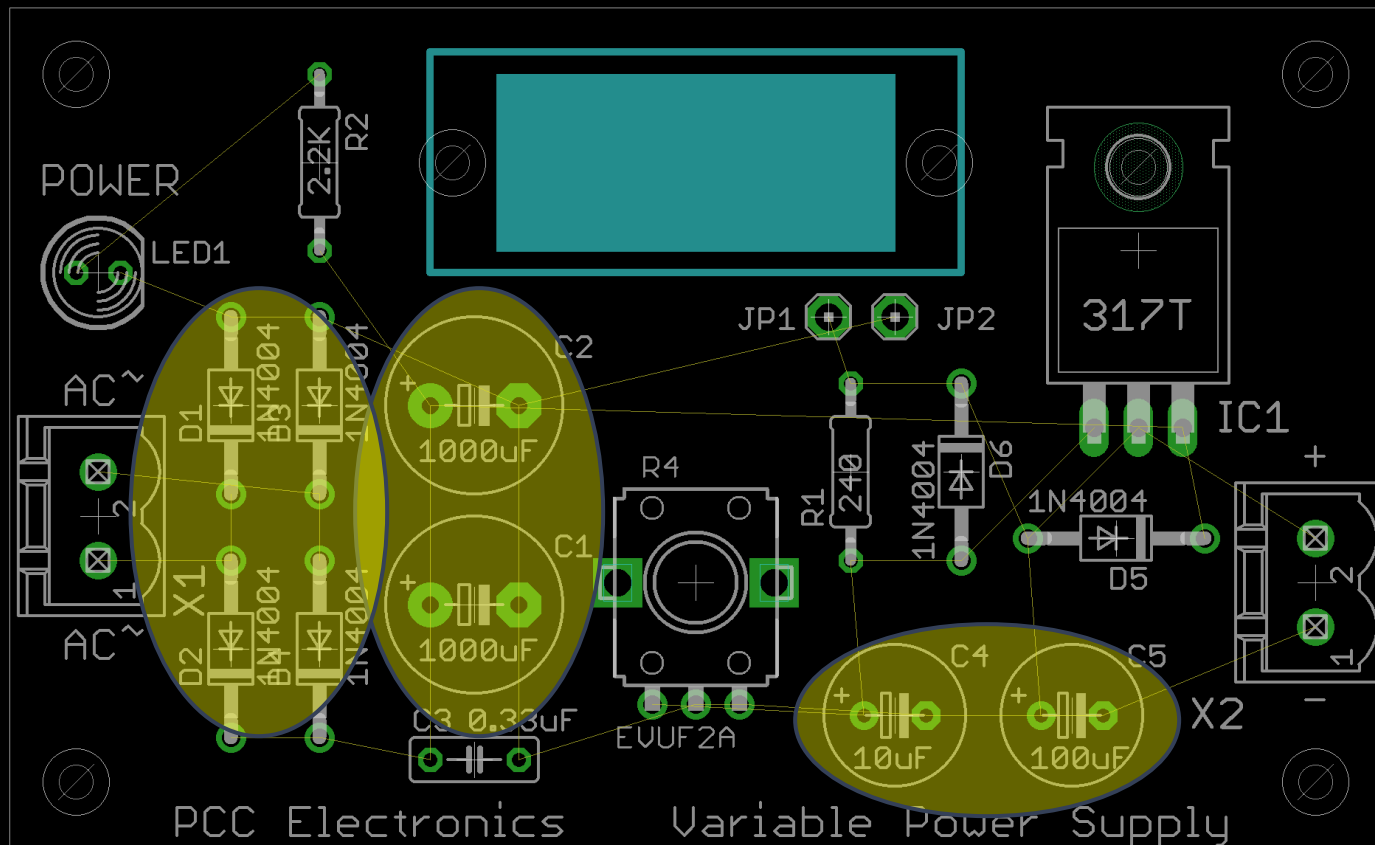
# Heat considerations: Isolate components that can get hot

Note space around voltage regulator:

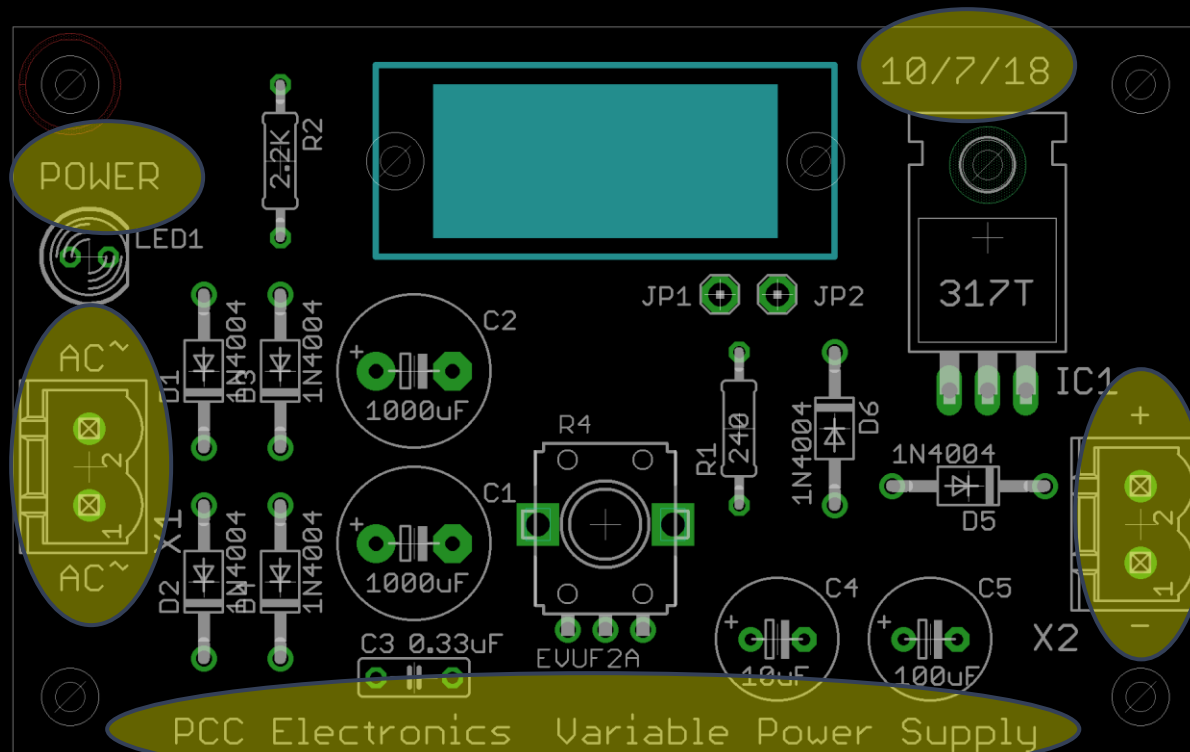


*DFM* – Design For Manufacturing: Try to be consistent with polarities / orientations – make it easy to solder!

Check display hole locations  
CHECK POT HOLES / DIRECTION



SILKSCREEN: (Use Text Command with layer 21):  
Include as much info as you can! Label inputs /  
outputs / names / dates, etc.



The GOAL is to make it so easy no manual is  
required to hook it up!!

Routing: Start with 20 mils trace / spacing  
Higher currents require wider trace widths  
Select using "class" command

Nr	Name	Width	Drill	Clearance
<input type="radio"/> 0	default	20mil	0mil	20mil
<input checked="" type="radio"/> 1		50mil	0mil	20mil
<input type="radio"/> 2		0mil	0mil	0mil
<input type="radio"/> 3		0mil	0mil	0mil
<input type="radio"/> 4		0mil	0mil	0mil
<input type="radio"/> 5		0mil	0mil	0mil
<input type="radio"/> 6		0mil	0mil	0mil
<input type="radio"/> 7		0mil	0mil	0mil
<input type="radio"/> 8		0mil	0mil	0mil
<input type="radio"/> 9		0mil	0mil	0mil
<input type="radio"/> 10		0mil	0mil	0mil
<input type="radio"/> 11		0mil	0mil	0mil
<input type="radio"/> 12		0mil	0mil	0mil
<input type="radio"/> 13		0mil	0mil	0mil
<input type="radio"/> 14		0mil	0mil	0mil
<input type="radio"/> 15		0mil	0mil	0mil

OK >> Cancel

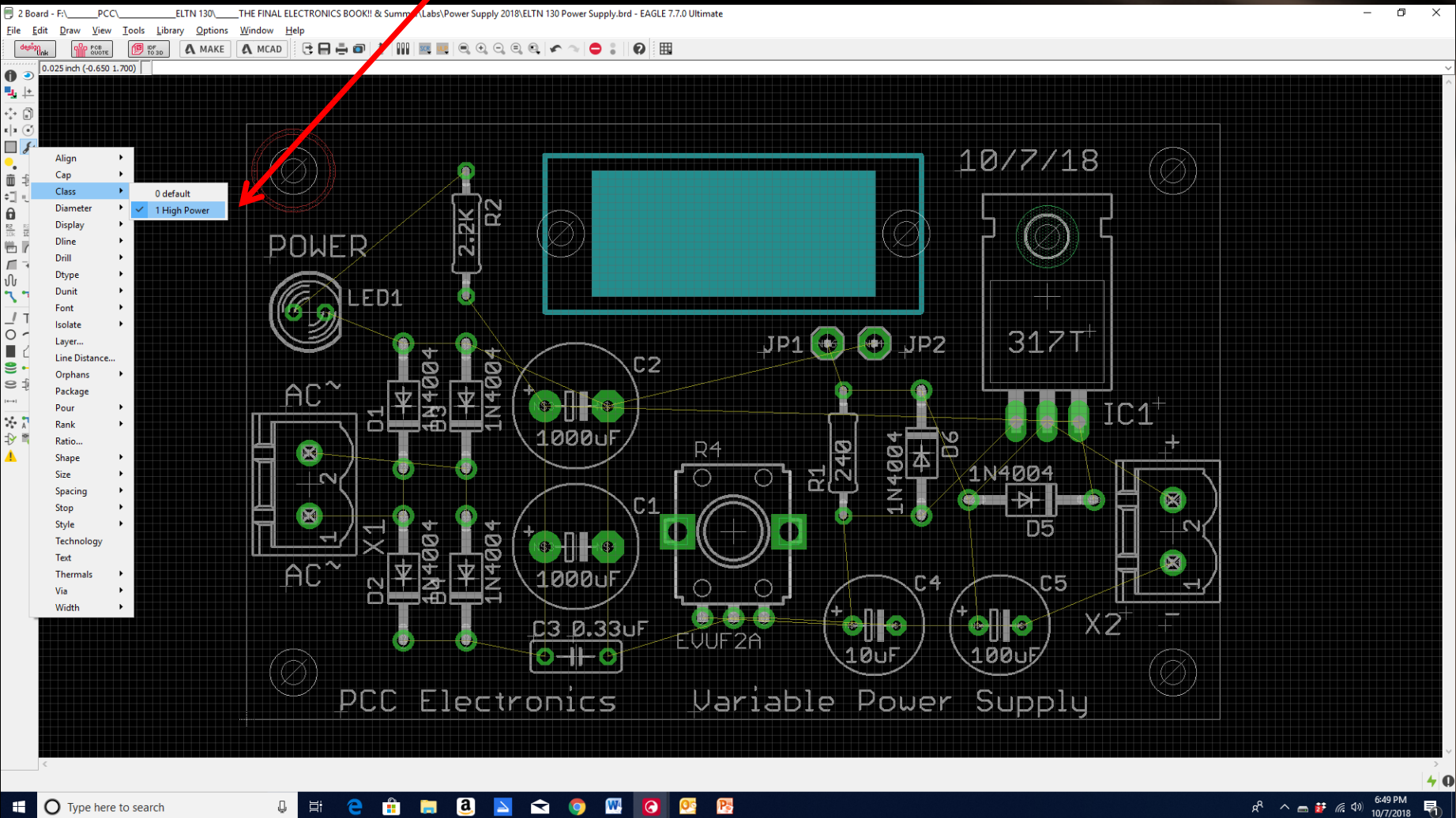
# Note: You can create different "classes" (trace widths / spacings)

Net classes

Nr	Name	Width	Drill	Clearance
<input checked="" type="radio"/> 0	default	25mil	0mil	35mil
<input type="radio"/> 1	High Power	50mil	0mil	20mil
<input type="radio"/> 2		0mil	0mil	0mil
<input type="radio"/> 3		0mil	0mil	0mil
<input type="radio"/> 4		0mil	0mil	0mil
<input type="radio"/> 5		0mil	0mil	0mil
<input type="radio"/> 6		0mil	0mil	0mil
<input type="radio"/> 7		0mil	0mil	0mil
<input type="radio"/> 8		0mil	0mil	0mil
<input type="radio"/> 9		0mil	0mil	0mil
<input type="radio"/> 10		0mil	0mil	0mil
<input type="radio"/> 11		0mil	0mil	0mil
<input type="radio"/> 12		0mil	0mil	0mil
<input type="radio"/> 13		0mil	0mil	0mil
<input type="radio"/> 14		0mil	0mil	0mil
<input type="radio"/> 15		0mil	0mil	0mil

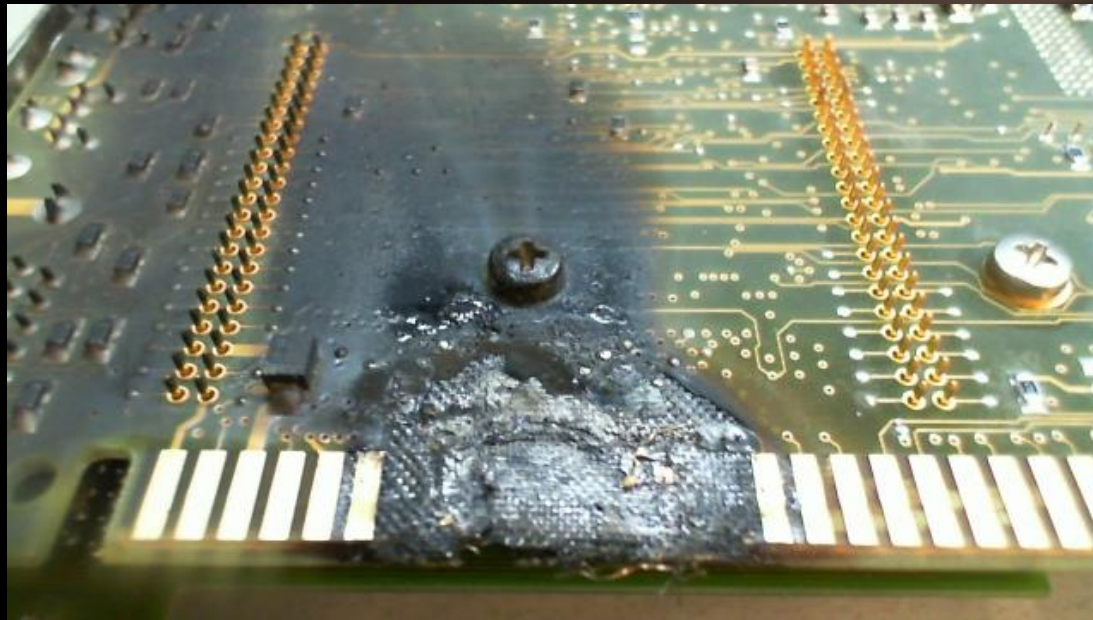
OK >> Cancel

# Trace classes can be changed with the "Change" command, selecting Class and clicking on traces



Trace widths can be determined using a trace width calculator  
This is based on current and heat.

<https://www.4pcb.com/trace-width-calculator.html>



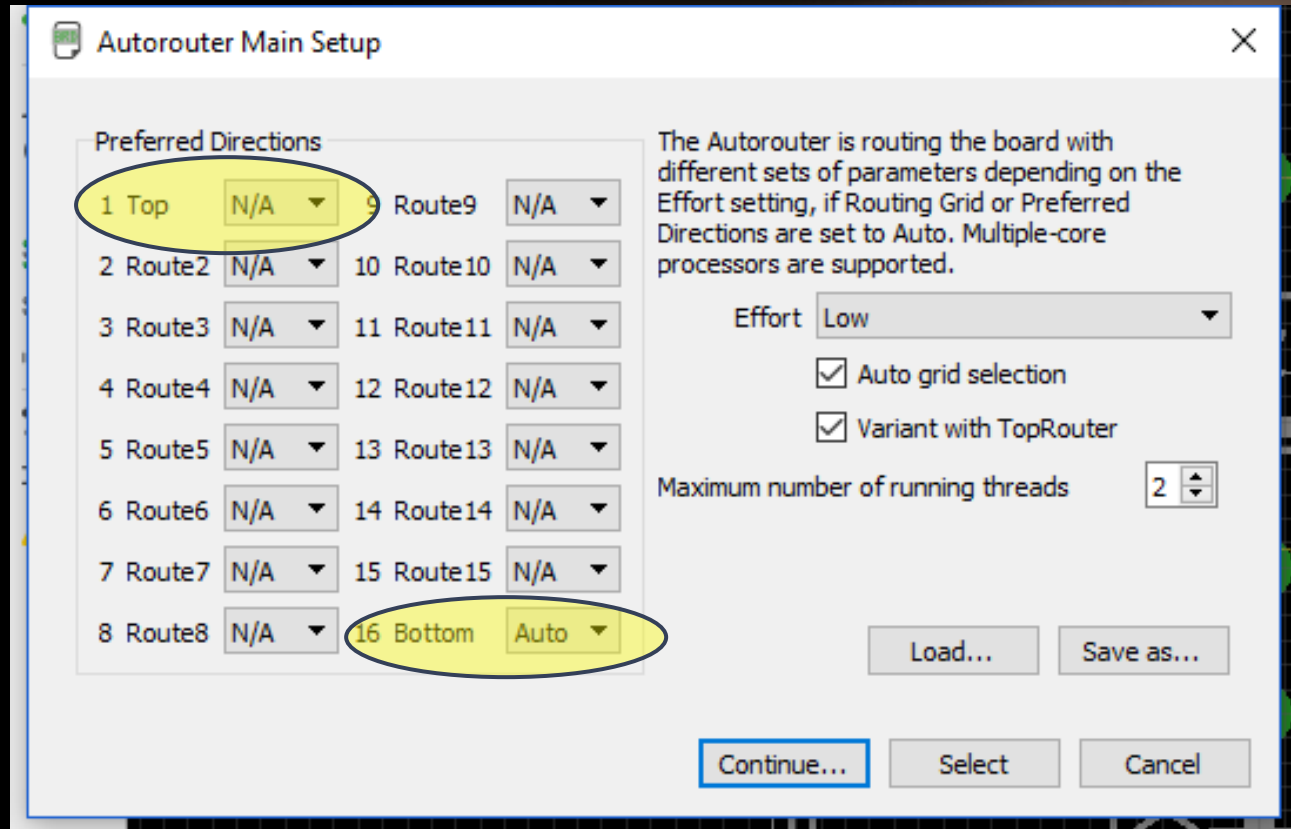
Most of the time not an issue – low currents don't require large traces

However if large currents are required traces can be replaced with wires or bus strips:

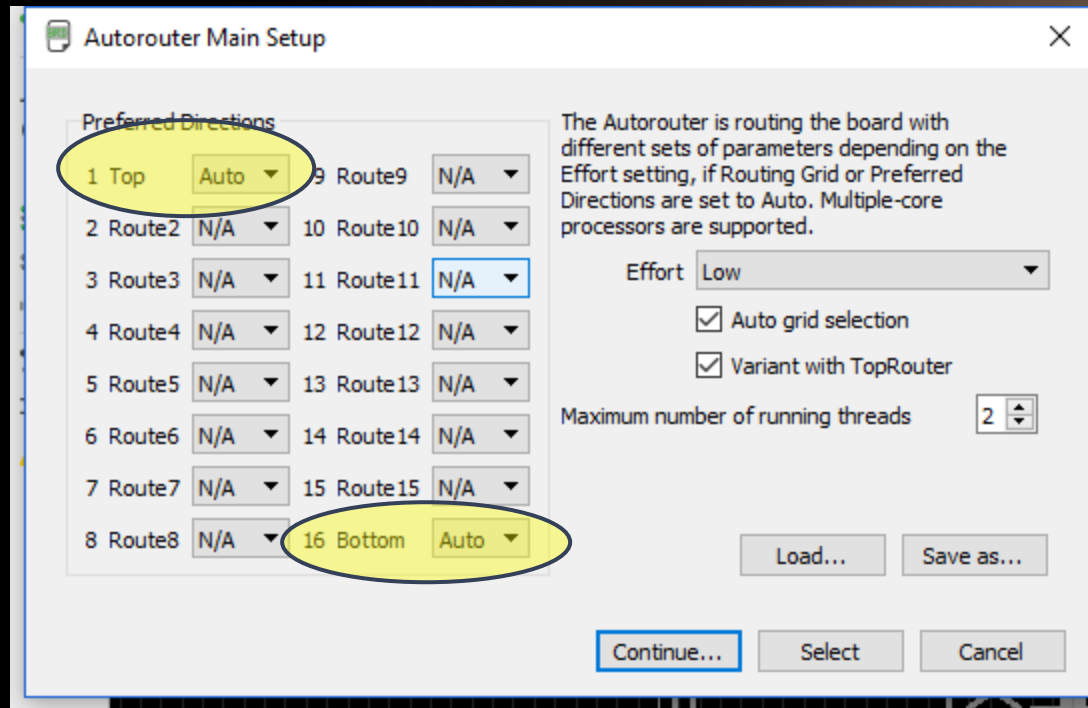




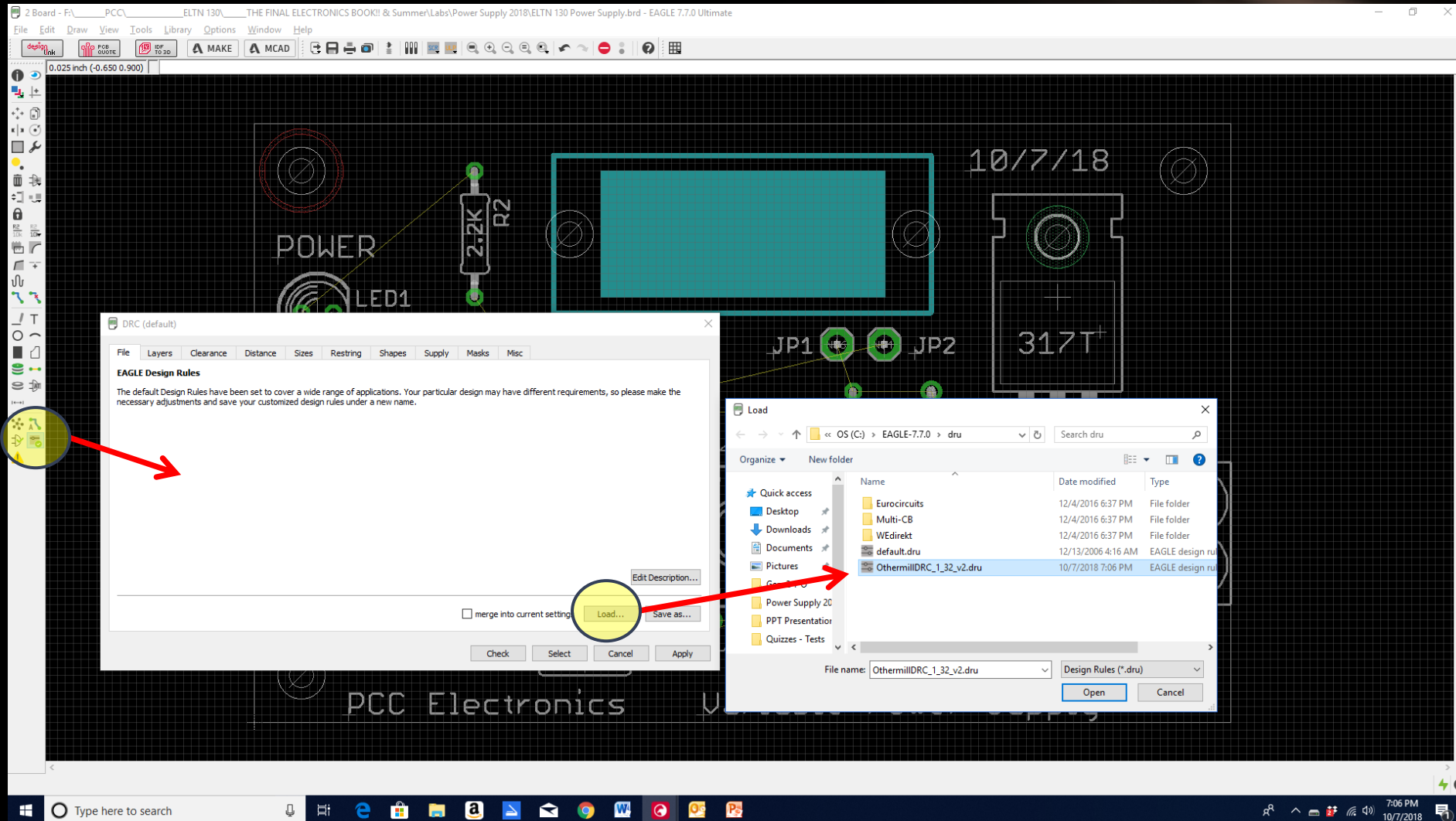
Autorouting:  
If using the Othermill, select:  
Bottom layer (Auto)  
Top Layer (N/A)



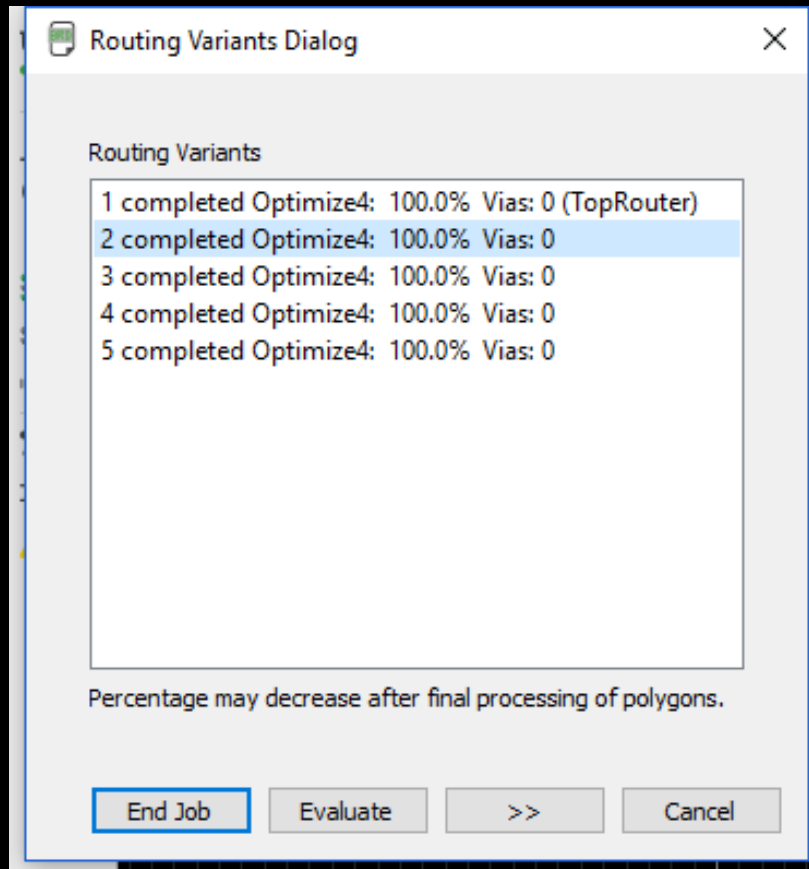
Autorouting:  
For double sided boards (later):  
Bottom layer (Auto)  
Top Layer (Auto)



# Autorouting with the Othermill: In order to route with the Othermill you MUST load the Othermill DRU's for routing! The file is located in Canvas...

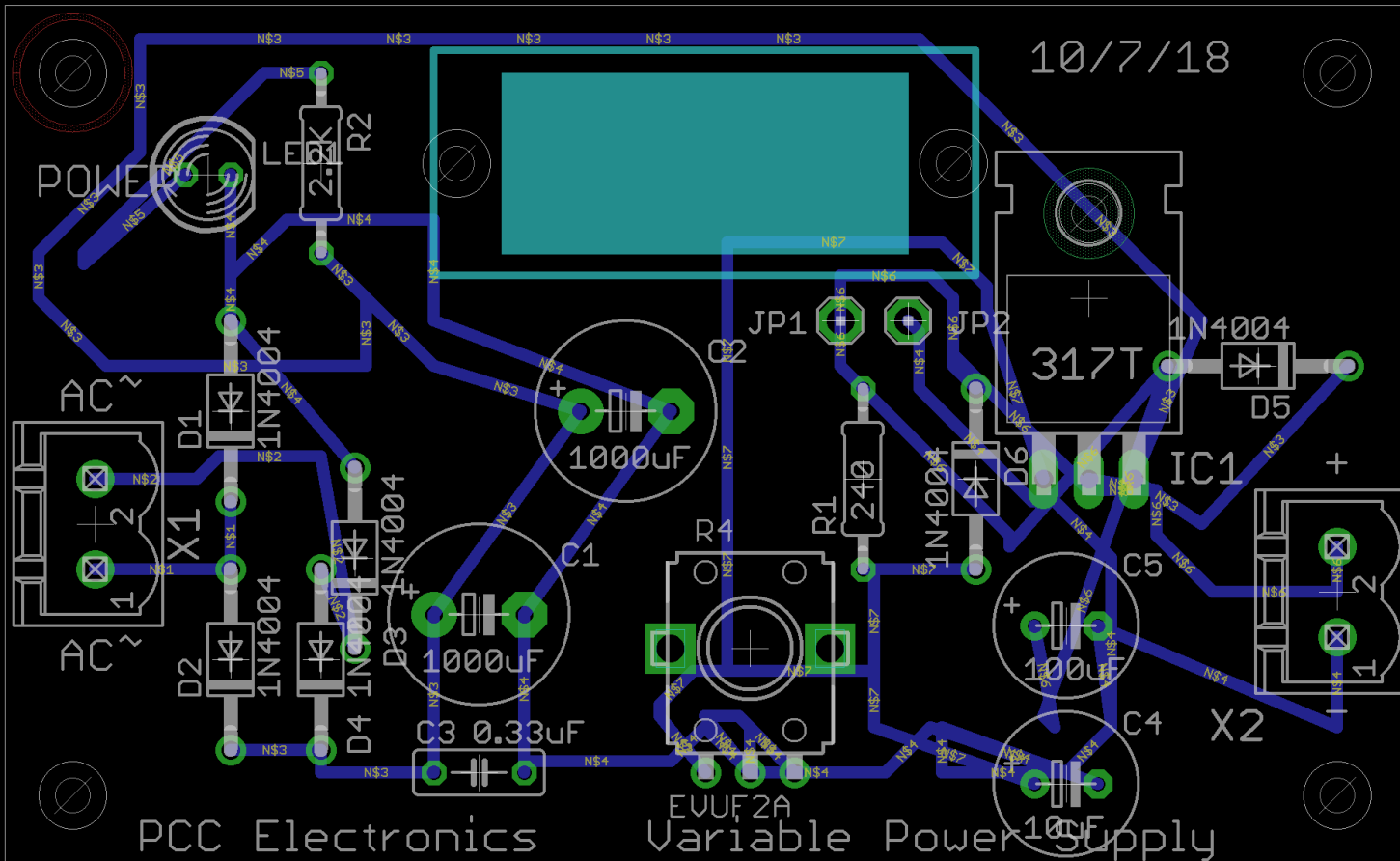


# Autorouting: When Autorouting make sure it gets to 100%

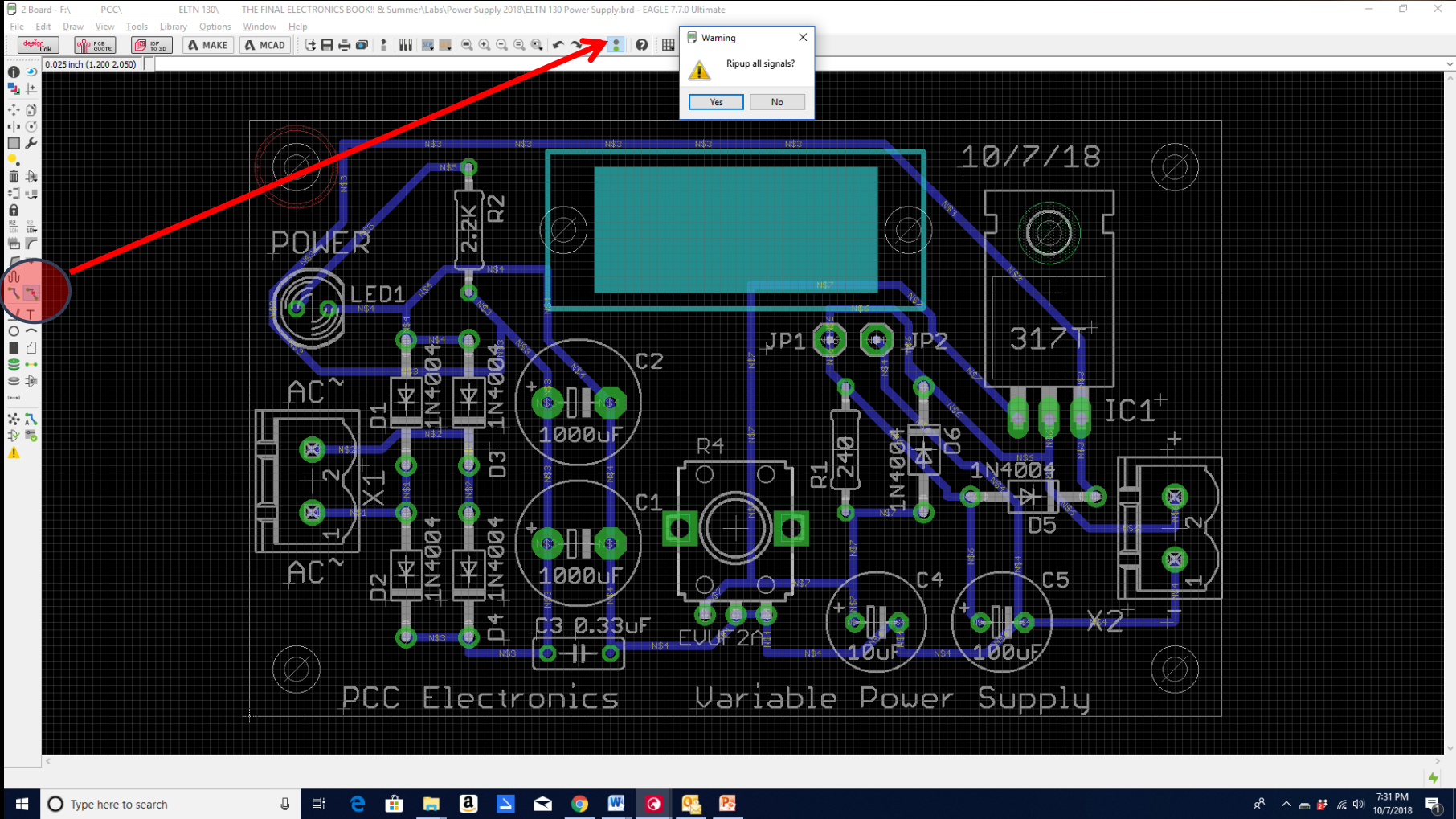


IMPORTANT!!!!!!

DO NOT move any components without RIPPING up first! What's wrong with this picture??

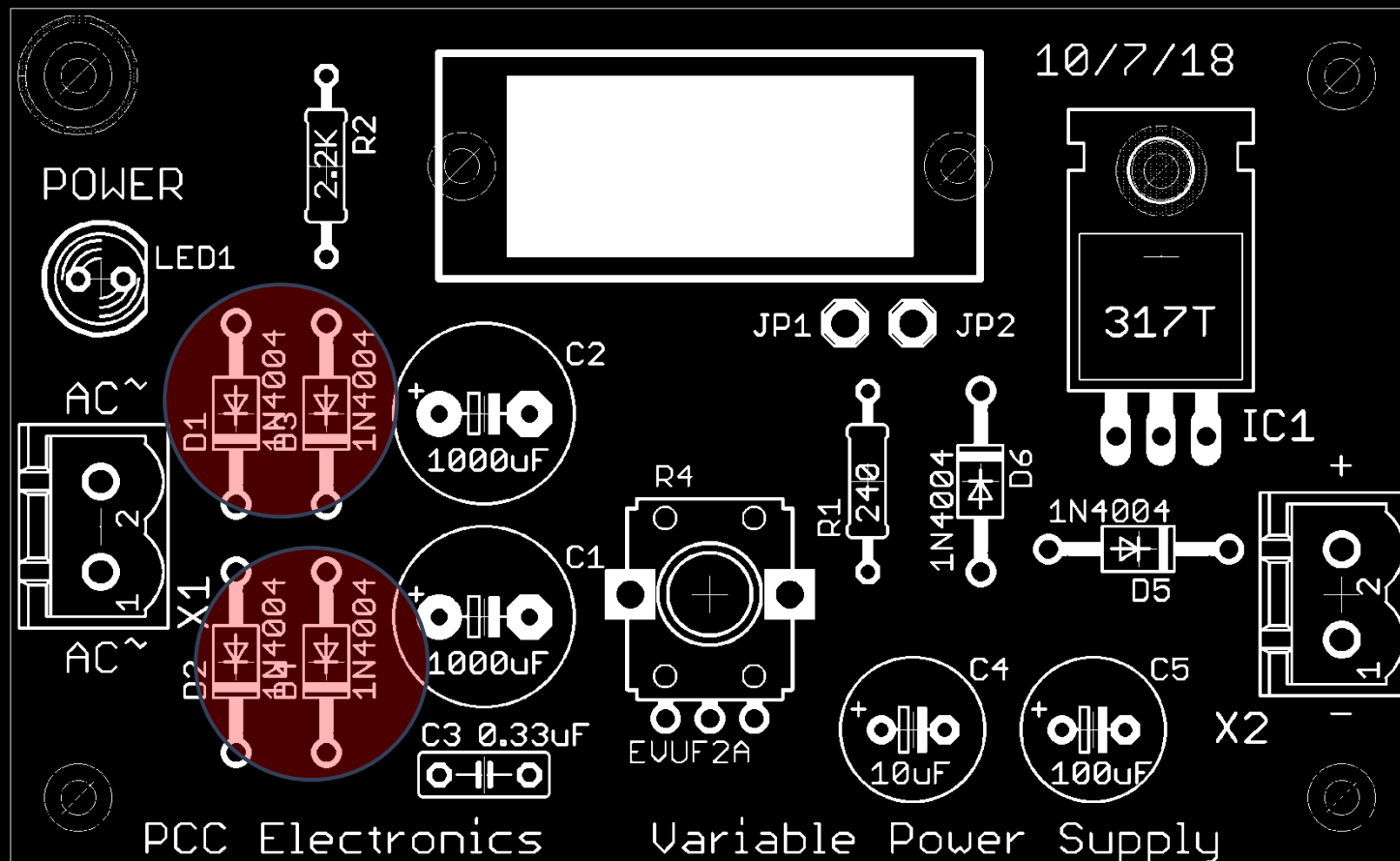


To ripup click the "Ripup" button, then the green traffic light signal and click "yes"





Once completed, turn off the layers 1,16, and 18 and print a 1:1 copy. This can be used to check if the components really fit! Also, check for Silkscreen errors...do you see any?





The "smash" command can be used to separate part numbers and text from the symbol, and allow them to be moved.

