

PM-MKII SWAN MARK II POWER SUPPLY REBUILD KIT v1.0

ASSEMBLY & INSTALLATION INSTRUCTIONS

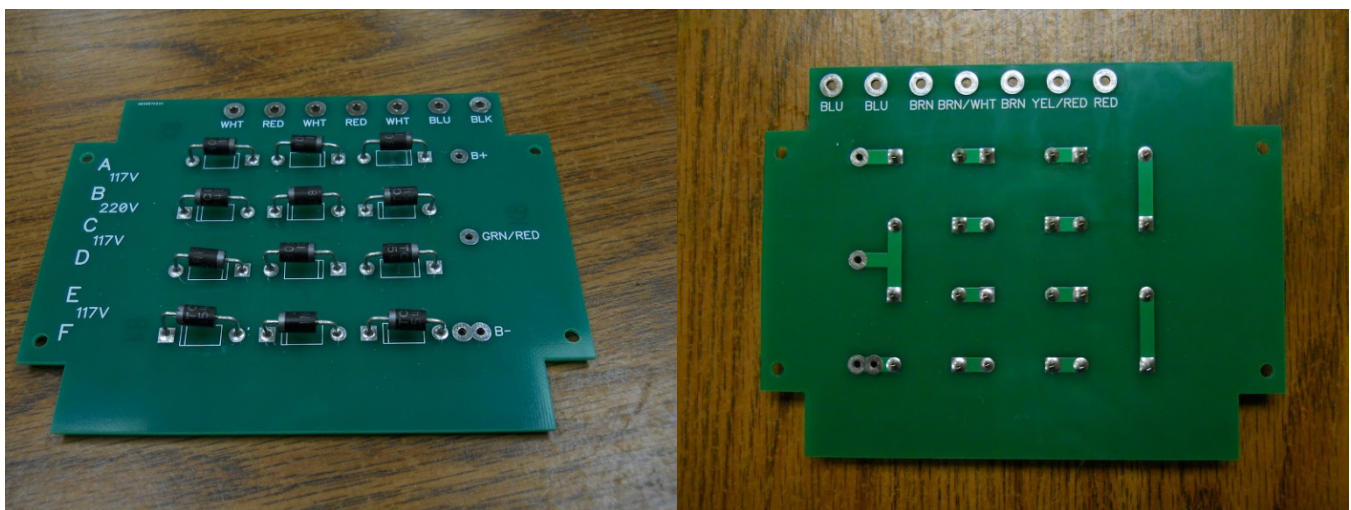
WARNING: Voltages inside the amplifier CAN & WILL KILL YOU! You MUST know how to work around HIGH VOLTAGE safely. If you do not, get assistance from someone who does. You MUST also be able to read your specific amplifier schematic and understand the design, theory and wiring of your amplifier to properly perform this upgrade.

- () **Read, read, re-read and fully understand these instructions prior to beginning this upgrade.** Make sure to perform the steps in the order they are listed. Also, be sure to label wires as they are disconnected from various points inside the amplifier. This will help when the time comes to re-attach the wires that will be disconnected during installation of the kit.
- () Go through the Bill of Materials (BOM) and compare that list with the parts in the kit to make sure all parts are present. If you are missing any parts, please contact Harbach Electronics, LLC.

PM-MKII RECTIFIER PCB ASSEMBLY (PCB-250)

Note: Both sides of the rectifier PCB are silkscreened. The bottom side of the PCB has the traces showing. The top side also has a silk screen but does not have any traces, only solder pads. Be sure to install components on the correct side of the PCB!

- () Install twelve (12) 1N5408 diodes (D1-D12) into the top side of the printed circuit board (PCB) according to PCB layout diagram and silk screen on the top of the PCB. **Note: DO NOT mount the diodes flat to the PCB. Leave approximately 1/8" spacing between the diode bodies and the PCB.** Solder the diode leads to the bottom side of the PCB and trim the leads just above the solder cone.
- () Refer to the pictures below for proper mounting and trimming of leads.



PM-MKII RECTIFIER PCB INSTALLATION

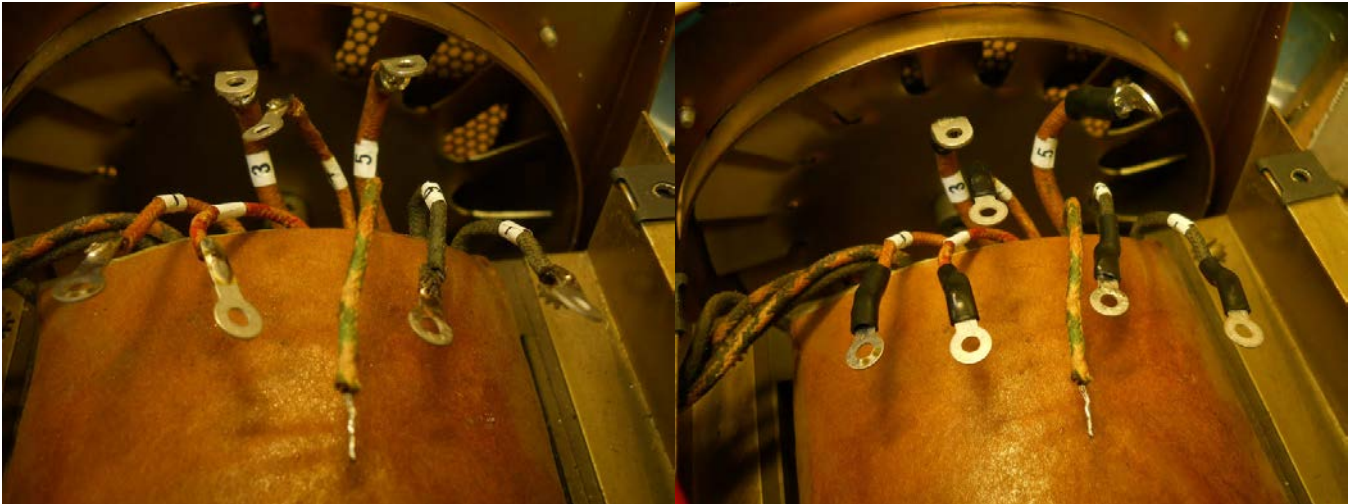
- () Unplug the amplifier power cord from the AC mains and let any high voltage stored in the electrolytic capacitors bleed down. Verify the HV has bled down as shown on the HV meter.
- () Remove the cover of the power supply by removing three (3) screws on each side of the cover.
- () Use a shorting bar or “chicken stick” to short the HV to ground to make sure any high voltage is completely bled off from the electrolytic capacitors.
- () Examine the original rectifier PCB and note that along the left hand edge there are seven (7) wires connected to the top or component side of the PCB and that the wire colors are printed on the top side of the new PCB. Also note that there are seven (7) transformer leads connected to these same seven (7) points on the bottom of the original PCB. The transformer lead colors are printed on the bottom side of the new PCB. Additionally there is a GRN/RED transformer lead connected near the top middle of the original PCB as well as the two leads for B+ and B-.
- () Begin removal of the original rectifier PCB by removing the four (4) #6 mounting screws and spacers used to mount the PCB to the bracket on the transformer. Carefully unsolder the GRN/RED transformer lead, the two (2) leads for B+ and B-, and the seven (7) leads along the left edge of the PCB.
- () Carefully swing the PCB up along the left edge and VERY CAREFULLY unsolder and remove the seven (7) transformer leads from along the left edge of the PCB. **Note: These leads are very short and there is no excess length present! The cloth/rubber insulation is old and may be very brittle. DO NOT just cut the leads or they will be too short! Make every attempt to preserve the integrity and length of the leads and clean the end of excess solder.**
- () In the following steps you will install a short length of heat shrink tubing over each of the seven (7) transformer leads and install a solder lug on each lead. There are two (2) sizes of solder lugs. The larger 12-10 AWG #4 lugs are used on the heavy (filament lead) connections (holes #3 & #5 labeled BRN and BRN on the bottom side of the PCB). The smaller #4 ring terminal lugs are for the remaining transformer leads. Refer to the pictures below for identification of each type of solder lug.



12-10 AWG #4 LUG #4 RING TERMINAL

- () Cut a 5/8" length of heat shrink tubing and slide it all the way down on each transformer lead towards the body of the transformer. Use 1/4" heat shrink tubing for the two (2) BRN filament leads and 3/16" heat shrink tubing for the rest of the leads.

- () Select the appropriate size lug and place it on the end of a transformer lead. Orient the lug with the back side towards the rear of the power supply. Solder the lug to the lead filling the wire cavity of the lug with solder. Trim any excess bit of wire from the lug. Slide the heat shrink tubing on each transformer lead up onto the lug and shrink it secure over the wire connection barrel. Make sure not to slide the heat shrink tubing too far on to the lug. It should not cover any portion of the screw hole in the lug.
- () Refer to the pictures below for proper attachment of solder lugs and heat shrink tubing.

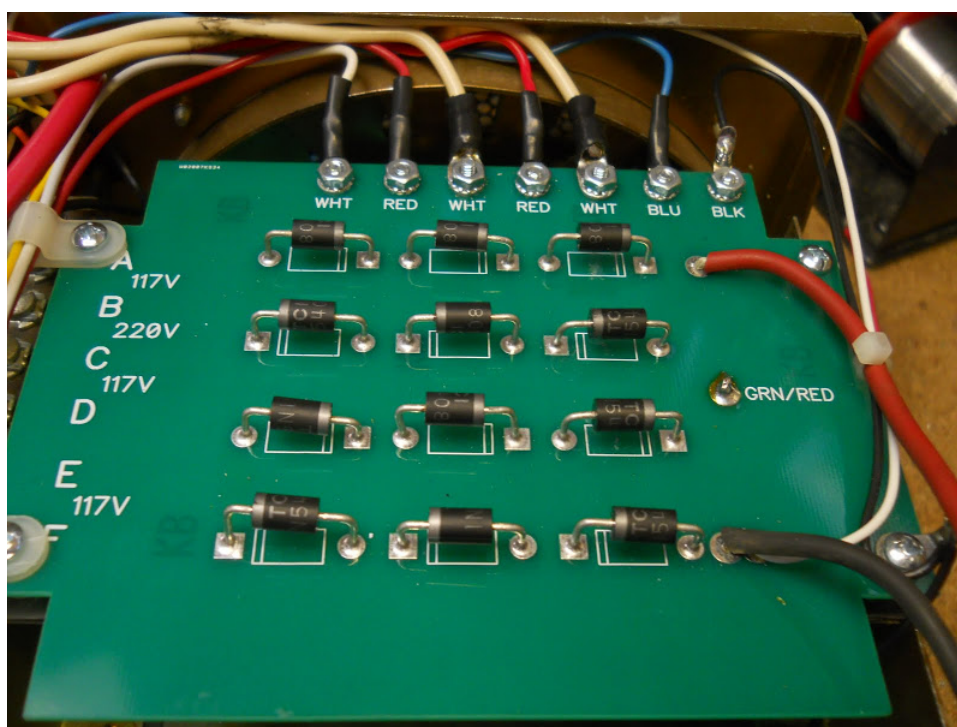


- () Start at the top end bottom side of the PCB (hole #1-BLU transformer lead) and work towards the bottom of the board (hole #7-RED transformer lead). At each lead location and from the bottom side of the PCB, place a #4-40 x 3/8" or #4-40 x 1/2" machine screw through the lug then up through the corresponding hole in the PCB. Then add the appropriate size solder lug on top of the board and then a #4-40 nut with integral lock washer. **DO NOT tighten the #4-40 nuts at this time!**

Note: Holes #3 & #5 require the larger 12-10 AWG #4 lugs on the top of the PCB with the barrels facing upwards. The remaining 5 holes require the smaller #4 ring terminals. The #4-40 x 1/2" machine screws are used at holes #3 & #5 as the larger solder lugs are used. The remaining holes require the #4-40 x 3/8" machine screws.

- () With the seven (7) transformer leads in place along the bottom side of the rectifier PCB, the PCB can be hinged down into its approximate mounting position.
- () Cut a 5/8" length of heat shrink tubing and slide it all the way down on each wire that connects to the lugs on the top side of the PCB along the left edge. Slide the tubing far enough down the wires so that it will not shrink when soldering the lugs to the wires. Use 1/4" heat shrink tubing for the two (2) WHITE filament wires and 3/16" heat shrink tubing for the rest of the wires.
- () Solder the wires to the appropriate lugs filling the wire cavity of the lug with solder. Trim any excess bit of wire from the lug. Slide the heat shrink tubing on each wire up onto the lug and shrink it secure over the wire connection barrel. Make sure not to slide the heat shrink tubing too far on to the lug. It should not cover any portion of the screw hole in the lug.
- () Starting with the top connection of the left hand side of the board, align the set of lugs and tighten the connection secure. An index finger of one hand under the board stabilizing the screw and 1/4" nut driver on top tightening the nut is the easiest way to do this. Give the transformer lead lugs a downward cast and the wiring connection lugs above the board an upward cast.

- () Solder and trim the B+ (1) and B- (2) wires to the solder pads marked on the PCB. Insert the wires through the PCB from the top side and solder on the bottom side. **Note: There are two (2) B- wires. One (1) goes to the B- on capacitor board and one (1) goes to the amplifier chassis through the remote cable.**
- () Solder and trim the GRN/RED transformer lead to the solder pad marked on the PCB. Insert the wires through the PCB from the bottom side and solder on the top side.
- () Install the new rectifier PCB in place using the original spacers under the board using new #6-32 X 3/4" machine screws and new #6-32 nuts with integral lock washers. The original Swan mounting screws were the thread cutting variety and frequently damaged the holes when they are removed. The PCB should be mounted secure to the chassis especially the upper right corner which also has a ground lug connection.
- () Refer to the picture below of the completed rectifier PCB installation.

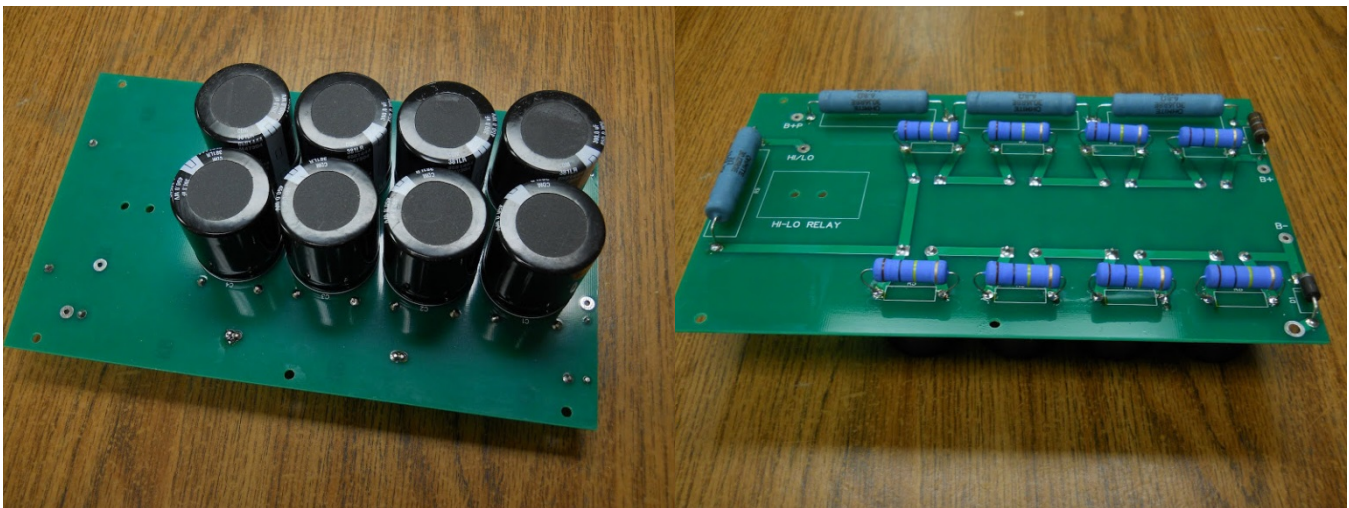


- () Inspect the installation thus far for any wire clippings and dropped hardware which could cause a short circuit or damage to the fan.
- () This completes the rectifier PCB assembly and installation portion of the power supply rebuild.

PM-MKII FILTER CAPACITOR PCB ASSEMBLY (PCB-251)

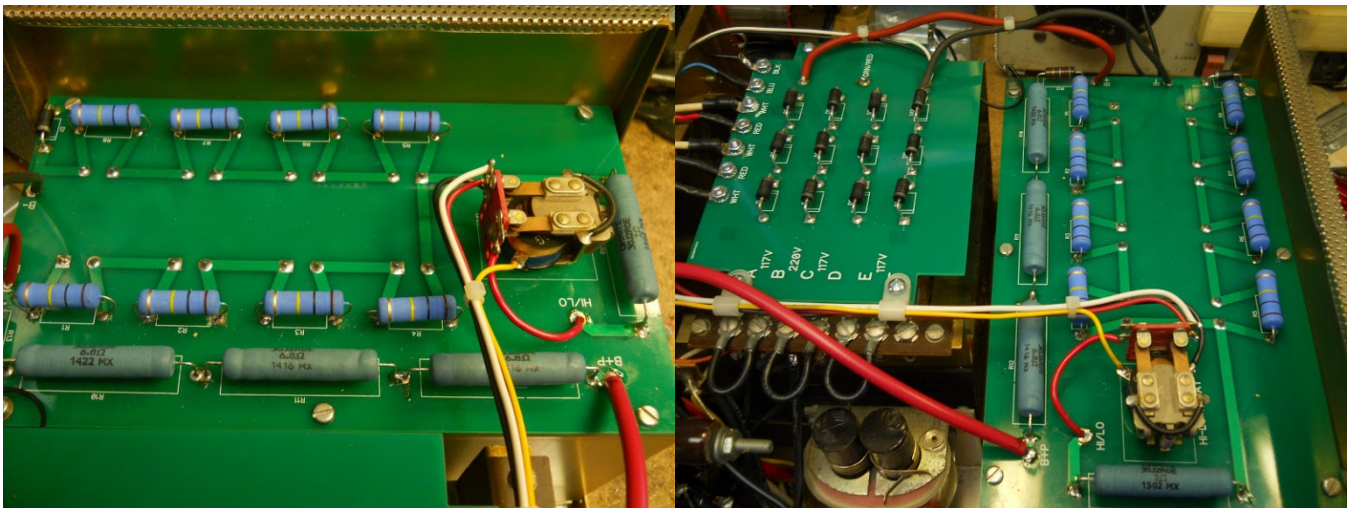
Note: Both sides of the filter capacitor PCB are silkscreened. The top side of the PCB has the traces showing. The bottom side also has a silk screen but does not have any traces, only solder pads. Be sure to install components on the correct side of the PCB!

- () Insert eight (8) 330 μ F/450VDC electrolytic capacitors (C1-C8) into the bottom side of the PCB according to the parts layout diagram and silk screen on the bottom of the PCB. Be sure to insert each capacitor with the correct polarity! The NEGATIVE terminal s denoted by the gray strip down the side of body of the capacitor. The POSITIVE terminal has no marking on the capacitor and goes in the hole denoted with a plus sign (+). Solder the capacitors terminals to the top side of the PCB and trim the sharp points of the leads just above the solder cone.
- () Insert eight (8) 100K Ω resistors (R1-R8) into the top side of the PCB according to the parts layout diagram and silk screen on the top of the PCB. Do not place the resistor flush against the PCB. Make sure to leave 1/4" space between the body of the resistor and the PCB. Solder the resistor leads to the bottom side of the PCB and trim the leads just above the solder cone.
- () Insert one (1) 1N5408 diode (D13) into the top side of the PCB according to parts layout diagram and silk screen on the top of the PCB. **Note: DO NOT mount the diode flat to the PCB. Leave approximately 1/4" spacing between the diode body and the PCB.** Solder the diode leads to the bottom side of the PCB and trim the leads just above the solder cone.
- () Insert one (1) 0.82 Ω 3-watt HV fuse resistor (R13) into the top side of the PCB according to parts layout diagram and silk screen on the top of the PCB. **Note: DO NOT mount the resistor flat to the PCB. Leave approximately 1/4" spacing between the resistor body and the PCB.** Solder the resistor leads to the bottom side of the PCB and trim the leads just above the solder cone.
- () Insert three (3) 6.8 Ω 10-watt HV glitch resistors (R10-R12) into the top side of the PCB according to parts layout diagram and silk screen on the top of the PCB. **Note: DO NOT mount the resistors flat to the PCB. Leave approximately 1/4" spacing between the resistor bodies and the PCB.** Solder the resistor leads to the bottom side of the PCB and trim the leads just above the solder cone.
- () Insert one (1) 2 Ω 10-watt surge resistor (R9) into the top side of the PCB according to parts layout diagram and silk screen on the top of the PCB. **Note: DO NOT mount the resistor flat to the PCB. Leave approximately 1/4" spacing between the resistor body and the PCB.** Solder the resistor leads to the bottom side of the PCB and trim the leads just above the solder cone.
- () Refer to the pictures below for correct parts orientation and installation.



PM-MKII FILTER CAPACITOR PCB INSTALLATION

- () Carefully remove K3 (HI-LO relay) from the original filter capacitor PCB (save the mounting hardware), remove the soldered connections for B+, B-, and HV OUT.
- () Remove the original filter capacitor PCB by removing six (6) #6 sheet metal screws holding the PCB in place.
- () Solder the B+ and B- wires from the new rectifier PCB to the filter capacitor PCB at the solder pads marked B+ & B-. Insert the B+ & B- wires through the PCB from the top side and solder on the bottom side of the filter capacitor PCB. Trim any excess wire just above the solder cone.
- () Mount K3 (HI-LO relay) on the top side of the filter capacitor PCB using the original mounting hardware. The location is silk screened on the top side of the PCB. Solder the HI/LO wire from the relay to the solder pad labeled HI/LO on the filter capacitor PCB. Insert HI/LO wire through the PCB from the top side and solder on the bottom side of the filter capacitor PCB. Trim any excess wire just above the solder cone.
- () Solder the HV OUT wire to the solder pad marked B+P on the new filter capacitor PCB. Insert B+P wire through the PCB from the top side and solder on the bottom side of the filter capacitor PCB. Trim any excess wire just above the solder cone. **Note: This wire was previously connected direct to the B+ wire on the original filter capacitor PCB but has been moved to a new location after the HV fuse resistor R13 and HV glitch resistors R10-R12.**
- () Install two (2) 1/4" nylon cable clamps around the four (4) leads to the HI-LO relay (RED, WHITE, BLACK & YELLOW) and secure the clamps using the lower rectifier PCB mounting screws. These clamps will allow the four (4) wires to be dressed away from resistor R12 on the filter capacitor PCB.
- () Install the new filter capacitor PCB in the original location using new #6-32 X 3/4" machine screws and new #6-32 nuts with integral lock washers.
- () Refer to the pictures below for correct PCB installation and final wiring connections.



- () Perform a final inspection inside the power supply for loose bits of solder or wire clippings and remove as these could cause a short circuit and result in damage to the new power supply!

FINAL ASSEMBLY & TESTING

- () Replace the cover on the power supply using the original three (3) screws on each side of the cover.

Note: NEVER operate the power supply in any orientation except the normal upright position. The original Swan design utilized a mercury displacement relay for AC power control and it MUST be operated in only normal upright position.

- () Connect the AC power cord to the appropriate AC mains power.
- () With the meter switch set to HV position, turn the power switch to the TUNE / CW position. The HV meter should indicate approximately 1.5KVDC. Turn the power switch to the SSB position. The HV meter should indicate approximately 2.9KVDC.
- () This completes the assembly, installation and testing of the PM-MKII power supply rebuild kit.

PM-MKII BILL OF MATERIALS (BOM)				
Verification	Harbach Electronics P/N	Quantity	Description	Designation
[]	PCB-250	1	PM-MARK II Rectifier PCB v1.0	N/A
[]	PCB-251	1	PM-MARK II Filter Capacitor PCB v1.0	N/A
[]	CAP-165	8	330 μ F 450 VDC Electrolytic Capacitor	C10-C16
[]	DIO-102	13	1N5408 Diode	D1-D13
[]	HST-250	7"	3/16" Heat Shrink Tubing	N/A
[]	HST-251	3"	1/4" Heat Shrink Tubing	N/A
[]	LUG-250	10	#4 Ring Terminal	N/A
[]	LUG-251	4	12-10 AWG #4 Lug	N/A
[]	NUT-106	7	#4-40 Nut with Integral Lock Washer	N/A
[]	NUT-107	10	#6-32 Nut with Integral Lock Washer	N/A
[]	RES-101	8	100K Ω 3-Watt Resistor	R1-R8
[]	RES-255	1	2 Ω 10-Watt Resistor	R9
[]	RES-256	3	6.8 Ω 10-Watt Resistor	R10-R12
[]	RES-400	1	0.82 Ω 3-Watt Resistor	R13
[]	SCR-255	5	#4-40 x 3/8" Machine Screw	N/A
[]	SCR-256	2	#4-40 x 1/2" Machine Screw	N/A
[]	SCR-106	10	#6-32 x 3/4" Machine Screw	N/A
[]	CCL-250	2	1/4" Nylon Cable Clamp	N/A

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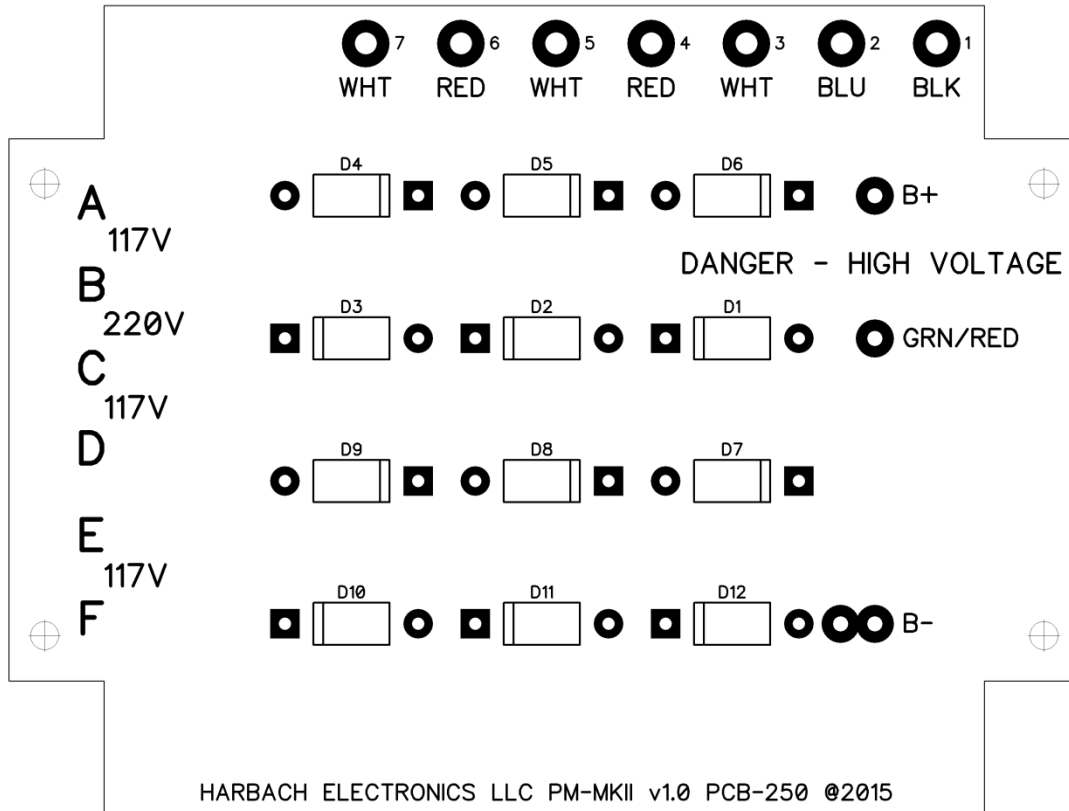
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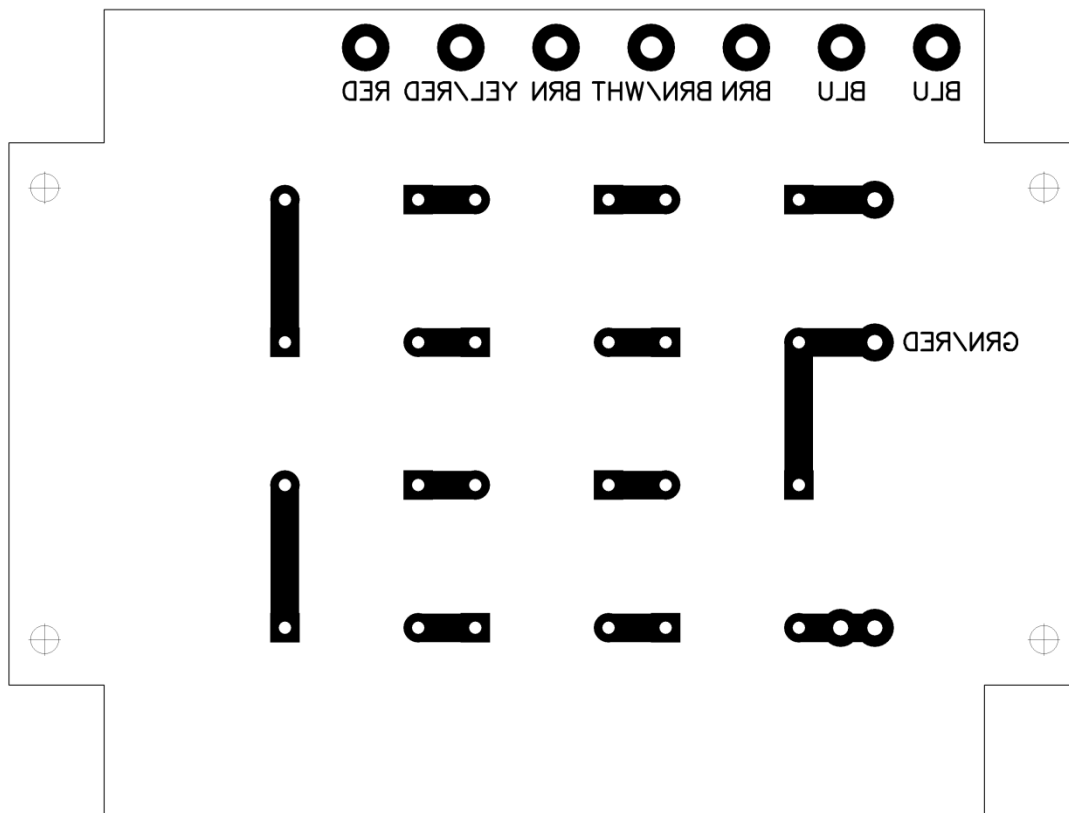
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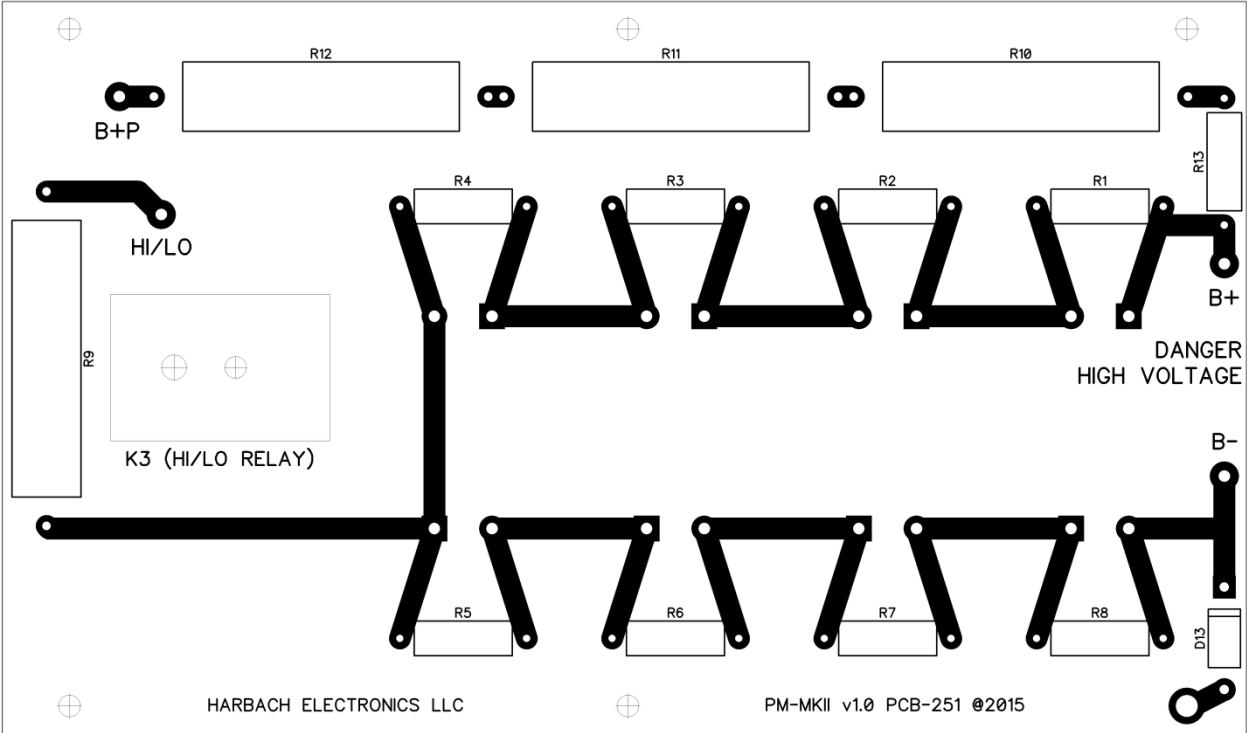
PM-MKII RECTIFIER PCB LAYOUT (PCB-250 TOP SIDE)



PM-MKII RECTIFIER PCB LAYOUT (PCB-250 BOTTOM SIDE)



PM-MKII FILTER CAPACITOR PCB LAYOUT (PCB-251 TOP SIDE)



PM-MKII FILTER CAPACITOR PCB LAYOUT (PCB-251 BOTTOM SIDE)

