

I. Introduction.

Thank you for purchasing the Scotty's Sled Shed Custom Power Supply Restoration Kit for Heathkit SB-400 and SB-401 model Transmitters.

This kit is intended for units with unmodified power supplies, in the original OEM configuration.

This kit was developed to help fellow vintage electronic enthusiasts.

You will need the following to install this kit:

1. Hot soldering iron (to remove chassis soldered original twist tab capacitors)
2. Desoldering tool or wick.
3. Solder
4. Painter's tape
5. Basic tools.
6. Eye protection suggested.
7. Fume extractor suggested.



Before you get started there is a list of items to be aware of.

1. Due to constant supply chain challenges, Scotty's Sled Shed reserves the right to substitute component OEMs. If there is an orange bodied resistor in installation guide images and you receive a blue bodied resistor, it is due to component substitutions.
2. You may see a blue capacitor in one pic and a yellow capacitor in another picture. Multiple pictures may have been taken over various kits with different capacitor values or manufacturers.
3. Scotty's Sled Shed LLC is only providing you with components for a DIY installation.
4. The following instructions are only a guide. Experienced users may have a preferred method of installation.
5. **CAUTION: Lethal voltages are present in these devices.** If you are not aware of that by now, you should NOT be performing this upgrade.
6. If you do not feel comfortable working around high voltages, please do not perform the upgrade. Find an experienced technician to perform or assist you.
7. Scotty's Sled Shed LLC is NOT liable for any damage caused to your equipment, bench, house, Power supply or that your spouse is mad at you for working on this 50-year-old piece of equipment. You are ON YOUR OWN.
8. Customer assumes all responsibilities and agrees to check all resistances, capacitance, and voltages before and after installation.
9. Customer assumes all responsibility to know how to read a schematic and perform the task this kit requires.
10. Customer assumes all responsibility to SAFELY perform procedures by following the OEM manual.
11. You get the point; you are responsible for yourself.
12. Please be sure to download the manual if you do not have it. They are readily available online at: <https://www.vintage-radio.info/heathkit>
13. Read the original OEM manual. The process for replacing components will be nearly identical to the original installation.
14. References are made in this guide to component numbers associated with the original manufacturer manual. Customers should familiarize themselves with what the components are. IE C4, C5, D7, R8
15. Some original components were pre 1970 (when the EPA was established). DO NOT CUT OPEN THE ORIGINAL CAPACITORS. There may be toxic chemicals inside. The power supply you have may have been modified.
16. Protect yourself and remember to wear protective eye wear, use a fume extractor, and have a fire extinguisher nearby.

II. Preparation

1. Take lots of pictures and video if you need to, of the original assembly for future reference.
2. Print out/copy an additional copy of the schematic.
3. Ability to label wires/components as needed-tape, label maker, etc.
4. On the extra schematic, it may help to write down where each lead of (Example) Capacitors C5, C6, C7 and associated resistors are connected to the terminal strips. Example C5 (+) to lug 1, (-) to chassis ground.
5. Be sure that all capacitors are discharged.
6. READ THE OEM OWNER/INSTALLATION MANUAL!
7. Solder paste will improve the efficiency of soldering and de-soldering.

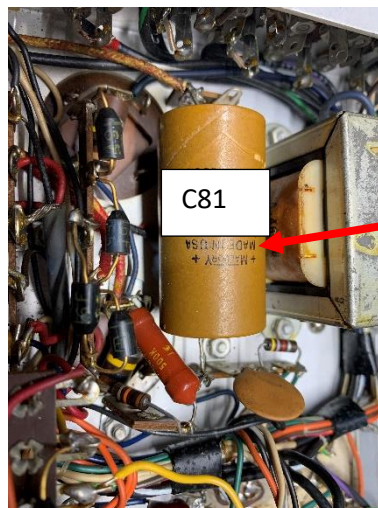
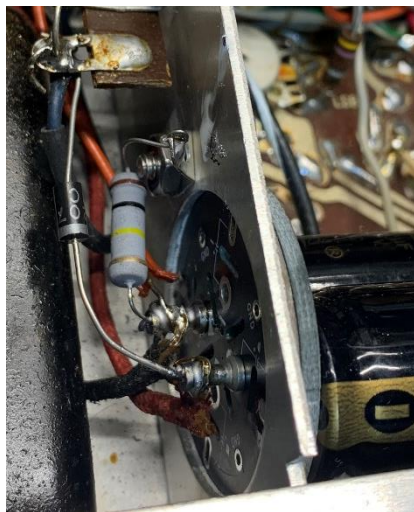
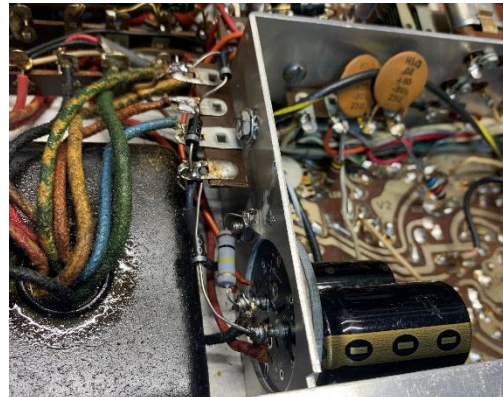
III. Low Voltage Power Supply C77 A/B

1. Open the bag labeled C77 and remove the contents. Verify the contents match the component list on the main bag the kit came in.
2. Note that the 4-in-1 Multi Cap has two sides, one marked "Turret Side" and other marked "Cap Side".
3. Install a solder turret from the "Turret Side" into the Holes for the shapes of Half-Moon  and Triangle. 
4. On the "Cap Side" slightly squeeze the end of the turret sticking through. Just enough to make it oblong, but do not close it off as the capacitor leg will need to go through the hollow center of the turret. I just use small snips or pliers. It doesn't require much pressure.
5. Solder the turrets to the Multi-Cap board but do not fill the hollow ends with solder.
6. From the Cap side, align markings with the Multi-Cap Spacer board with the markings on the Multi-Cap PCB board.
7. Install the 100uf capacitor in the area marked for Half-Moon. The positive lead will go through the center of the hollow turret. Solder only the negative lead to the board.
8. Install the 47uf Capacitor in the area marked for Triangle. The positive lead will go through the center of the hollow turret. Solder only the negative lead to the board.



9. Set aside the newly assembled C77.
10. On original C77, cut diode D4 at the solder tab of C77A (half-moon). This will be replaced from the kit.
11. Mark and remove the orange wire from C77B (Triangle).
12. Mark and remove the black lead (connects to filter choke) from C77B (Triangle).
13. Mark and remove the red lead (connects to filter choke) from C77A (moon).
14. Remove C77.
15. Clean surfaces around mounting holes.

16. Install new C77 with the 100uF (moon) facing up toward you to clear the circuit board below.
17. On the turret side of the chassis, install the #6 ground lug on the mounting bolt of C77. It doesn't matter which one, but the left side may be easier.
18. Install new R41 100K 2w resistor, attached to #6 ground lug and to Triangle. Note that you can trim the lead on the new R41, and it will slip into the hollow end of the turret.
19. Attach black filter choke wire and the marked orange wire to Triangle, with R41 and solder.
20. Solder other end of R41 to ground lug.
21. Replace D4 with one of the supplied rectifier diodes in the MISC pack.
22. Insert cathode of D4 (new diode) into hollow end of Moon Turret.
23. Wrap red wire from filter around turret post and solder.
24. Replace D2 and D3 with supplied rectifier diodes in the MISC pack.
25. Replace C81 100uF 350V with supplied 100uF 450V axial capacitor. This step you may want to take after you replace C78 and C79, but you should be able to work around the new C81.
26. Double Check connections.
27. You can test the low voltage circuit now by bringing the unit up on a Variac and test for around 250VDC at the output of C77B or at the orange wire on the last terminal of terminal strip J near the relay.



You may want to replace C81 after you replace C78 and C79 to give you more room to work on C78/C79. Just don't forget to replace it when done.



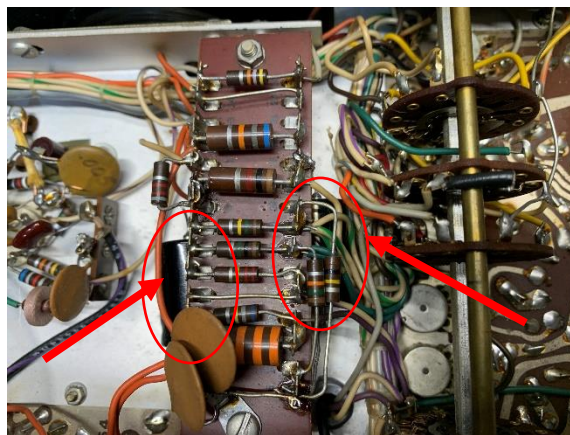
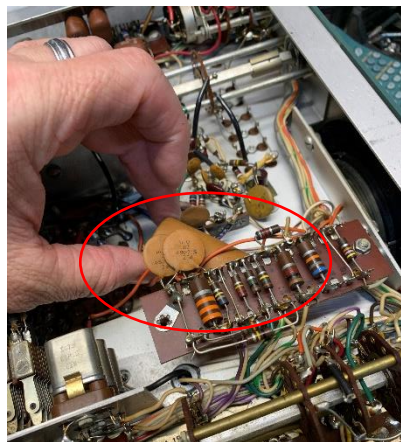
IV. Bias Power Supply C403 and C404.

C403 and C404 are located under Terminal Board #2 behind the VFO wheel on the underside of the unit. Each terminal pin is numbered. This is a direct swap for both of those capacitors.

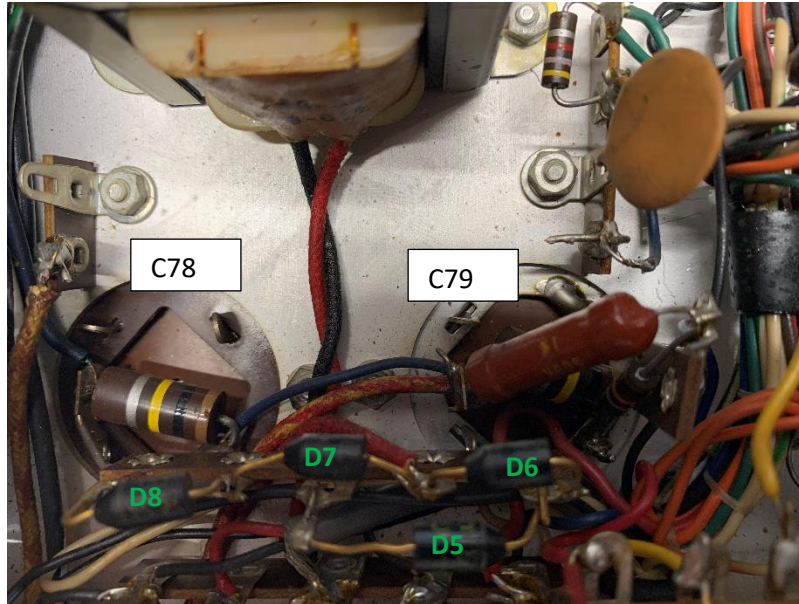
C403 is connected Positive to Pin 1 and Negative to Pin 10.

C404 is connected Positive to Pin 16 and Negative to Pin 26.

1. Cut both C403 and C404 at Pins 1, 10, 16 and 26.
2. Pull C403 out. Slide C404 out through the same location where C403 was.
3. Install C404 first then C403.
4. R408 (33k ohm 2W) is also on this board. You can replace it if needed with supplied resistor in the MISC pack.
5. Test the unit by powering on with Variac. Should read about -170VDC at Pin 9 of Terminal Board #2.

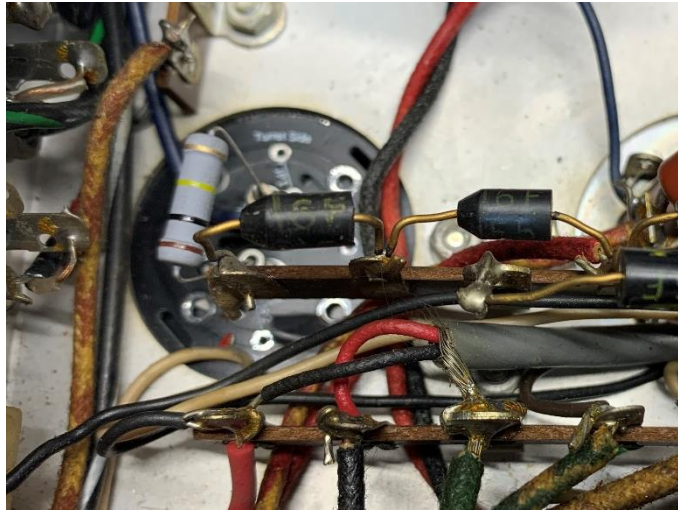
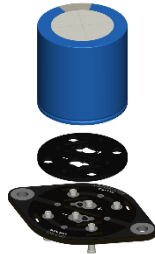


V. High Voltage Supply C78.



1. If you did replace C81, it may be in your way. If not, then now is the time to make note of where it was soldered in and cut it out of the way. I leave the leads long to make it easier to find the connection point when putting the new one in.
2. Cut the jumper between D8 and Pos of C78
3. Cut the jumper between C78 neg and C79 Pos
4. Cut resistor R44 out of C78 and remove blue wire at Pos of C78. Will replace this resistor.
5. Remove C78
6. Open the bag labeled C78 and remove the contents.
7. Note that the Uni-Cap board is different than the 4-in-1 Multi-Cap board used for C77A/B. There user guide for the Uni-Cap is available at www.w8aor.com/downloads.
8. There are 6 turret holes. The board is marked "Turret Side" and "Cap Side". From the Turret Side, Install a turret in the hole marked + and the hole marked -.
9. As with C77, squeeze the turret end sticking through Cap Side enough to make the turret oblong so it doesn't fall out. Do not close the hollow end shut.
10. Solder the turret to the Uni-Cap board but do not fill the hollow end with solder.
11. Note there are 4 jumpers marked JP1, JP2, JP3, JP4. We will not use those jumpers on C78. JP1 and JP2 jumpers tie either the Positive or Negative center post to the Can Common inner ring (where the other 4 outer turret post holes are). JP3 and JP4 tie the center Positive or Negative turret to the outer flange for Chassis Common or Ground (GND). In the configuration for only two center turrets and no jumpers, C78 is isolated from chassis ground.
12. Align the markings on the spacer with the Uni-Cap board on the "Cap Side" and place on top of the Uni-Cap board.
13. Install the supplied 150uF 450V capacitor with Positive and Negative terminal leads inside the hollow turrets at the Center. Positive to Positive, Negative to Negative.
14. Bend leads over the end of the turret on "Turret Side". Do not solder leads.
15. Install the new C78 into the same location removed.

16. Trim the leads on the 100k ohm 2W resistor and insert one lead each into the hollow end of new C78 from the Turret Side. Do not solder yet.



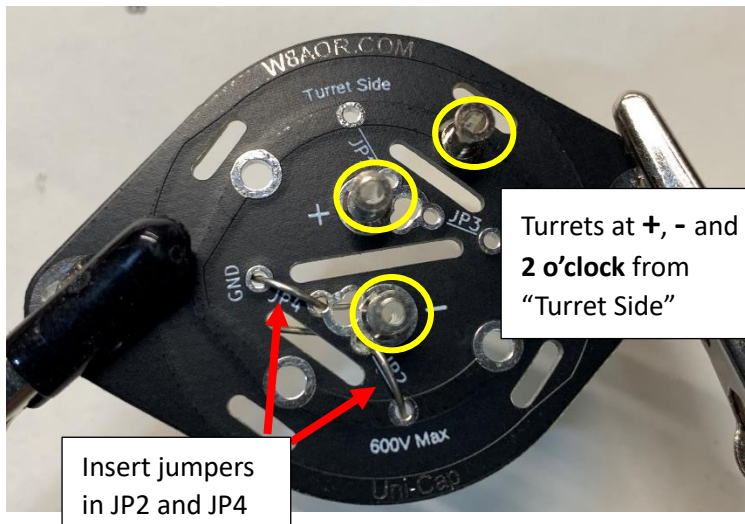
17. Install new D8 with cathode to Positive (+) turret of C78. You may be able to also insert the lead end of the new D8 into the hollow turret.
 18. Connect blue wire to C78 Positive. Solder all connections at C78 Positive Turret.
 19. Replace D5, D6, D7

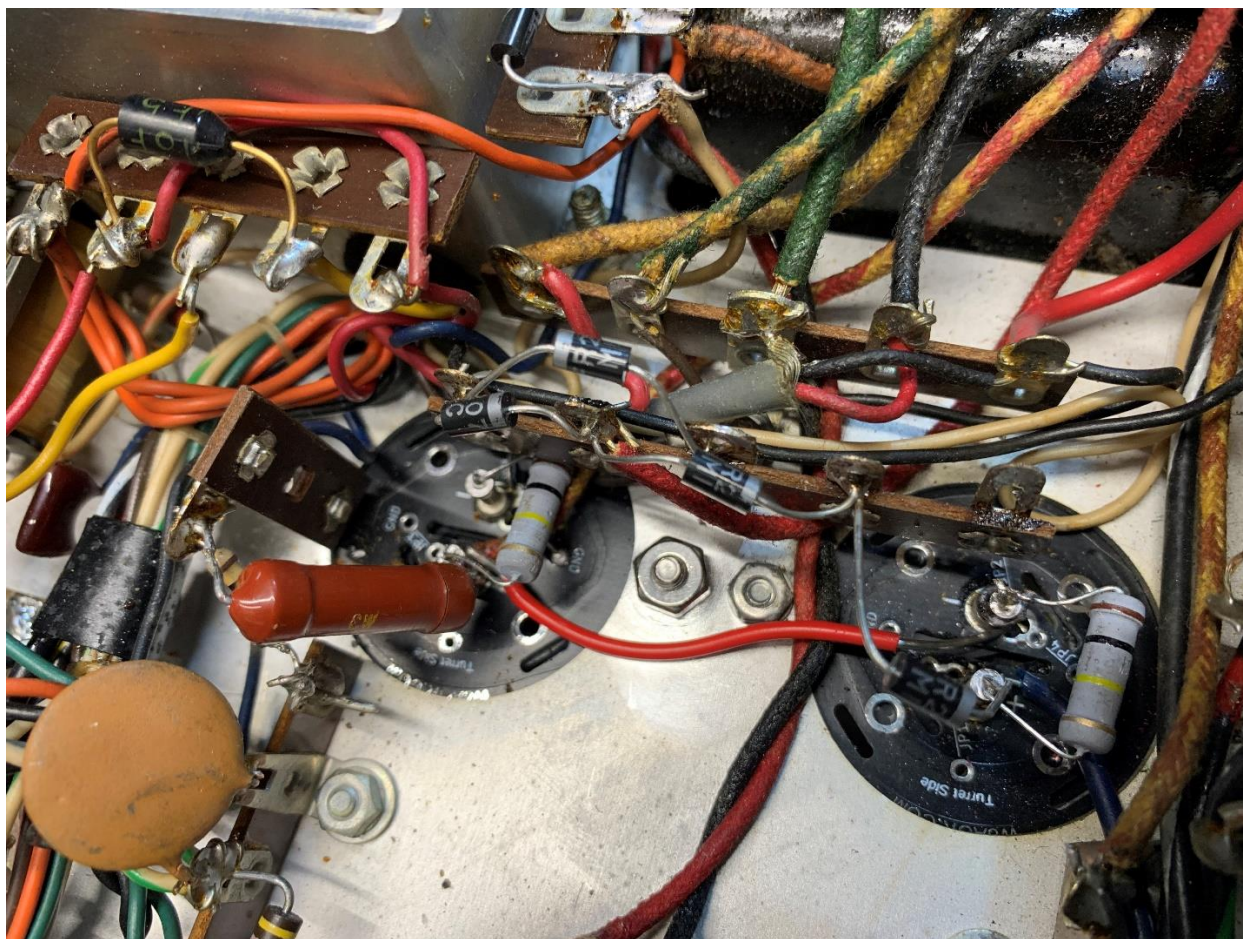
VI. High Voltage Supply C79

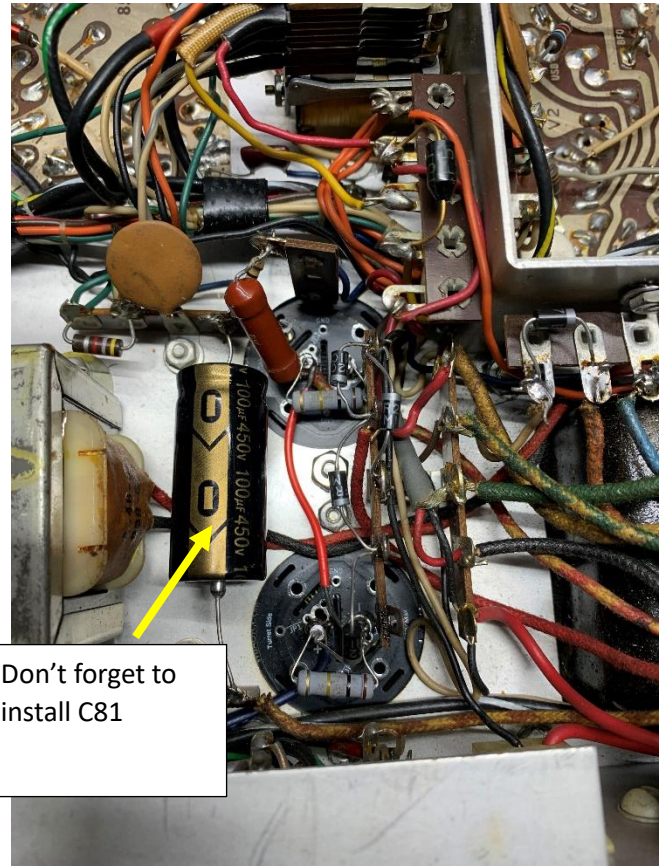
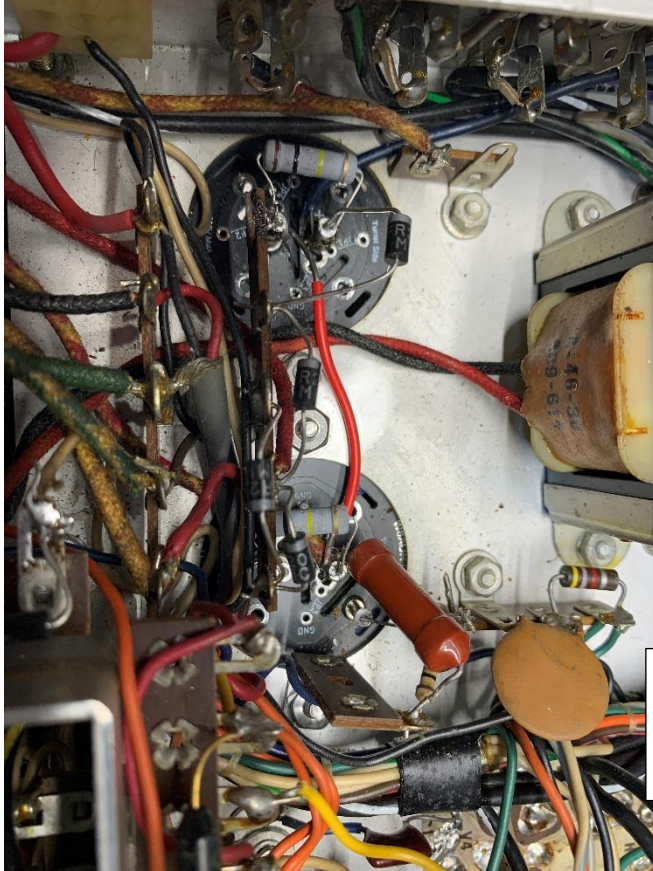
- Carefully desolder and remove R43 500k ohm 1% resistor at C79. You will reuse this resistor.
- Cut out R45 100k 2W resistor. You will replace R45 with resistor in the kit.
- Desolder and disconnect the Red/Yellow transformer lead at C79.
- Desolder or cut R42 10k ohm resistor from C79. A replacement is provided in the kit.
- Remove C79.
- Clean well around the original mounting holes of C79 on top and bottom side of the chassis. This will be required to make good ground for the new C79.
- Build new C79 just like C78 with a turret in Positive, Negative and 10 o'clock position turret side (2 o'clock Cap Side).
- Squeeze and solder turrets to the board.
- For C79, install a jumper in JP2 and JP4 with the loop of jumper on the Turret side and lead ends sticking through the Cap Side. I use leads from the old capacitors, diodes or resistors removed previously. Solder jumpers in place. Trim lead ends
- Align spacer and install the 150uf 450V supplied capacitor same as C78. Do not solder leads.
- Install new C79.
- Trim leads of supplied 100k 2W resistor and insert into + and - turrets like done for C78.
- Solder the leads of the capacitor and 100K resistor at the negative turret only.

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14. Install the supplied 10k ohm resistor at the 2 o'clock turret and the terminal strip where the 500k ohm resistor is connected. Solder both leads of the resistor.
15. Strip the ends of the supplied 4" 18ga hookup wire. Wrap one end around the negative (-) turret of C78.
16. Solder the wire and leg of 100k ohm resistor at negative terminal of C78.
17. Attach the other end to the Positive turret (+) of C79. Do not solder yet.
18. Wrap the Red/Yellow transformer lead to Positive turret (+) of C79.
19. Wrap the free lead of the 500k ohm 1% resistor(R43) around the Positive (+) turret of C79.
20. Solder all four connections at the Positive turret of C79.
21. All connections on C78 and C79 should now be soldered.
22. Install/reinstall C81.
23. Test circuit by bringing up on a Variac and check for 750VDC at Anode of D8 or positive turret of C78.
24. The Power supply for the SB400/401 is now complete.
25. Replace the 5 electrolytic capacitors on the Carrier Generator board.







Don't forget to install C81



I welcome feedback on any tips or tricks you find to make the project go faster.

Customer pics of final installations are always welcome.

If you find an error in this document, please kindly let me know at mysledshed@yahoo.com

Please be professional in your communicate.

Thank you, and good luck!

73's

Scott

W8AOR