

## Template

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### I. Introduction.

Thank you for purchasing the Scotty's Sled Shed Custom Probe Modification Kit for

This kit is intended for unmodified power supplies, configured 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.
8. Drill
9. 1/8" drill bit.

Component list:

Qty 1: 4-1 Capacitor V2 (WIDE) PCB Board  
Qty 3: Keystone Solder Turrets  
Qty 1: 4-1 V2 (Wide) Spacer Board  
Qty 1: #6 Ground Lug  
Qty 1: Keystone 3 Lug Term Strip  
Qty 2: #6-32 SS Nut/Bolt HW  
Qty 1: 18 ga hookup wire 5"  
Qty 1: 18 ga hookup wire 3"  
Qty 2: 47uF 160v Axial Electrolytic Capacitors  
Qty 1: 100uF 250V Radial Electrolytic Capacitor  
Qty 2: 47uF 250V Radial Electrolytic Capacitor  
Qty 1: 4.7uf 160v (min) Axial Electrolytic Capacitor  
Qty 1: .047uF 630v Axial Film Capacitor  
Qty 1: .001uF 1KV Ceramic Disc Capacitor  
Qty 2: 0.22uF 400v Radial Film Capacitor  
Qty 2: 0.1uf 400v Radial Film Capacitor  
Qty 2: 1N270 or equivalent germanium diodes  
Qty 1: 1kv 2a Rectifier Diode  
Qty 2: 4.7k ohm 1/2w Resistor  
Qty 1: 330ohm 2w resistor  
Qty 1 820ohm 1w resistor

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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:
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.

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**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 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 Original Heathkit OWNER/INSTALLATION MANUAL!
7. Solder paste will improve the efficiency of soldering and de-soldering.

**III. Component identification and replacement.**

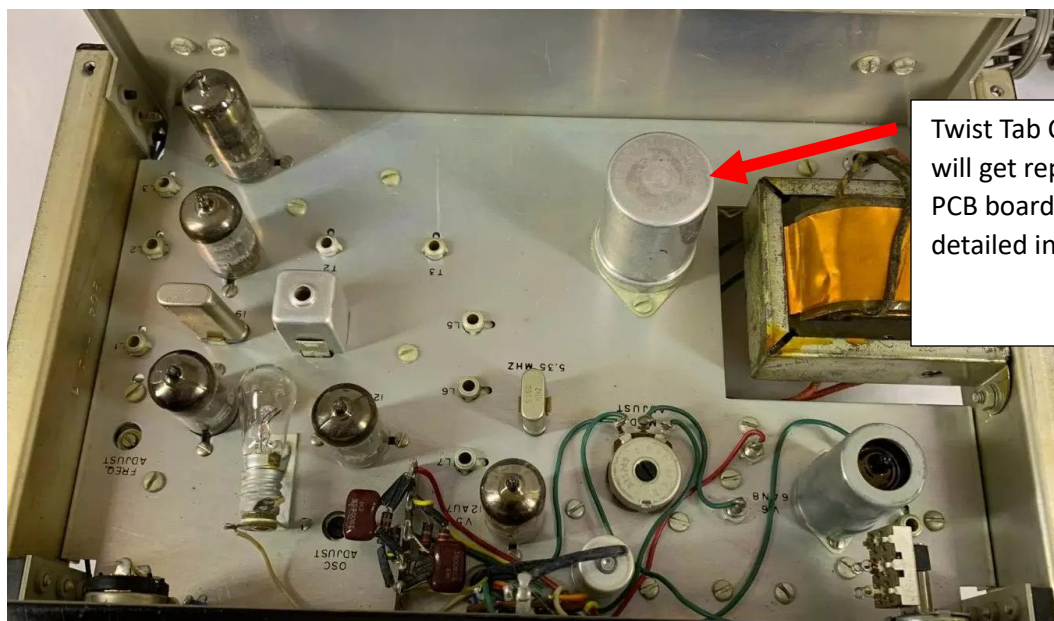
The original Heathkit manual lacked a full pictogram of component layout. Below are pictures from an actual unit marking the main HV capacitors that should be replaced.

1. Start with replacing C8, C4, C32 and the two .1uf 400v Film capacitors C6, C7 (if needed). Replacements are included in your kit.
2. There are also two .022uf 400v radial film caps in the kit in case you find one out of spec (C38, C35, C34, C3, C46 etc.). These do not tend to fail but extras are in the kit just in case.

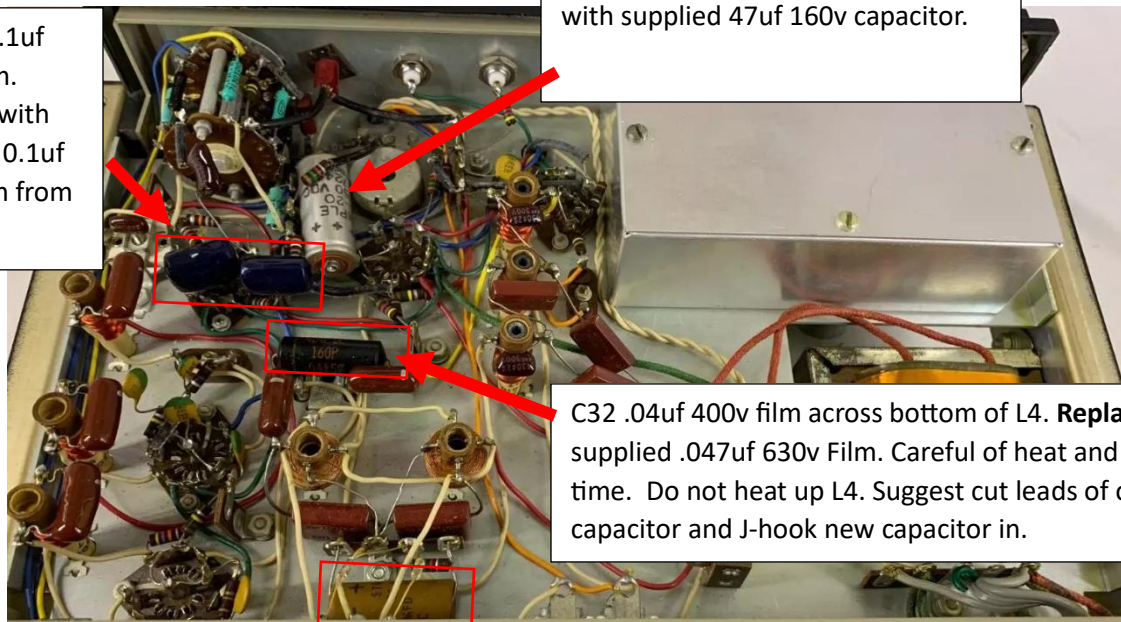


C46 is a 40uf 150v electrolytic mounted on the top side connecting Pin 1 of S2 Rear and Pin 6 of V5A 12AU7 tube. This will be one of the last capacitors to replace. You will relocate the single lug terminal strip from the Twist Tab Capacitor C42/43/44 when replacing C46.

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Twist Tab Capacitor C42/43/44. This will get replaced with the custom PCB board in your kit. This will have detailed instructions in next section



C6&C7 0.1uf 400v Film. **Replace** with supplied 0.1uf 400V film from kit

C4 40uf 150v electrolytic. **Replace** with supplied 47uf 160v capacitor.

C32 .04uf 400v film across bottom of L4. **Replace** with supplied .047uf 630v Film. Careful of heat and dwell time. Do not heat up L4. Suggest cut leads of original capacitor and J-hook new capacitor in.

C8 2uf 150v Electrolytic. **Replace** with the 4.7uf 160V(minimum) from the kit

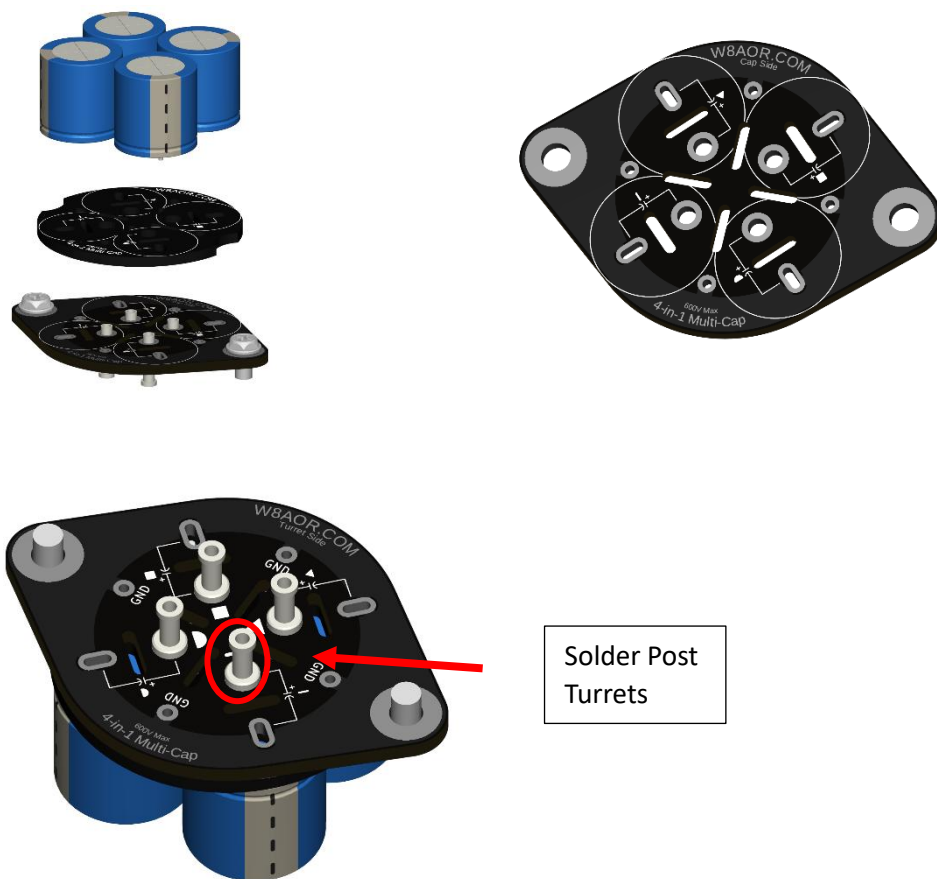


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## IV. Replacing Twist Tab Capacitor C42/43/44

After you have replaced C4, C32, C8, C6 and C7, we will start to build the new C42,43,44 PCB board.

1. Open the bag and check that all components listed on the bag cover are included.
2. Identify the different sides of the circuit board.
  - a. The board has two sides. One side is marked "Cap Side" the other side is marked "Turret side".
  - b. The board is marked on both sides with a Square, Triangle, Half-Moon, and Dash.
  - c. The Spacer Board is also marked with the same symbols which correspond to the original multi-sector capacitor.
  - d. The "Turret Side" is where the long side of the Solder Post Turret will mount.
  - e. Capacitors mount on the "Capacitor Side".
  - f. Spacer is bi-directional-be sure to align the spacer with the markings on the PCB.
  - g. Below image is the order in which the components are installed.
  - h. Note that the Negative side of the capacitor faces the outside. All the Positive legs mount inside the turrets in the center.

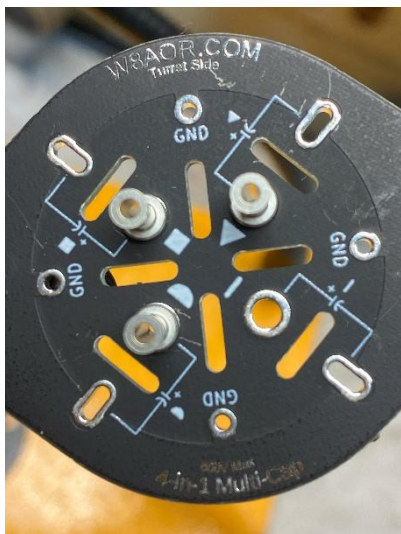


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3. Install a turret in one of 3 of center holes marked Half Moon, Square and Triangle. It will only fit inside the positive post hole in the center.
  - a. Slightly squeeze turret from the Cap Side to make it oblong to prevent from falling out. I use small snips. It only requires a slight amount of pressure to make the solder turret oblong. Do not squeeze too hard or you will collapse the hollow turret. **(See image below)**
  - b. Add some solder flux to both sides of the board around the pin (optional).
  - c. Solder on the "Cap Side". Just don't fill the center of the turret with solder.
  - d. Repeat for the other two turrets.
  - e. If you close the hole just snip down a bit more to the board and the hole in the turret will be enough to get the capacitor leg through.



Slightly squeeze the turret from the Cap side just enough to make it oblong. This will keep it from falling out while you solder the turret in.

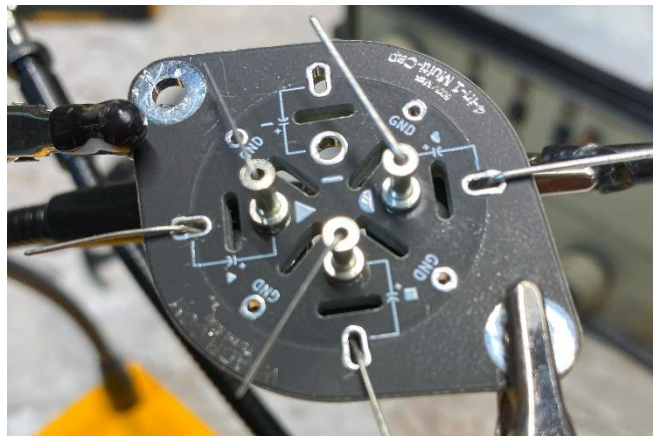


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4. From the "Cap Side" install and align the spacer board.

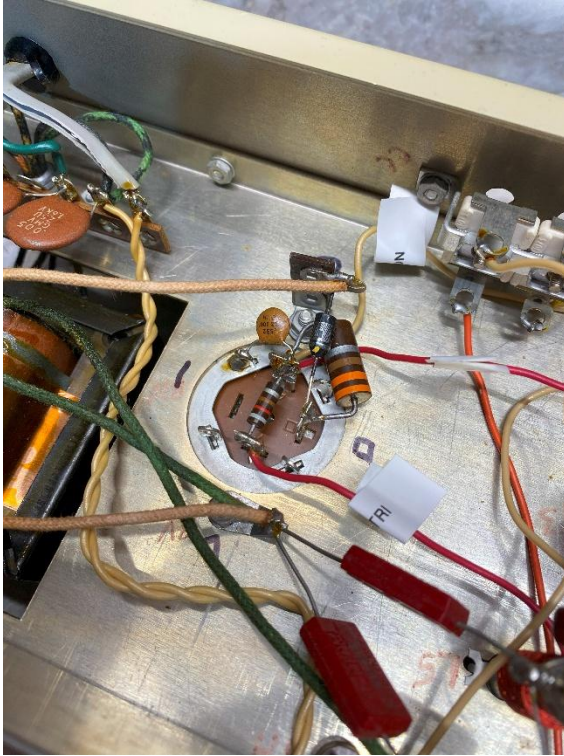


5. From the Cap side with the spacer. In the Slots marked Half Moon (Dome) install the 100uf 250V radial electrolytic. The positive leg goes into the center of the turret marked positive (+). Negative goes into the slot marked (-) Bend the legs over the turret end and the board.
6. Repeat the process for Square and Triangle with the two 47f 250v radial capacitors. Do not solder yet.



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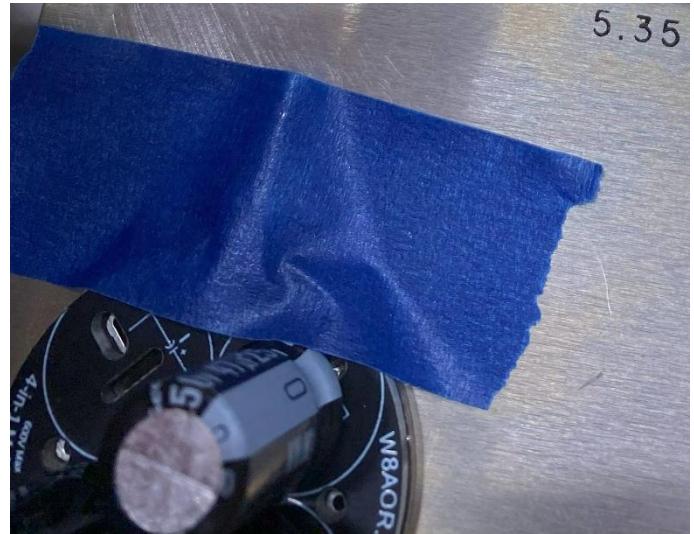
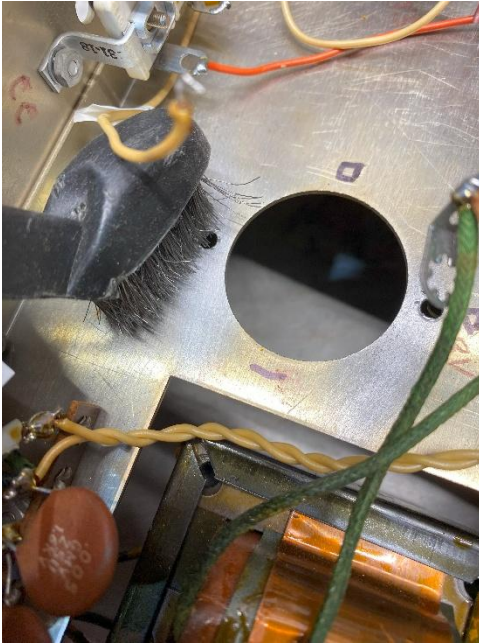
7. Trim the leads and solder the negative leads ONLY for Square and Triangle. Set assembly aside.
8. Mark all the hookup wire leads going to the existing Twist Tab Capacitor. Suggest using a label maker or painter's tape. There should be two leads going to the tab marked Half Moon, one going to Triangle, and one leading from transformer going to the single lug terminal strip, where the half wave rectifier diode D1 is attached. You can leave the terminations at the ground lug. It will be reused.



9. Unsolder the four leads, three going to the capacitor and the lead to the terminal strip.
10. Cut D1 from the terminal strip.
11. If you want, mark the chassis with the symbols Half Moon, Square, Triangle. The new cap board will be off by 45' from the original layout.
12. Remove the Twist Tab Capacitor. SAVE the terminal strip, this will be needed for the C46 replacement.
13. With wire brush clean around the mounting holes top and bottom to get a clean ground connection.
14. Align the new assembly so that the Half Moon and Square sides are oriented toward the outside of the chassis.
15. From the to side install the new PCB Capacitor assembly with the new 6-32 hardware. Use a tooth washer between the head of the screw and the board. Set in place. Use Painters tape over the screw heads to the chassis to hold the assembly in place while you turn the unit over.

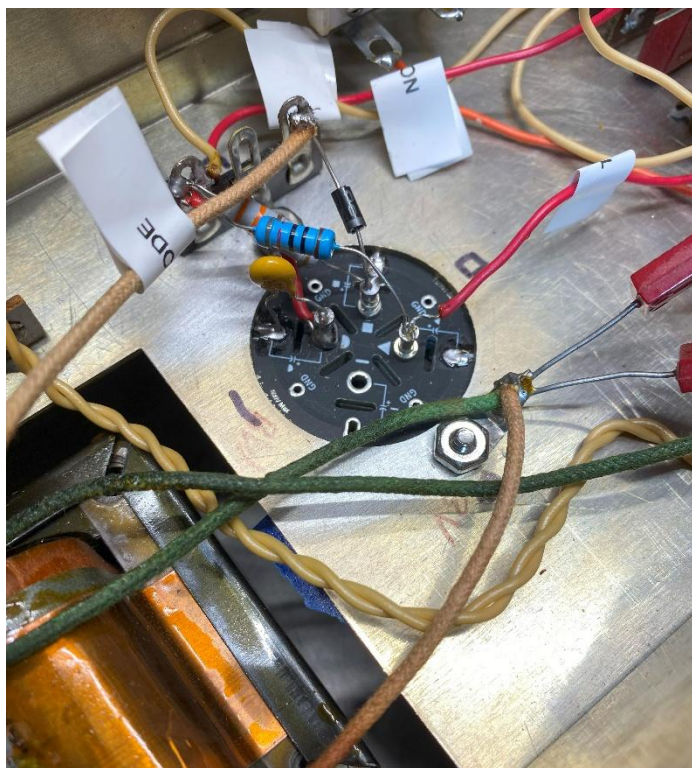


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16. Install the supplied 3-lug terminal strip where you removed the single lug terminal strip. Also reconnect the ground lug removed earlier with the supplied 6-32 hardware.
17. Install the supplied .001uf ceramic capacitor between the Half-moon positive (+) turret and the ground lead on the PCB board. Solder ONLY the ground leads on the PCB board.
18. Install jumper from Half-Moon Positive turret to the first lug of terminal strip. Attach to the two hookup wire leads you removed earlier marked Half-Moon to the same lug. Do not solder yet.
19. Connect the 330ohm 2W resistor between the first lug of the terminal strip and the turret of Square.
20. Connect the 820ohm 1w resistor between the first lug of the terminal strip and the turret of Triangle.
21. Solder all the leads going to the first lug of the terminal strip.
22. Attach the hookup wire you removed from Twist Tab capacitor marked Triangle, to the turret on the new assembly marked Triangle. Solder the resistor and wire at the turret.
23. Install supplied rectifier diode between the 3<sup>rd</sup> lug of the terminal strip and the Square turret. The cathode (banded end) goes to the turret. Anode goes to the terminal strip. Solder the diode and 820ohm resistor lead at the Square Turret.
24. Reconnect the transformer lead you removed from the terminal strip earlier to the 3<sup>rd</sup> lug of terminal strip where D1 is also connected. Solder leads. C42/43/44 complete.

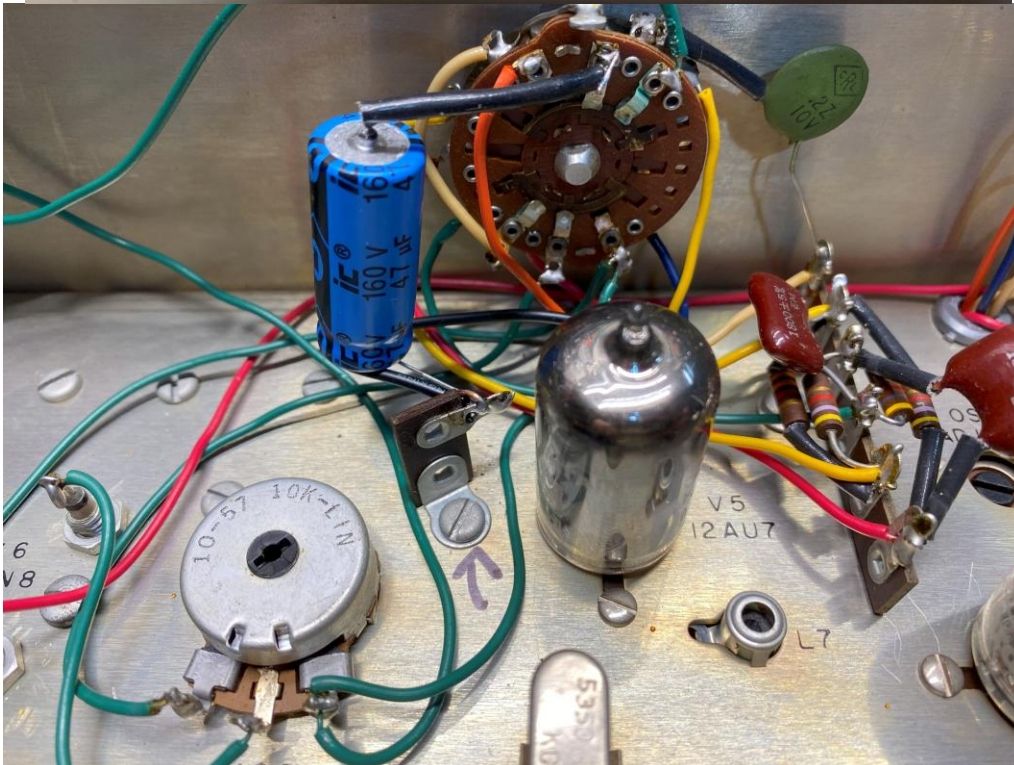
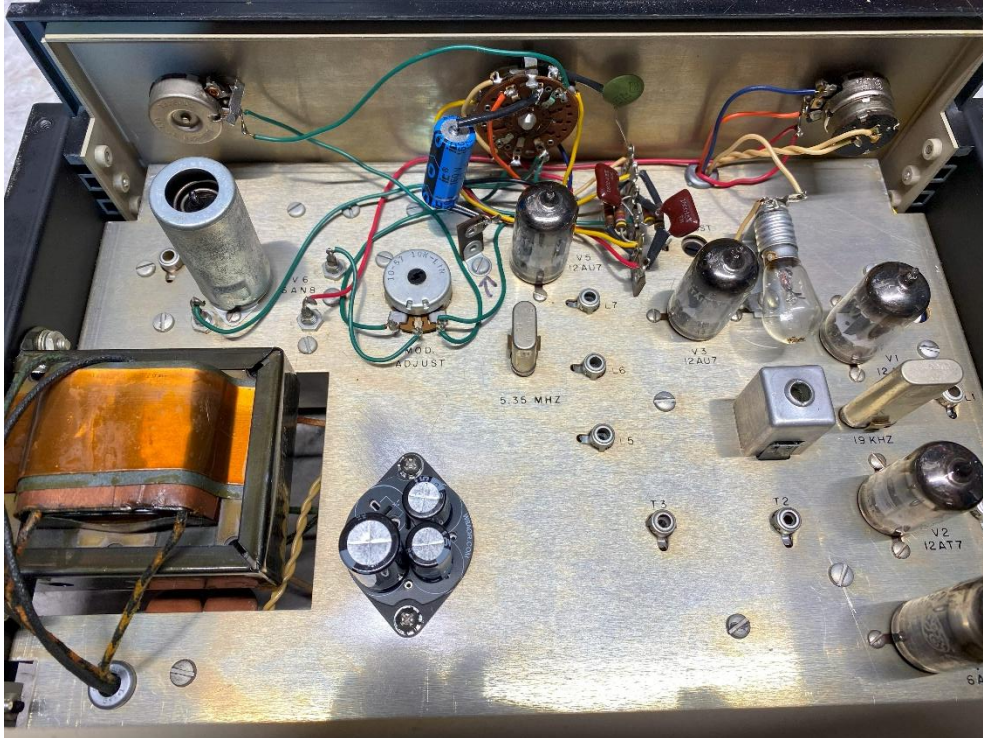
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- V. Replace C46.
1. Note orientation of original capacitor. Cut leads close to capacitor and remove.
  2. Install the single lug terminal strip you removed earlier by removing the screw left of tube V5. It will be easier to remove the tube for the rest of this.
  3. Install the new capacitor between the terminal strip (positive to the terminal strip) and the S2 wafer switch lug.
  4. Remove the lead that was from the positive side of the + side of the capacitor that goes through the hole in the chassis to leg 6 of V5 on the other side of the chassis.
  5. Use the 5" supplied hook up wire and make a jumper connecting to the single lug terminal strip that C46 is now connected, through the chassis down to the leg 6 of V5 on the other side of the chassis. Solder the jumper and capacitor in.
  6. Congratulations, the upgrade is now complete. Return tube V5 back to its spot, test unit by bringing it up slowly with a Variac.
  7. Follow the original Heathkit manual for final alignment and calibration.



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

I would like to see customer pics of final installations.

If you find an error in this document, please kindly let me know at [mysledshed@yahoo.com](mailto:mysledshed@yahoo.com)

Please be professional in your communicate.

Thank you, and good luck!

73's

Scott

W8AOR