

I. Introduction.

Thank you for purchasing the Scotty's Sled Shed Component Kit for Heathkit SB-610 Monitor Scope.

This kit was developed to reduce the frustration of trying to source replacement components that sometimes are not available from one location. This causes the customer to purchase a single component from a source where the shipping costs more than the component.

The multi-section capacitors are hard to find, expensive and sometimes obsolete. The kit includes a custom designed circuit board to use modern capacitors in place of the obsolete multi-sector capacitors.

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

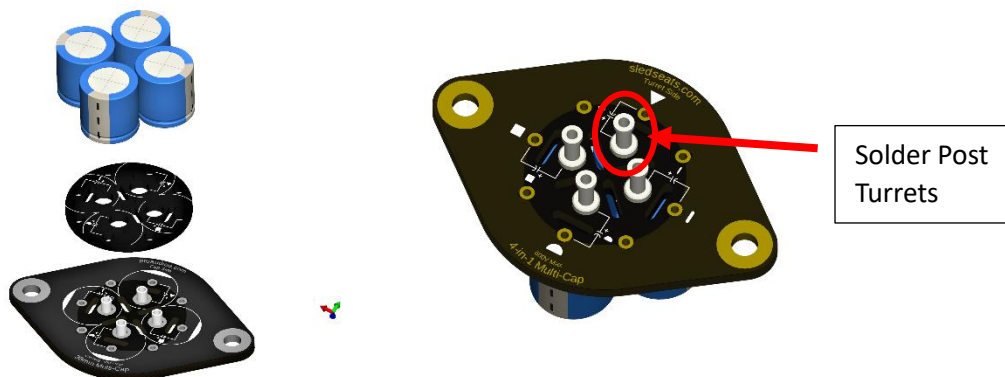
1. Due to constant supply chain challenges, Scotty's Sled Shed reserves the right to substitute component OEMs. If there is an orange bodied resistor in installation guide images and you receive a blue bodied resistor, it is due to component substitutions. The OEM component list is 1/2watt for all resistors. The supply be a mix of ½ and 1watt resistors in your kit depending on supply chain. If the price was the same or less for 1 watt, then we will supply a 1watt resistor.
2. Scotty's Sled Shed LLC is only providing you with components for a DIY installation.
3. The following instructions are only a guide. Experienced users may have a preferred method of installation.
4. **CAUTION: Lethal voltages are present in these devices.** If you are not aware of that by now, you should NOT be performing this upgrade.
5. The CRT has -1400VDC applied. **DO NOT TEST THESE VOLTAGES WITH A STANDARD MULTI-METER!** You will need at least a 10M ohm VTVM, or high voltage 100X probe for an oscilloscope.
6. 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.
7. Customer assumes all responsibilities and agrees to check all resistances, capacitance, and voltages before and after installation.
8. Customer assumes all responsibility to know how to read a schematic and perform the task this kit requires.
9. Customer assumes all responsibility to SAFELY perform procedures by following the Heathkit OEM manual.
10. You get the point; you are responsible for yourself.
11. 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>



II. Preparation-Capacitors.

Assembly and Installation guide for the Multi-Cap capacitor circuit 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.
 - 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.



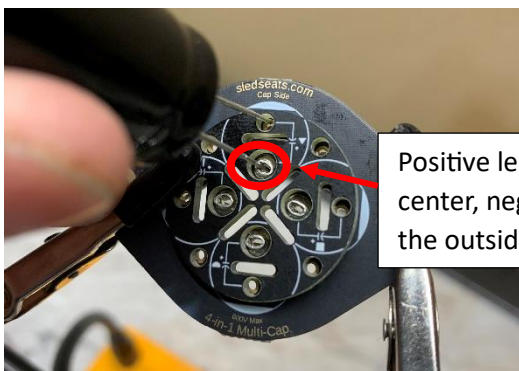
3. Install a turret in one of the 4 center holes. It will only fit in the positive post hole in the center.
 - a. Slightly squeeze turret from the Cap Side to make it oblong to prevent from falling out. Use small snips. It only requires a slight amount of pressure to make the solder turret oblong. Do 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 "Turret side". Add some solder to the Capacitor side as well.
 - d. Be careful not to have too long of a dwell time. A good hot iron will make the work fast and smooth.
 - e. Repeat for the other three turrets.
 - f. 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.

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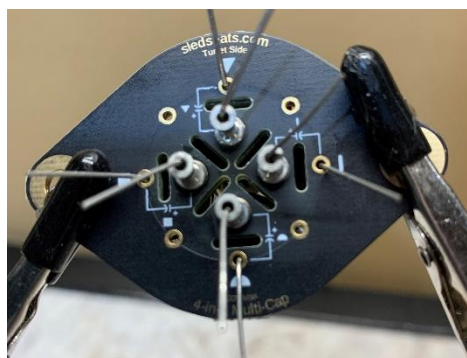
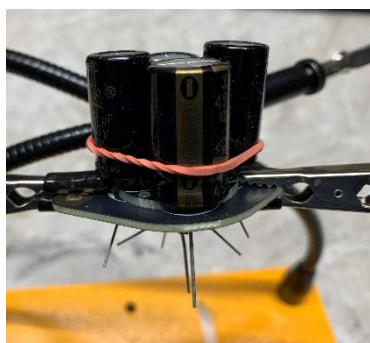


Slightly squeeze the short end of the Solder Post Turret on the "Cap Side". It requires very little pressure.

4. Install spacer board on the "Capacitor Side" aligning the symbols on the spacer board with the Multi-Cap Board. If the Turret sits flush or above the spacer board, you have not trimmed enough of the turret off. The turret must sit below the top of the spacer board.
5. Install the 68uF 450V Electrolytic Capacitor at the Half-Moon location, with the POSITIVE leg inside the turret on the + side. The NEGATIVE goes to the outside hole. The outer hole and entire outer area of the bottom of the board is tied to all 4 Negative Pin leads and the mounting holes of the board.
6. Bend the legs on the Turret Side to get the capacitor to hold the spacer board tight and flush to the Multi-Cap board. Add some solder paste (optional) and solder the NEGATIVE leads ONLY on the Turret Side. Do not solder the positive lead yet.
7. Repeat for the remaining three locations with the 47uF 450V (Square) and 22uF 250V (Triangle and Dash) caps.
8. Snip off the excess lead lengths.
9. Optional-hold the 4 capacitors together with a zip tie or rubber band. I found this works for keeping all the capacitors evenly installed while soldering. Remove after installation is complete.



Positive lead goes in center, negative to the outside.

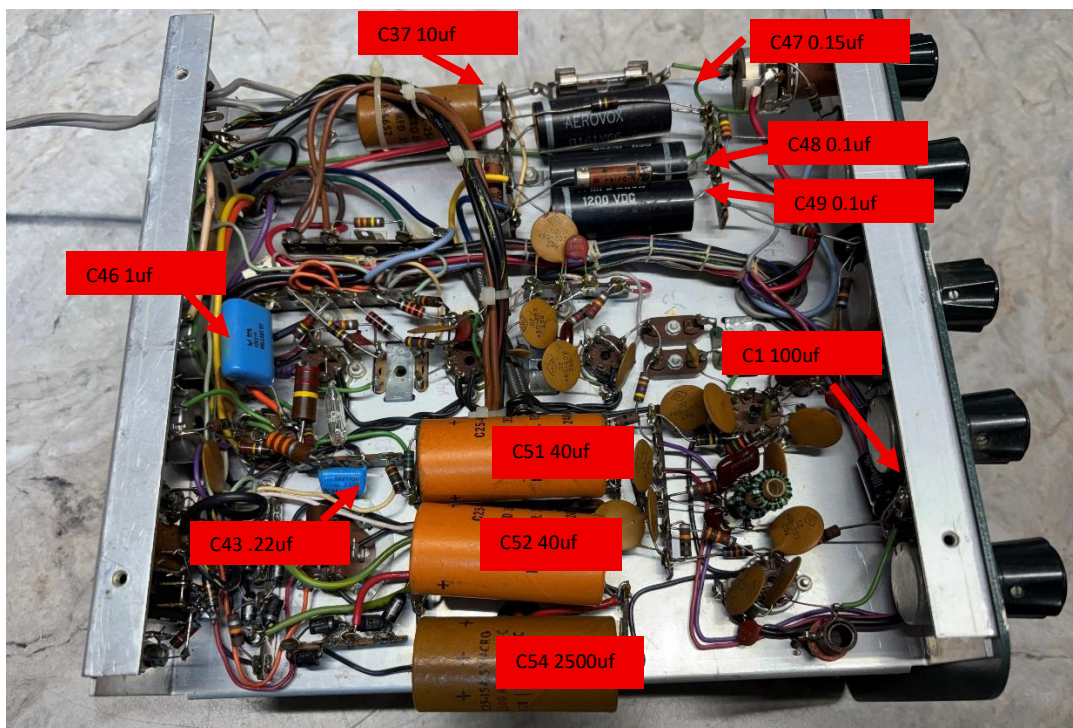


10. If you have an oscilloscope and follow the theory of finding the foil side of film capacitor, do that now to all the film capacitors and mark the foil side. There are several YouTube Videos on this procedure. I do not advocate one way or the other. It is your choice. I test and mark to show in the guide images.

III. Component removal and installation.

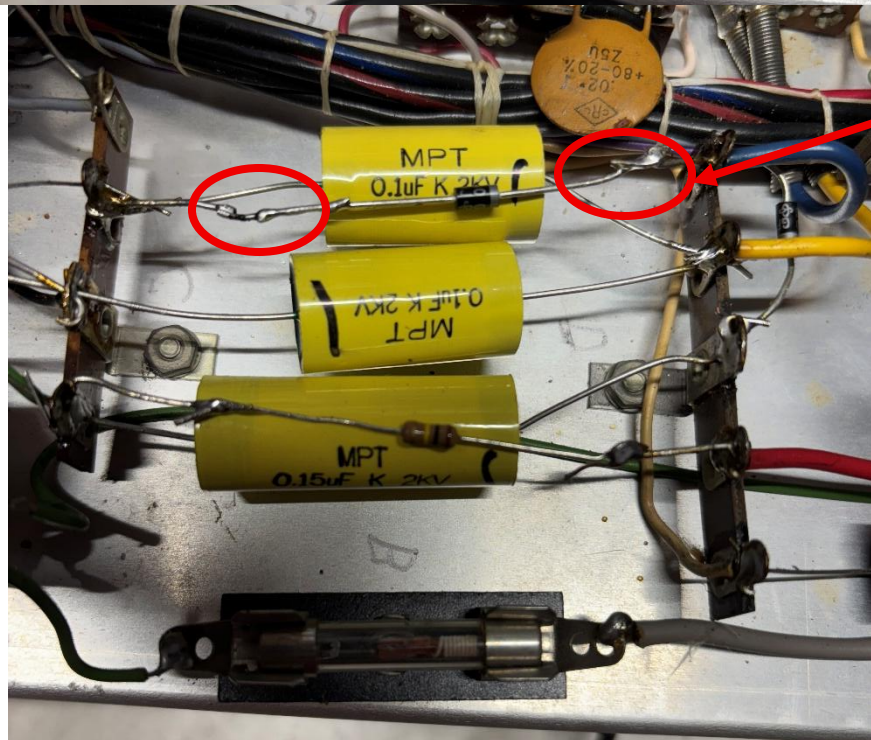
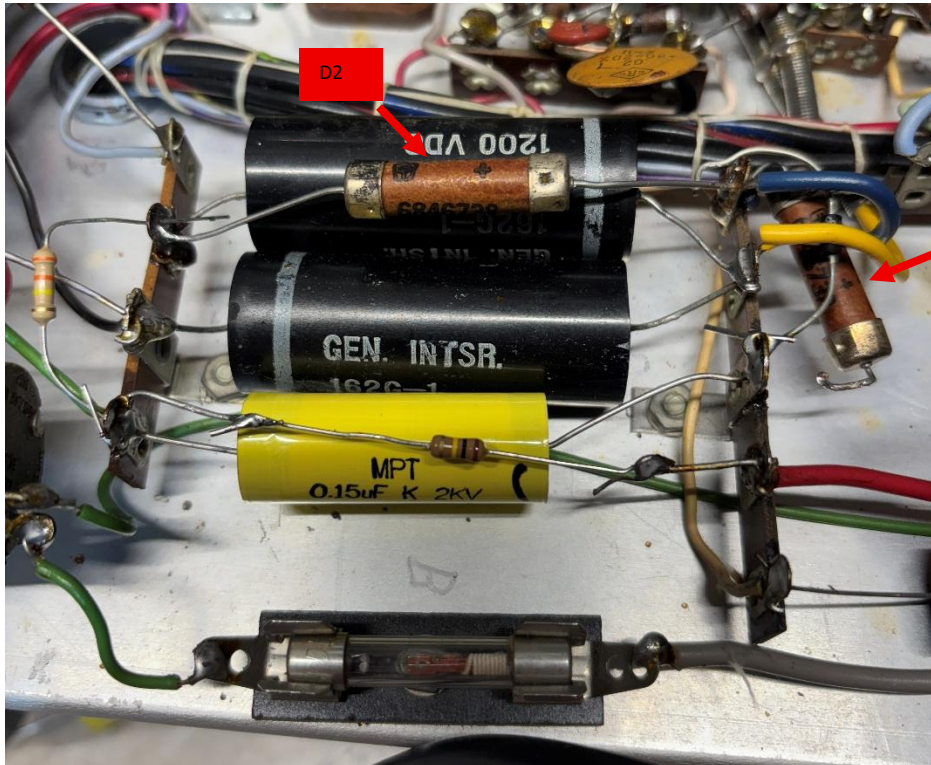
The technique for desoldering joints and removing old legs is a personal preference. I prefer to use a good Chemtronics desoldering wick vs a desoldering iron. Cutting the legs off the capacitors and resistors before desoldering will make the work go faster.

1. Replace the two large (C51 & C52) 40uF 450v Electrolytic capacitors first, one at a time. Replace with provided 47uF 450V axial capacitors.
2. Replace the (C37) 10uf axial capacitors with supplied 10uF 450V axial capacitors.
3. Replace (C1) 100uf axial capacitor with supplied 100uf 25v axial capacitor.
4. Replace C47 0.15uF large film capacitor with the supplied 0.15uF 1600V (may sub with 2kV) film capacitor.
5. Replace C48 and C49 0.1uF 1200V film capacitor with supplied 0.1uF 1200V (may sub with 1.6KV) film capacitor.



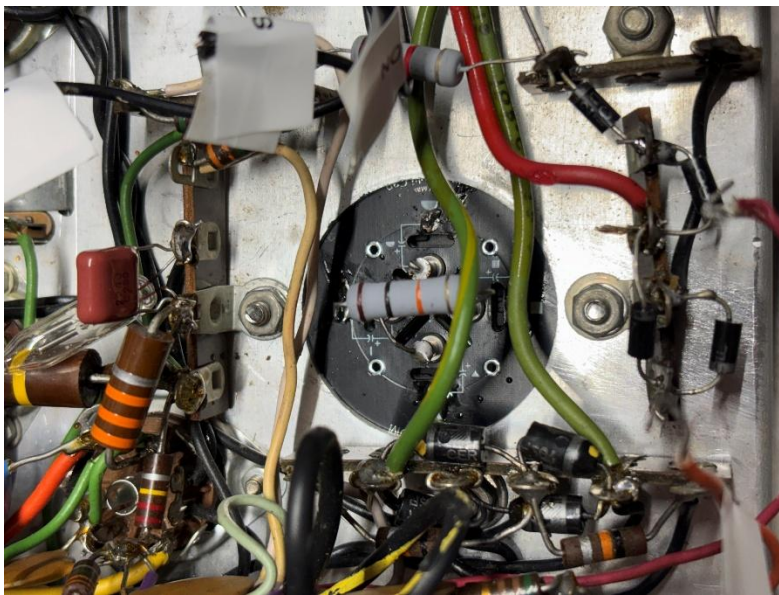
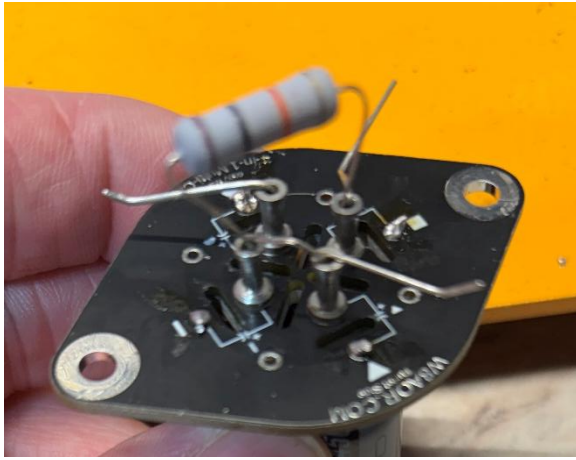
6. Replace Diodes D2 and D2 (selenium rectifiers with the supplied 3kv 250ma diodes. Note you may need to "J-hook" for the length so leave lead from the selenium rectifiers to connect into.

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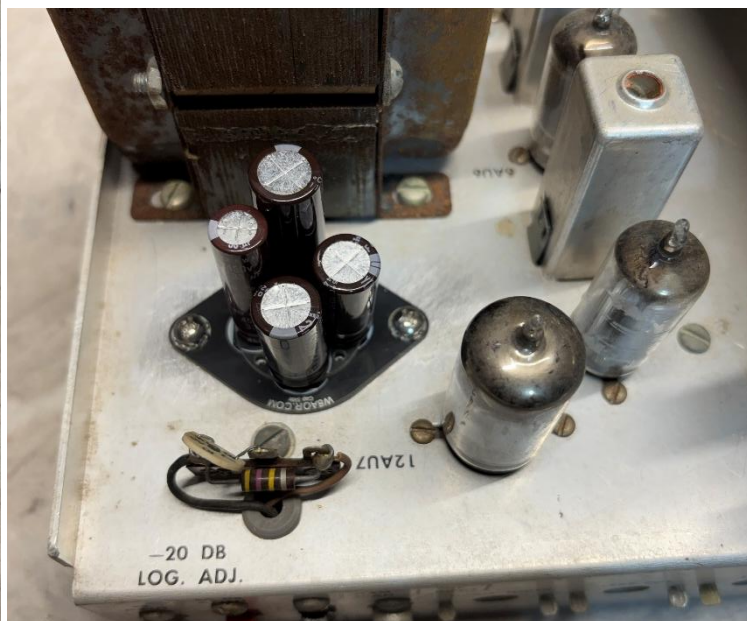
8. Before installing the new C53, install the new R82 10k 2W resistor across Square and Dash turrets from the bottom side.



9. Note the orientation of the 4 sections of the Multi-Sectional Can Capacitor. On the bottom of the capacitor there will be three cut outs, Half Moon, Triangle and Square. The 4th one is sometimes marked with a Dash or left blank. The top and bottom of the supplied Multi-Cap board will also be marked with Half-Moon, Triangle, Square and Dash. The Heathkit Manual does not depict this very well. The orientation is as marked below. May be installed 180' from diagram.
10. Clean the chassis surface area top and bottom around the mounting holes with a wire brush. Harbor Freight has a full set for about \$5.00 that fits in tight spots well.

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11. Install the new Multi-Cap board assembly from the top side. I use painter's tape to hold the bolt heads in place while I get the tooth washer and nut started on the bottom.
 - a. Note the orientation.
 - b. Square should be facing the terminal strip on outer edge of chassis.
 - c. Dome should be facing toward the three Axial capacitors C51, C52, C54.
12. Clean the surface of the terminal strips that bolted to the capacitor. Re-install the bolts and snug up both nuts holding the Multi-Cap assembly in.
13. Attach and solder the appropriate wires to their associated terminal as stated in step 7 above.
14. Solder all the wires, trim the leads.
15. Don't forget to replace C43 if you removed it when uninstalling the terminal strip.
16. Replace the 1uf capacitor C1 100uf with replacement capacitor if tests out of spec.
17. There are replacement resistors to replace the high wattage units like R81, R83 across C51 and C52, R79 330k at C48/47, R72 220kw 2W at V5, R66 330k 1W and a few others.
18. This completes the installation of the restoration kit. Double check all your connections before powering the unit up. Validate the resistance measurements as shown in the Heathkit Manual on page 29. Suggest powering up with a variac, slowly.
19. The final installation should look like the following.



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

Please be professional in your communicate.

Thank you, and good luck!

73's

Scott

W8AOR

