I. Introduction.

Thank you for purchasing the Scotty's Sled Shed Capacitor Restoration Kit for the Heathkit IG-72, AG-9 and AG-9A Audio Signal Generators.

This kit is intended for unmodified units.

This kit was developed to help fellow vintage electronic enthusiasts.

The difference between this kit and those that include an entire circuit board, is the ability to upgrade one component at a time, in the original locations of the unit.

You will need the following to install this kit:

1. Hot soldering iron
2. Desoldering tool or wick.
3. Solder
4. Painter's tape or label maker.
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.

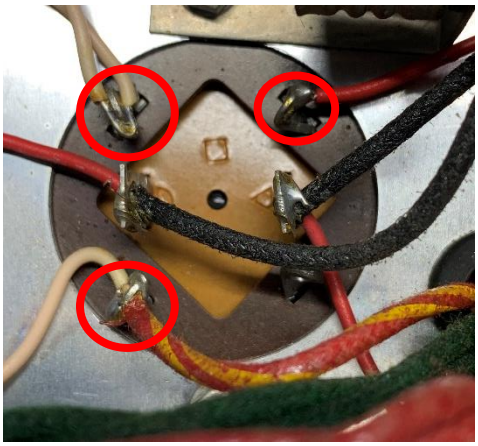
1. Due to constant supply chain challenges, Scotty's Sled Shed reserves the right to substitute component OEMs. If there is an orange bodied resistor in installation guide images and you receive a blue bodied resistor, it is due to component substitutions.
2. You may see a blue capacitor in one pic and 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 vintage 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 owner's 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

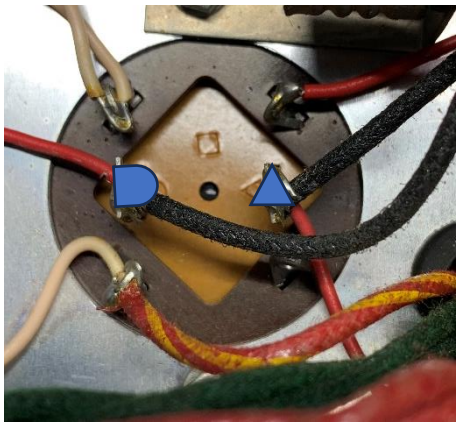
1. Take lots of pictures and video if you need to, of the original assembly for future reference.
2. Print out/copy an additional copy of the schematic.
3. Ability to label wires/components as needed-tape, label maker, etc.
4. On the extra schematic, it may help to write down where each lead of Capacitors 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. Solder paste will improve the efficiency of soldering and de-soldering.

III. Capacitor 6 Replacement (dual 40uF twist tab can multi section capacitor):

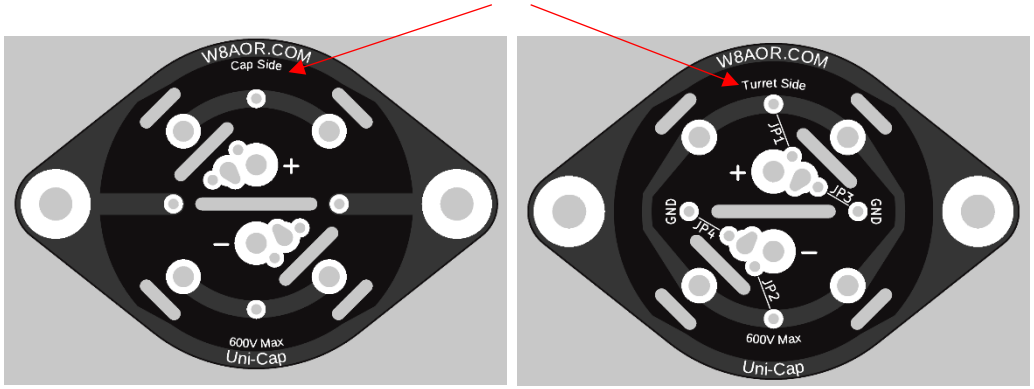
1. Take several pictures of configuration. The schematic shows the negative leads of this capacitor are tied directly to chassis ground, when in fact they are not. This capacitor is chassis isolated.
2. All 4 of the outer twist tabs are the "negative" lead of the capacitor. Begin by marking each wire going to each "negative" twist tab lead as "neg", desolder and move aside.



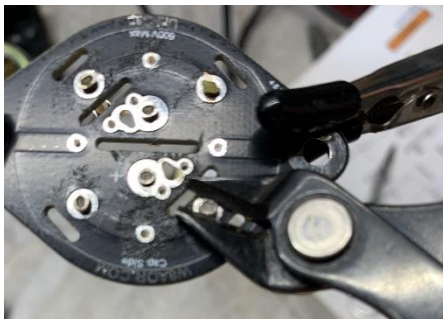
3. There are two "positive" leads of the capacitors with markings of a Half-Moon (dome) and a Triangle.
    a. Mark each lead to Half-moon, desolder and move aside.
    b. Mark each lead to Triangle, desolder and move aside.



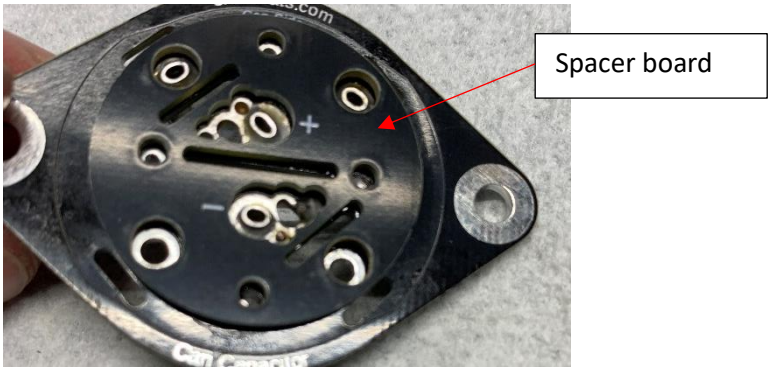
4. Remove the two #6-32 nuts and bolts, remove the capacitor.
5. Prepare the new capacitor with the W8AOR Uni-Cap board.
    a. If you have solder paste, apply a thin coating to all the mounting holes in the inner side of the capacitor, both sides. Not the outer flange mounting holes.
6. There are two sides to the Uni-Cap board. One side is marked "Cap Side" the other is marked "Turret Side".



7. Insert one of each of the 6 Solder Turrets from the "Turret Side". The short end will stick out slightly on the "Cap Side".
8. With a pair of snips or needle nose pliers, gently squeeze the turret on the "Cap Side" just enough to make it slightly oblong so it will not fall out while soldering. It does not take a lot of pressure. Do not squeeze to the point where the opening is closed shut.

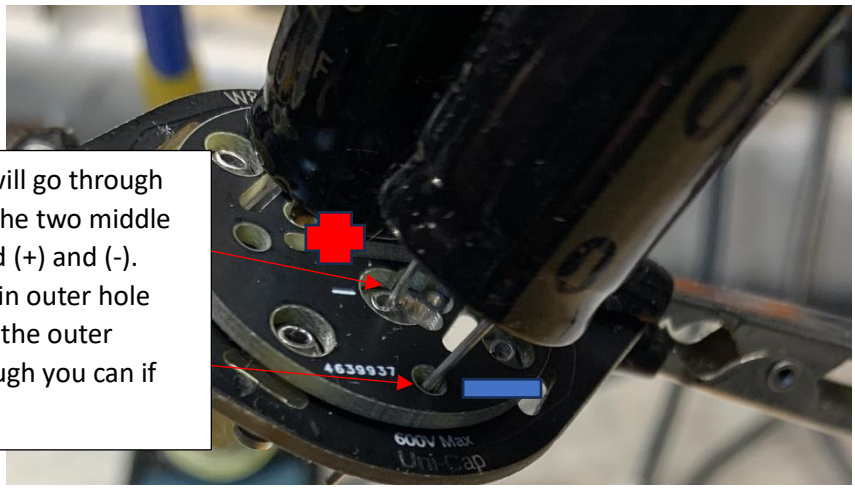


9. On the "Cap Side" align the spacer board so the markings and hole arrangements line up with the markings on the Uni-Cap board.



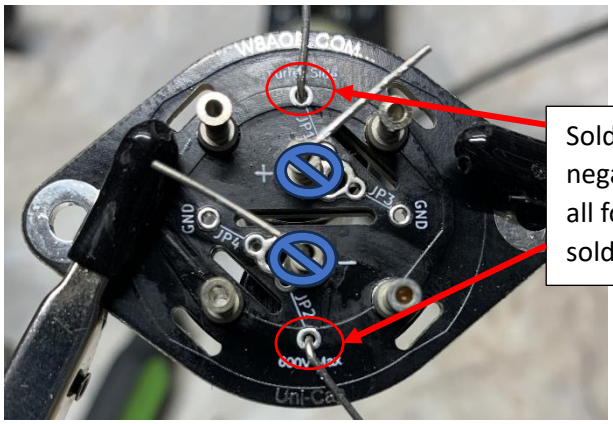
10. The Uni-Cap was designed for a single capacitor. In this application (thanks to Terry Dayton N6TLU of D-Lab's Electronics) we will use this as a dual capacitor assembly.

11. Install both supplied 47uF 450v Radial electrolytic capacitors with the positive lead in the two middle turrets.
    a. One in the turret marked (+) the other in the turret marked (-).
    b. The positive leads will go through the hollow center of the turrets.
    c. The negative leads will go into the small holes directly above and below the turrets.



Positive lead will go through the center of the two middle turrets marked (+) and (-). Negative lead in outer hole next to it. Not the outer Turrets. Although you can if you wish.

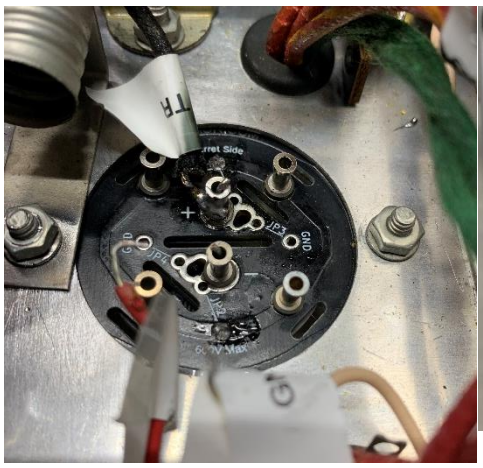
12. Bend over the leads from the underside and solder the negative leads only. Trim excess length.

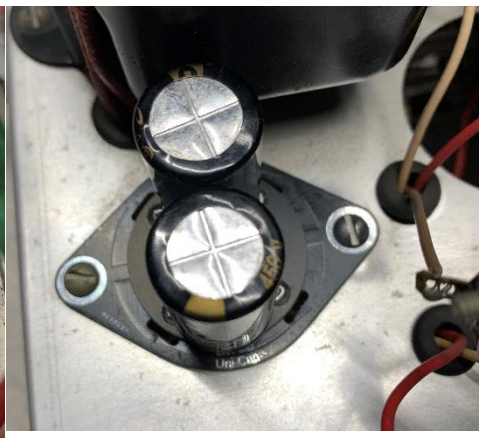


Solder only the two negative leads. Trim all four leads. Do not solder center turrets.

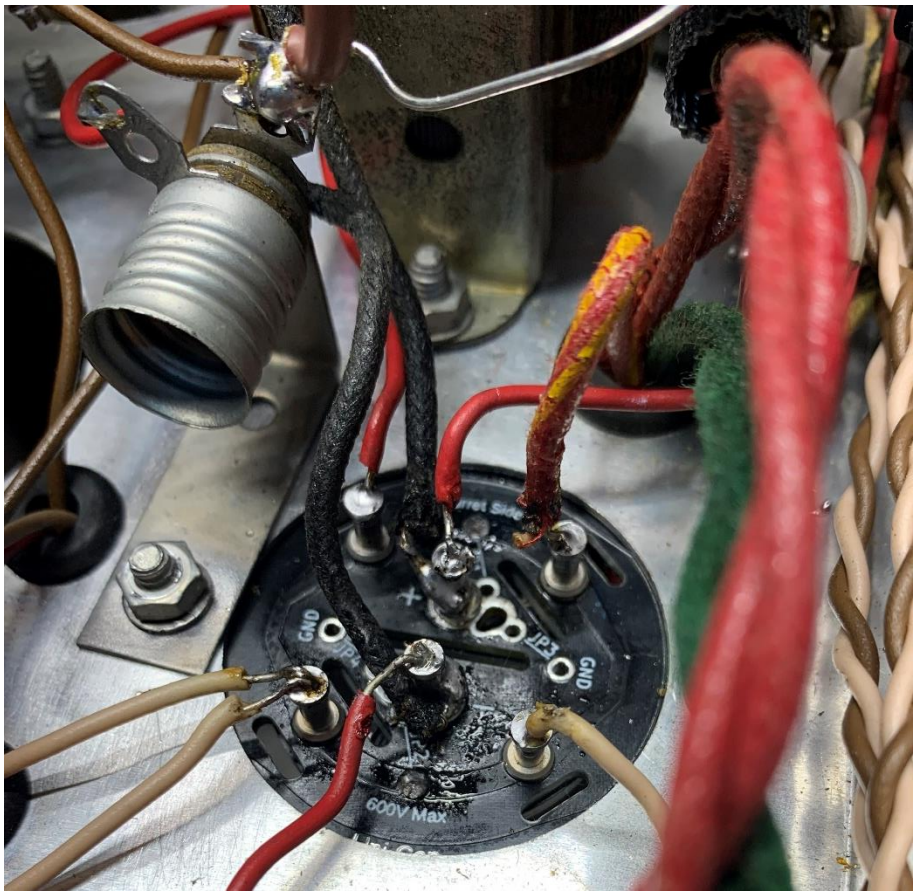
13. Install the new Uni-Cap board assembly. This can be installed from the top side or bottom side. Installing from the top side is the easiest. Secure with the original mounting hardware.

14. Note that in this configuration, there are no jumpers for J1, J2, J3, J4 installed. Those are reserved for different single cap configurations for "Can-Common" and "Can-Common to Chassis".



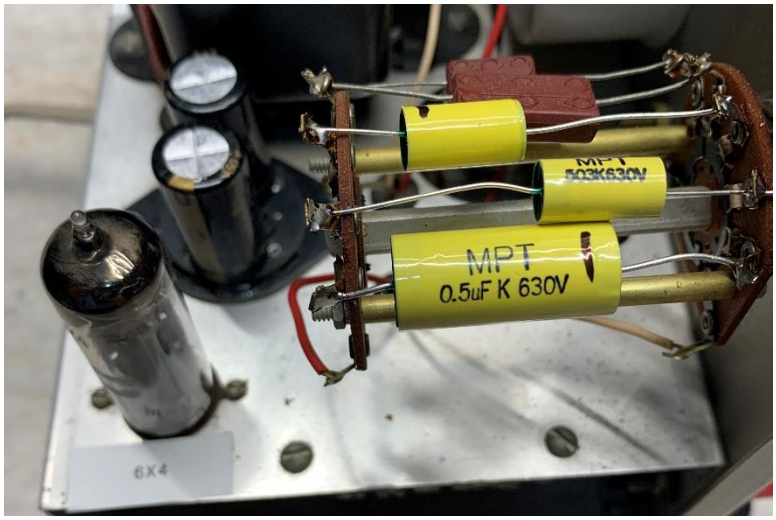


15. Complete the assembly by reattaching and soldering the original wires.
16. Note that for the small 20ga solid strand wires, you can insert them into the hollow end of the solder turret. This makes for a nice clean installation, and easy future maintenance.



IV. Axial Film and Electrolytic Capacitor replacement.

1. The remaining capacitors are essentially a one for one replacement and will not require any special instructions.
2. You may find that the original 20uF has much longer leads than the supplied replacement. Do not skip this step just because of that limitation. You will need to use some jumper wire and heat shrink tubing to make up for the leads. Or cut the original leads close to the body and solder (j - hook) to the original leads with new capacitor.
3. Mind the polarity.
4. The three film caps are installed on the multiplier dial. If you follow the "find the foil side" theory of film caps, do that now and then replace the .005uF, .05uF and 0.5uF capacitors.
5. The Bake-Lite style flat ceramic caps rarely fall out of spec, so replacements are not provided.
6. Check all resistor values, replace any out of spec.
7. This completes the upgrade.



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 communique.

Thank you, and good luck!

73's

Scott

W8AOR