

Heathkit of the Month - Extra #1:
by Bob Eckweiler, AF6C



This introduces a new a new feature of the Heathkit of the month. Occasionally I may find a repair technique or such to help get a kit back into working order when parts are not easily obtainable. These won't appear often but will be added when I find they might be useful to those working on the kits.

MAINTENANCE
Slide Switch Repair
Featuring the HM-102
HF Power Meter

Introduction:

After servicing a friend's Heathkit HM-102 that he picked up at a local swap meet, and that initially looked like a basket case, I was surprised how well it worked. It calibrated easily and held the calibration. I thought back to the HM-102 that I had acquired recently and was currently using. It was constructed well and appeared to be in a lot better physical condition, but was not nearly as solid in its performance. It was time I did something about that.

My HM-102 was disassembled and examined carefully. The soldering was not in question though I reheated a few joints, more to make me feel I was doing something than thinking I was fixing a problem. After cleaning the pots and switches with a small and careful application of De-Ox-ID cleaner I check the pots, rotary switch and slide switches with an ohmmeter. The pots seemed fine as did the rotary switch. But the first slide switch, which was located on the SWR sensitivity pot, and activated by pulling the knob out, showed erratic resistance. Sometimes it was near zero, sometimes it was high and sometimes it was beyond the scale my digital ohmmeter was set on. The switch had a problem.

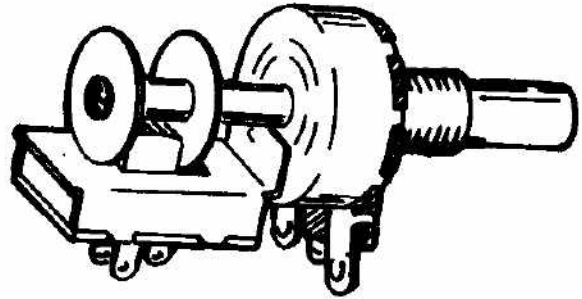


Figure 1: Pot with Integral Slide Switch

Finding a replacement for this pot - switch assembly (Fig. 1) would not be easy. The alternative was to take it apart and see what ailed it. The switch assembly does not come separate from the pot, but the fiber switch back plate can be removed by lifting the four metal tabs that hold it in place. This is not easy to do.

With some trepidation I was able to bend the tabs up carefully and totally disassemble the switch. Once the tabs were lifted it was obvious there was at least one spring underneath so extra care was taken not to have pieces shoot everywhere. The switch was then cleaned, lubricated and reassembled. The contact surfaces on this switch were badly tarnished and almost black, but they cleaned up to shiny silver with a cotton swab and some 91% alcohol. When I was

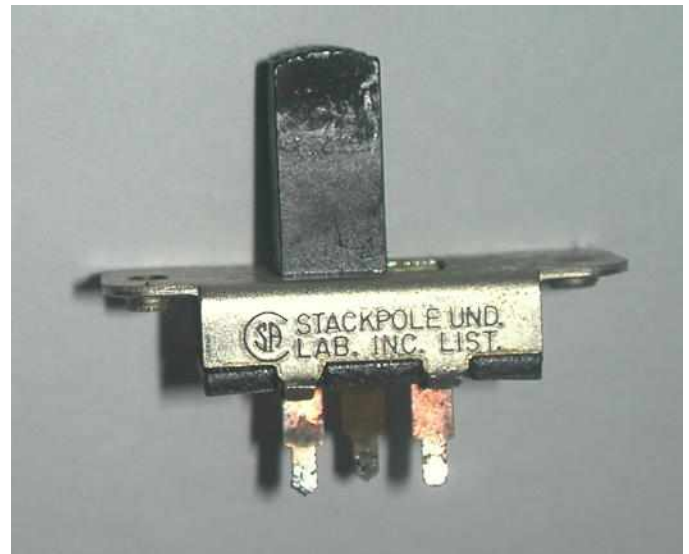


Figure 2: Slide Switch from Circuit Board

all done I cussed myself because I should have documented the process with some pictures.

After reassembly, I tested the HM-102 performance and the SWR section worked as solid as I could ever wish for. Unfortunately, though, the Power calibration still remained erratic. That circuit used a second slide switch. This one was a different style designed for circuit board mounting and included a vertically extended slider; however the guts of the switch appeared identical (Figure 2).

Here are step by step instructions for disassembling, cleaning and reassembling the switch:

Items You Will Need:

- Needle nose pliers
- Medium weight wire cutters, Preferably an old pair
- A 7/8" or 19 mm socket (or something similar) to hold the switch during assembly.
- Cotton Swabs
- Palmolive, Dawn or other dish detergent.
- 91% isopropyl alcohol or other solvent.
- White lithium grease (GC 19-2302)
- De-Ox-Id contact cleaner and lubricant.

Disassembly:

It is assumed you have removed the slide switch to be repaired. However if the switch is easily accessible when mounted you may leave it mounted. When the initial switch was serviced the pot assembly remained mounted. This can make the switch more stable while disassembling. Be sure to note the orientation of the switch terminals prior to disassembly.

If you examine the slide switch you will see four tabs that are bent over holding the fiber plate with the terminals to the metal switch bracket (See Figure 3). These need to be carefully bent up. Caution, excessive bending will cause the tabs to fatigue and break. Without

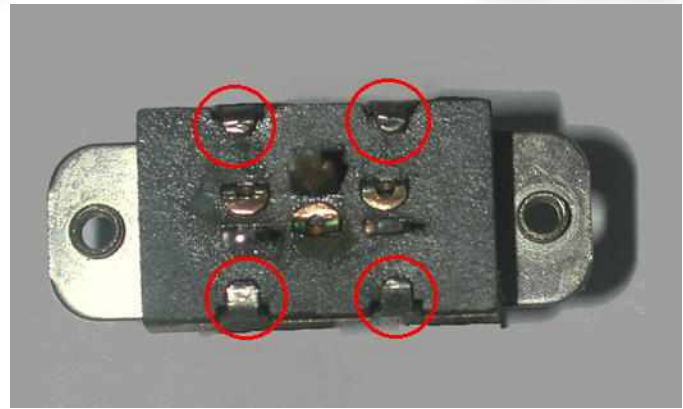


Figure 3: Slide Switch Showing the Tabs

damaging the metal frame or fiber plate you will need to get something under the tab and lift it slightly. I've never had luck using needle nose pliers, but an old pair of wire cutters can be used to get under the tab. You don't want to mar the metal frame so it is wise to protect the other cutter blade; I used a thin piece of brass shim stock. Again just bend the tab up far enough so you can use needle nose pliers to complete the bending. Keep pressure on the fiber plate so it doesn't come off and allow the spring and contact to fly off.

Now gently remove the fiber plate, contact and spring. Also remove the plastic slider. When you are done you should have five parts as listed in figure 4.

Cleaning:

Clean the disc contact (figure 5) with the alcohol. It should clean easily to a silver shine - this



Figure 4: Disassembled Slide Switch parts.
Left to right: Fiber plate with terminals and fixed contacts, disc contact, spring, plastic slider and metal switch frame.



Figure 5: The silver disc contact prior to cleaning. The earlier switch contact was much dirtier to the point of being covered with black tarnish. However this had enough dirt to cause switch failure.

part is silver plated so don't use anything abrasive. If your disc shows signs of burning, polish it gently; the HM-102 puts minimal current through the slide switches so this is not a problem. That may not be true for switches in other Heathkits. Similarly, clean the contacts on the fiber board. These too should clean up to a silvery shine.

The spring in both the switches was clean; I left them alone. However, I did clean all the lubricant off the metal switch frame, again with the alcohol. The plastic slider was washed with de-



**Figure 6: Cleaned Parts:
Ready for lubrication and assembly.**

tergent and water at the sink, and everything was set aside to dry (Figure 6)

Lubrication and Reassembly:

Use something that will hold the metal frame above the table; I used a 19 mm socket wrench. Place the metal frame atop the socket with the tabs pointed up. Apply a small film of lithium grease to the frame's channel where the plastic slide moves back and forth using a cotton swab. Place the plastic slide in the frame (it can go either way) and slide it back and forth a few times to disperse the grease; then gently wipe away any excess grease. (figure 7).



Figure 7: Frame with slide inserted

Insert the spring into the well in the plastic slider (figure 8) and gently place the contact



Figure 8: Slide with spring inserted

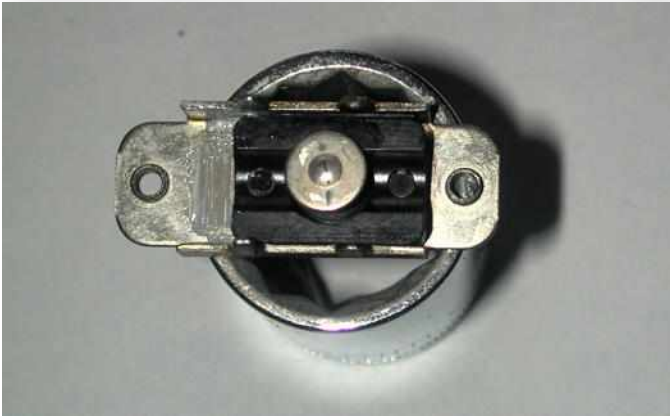


Figure 9: Slide with spring and disc contact inserted

disk onto the end of the spring (figure 9). Try not to touch the contact surface, and clean with some alcohol and a cotton swap if you do.

Now, place a tiny drop of De-Ox-Id or other quality contact lubricant* on the contact disk. Spread the contact cleaner evenly on the surface; I used a thin strip of plain white paper. Rotate the disc contact so that the previous wear, if noticeable, is off from the axis of slide motion. This can be seen in figure 9 with the previous wear marks now almost vertical.

Finally, the fiber plate is installed. Depending on the switch, make sure the solder contacts are oriented as they were prior to the switch being taken apart. Bend each of the four tabs back down to the 45° position. This should hold the fiber plate in place, though it might be loose. Continue bending each of the tabs down further to about 30° to horizontal. This should be close to where the tabs were prior to disassembly. Do not be tempted to bent the tabs to horizontal.

Checking the Finished Switch

The first thing you want to do is to be sure the switch slides freely. It should unless you bent the metal switch frame or pressed the tabs down too far.

Now it is time to check the switch electrically. Use leads with an alligator clip on each end so you don't get false readings from poor probe contact. First use an ohmmeter on a high resis-

tance scale and check between each terminal and the frame. They should all read infinity. Then check from the center terminal to each of the end contacts, one at a time, with the ohmmeter on a low-resistance scale. In one position the resistance should be close to zero and in the other infinity. The resistances should hold steady. Figure 10 shows the repaired switch re-assembled and ready to be reinstalled.

Summary:

As Heathkits get older, finding replacement parts is going to become harder and repairing the kits are going to take more ingenuity.

While this repair is not "rocket science", perhaps it will encourage others to attempt the repair instead of living with an annoying problem. My HM-102 has worked flawlessly since the switches were disassembled, cleaned and lubricated. Regular contact cleaner, such as De-Ox-Id didn't, by itself, return the switch to the solid operational condition one would want.

From time to time I may add to the Extra series of Heathkit articles as I find solutions to problems encountered restoring or fixing a kit or particular part.

73, from AF6C



This article originally appeared in the September 2014 issue of RF, the newsletter of the Orange County Amateur Radio Club - W6ZE.

Remember, if you are getting rid of any old Heathkit Manuals or Catalogs, please pass them along to me for my research.

Thanks - AF6C