Repairing a Philco Tombstone.

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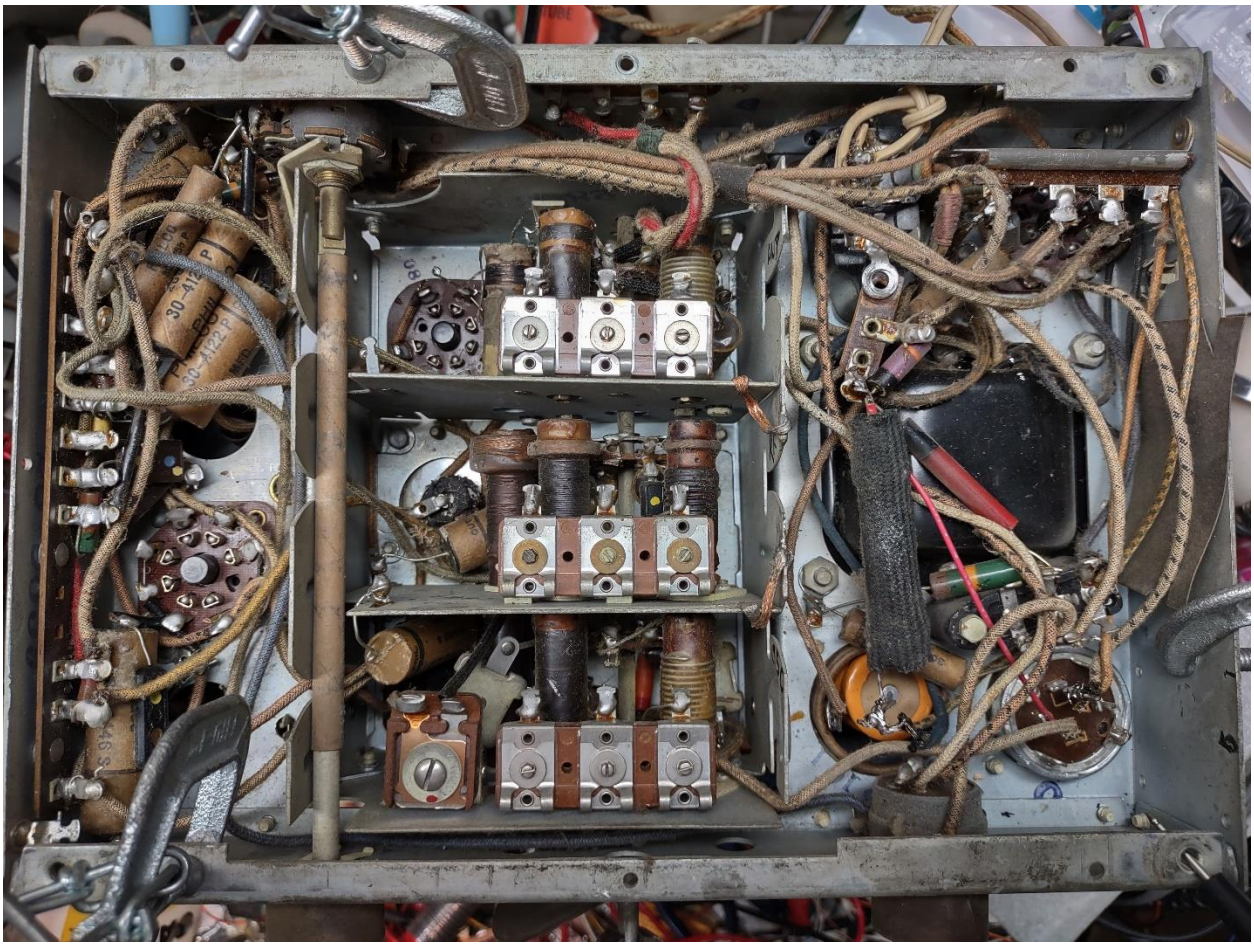
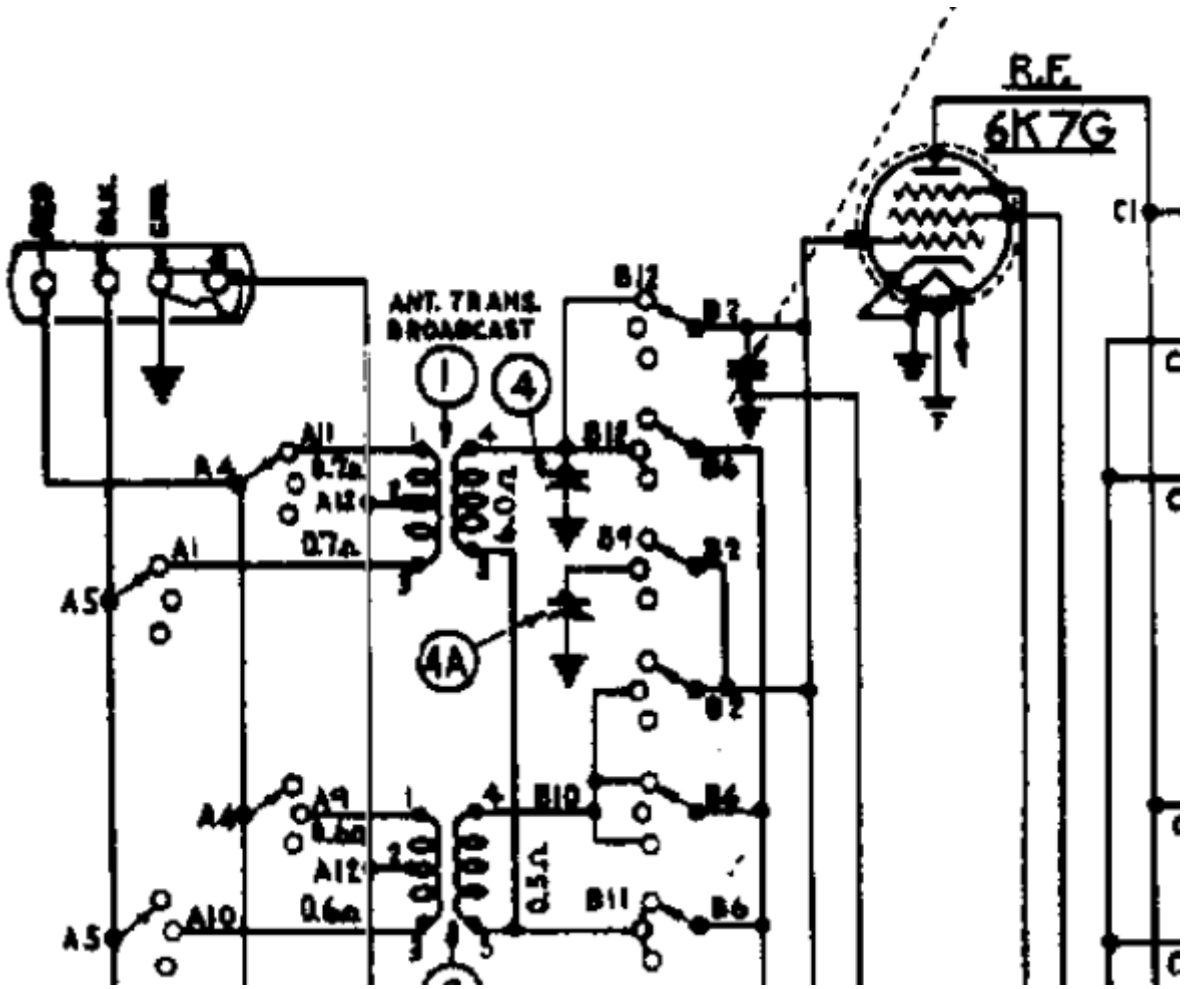
I was given a Philco model 37-620 (1937) tombstone to repair. This is a nice looking 6-tube 3-band radio.

After giving it a visual inspection, I turned it on with a 100W bulb in series with the line. It came to life weakly with hum, and the bulb barely lit, all good. As is the case in most radios of this vintage, the power supply capacitors needed changing. The original “wet” electrolytics were still present, one was shunted with a more modern capacitor; the radio had seen very little servicing in the past. I tested the ESR of the capacitors, and all of them were pretty much open. (The Equivalent Series Resistance (ESR) test was a formality. Wet electrolytic capacitors of this age will always be defective, and I will always replace them). I replaced one with a more modern (but physically similar) multi-section capacitor, and hid another in the empty shell of one of the original capacitors. Below is the chassis with the capacitors replaced.

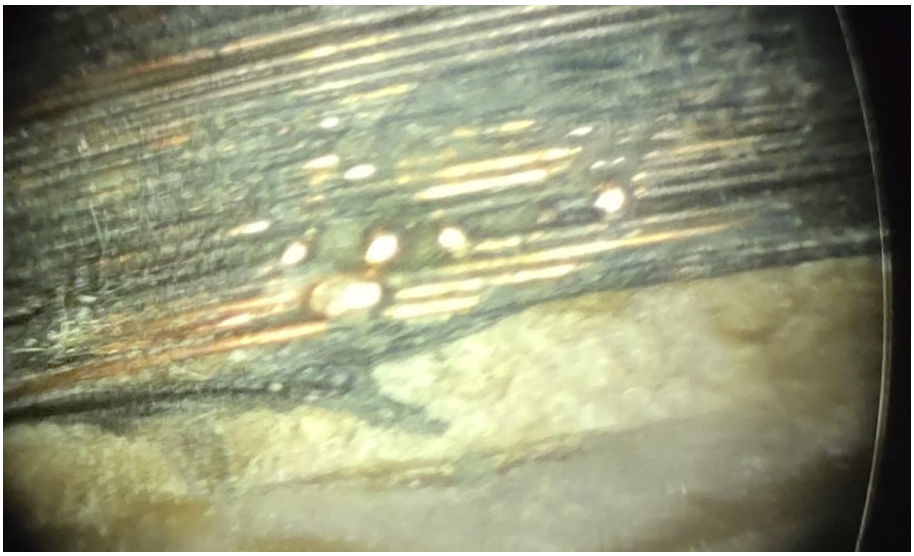


This brought some life back to the radio. I connected an antenna, and some AM stations came in weakly, but short-wave was quite active. Even with a long antenna, the AVC voltage on a local station was barely -1V (I mention the value of the AGC voltage as a gauge to the health of a radio in the Spring 2024 OVRC newsletter). Something was killing ONLY the AM band. This generally narrows it down to some part close to the band switch. I had noticed earlier that one of the antenna coils did not look “right”. You can see in the photo below that the upper end of the coil is dark and shiny, where the rest of the coil is lighter and dull. This is an indication that the winding has overheated and the wax has melted, something that should never happen to a coil like this.

This was the AM antenna coil that connects, through the band selection switch, to the antenna terminals at the back of the radio. I measured the resistance of this coil, and it was an open circuit; it should be a low resistance. The short-wave antenna coils were low resistance as they should be. If I hadn't noticed the discolouration, I'm not sure I'd ever have found this fault!



This radio is well built with many small compartments dividing apart the various functions for the radio. Unfortunately, it makes it very difficult to work on, because many of the components are deep in caverns. It was a challenge getting the coil out. I removed it and looked at the windings under a microscope. Balls of formerly molten copper were visible, confirming my suspicion that this coil had seen way too much current.



I rewound the coil with #36 magnet wire (scavenged from a colour TV deflection magnet). It required 30 turns close-wound (with a centre tap), so not too difficult to wind by hand. The other “secondary” winding was intact. Reinstalling the coil was another adventure, and I ended up supporting it by its leads.

It is worth considering how this damage could have happened. A lightning strike nearby could have done it. A direct strike would have caused much more damage unless there was a good lightning arrester on the antenna. Possibly the antenna touched a live wire. Another possibility is that the chassis of the radio was live (due to a damaged power transformer or line capacitor), and the antenna touched an external ground. However, I checked the capacitors and transformer and leakage was minimal.

How did I check this leakage? With the radio running, still with its 2-prong plug, I connected an AC ammeter (protected with a small 120V bulb, like an old Christmas tree bulb, in series), from the chassis to ground and looked for light or current. I reversed the plug and repeated. I would expect it to be much less that 1mA, and it was. GFI circuit breakers trip at 5mA, so I would like to see MUCH less leakage than this.

With the new coil in place, the radio came to life. With a small antenna, the AGC voltage on a local station was -15V, which is good. The rest of the repair was routine. I replaced the coupling capacitor to the 6F6G grid (because I could see a voltage drop across the grid resistor). I replaced the line cord with a modern cloth-covered 3-prong cord, and added a fuse. I removed the capacitors at the line input (they were redundant because the chassis is now grounded with the 3rd prong in the plug), and cleaned the switches. The radio works like new, picking up numerous stations on all three bands in the evening with a small antenna.

Those who know this radio will see that the band-select knob is wrong. It should be a lever, not a round knob. I do not have the right knob; if you have an extra one, please let me know, I’m sure the owner would like the correct knob.