Repairing a Bird Wattmeter Element with Surprising Results

I had a Bird 43 Wattmeter with a hand full of element for many years and never thought much about it and used it when needed.

Recently I was at a local Ham flea market and found a UHF (400 to 1000 MHz) 1000 Watt element at a table of free stuff. I didn't have a lot of use for it because of the power rating but thought I would add it to my collection. If it worked, that would be good and if it didn't that would be OK also. When I got a chance to test it, I found it did not work. There was no defection on the meter. I decided to take it apart to see if it was fixable. YouTube has some videos on how to take it apart but essentially the top cap is just glued on at least it was in my case. One suggested drilling out an indexing pin and that's what I did. Not sure if this was necessary but I just had to pry off the glued cap somehow. What I found was the calibration pot was open. As can imagine the pot is tiny so as to fit inside the element. It is a 25 KΩ pot. Looking through the spare pots I had, I found a 22 KΩ that I thought would fit. I changed the pot and this was a bit of a challenge because of its size and the space available.

The highest power UHF transmitter I had available to test the element was adjustable from 0 to 34 Watts. At least it should give some indication on the meter if the element worked. What surprised me was when I keyed the transmitter the Wattmeter when to almost full scale. Remember it is a kilowatt element. What I ended up doing was using the 50 Watt scale on the meter and adjusting the calibration pot to 34 Watts essentially making it a 50 Watt element. I also have 100 and 10 Watt UHF elements and used them to get a sense of how good the tracking was. My limitation was the amount of RF power available. The tracking looked pretty good. I did notice when terminating into a good 50 Ω load my 10 Watt element showed no reflected power but the recalibrated 1000 Watt element indicated about 0.7 Watt reflected so it's not perfect. Then again, it still might be within spec as the advertised spec is +/- 5% of full scale but I wouldn't expect the 0.7 Watt reflected result with a good working element. I did all the tests on just one frequency, 444 MHz.

I should mention it looks like someone previous made an attempt to take the element apart. I assume the frequency and power information on the cap belongs to this element.

I'll do some more testing if I get access to a higher power transmitter or amplifier. I also have a Bird 67 Termaline Wattmeter (500 Watt) that could give me a little more flexibility in comparison measurements.

So what are the conclusions? One thing, if you have a dead Bird element you might want to take it apart to see if it can be fixed. It might just be a bad calibration pot. I don't know how obtainable the pots are and they may not be easy to replace depending on your skills. You also need a means of recalibrating it.

I did not find the results I got calibrating the element to 50 Watts were acceptable as indicated by the reflective power reading. Things might be different if you went, for example, from say 1000 Watts to 500 Watts. I don't know if this will work, it will need to be tried and tested. I am thinking here that you may have more use for a 500 Watt element than a 1000 Watt element but you may be compromising the accuracy.

I assume if the above repaired element was calibrated at 1000 Watts it would work ok.

I did not make an attempt to remove the bottom Teflon part of the element but apparently this can be done.

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