Heathkit QM-1 Q-Meter

I bought this Q Meter at a local HAM flea market. It uses tubes (valves) and is 1950's vintage and is in good cosmetic condition. It covers 150 kHz to 18 mHz in four bands.

The circuitry consists of a four band RF oscillator, an LC tuned circuit using the inductor to be tested as part of the tuned circuit, a diode rectifier (6AL5 tube) and a meter circuit displaying the output as "Q".

As received, the oscillator was intermitted in a couple of ranges. At first I thought it was just bad switch contacts but it was not. It turned out that some of the oscillator coils were not tightened down to the chassis property resulting in poor ground connections. Overall it was put together very well, either an experienced builder put it together or maybe it was factory wired if that was available. I wish all the Heathkits I buy at the flea market were like this. When you think about it, a "Q" meter would probably be a last thing an inexperienced new HAM would buy.

Checking the voltages, the secondary voltages from the power transformer were high. This includes both the high voltage winding and the filament winding. Today's higher line voltage would not account for this. This led to the DC voltages to power the instrument to also be high. It seems there is a problem with the transformer's primary winding or the transformer was just wound wrong. I think the transformer was wound wrong. The transformer runs quite cool. I do not see a problem with the higher DC voltage as long as it did not affect the accuracy of the instrument. I checked this as shown later. I did have an issue with the higher filament voltage which was about 7 VAC. I ended up putting two silicon diodes in parallel, anode to cathode, on the ground side of the transformer's filament winding resulting in a measured filament voltage of 6.3 VAC. The transformer does not have a 5 Volt rectifier winding.

I now had an issue of checking the instrument's accuracy. The kit originally came with a coil with know "Q" for calibration. I do not have this coil. BTW the accuracy of this "Q" meter for "Q" readings is not given in its specs. I did not have any coils of know "Q". Mike, WU2D has a good video on YouTube about a Boonton 160A "Q" meter. It looks like the Heathkit QM-1 was inspired by the 160A as the circuitry and the panel layout is somewhat similar. Mike wound a coil using a T50-2 core and 28 gauge enameled wire and measured the "Q" of 190. I had a T50-2 core and 28 gauge wire so I did the same to compare results. I don't know how much difference there could be between the two wound coils. I measured a "Q" of 205. This difference doesn't seem too bad. I would trust his readings over mine. The Boonton 160A is definitely a better "Q" meter than this Heathkit. I've had experience with the 160A. I also have a Boonton 190A Q meter but does not cover the ranges of the Heathkit QM-1.

The QM-1 "Q" meter can be "calibrated" in two ranges, 0 to 250 and 0 to 500. For the 0 to 500 range during the panel calibration procedure, the reference is set at a different (lower) point on the meter. I found that a high "Q" reading in range one does not agree with the reading in range two. The range two reading tends to be higher. For example, a reading of 240 on range one might read 260 on range two. If you want to know how to calibrate the "Q" meter you can look at the YouTube video linked below.

As mentioned above I had a concern with the operating voltages being too high affecting its accuracy. I used a Variac on the AC input to set the DC and filament voltages as indicated on the schematic. I did not see any significant difference in measured readings after calibration.

I do not have a lot of faith in the accuracy of this instrument. Mike, WU2D may have said it best. It's good for comparing similar coils to find the best one. This is not a quote. He was not referring to the Heathkit QM-1 but it applies.

This "Q" meter can do other things that I am not going into here. See the YouTube link below for more details. I will mention that it can measure the inductance of the test coil in a couple of ways. On the top of the "Q" meter there is a chart of frequencies that can be used to measure the inductance where the inductance value can be read directly off the "Q" meter. Another way is to find a resonance of the coil using any suitable frequency and use the frequency and capacitance indicated on the "Q" meter to find the inductance. A better approach would be to use an LC or LCR meter.

Here is a YouTube video on the Heathkit QM-1 that is worth watching.

A "Q" meter is generally not a "must have" instrument for a typical electronic repair bench but could be useful to the experimenter.

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