

## L/C Meter

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Gord Rabjohn

This meter is designed to measure the value of chokes (up to about 100H) and electrolytic capacitors (up to about 100uF). It works in conjunction with your DVM on the AC range. It was intended to check power supply components for tube radios.

The inductance side uses the theory for the inductance meter described by me elsewhere. The capacitance side uses a similar theory: The AC current through a capacitor is measured by looking at the AC voltage drop across a series resistor (R4, R5, R6). The twist here is that we don't want to impose the wrong polarity across the electrolytic capacitor, so the AC fed to the capacitor is raised "above ground" with C1 + D1. As long as the voltage source is constant, and the drop across the resistor is small, the capacitance is linearly proportional to the voltage drop across the resistor. Note that the capacitor "sees" almost the full AC voltage across it, in my case about 7VRMS (so, 20V peak). This means the current through that capacitor can be large. For example, a 100uF capacitor is about 27 ohms at 60Hz, so with 6V RMS applied, the current is almost 0.25A. Some electrolytic capacitors will not tolerate this much current; they heat up and lose capacitance. So, a low excitation voltage is beneficial, but not too low, because the output voltage becomes too low.

In my version, the transformer has a 7V (open circuit) winding and a 17V (open circuit) winding for a series total of about 24V. The high 24V is perfect for the inductor measurement, and the 7V is best for the capacitor measurement. Note that my transformer is rather "wimpy" for the capacitor test, the effective resistance of the 7V winding is about 15 ohms which seriously affects the accuracy in the 100uF/V range, where we suck large currents from it. The value of the resistor in this range is tweaked to improve accuracy around the 50uF range, but it is a compromise. A better implementation would use a transformer with more current (maybe 6V, 0.6A). (Note that R4 should be multi-watt. As long as the output is 1V or less, a half watt is OK, but if the cap terminal is shorted, then R4 dissipates significant power.)

The capacitance side is also sensitive to ESR. If a capacitor appears too low, it may be because the ESR is too high. However, this circuit tests the capacitor at the same frequency as a filter capacitor operates, so it gives you a really good indication of how well it will perform as a filter cap. If you need a 20uF filter capacitor and this meter says your cap looks like 1uF, then that cap is not going to work for you, whether it reads low because of ESR or because of low capacitance.



