

# Add inductance ranges to the direct-C meter

With a small amount of additional circuitry, the direct reading capacitance meter described in January can be arranged to measure inductance as well. This brief note gives the details.

The January 1979 issue of Electronics Australia featured an inexpensive, direct reading capacitance meter operation on the principle of charge storage to determine capacitance. With the addition of a few components plus some component value changes, the same basic meter can be used in a dual role for rapid measurement of inductance as well as capacitance.

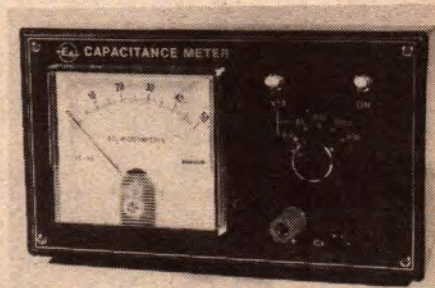
The range of inductance measurement is from 3 microhenries to 3 Henries full scale, with a lower measurement limit in the order of 0.1uH set by stray inductance of the test leads. Measurement is possible even in the presence of moderate shunt capacitance or resistance.

Absolute accuracy of the meter cannot be compared with a precision RF bridge, but speed and convenience make it useful for construction, measurement or comparison of RF chokes, peaking inductors, loudspeaker crossovers, TV coils, IF transformers, audio filters, CRT scanning coils etc. Simplicity, component

availability and ease of calibration make the meter suitable for home construction. A variety of meter movements and calibration scales, such as 0-50 uA or 0-100 uA, can be accommodated by appropriate component variations.

In operation, the 555 timer switches the 2N3643 transistor rapidly between the on (saturated) and off states. During the on state, current through the test inductor builds up to a steady-state value determined by the effective series resistance in the collector circuit of the 2N3643. When the 2N3643 is switched rapidly off, decay of the inductor current generates back EMF to force an alternative current path through the 1N914 diode and meter circuit. It can be readily demonstrated that the time-averaged value of this current is directly proportional to the test inductance value.

For normal use, the L x 100 range is employed to minimise errors caused by inductor series (winding) resistance. The L x 1 range is used for very small inductances, or to reduce errors caused

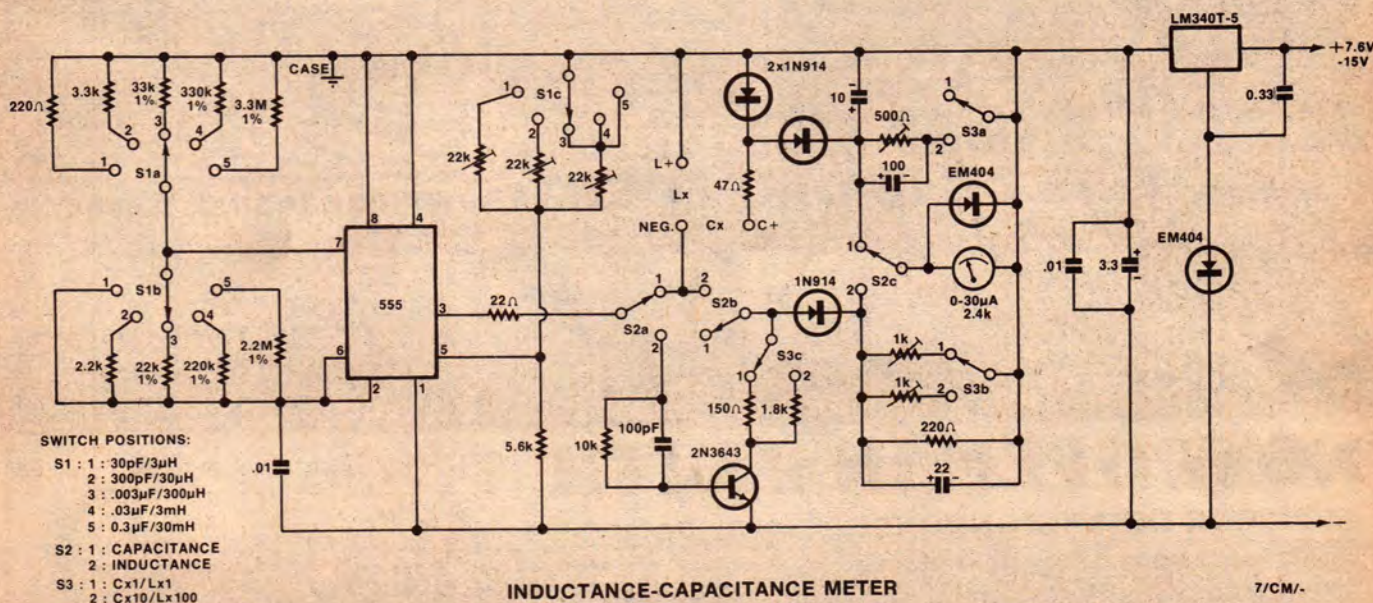


The original capacitance meter, described in the January 1979 issue. Low in cost, it reads from a few pF to 5uF.

by unavoidable shunt capacitance and resistance.

A few brief experiments with a 1mH choke, or a short circuited 2 metre length of TV ribbon, plus a handful of resistors and capacitors to act as parasitic impedances, will soon establish a working familiarity with the meter. With appropriate techniques even magnetising and leakage inductances of gapless ferrite or iron cored transformers can be measured.

You might be able to squeeze the meter into the original case, but it would probably be better to use the next size up.



Here is the complete circuit of the expanded meter. Only a handful of additional parts are required.