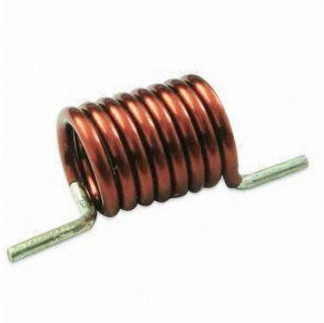


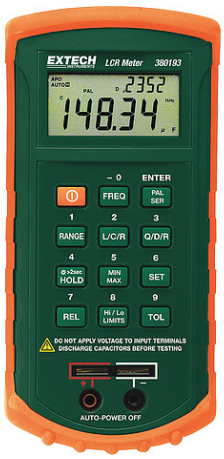
ELT 101: Basic Electricity: AC/DC

Lab 13-1: Inductive Circuits

An inductor opposes any change in current. The difference between this and a resistor is an inductor will oppose current without generating heat. And the amount of opposition the inductor offers depends on the frequency of the current. So what we have here is basically a frequency dependent resistor. This makes inductors useful as filters. In this lab, we'll look at some basic inductive circuits.

Objectives

1) Calculate total inductance for series, parallel and series-parallel inductors.
2) Verify your calculations by constructing each circuit and measuring total inductance.
3) Observe a demo of a RL circuit's time constant



Equipment and materials

1) Safety glasses
2) EXTECH LCR meter
3) Electrical trainer
4) Jumper leads

<u>Procedure 1: Calculate total inductance for series, parallel and series-parallel inductors</u>

The electrical trainer has three inductors: (L1) 330uH, (L2) 470uH and (L3) 1mH.

1) Calculate total inductor for the combinations shown in the table below.

Circuit	Calculated inductance	Measured inductance
L1 and L2 and L3 in series		
L1 and L2 and L3 in parallel		
L1 in series with L2/L3 in parallel		

Procedure 2: Verify your calculations by constructing each circuit and measuring total inductance

1) Construct each of the inductive circuits and use the EXTECH LCR meter set to read inductance to measure each total inductance. (If you need help using the LCR meter, just ask your instructor for help.)
2) Record each total inductance in the table on page 1.
3) Do your measured total inductances match your calculated total inductances? If not, why not?

_____

_____

Procedure 3: Observe a demo of a RL circuit's time constant

Ask your instructor to hook up the 22 ohm resistor in series with the 1mH inductor.

1) Calculate the time constant for this circuit using the formula TC = L/R
2) Record your time constant below.

TC = _____

3) Given this, how long will it take the inductor's field to completely expand?

_____

4) Ask your instructor to inject a 4.5KHz square wave into the circuit using a function generator and then observe the resulting output with an oscilloscope.
5) Does the resulting display match your calculations? If not, why not?

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****** end of lab 13-1 ******