

3.2: Activities

Equipment

- component board
- 9V DC power supply ("battery")
- multimeter
- loose capacitors
- wires
- alligator clips

The General Idea

There are two parts to this lab. In the first part, you are given two different capacitors from a manufacturer who asks that you check that they have capacitances in approximately the correct ratio. In part 2, you are given a known capacitor and must use it to find the approximate capacitance of another unknown capacitor. For confirmation purposes, you are asked to do this latter measurement two different ways. One of these ways must involve charging one capacitor with another (rather than charging both with the battery). In both cases, all you have at your disposal to work with is a battery and a voltmeter.

Some Things to Think About

Part 1

- In the [Background Material](#), a way of comparing capacitance ratios is discussed. How can we be assured of charging both capacitors equally?
- You are told that the ratio of the two capacitances of the capacitors on the component board is supposed to be 0.47.
- The percentage uncertainty in capacitances acceptable to the manufacturer that has hired you is fairly large – about 15%. Discuss whether the ratio you find is "correct" to within this tolerance
- Indicate which capacitor is the one with the larger of the two capacitances.

Part 2

- You now are told that the larger of the two capacitances on the component board is $1000\mu F$.
- Choose one of the three varieties of loose capacitors to measure.
- Use the alligator clips to make connections with the loose capacitor, and **be sure to observe proper polarity!**
- Naturally one method you can use is the same as part 1. But you will have to give some thought about how to perform the second measurement. Obviously to charge one capacitor with another, the first capacitor needs to already be charged, and this you will do with the battery. Again, when connecting the charged capacitor with the uncharged one, make sure they are connected positive-to-positive, negative-to-negative.
- When you charge one capacitor with the battery, does it matter which one you choose to charge?
- Your capacitor-charges-capacitor calculation will depend upon starting with one capacitor uncharged, so you need to make sure that this is true by shorting it beforehand.

Lab Report

Craft a lab report for these activities and analysis, making sure to include every contributing group member's name on the front page. You are **strongly encouraged** to refer back to the [Read Me](#) as you do this, to make sure that you are not leaving out anything important. You should also feel free to get feedback from your lab TA whenever you find that your group is at an impasse.

Every member of the group must upload a separate digital copy of the report to their lab assignment in Canvas *prior to leaving the lab classroom*. These reports are not to be written outside the lab setting.

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