MASSACHVSETTS INSTITVTE OF TECHNOLOGY
Department of Electrical Engineering and Computer Science
6.01—Introduction to EECS I
Spring Semester, 2008

Assignment 7, Issued: Tuesday, Mar. 18

Overview of this week's work

In software lab

- Work through part 1 of this lab.

Before the start of your design lab on Mar 20 or 21 Midterm

In design lab

- Work through part 2 of this lab.
- There will be no nanoquiz or homework write-up due; but we will assign credit for both parts of this lab based on check-off sheets.

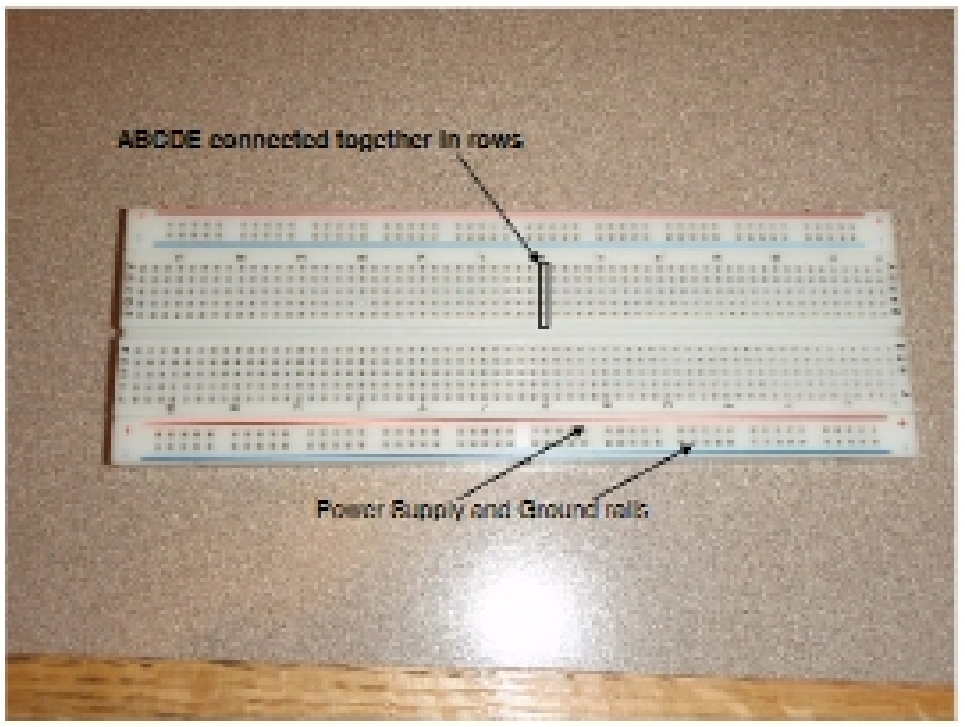

Figure 1: Protoboard

Circuit Lab: Part 1

There are several exercises here, to be done in the two lab sessions this week. Please be sure to have done Exercise 6 before you leave the "software lab" of the week: the one on Tuesday or Wednesday that is 1.5 hours long.

The first thing you must do is become familiar with the prototyping board. You will be building your circuits on this card, an exemplar of which is shown in Figure 1.

The protoboard provides for easy and rapid prototyping of circuits: you can just plug in component parts and connect wires. Under each of the holes in the card are springy connectors. This particular card (which is just like the ones you will be using) has 63 rows of connections. Five holes on one side of a separator and five holes on the other side are connected together. The separator is there because we can plug in electronic components such as operational amplifiers, straddling the separator. You will notice the rows are numbered and the columns are labeled A-E and F-J (a little bit like airplane seating). There are two columns of holes on either side of the board, generally used for power supply and ground, and those holes are connected together along the red and blue lines. CAUTION: for some reason that none of us on the staff understand, the connection is broken between rows 31 and 33. Typical use of this thing requires that you 'jumper' (connect a wire) between the two ends of the power supply 'rails' and between the two ends of the ground 'rails' at those two rows. Failure to do this leads almost everyone to wonder why their circuit is not working.If you look carefully at the bottom of figure 9, you can see an example of these two jumpers as they should appear on your protoboard.

We will also be making use of a multimeter, used to measure voltage, current and resistance. Although some multimeters can measure frequency, temperature and other things, we will make use of only the elementary functions. You will also find it convenient to find a pair of 'clip-leads',

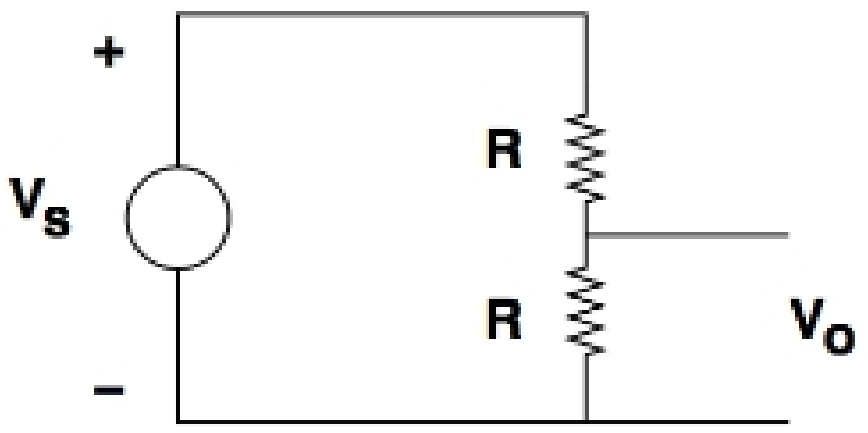

Figure 2: Voltage divider (schematic)

colorful wires with alligator clips at each end.

The multimeters all have two leads. One of them (the black lead) is plugged into a 'ground' or 'common' jack and the other (red) is usually plugged into a jack marked something like 'V-Ω-mA'. If you need to measure current higher than 100 or 200 mA, the red lead goes into another jack that is marked for that higher current.

The meters all have a control dial that selects what you are measuring. AC voltage is measured by setting the dial to one of the stops that have little tilde's (representing a sine wave). DC voltage is measured by setting the dial to one of the stops marked by a solid line over a dashed line. Resistance settings are marked by 'kΩ'. Most multimeters also have an 'off' position. Many, but not all multimeters will turn themselves off after being unused for some period of time, but it is best to set the dial to 'off' after you have made a measurement, to avoid exhausting the battery.

You will need to identify resistors. Almost all of the resistors we will be using are color coded, and some of us find those codes hard to read, so it is always best to verify the value of a resistor with a multimeter before using it. However, the color code consists of three bands around the resistor (you have to figure out which end is the first band). The first two are two digits of the value. The third band is a power of ten. The colors have meaning:

0 black

1 brown

2 red

3 orange

4 yellow

5 green

6 blue

7 violet

8 gray

9 white