MICROCONTROLLER PROJECT LABORATORY

EDUCATIONAL STUDIES PROGRAM – HIGH SCHOOL STUDIES PROGRAM – SUMMER 2001
MASSACHUSETTS INSTITUTE OF TECHNOLOGY

CLASS 2 NEWS: JULY 12, 2001

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1 Class Schedule & Homework

Class 2, Thursday, July 12:	Finish Part 1 of the lab.
For Homework:	Finish Part 2 of the lab. Due at start of class on Tuesday. Trouble? E-mail me or come early (5 p.m.) on Tuesday. dricket@mit.edu, 617-876-4941
Class 3, Tuesday, July17:	Finish Part 3 of the lab.

2 Corrections

My apologies for the mistakes in the lab handout and the confusion in getting everyone a kit.
Corrections to Lab 1:

1.1 B-D	There is no "power plug." Cut the round end off the power supply and use your wire strippers to get at the red and black wires. Connect them to the red and black posts.
1.1 K	Should be "repeat the last three steps." (not "J, K, L")
1.1 N	The voltage should be near 2, not 3 volts.

3 Please ask for help when you are confused!

It's okay to be confused or not understand the directions. The class instructors are here to help. Don't get stuck for 20 minutes because I write poor directions.

4 Transistor Question

There was a brief discussion about transistors at the first class. Transistors come in many varieties. For example:

- The bipolar silicon NPN transistors we will use in Lab 1 require a small current flowing into the base to control the current from collector to emitter. The collector-emitter current can be 100 times the base-emitter current.
- MOSFET transistors are a very popular modern variety used in our integrated circuits. They require only a tiny input current, and respond primarily to the voltage of the control lead.

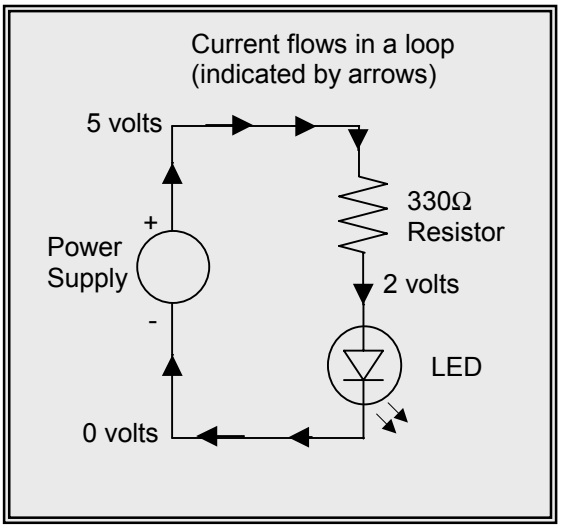
The important property of all transistors is that they let one electrical signal control another. For example, in an audio amplifier, the tiny electrical voltage generated by your voice hitting a microphone can be increased to power huge loudspeakers for an auditorium.

5 Capacitor Question

There was also a question about capacitors at the last class. In physics, the *what* of a capacitor is that it "charges up" when you apply a voltage to it. However, I described capacitors as they are used in electrical engineering: they permit high-frequency signals to pass through, but block low frequencies.

6 Current through an LED and resistor

At the end of section 1.1 of the lab, you connect a green LED to serve as a power light. The circuit diagram of this system is shown at right.



The power supply pumps voltage up to 5 volts at its positive end. Electric current flows from this high point down to the low point: end 0-volt end of the power supply, called ground.

We can find the amount of current flow through this loop by measuring the voltage across the resistor. You can do this either by putting the ends of the multimeter at the ends of the resistor, or you can measure the absolute voltage at the two ends of the resistor and subtract to find the difference. In both cases, you should get about 3 volts.

Since we know the voltage, V, across the resistor, and the resistance value, R, we can use the equation $V = IR$ to solve for the current, I. This same current flows all the way around the loop, through the LED, and back to the power supply.

The power through the LED is given by $P = IV$. The current, I, is the same as from the resistor, but the voltage here is the voltage across the LED, 2 volts, not the 3 volts across the resistor.

Check your answer to the end of part 1.1 with a staff member if this isn't clear.