ESS 205 Multimeter and Breadboard Guide:

Important rules for using the multimeters: (from
http://mechatronics.mech.northwestern.edu/design_ref/tools/multimeter.html)

A multimeter is used to make various electrical measurements, such as AC and DC voltage, AC and DC current, and resistance. It is called a *multi*meter because it combines the functions of a voltmeter, ammeter, and ohmmeter.

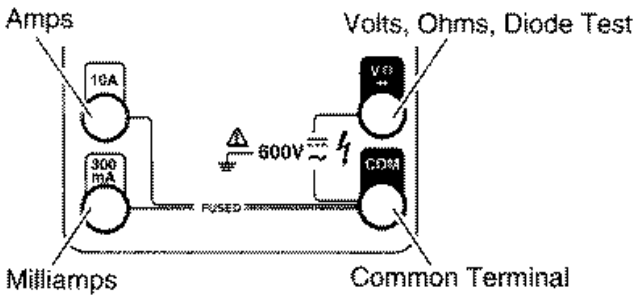
Important note: The most common mistake when using a multimeter is not switching the test leads when switching between current sensing and any other type of sensing (voltage, resistance). It is critical that the test leads are in the proper jacks for the measurement you are making.

Safety Information

- Never touch the probes to a voltage source when a test lead is plugged into the 10 A or 300 mA input jack.
- Be sure the test leads and rotary switch are in the correct position for the desired measurement.
- Never use the meter if the meter or the test leads look damaged.
- Never measure resistance in a circuit when power is applied.
- Be careful when working with voltages above 60 V DC or 30 V AC rms. Such voltages pose a shock hazard.
- Keep your fingers behind the finger guards on the test probes when making measurements.
- To avoid false readings, which could lead to possible electric shock or personal injury, replace the battery as soon as the battery indicator appears.

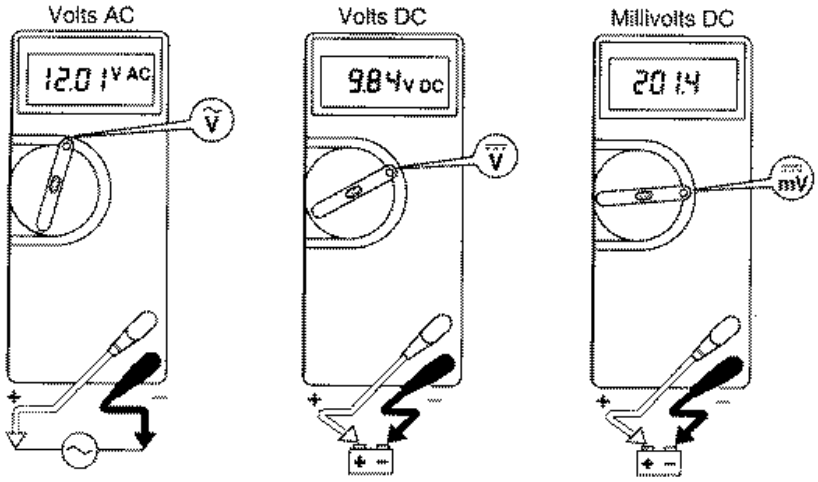
Input Jacks (Note that MultiTec meters have a slightly different configuration of jacks and switch positions.)

The black lead is always plugged into the common terminal. The red lead is plugged into the 10 A jack when measuring currents greater than 300 mA, the 300 mA jack when measuring currents less than 300 mA, and the remaining jack (V-ohms-diode) for all other measurements.



AC and DC Voltage

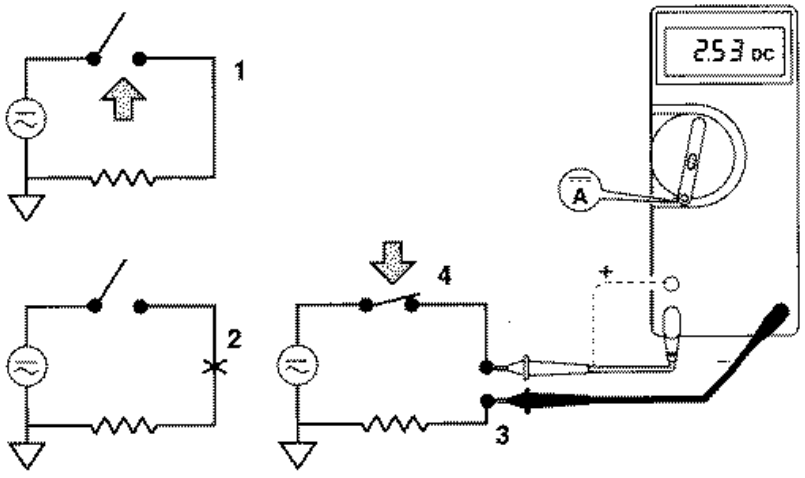
Always measure voltage in parallel.



Current

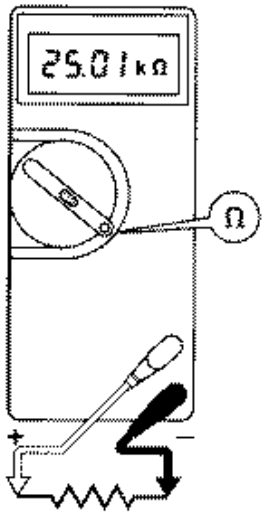
Always measure current in series. If you measure current across a component in parallel, you will blow the fuse.

Turn off power to the circuit. Break the circuit. Put the meter in series with the circuit as shown and turn power on. To avoid blowing an input fuse, use the 10 A jack until you are sure that the current is less than 300 mA.



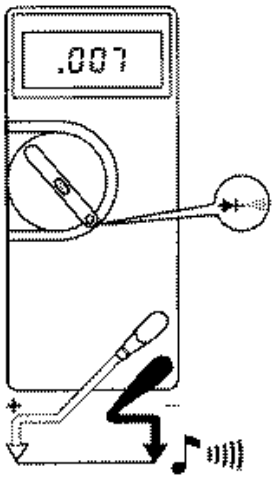
Resistance

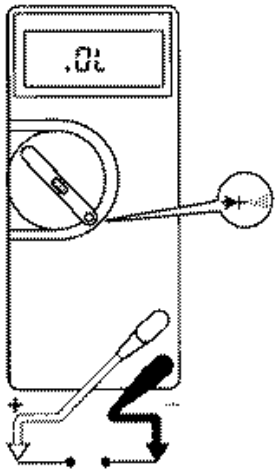
Turn off the power and discharge all capacitors. An external voltage across a component will give invalid resistance readings.



Continuity Test

This mode is used to check if two points are electrically connected. It is often used to verify connectors. If continuity exists (resistance less than 210 ohms), the beeper sounds continuously.





Breadboard connections: