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Circuit Menu

   This menu can be used to create a <u>new</u> circuit, <u>open</u> an existing circuit, <u>save</u> a circuit, <u>saveas</u> a circuit, or <u>exit</u> the program.

New Item

   Clicking on this item will allow the user to start a new circuit.   A dialog box will appear asking for the voltage   and the internal resistance of the power supply.   Use the mouse or TAB key to move from box to box.

Open Item

When choosing this menu item a dialog box will appear containing all previously stored circuits.   Select the desired file and it will appear in the main window.

Save Item

When choosing this menu item the current circuit will be saved to disk.   If the circuit is new   the user will be prompted for a file name.   Use a file name of 8 letters (no spaces) or less.

SaveAs Item

When choosing this menu item the current circuit will be saved to disk under a file name different than the present file name.   The user will be prompted for a file name.   Use a filename of 8 letters (no spaces) or less.

Purpose of the program

Setting up   circuits to illustrate ohms' law and resistors in series and parallel can be tedious and expensive.   Usually lab groups are very large due to the unavailability of equipment. This program allows the student to create complex series, parallel, and combination circuits with up to 19 resistors.   The relationship between resistance, potential difference, and current can be inferred by the student by trying different combinations of resistors.   A lab which accomplishes this task is included with the registered copy.   See register.txt for more information.

Procedure for setting up a circuit

        To create a circuit click on the resistor icon on the left of the screen.

A message box will appear telling the user to click the left mouse bottom at the location the resistor is to be added.   After this is completed a dialog box will appear.   Enter the desired resistance of the resistor.   You may enter from 0 to 100 ohms in the dialog box.   In the registered version up to 19 resistors can be included in a circuit.   The unregistered version allows only 3 resistors.   See register.txt for more information.
        You may add wires to the resistors on the screen at any time.   Click on the wire icon on the left of the screen.

You will be prompted to click the left mouse button on on terminal to be connected and then to drag the mouse to the other terminal to be connected.   You may only join a positive to negative terminal for resistors and like polarities when joining the power supply to any resistors.   When a circuit is complete a message box will appear.   Clicking on Run will have the computer calculate all of the currents in the circuit.   Resistors may be added to a completed circuit if they are placed in parallel to existing resistors.   If a mistake is made when setting up a circuit click on Edit|Undo (or press the backspace key) until the circuit is in the state desired.

Edit Menu

This menu allows the user to <u>Move</u> , <u>Undo</u> , or <u>Change</u> the properties of a power supply or resistor.

Move Menu Item

To move a power supply or resistor to another location on the screen click on this menu item.   Click the left mouse button on the device to be moved and drag it to its new location.   If there are any wires attached to the device you will not be able to move it.   Click on Undo until there are no wires attached to the device.

Undo Menu Item

       To return to a previous state of the circuit click on this menu item or press the backspace key.

Change Menu Item

To change the properties of a power supply   or resistor(voltage and internal resistance for a power supply, resistance for a resistor) click on this menu item.   Click the left mouse button on the device you want to change the properties of and then enter the new values into the dialog box provided.

Ohms' Law

      Circuits that follow Ohms' law relate the potential difference to the current and resistance as shown by the equation V=IR where I is the current in amperes, R is the resistance in ohms, and V is the potential difference in volts.   In a simple one resistor circuit with a power supply of 12 volts and no internal resistance connected to a 4 ohm resistor the current would be equal to the potential difference (12 V) divided by the resistance (4 ohms) which is 3 amperes.   Knowing any two of the quantities allows the third to be calculated using algebra.

      Resistors can be connected either in series, parallel, or a combination.   A resistor is any device That offers a resistance to the electric charge being passed through it.   Many electronic devices contain resistors or are resistors themselves.   (a light bulb for example).   When resistors are connect in series the total resistance of the combination is the sum of the individual resistors. For example, if a resistor of 4 ohms is attached to one of 5 ohms in series (see below illustration) the total resistance would be 9 ohms.

5 ohms   4 ohms
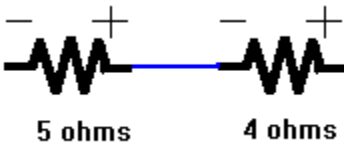
When resistors are attached in parallel the reciprocal of the total resistance is equal to the sum of the reciprocals of the individual resistance.   For example, if a resistor of 3 ohms is attached to one of 6 ohms in parallel (see below illustration) the total resistance would be
1/R = 1/3 + 1/6 = 2/6 + 1/6   = 3/6 so R = 6/3 or 2 ohms.   The total resistance in a parallel circuit is always less than the least resistor.

3 ohms

6 ohms
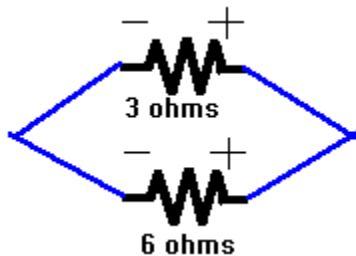
The purpose of this program is to allow you to investigate different series and parallel circuits and to infer the relationship between the voltage, resistance, and current in the system.

Run menu Item

When this item is chosen the computer will calculate all of the currents in the system and display them on the screen.   In order for this procedure to function the circuit must be complete.

Exit

To quit the program select this menu item or press Alt-x.