

Main Topic	Electricity
Subtopic	Circuits
Learning Level	High
Technology Level	Low
Activity Type	Student

Description: Use the Genecon and a pre-wired parallel bulb base to characterize certain properties of parallel circuits.

Required Equipment	Genecon, Series/Parallel Bulb Board, mini bulbs
Optional Equipment	Voltmeter, Ammeter

This lab is excerpted from the Genecon Experiment Manual, from Arbor Scientific's Complete Genecon Experiment Set (P6-2635).

Educational Objectives

- Characterize properties of parallel circuits.

Concept Overview

In a parallel circuit, the resistance of the entire circuit decreases as resistors (bulbs, in this case) are added. At the same time, the power used by the circuit increases when bulbs are added. The voltage, however, remains constant across the components of the circuit.

Lab Tips

In these exercises students will study some aspects of parallel circuits. The most convenient device for doing this is the Series/Parallel Bulb Board (Arbor Scientific P6-1120). Parallel wiring is as simple as connecting all of the bars, and various loads can be test quickly, easily, and safely.

The optional activities using meters can lead naturally to a discussion of Ohm's Law ($V=IR$).

Parallel Circuits

Name: _____

Class: _____

Goal:

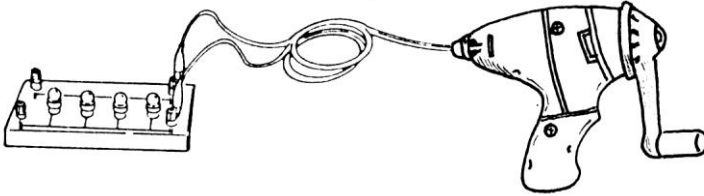
- Characterize properties of parallel circuits.

Materials:

Genecon, Series/Parallel Bulb Board, mini bulbs

Procedure:

1. Put four bulbs into the bulb board, and disconnect the bars from the fifth bulb holder.
2. Connect the Genecon to the bulb board as shown:



3. Unscrew the bulbs slightly in their sockets to disconnect them. (You do not need to remove the bulbs.)
4. While you turn the handle of the Genecon at a constant, moderate rate, have your lab partner screw in the bulbs one at a time. What do you notice about the amount of energy required to turn the handle as the number of bulbs increases?

5. Notice that, in a parallel circuit, having a disconnected bulb does not affect the lighting of the other bulbs in the circuit. What would happen if you unscrewed one bulb in a series circuit of four bulbs?

6. Repeat the above experiment, taking extra care to turn at a constant rate. (Having a partner tap out time may help you maintain the rate despite changes in the handle resistance.) Note carefully the brightness of each bulb as more bulbs are added to the circuit. If you are turning carefully, there should be no differences. What does this tell you about the voltage across the bulbs in a parallel circuit?

Optional Activity

7. Connect a voltmeter across the first bulb to measure the voltage as you connect the other bulbs. How does the voltage change as more bulbs are added (while turning at a constant rate)?

8. Connect an ammeter in series with the start of the bulb board, being careful to observe polarity. Use an ammeter rated to 1A or more. What happens to the current in the circuit as more bulbs are added?
