



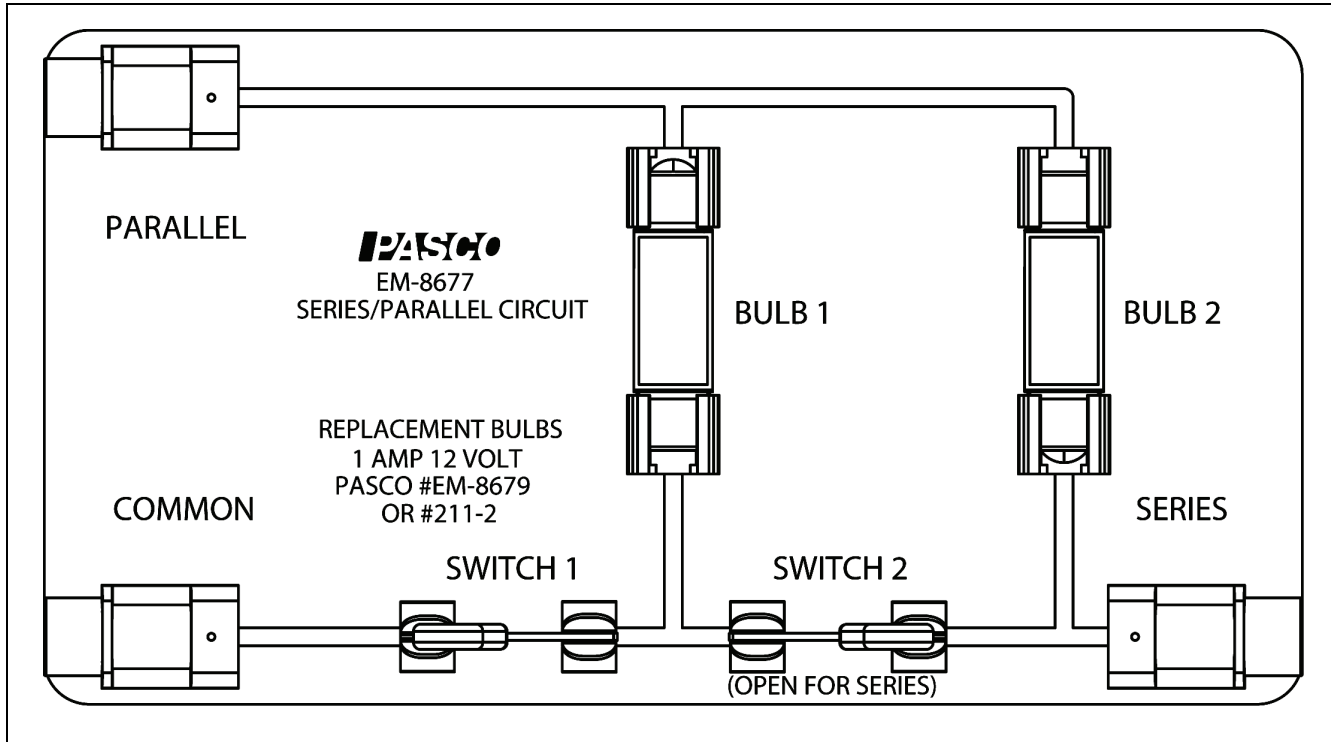
# Series/Parallel Circuit

EM-8677

Part of

## Hand-Crank Generator Activity Kit

EM-8676



### Series/Parallel Circuit (EM-8677)

Included Items	Model Number
Series/Parallel Circuit	EM-8677
Replacement Bulbs (5 pack)	EM-8679

#### Recommended Items\*

Banana Plug Patch Cords (EM-9740 or EM-9745)

Hand-Crank Generator (EM-8090)

-OR-

Student Power Supply, 18 VDC, 3A (SE-8828)

\*See the PASCO catalog or web site at  
[WWW.PASCO.COM](http://WWW.PASCO.COM)

### Hand-Crank Generator Activity Kit (EM-8676)

Model	Items
EM-8090	Hand-Crank Generator
EM-8677	Series/Parallel Circuit

### Introduction

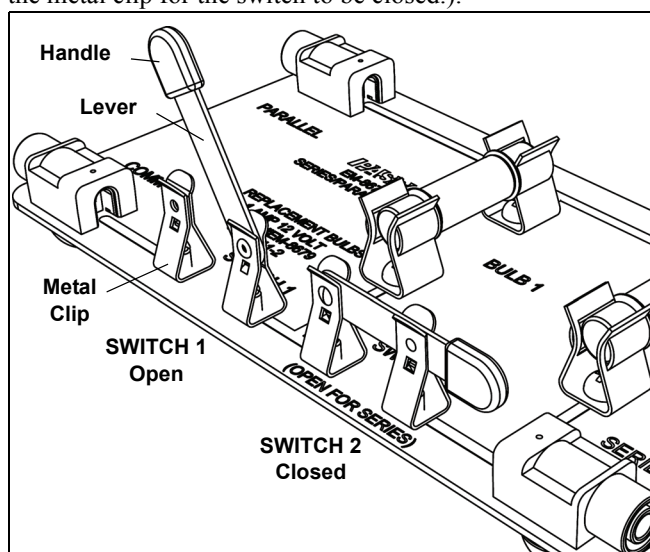
The Series/Parallel Circuit is designed for standard electricity experiments in the classroom. The board includes three ports (Series, Parallel, and Common (Ground)), two switches, and two light bulb holders. The board can be connected to a power source or a generator, such as PASCO's Hand-Crank Generator (EM-8090).

**WARNING:** The Series/Parallel Circuit has conductive properties. Treat the circuit board as you would other con-

ductors. Do not use the circuit board around water or place it on other conductive surfaces, especially when the board is connected to a power source. Always connect the ground lead to the COMMON port. Be aware of standard electrical safety precautions. PASCO cannot be held responsible for negligent safety practices in the classroom.

## Opening and Closing the Switches

In the Series/Parallel Circuit, the switch is a metal lever that can be manually moved up and down inside a metal clip (See the figure). In an electrical path, a closed switch allows current travel and an open switch stops current travel. To open a switch, move the handle up so that the lever is out of the clip. To close the switch, use the handle to move the lever down into the metal clip. (The lever must rest between the jaws of the metal clip for the switch to be closed.)



## Inserting and Replacing the Bulbs

The light bulbs come included in the package with the Series/Parallel Circuit and insert into the metal light bulb holders mounted on the circuit board. You will need to insert the included 12-volt light bulbs for the circuit to operate properly. If you need replacement bulbs, order EM-8679 Replacement Bulbs (5 pack).

**WARNING:** Do not remove the bulb with the bulb lit or any connected power sources turned on. To avoid the risk of shock, always disconnect the red positive lead wire from the port on the circuit board and turn off any connected power sources before removing the light bulb.

To remove a light bulb, use a screwdriver to gently pry up one end of the bulb, and then lift the bulb out from the metal clips. Be careful not to put force on the glass portion of the bulb.

## Setup

1. Place the Series/Parallel Circuit on a non-conductive surface, such as a wooden table. With the power source turned off and switches open, connect the ground lead wire of the power source to the COMMON port.

**WARNING:** Do not use a power source greater than 12 volts with the Series/Parallel Circuit. Exceeding the voltage is hazardous and may destroy, melt, or burn components in the circuit board.

2. **For current travel through the series circuit:** Connect the positive lead wire of the power source to the SERIES port. Close SWITCH 1 and keep SWITCH 2 open. (See the figure on the next page for the schematic of the electrical pathway.)

OR

3. **For current travel through the parallel circuit:** Connect the positive lead wire of the power source to the PARALLEL port. Close SWITCH 1 to light BULB 1 and/or close SWITCH 2 to light BULB 2. (SWITCH 1 lights BULB 1 and SWITCH 2 lights BULB 2.) (See the figure on the next page for the schematic of the electrical pathway.)

## Operation Using the Hand-Crank Generator

**Series Circuit:** Connect the black lead wire to the COMMON port (ground) and the red lead wire to the SERIES port of the Series/Parallel Circuit. Close SWITCH 1. Note: Keep SWITCH 2 open. (SWITCH 2 is used for demonstrating parallel circuits.)

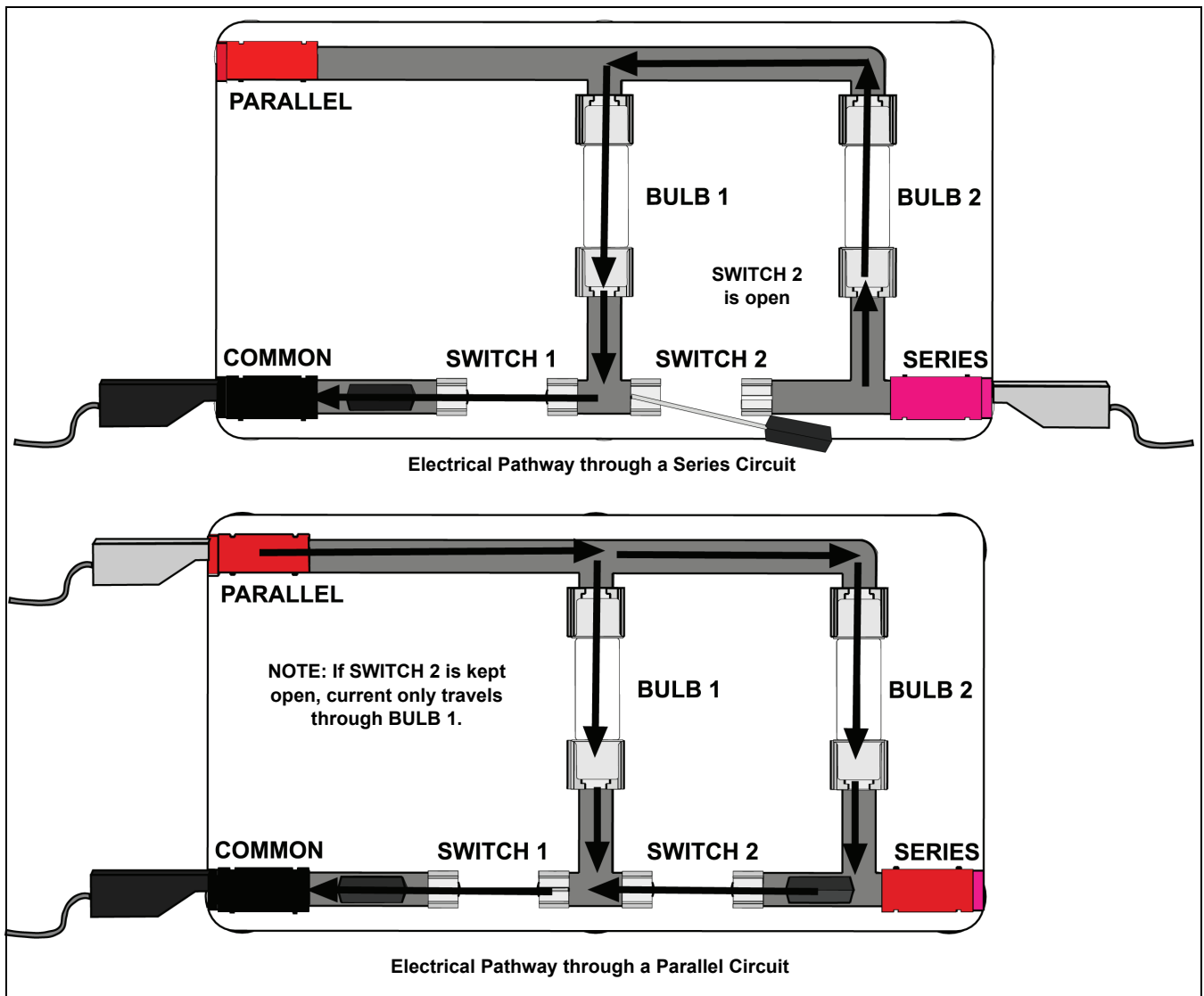
Rotate the Hand Crank Generator in the positive direction (shown by the arrow on the label of the generator) at approximately 1 to 2 revolutions per second. Note what happens to both bulbs.

**Parallel Circuit:** Connect the black lead wire into the COMMON port and the red lead wire into the PARALLEL port of the Series/Parallel Circuit.

With Switches 1 and 2 open, rotate the Hand-Crank Generator in the positive direction (shown by the arrow on the label of the generator) at approximately 1 to 2 revolutions per second. Note what happens.

With the lead wires still connected, close SWITCH 1 by moving the switch handle down into the metal clip. Crank the handle. Note what happens.

Close both SWITCH 1 and SWITCH 2 and crank the handle again. Note what happens.



## Technical Support

For assistance with any PASCO product, contact PASCO at:

Address: PASCO scientific  
10101 Foothills Blvd.  
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Phone: +1 916-786-3800 (worldwide)  
800-772-8700 (U.S.)

E-mail: [support@pasco.com](mailto:support@pasco.com)

Web [www.pasco.com](http://www.pasco.com)

For the latest information about the Series/Parallel Circuit or the replacement items and accessories, go to the PASCO web site at [www.pasco.com](http://www.pasco.com) and enter the model number in the search window.

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The European Union WEEE (Waste Electronic and Electrical Equipment) symbol (to the right) and on the product or its packaging indicates that this product must not be disposed of in a standard waste container.

