

# MERIT BADGE SERIES



# ELECTRONICS



BOY SCOUTS OF AMERICA®



STEM-Based

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# ELECTRONICS



*"Enhancing our youths' competitive edge through merit badges"*



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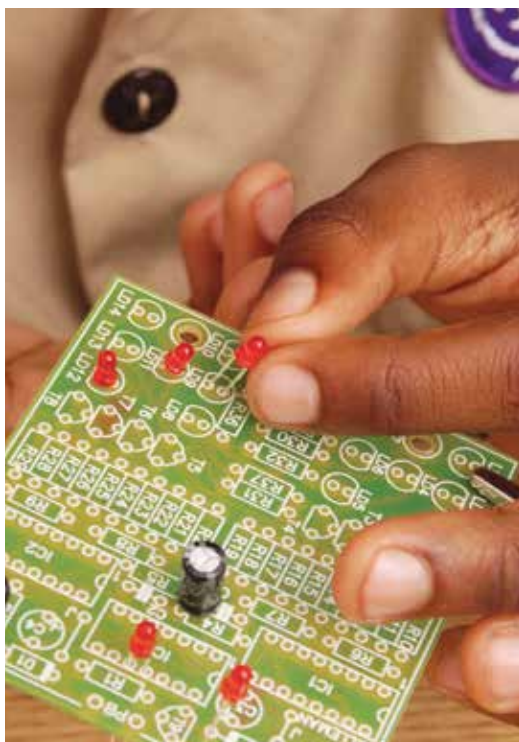
# Requirements

1. Describe the safety precautions you must exercise when using, building, altering, or repairing electronic devices.
2. Do the following:
  - a. Draw a simple schematic diagram. It must show resistors, capacitors, and transistors or integrated circuits. Use the correct symbols. Label all parts.
  - b. Tell the purpose of each part.
3. Do the following:
  - a. Show the right way to solder and desolder.
  - b. Show how to avoid heat damage to electronic components.
  - c. Tell about the function of a printed circuit board. Tell what precautions should be observed when soldering printed circuit boards.
4. Discuss each of the following with your merit badge counselor, and then choose ONE of the following and build a circuit to show the techniques used:
  - a. Tell how you can use electronics for a control purpose, and then build a control device circuit.
  - b. Tell about the basic principles of digital techniques, and then build a digital circuit. Show how to change three decimal numbers into binary numbers and three binary numbers into decimal numbers.

- c. Tell about three audio applications of electronics, and then build an audio circuit.

Show how to read the schematic diagram of the project you chose and, to the best of your ability, explain to your counselor how the circuit you built operates.

5. Do the following:
  - a. Show how to solve a simple problem involving current, voltage, and resistance using Ohm's law.
  - b. Tell about the need for and the use of test equipment in electronics. Name three types of test equipment. Tell how they operate.
6. Find out about three career opportunities in electronics that interest you. Discuss with and explain to your counselor what training and education are needed for each position.



# Electronics Resources

## Scouting Literature

*Computers, Electricity, Inventing, Radio, and Robotics* merit badge pamphlets

Visit the Boy Scouts of America's official retail website at <http://www.scoutstuff.org> for a complete listing of all merit badge pamphlets and other helpful Scouting materials and supplies.

## Books

Bartholomew, Alan. *Electric Mischief: Battery-Powered Gadgets Kids Can Build*. Kids Can Press, 2002. Includes directions for an assortment of electronics.

Bonnet, Bob, and Dan Keen. *Science Fair Projects With Electricity & Electronics*. Goodwill Publishing House, 2006. Includes nearly 50 projects on electricity and electronics.

Bridgman, Roger. *Eyewitness: Electronics*. DK Publishing, 2000. Traces the history, discoveries, and devices of this fast-moving science.

Ceceri, Kathy. *Robotics: Discover the Science and Technology of the Future with 20 Projects*. Nomad Press, 2012.

Chirico, JoAnn. *Electronics*. VGM Career Horizons, 1996. This book explores career possibilities in electronics and electricity.

Engelbert, Phillis. *Technology in Action: Science Applied to Everyday Life*. Gale, 1998. A general look at technology and technical applications of scientific knowledge, with a section on computers and electronics.

Leon, George deLucenay. *Electronics Projects for Young Scientists*. Franklin Watts, 1991. Introduces the basic principles of electronics and includes project ideas such as a crystal radio, an intercom, and a pair of electronic dice.

Maxfield, Clive "Max." *Bebop to the Boolean Boogie: An Unconventional Guide to Electronics*. Newnes, 2009. This book covers the basics of electronics clearly, simply, and in an entertaining style.

Predko, Myke. *Digital Electronics Guidebook: With Projects!* McGraw-Hill, 2002. Introduces the nuts and bolts of digital electronics.

Rowh, Mark. *Opportunities in Electronics Careers*. McGraw-Hill, 2007. Check out the many electronics-related career opportunities featured in this book.

Slone, G. Randy. *TAB Electronics Guide to Understanding Electricity and Electronics*. 2nd ed. McGraw-Hill, 2000. A learn-as-you-go guide for readers of any electronics skill level.

## Magazines

### **Nuts & Volts**

430 Princland Court  
Corona, CA 92879  
Telephone: 951-371-8497  
Website: <http://www.nutsvolts.com>

### **Popular Science**

Website: <http://www.popsci.com>

## Organizations and Websites

### **American Microsemiconductor Inc.**

Website:  
<http://www.americanmicrosemi.com/information/tutorial>

### **ePanorama.net**

Website: <http://www.epanorama.net>

### **Howstuffworks**

Website:  
<http://electronics.howstuffworks.com>

### **101science.com**

Website: <http://www.101science.com/Radio.htm>

## Electronics Parts and Suppliers

In most places, **Radio Shack** stores can be the best source for electronics parts. However, most Radio Shacks have reduced their parts inventories, which means you might have to look

elsewhere to find all the parts you need for a project (or check out their website, <http://www.radioshack.com>). Electronics parts and kits also can be ordered over the Internet or via mail or toll-free telephone from various suppliers.

Whenever you go online, be sure you have your parent's permission first.

### **Allied Electronics**

7151 Jack Newell Blvd. S.  
Fort Worth, TX 76118  
Toll-free telephone: 866-433-5722  
Website: <http://www.alliedelec.com>

### **C&S Sales Inc.**

150 Carpenter Ave.  
Wheeling, IL 60090  
Toll-free telephone: 800-292-7711  
Website: <http://cs-sales.net>

### **Carl's Electronics**

484 Lakepark Ave., Suite 59  
Oakland, CA 94610  
Toll-free telephone: 866-664-0627  
Website: <http://www.electronickits.com>

### **Digi-Key Corporation**

701 Brooks Ave. S.  
Thief River Falls, MN 56701  
Toll-free telephone: 800-344-4539  
Website: <http://www.digikey.com>

### **Electronic Courseware International**

P.O. Box 604  
Snyder, TX 79550  
Toll-free telephone: 800-453-1708  
Website: <http://www.sciencelabs.com>

**HobbyTron.com**

24700 Avenue Rockefeller  
Santa Clarita, CA 91355  
Telephone: 818-675-9000  
Website: <http://www.hobbytron.com>

**MCM Electronics**

650 Congress Park Drive  
Centerville, OH 45459  
Toll-free telephone: 888-235-4692  
Website:  
<http://www.mcmelectronics.com>

**Mouser Electronics**

1000 N. Main St.  
Mansfield, TX 76063  
Toll-free telephone: 800-346-6873  
Website: <http://www.mouser.com>

**Acknowledgments**

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