



Requirements for the Electronics merit badge:

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 choose 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.

blue – instructed and conducted during Troop meetings BEFORE the December Outing. All requirements in black will be covered during the December outing. If you bring your project, the merit badge will be completed.



When considering a project:

talk to parents about cost

project **MUST** be soldered and assembled by you

schematic **MUST** be drawn for your project

the circuit must meet requirement 4a or 4b or 4c and approved by your counselor **BEFORE** beginning the project.

IT SHOULD BE FUN and INTERESTING!

<http://www.hobbytron.com>

<http://www.bakatronics.com/shop>

<http://www.electronickits.com/>

Resources:

Bartholomew, Alan. *Electric Gadgets and Gizmos: Battery-Powered Buildable Gadgets That Go!* General Distribution Services, 1998. Includes directions for an assortment of electronics.

Bonnet, Bob. *Science Fair Projects With Electricity & Electronics*. Sterling Publishing, 1996. 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.

Chirico, Joann. *Electronics*. NTC Publishing, 1995. This book explores career possibilities in electronics and electricity.

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.

Predko, Myke. *Digital Electronics Guidebook: With Projects!* McGraw-Hill, 2001. Introduces the nuts and bolts of digital electronics.

Slone, G. Randy. TAB Electronics Guide to Understanding Electricity and Electronics. 2nd ed. McGraw-Hill, 2002. A learn-as-you-go guide for readers of any electronics skill level.

Magazines

Nuts & Volts
430 Princeland Court
Corona, CA 92879
Toll-free telephone: 800-783-4624
Web site: <http://www.nutsvolts.com>

Popular Science

P.O. Box 6001
Tampa, FL 33660-0001
Toll-free telephone: 800-289-9399
Web site: <http://www.popsci.com>

Organizations and Web Sites

American Microsemiconductor Inc. —
<http://www.americanmicrosemi.com/tutorials.htm>

ePanorama.net — [http:// www.epanorama.net/index.php](http://www.epanorama.net/index.php)

Howstuffworks — [http:// electronics.howstuffworks.com](http://electronics.howstuffworks.com)

101science.com — [http:// www.101science.com/Radio.htm](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 Web site, <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.

Allied Electronics
7410 Pebble Drive
Fort Worth, TX 76118
Toll-free telephone: 800-433-5700
Web site: <http://www.alliedelec.com>

C and H Sales Company
2176 East Colorado Blvd.
Pasadena, CA 91107
Toll-free telephone: 800-325-9465
Web site: <http://www.aaaim.com/CandH>

Carl's Electronics
P.O. Box 182
Sterling, MA 01564
Toll-free telephone: 800-439-1417
Web site: <http://www.electronickits.com>

Digi-Key Corporation
P.O. Box 677
Thief River Falls, MN 56701-0677
Toll-free telephone: 800-344-4539
Web site: <http://www.digi-key.com>

Electronic Courseware Interactive
P.O. Box 1657
Kyle, TX 78640
Toll-free telephone: 800-453-1708
Web site: <http://www.eki.com/default.asp>

Hobbytron.com
1216 South 1580 West, Suite B
Orem, UT 84058
Toll-free telephone: 800-494-1778
Web site: <http://www.hobbytron.com>

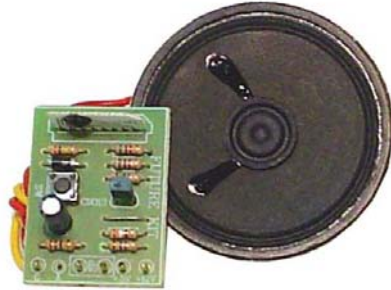
MCM Electronics
650 Congress Park Drive
Centerville, OH 45459
Toll-free telephone: 800-543-4330
Web site: <http://www.mcmelectronics.com>

Mouser Electronics
2401 Highway 287 North
Mansfield, TX 76063
Toll-free telephone: 800-346-6873
Web site: <http://www.mouser.com>

Kit Examples:

<http://www.bakatronics.com/>

Item Name:
FK201 Monkey Sound Effects Kit
Item #:
FK201
Price/ea:
\$6.99



Kit includes all components and instructions to make a digital sound effect generator that is preprogrammed to sound like a MONKEY. Great for sound effects on a model railroad, display scene, or just for the fun of it. Add a magnetic switch to turn it on and off with a small magnet mounted on a train car and have the effect start when a train passes by. Automatically resets after a preprogrammed delay. Add our other effects generators to make the railroad or scene come alive with sounds. You could even add remote switches on the display to start the sounds individually.

Operates on 3 volt DC. 2 AA or AAA Batteries will operate the circuit. A Battery holder is available under options

Kit comes with complete with circuit board, components, PreProgrammed Digital IC, a 2" speaker and instructions. Requires basic soldering skills and a 15 to 30 watt soldering iron. A small amount of solder is included with the kit

Another great kit to have fun with and add a new level of interest to your railroad. You can even combine it with our Illuminator Kit to have up to 5 sounds automatically turn on and off at predetermined intervals.

Item Name:
FK1005 Solar LED Flasher
Item #:
FK1005
Price/ea:
\$13.99



Kit includes the components and materials to assemble a Solar powered DC Electronic LED Flasher.

Demonstrate the power of the Sun and Learn about solar cells and LED Flashers by assembling this simple kit. Get started in the world of solar power today and have fun doing it!

Kit Example:

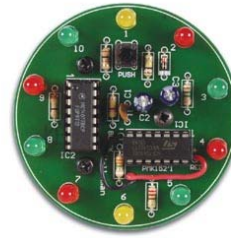
<http://www.hobbytron.com>

Wheel of Fortune

V-MK152

\$7.20 \$5.95

On Sale!



This is a new 10 LED Wheel of Fortune game.

Features: 10-LED Wheel of Fortune
 Push the button to start spinning action
 Spinning speed gradually decreases
 Finally it stops and one LED remains lit
 Auto power-off
 Low power consumption

Power supply: 9V battery (not included)

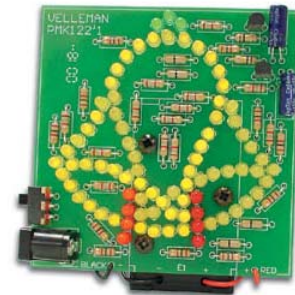
Dimensions: 2.6" x 1.3"

Kit Examples:

<http://www.apogeekits.com>

V-MK122

\$16.95



This is an animated bell. No need to remove battery when using external supply. 12V operation possible for use in cars, trucks. On/off switch included.

Specifications:

Power supply: 9 to 12V DC adapter or 9V alkaline battery (not incl.)

All of the project examples were only for illustration and are not suggested projects. These are only suggestions to begin the process of selecting a fun and interesting project.

Yours in Scouting,

Mr. Pepe
Electronics MB Counselor