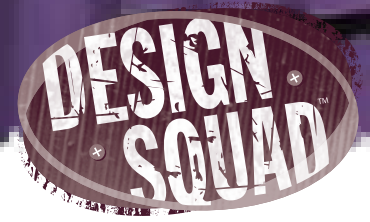


## CHALLENGE 1

# HIDDEN ALARM



## YOUR CHALLENGE

Make your friends and family ask, “What’s buzzing?” Design an alarm that you can turn on and off and that is small enough to hide.

## MATERIALS\*

- 1 AA battery
- AA battery holder (optional)
- Aluminum foil
- 1 buzzer (preferably one with wires attached)
- 1–2 feet of electrical wire (22-gauge works well. Ask an adult to help you strip the plastic coating off the ends to expose the wire.)
- Scissors
- Tape (duct or masking)
- Thin cardboard (non-corrugated, such as chipboard, oaktag, or paperboard from cereal boxes)
- Wire strippers

\* For information on where to get these materials, see page 6 or visit [pbskidsgo.org/designsquad/engineers](http://pbskidsgo.org/designsquad/engineers).

## BRAINSTORM AND DESIGN

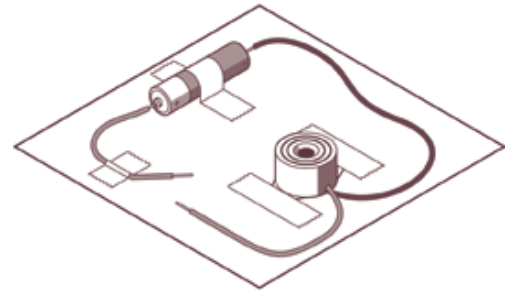
Before you begin designing, brainstorm answers to the following questions and record your ideas in your design notebook.

- Where do I want to hide my alarm?
- How small does it need to be to fit in my hiding place?
- How will I turn my alarm on and off?

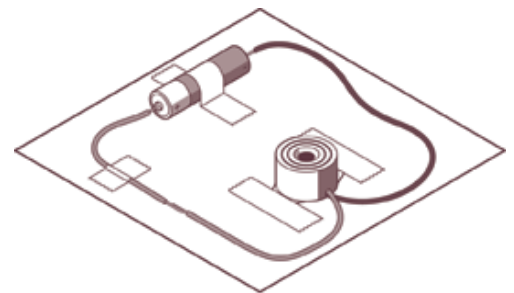
## BUILD, TEST, AND REDESIGN

A **circuit** is a path along which electricity can travel. In a **closed circuit**, all the parts are connected and the electricity flows uninterrupted from the battery to the buzzer and back to the battery. In an **open circuit**, some parts are disconnected, and the gap prevents electricity from flowing.

Build your design and test it. Did your alarm buzz on command? Did it fit in its hiding place? Did you trick anyone? When we made ours, we had to debug some problems. For example, our buzzer didn’t work at first, and it took some tweaking to get the switch to turn on and off reliably. If things like this happen to you, figure out a way to fix the problem so that your alarm works every time.



Open circuit



Closed circuit

# HIDDEN ALARM

## TAKE IT TO THE NEXT LEVEL

- Make your alarm even smaller.
- Change your alarm to fit into a different kind of hiding place.

### INSIDE THE ENGINEERING

#### SMALLER AND BETTER

Maybe the best things DO come in small packages! The first computer, called the Electronic Numerical Integrator and Computer (ENIAC), was built in the 1940s (not so long ago, really). It was so big it filled a small building and weighed 30 tons! Since then, engineers have been making computers smaller and smaller and smaller. Today, the average laptop computer weighs just six pounds. That means ENIAC weighed as much as 10,000 laptops. We don't even want to think about carrying all those around. On top of that, today's laptops are even more powerful than ENIAC. How'd they do it? By making the parts much, much smaller and much, much faster. Just think, ENIAC, laptops, and the alarm you made work in the same basic way—by switching circuits on and off.



Watch *Design Squad* on PBS (check local listings). Download more challenges at [pbskidsgo.org/designsquad](http://pbskidsgo.org/designsquad).



## TAKE IT ONLINE

Want a jolt? Build your own circuits and diagram them! Download *Basic Electrical Concepts in a Flash* from Intel's *Design and Discovery* hands-on engineering program.

➔ [intel.com/education/designanddiscovery](http://intel.com/education/designanddiscovery)



Photo: Mika Tomczak

The *Design Squad* cast hit the dance floor. They used circuits to design and build a sound and light show that went along with a dance routine given them by a hip-hop artist. Cast members used wireless sensors to activate the lights as they danced.



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