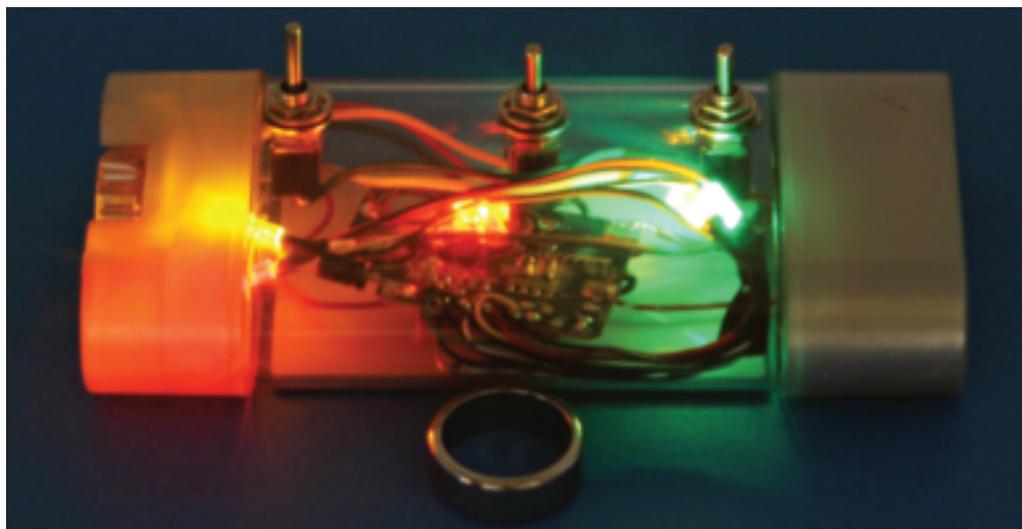


MYSTERY ELECTRONIC SWITCHES

Only you know how to make this nifty magic gadget light up.

BY J. TREGRE



Everyone loves a good mystery. This project only took about 2 evenings to design, build, and test. So, what's so mysterious about it? You're the only one who knows how to toggle the 3 switches to the correct positions that make its LEDs light up. No matter who else tries it, or how long they keep toggling the switches, the LEDs will never be able to light up for them.

Revealing the Mystery

A good illusionist never discloses the secret that makes a trick work. Once you do, the magic has ended. With that said, I'll break my own rule and reveal how my circuit really works: inside the container are 2 reed switches that can be activated by a magnet, and you'll wear a special magnetic ring to activate them. Whenever you display your ability to make the LEDs light up, you must make sure that your finger with the magnetic ring is placed right alongside one of the magnetic reed switches.

Build the Circuit

Remove the printed circuit board (PCB) from the LED greeting card. Find the positive and negative contacts on the PCB for the battery pack (Figure A). I used a Hallmark Christmas card because its LED display circuit was very flat and required only

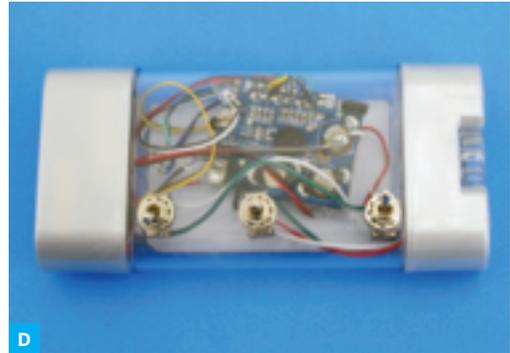
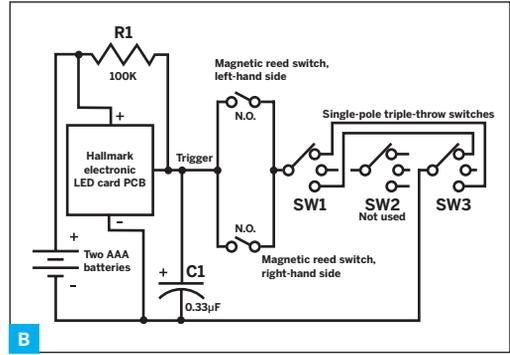
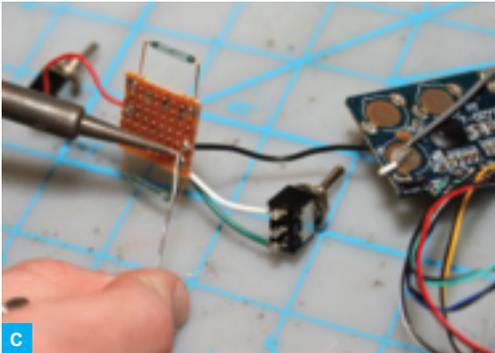
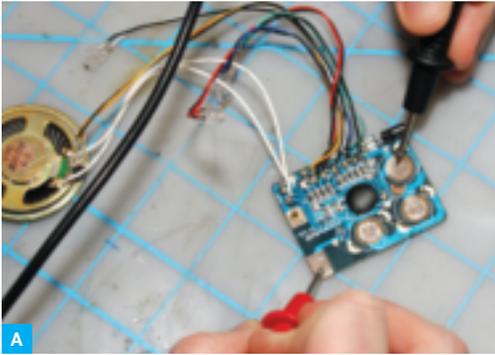
3 volts to operate. Different cards have different circuits, so this step will vary. Some cards also have a speaker for sound — I wish mine had sound!

Refer to the schematic diagram (Figure B) to build the circuit. My PCB had the trigger between the ground (-) and battery, but others have the trigger between the positive power (+) and battery.

I used a clear plastic antiperspirant container, so that my audience could see all the working electronics of this circuit. The circuit board fit perfectly into this container, allowing 2 AAA batteries in their holder to fit on the underside.

Place the reed switches inside your container on the left and the right, so they'll be close to the magnetic ring whichever way you hold the container. Figure C shows a bit of perf board used to keep the reed switches in place; they're connected in parallel, then placed in series with the 3 toggle switches.

Photography by Ed Troxell



NOTE: I added the 100K pull-up resistor from power (+) to the PCB trigger to avoid EMI noise (electromagnetic interference). I also added a 0.33µF capacitor from the trigger to ground; without this, the LEDs may activate prematurely whenever the 3 switches are touched.

Fool Your Friends

Now just flip the switches in the correct pattern and the LEDs light up and remain lit for several seconds. Whichever way SW1 is toggled, SW3 must be in the opposite direction (Figure D). SW2 isn't used at all; it's just there, all wired up for show.

Practice your performance; the more confident you are, the more your audience will be determined to beat you at your own trick. Never display your trick to the same people more than 2 or 3 times, because someone will figure it out and reveal your secret. I tell my audience it's a mathematical algorithm and only I know the sequence to toggle the 3 switches, then I dare them to match my ability to get the LEDs to light up. "Well, do you feel lucky?"

MATERIALS

- AAA batteries (2)
- 2xAAA battery holder
- Clear plastic antiperspirant container as big as possible
- Capacitor, 0.33µF [Jameco part #609086, jameco.com](#)
- Resistor, 100kΩ [Jameco #691340](#)
- Electronic Hallmark Halloween or Christmas card with LEDs [You might want to buy a few different ones; some circuit boards are easier to use than others.](#)
- Magnetic reed switches (2) [Jameco #171872](#)
- Single-pole triple-throw switches (3)
- Magnetic ring [Search online for Wizard PK rings. These come in silver and gold and are available in 8 different metric sizes \(convert U.S. ring sizes at \[onlineconversion.com/ring_size.htm\]\(http://onlineconversion.com/ring_size.htm\)\).](#)
- Soldering iron and solder
- Hookup wire
- Miscellaneous tools (optional) to disconnect the circuit board and its batteries, if needed. [You might use needlenose pliers, wire cutters/strippers, or a heat gun or hair dryer to melt glue or shrink heat-shrink tubing.](#)
- Multimeter or ohmmeter (optional) but handy

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