HOMEMADE STROBE PHOTOGRAPHY

By Tom Anderson and Wendell Anderson

Pictures of high-speed events such as popping balloons, breaking glass, and splashing liquids reveal interesting structures not visible to the naked eye. You can take your own high-speed photos to capture these ephemeral events. >>

Set up: p.108 **Make it:** p.109 **Use it:** p.116

Photography by Tom Anderson and Wendell Anderson

JUMPIN' JACKED FLASH

We built a strobe flash out of a Kodak disposable camera and then designed a circuit that triggers the flash when it detects a sound or other measurable event. The strobe flash will freeze motion!

We use a digital camera set for a long exposure (two seconds or more), and shoot the picture in a dark room. When the balloon pops, the sound-activated trigger circuit fires the flash, and the camera captures the incredible event.

Why not just take the picture of the balloon with a digital camera and its built-in flash? First, getting the timing right is a hard problem: the camera's exposure, its flash, and the event itself need to be synchronized. (Try it yourself and see what luck you have.) The second problem is that a stock camera flash doesn't make a very good strobe because it flashes too long, causing blurry high-speed photos.

Tom Anderson and Wendell Anderson are engineers for an electronics company. As a hobby, they develop audio hardware and software projects.

SOUND TRIGGER

We take long exposures in a darkened room. It doesn't need to be pitch black; we use a garage at night with the lights out. Even though the shutter is open for 2 to 15 seconds, the flash fires just once, triggered by sound. The flash freezes the motion, and we get a picture. When taking a flash picture in a dark room, it doesn't matter how long the shutter is open. All that matters is that the flash fires while the shutter is open.

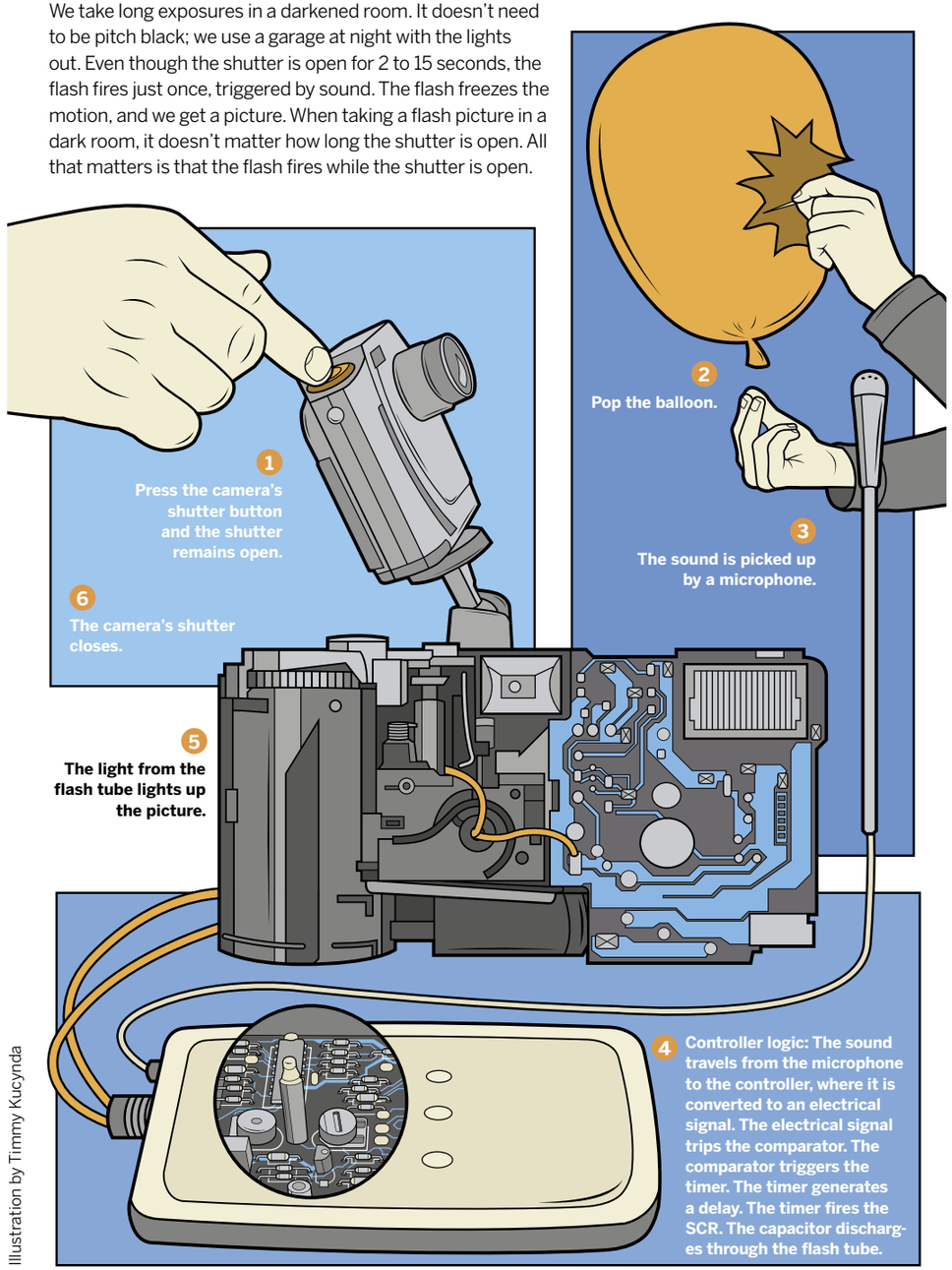


Illustration by Timmy Kucynda

Strobe Photo Gallery
This page, clockwise from top: Bottle blast in Bryn Russell's high-speed studio; .22 bullet meets crayons, by Khuong Nguyen, Ed Bystrom, and Chen-Chei Chuang; Chris Pycior captures Dan Brown making a catch in Lee's Summit, Mo.; drive-by fruiting by Bryn Russell. (Not all of these photos can be taken using the Flash Controller Kit).

Opposite page, clockwise from top: Ken Reppart's glass is more than half full; firecracker explosion by Tom and Wendell Anderson; board breaking by Tom and Wendell Anderson.

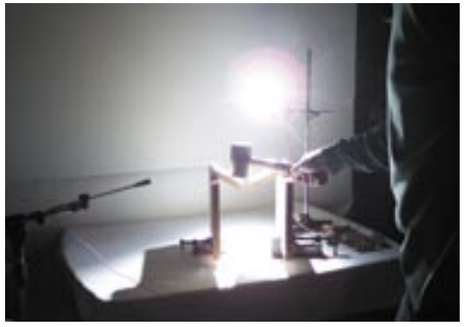
See more strobe photography in the Flickr high-speed photography pool, flickr.com/groups/highspeed/pool.

A BRIEF HISTORY OF HIGH-SPEED PHOTOGRAPHY

Ernst Mach published some of the earliest high-speed images in 1887, using the light from a spark gap to freeze a bullet and reveal the shadow of the supersonic shock wave preceding it. But it is MIT professor Harold "Doc" Edgerton (1903-1990) who is largely credited with transforming strobes from an obscure laboratory instrument into a pedestrian device in every camera. In addition to having the scientific and engineering acumen to perfect strobes commercially, Edgerton is equally recognized for his visual aesthetic. Many of the striking images he created of illuminating phenomena adorn art museums worldwide. His photos and strobe equipment can be seen at the MIT Museum.

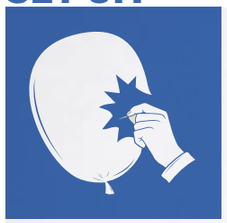
—Peter Mui

Editor's Note: Peter Mui had Doc Edgerton as his thesis advisor at MIT and after graduation was a research assistant in his lab until 1990.



SET UP.

Visit makezine.com/04/strobe for source list.



MATERIALS

- Disposable camera*
- Flash Controller*
- Battery*
- Flash cable 2.5mm mono male-to-male*
- 2.5mm phone jack*
- Flash wire 22 awg hookup wire, 8" long, one green, one red*
- Computer microphone*
- Balloon
- Drill
- Soldering iron or soldering gun
- Solder
- Nail

* These items are included in the Flash Controller Kit.

Photography by Tom Anderson and Wendell Anderson

The authors of this project have worked with MAKE to develop a limited number of kits for sale. The Flash Controller Kit includes all of the electronic components, the circuit board, an enclosure (the box), a disposable camera, a microphone, and other components described in this project. The Flash Controller included in the kit is assembled and tested, although you can order an unassembled version if you want to solder more than 60 components. (You should at least have soldering equipment and a volt-ohm meter and know how to use them. This is not a "learn to solder" project.) The Flash Controller Kit costs $99, and you can order it at makezine.com/go/flashkit.

MAKE IT.

HOW TO CAPTURE HIGH-SPEED MOTION

START **Time: An Afternoon** **Complexity: Low**

1. DISASSEMBLE THE DISPOSABLE CAMERA

The flash speed of a weaker flash is fast enough to make a pretty good strobe light. So we made one out of the cheapest disposable camera we could find (under $5). We took apart a single-use camera, added a connection for the flash controller circuit to fire the flash, and then put the camera back together.

WARNING: Nasty Shock Inside

Before you take apart a single-use camera, you need to know that there is a large electrolytic capacitor inside the camera. This capacitor, which stores the charge for the flash bulb, is charged to 330V and can give you a nasty shock if you touch the leads or the circuit board before it is discharged. We tell you how to safely discharge the capacitor, so do not leave out this step.

Watch this video clip of discharging a capacitor: makezine.com/04/flash/caps.mov

About Single-Use Cameras

Even if you don't make a strobe photo system, you may find it interesting to take apart a single-use camera, which is surprisingly maker-friendly. These cameras are designed to be taken apart and put back together, but not necessarily by those who buy them. Inside you may find parts that show the wear and tear of multiple re-uses. We got a few used cameras for free just by asking for them at a local camera shop. (Kodak pays about $0.15 each for returning them for recycling, so don't waste your time asking for free ones at the big W. See kodak.com and search for "one-time-use camera recycling" for details on Kodak's recycling program.)

The usual reason for disassembling a disposable camera would be to add new film and a battery, but we want to use the camera as a sound-triggered flash attachment. The actual photos will be taken with a digital (or film) camera.

Camera Disassembly, Step-by-Step

Follow along with the photographs on the next page. First, we remove the stickers and goo from the outside of the camera **[1]**. There are four side latches (left, right, top, and bottom). We found it easiest to start with the left. Using a small, flat-bladed screwdriver, gently pry open the latch, and slightly separate the plastic back from the camera, which keeps the latch open **[2]**. While holding the front and back slightly apart, pry out the top and bottom latch. Finally, pry out the right latch and remove the plastic back **[3]**. Try not to break the latches. (If you do, use duct tape or rubber bands when reassembling.) Remove the film and battery **[4]**.

The charged-up capacitor leads should be visible near the bottom center, when looking in through the back of the camera. Using the tip of a small, insulated, plastic-handled screwdriver, short the two capacitor leads together **[5]**. You will probably see a flash and hear a loud pop. After you are sure the capacitor has been discharged, gently pry off the latch that holds the plastic front **[6, 7]**. Behind the plastic front is a lens and shutter. Carefully pry off the lens holder as shown **[8]**. Beneath is the shutter, with a spring connected to it. Remove these as well **[9]**. There should be a hole in the center that is open from the front to the back **[10]**.