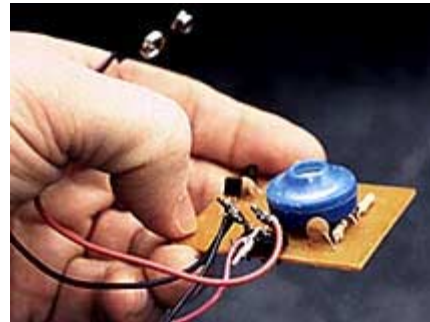


Lo-cost, Hi-speed Imaging System

The flash on single-use cameras can easily be converted for use in observing high-speed events. A method is described below for connecting the flash on a Kodak FunSaver to a sound trigger. This particular camera is used, because the electrical connections are easy to make. Note that this is *not* the Pocket FunSaver. While the latter camera can be used, the electrical connections are more difficult.

Caution: This activity should only be done under adult supervision. There is a hazard of electrical shock from the flash capacitor.

The sound trigger used is the piezoelectric variety described in the Tools section of the HiViz web site (<http://www.hiviz.com/tools/>). A photograph of an assembled trigger is shown to the right. This trigger uses a piezoelectric transducer. For those who wish to make their own triggers, instructions are provided on the HiViz site. The trigger in the photo is available as a kit. (See contact information at the bottom of the page.)



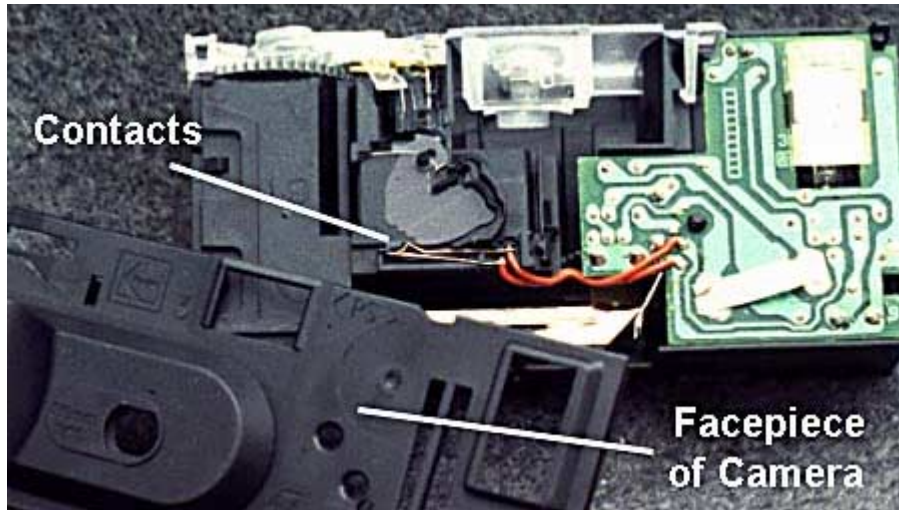
Converting a FunSaver Camera

The photo of a balloon burst to the right was taken using the flash unit on a single-use camera. The rip was easily captured, although the receding balloon material is noticeably blurred. That's because these flash units typically have a duration of about half a millisecond. That's about 10 times the minimum duration of a self-contained flash unit that one would use on a camera. Despite the longer duration, one can still obtain dramatic photos. Moreover, the intensity of the flash is great enough that one can use small apertures at distances of a few meters for photographing on ISO-400 film. Another advantage is, of course, the low cost. Some camera stores will give discarded one-use cameras to teachers.



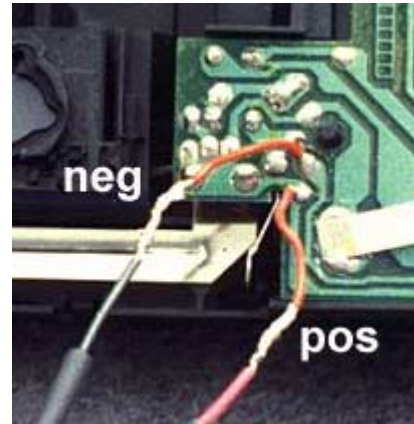
Instructions for making connections

1. If the battery is still in the camera, remove it. Then use a knife blade to pry off the front of the camera (the side with the lens). This can be done without breaking anything. Once inside the camera, be careful not to touch any electrical contacts. Some may be at high voltage, probably 200-300 V, which will give you a sting. A photograph of the opened camera is shown below.



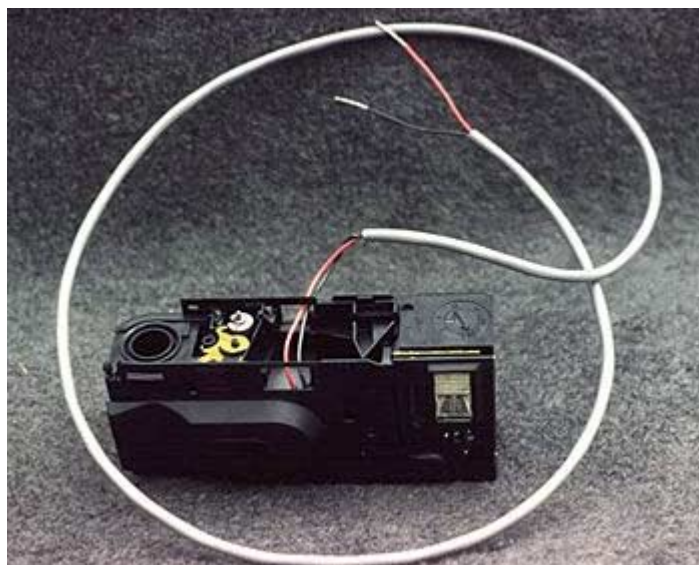
2. The flash contacts are two long, thin copper pieces below the lens aperture. They are attached to red wires. Using a screwdriver with an insulated handle, short across the contacts. If the flash capacitor is charged, this will discharge it. Be prepared for a flash of light, just in case. Now you can cut the copper contacts from the wires. Leave as long a length of wire as possible. Strip both wires about a quarter of an inch.

3. The lower of the two wires is the positive lead, as shown to the right. This will be connected to the positive lead from the sound trigger. The other wire, of course, will be connected to the negative lead. Before making connections, however, bring the two leads from the sound trigger through the viewfinder window of the camera. (Drill a small hole in the plastic if necessary.) That way, you'll be able to put the front of the camera back on when you're finished.



4. Twist the positive leads together and solder them. Repeat with the negative leads. Wrap each splice with electrical tape or use heat shrink tubing. Then you can reassemble the camera. A photograph is shown below.

Note: It's important to insulate the spliced wires so that they won't come into contact with other metallic parts in the camera. In the latter event, a dramatic spark discharge may be produced.



5. Before connecting the sound trigger, test the flash as follows. Put a battery in the battery compartment of the camera. Charge the flash using the button below the flash. You'll hear a high-pitched whine as the unit is charging. An orange light will blink when the flash is ready, and you can release the button. Now short the two wires together, being sure not to touch the bare leads. If your connections inside the camera are secure, the flash should discharge.
6. Remove the battery and discharge the flash before making connections to the sound trigger. When you do make connections, make sure that you connect the positive lead of the sound trigger to the positive lead from the camera. Now test the assembly by putting the battery back in the camera and charging the flash. A hand clap near the sound trigger should cause the flash to discharge.

Taking photographs

The techniques for taking photographs using the flash unit and sound trigger are similar to those described on the HiViz site. Selecting a camera aperture will take some trial and error. If you're using ISO-400 film and are a few meters from your subject, try starting with $f/8$. Then bracket several exposures 1-2 f-stops on either side of $f/8$. A photograph taken with this system by Elizabeth Whitlock is shown here. The photo is of a large, plastic ball thrown on a table.

