A do-it-yourself intervalometer can mean extraordinary film effects at very low cost

For less than $10, you can build a camera accessory which makes some of the most extraordinary effects in filmmaking possible. The range of its subjects is limited only by the ingenuity of the filmmaker. They include the growth cycles of plants, the monthly ebb and flow of the ocean's tide and the transformation of caterpillars into butterflies—all contained in the three minutes of one Super-8 cartridge.

The accessory is an intervalometer, which will automatically trigger your camera's shutter at predetermined time intervals, while you are doing something else. This device allows you to significantly compress the actual duration of an event. For example, if the interval is set for one frame per second, filming a four minute mile run will produce about 13 seconds of screen time. At one frame each minute, the cloud formations of an entire 12 hour day will fit into 40 seconds of film. Depending upon the parts used in your intervalometer, at its upper limit the compression becomes phenomenal. A 10-foot roll of film will last *in days* about two times the time interval *in minutes*. This means that a single cartridge will accommodate 25 days of filming the life of a plant at an interval of one frame each ten minutes. What makes the intervalometer tick is a "stable integrated circuit timer" (see Figure 1), which produces 50-millisecond pulses at a frequency of occurrence which can be deliberately varied. These pulses drive an electronic relay that controls the shutter of any camera with single frame shooting capability and a socket for remote triggering.

Building the Intervalometer

The first step is to cut a piece of universal perforated circuit board, available at any electronics or radio parts store, to the size dictated by your choice of a case for the unit. We used an old plastic medicine box, which allowed for a 2-inch by 3-inch board.

Next, mount the main components in the appropriate holes in the board (see Figure 1) with small screws and nuts. These components include the ready-made "RS-555" Radio Shack integrated circuit timer and its 8-pin socket, the relay, capacitor and resistors. (See Parts List for exact specifications.) Small lengths of #24 connecting wire should be used to link the eight pins of the timer to the other components in the configuration shown in Figure 1. Or, they may be soldered together. The components should also be soldered to hook-up wires leading off the board as indicated in Figure 1.

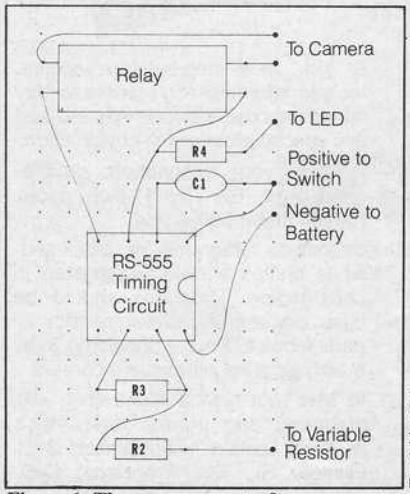

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Figure 1: The arrangement of components on the circuit board.

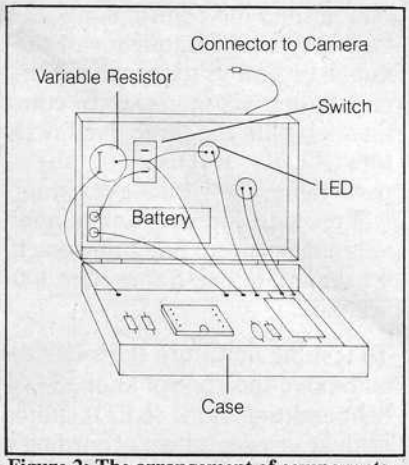

Figure 2: The arrangement of components in the case top, with connections to the circuit board indicated.

While the solder hardens, drill 3⁄8-inch holes for the remaining components—the battery clip, variable resistor, switch and light emitting diode (LED)—in the upper half of the case (see Figure 2). A larger hole should be drilled through the case for the cable which will connect the device to the camera. This can be lamp cord, speaker wire, coaxial or any other two-wire cable. At its end, attach a subminiature phone plug for insertion into the camera's remote socket.

Finally, mount the components in the case top as shown in Figure 2, set the completed circuit board in the bottom, and solder the wires coming from the board to their proper places. Put the battery into the mounted clips, tape it down, and your intervalometer is ready for testing.

Testing the Intervalometer

The key to this system is the vari-

Parts List

9 Volt Battery and Battery Clip
Universal Perforated Circuit Board
Capacitor (C1), 22mfd., 15v., tant.
Case
Subminiature Phone Plug
Variable Resistor (R1), 5M ohm, type RV4-505A*
Knob and Pointer
Light Emitting Diode
Relay, 6-12 vdc., PCB mounting
Resistor (R2), carbon 2.2K
Resistor (R3), carbon 3.3K
Resistor (R4), carbon ohms
Semiconductor ("RS 555" Integrated Circuit Timer)
8-Pin Socket for "RS 555"
Switch
Connecting Wires, Cable, Solder
Selection of fixed resistors for optional design (see text)
12-Pole Switch for optional design

With the exception of the variable resistor, all parts are available from your local outlet of *Radio Shack, 2617 W. 7th Street, Fort Worth, Texas 76107.*

*Available from *Allied Electronics, P.O. Box 942, South Lynfield, Mass. 01940.*

able resistor (R1 in Figure 2) mounted in the case cover. As you turn up the control knob attached to it, the frequency of the impulses sent to trigger the camera shutter will increase. In combination with the three fixed resistors (R2, R3, R4) listed in the parts table, the variable resistor will provide you with a time interval range of from one frame each 0.1 second to one frame each 100 seconds.

To test the unit, turn the switch on and move the control knob. The light emitting diode (LED) should flash at varying rates, according to the position of the knob. Slight clicking should also be heard from the relay. The intervalometer can be calibrated by timing the flashes or clicks with a stopwatch, and making a dial with a felt tip pen around the knob on the plastic case. A more exact check can be made by actually filming a running clock, and then counting the frames of the developed film.

An Option for Longer Intervals

An alternative approach, which will provide you with a much greater range of time intervals, is to use 12 fixed resistors instead of a variable resistor. These should be mounted on the circuit board where R2 appears and soldered onto a 12-position switch, one resistor to each switch pole. The other ends of the resistors are soldered to a common point which is then connected to pin 8 of the timing circuit and to the positive terminal of the battery. The switch itself is connected to pin 7 of the timing circuit and to R3 (Figure 3).

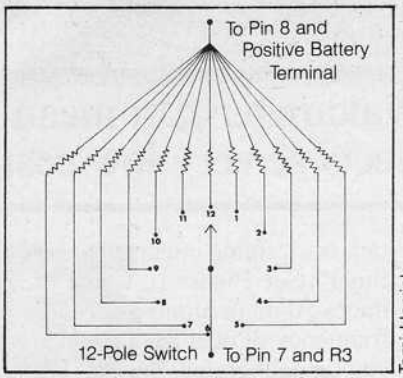

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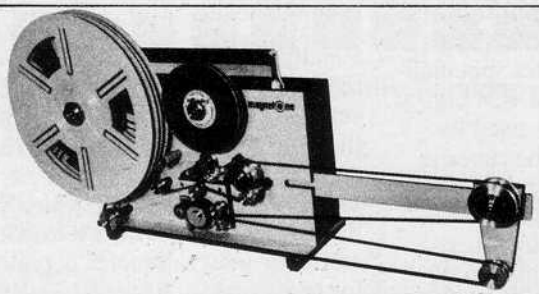
Figure 3: Diagrammatic view of fixed resistor long interval option.

The values of these fixed resistors will determine the time interval between shots. To find out what resistor is appropriate for each of the 12 positions on your switch, borrow a pocket calculator and work out this equation: Subtract the figure 0.471 from the desired amount of time between frames (in seconds). Then divide the result by 0.000693. The answer will equal, in ohms, the necessary resistance. For example, if you want to take one frame every 45 minutes (2,700 seconds), the calculation will be:

$$\text{resistor value} = \frac{2{,}700 - 0.471}{0.000693} = 3{,}895{,}424 \text{ ohms}$$

Rounded off and simplified with the symbol for one million (M), the needed resistor is one with a value of 3.9M ohms. This formula works best if very low leakage (computer grade) capacitors and precision resistors are used.

Before you activate the unit for your first try at time-lapse photography, be sure that the camera is rigidly mounted. It must not move for the entire duration of the event being filmed. Then adjust for focus and exposure, set the intervalometer for the desired time interval, plug it into your camera and let it do the rest.—*Walt Fitelson and Demetrios Matsakis, Oakland, Calif.; Ralph Moore, New Castle, Del.* □



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Entries Must Arrive By May 15, 1979

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1) Explain how you made your "Tool & Trick" in a step-by-step account. Include information on where to buy materials, cost, the tools needed and any special problems in construction.

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3) Include diagrams or black-and-white photos showing each step in construction. Diagrams should be clear pen-and-ink drawings with all parts labeled. Photos should be 3- by 5-inch glossies with square corners.

4) Mail your "Tool & Trick" along with diagrams and photos to: SUPER-8 FILMAKER, Tools & Tricks Contest, 3161 Fillmore St., San Francisco, Calif. 94123.