Build Your Own SLAVE FLASH TRIGGER

You own one of those fully automatic cameras with built-in automatic focus, strobe, automatic film loader, clock, LCD program display, and a host of other goodies; yet your indoor flash pictures leave much to be desired: Close-up faces are washed out with too much light because the background is too dark. Group shots are ruined because of unsightly shadows. Wedding photos are disappointing because the camera's flash buries the subtle lighting effects stained-glass windows provide.

Most of those problems come about because the scene is illuminated by only a single source—your flash gun. While a single flash gun may be adequate in some situations, often photographs suffer from harsh shadows. Alternatively the photograph can appear to lack contrast and depth, particularly if all the light is coming directly from the front.

The best way around those problems is to use a second flash gun. By correctly positioning and aiming that second flash, you can fill in any shadows that would otherwise be created and greatly improve the "depth" of your photographs. You can also use a second (or even a third or fourth) flash to light the background scenery behind a subject.

Of course, for that to work the multiple flash units must be made to fire at the same time. That can be done by simply connecting them in parallel with the camera's flash socket via a multi-way adapter cable. Although that technique generally works okay, cable-connected flash guns do have their limitations. For example you may be prevented from positioning a flash gun exactly where you want it because the cable isn't long enough. Cables are also a nuisance—they're easy to trip over, they get in the way, and they're often unreliable.

A far better method is to use an electronic slave-flash trigger such as the unit described in this article. That device automatically triggers a slave flash-gun whenever it detects high-intensity light from the primary flash-gun. That eliminates trailing cords, which means that you can place the slave flash gun anywhere you want.

Commercial slave-flash triggers are expensive, so you can save money if you build one yourself. As you'll see from the Parts List, only a handful of parts are required to assemble the Slave-Flash Trigger*, and the unit will only take an hour or so to put together. The performance of our "homebrew" unit is on a par with expensive commercial units; it has excellent sensitivity and will not false trigger.

When triggered properly, a slave flash can give your photographs a professional look.

BY JOHN CLARKE AND GREG SWAIN

How it Works. Take a look now at Fig. 1. The circuit is really very simple. It uses a phototransistor (Q1), an SCR (C106D1), three resistors, and a 9-volt battery.

The SCR takes the place of the camera contacts and is wired across the trigger circuit of the flash gun. Normally, the SCR is off, so the flash gun is able to charge to its trigger voltage.

Phototransistor Q1 is used to monitor the light level. When a high-intensity flash occurs, Q1 briefly conducts and supplies gate current to the SCR. That causes the SCR to turn on, which then triggers the slave flash-gun via the hot-shoe adapter terminals. Once the flash gun has triggered, the SCR quickly turns off again. That happens because the current in circuit quickly falls below the SCR's holding current.

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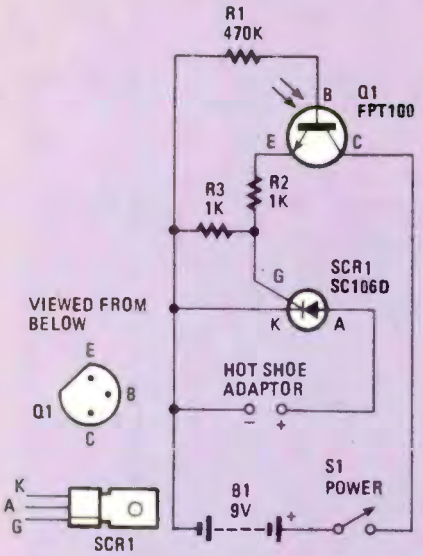

Fig. 1. The circuit uses a phototransistor (Q1), a silicon controlled rectifier (SCR1), and a few resistors. When a high-intensity flash occurs from a nearby strobe or flashbulb, Q1 conducts and turns on SCR1, which triggers the slave flashgun via the hot-shoe adapter terminals.

The resistor at the base of Q1 (R1) determines the sensitivity of the circuit. If you wish, you can reduce the sensitivity simply by reducing the value of the resistor from that shown. The 1K resistor between the gate and cathode of the SCR (R3) prevents the SCR from false triggering if high voltages are applied between the anode and the cathode.

Power for the Slave-Flash Trigger is derived from a 9-volt transistor-radio battery. Switch S1 disconnects power when the Slave-Flash Trigger is not in use.

Let's discuss parts availability for a moment before we get to the actual assembly. The unit specified for SCR1 is a GE C106D1. Many electronics-parts retailers carry an equivalent unit made by Teccor. That unit, the T106D1, can be used with no problems.

The phototransistor presents more of a problem. The Fairchild FPT-100 used in the original project is no longer manufactured, although it may still be available from a number of surplus sources. However, thanks to the sensitivity of the C106 and its equivalent, the phototransistor required by the project is not critical and almost any reasonably fast (switching time less than about 10 µs) substitute can be used. One possibility is the GE L14G2, which is available from Digi-Key (PO Box 677, Thief River Falls, MN 56701) and others.

The hot-shoe adaptor is a photographic accessory that is available from most photographic supply stores.

Assembly. We made up two versions of the Slave-Flash Trigger—one on a small printed-circuit board and the other on *Veroboard*—a pre-etched, pre-punched board that is quite handy. The Veroboard layout, shown in Fig. 2, can also be used by those readers who wish to use ordinary perforated construction board and point-to-point wiring. Figure 3 shows the template for the printed-circuit board, while the printed-circuit layout is shown in Fig. 4.

When building the printed-circuit version, mount Q1 upright, about ½-inch above the surface of the board. The body of the SCR should be mounted flat against the board, with the leads bent 90° to mate with the appropriate holes.

The assembly details of the Veroboard version are similar. You can make the required cuts in copper tracks with an oversized drill bit. As always, be careful when working with Veroboard; mistakes are easy to make but are difficult to correct.

PARTS LIST FOR THE SLAVE FLASH TRIGGER

SCR1—C106D1 or T106D1 silicon controlled rectifier
Q1—FPT 100 phototransistor (or equivalent, see text)
R1—470,000-ohm, ¼-watt resistor
R2, R3—1000-ohm, ¼-watt resistor
B1—9-volt transistor-radio battery
Plastic case (3¼ × 2⅛ × 1⅛ in.), printed-circuit board materials or Veroboard (see text), hot-shoe adaptor, photographic shielded cable with connector, RTV cement, battery clip, wire, solder, hardware, etc.

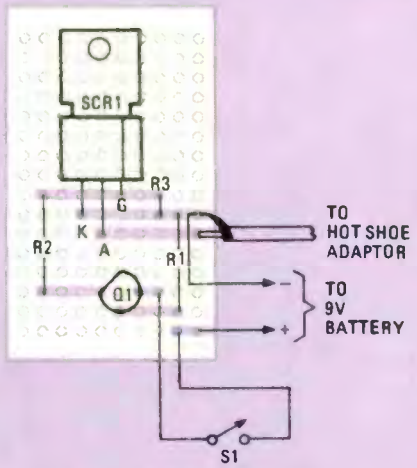

Fig. 2. Parts layout for the Veroboard version of the project.

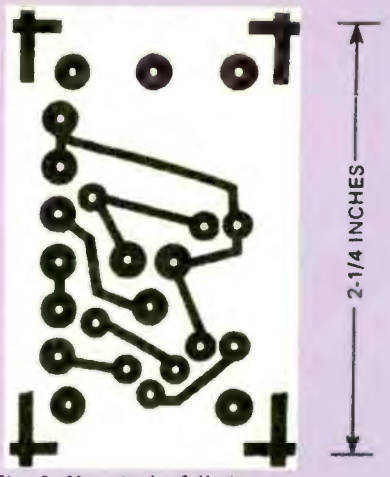

Fig. 3. Here is the full-size template for the printed-circuit version of the project.

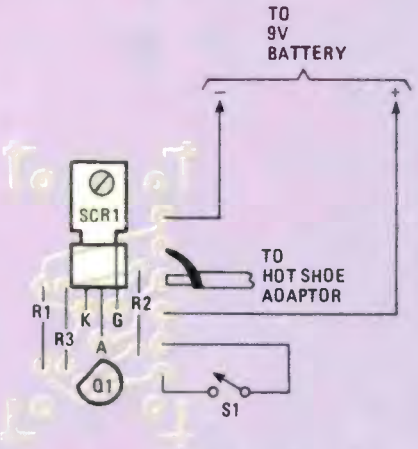

Fig. 4. Wiring diagram for the printed-circuit board version. The SCR is mounted flat against the board while the phototransistor should stand about ½- inch above the board.

We mounted the completed board assembly in a small plastic case; the one we used measured about 3¼(L) × 2⅛(W) × 1⅛(H) inches. The case is used upside down, with the lid becoming the base. The hot-shoe adaptor is secured to the top of the case using a screw, while the on/off switch is mounted at one end.

A third hole is drilled at the other end of the case to accept a mounting bezel for the phototransistor. The board is then supported vertically in the case when the phototransistor is clipped into the bezel. You might want to use a bit of RTV cement to hold the board securely.

Note that some flash guns do not

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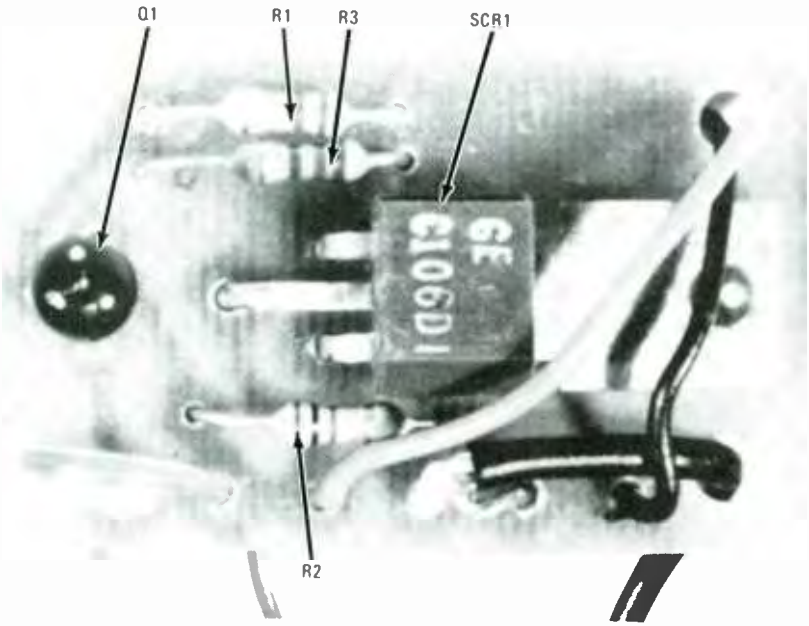
include a hot-shoe plate. In that case, just delete the hot-shoe adaptor and connect a cable and plug instead. Just remember—the center terminal of the plug is positive; it goes to the anode of the SCR.

Finish up the project by placing rubber feet on the bottom of the case. If you like, you can add decals or press-type to dress up the unit.

Firing it up! To test the unit, simply connect it to a flash gun or electronic strobe, switch it on, and check that the flash gun fires whenever the primary flash connected to the camera fires.

If everything is working as it should be, you should find that the unit will trigger reliably at distances of up to 50 feet.

Finally, here's a rather unusual application for your Slave-Flash Trigger. If you have a motor-drive camera, you will probably find that the unit will trigger that as well (depends on the motor drive). That means that you can set a motor driven camera up some distance away and trigger it by setting off a flash. ■



The board for the Slave-Flash Trigger should take only a few minutes to assemble, no matter which version you choose to build. The printed-circuit version is at the left, and the Veroboard version is shown at the right. Phototransistor Q1 must be clipped into an LED bezel at one end of the case so it can be exposed to light.