Fall 2020

The Optical Slave Flash Trigger Circuit Design, Set-Up, and Causes of Failure

Miranda Shook
Valparaiso University

MIRANDA SHOOK | E.E. Major Valparaiso University

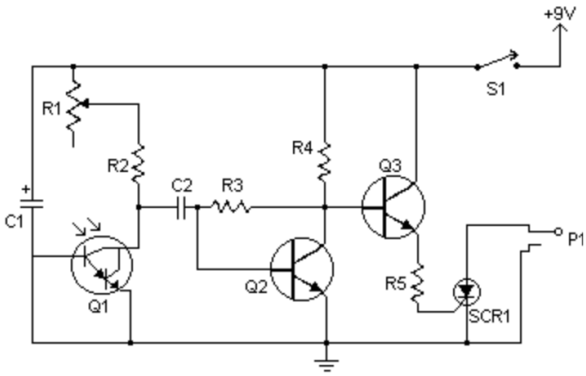
VALPARAISO UNIVERSITY

The Optical Slave Flash Trigger Circuit Design, Set-Up, and Causes of Failure

Often the perfect picture requires more than the provided ambient light and the in-camera flash. These design requirements lead to a low-cost device, that adds an additional flash triggered by the camera flash.

Light is the most important part of creating an image and gives photographs color, form, and texture. There are many times where the built-in camera flash is not powerful enough to create a good image and extra light is needed to capture the subject. A low-cost circuit can synchronize an additional slave flash and be triggered by the camera flash. This document will describe the design and give a practical guide to setting up and troubleshooting this specific circuit. This circuit is simple and effective at creating a synchronized flash.

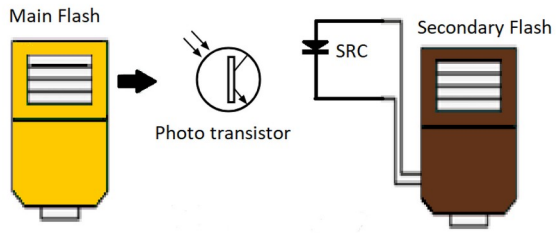
The circuit diagram for this slave flash trigger which will react to the main flash and produce its own flash milliseconds later. Q1, the phototransistor is what sees the main flash going off, this specific design uses a 2N5777 NPN Phototransistor. The first resistor (R1) should be adjustable to account for different lighting environments; it is a 47k Linear Pot. The remaining resistors do not need to change and their values are as follows: R2 and R3 are 3KΩ resistors, R4 is a 220Ω resistor, and R5 is a 680Ω resistor. Additionally, there are 2 capacitors and 2 transistors; C1 is a 10µf 25V Electrolytic Capacitor, C2 0.047µf 25V Ceramic Capacitor, and Q2 and Q3 are both 2N3904 NPN Transistors. The last major component is the 400V 2A SCR (SCR1) which provides



1. An Example Circuit Diagram for an Optical Trigger Flash Circuit

3. Expanded slave flash trigger circuit

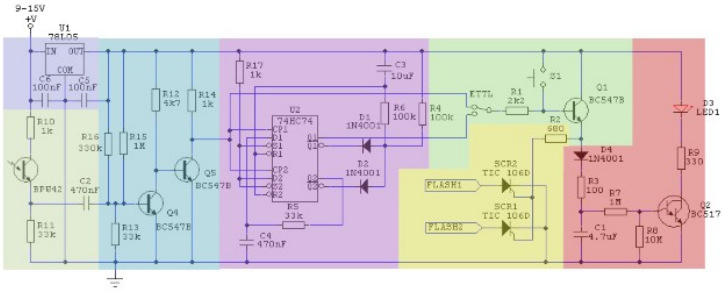
the energy for the slave flash to go off. A switch and a plug are also mounted on this board to allow the circuit to be turned on and off and to be and to be plugged directly to the main flash.



2. Set up to show how to position flash and slave flash

There are a few key points to ensure that a slave trigger circuit, such as this one, works. First there must be no obstruction from the main flash to the phototransistor. If the phototransistor is obstructed and the light cannot reach the phototransistor the secondary flash will fail. Second, the circuit should be adjusted to the environment around it. Bright scenery can cause the secondary flash to behave unexpectedly. Adjusting R1 so the secondary flash only reacts to the main flash is crucial. The third common problem is a pre-flash. Often a camera will flash twice, first to adjust the settings, and second to take the picture. The secondary flash will often react to the first 'adjustment' flash from that camera and fail to flash for the picture. Usually switching to a manual flash mode will remove this issue, otherwise there are more complicated designs which ignore the first 'adjustment' flash.

A further circuit design includes two features which many photographers rely on. The first main difference is to include a D-flip-flop which ignores unintentional flashes. This is the purple portion of the last circuit design. The second additional feature confirms that the flash has triggered. There is



an LED which will stay lit for five to ten seconds after the flash had triggered.

The optimal trigger for a slave flash requires a few key components, camera specifications, and setup requirements. The main flash should be singular, pre-flashes can cause a premature slave flash. A photographer can force this through the manual mode. The phototransistor should be made so regular amounts of light will not trigger the flash, but the main flash from the camera will. It should also be in the line of the camera flash so that there is a clear signal to trigger the auxiliary flash. There should be no obstruction of light to the phototransistor of the circuit. The second flash of light will be triggered mili-seconds after the camera flash and can create better images. Photographers use light for better colors, fewer shadows, and to focus on specific parts of the subject matter. This makes the optical trigger circuit a must have tool for photographers.

Works Cited

Cake, Aaron. *Flash Slave Trigger*, 3 Mar. 2007, www.aaroncake.net/circuits/slave.asp.

Sindlar, Libor. “Ptical Flash Trigger with Second Pulse Detection.” *Optical Flash Trigger*, 28 Jan. 2007, www.sindlar.com/photo/flash_trigger/flash_trigger.html.