Building a Pulser Control for Your TELRAD Finder

This page provides infomation on pulsing or flashing a Telrad LED reticle.

The documentation and circuit design are by Jim Heilman.

This web page and the graphics were created for the Wabash Valley Astronomical Society website by Franz Frederick.

Modified Telrad finder by Franz Frederick.
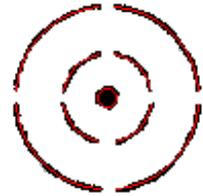
Why add a pulser to the TELRAD finder?

The TELRAD finder was developed by Steve Kufeld of Pine Mountain, California. It has become the single most desirable accessory for amateur telescopes. It is 1X finder which projects a set of three concentric circles (a bullseye) on the view of the sky as seen through the TELRAD finder. The smallest circle represents a 0.5 degree diameter, the next larger circle covers a 2 degree diameter and the largest circle covers a 4 degree diameter. This makes the TELRAD extremely helpful for skyhopping and for general object location.
The standard TELRAD finder has one electronic control, the potentiometer located on the side of the finder. This control is both an on-off switch and a variable LED light level control. While this permits the amateur astronomer to "fade"out the LED to see faint objects and then turn up the LED light level, this has a tendency to slow down or complicate the location of faint objects through the finder.

If one could add a circuit to pulse the LED on and off through a variable control then the deep sky object finding process could be that of telescope movement and focusing primarily. This web page presents a pulsing circuit which can be added to the already excellent TELRAD finder at relatively low cost.

The small perforated development board contains all parts except the potentiometer and the knob.

The bottom side of the perf board contains the point-to-point wiring of the circuit.

Please note the potentiomenter and knob at the front ("star") end of the Telrad finder. The potentiometer knob controls the on-off time (pulsing) of the LED in the Telrad finder.

TELRAD circuit before adding the pulser circuit.
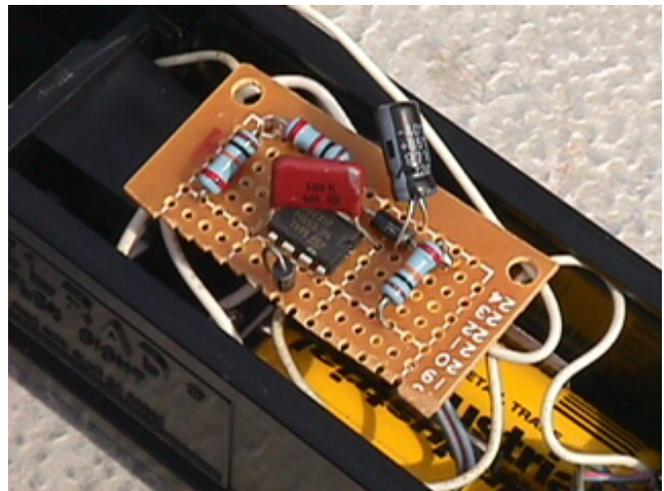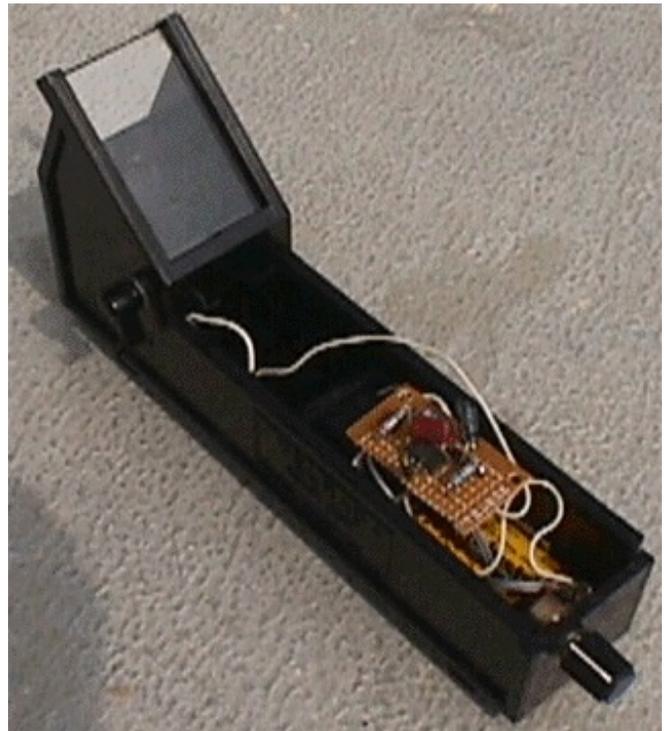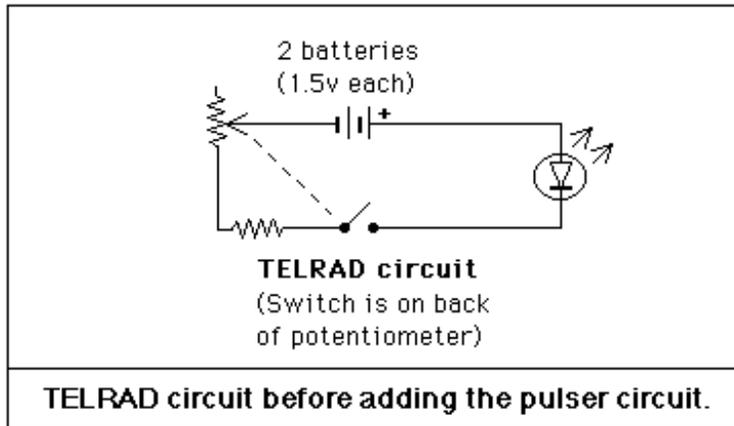
Variable Duty Cycle Square Wave Generator

In this circuit independant charge and discharge paths for Capacitor C are established by diodes Da and Db. The Charge path for C is from Vcc through Ra and Da. The discharge path is through Db, Rb and pin 7.

The respective period T, and the duty cycle are given by the following;

T = 0.7 (Ra + Rb) C

Duty Cycle = Rb / (Ra + Rb)
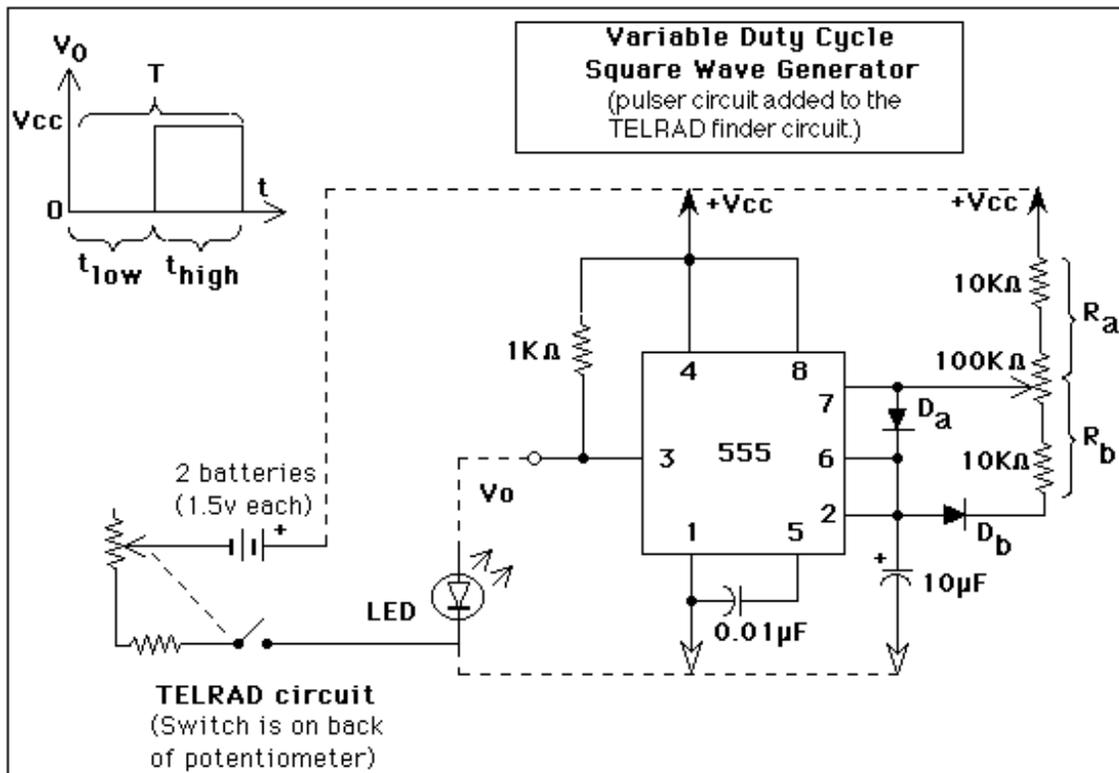
To use with the Telrad, connect Vcc to the battery positive side and ground to the battery negative side. You may do this through the switch already installed in the Telrad to control power. The Telrad's LED lead going to the positive side of the batttery is

connected to pin 3.

If you just want to vary the duty cycle, only one potentiometer is needed (see circuit above).

If you wish to vary the frequency and duty cycle, two potentiometers are needed (see Special Design Notes below).
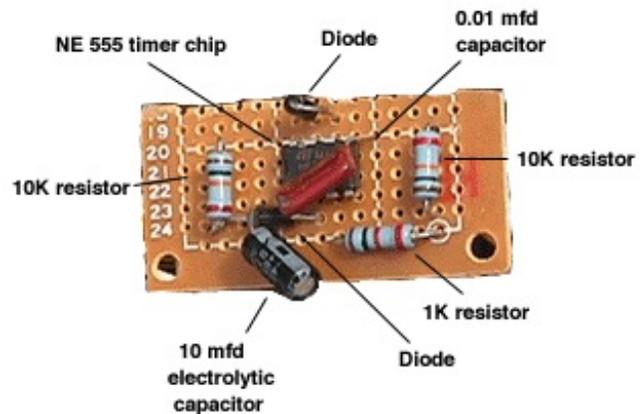
Special Design Notes

Changing the frequency will affect the duty cycle. With the components identified, 10k for the top part of Ra, a 100k pot for the middle part, a 10k resistor for the bottom part of Rb and a 10 uf capacitor for C, the duty cycle will range from 50% to 90% with a frequency of .85 Hz. If you replace Ra with a 100k pot, you will be able to vary the frequecy from 1.5 Hz to .75Hz. The duty cycle is then variable from 9% to 52%.

The 555 timer chip is a standard Radio Shack item. The small pots will have to be purchased from someone other than Radio Shack. If you just want to vary the OFF time use a regular size pot for the middle resistor and a 10 turn 100k pot (the upper part of Ra) mounted on the perf-board. You can then vary the frequency to your liking and then button the thing up and vary the ON time with the pot mounted through the side of the Telrad.

If you just want a fixed pulse rate and ON/OFF time, use 10 turn pots for both variable pots, set them and place the perf-board into the Telrad's battery compartment.

The Year-Round Messier Marathon Field Guide by Harvard Pennington
Willmann-Bell, Inc. (pub.) 1999, ISBN 0-943396-54-9
{An excellent Messier guide which uses Telrad finder guides.}

Finder Charts of The Messier Objects Vol. 1 - M1 through M55 by Brent Watson
Sky Spot, 1263 East Beverly Way, Bountiful, UT 84010 (1993)

Finder Charts of The Messier Objects Vol. 2 - M56 through M110 by Brent Watson Sky Spot, 1263 East Beverly Way, Bountiful, UT 84010 (1993)

Finder Charts of Bright Objects by Brent Watson
Sky Spot, 1263 East Beverly Way, Bountiful, UT 84010

Finder Charts of Overlooked Objects by Brent Watson
Sky Spot, 1263 East Beverly Way, Bountiful, UT 84010

If you have any questions on the subject, please make a post to the ATM List Server addressed to Jim Heilman.