I would really be grateful if you start to build the Timer, that you go to the Photrio thread and say hi. Also please post photos of your completed tester.

Please refer to Photrio for further build help & to let us know you are building the timer.
(1) Trigger Trap Splash Freeze Timer Cheap-Easy-It-Works | Photrio.com Photography Forums

GitHub repository where all documentation & code can be found. billbill100 (github.com)

V2.0 10/12/2024

Trigger Trap Splash Freeze Timer Operating Instructions.

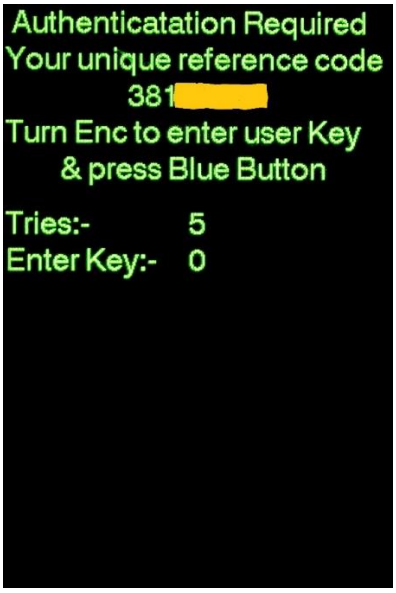
First use after loading firmware.

Assuming the build has been completed correctly and the firmware loaded, when the Shutter Tester is connected to the computer via the USB cable (or another suitable power source), TFT & LCD should light & there will be output to the pc monitor.

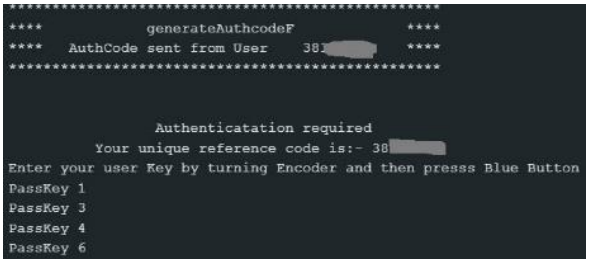
Note in these steps, the terms 'turn the encoder' and 'press the encoder' are used.
For normal usage, the encoder is referred to as 'the **Blue Button**'.

Enter User Key is to input the user-key. This is supplied free of charge upon request. Make a note of it, in case you ever perform a factory reset. Note the User Key has been added to prevent piracy and users being charged for downloads. The firmware is supplied free of charge and always will be.

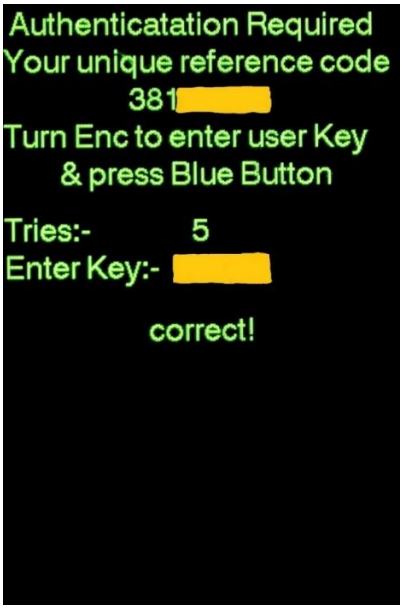
Following the on-screen prompts, turn the encoder to show the User Key value. Then press the encoder.
If correct, the Shutter Tester will restart.



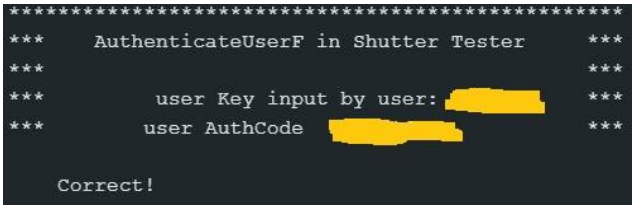
TFT showing user key input screen.



PC showing user key input screen.



TFT showing user has input correct user key.



PC showing user has input correct user key.

If the user key has been entered correctly, 'Correct! Will be displayed' and the Shutter Tester will restart in normal operation mode.

Note: - Sometimes a firmware upgrade will require the Shutter Tester is reset to default factory settings, so ensure you keep a note of your user-key.

Normal use.

Buttons

Blue	Each time this button is pressed, the red marker will move to the next parameter.
Blue knob	Turning the knob will change the parameter
White	Toggles the focus (shutter half-press). Optionally, this will also open/close the shutter.
Red	Pauses Timer to stop any triggers activating the splash or flash
Green	Starts splash sequence. Optionally just fires the flash.
Yellow	Single press gives one drip. Long press gives purge of water lines.
Black	Opens Options Menu

On-Screen Parameters

Master Delay mS. (Splash only)
This opens the shutter and pauses the delay sequence and all timers, for the set period.
This is useful as it gives time for the camera to lift its mirror and open the shutter.

Flash Delay
To make adjustment quicker, the Flash delay, which works in microseconds has been split to two lines, with the top showing the milliseconds component and the second line, the microseconds. Think of it as both rows run consecutively, MMMMuuu.

Normally the microsecond part does not need to be adjusted. One would have to turn the microseconds 1000 times just to get 1 millisecond. Or 1000 X 1000 times for one second!

For fine adjustment, the microseconds can be adjusted.

Note:-
Flash Delay starts from the end of Master Delay.
The flash will only fire after the full sequence has completed. If the sequence is longer than the flash delay time, the display shows yellow as a warning.

Drip1 On Time
This is how long the solenoid will open for, to allow a water drop to form & drop.
(If this figure is set to 0, no drips will occur and the sequence will jump directly to Flash Delay).

Drip 2 Delay
This is the pause before the solenoid is open again for another drip.
(If this figure is set to 0, no further drips will occur and the sequence will jump directly to Flash Delay).

Drip 2 On Time
This is how long the solenoid will open for, to allow a water drop to form & drop.
(If this figure is set to 0, no further drips will occur and the sequence will jump directly to Flash Delay).

Drip 3 Delay
This is the pause before the solenoid is open again for another drip.
(If this figure is set to 0, no further drips will occur and the sequence will jump directly to Flash Delay).

Drip3 On Time
This is how long the solenoid will open for, to allow a water drop to form & drop.
(If this figure is set to 0, no further drips will occur and the sequence will jump directly to Flash Delay).

TimeOut
After the sequence has completed, how long until re-trigger is permitted.

The Options Screen

Pressing the Black button brings up the Options Screen.

Each time the **Blue** button is pressed, a red marker will appear at the next parameter.

To change, rotate the **Blue knob**.

Save Settings.
This will save the current settings to memory & they will remain after power off

Factory Reset.
Current memory settings will be cleared and replaced with default settings. The Timer will then restart.

LightSensor.
This affects the behaviour of the light sensor, when room lights are turned off.

OFF.	Does nothing
Open Shutter.	When the room light is turned off, the shutter will open.
Start Splash	When the room light is turned off, the Splash sequence will start.

FlashOrSplash.
This affects the behaviour of the **Green** button, when pressed.

Flash Only.	Starts flash delay & then fires the flash. Master Delay and Drip timers are all bypassed.
Splash.	Starts complete Splash sequence.

White Button
This affects the behaviour of the White button, when pressed.

FocusOnly.	Will 'half push' the shutter button.
Foc+Shuttr.	Will fully press the shutter button, operating focus & the camera shutter.

Mode

Normal.	Flash & Splash functions normally.
Normal+RL.	The external relay will be energised, followed with a pause equal to Master Delay before continuing. Works with Green & White buttons & light-sensor. (Allows time for light to extinguish before shutter opens)
Fast.	This is used when very fast, low latency timings are needed. The camera shutter is manually controlled. Rotating the blue knob adjusts the flash delay. To minimise latency, other than updating the user selected flash delay, there are no on-screen prompts during trigger. Timeout is then displayed. 1 uS timing accuracy can be achieved. **Note:-** Other than a power reset, there is no way to exit this mode.
Instant.	As per fast, but no option to set delay. Latency is < 0.3uS.

Trigger Low
This will change to indicate whether or not the external input is currently triggered.
Useful for aligning light/Laser sensors or testing distance for sound sensors, without the flash firing.

Trigger High
This will change to indicate whether or not the external input is currently triggered.
Useful for aligning light/Laser sensors or testing distance for sound sensors without the flash firing.

Press Black button to return to main screen with updated options.
Note: - Any changes are not automatically saved. Use Save Settings option, if required.

General Splash Notes.
For splash photography, shutter latency is not usually a problem, as the flash delay is comparatively large & the Timer can be allowed to control the shutter opening & closing. Additional time to allow for latency can be used by increasing Master Delay setting.

The splash sequence can only be started by pressing the Green button or using the Light-Sensor option. External triggers will not start the Splash sequence.

General Flash Notes
When the Timer is triggered by an external trigger, Master Delay & all the Drip On & Drip Delay timers are bypassed. It is only Flash Delay and Timeout that are used.

Pressing the Green button in Flash Only simulates an external trigger. This can be useful for testing the setup.

General Notes
Shutter latency is the time from when the shutter is pressed to the time the camera has lifted the mirror & opened the shutter. This can be many milliseconds.

Normal+RL allows a room light to be automatically controlled. When Green or White buttons are pressed, the relay will operate (which can be connected to a light). A delay equal to Master Delay will occur, to allow the light to fully extinguish. The timer then continues in either Flash or Splash mode.

The Light-Sensor has a hysteresis applied, equal to the TimeOut time. This is to avoid repeated triggering in flickering light. LED light for example, is often controlled by PWM, which rapidly turns the LEDs on and off to control brightness.

The term 'focus' is used here, to mean half-pressing the shutter button. This also wakes the camera. However, the camera will not be able to focus in the dark & so should be pre-focused and set to manual focus.

www.doc-diy.net :: camera remote release pinout list

Setting up Splash. Practical guide.

The Mariotte bottle should be filled with water and the lines to the solenoids purged, using the **Yellow** button.
Height of the bottle above the solenoids & solenoids above the table are all variable & will create different effects.
On the table, a water container should be placed, Again, amount of water in it & depth can all be experimented with.

The camera should be on a tripod. Focus should be set to manual & pre-focused on where the drop will hit the water.
Camera should be in manual mode, including iso. Shutter set to B.

The camera can be controlled by simply pressing & holding the shutter button, but this is fiddly. A better option is to either use a manual camera release, or connect the camera to the Trigger-Timer, which makes things far easier.

Flash should be positioned to light a white or coloured card positioned behind the splash. The card so positioned that the light will bounce from this, through the splash into the camera.
Water (& glass) is best lit from behind, but feel free to experiment with other lighting angles.
Set the flash to the lowest power setting, as this gives the shortest flash duration.

Take some test photos & adjust the camera aperture and iso to give a well-lit scene. The room should be dark. A little light to see what you are doing, will be fine.

Now we can start to set the timings. Set Master Delay to 2000, Flash Delay to 2005. Set drip time on to 0005. Turn drips 2 & 3 to 0.

Take a test photo. No drip should be seen, as the flash fires at exactly the same time as the drip ends. (2000 + 0005).
Now, increase the flash delay slowly & if you are lucky, you will capture a sphere of water falling.

Keep increasing the flash delay until the photo shows the drip hitting the water. Keep increasing the delay & you will see the water become calm. Keep increasing the delay & you will now see the splash rebounding from within the water.

This will give a benchmark time. You can now experiment with longer or shorter drip lengths. Increasing the height of the solenoids will require a longer flash delay.

Once you have a nice eruption from the water, it is time for drip 2. By adjusting Drip 2 Delay & Drip 2 On Time.

Drip 2 should hit the eruption caused by drip 1, right at its peak. This will create the ‘mushroom’ & ‘ring of pearls’ effect. Again, experiment with the size & timing of drip 2.

Drip 3 can be used to either collide with the first collision, or left as a falling sphere, to add more context to the photo.

Experimentation is the key. Different timings, different drip size & different lighting. Adding food colouring to the water or thickening it by adding guar gum. Maybe add different colours to the water container and Mariotte bottle.

A rebounding splash

After a drip hits the water

On its way down…..

Impact!

Second drip collides with first.