Drop photography setups

Time control

Some tech tips Setup: 1 2 3 4 5 6 7

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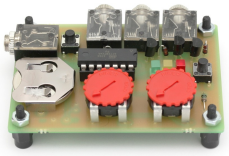
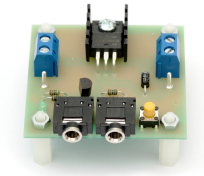
Some tech tips

The best choice for the **camera** is a DSLR. It should be operated in manual mode with manual focus for the lowest shutter lag. The shutter lag ranges usually between 40 and 120 ms depending on the model and age. The camera is the slowest device in the chain so make sure you trigger it well in advance of the photographed event. If the photo flash is the only light source the exposure time plays no role and bulb mode can be used. When a flash is used, the shortest exposure time is about 1/180 s.

The **flash** should be operated in manual mode. The flash duration is not really critical in drop photography. Nevertheless a power output higher than 1/16 (for system flashes) might result in visible motion blur. The trigger lag of flash units is negligible, assume they react immediately. Some more info on photo flash timing: www.doc-diy.net/photo/photoflash_timing



The purpose of the **delay** circuit is to introduce a precise user specified delay between sensors and cameras or flashes. The presented circuit can work in three time ranges: 0-10 ms, 0-100 ms or 0-1 s. It can operate in two modes. The first mode the rotary knobs set the delay (coarse/fine) and the release pulse duration is fix. In the second mode the rotary buttons control the delay time and the release pulse duration as needed for drop generation with a magnetic valve. Press the ON/OFF button for more than 6 s to switch between the modes. More info can be found here:
www.doc-diy.net/photo/delay



The **servo switch** is used to control heavy loads with logic signals. It is needed to operate the magnetic valve. The two 3.5mm jack inputs are connected in parallel are directly compatible with the SmaTrig or delay outputs. The supply voltage of the servo should range between 5-15 V. The load current should not exceed a couple of Amperes.
www.doc-diy.net/photo/servoswitch

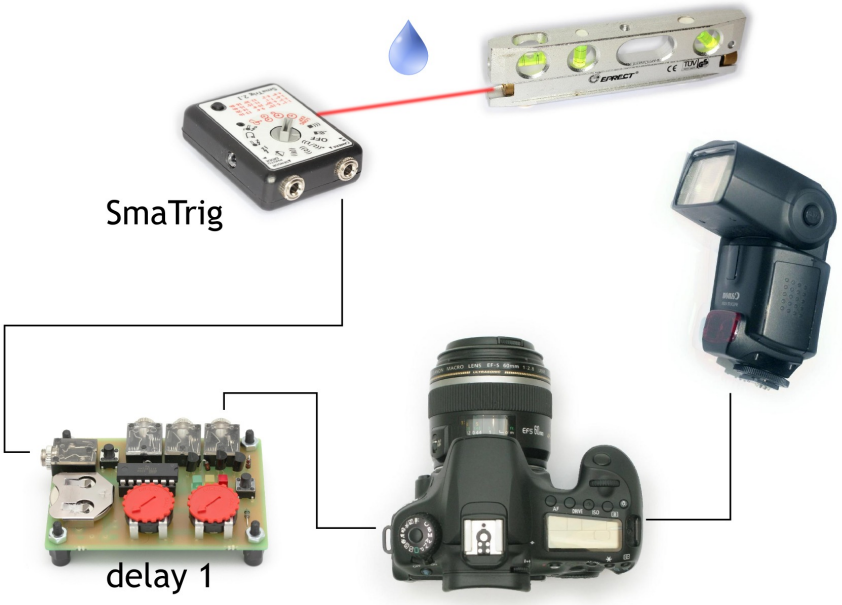
The **SmaTrig** can be used as a light barrier to detect falling drops. Use function 7. Light barrier for this purpose. The laser beam should point directly at the photo diode. The trigger ticks like a clock when the function is active. More info: www.doc-diy.net/photo/smatrig21

The best choice for the **laser** are the small spirit levels. They usually have a tripod mount and standard size batteries. Laser pointers can be used too, but are difficult to mount and have a short battery life.

0.1 Setup 1

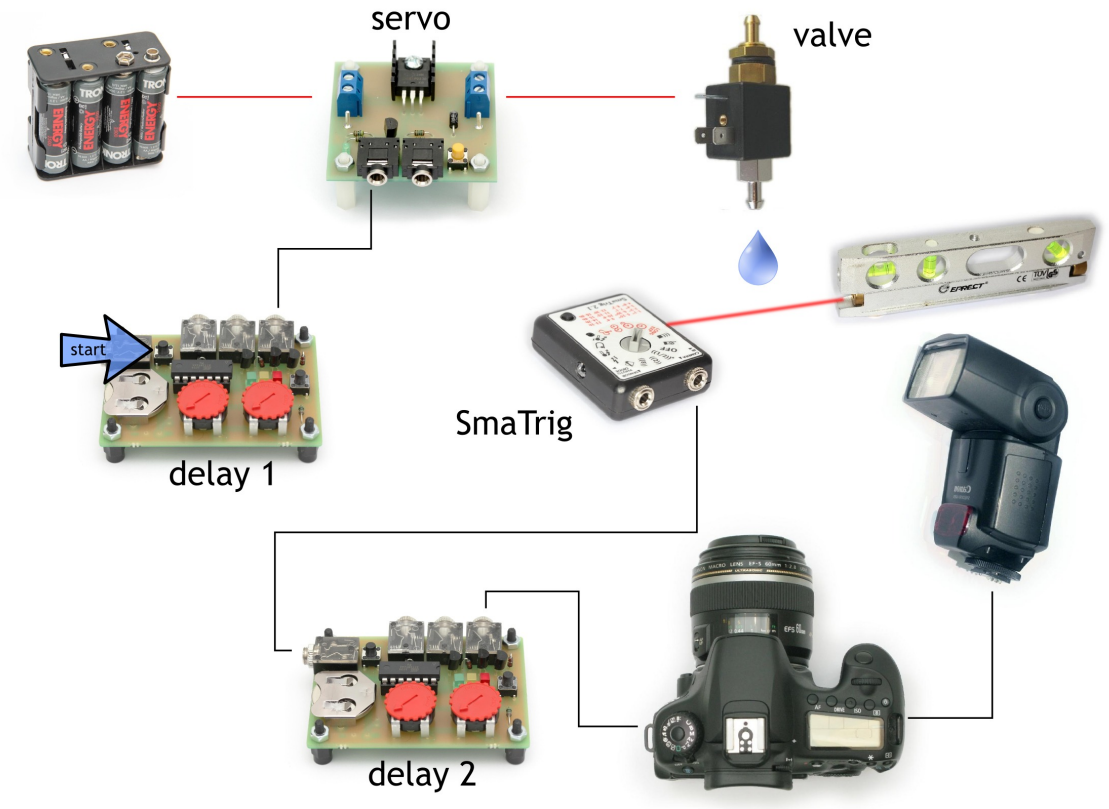
- Simplest setup with controllable timing.
- SmaTrig and laser beam form a light barrier for drop detection.
- User a laser pointer or better a spirit level with a laser.
- The delay is generated internally the SmaTrig. The light barrier function allows to add a delay when the button is pressed multiple times when the function is activated. Each press increases the delay by 62 ms (64/1000 s).
- The delay can be adjusted additionally by moving the light barrier up and down.
- The flash is controlled directly by the camera. The built-in flash can be used.
- The exposure time should be longer than 1/180 s as with all flash applications.
- The time between drop detection and the impact should be longer than the shutter lag of the camera. Otherwise the event will be missed.
- The timing is not very precise since the varying shutter lag of camera adds to the total delay time.
- Since the exposure time is short, the ambient light has little influence on the exposure. It's a daylight setup.

0.2 Setup 2



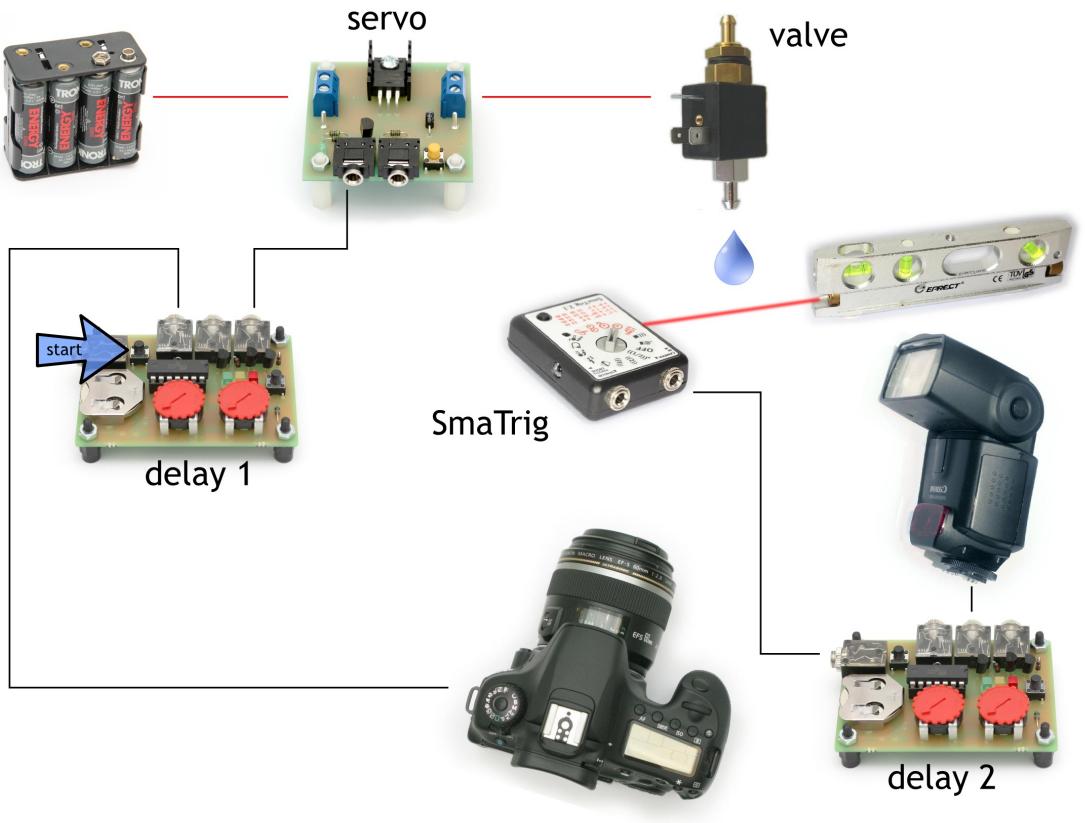
- Setup comparable with setup 1, but with a delay element allowing an easy adjustment of the trigger moment.
- Delay 1 set the time lag between drop detection and camera release.

Setup 3



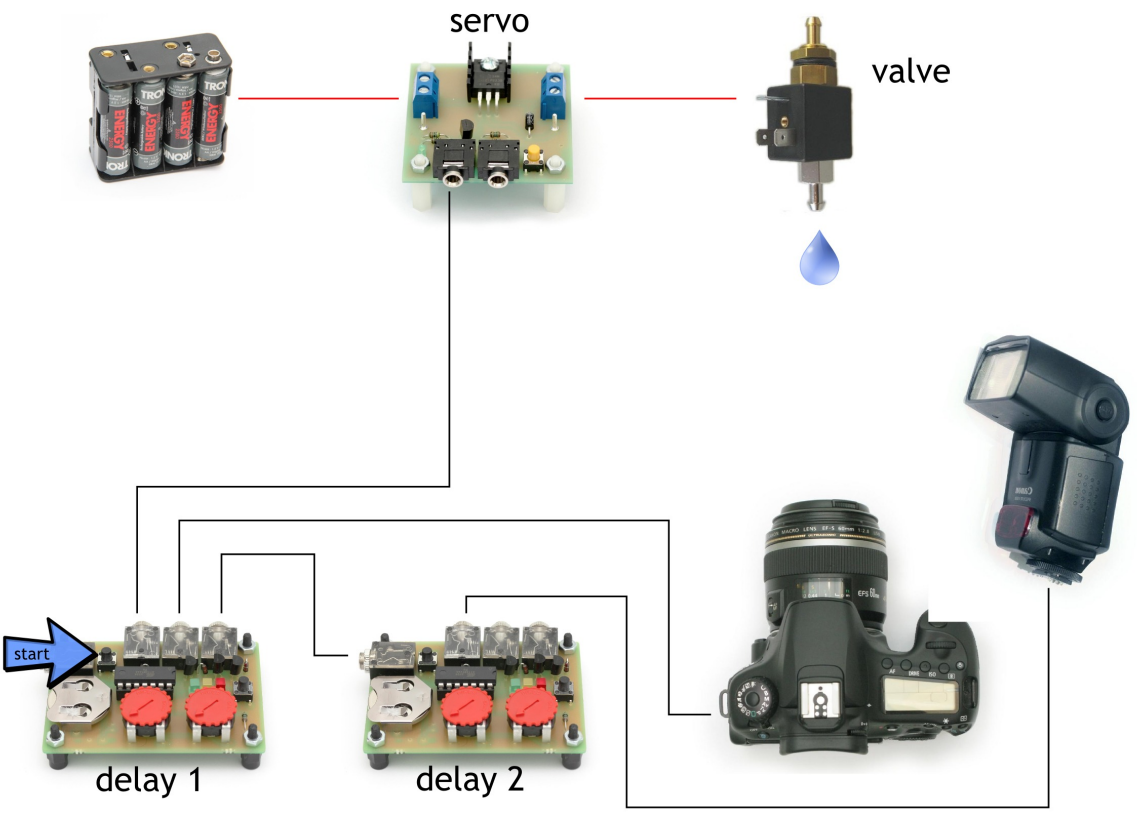
- Setup comparable with setup 2, but with an electronically controlled drop generation.
- The drop generation is separated from the camera trigger circuitry.
- Delay 1 works in the mode delay/pulse-duration.

Setup 4



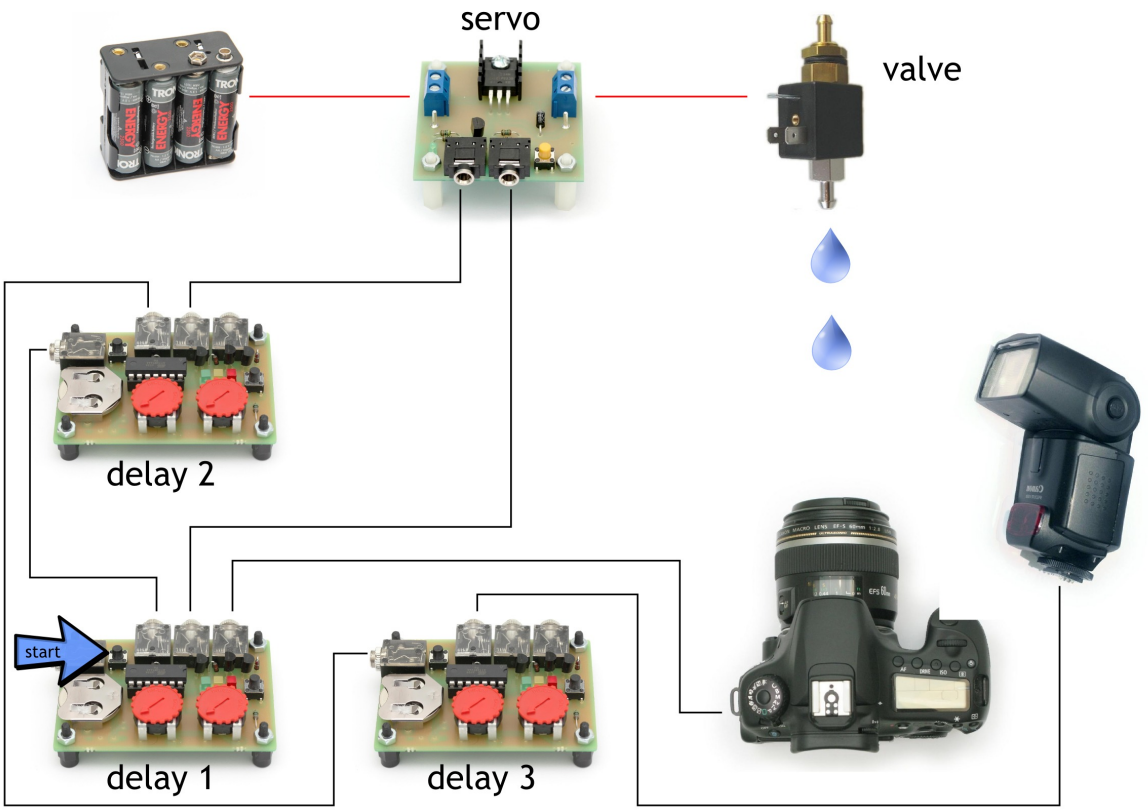
- Setup comparable with setup 3.
- Precise timing, because the flash is controlled directly. The varying shutter lag of the camera doesn't add to the delay time.

Setup 5



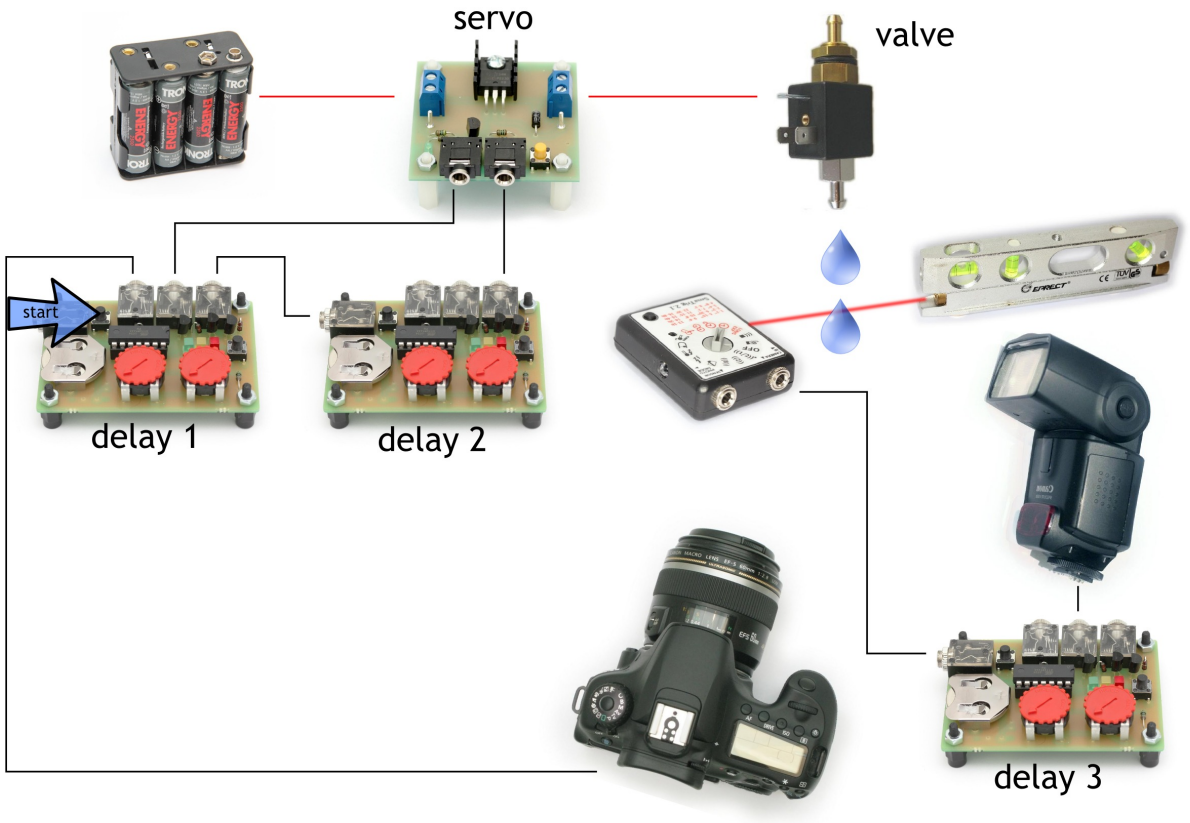
- Simple mechanical setup without the light barrier.
- The flash will fire independent of the drop trajectory.

Setup 6 / drop-on-drop



- Setup conceived for drop-on-drop photography.
- Both inputs of servo switch are connected in parallel. The trigger signals from Delay 1 and 2 are linked with an OR-relation.
- Delay 1 and 2 work in mode delay/pulse-duration, Delay 3 works in normal coarse/fine delay mode.
- Delay 1 sets the size of the first drop.
- Delay 2 sets the drop distance and the size of the second drop.
- The camera is in manual mode. The exposure time should be long enough to capture the event. 1/4 s might be a good starting value. For strong ambient light shorter values are recommended. For dark conditions the exposure time can very long.
- Alternatively the camera can be connected to Delay 2 for a later triggering and a shorter exposure time. The camera should be fast enough.

Setup 7 / drop-on-drop



- Setup conceived for drop-on-drop photography.
- Setup comparable with setup 6, but a light barrier is used as input for Delay 3. Drops with "bad" trajectory will not be detected.
- Precise timing, due to direct triggering of flash and drop detection close to impact point.