

**I would really be grateful if you start to build the Developing 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.  
[Build a B&W film developing timer & twiddler - Cheap, Easy & it Works | Photrio.com Photography Forums](#)

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

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## **Developing Timer Operating Instructions**

The Developing Timer works in exactly the same way as if one were using a standard timer or stopwatch.

However, by setting some basic parameters, the Developing Timer will step through each stage of the develop/stop/fix process, audibly and visually alerting the user that another operation is shortly due, or is taking place.

In this way, the user does not have to constantly watch the timer or have to remember when to stop developing or when and how long each agitation should be etc.

The Develop Timer is a modern take on the basic three-line LCD developing timers one can purchase, with dev/stop/fix times. Now using a modern colour display, easy time input with both visual & audible prompts & warnings.

It has been designed to be easy to use. Just press one knob to select the different times and turn the same knob to change them.

It is presumed the standard method of development timings are used. Developer is poured in and then the timer started. 10 seconds before end of development, the developer is poured out, with the Stop bath being poured in exactly at the end of development time.

### **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.

Authentication Required  
Your unique reference code  
381 [REDACTED]  
Turn Enc to enter user Key  
& press Blue Button  
Tries:- 5  
Enter Key:- 0

*TFT showing user key input screen.*

```
***** generateAuthcodeF *****  
**** AuthCode sent from User 381 [REDACTED] ****  
*****  
  
Authentication required  
Your unique reference code is:- 381 [REDACTED]  
Enter your user Key by turning Encoder and then presss Blue Button  
PassKey 1  
PassKey 3  
PassKey 4  
PassKey 6
```

*PC showing user key input screen.*

Authentication Required  
Your unique reference code  
381 [REDACTED]  
Turn Enc to enter user Key  
& press Blue Button  
Tries:- 5  
Enter Key:- [REDACTED]  
  
correct!

*TFT showing user has input correct user key.*

```
*****  
*** AuthenticateUserF in Shutter Tester ***  
*** ***  
*** user Key input by user: [REDACTED] ***  
*** user AuthCode [REDACTED] ***  
  
Correct!
```

*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.**

### **To set the times:**

Pressing the **Blue** knob once will place a red mark next to the *Develop Time*.

Turning the **Blue** knob will allow the developing time to be set. A maximum development time of 99 minutes 59 seconds can be set.

Pressing the **Blue** knob a second time, moves the red mark to the next line, *Initial Agitate*.

Turning the **Blue** knob will allow the Initial Agitation time to be set.

Pressing the **Blue** knob a third time, moves the red mark to the next line, *Agitate Every*.

Turning the **Blue** knob changes the interval between secondary agitations.

Pressing the **Blue** knob a fourth time, moves the red mark to the next line, *Secondary Ag(itation) Time*.

Turning the **Blue** knob changes the length of each secondary agitation.

Pressing the **Blue** knob a fifth time allows setting of the Stop bath time and a final press allows setting of the Fix bath time. A maximum time of 60 minutes can be set for these.

As an example, developing Ilford FP4 in ID11.

The developing time is set at 11 minutes.

Initial Agitation is 30 seconds

Secondary agitation is every 60 seconds (1 minute)

and each secondary agitation is performed for 10 seconds.

Note:- as with normal manual development, all timings are taken from development start. So initial agitation is from start of development time for 30 seconds. Secondary agitation interval (*Agitate Every*) is also taken from start of development time. So, in this example, agitations will take place exactly on the minute, for 10 seconds duration.

Stop bath has no programmable agitation times & it is usual for the stop bath to be continually agitated.

Visual prompt will be given, but there will be no audible warnings until 10 seconds before *Fix Time* ends.

Auto-Twiddle, if selected, will turn for the whole Stop Bath time.

Fix bath gives initial agitation of 10 seconds and further agitations on the minute, of 10 seconds. Audible and visual notifications are given.

Auto-Twiddle, if selected, will turn for 10 seconds every minute



### To start the Developing Sequence.

Pour in the developer & Press the **Green** button.

Immediately, *Develop Time* will start counting down.

At the same time, the *Initial Agitation* time will start to countdown, highlighted in Yellow/Red, with a deep pitch audible alert and on-screen prompt, requesting the user to start agitating.

This will continue until the *Initial Agitation* time has counted down to zero.

In our example, this will be from 11.00 minutes to 10.30 minutes, i.e 30 seconds.

The *Agitate Every* timer will also be counting down and 10 seconds before secondary agitation is due to take place, the *Develop Time* will change colour to Yellow and a high pitch audible alert will be heard, to notify the user that an action, soon required.

In our example this will start at 10.10 and end at 10.00

When *Agitate Every* timer has counted down to 0, the *Secondary Ag(itation time)* will be highlighted Red/Yellow, with a deep pitch audible alert and on-screen prompt, requesting the user to start agitating.

(in our example, this will start at 10.00 and end at 9.50)

The sequence of *Agitate Every and Secondary Ag(itation time)* will repeat for the length of the developing time. In our example, 10 seconds before each complete minute, the high pitch warning will be heard & on the minute, a deep tone will be heard, prompting the user to start agitating.

**Note:** No agitations will be performed within the final 20 seconds of development time.

20 seconds before *Develop Time* ends, *Develop Time* will be highlighted in Yellow and a high pitch audible tone heard, to warn the user that an action will be required in 10 seconds.

10 seconds before *Develop Time* ends, the tone will change to a deep tone, with an on-screen prompt, instructing the user to pour out the developer, A tri-tone will be heard at end of development time.

The Stop bath should be poured in immediately at the end of the development time. In our example, 11 minutes.

This completes the Developer cycle and the timer will pause, with an on-screen prompt, waiting for user input.

## The Stop Bath.

When the Stop bath has been poured in, press the **Green** button.

The *Stop Time* will now count down for the allotted time.

As the stop bath is a very short duration & is normally agitated for the whole duration, the Stop Time will be highlighted Yellow/Red for the whole countdown period, but there will be no audible agitation warning.

10 seconds before the end, a deep pitch audible alert will be heard. At the end of Stop Time, a tri-tone will be heard & an on-screen message to pour out stop bath & pour in Fix bath.

## The Fix Bath.

When the Fix bath has been poured in, press the **Green** button.

The *Fix Time* assumes standard fixing of agitation for the first 10 seconds and 10 seconds every minute.

For the first 10 seconds, Fix Time will be highlighted Yellow/Red, on-screen prompt & a deep audible tone, alerting the user to agitate.

For 10 seconds every minute, the same warnings will be given, whilst Fix Time counts down to 0. At the end of which, a tri-tone will be heard & the screen will prompt to wash film.

Pressing the Black button will reset the Developing Timer, ready for another developing cycle.

## Auto-Twiddler.

If the optional stepper motor is installed, it works as follows.

Pour in the developer and press the **Green** button to start development, tap the tank to dislodge bubbles and place the Auto-Twiddle mechanism onto the developing tank.

To start auto-twiddling Press the **Yellow** button. The *Auto-Twiddle* icon will turn yellow & run for the duration of Initial Agitate time.

When secondary agitations are required, the motor will automatically start to turn.

The speed of auto-twiddling is adjusted by turning the **Blue** knob during Development. The RPM is shown on the display.

The auto twiddler can be turned off at any time by pressing the **Yellow** button. *Auto-Twiddle* will turn **Grey** on the screen and the motor (if running) will stop. Pressing **Yellow** again the button will re-activate auto-twiddling.

At the end of development, the auto-twiddler turns itself off and the **Yellow** button must be pressed for auto-twiddling if required during the Stop Bath process.

Similarly, at the end of the Stop Bath process, the auto-twiddler turns itself off and the **Yellow** button must be pressed for auto-twiddling if required during the Fix Bath process.

The design & build of the auto-twiddler mechanism is left up to the user. It is noted that the cheap Chinese developing tanks also raise and lower the film holding spiral during twiddling, which is an upgrade to the standard Paterson rotation only. Jobo & its clones have no provision for twiddling.

### Important Notes.

It is important that the film is orientated correctly into the developing tank if twiddling (manual or auto). The film should be wound clockwise, starting from centre to the outside, when looking from above. This way, when twiddling (clockwise), fresh stock will be pulled into the film leading edge and pushed through the film.



Film wound & loaded clockwise in developing tank, when viewed from above

### General Notes.

Initial agitation time cannot be set longer than development time – 20 seconds.

Secondary agitations will not be performed in the final 20 seconds of development.

Secondary agitation will not start until at least 20s after initial agitation has finished.

If the **E-stop** button is pushed whilst motor is running, the motor will stop dead, with no deceleration.

To save the current settings, press and hold the **Black** button, press the **Green** button and release both. The Developing Timer gives a high pitch tone. This can only be performed when not in a developing cycle.

To Factory Reset to default parameters, press and hold the **Black** button, press the **Yellow** button and release both. The Developing Timer will blow a raspberry & reset. This can only be performed when not in a developing cycle.

The **Black** button may be pressed & released at the end of the development or stop cycle & it will reset the Development Timer back to the setup screen.

The debate as to agitate by inversion or twiddling will go on forever.

With Patterson tanks, one has the choice of either twiddle or agitate.

Jobo have no provision for twiddling.

The Chinese tanks are designed to be twiddled only and leak if inverted. A nice feature of these tanks is that they also slightly raise & lower the spool during twiddling.

From my own experimentation, I have found twiddling every bit as good as inversion, with the added benefit that there is no chance of chemical leaks or the lid popping off whilst inverted. It also stops over aeration of the Developer, especially if only developing one film in a multi-film tank (Patterson themselves warn of over vigorous agitation in this situation)

When using a water bath, as I always do, to maintain an even temperature, one does not get water everywhere during the agitations.

The water bath, I use for the rinse, as it is at the correct temperature, using the method Patterson describe. Auto-twiddling ensures that no errant chemical has found its way into the water bath.

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