

# OccultTools

## Acquisition Delay Help

### Operating conditions

The description of the procedure and the principle of the calculations are described in document :

"Measurement of the acquisition delay of a digital camera

download here [http://www.nocturno.fr/acquisitiondelay/acqd\\_en.html](http://www.nocturno.fr/acquisitiondelay/acqd_en.html)

The calculations are based on

PPS time = 100 ms (default value for gps modules; please check).

Exposure time = 40 ms; must be adhered to

Recording time = 90 s minimum.

Measurements should be taken in the dark or, failing that, in very low light.

The video recording parameters must correspond to those normally used for a stellar occultation. In particular windowing, USB speed and binning must be preserved. In the event of a change, a new video must be recorded.

An exposure time of 40 ms is imposed for calculation purposes. The only parameter that can be modified to adjust signal intensity is the gain.

The ADU signal should be as large as possible without being saturated. With Tangra, this is shown by the pink pixels in the photometric circles.

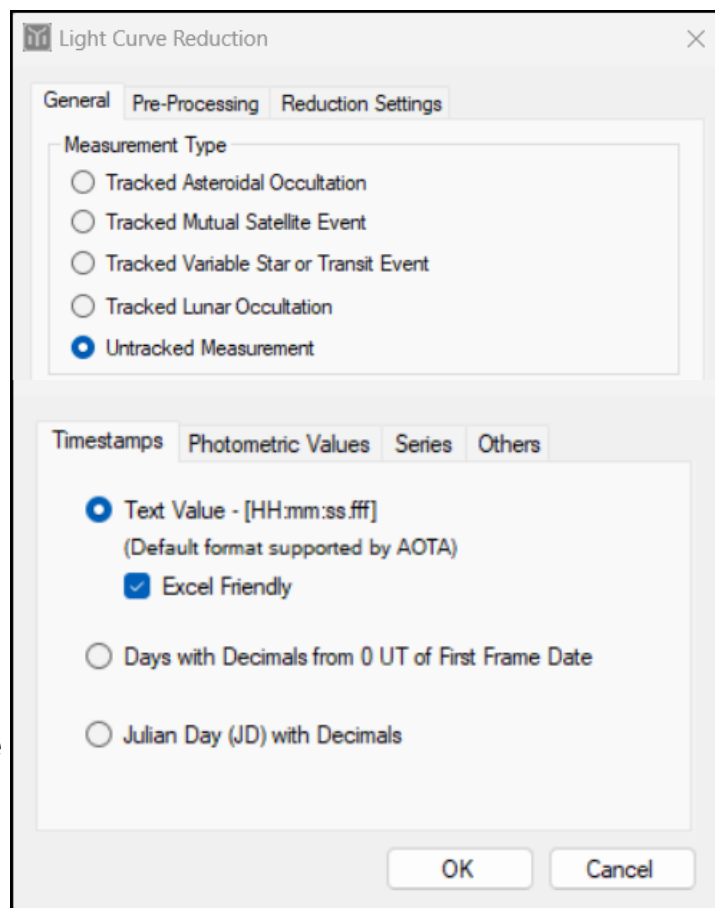
### Reduction by Tangra

When reducing the video, select "Untracked Measurement".

Once Tangra has reduced the video file, export the results as a CSV file with the following parameters

"Text value - [HH:mm:ss.fff].

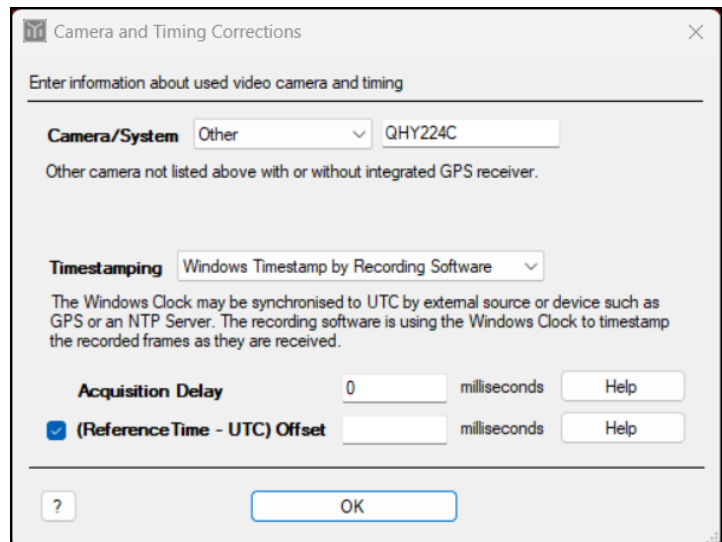
It is this CSV file that is processed by the software.



At the end of the video reduction, Tangra asks you to enter the Acquisition Delay and the Offset.

Enter zero for the acquisition delay.

For the offset, enter the value given by the Meiberg software to correct any offset from UTC time.



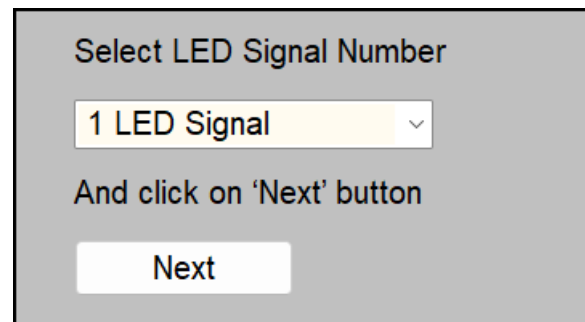
## Software user guide

To distinguish the PPS signal from noise, an ADU value needs to be defined, defining a threshold above which the signal is considered to be a PPS signal and noise below. The software contains an algorithm for automatically searching for the Threshold value.

Select the "Acquisition Delay" radio button.  
Confirm the selection to access the choice of CSV file to be processed.

After validation,  
the following information appears:

Select the number of signals to be processed :  
"1 LED Signal" for Global Shutter cameras.  
"3 LED Signal" for Rolling Shutter cameras.



In the case of a Rolling Shutter camera, the acquisition time depends on the sensor line on which the occulted star is positioned.

After clicking on "Next", the results are displayed and saved in a CSV file.

For a Global Shutter camera, the Acquisition Delay is displayed directly.  
For a Rolling Shutter camera, the 3 Acquisition Delay values calculated correspond to the Y positions of the 3 LEDs on the sensor.

The value of the Acquisition Delay is linearly related to the position Y :

$$\text{Acquisition Delay} = \text{Slope} * Y + \text{Intercept}$$

The Slope and Intercept are calculated by the software, as is the R2 correlation coefficient.

The CSV file is used to calculate the value of the Acquisition Delay for a given Y.  
By entering the line number where the occulted star appears, cell B18 contains the formula giving the Delay value.

However, as the CSV file is only a text file, this formula is not automatically recognised when the file is opened in a spreadsheet program (Excel, LibreOffice Calc). The file must be modified as follows:

if the decimal separator in the OS is a comma, replace it with a full stop in cells B13 " and B14.

- enters a value for Y in cell A18,
- copy the contents of cell B18,
- **Delete all** the contents of cell B18,
- Paste Special / Unformatted Text from the previous copy into cell B18.

The formula is then recognised and the Delay value is displayed.

**NOTE:**

With a laptop, it is essential to use an external power supply so as not to degrade the computer's performance.

**IMPORTANT NOTE:**

The CSV file may contain various anomalies detected or not by the software. In this case the results should be aberrant, check the contents of the CSV file.

It is up to the observer to think critically about the results displayed: "garbage in, garbage out".

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