

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

[Build a shutter tester for Focal Plane shutters - Cheap, Easy & it Works | Page 18 | Photrio.com Photography Forums](#)

Please refer to Photrio for further build help

ESP32 Shutter Tester Operating Guide V1.6 11/04/2024

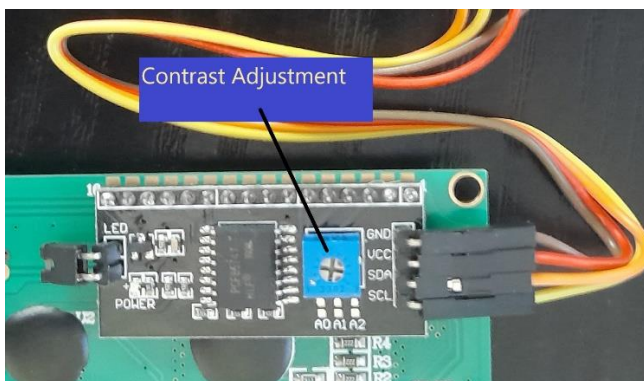
For firmware 3_0_8_3 onwards

Note photos show earlier FW with numbers rather than colours indication Button functions.

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, The LCD should light & splash screen will show for a few seconds and then change to display the menu options.

If the LCD lights, but no text can be seen, try adjusting the contrast screw on the back. As an initial setting, turn fully clockwise and then just a small amount back.



When first applying power, via USB, the splash screen is shown.

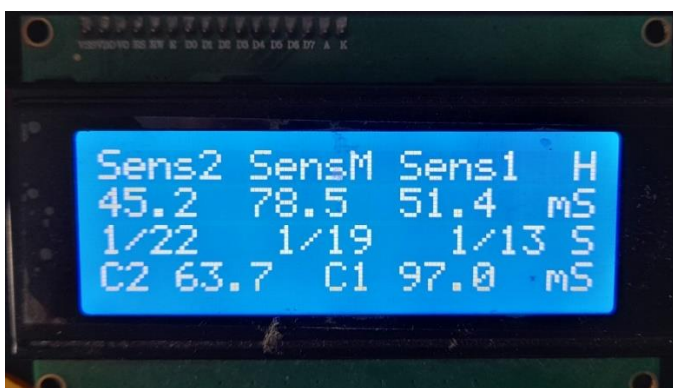


After a few seconds, the menu screen will display the four button functions.

Note:- pressing buttons will not do anything until Shutter tester is in normal operating screen.



Normal operating screen.

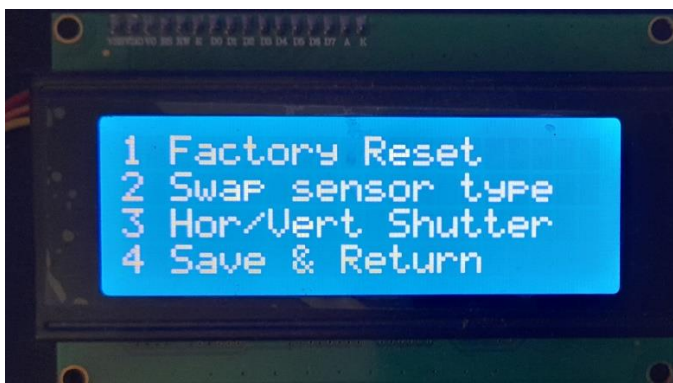


Alignment & Setup Utility

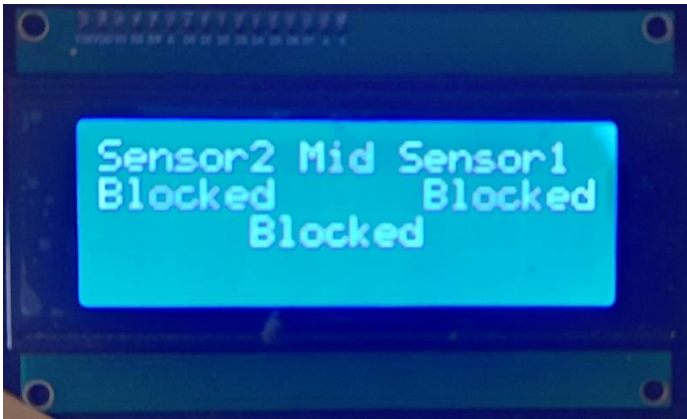
Pressing **Button4 Black** will take you to the Alignment & shutter mode Utility.

This utility will allow checking and aligning of the three laser and receiver pairs by giving an indication on the LCD whether or not the receiver can see the laser beam. Output is also sent to the computer screen.

Initially, the screen will show the menu option for the utility & then change to the alignment screen.



When the laser is shining onto the receiver and the receiver can see the laser, the LCD will report 'Seen' When the laser is blocked, by a piece of card or your hand, the LCD will say 'blocked'.



There are two different versions of the sensor, referred to as 'original' and 'new'. Both look identical, so there is no way to tell by looking, which type they are. The only difference between the two is that one has an inverse output to the other. If the Laser Alignment Utility seems to be working backwards, it means you have the other type of sensor.

Pressing Button2 Yellow will toggle the code to work for the other type of sensor. Note all sensors must be the same type, one cannot mix & match original & new.

If there is no change to the LCD screen, then check all the wiring. Lasers should be shining Red and the LED on the receiver boards should be on. There is no protection from incorrect wiring or sensor orientation on the boards, so incorrect wiring will most likely result in a damaged board or sensor.

Pressing Button3 Green will toggle between Horizontal and Vertical shutter mechanisms. It is important to select the correct shutter type for the camera you are testing. LCD will update to show shutter has been changed.

Pressing Button1 White Will reset the board and restore the default settings (new sensor, horizontal shutter, light-meter 1.20 calibration value)

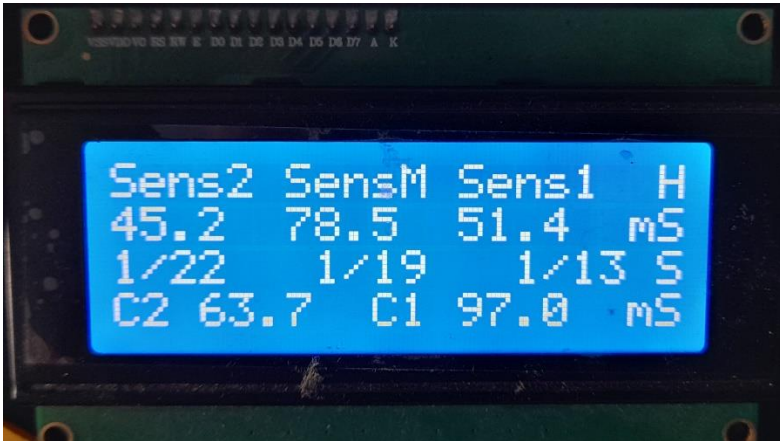
Pressing Button5 Red Will show the startup & splash screen, detailing Button functions.

To exit the utility, press **Button4 Black**

Note:- You will probably find that the Laser barrel is not affixed to the pcb other than by its connecting wires. Adding a bit of hot-glue, or another suitable adhesive, will hold it in place.

Normal Use

After a few seconds, the display will change to the testing screen.



Testing screen

There are three columns. Each column will show the calculated exposure measurement from each of the three sensors.

The measured exposure is shown in milliseconds (0.001 of a second) to one decimal place.

The fractional value is then shown below

The last values, C2 & C1 show the time each curtain took to travel the 32mm or 20mm distance between the outer sensors, in milliseconds.

Each time the camera shutter is fired, the display will automatically update.

If 'B' appears in the top row of the LCD, it is indicating that shutter bounce has been detected.

H or V will be shown on the top row of the LCD, indicating horizontal or vertical shutter mode.

If 'F' appears in the top row of the LCD, it indicates that the camera flash-trigger was activated when first curtain fully opened and before the second started to close, thus Flash sync ok. Note:- This is measured between the two outer sensors, not the full width of the film gate. TFT & computer screen give a detailed timing analysis.

Pressing Button1 **White** will show the average of (up to) the last ten readings.

Pressing Button2 **Yellow** will clear all of the accumulated average readings.

Pressing Button3 **Green** will go to the Light-meter Utility

Pressing Button4 **Black** will go to the Alignment Utility.

Pressing Button5 **Red** will go to Optical LED Shutter Tester Utility.

Note:- Due to limitations of memory, error checking is limited. So strange readings may occur, for example fingers waved across the lasers or a seriously badly behaving camera is being tested.

Light-meter Utility

The Light-meter Utility will show the Lux light level and EV, based on 100 iso, in the range EV 0 to 16

The calibration value of the sensor is also shown. If the user has access to a calibrated Lux meter, calibration of the shutter tester light meter can be achieved by pressing button 2 **Yellow** or 3 **Green** to change the calibration figure between the value of 0.94 and 1.44. Default setting is 1.20

Note:- DO NOT use the lasers as a light source. The user will have to provide their own light. Maybe a dimmable LED light panel or a photographic continuous light. Note some LED panels are PWM (which cause flickering) rather than current controlled, so can create issues and cause continually changing values.

The tft shows an EV chart, based on 100 iso from EV 5 to 16. If the light-meter reading falls between 5-16, the corresponding EV row will be highlighted.

A full EV chart is included at the end of this document.

Pressing Button4 **Black** will exit the utility.

Pressing Button3 **Green** will increase calibration value

Pressing Button2 **Yellow** will decrease calibration value

Optical Shutter Tester

If the optional LED matrix has been added, it can be accessed by pressing the **Red** button.

The matrix will display the speed 1/30s and then start strobing a row of LEDs moving to each new row at 1/30s intervals.

Set The tester and camera to 1/30s.

When photographing, or looking through the film gate of a film camera, if the shutter speed is correct, two rows of LEDs should be seen. (If you press the shutter at the exact moment the LEDs strobe you will only see one line, but this will be a 1 in 30 chance at the slowest speed)

If more than two rows of LEDs are seen, it is an indication that the shutter speed is slow.

Pressing the **Green** button will increase the strobing speed to the next standard shutter speed. Each shutter speed can be tested in a similar manor.

For a digital camera, take a photo & review it. For a film camera, open the back of the camera and look through the film gate when taking a photo.

Note this method only gives an indication of the speed only.

TFT screen

Note:- Photos are of older Firmware which use Button numbers, rather than colours.

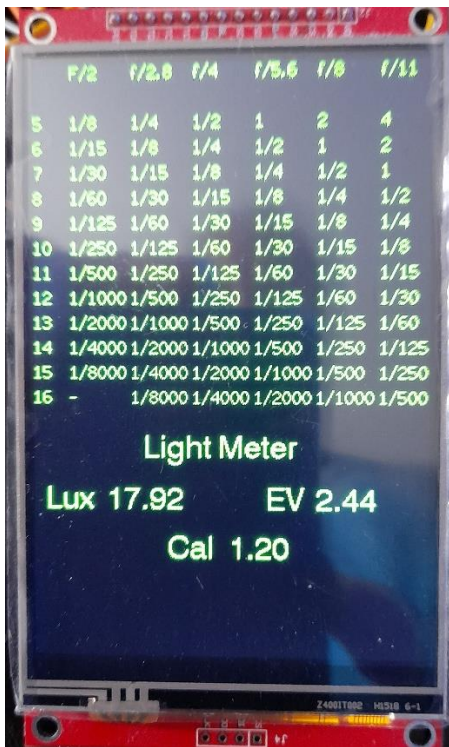
The TFT screen shows far more data than that of the LCD. It has a similar layout & display to that of the computer screen. Colour is used (green/yellow/Red) to indicate degree of error from the camera.

Detailed analysis is at the top, with a larger display, similar to the LCD at the bottom.

Additionally, this shows deviation from centre in fractional and stops.

Average screen (not shown) gives detailed analysis and displays the last 10 readings.





Computer Screen Display

Far more information can be displayed on the computer screen, than that of the LCD alone.

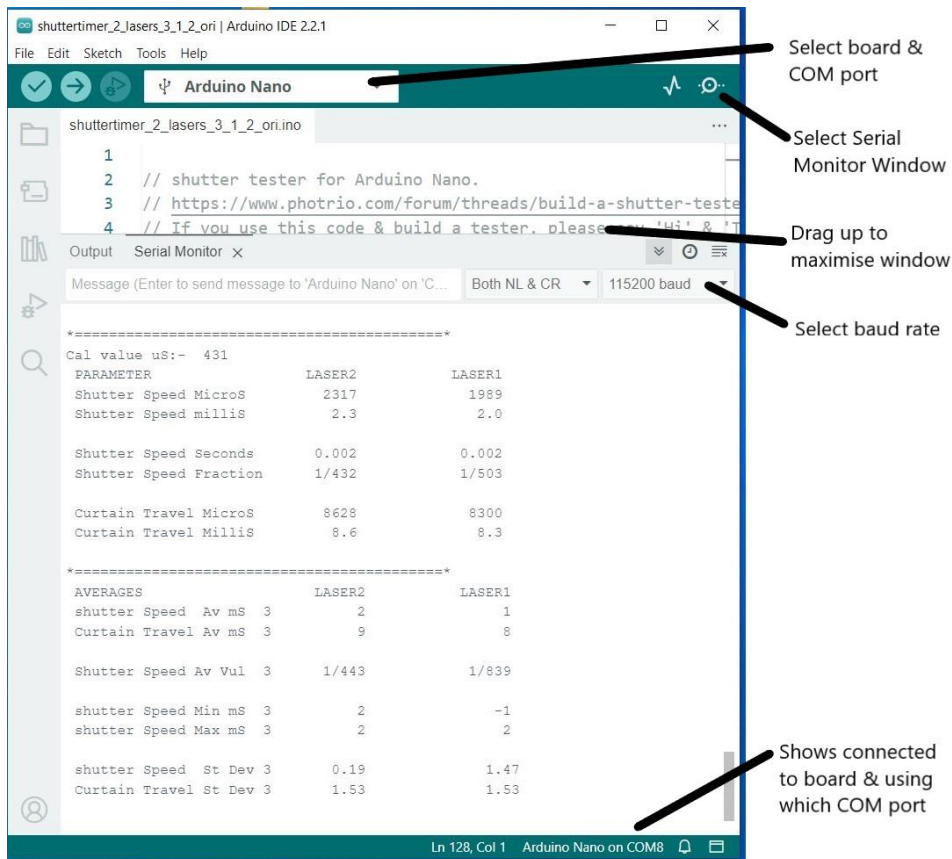
For this, a computer program called 'Arduino IDE' will be required. See separate document of how to install this program.

In the top drop-down box, select your board and com-port. Note:- a new install of Arduino IDE will not recognise an ESP32 board. Just select Nano.

Select 'Serial Monitor' by clicking the icon as shown.

The Serial Monitor window will be small, so drag the bar up, to make it larger

Select the correct baud rate of 460800 for Esp32.



The display follows a similar format to that of the LCD, but with more information.

Shutter bounces will be shown, as well as, if flash sync has occurred at the given speed.

Averages are updated and displayed. The number of cumulative tests used to calculate the average are shown (in this picture, 3 can be seen).

A maximum of ten individual tests are used to calculate the average. After this, the oldest is lost from the calculation and the latest reading added.

As with the LCD, pressing Button2 will clear the historic data and new averages will be calculated using new test data.

Link to a good web recourse for measuring light & EV

[Understanding Exposure Value, with calculator and EV chart \(including for third stops\) \(scantips.com\)](https://scantips.com/understanding-exposure-value-with-calculator-and-ev-chart-including-for-third-stops/)

The Standard EV chart of Full stops

EV	EV Chart of Full stops										EV
	f/1.4	f/2	f/2.8	f/4	f/5.6	f/8	f/11	f/16	f/22	f/32	
0	2"	4"	8"	15"	30"	64"	128"	256"	512"		0
1	1 sec	2"	4"	8"	15"	30"	64"	128"	256"	512"	1
2	1/2	1 sec	2"	4"	8"	15"	30"	64"	128"	256"	2
3	1/4	1/2	1 sec	2"	4"	8"	15"	30"	64"	128"	3
4	1/8	1/4	1/2	1 sec	2"	4"	8"	15"	30"	64"	4
5	1/15	1/8	1/4	1/2	1 sec	2"	4"	8"	15"	30"	5
6	1/30	1/15	1/8	1/4	1/2	1 sec	2"	4"	8"	15"	6
7	1/60	1/30	1/15	1/8	1/4	1/2	1 sec	2"	4"	8"	7
8	1/125	1/60	1/30	1/15	1/8	1/4	1/2	1 sec	2"	4"	8
9	1/250	1/125	1/60	1/30	1/15	1/8	1/4	1/2	1 sec	2"	9
10	1/500	1/250	1/125	1/60	1/30	1/15	1/8	1/4	1/2	1 sec	10
11	1/1000	1/500	1/250	1/125	1/60	1/30	1/15	1/8	1/4	1/2	11
12	1/2000	1/1000	1/500	1/250	1/125	1/60	1/30	1/15	1/8	1/4	12
13	1/4000	1/2000	1/1000	1/500	1/250	1/125	1/60	1/30	1/15	1/8	13
14	1/8000	1/4000	1/2000	1/1000	1/500	1/250	1/125	1/60	1/30	1/15	14
15		1/8000	1/4000	1/2000	1/1000	1/500	1/250	1/125	1/60	1/30	15
16			1/8000	1/4000	1/2000	1/1000	1/500	1/250	1/125	1/60	16
17				1/8000	1/4000	1/2000	1/1000	1/500	1/250	1/125	17
18					1/8000	1/4000	1/2000	1/1000	1/500	1/250	18
19						1/8000	1/4000	1/2000	1/1000	1/500	19
20							1/8000	1/4000	1/2000	1/1000	20
EV	f/1.4	f/2	f/2.8	f/4	f/5.6	f/8	f/11	f/16	f/22	f/32	EV