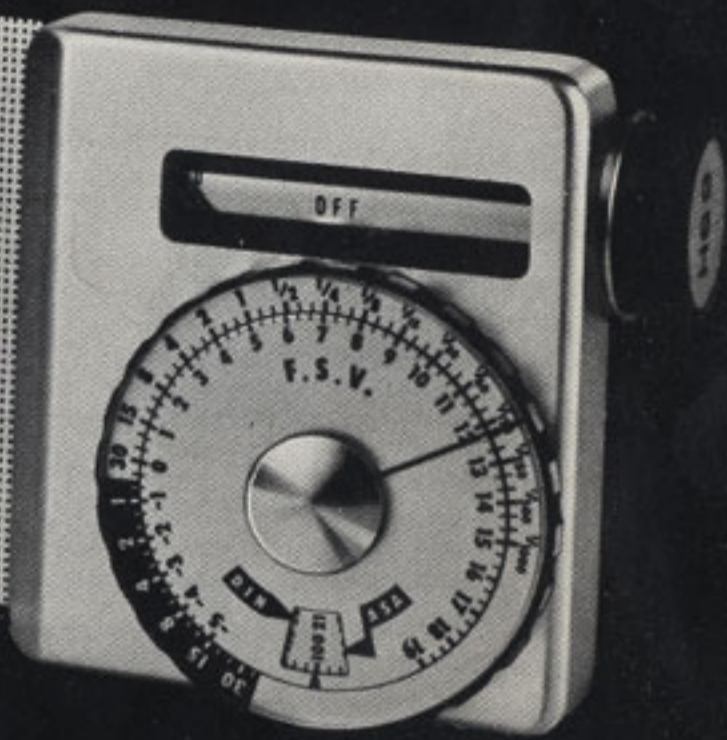


*Horseman*  
**OPTICAL EXPOSURE COMPUTER**



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# HOSEMAN OPTICAL EXPOSURE COMPUTER

## CHARACTERISTIC ELEMENTS

1. NAME: HORSEMAN Optical Exposure Computer
2. SENSITIVITY RANGE OF SENSITIVE MATERIAL
  - DIN 6 - 42
  - ASA 3 - 12000
3. THE INDICATING RANGE OF A METER NEEDLE  
F.S.V. 2 - 16
4. MEASURING METHOD

Measures the light values falling over the entire film surface after passing through the lens.

Computes a correct exposure time for the various diaphragm and shutter speed settings on the camera.
5. CAMERAS WHICH WILL ACCEPT OPTICAL EXPOSURE COMPUTER.

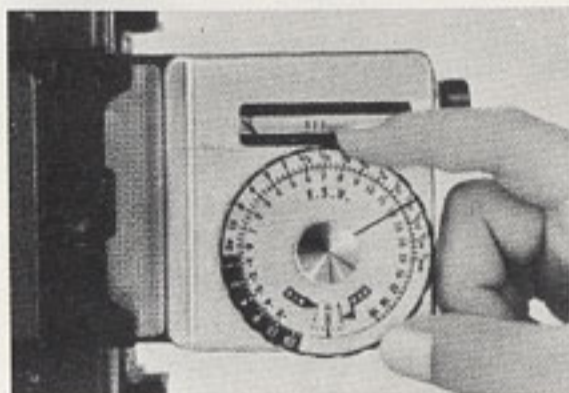
All cameras that meet with international standard 6 x 7cm., 6 x 9cm. size backs.  
(Also available in 4 x 5 camera with the optional accessory.)
6. MEASURING DIAL Switch with 6 graduations.
  - (1) F.S.V. 2, 3, 4, 5, 6
  - (2) F.S.V. 6, 7, 8, 9, 10, 11
  - (3) F.S.V. 10, 11, 12, 13, 14, 15, 16
  - (4) OFF
  - (5) Battery check for A battery
  - (6) Battery check for B battery
7. LIST OF NUMERICAL VALUES.
  - (1) Shutter speed values;  
30, 15, 8, 4, 2, 1, minute 30, 15, 8, 4, 2, 1, 1/2, 1/4, 1/8, 1/15, 1/30, 1/50, 1/125, 1/500
  - (2) Value of F.S.V.  
-5, -4, -3, -2, -1, 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19
  - (3) Value of sensitivity-graduation  
DIN: 6, 9, 12, 15, 18, 21, 24, 27, 30, 33, 39, 42  
ASA: 3, 6, 12, 25, 50, 100, 200, 400, 800, 1600, 3200, 6400, 12000  
\*1/3 graduation marks are marked between continued values of each (1), (2) and (3).
8. BATTERY REQUIRED.
  - (1) A battery: 5.2 V. Mercury battery Toshiba 4MC(Y) or Mallory TR-114R (Y)
  - (2) B battery: 1.3 V. Mercury battery Toshiba MK(Y) or Mallory TR-640R(Y)
9. OUTSIDE DIMENSION.

Sensitive plane: 55mm x 82mm  
Body: L. 211mm, H. 78mm, D. Max. 42mm Min. 14mm
10. WEIGHT  
Body with batteries: 400 gr.

## GENERAL DIRECTION FOR USE

### \*First

Adjust the focus of camera at subject. Open the shutter. After the cocking lever is cocked and the focus lever is pulled out, the shutter will be opened fully. (Remarks: When the rangefinder is used for focusing the shutter must be opened before using the computer.) Focus accurately, make any necessary swings and tilts or bellows extension for close-up or micro-photography before making exposure reading. The lens diaphragm may be either fully open at any desired f/stop.



### \*Second

Put the sensitivity value of the film to be used in the window (K5) on the round dial. The sensitivity value of the film in use can be aligned in the graduation window, by revolving the adjusting dial (K9). (round dial with sensitivity values written on it, ASA in red letters DIN in black letters.)

When the film used has a sensitivity value not shown on the printed graduations of (K9) eg. ASA - 40, 64 or 80, refer to Table 1, for equivalent intermediate film speeds expressed in 1/3 of an f/stop increments.

Table 1. - Film speeds in 1/3 f/stop increments

DIN	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42			
ASA	3	4	5	6	8	10	12	16	20	25	32	40	50	64	80	100	125	160		
	200	250	320	400	500	640	800	1000	1250	2600										
	2000	2500	3200	4000	5000	6400	8000	10000	12000											

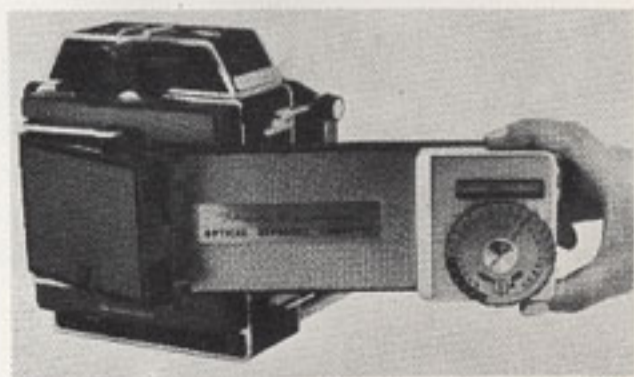
Each mark represents 1/3 of an f/stop, thus intermediate speeds are achieved by referring to the table and setting to the correct mark.

Table 1.



### \*Third

Insert the Optical Exposure Computer into the camera back. Lift up the one side of the Groundglass frame. Insert the Optical exposure Computer gently. Light acceptance plane faces to the camera lens in a manner similar to a sheet film holder.

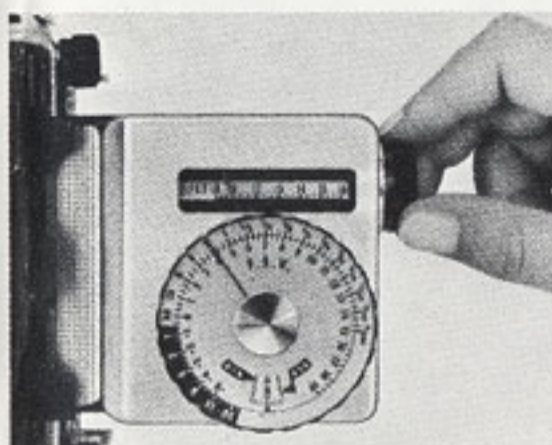


#### \*Fourth

Measure the F.S.V. value

Rotate the switch knob (M6) of the dial toward you (counter clockwise) The dial with for F.S.V. 10 – 16 (low sensitivity) will appear in the window (M1).

Next click the F.S.V. 6 – 11 (medium sensitivity). In the last click the F.S.V. 2 – 6 will appear (high sensitivity). When the needle of the meter (M2) does not reach the F.S.V. 10 on the F.S.V. 10 – 16 dial, the dial must be changed to the next higher 6 – 11.



If the reading is too low and needle fails to indicate, move range switch to next higher sensitivity, eg. from 6 – 11 to 2 – 6 for low light level situations. Select the f/stop desired and make your exposure readings. If the light is too dim for the f/stop you desire to use, open up the lens or refer to the procedure described under 'methods for applied use'.

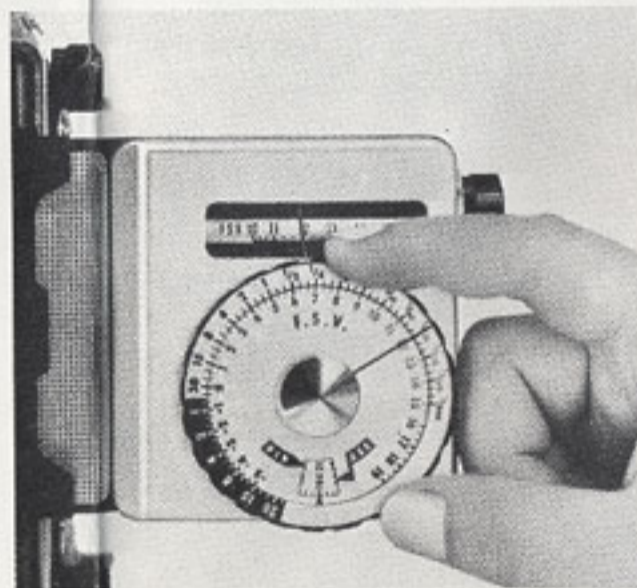
Select the range that keeps the needle within the marked graduations. The bigger F.S.V. is for high illumination and the smaller F.S.V. shows lower illumination.

#### \*Fifth

Search and pick the correct shutter speed value

The transparent plastic dial with green line (K8) is revolved until it is aligned with the F.S.V. light value indicated by the meter. The shutter speed indicated by this green line will give correct exposure.

If a shorter shutter speed is desired eg. 1/30 to 1/60, open the lens diaphragm until the F.S.V. value on the meter corresponds to the desired shutter time. Conversely closing down the lens will give a lower F.S.V. value and call for a longer shutter speed eg. 1/125 to 1/60th.



## IMPORTANT PROCEDURES FOR USE

- (1) If the Optical Exposure Computer is in darkness (case) for a long time without use, expose the Exposure Computer briefly to light so that the needle of the meter operates between F.S.V. 10 – 16. By rotating the switch knob counter-clockwise while meter is in camera with lens fully open and camera pointed at well lit object such as a window accomplish this.
- (2) If the needle goes beyond the limits of graduation value F.S.V. 16 on the first click, the lightness range is too great for the meter. Close the diaphragm as the light is too bright for low sensitivity range of meter.
- (3) If the light is too dim and the needle will not reach F.S.V. 2 at the desired f/stop setting, alternative reading can be taken by first increasing the lens diaphragm opening until sufficient light falls on the cell for a reading. To calculate the correct exposure time at a lower f/stop reading, the minus F.S.V. values (shown in black) can be used.

Table 2 shows F.S.V. values on the top line and corresponding f/stop values on the bottom. By counting the number of f/stops required to obtain a useful meter reading, and then counting down from that reading by an equal number of F.S.V. values, a correct exposure can be determined for the lower f/stop desired.

For Example:

Desired lens diaphragm f/22 (meter does not read)  
 lens diaphragm f/4 (meter reads F.S.V. 2)

Consulting the table we see that there are 5 f/stop moves required to go from f/4 to f/22 eg. 5.6, 8, 11, 16 and 22.

Counting downward from F.S.V. value 2 (obtained at the f/4 diaphragm opening) we have corresponding F.S.V. 1, 0, -1, -2, and -3 for a total 5. The correct F.S.V. value for f/22 diaphragm setting -3.

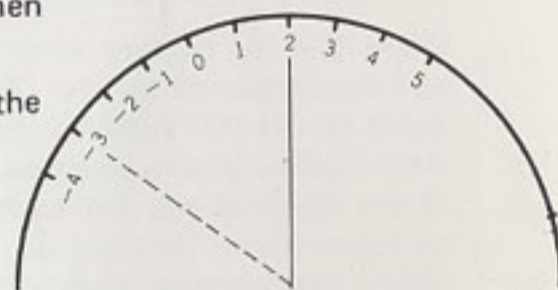
Consulting the meter calculator dial at F.S.V. -3 would indicate the correct exposure time. The times shown as Black on a silver field are seconds fractions of a second, and White on a black field as minutes. Thus if we had to move the diaphragm up scale 4 f/stop to obtain a reading, we can count down on the F.S.V. table by the same number or moves to obtain the correct shutter speed at the desired f/stop.

Table 2.

1.12	1.25	1.58	1.76	2.3	2.5	3.1	3.5	4.5	5	6.3	7	9	9.8	12.7	13.8	17.9	19.5	25.3	27.8	35.8	40
1	1.4	2	2.8	4	5.6	8	11	16	22	32	45										
1.18	1.7	2.4	3.4	4.8	6.8	9.5	13	18	25.4	37.8											

- (4) When the photography has strong contrast such as pure white and deep black it is best to move the camera so as to take selective readings for lightest and darkest and then average the two.
- (5) A CDS cell requires a certain time to 'settle' to arrive at the correct reading. On the various sensitivity ranges this is;

F.S.V.	2 – 6	.....	20 sec.
F.S.V.	6 – 11	.....	5 sec.
F.S.V.	10 – 16	.....	5 sec.



## THE METHODS OF APPLIED USE

The methods of general use are explained up to here, and other applied methods will be described here;

### TO PRE-SELECT A DIAPHRAGM SETTING

In the case of taking a photograph after first having determined the lens-diaphragm setting that the photographer wants to use;

After focusing the lens, set the determined lens-diaphragm opening and insert the Optical Exposure Computer into the camera.

Open the shutter. The F.S.V. value that appears on the relevant F.S.V. scale is matched with the shutter speed.

### TO SELECT A SHUTTER SPEED

In the case of taking a photograph after having determined the shutter speed value that the photographer wants to use:

Insert the Optical Exposure Computer into the camera gently and operate the diaphragm lever until the meter needle indicates the F.S.V. value which correspond to the shutter speed value that you want to use. The diaphragm is now set correctly for that shutter speed.

### TO SELECT BOTH SHUTTER AND F/STOP

In the case of having determined both the shutter speed and lens diaphragm value:

Insert the Optical Exposure Computer into the camera gently. Set the green indicator needle at the lens diaphragm value and shutter speed that you want to use. Adjust the light source by changing its position to achieve the correct light intensity.

The exposure will be correct when the F.S.V. value matches the desired f/stop - shutter speed combination.

## ALLOWABLE:

- (1) Errors in measurement.

F.S.V. 2 - 6  $\pm 1/2$  F.S.V.

F.S.V. 6 - 16  $\pm 1/3$  F.S.V.

The above tolerances are within the manufacturing tolerance of the meter. For more precise determination users should test with the particular film, lighting and processing combination to be used.

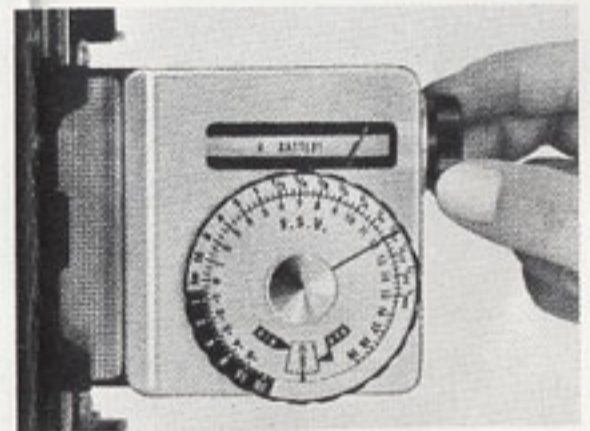
- (2) Before measuring with the Optical Exposure Computer to check the condition of both the 'A' and 'B' batteries. Both the 'A' and 'B' batteries are checked by rotating its knob clockwise. If the needle does not reach the red mark, the battery would have to be changed for new one. (effective life of the mercury battery is about one year)

'A' battery is designed for measuring F.S.V. 2 - 6 ranges.

'B' battery is designed for measuring F.S.V. 6 - 16 ranges.

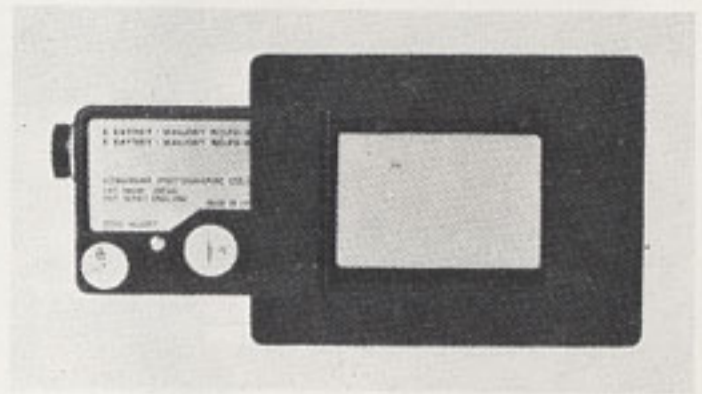
When the 'A' battery were exhausted and unable to measure, the F.S.V. value 6 - 16 would still be measured by the 'B' battery. Should the 'B' battery be exhausted, the F.S.V. 2 - 6 value would still function powered by the 'A' battery.

- (3) Any sudden shocks must be avoided on the Optical Exposure Computer.  
(4) If the sensitive cell (light acceptance plane) is left in strong light for a long time, the length of effective life of the light acceptance material CDS is shortened considerably.  
(5) Avoid high temperatures and humidities in storage of the Optical Exposure Computer.



- (6) The Optical Exposure Computer is usable with the following cameras:
- a) HORSEMAN 760, 960, 970 and 980
  - b) Linhof Technica 70
  - c) Linhof Colour 6 x 9
  - d) Linhof Press 70
  - e) Linhof Expert 6 x 9
  - f) Century Graphic 2" x 3"
  - g) Mamiya Press

In general it fits any camera that accepts the international standard 2" 1/4 x 3" 1/4 sheet film holder. With optional Horseman 4" x 5" adapter for meter it can be usable with any 4" x 5" view cameras.



- (7) Always turn meter OFF when not in use. The batteries are rapidly exhausted if the meter is left on for long periods of time.

## INTERCHANGING BATTERIES

Use a coin to unscrew cover of 'A' and 'B' batteries. Pull out the exhausted battery from its chamber and then insert the new one. The negative (-) terminal of each battery should face downward and (+) terminal towards you as batteries are inserted.

'A' battery ..... 5.2 V. Mercury battery

Toşhiba 4MC(Y)

Mallory TR-114R(Y)

'B' battery ..... 1.3 V. Mercury battery

Toşhiba MK(Y)

Mallory TR-640R(Y)

## ZERO ADJUST

The switch knob of the F.S.V. (M6) must be on OFF.

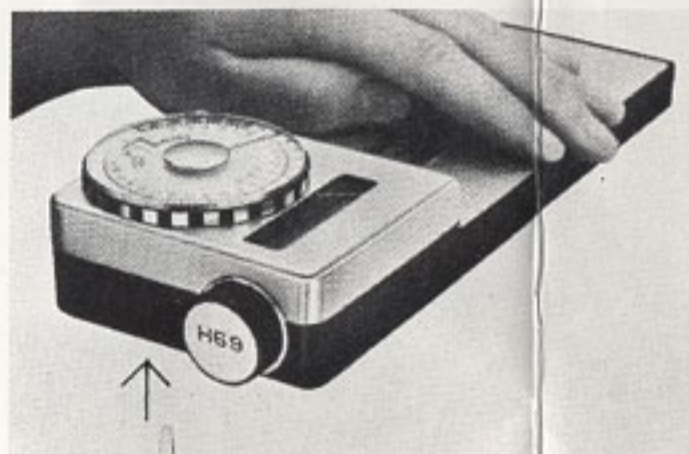
Keep the Optical Exposure Computer flat on a desk as in the picture. With a small screw driver turn the screw of ZERO adjuster gently to the right or left until the needle of the meter comes to the original ZERO mark.

- (8) Selection of film speed.

The calibration of this meter is made to current recommendations of film manufacturers. Should negatives be consistently denser or lighter than desired, a higher or lower film speed may be used. Factors that affect this selection are:

- a) processing technique of film.
- b) type of printing equipment used eg. Condenser enlarger VS diffusion.
- c) personal preferences.

See Table 1 for equivalent film speeds expressed in 1/3 of an f/stop increments.



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