

QUANTUM CALCU-FLASH

OPERATING INSTRUCTIONS

1. INTRODUCTION

This manual is your guide to operating Calcu-Flash. Please read it completely to understand fully the unique capabilities of your instrument. Refer to diagrams 1 & 2 throughout this manual.

There are three operating controls:

- **ON/RESET**
- **TRIGGER**
- and
- **MEMORY**

Three turrets are supplied. Two are for incident light and one is for reflected light. The calculator dial provides f-stop, film speed, light value, and shutter speed.

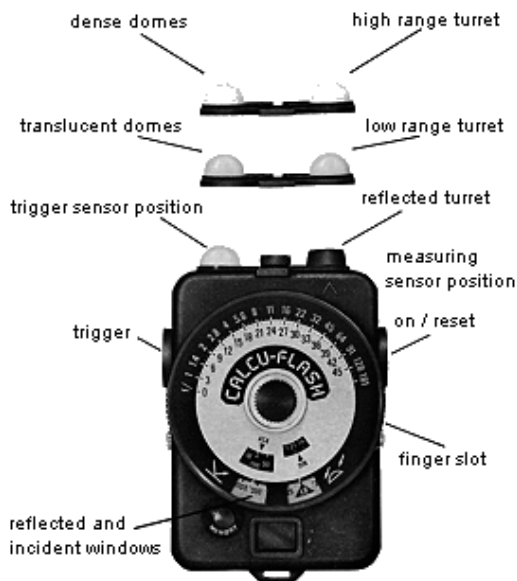


Diagram 1

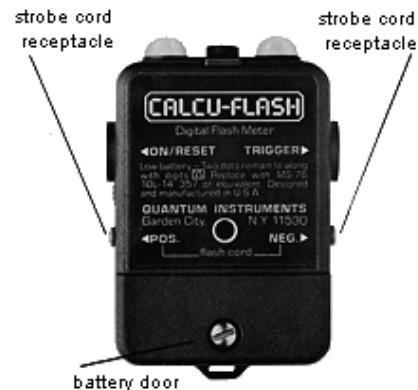


Diagram 2



2. SELECTING AND SETTING A LIGHT TURRET

For reflected light, use the reflected turret with the lens mounted over the inverted V mark on the Calcu-Flash housing.

For incident light use either the high (marked HI) or low (marked LO) range incident turret.

To mount a turret, first turn the turret thumbscrew counter-clockwise until free. Put the desired turret on Calcu-Flash and replace the thumbscrew. Use only light pressure to tighten.

3. SETTING FILM SPEED

First, rotate the outer dial rim until the reflected  and incident  symbols lie on either side of the digital display window. This exposes the film speed dial in the finger slot on the right hand side of Calcu-Flash.




Next, place your index finger into the slot and your thumb on the dial rim. Squeeze the rim and dial together and turn them. The ASA and DIN numbers will change to new values. If the desired value is not reached, reset the rim to its original position, and again, rotate the rim and dial.

See **Specifications** for the exact designations of film speed dot markings.




4. SELECTING INCIDENT LIGHT MODE

Select one of the incident turrets, and place Calcu-Flash at the subject position. Point the centers of the diffusing domes toward the camera, as in diagram 3.

Flash Measurements

Set the incident window  pointer to  for the low range turret, or to  for the high range turret. The f-numbers on the outer dial scale now correspond to digital flash readings 0 to 45 on the inner scale.

Continuous (steady) Light Measurements

Use the low range turret and set the incident window  pointer to one of the shutter speed settings from 1/2000 to 1/2 second. The  symbol equals 1/60 second. When the high range turret is required, set the pointer to  only, representing 1/60 second.

The f-numbers on the dial now correspond to digital **exposure** readings 0 to 45 on the inner dial, for the selected camera shutter speed.

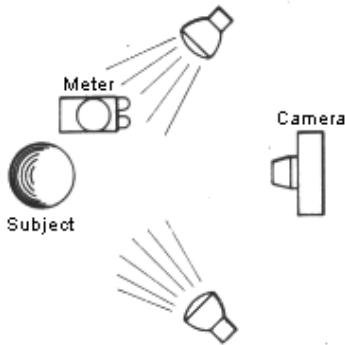




Diagram 3- Incident Light Reading



5. SELECTING REFLECTED LIGHT MODE

Mount the reflected light turret on Calcu-Flash with the lens over the inverted V mark. Aim the lens at the subject from the camera position as in diagram 4. The lens measures over a 30° angle.

For Flash Measurements

Set the pointer of the reflected  window to  only. The f-numbers on the outer dial now correspond to digital flash readings 0 to 45 on the inner scale.

For Continuous Light Measurements

Set the reflected window  pointer to one of the camera shutter speed settings, or  for 1/60 second. The f-numbers now correspond to the digital **exposure** readings 0 to 45 on the inner dial, for the selected camera shutter speed.

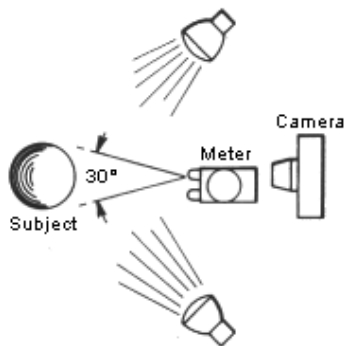


Diagram 4 - Reflected Light Reading

6. TAKING A FLASH MEASUREMENT

Cordless Operation

Press the **ON/RESET** control. A **00** will appear momentarily in the digital display window. Calcu-Flash is now "ready" to measure a flash, and will remain so for at least one minute.

Aim Calcu-Flash in the required direction and fire the strobe(s). A digital reading will appear momentarily in the display window. It can be instantly recalled by pressing the **MEMORY** control.

To make an accumulated reading of a series of flashes, simply fire the strobe(s) again. The additional light energy will be added to the previous digital reading and displayed. It, too, can be recalled with **MEMORY**.

Wired Operation

First, connect the flash cord (supplied) between Calcu-Flash and the strobe units, **before energizing them**.

Next, energize the strobes. Push the **ON/RESET** control. Then push **TRIGGER** to fire and measure the strobes. If the strobes did not fire, try the other flash cord receptacle on Calcu-Flash (pos. or neg.). Take accumulated measurements as in the cordless mode.

Dials

Translate the digital flash readings to the corresponding f-numbers on the dials. It is not necessary to rotate the dials for flash readings once they are set according to the previous instructions specified in sections 3, 4, & 5.

Note that all line markings on the dials are one Ev (or stop) apart. Dot markings are 1/3 stop increments. The digital readings 0 to 45 are a sequence of light values in 1/3 stop increments.

Notes The **ON/RESET** control cancels previous readings and activates the one minute timer in Calcu-Flash. Thereafter, when another function is exercised, the one minute timer is re-activated. (This includes **MEMORY**, **TRIGGER**, or remote flash sensing). Accumulated flash readings that require a long period of time can easily be accomplished. Simply space the strobe burst less than one minute apart, or use **MEMORY** occasionally.

When Calcu-Flash senses a flash or when **TRIGGER** is pressed, a measuring "gate" of 1/60 second duration is opened. Flash plus ambient light energy are measured when the gate is open. Since flash energy normally dominates, the camera shutter speed is insignificant. Whenever ambient light contributes significantly to the overall illumination, refer to the **Fill Flash** section of this manual.

7. TAKING CONTINUOUS LIGHT READINGS

Select the incident or reflected light mode. Press the **ON/RESET** control to activate Calcu-Flash. Then press the **TRIGGER** control **once** to take a reading. To take a new measurement, first cancel the previous reading by pressing **ON/RESET**.

Set and read the dials as explained in sections 4 and 5.

8. CONSIDERATIONS FOR GOOD MEASUREMENTS

When measuring flashes, be sure to allow all strobe units to recycle completely before firing them. Otherwise, you may not supply an equal amount of light energy when repeating the process for the actual picture exposure.

In addition, check occasionally that your strobes emit consistent flash energy. Measure single bursts from a fixed position and compare digital readings. Significant irregularities will be apparent because each Calcu-Flash digital reading is 1/3 Ev (Exposure Value, or stop) from the next.

Photographers often use accumulated flash to provide enough exposure for a specifically desired f-number. In that case it helps first to set the dials of Calcu-Flash to the proper mode. Read the digital value on the inner dial corresponding to the desired f-number on the outer dial. Then, fire the strobe(s) until that digital value is measured. Finally, repeat the required number of flashes for the actual picture.

9. FILL-FLASH APPLICATIONS

Fill-Flash is the technique of adding strobe lighting to existing continuous lighting to achieve desired emphasis or highlighting of certain subjects. A simplified method for determine flash-to-continuous lighting ratios requires two readings.

First, measure continuous (ambient) light with Calcu-Flash. Next, measure flash energy (which includes ambient light). Take both readings in the same mode, preferably incident light. Notice **digital** light value difference between the two readings. Adjust the continuous or strobe lighting to obtain different ratios, if necessary.

Use table 1. Table 2 lists the required exposure compensations that must be applied to the flash readings.

FILL FLASH LIGHTING RATIOS						
(Table 1)						
Digit Difference (Between flash & continuous readings)	Ratio-flash: continuous					
	1/15	1/30	1/60	1/125	1/250	1/500
1	1:16	1:8	1:4	1:2	1:1	2:1
2	1:7	1:3	1:2	1:1	2:1	5:1
3	1:4	1:2	1:1	2:1	4:1	8:1
4	1:3	2:3	3:2	3:1	6:1	12:1
5	1:2	1:1	2:1	4:1	8:1	16:1
6	3:4	3:2	3:1	6:1	12:1	24:1
7	1:1	2:1	4:1	8:1	16:1	
8	4:3	5:2	5:1	10:1	20:1	
9	2:1	4:1	7:1	14:1		
10	2:1	4:1	9:1	18:1		

FILL FLASH COMPENSATION CHART	
(Table 2)	
Digit Difference	Exposure compensation (in stops)



	1/15	1/125	1/250	1/500
1	-2	+2/3	+1 1/3	+1 2/3
2	-1 1/2	+2/3	+1	+1
3	-1 1/3	+1/3	+2/3	+2/3
4	-1	+1/3	+1/2	+2/3
5	-1	+1/3	+1/3	+1/2
6	-2/3	0	+1/3	+1/3
7	-2/3	0	+1/3	+1/3
8	-1/2	0	0	+1/3
9	-1/3	0	0	0
10	-1/3	0	0	0

10. CALIBRATED MEASUREMENTS

Incident Flash Power

Calcu-Flash will measure and read lux-seconds (or footcandle-seconds) directly on its dial.

Low Range

Select the low range incident turret. Set the DIN pointer to the yellow "12" on the film speed dial to read out lux-seconds. Turn the dial rim completely around until the yellow numbers (on black background) appear next to the digital number scale. Take a measurement. Read the correct lux-second value corresponding to the digital reading on the inner dial scale. (The incident  and reflected  windows are irrelevant).

For footcandle readings, set the ASA pointer to the yellow triangle next to ASA 1.5. Measure and read as explained above.

High Range

Select the high range incident turret. Set the DIN pointer to the silver triangle next to DIN 30 for lux-second readings. Set the ASA pointer to the silver triangle at ASA 100 for footcandle-second readings.

Strobe Power Output (BCPS)

BCPS (beam-candlepower-seconds) is useful because it rates true light energy output instead of the electrical input power (watt-seconds) of a strobe.

To measure BCPS, place Calcu-Flash exactly 3.16 meters from the strobe. Measure lux-seconds and multiply the value obtained by 10. The result is BCPS, and it is independent of distance.

(Another method: place Calcu-Flash 10 feet from the strobe; read footcandle-seconds; multiply it by 100. The result will be the same).

True BCPS measurements require a test area in which reflections from walls, ceiling, and floor are minimal. A flat diffuser accessory, DX-1, is also recommended for absolute accuracy.

Strobe beam pattern

Calcu-Flash checks strobe beam angular coverage and uniformity. Take incident readings at various angles, but keep constant the distance to the strobe. The differences between digital readings are the variations, in steps of 1/3 Ev, in the strobe beam. A DX-1 attachment is also recommended.

Guide number calculator

Take an incident flash reading for which ambient light is not a factor. Multiply the distance to the strobe by the f-number to obtain the guide number (for the particular film speed setting) of the strobe.

11. USEFUL INFORMATION

Measuring limits of Calcu-Flash

The digital display reads from **01** to **44** for measurements on the high or low range. When a single flash reading exceeds **30** on the low range, switch to the high range turret for best accuracy. However, multiple flash measurements can be **accumulated** to **44** with full accuracy on either range.

The above restriction does not apply to continuous light readings.

When the display reads below **10** and succeeding flashes are to be accumulated, take your readings quickly. That will assure maximum accuracy.

Measuring speed and color sensitivity

Through confirmed laboratory test, Calcu-Flash has been shown to measure accurately the fastest thyristor strobes (1/50,000 second). Furthermore, the blue-enhanced photodiode of Calcu-Flash is color corrected to match closely the color sensitivity of film emulsions.

When measuring thyristor strobes, remember that their light sensors read reflected light. They are sometimes "fooled" by subjects of especially high or low reflectance. Some automatic strobes use uncorrected sensors that make occasional exposure errors due to subject color. Calcu-Flash avoids these pitfalls, and its incident light exposure readings are more reliable and accurate.

Diffusing dome size

It is a common misconception that the size of an incident light diffusing dome affects an instrument's sensitivity and accuracy. Actually, only the geometry (i.e. hemispherical) of the diffuser, its density, and its color transmission characteristics are important. A large dome intercepts more light but only a small part of it reaches the light sensor inside. A smaller dome intercepts less light but a greater portion of it eventually reaches the sensor.

Care of the dial

To clean the dials, first turn the dial thumbscrew counterclockwise until it is free. Remove the clear dial cover. Use a moist, cotton tipped swab and rotate the dials to reach all areas. To replace the clear dial take note of the alignment slots. Tighten the thumbscrew clockwise.

Miscellaneous

When using the tripod mount, tighten the thread with no more than light pressure. Calcu-Flash is extremely light and does not need excessive clamping force.

The circuits used to trigger strobes in the wired mode will withstand up to 350 volts. That is sufficient for all common strobes. If your equipment has a trigger voltage (not supply voltage) greater than 350 volts, you must use Calcu-Flash in the cordless mode.

12. BATTERIES

When the batteries are weak two dots appear above the digits in the Calcu-Flash display. When they first appear there is still enough power for many readings. When they appear **before** the digits appear, the batteries must be changed.

To do so, remove the battery door by turning the battery door screw counterclockwise with a coin. Handle the new batteries with tissue paper. Insert them and observe proper polarity. Replace the battery door and tighten the screw.

Push **ON/RESET**. If the battery indicators appear, wipe the batteries and contacts with tissue paper to remove

grease or dirt. Occasionally, new batteries must be used for a short time before the indicators will turn off.

Cold temperatures will sometimes cause the battery voltage to drop and the indicators to turn on. That does not mean, necessarily, that the batteries need to be replaced.

13. USING ATTACHMENTS

SX-1 spot attachment

This attachment measures a 10° angle for reflected light, compared to 30° for the standard reflected mode. No compensations are necessary. Use the reflected \sphericalangle window pointer of the dial.

CFX-1 and 2 filter attachments

These accessories provide for filtered light measurements. The filters supplied are standard photographic types. CFX-1 contains the 80B, 85B, 25A, 8, and 4x (neutral density) filters. CFX-2 comes with the 81A, 82A, 11 and 21 filters. All common filter types are additionally available separately. CFX-1 is the basic set that contains a special turret for mounting the filters.

Now, when using a particular filter on a camera, the same type can be mounted on the meter. Filter factors, and their variations due to color temperature of light sources, can be dispensed with. Use the reflected \sphericalangle window pointer.

FOX-1 fiber optic probe

This accessory measures reflected light values of 1/8 inch (3 mm) diameter areas on focusing screens, ground glass, light tables and other luminant objects. It permits exact readings of scene contrast, and serves as a densitometer for negatives and transparencies with a resolution of 0.1 density units. Use the reflected window \sphericalangle pointer. Additional information is supplied in the FOX-1 instructions.

DX-1 flat diffuser

The purpose of the flat diffuser attachment is to make calibrated illuminance measurements and contrast measurements with studio lighting. Its applications are better described in the CALIBRATED MEASUREMENTS section. Consult your photographic dealer for recent additions to the Calcu-Light/Calcu-Flash digital light measurement system.

14. SPECIFICATIONS

Model: Calcu-Flash.

Capabilities: Strobe and continuous integrated light measurements of incident and reflected light.

Readout: Two digit L.E.D. display of light value in 1/3 Ev sequence, 00 to 44. Accuracy: 1/3 Ev.

Sensor: Blue enhanced silicon photodiode.

Light Acceptance Angle: 30° for reflected, 180° incident, plus various angles with attachments.

Trigger: Light sensing trigger for remote, or manual trigger with push-button.

Trigger Speed: 2 microseconds (.000002 sec.).

Measuring Gate Time: 1/60 sec.

Output: Jack and cord for firing flash units. Dual polarity. Fires on manual or remote trigger.

Measuring Range (flash):

Incident light 2.2 to 3,500,000 lux-sec.

0.2 to 320,000 footcandle-sec.

Reflected light 0.96 to 20,000 candela-sec./m²

0.28 to 5,800 footlambert-sec.

Measuring Range (continuous light at ASA 100):

Ev 6 to Ev 26, incident light

Ev 9.3 to Ev 23.3, reflected light.

Dial Markings: ASA 0.05 to 800,000

DIN: (-12 to 60)

Shutter: 1/2000 to 1/2 sec. (for continuous light)

F#: 1.0 to 181

Units: 0.4 to 800,000 in units of fc.-sec. or lux-seconds

Batteries: Mallory MS-76, 10L14, Ray-O-Vac RS-76, RW-22, RW-42, Eveready S-76, 357, or equivalents.

Size: 10 x 7 x 3 cm (4 x 2 3/4 x 1 1/4 inches).

Weight: 126 grams (4.5 oz.).

Supplied With: Instrument with 1/4-20 tripod thread, flash cord (approx. 16' or 5m), instruction manual, low range turret, high range turret, reflected light turret, batteries, accessory case, and neck strap.

Specifications Subject to Change Without Notice

15. Intermediate Film Speed Markings

The DIN scale is marked in steps of 3 (0, 3, 6,...48). Intermediate markings (dots) are whole numbers, i.e., 0 1 2 3 4 5 6 ... etc.

The ASA scale shows only the bold type values listed below. The intermediate values are marked by dots on the dial scale.

0.8 1.0 1.2 **1.6** 2.0 2.4 **3.0** 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 1200 **1.6M** 2000 2500 **3.2M** 4000 5000 **6.4M**
8000 10,000 **12M** 16,000 20,000 **25M** 32,000 40,000 **50M**

Ultra-High Film Speed Markings

Use the DIN scale pointer. There are four undesignated line markings to the left of DIN 48. They are DIN 51, 54, 57, 60. These correspond, respectively, to ASA 100,000, 200,000, 400,000, and 800,000.

Ultra-Low Film Markings

Use the ASA scale pointer. There are four undesignated line markings to the right of ASA 0.8. They are ASA 0.4, 0.2, 0.1, 0.05. They correspond, respectively, to DIN -3, -6, -9, and -12.

F-Number Markings

The f # scale is marked with the bold type values below. The intermediate values correspond to the dots on the dial, with the exception of f/0.7 and f/181, which correspond to lines. 0.7 0.8 0.9 **1** 1.1 1.3 **1.4** 1.6 1.8 **2** 2.2 2.5
2.8 3.2 3.6 **4** 4.5 5 **5.6** 6.4 7.1 **8** 9 10 **11** 13 14 **16** 18 20 **22** 25 29 **32** 36 40 **45** 51 57 **64** 72 81 **91**
102 114 **128** 144 161 181

A NOTE ON BATTERIES

To insure daily trouble-free performance of your meter, proper care must be given to the batteries and the battery compartment.

1. Clean batteries - use clean tissue paper and rub gently. Handle batteries with tissue paper, not fingers, after cleaning. When meter is left unused for extended period, remove batteries (do not stack).
2. Clean battery contacts use clean tissue paper with alcohol, or pencil eraser. Clean all four contacts at the bottom of the battery compartment.
3. Gently clean all four springs on the battery door.

The above procedures should also be followed before replacing old batteries with new ones and before you return meter to factory for repair, or if batteries appear to be weak.