

SPECTRA®

THE INDUSTRY STANDARD

Professional IV-A OPERATING INSTRUCTIONS



SPECTRA CINE SERVICES



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FOREWORD

Congratulations!

You now own the SPECTRA PROFESSIONAL IV-A exposure meter from SPECTRA CINE RESEARCH CORPORATION - One of the world's most advanced exposure meters. Using advanced micro-computer technology, state of the art solid state integrated circuitry, and liquid crystal display with digital (numeric) and Analog (bargraph) LCD scale, the meter reads Incident and Reflected light directly in f/stops, footcandles or lux and instantly calculates the f/stop difference, contrast ratio and average of your particular lighting situation. The multiple channel memory enables you to recall the stored measurement, current measurement, f/stop difference, contrast ratio and average. The meter covers a sensitivity range of almost One million to one.

This manual has been prepared to enable you to get optimum performance from your new meter. The information set forth in this manual will serve you over the years, and the few minutes you invest now to acquaint yourself with its contents will reap rewards for you throughout the life of your instrument.

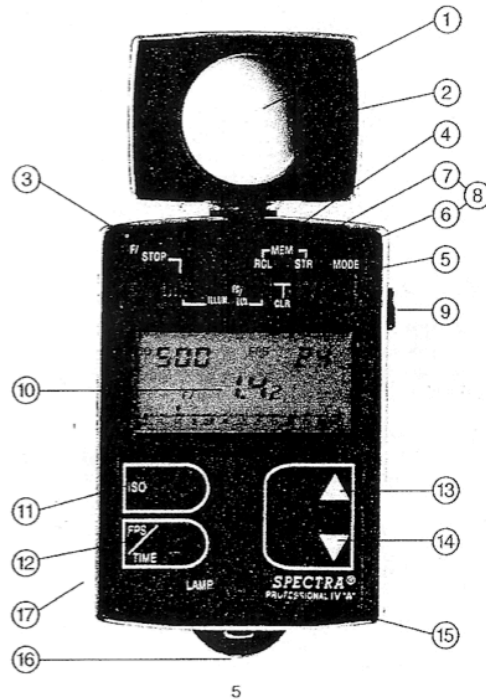
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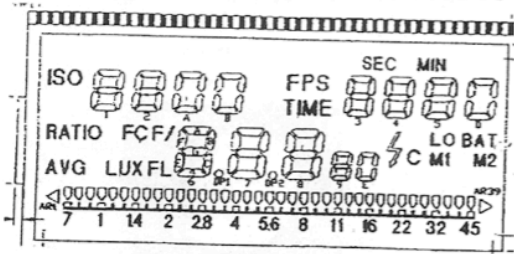
PARTS DESIGNATIONS

1. Photosphere or Photodisc
2. Swivel Head 280 degrees
3. f/stop, Illuminance Switch
4. Footcandles/ lux switch
5. Mode selection Ratio, Average, Normal.
6. Memory store (STR) switch.
7. Memory recall (RCL) switch.
8. Memory erasure if RCL and STR pressed together.
9. Read On Switch.
10. Liquid Crystal Display.
11. ISO Setting Switch.
12. FPS/TIME setting switch.
13. Up increment Selection Switch.
14. Down Increment Selection Switch.
15. Back light Display Light Switch.
16. Neck Strap.
17. Battery Compartment (In back of unit)

PROFESSIONAL IV-A™ ADVANCED DIGITAL EXPOSURE METER (ADEM™)



SPECTRA PROFESSIONAL IV-A



LIQUID CRYSTAL DISPLAY
WITH ALL ELEMENTS SHOWN

PREPARATIONS

BATTERY

The Spectra Professional IV-A is powered by a 6-volt battery (Eveready No 544, Duracell No PX-28 or equivalent) Alkaline batteries can also be used.

INSTALLATION

Remove the battery compartment cover by pressing down on the grooved area and sliding the cover towards the bottom of the meter.

Insert the new battery in the battery compartment in the proper orientation; press down firmly to make sure good contact is achieved between the metal battery clips.

CAUTION: Make certain that the polarity labels ("plus" and "minus" signs) on the battery are oriented as shown in the battery compartment. Reversal of battery polarity will result in destruction of the battery and possible damage to the meter.

Replace the battery compartment cover by sliding it towards the top of the meter until it clicks into place.

AUTO POWER OFF

To conserve power, the Professional IV-A's display automatically switches off if you do not make another reading or press any button for one minute.

CONDITION - Low Battery Warning

The Spectra Professional IV-A will alert you when the battery is low. Near the end of the battery's life, the meter will flash the "LO BAT" indicator on the LCD display, and the meter will remain operational for about another 3 hours of usage time. If, however, the battery is at the end of its life, the "LO BAT" indicator will stay lit, the meter will not be operational.

NOTE: When the battery eventually dies out the "LO BAT" display will not light up.

SETTING THE FILM SPEED (ISO)

To set Film Speed, proceed as follows:

Slide the F/STOP - ILLUM switch to F/STOP. Press the Film Speed (ISO) switch once. The ISO annunciator will now start flashing on the LCD display. Set the desired Film Speed by pressing the up arrow switch for the higher Film Speed or the down arrow switch for a lower Film Speed. Once the desired Film Speed has been selected, press the Film Speed (ISO) switch once again. The ISO annunciator will now stop flashing on the LCD display. Your Film Speed setting is now locked in and cannot be changed until the above procedure is repeated. Accidentally pressing the up or down switches will not change your film speed settings.

AVAILABLE FILM SPEED (ISO)

FILM SPEED (ISO) RANGE

3, 4, 5, 6, 8, 10, 12, 16, 20, 25, 32, 40, 50, 64, 80, 100, 120, 160, 200, 320, 400, 500, 640, 800, 1000, 1200, 1600, 2000, 3200, 4000, 5000, 6400, 8000. (120 and 1200 film speeds can be substituted for 125 and 1250 respectively without any correction).

SETTING THE SHUTTER SPEED (FPS/TIME)

To set Frames Per Second (FPS)(for motion picture cameras or Exposure Time (TIME).

Slide the F/STOP - ILLUM switch to F/STOP. Press the Shutter Speed (FPS/TIME) switch once. The Frames Per Second (FPS) or the Exposure Time (TIME) annunciator will now start flashing on the LCD display. Set the desired Shutter Speed (FPS/TIME) by pressing the up arrow switch for the higher Shutter Speed (FPS/TIME) or the down arrow switch for a lower Shutter Speed (FPS/TIME). As you push the up or down switch and the meter cycles through the various Frames Per Second and Exposure Times. The annunciator will toggle among FPS, TIME (1/SEC), SEC, and MIN, and the f/stop value will be computed to the appropriate one corresponding to the changed FPS/TIME value.

Once the desired Shutter Speed (FPS/TIME) has been selected, press the FPS/TIME switch once again. The FPS or TIME annunciator will now stop flashing on the LCD display. Your Shutter Speed (FPS/TIME) setting is now locked in and cannot be changed until the above procedure is repeated. Accidentally pressing the up or down switches will not change the settings.

AVAILABLE SHUTTER SPEEDS (FPS/TIME)

FRAMES PER SECOND (FPS) FOR MOTION PICTURE CAMERAS AT 170 TO 180 SHUTTER ANGLE.

2, 3, 4, 6, 8, 12, 14, 18, 24, 25, 30, 32, 36, 40, 48, 60, 64, 72, 96, 120, 128, 150, 200, 240, 256, 300, 360.

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NOTE: After pressing the **ON/READ** button, the reading will be held on the LCD display for 60 seconds. After this period, the meter will put itself into STANDBY mode, and the display will go blank; however, all settings will stay in memory indefinitely, pressing the **ON/READ** switch will bring the meter back into active mode, and the display will be restored.

REFLECTED - LIGHT READINGS

When the Photosphere is removed and the head is completely rotated, the SPECTRA Professional IV-A becomes a 42-degree reflected meter. Reflected light readings are made by measuring the light reflected back from the subject towards the camera.

The reflected-light method has the theoretical advantage that it is possible to determine optimum exposure for all given subjects, since the method is based on the light reflected from the actual subject.

PROCEDURE:

- 1) Remove Photosphere by gripping the black knurled ring, pressing inward firmly and turning it approximately 60 degrees counterclockwise. (Store it in the carrying case or other protected location).
- 2) Rotate the swivel head so that the Light Sensor faces the back of the meter.
- 3) From the camera position, point the light sensor towards the important part of the subject. Remember that the Reflected- Light Sensor sees light over a 42 degree field, similar to your camera equipped with a normal lens; therefore if the scene is uniform, you should move in close enough to the subject to exclude extraneous background (but stay far enough away to include both important highlight and shadow areas). Be careful not to cast any shadows or reflections on the subject. Also be careful not to tip the Sensor upwards, as this may result in including too much bright sky in the reading (and consequential erroneous exposure). If the subject is back-lit, either turn off the back-lights or move close enough to the subject so that the meter does not measure the back-lights.

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TIME (1/SECOND).

8000, 4000, 2000, 1000, 500, 250, 125, 60, 30, 15, 8, 4, 2.

TIME (SECOND)

1, 2, 4, 8, 15, 30.

TIME (MINUTE)

1, 2, 4, 8, 15, 30.

AVAILABLE F/STOP

The Spectra Professional IV-A has a digital (numeric) and an analog (bargraph) liquid crystal display. The meter has a digital f/stop range of **f/0.35** to **f/128** in 1/10-stop increments and the analog range of **f/0.7** to **f/45** in 1/3-stop increments.

SELECTING A MEASURING METHOD

INCIDENT- LIGHT READINGS

Hold the meter at the principle point of interest of the subject with the Photosphere pointing directly towards the camera. If it is not possible to get close to the subject, but the lighting is uniform (for example, outdoors under open sky), hold the meter parallel to the subject with the photosphere pointing towards the camera.

NOTE: If necessary rotate the swivel head so that the Photosphere will not pick up any reflections or shadows from the photographer taking the readings.

When ready to take a reading press the **ON/READ** button. The resulting reading can be adjusted for any Film Speed (ISO) and/or Shutter Speed (FPS/TIME) combination by repeating steps outlined in SETTING THE FILM SPEED and SETTING THE SHUTTER SPEED.

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4) Press the ON/READ switch to make the readings.

5) Read f/stop indicated on display.

ILLUMINANCE

This section describes the correct operating procedure for measuring illuminance (footcandles or lux) and using illuminance to determine lighting contrast.

Illuminance is the scientific name for the measurement of incident light. The unit of measurement for illuminance is commonly the "footcandle" in the English system, and the "lux" or "dekalux" (lux times 10) in the metric system.

You can use your Spectra Professional IV-A to read directly in footcandles or lux according to the following procedure:

Installing the Photodisk

To install the Photodisk, align the 3 bayonets (on the back of the Photodisk) into the meter's bayonet mount. Then press inward firmly on the black knurled ring and turn it approximately 60 clockwise (until the bayonets click into place).

ILLUMINANCE LEVELS AND RESOLUTION

The meter measures illuminance levels in footcandles (fc) and lux (lx). It measures from **0.1 to 70,000 fc**, and **1 to 100,000 lx**. The meter resolution between **0.1 to 49.9** is in **0.1 fc increments**, between **50 to 999** is in **1 fc increments**, and between **1,000 to 70,000** is in **10 fc increments**.

TAKING AN ILLUMINANCE READING

1) Slide the **F/STOP- ILLUMINANCE** switch to **ILLUMINANCE**.

2) Select either footcandles or lux by activating the FC/LUX switch. The corresponding annunciator will appear on the LCD display. Hold the meter with the Photodisk pointed directly at the light source being measured.

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NOTE: If necessary, rotate the swivel head so that the Photodisk will not pick up any reflections or shadows from the photographer.

Press the **ON/READ** switch and make the reading. The resulting reading can be converted back and forth between footcandles and lux by pressing the FC/LUX switch. The reading can also be converted to f/stops by switching the **F/STOP-ILLUMINANCE** switch to **F/STOP**.

NOTE: After pressing the **ON/READ** switch, the reading will be held on the LCD display for 60 seconds. After this period, the meter will put itself into **STANDBY** mode, and the display will blank; however, all settings will stay in memory indefinitely (unless the battery is removed).

SPECIAL FUNCTIONS CONTRAST RATIO

Lighting contrast is defined as the ratio of the illumination produced by the key light plus fill light to that produced by the fill light alone.

While the exact value of lighting contrast for a particular scene is a matter of artistic choice, the following range of values are commonly suggested:

Color Films: 1.5:1 to 5:1

Black and White Films: 2:1 to 16:1

Lighting contrast can be measured as follows:

Ratio Mode

Procedure for measuring f/stop difference and contrast ratio.

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AVERAGE MODE

Procedure for measuring average f/stop and footcandles.



Press mode selection button until **AVG** appears in the display window. Take a reading and press memory store (**STR**) button. **M1** will appear in the display window indicating that one value is stored.



Take a second reading and hold the **ON/READ** button. The average f/stop or average footcandles will appear in the digital display (in the f/stop mode - two f/stop values will also be indicated on the bargraph scale with flashing bar indicating their average). **M1, M2** will also appear in the display window indicating average of two readings.



Release the **ON/READ** button. The last reading will appear in the digital display (in f/stop mode - two f/stop values will remain displayed on the bargraph scale). **M2** will also appear in display window indicating the second or current (last) reading.

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Press mode selection button until **RATIO** appears in the display window. Point the meter, from the subject, directly at the key plus fill light take a reading and press memory store (**STR**) button (in all readings, be careful that your own shadow does not fall on the meter). **M1** will appear in the display window indicating that one value is stored.



Point the meter, from the subject, toward the fill light or reflectors (exclude the key light) Take a second reading and hold the **ON/READ** button. The f/stop difference or ratio to the first reading will appear in the digital display (in f/stop mode - two f/stop values will also be indicated on the bargraph scale); **M1, M2** will also appear in the display window indicating the ratio of the current reading to the stored reading



Release the **ON/READ** button. The last reading will appear in the digital display (in f/stop mode - the two f/stop values will remain displayed on the bargraph scale). **M2** will also appear in the display window indicating the second or current (last) reading. By pressing the recall (**RCL**) button, the first reading (**M1**), second or current reading (**M2**), f/stop difference, or contrast ratio or average can be recalled.

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MEMORY RECALL

By pressing the recall (**RCL**) button, the first reading (**M1**), second or current reading (**M2**), f/stop difference, or contrast ratio, or average, can be recalled

MEMORY UPDATE

If the film speed or the fps/time setting is changed, the f/stops are immediately recalculated and displayed in the Normal, F/stop difference, and Average modes.

MEMORY ERASURE

You can erase the memory **M1** and memory **M2** by pressing the memory **STR** and **RCL** button simultaneously.

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CAMERA SHUTTER ANGLE CONSIDERATION

Changes in f/stop when camera shutter angle changes and compensation.

camera shutter angle s ∠ (degrees)	f/stop to be added or subtracted from the meter's reading to compensate for shutter angle.		OR	meter's film speed (ISO) to be increased or decreased by the number in order to compensate for the change in the shutter angle.
	digital 0.1 f/stop increments	analog 1/3 f/stop increments		
205	+0.2	+1/3		+1
193	+0.1	0		0
180	0	0		0
171	-0.1	0		0
163	-0.1	0		0
154	-0.2	-1/3		-1
144	-0.3	-1/3		-1
138	-0.4	-1/3		-1
130	-0.4	-2/3		-2
123	-0.5	-2/3		-2
115	-0.6	-2/3		-2
109	-0.7	-2/3		-2
103	-0.8	-1		-3
96	-0.9	-1		-3
90	-1.0	-1		-3
83	-1.1	-1		-3
77	-1.2	-1 1/3		-4
70	-1.3	-1 1/3		-4
65	-1.4	-1 1/3		-4
60	-1.5	-1 2/3		-5
55	-1.6	-1 2/3		-5
52	-1.7	-1 2/3		-5
50	-1.8	-1 2/3		-5
48	-1.9	-2		-6
45	-2.0	-2		-6

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* change of 1 film speed is equal to 1/3 f/stop.

example: If you have set ISO 500 on the meter and using 144 degree shutter angle, you will change the film speed (ISO) on the meter by -1 increment or ISO 400 and take a measurement. There will be no other compensation needed.

The f/stop calculations using Frames per second (FPS) are made on the basis of a camera shutter angle being at 180 degrees. To calculate the increase or Decrease in f/stop or Difference (ΔF).

The Basic formula is as follows:

$$\Delta F = \frac{\log(\text{angle}) - \log(180)}{\log 2} = \frac{\log(\text{angle}) - 2.255}{0.301}$$

Example: At 45 degree shutter angle the difference will be -2 f/stop.
 $\frac{1.653 - 2.255}{0.301} = -2 \text{ f/stop}$

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Filter Factor Correction

The easiest way to correct for the loss in transmission caused by use of a filter is to divide the manufacturer's suggested filter factor into the ISO film speed, and use this value for the ISO setting on the Professional IV meter.

For example:

Actual ISO film speed = 160
 Filter factor = 2.5X

Therefore; adjusted ISO film speed = $\frac{160}{2.5} = 64$

Alternately, you may increase the exposure by the number of f/stops indicated in the following table next to the Filter Factor you are using:

f/stop Changes for Filter Factors

Filter	Exposure Increase
Factor	(f/stops)
1.2X	1/3
1.5X	2/3
2X	1
2.5X	1-1/3
3X	1-2/3
4X	2
5X	2-1/3
6X	2-2/3
8X	3
10X	3-1/3
12X	3-2/3
16X	4

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TIPS FOR ACHIEVING OPTIMUM EXPOSURE

FINE TUNING YOUR EQUIPMENT:

There are many extraneous physical factors that can affect the actual photographic exposure. These include:

- 1) Variations due to inaccuracies of the camera's f/stop and shutter speeds.
- 2) Increase in effective shutter speed for fast blade shutters when used in conjunction with small f/stops
- 3) Film speed variations due to "reciprocity law Failure, manufacturing variations, and processing variations.

In addition, subjective and artistic considerations can also influence the selection of the "correct exposure".

Therefore, it is advisable to shoot some test film with your own equipment (including camera, film, processing, and light sources) to determine what is the optimum exposure for your situation and personal preferences. Take and record meter readings of the scene. Shoot a test series, preferably on reversal color film, varying the exposure above and below the meter's indicated exposure in 1/3-stop increments. After the film is processed, view it critically and select what you feel to be the optimum exposure. If you find that the optimum exposure is not the same as the exposure indicated by the meter, you can correct the situation in the future by modifying the ISO film speed to compensate for the discrepancy.

The technique for modifying the ISO film speed is as follows:

- 1) Count the number of 1/3-stop increments between the meter's indicated exposure and the "optimum" exposure.
- 2) For every 1/3-stop increment, change the ISO setting by 1 increment (each ISO setting differs from the next by 1/3 stop). If the meter indicated exposure is lighter than the optimum exposure, increase the ISO setting; if the meter-indicated exposure is darker, reduce the ISO setting.

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MAINTENANCE INSTRUCTIONS

TAKING CARE OF YOUR METER

Your Spectra Professional IV-A exposure meter is a precision instrument and should be handled as such. Do not drop the meter or subject it to excessive shock, vibration, or temperature extremes. Store your meter in its carrying case when not in use.

Keep the instrument clean and dust free. Dust the exterior surface regularly with a soft camel's-hair brush or a soft, clean cotton cloth, or blow it off with clean, dry air.

If the exterior surface becomes dirty, clean it with a soft, clean, damp cloth (not soaking wet), or with a cleaner especially formulated for cleaning plastics. Lens cleaning fluid may be used to clean the LCD display window and light sensor window.

CAUTION: Do NOT use acetone or any other organic solvents. Do NOT use excessive pressure on the LCD display window or light sensor window.

EXPECTED BATTERY LIFE

The expected battery life is dependent upon the average number of readings taken per day with the Spectra Professional IV and the type of battery used. The following computations are an estimate of the battery life in terms of total readings:

The meter draws 5 milliamperes for 30 seconds after the READ/ON button is depressed and released. The table below shows the total number of readings for various battery types.

Comparative Battery Life

BATTERY	BATTERY CAPACITY	TOTAL READINGS	DAYS OF OPERATION*	SHELF LIFE
Lithium	160 maH	3000	300	3 Years
SilverOxide	175 maH	3500	350	2 Years
Alkaline	85 maH	1600	160	1 Year

*@ 10 readings per day

If the meter is used less frequently, then the shelf life of the battery is the limiting factor in determining the replacement time.

RECALIBRATION

Your Spectra exposure meter is designed to maintain accurate calibration for many years; however, as components age and optical surfaces become dirty or contaminated, the calibration of the meter is subject to change.

We therefore suggest that you return the instrument to Spectra Cine, Inc. or an authorized service center for recalibration at periodic intervals not to exceed 2 years for normal work, or 1 year for critical or extreme environmental applications. A recalibration and maintenance service is available from Spectra Cine, Inc. or an authorized service center for a nominal charge.

You should not attempt to recalibrate the meter yourself. Recalibration of the meter requires both a equipped calibration laboratory and an intimate knowledge of the internal workings of the instrument.

MALFUNCTION REPAIR

There are no user-serviceable components inside your meter. The interior of the meter is complex and contains numerous

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delicate and sensitive electronic components which cannot be adjusted without proper tools and facilities. Therefore, you should not attempt to repair your meter, except by returning it to Spectra Cine, Inc. or an authorized service center.

NOTE: Opening your meter will void your warranty. (The meter is equipped with an indicator which will signal if the cover has been removed by other than factory-authorized personnel).

If your Spectra meter does not operate, first check to see that the battery indicator is not lit. If the meter indicates a normal battery condition, it will need to be evaluated by an authorized service technician.

Warranty Repair

If the instrument is still within the one year warranty period, it will be repaired at no charge to the customer (provided the warranty has not been voided by tampering, physical damage, or other abuse). The meter should be brought or shipped *prepaid* to the Service Department of Spectra Cine, Inc., 820 North Hollywood Way, Burbank, California 91505 U.S.A.. Be sure to include your name, address, telephone number, your copy of your warranty card, and a note describing the nature of the malfunction. If your warranty claim is valid, your instrument will be repaired and returned to you, at no charge, by UPS or other commercial surface transportation method of our choice. If express delivery is desired, all additional charges will be paid by the customer.

Out-of-Warranty Repair

If the meter is out of warranty, it should be brought or shipped prepaid to the Service Department of Spectra Cine, Inc., at the above address, along with a note describing the nature of the malfunction. If an estimate of repair costs is required, please indicate so, and you will be provided with such. Payment for repairs can be made by check sent in advance for the total amount due, or by C.O.D.. As an added convenience, we also accept Visa and Mastercard.

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SPECIFICATIONS

TYPE: Spectra Professional IV-A Advanced Digital Exposure Meter (ADEM™) for measuring Incident and Reflected light

TECHNOLOGY: For highest accuracy and reliability it utilizes Advanced front end op amp, Custom Sealed Hybrid electronic circuitry, Multiple Range Linear Circuit (MRLC) controlled by Advanced microcomputer and custom liquid crystal display with Backlit Electroluminescent lamp.

LIGHT SENSOR: Silicon Photovoltaic cell. Computer selected glass filters tailored to spectral response of the film. Swivel head assembly turns 270 degrees.

MEASURING CAPABILITY: Direct readout of photographic exposures. Measures contrast ratios and average in f-stop and illuminance modes. Measures illuminance level in footcandles (fc) and lux (lx).

MEASURING RANGE: One million to one (20f/stop) direct reading Multiple Range Linear Circuit. Digital f-stop: f.35 to f128 in 1/10-stop increments. Analog f-stop: f0.7 to f45 in 1/3stop increments. **Photographic Illuminance:** Footcandles 0.1 to 70,000 and lux 1 to 100,000. **Contrast Ratios:** Calculates ratio of key plus fill to fill light alone from 1:1 to 999:1. **f/stop-difference:** Plus or Minus 12 f/stop. **Average:** Average of two readings and or continuous averaging in f-stop and footcandle mode.

DISPLAY RANGE: ISO: 3 to 8000 in 1/3-stop increments. **FRAMES PER SECOND:** 2 to 360 (for motion picture cameras). Exposure time: 1/8000 sec to 30 minutes.

RESOLUTION: Digital 0.1-stop. Analog: 0.2-stop **ACCURACY:** Digital 0.1 f-stop. Calibration is traceable to National Institute Of Standard Technology (NIST), Washington, DC.

ADDITIONAL FUNCTIONS: Memory Recall switch is to recall stored reading in memory-1(m1), current reading in memory-2(m2) and or the **Ratio, Average and f/stop difference** of the two readings.

LAMP: Electroluminescent lamp for backlit liquid crystal display.

POWER CONSUMPTION: Operating 5 mA/reading. Data Retention 5uA.

POWER SOURCE: One 6 volt battery no's: A544, or PX28L, or PX28.

ESTIMATED BATTERY LIFE: Approximately one year with normal use.

DIMENSIONS: 5-1/2 X 2-1/2 X 2

WEIGHT: Approximately 6 ounces

WARRANTY: Two year limited warranty

SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE

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