

FLUKE®

Biomedical

Nuclear Associates 07-417

Dual Color Electronic Sensitometer

Operators Manual

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Section 1

General Information

1.1 Product Description

Model 07-417 (Figure 1-1) is a portable, battery or line operated Sensitometer designed to make reproducible exposures on x-ray film for measuring the performance of film processing systems. Dual color capability makes this unit ideal for use in blue sensitive sheet film and green sensitive sheet films as well as Cine film applications.

In quality control applications, the Sensitometer can be used to expose a sheet of x-ray film under optimum conditions. Other films can then be exposed periodically (e.g., daily) and compared to the initial film using a densitometer (e.g., Model 07-445). It can then be determined if there is a need for corrective action in order to obtain high quality radiographs.

1.2 Specifications

Light Source	Two color electroluminescent lamp Green: 520 nm +10 nm. Blue: 455 nm +10 nm.
Exposure Time	50 to 500 ms (100 ms optional)
Adjustment Range	1 ms to 9999 ms.
Adjustment Resolution	1 ms increments.
Exposure Adjustment	Separate rear case screwdriver adjustment for each Color; 1.0 D range.
Exposure Monitor	Audible tone during exposure.
Repeatability	0.04 log exposure entry from unit to unit.
Time Stability	± 0.02 log exposure per year
Temperature Stability	± 0.02 log exposure from 10° C to 45° C
Step Wedge	21-steps, 0.15 D/setup
Controls	BLUE/GREEN Switch: Rocker switch selects color. EXPOSURE: Push-button switch starts exposure with two-second delay to prevent double exposures.
Power	Battery: Two 9 V alkaline batteries Type: MN1604 or equivalent Life: 10,000 exposures Low Battery Indication: When battery voltage is insufficient for proper exposure, exposure will not be made and the tone will not sound.

an

Power Con't AC: Optional power converter
Part: 14-407 (United States, Canada)
Input: 115 VAC, 60Hz, 13W
Output: 12 VDC, 400 mA, Regulated
Part: 14-431 (Europe)
Input: 230 VAC, 50 Hz
Output: 12 VDC, 640 mA, Regulated
Part: 14-432 (United Kingdom)
Input: 230 VAC, 50 Hz
Output: 12 VDC, 640 mA, Regulated

Operating Conditions 100 C to 450 C (500 F to 1040 F)
Max. 90% Relative Humidity

Dimensions (W x H x D) 5/8" X 35/8" x 51/4"
(195 mm x 92 mm x 135 mm)

Weight 2.5 lb (1.1 kg)

Routine Cleaning of Case

CAUTION

Do not immerse the Model 07-417. The unit is not waterproof. Liquid could damage the circuits. The unit should be kept clean and free from dirt and contamination. The unit maybe cleaned by wiping with a damp cloth using any commercially available cleaning or decontaminating agent (See Section 3.2, Cleaning the Mylar Cover).

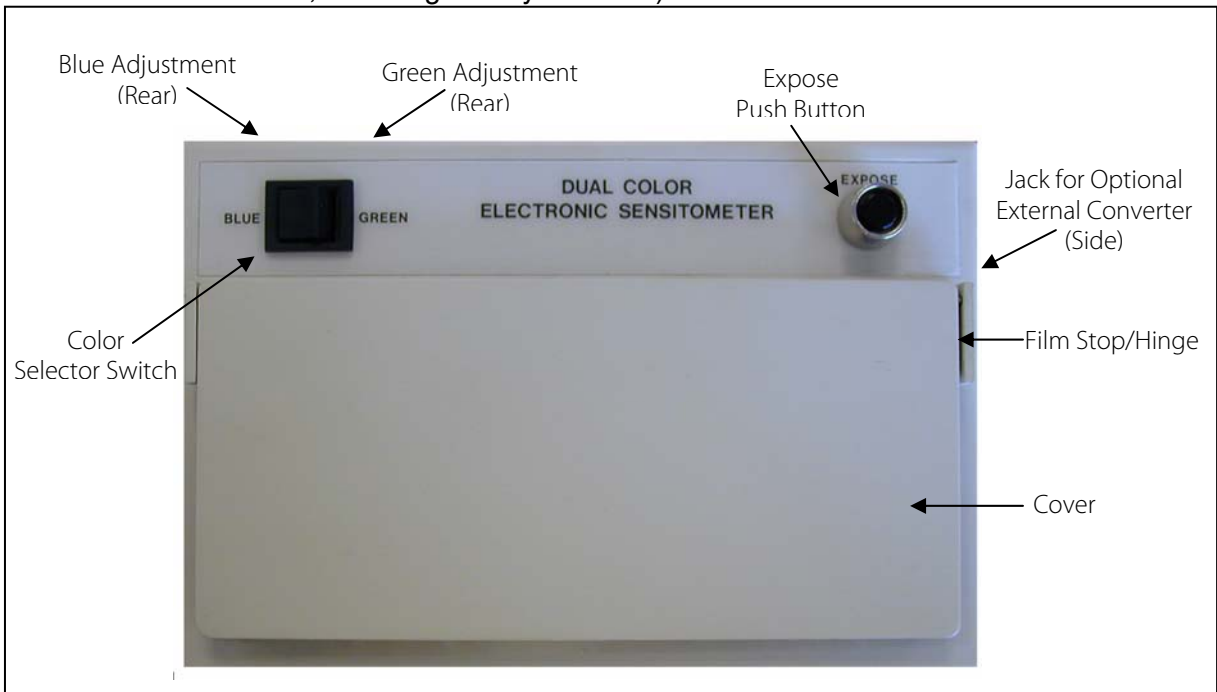


Figure 1-1. Model 07-417 Sensitometer

1.3 Procedures, Warnings, and Cautions

The equipment described in this manual is intended to be used for QUALITY CONTROL testing of x-ray film in processor equipment. It should be used only by persons who have been trained in the proper interpretation of its readings and the appropriate safety procedures to be followed.

Although the equipment described in this manual is designed and manufactured in compliance with all applicable safety standards, certain hazards are inherent in the use of this equipment.

WARNINGS and CAUTIONS are presented throughout this document, when applicable, to alert the user to potentially hazardous situations. A WARNING is a precautionary message preceding an operation that has the potential to cause personal injury or death. A CAUTION is a precautionary message preceding an operation that has the potential to cause permanent damage to the equipment and or loss of data. Failure to comply with WARNINGS and CAUTIONS is at the user's own risk and is sufficient cause to terminate the warranty agreement between Fluke Biomedical, Radiation Management Services and the customer.

Adequate warnings are included in this manual and on the product itself to cover hazards that may be encountered in normal use and servicing of this equipment. No other procedures are warranted by Fluke Biomedical. It shall be the owner's or user's responsibility to see to it that the procedures described here are meticulously followed, and especially that WARNINGS and CAUTIONS are heeded. Failure on the part of the owner or user in any way to follow the prescribed procedures shall absolve Fluke Biomedical and its agents from any resulting liability.

WARNING



This instrument contains CMOS integrated circuits. Static charge normally present in a dry atmosphere or leakage current in soldering irons or other non-grounded tools can instantly destroy CMOS components. Do not attempt to remove or replace ICs in this device without observing antistatic and leakage current precautions. Service should be performed only by a technician thoroughly familiar with CMOS devices.

Section 2 Operation

2.1 Making An Exposure

Use the following procedure to make an exposure:

1. Raise the cover slightly and insert the film against the film stop (emulsion side down with single emulsion films). Refer to Figure 2-1 for proper film insertion.

NOTE

The film stop is the "U" bracket that is part of the cover hinge.

2. Close the cover and press the EXPOSE push-button.

NOTE

The unit does not produce a second exposure if the EXPOSE push-button is pressed within two seconds of the original exposure, preventing the possibility of double exposures.

3. Open the cover and remove the film.

NOTE

Be careful not to damage the thin mylar sheet that covers the step tablet. It can be cleaned as necessary using a soft, damp, lint free cloth or camel hairbrush.

2.2 Adjusting the Exposure

The Model 07-417 Dual Color Sensitometer is factory calibrated to produce a density of 1 + base + fog in the center of the step tablet for medium speed blue sensitive films (e.g., Kodak XRP- 1) and green sensitive films (e.g., Kodak OG- 1). The exposure may be adjusted by using a screwdriver to turn the potentiometers accessed through the rear of the unit. Refer to Figure 1-1 for green and blue adjustment locations. Each adjustment has a total range of approximately 1.0 D.



Figure 2-1. Film Insertion

2.3 Receiving Inspection

Upon receipt of the unit:

1. Check the shipping carton(s) and their contents for in-shipment damage. If damage is evident, file a claim with the carrier and notify the Customer Service Department at Fluke Biomedical 440.498.2564.
2. Check that all items listed on the packing slip are present and in good condition. If any items are missing or damaged, contact the Customer Service Department at Fluke Biomedical 440.498.2564.

2.4 Storage

If necessary to store the unit prior to use, pack it in the original container(s), if possible, and store in an environment free of corrosive materials, fluctuations in temperature and humidity, and vibration and shock.

2.5 Battery Installation

NOTE

The Dual Color Sensitometer requires two (2) 9 V batteries. One battery is installed; the other is securely fastened to the packing material around the sensitometer.

Use the following procedure to install the batteries:

1. Locate the battery compartment on the underside of the sensitometer.
2. Pull out the top of the battery compartment cover retainer.
3. Completely remove the battery compartment cover.
4. Note the placement of the installed battery and install the supplied battery in a likewise manner.
5. Replace the battery compartment cover.
6. Push down on the plastic retainer to secure the battery compartment cover.

2.6 Initial Checkout

Check unit operation as follows:

1. With the color selector switch in either the BLUE or GREEN position, press the EXPOSE push-button. A short tone of about 1,000 Hz indicates a proper exposure.
2. In a darkroom, lift the cover of the sensitometer.
 - a. With the color selector switch in the BLUE position, press the EXPOSE push-button and verify that the proper color illuminates the step tablet. The tone should sound for the same period as the exposure.
 - b. With the color selector switch in the GREEN position, press the EXPOSE push-button and verify that the proper color illuminates the step tablet. The tone should sound for the same period as the exposure.

NOTE

When using the Dual Color Sensitometer with single emulsion film, the emulsion side should always be down, in contact with the step tablet. The numbers on exposed single emulsion film read correctly with the emulsion side up, on units with alternating long and short marks above the steps. On newer units, with all long marks above the steps, the numbers on the exposed film read correctly with the emulsion side down.

Section 3 Maintenance

NOTE

This instrument contains CMOS integrated circuits. Static charge normally present in a dry atmosphere or leakage current in soldering irons or other non-grounded tools can instantly destroy CMOS components. Do not attempt to remove or replace ICs in this device without observing antistatic and leakage current precautions. Service should be performed only by a technician thoroughly familiar with CMOS devices.

3.1 Replacing the Batteries

The batteries shipped with the unit should provide, under normal circumstances, approximately 10,000 exposures. The batteries should be replaced at least once a year. Use the following procedure:

1. Locate the battery compartment on the underside of the sensitometer.
2. Pullout the top of the battery compartment cover retainer.
3. Completely remove the battery compartment cover.
4. Remove the used batteries.
5. Insert two (2) fresh 9 V alkaline batteries.

NOTE

Alkaline batteries must be used; otherwise the unit may not operate properly.

6. Replace the battery compartment cover.

3.2 Cleaning the Mylar Cover

The step tablet is protected by a Mylar sheet that should be cleaned routinely with a damp lint-free cloth. Use extreme care when cleaning the Mylar sheet so as not to damage it.

3.3 Replacing the Mylar Cover

If the step tablet mylar cover is damaged, replace it using the following procedure:

1. Remove the batteries (refer to Replacing the Batteries, Section 3.1).
2. Remove the case from the base by removing the four (4) screws on the sides of the case.
3. Remove the cover and hinge from the case by removing the two (2) screws located inside the case.
4. Starting at the edge nearest the cover, carefully peel off the mylar film.

NOTE

Be careful not to lift off the step tablet or the double-sided tape.

5. Clean the step tablet with a camel hairbrush.
6. Position the replacement the mylar cover film (Part No. 138032) over the step tablet.
7. Secure the sides and front edge of the film to the step wedge using Magic™ transparent tape, 0.5 inches wide.

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