USE ONLY: AA NICad batteries that are 600/700mAhr rated, six required. Other types may burst causing personal injury.

AUFGEPASST: Verwenden Sie nur AA Nicad Akkus von 600/700mAhr (Milliampere/Stunde) Nennstrom (6 Stück erforderlich). Mit anderen

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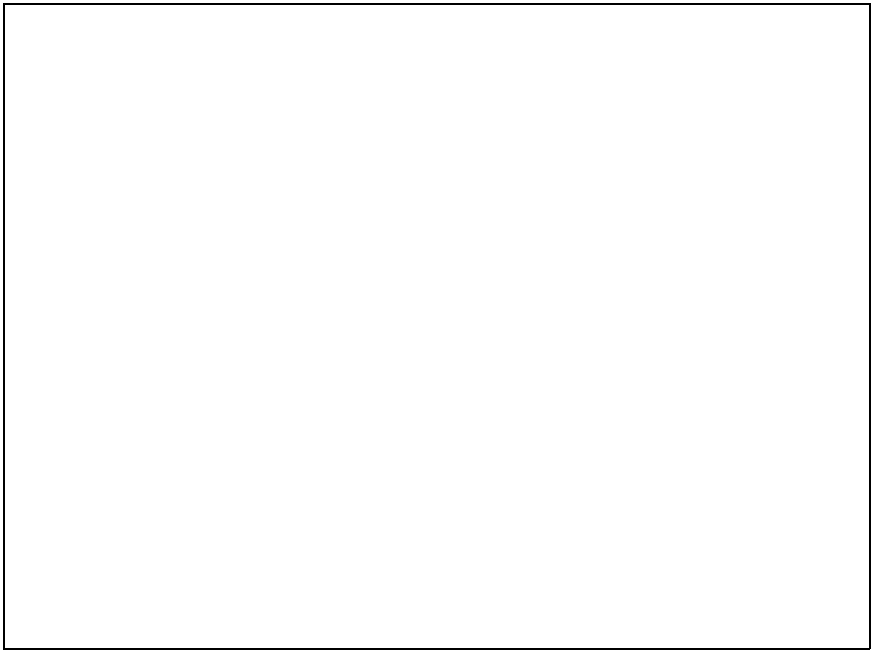
TARGET WINDOW

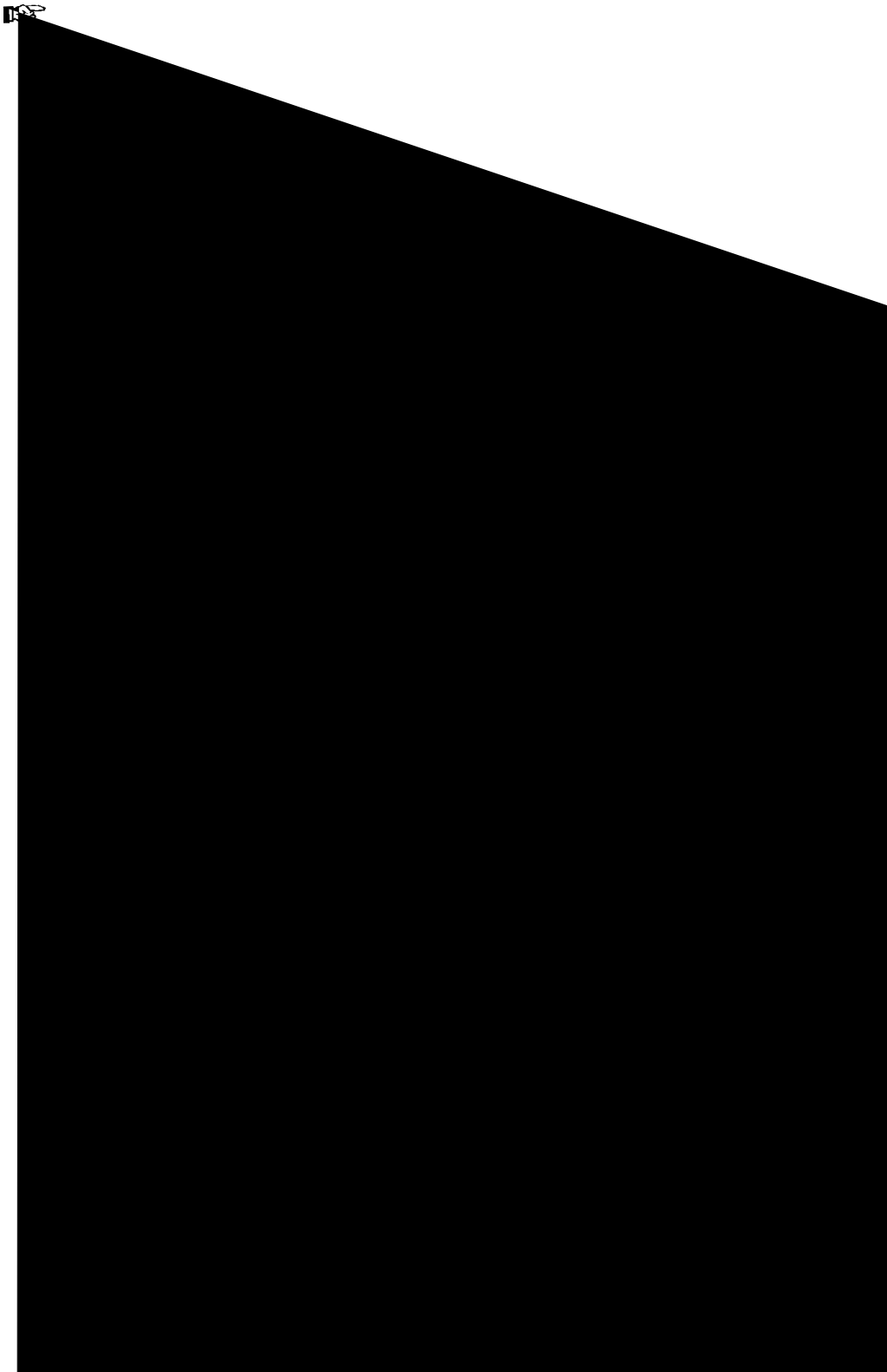
When measuring, center target window opening over spot to read using the cross hairs for alignment purposes.

The 938 is shipped from the factory with 4mm optics installed. Although the illuminating spot produced by the instrument is 4mm, the actual target window opening is 6mm. Therefore, proper positioning under the target window opening is important when measuring 4mm size patches. Example 4 shows the target window placement on a 4mm size patch of a color bar.



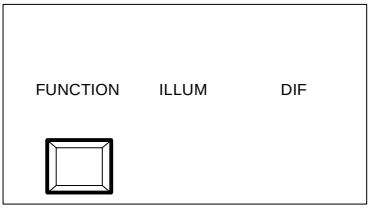
3. Colorimetric Operation

3.1 Key Descriptions



There are eight different illuminants and two observers to choose from.

1) To enable illuminant selection:
Hold down **[ILLUM]** until **"SELECT ILLUMINANT"** is displayed.



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2) The active illuminant & observer are displayed.

Press **[ILLUM]** to select a different illuminant.

Note: Illuminant F2 represents a cool white fluorescent lamp.

Illuminant F7 represents a broad-band daylight fluorescent lamp.

Illuminant F11 represents a narrow-band white fluorescent lamp (or illuminant TL84).

Illuminant F12 represents Ultralume 3000.

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3) Press **[DIF]** to select a different observer.

The 938 can perform absolute measurement in XYZ (RGB), Yxy, L*a*b*, L*u*v*, L*C*h°, Whiteness, & Yellowness.

> **Helpful Hint:** If you are going to measure something like a textile, you will receive better results if you use the averaging function (see Section 8.1). Also,

<

The 938 can measure the difference between a sample color and a reference. In order to measure these differences the reference must first be entered into memory. There are 24 different locations to store

To activate the Difference mode, press **[DIF]** and the Δ sign will appear in the display. The Δ

5) The cursor will blink over the active value that can be edited. Enter the numbers for each value.

- The **[DIF]** key advances the cursor to the next value to be edited.
- The **[DIF]** key is used in

3.5.2 Taking A Difference Measurement

> If the Δ is not displayed, press [DIF] to activate difference mode.
> The reference color must first be entered into memory, refer to Section 3.5.1.
> If reference selection is not set to auto, select the correct reference location before following the procedure below (refer to Section 3.5.1).

CMC is an ellipsoidal tolerancing method which attempts to correlate small measured color differences with visual assessment.

Each momentary depression of **[FUNCTION]** in densitometric mode will sequentially page through the available function: DEN (or DEN-P), DOT, TRAP, PC (or PC-P), H/G (or H/S) or H/G-P (or H/S-P), BRIGHT, and λDEN (or

2) The active response is displayed.
Press **[**

3) Place target window on paper and lower unit to target window.
Hold firmly compressed until data is displayed.

> Paper value can also be manually entered by, holding down the **[▼▲]** key, pressing **[▼]** to decrease value or **[▲]** to increase value.

> If solid value is displayed during paper measurement, press the [▼▲] key twice (while unit is still down) to enter measurement as paper.

4) Center target window over solid patch to be measured, lower unit to target window.
Hold compressed until data is displayed.

> When the Store Data function (Sec. 6) is used in conjunction with Dot

4) Center target window over overprint patch to be measured, and lower unit to target window.
The most dominant ink is displayed.

> If **"NEWSPRINT"** formula is selected in setup parameters (Sec. 8.3), black, cyan, magenta, and

9) By momentarily pressing the **[▼▲]** key the display will toggle between the trap value and selected paper value.

> Momentarily pressing the **[▲]** key at paper level will display the different paper value for vcmy.

DMAX ENTRY (TRAP Newsprint Only)

The print contrast function provides the ability to monitor a 3/4 tonearea and is usefu

The 938 has the ability to measure the brightness of paper. The spectral weight table is derived from 1987 TAPPI Spec - T 452 OM-87.

The 938 has a special feature that allows spectral data to be displayed as a density, dot, or reflectance measurement. Values for the spectral measurements are in 20nm increments from 400 to 700 nanometers. Only one of the three spectral measurement features can be used at a time. To select between density, dot, and reflectance, refer to Section 8.3.

Only one wavelength value is displayed at a time. The 938 will automatically display the wavelength with the maximum absorption (least reflectance). This procedure can be overridden allowing the selection of the wavelength you wish to display, by turning off Auto Color in Modes (see Sec. 8.3).

4.10.1 Spectral Density Operation

A spectral density measurement can be taken with or without paper subtracted from the measurement.

To take a spectral density measurement:

> λ**DEN** must be selected for spectral operation (see Sec. 8.3).

1) Press **[FUNCTION]** to select λ**DEN.**

4.10.2 Spectral Dot Operation

The spectral dot feature is used for measuring dot values of nonprocess inks.

To take a spectral dot measurement:

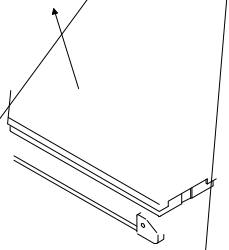
> λDOT must be selected in spectral operation (see Sec. 8.3).

1) Press **[FUNCTION]** to select **λDOT.**

2) Place target window on paper and lower unit to target window.
Hold compressed until data is displayed.

> The paper value for each

4) Center target window over tint that corresponds to the previous solid measurement, and lower unit to target window.
Hold compressed until data is displayed.



5) The display will show the tint value at the wavelength selected for the corresponding solid.

> Pressing the **[▲]** will allow you to page through the other tint values for each 20nm increment.

4.10.3 Spectral Reflectance Operation

The 938 allows you to measure a sample and display it's relative reflectance.

To take a spectral reflectance measurement:

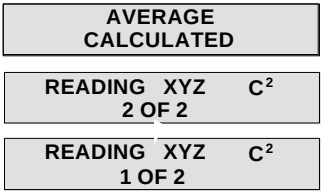
> λ**REFL** must be selected in spectral operation (see Sec. 8.3).

1) λPress

5. Measurement Averaging Procedure

When averaging is activated in setup, averaging operation will occur on all the functions that are turned on in modes. Refer to Section 8.1 to activ

3) Center the target window over second area on the sample to measure. Lower unit to target window and hold compressed. **"READING XYZ C^2 1 OF 2"** and **"2 OF 2"** will momentarily be displayed, and then the averaged data.



4) The display will show the average absolute values for XYZ.

> Do not jar or lift reading head during sub averaging measurements.
> When averaging is activated, this basic procedure must be followed for all measurements.

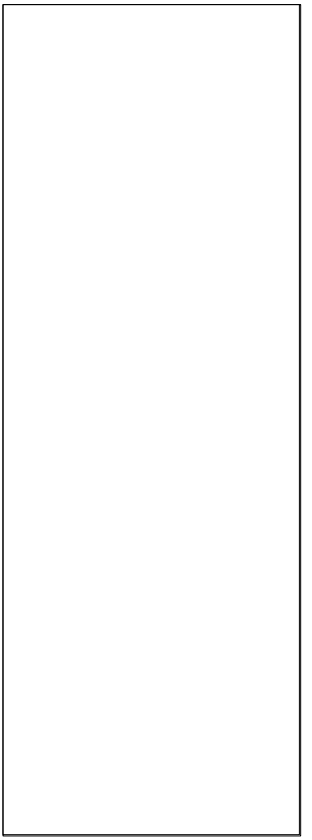
7.1 Positioning the 938 Onto the Standard

You must set the 938 on the white standard so that the maximum amount of the bottom rubber pad of the shoe resides on the standard, and the target is centered on the circle. If you do not, the unit may rock slightly and cause an erroneous reading of the standard.

1) Center the target window on the White circle, making sure that the rubber pad on the instrument is completely on the standard **and is flat**.

2) Take the measurement.

Shown below is an **IMPROPER METHOD**



> If you are changing aperture size: Do steps 1, 2, & 5a thru 5d. Skip steps 3 & 4.

4) Measure the WHITE patch on the standard. You must hold the unit depressed until all five readings have been completed.

> You must set the unit on the standard so that the maximum

5a) Select **"CHANGE"**, press **[DIF].**

5b) Select **"NO"**, press **[FUNCTION]**.

5c) Press **[FUNCTION]** to select **"NEXT"** if the aperture size is correct (go to step 5d).

If the aperture size is wrong press **[DIF]** to change size.

8. Setting System Parameters

8.1 Averaging

The averaging feature allows the unit to make several measurements from the same and/or different locations on a sample. This will allow you to have a better overall average of a sample color. The averaging feature has two functions:

-

8.2 Colorimetric Operation Parameters

Colorimetric operation setup allows you to select various options, and individually turn On or Off certain functions. When a function is turned off it will not be displayed during operation.

1) Press both **[FUNCTION]** and **[ILLUM]** at the same time.

> To exit Colorimetric Operation Setup:Press **[FUNCTION]** and **[ILLUM]** at the same time and the unit will return back to normal operation.

8.3 Densitometric Operation Parameters

Densitometric operation setup allows you to change various options, and individually turn On or Off certain functions. When a function is turned off it will not be displayed during operation.

1) Press both **[FUNCTION]** and **[ILLUM]** at the same time.

> To exit Densitometric Operation Setup:Press **[FUNCTION]** and **[ILLUM]** at the

[I L N C T

Your instrument comes equipped with a serial port that allows data to

N t **E**

t **T**

O **M** **P** **U** **T**

M

A **O**

h e

9. Display Messages

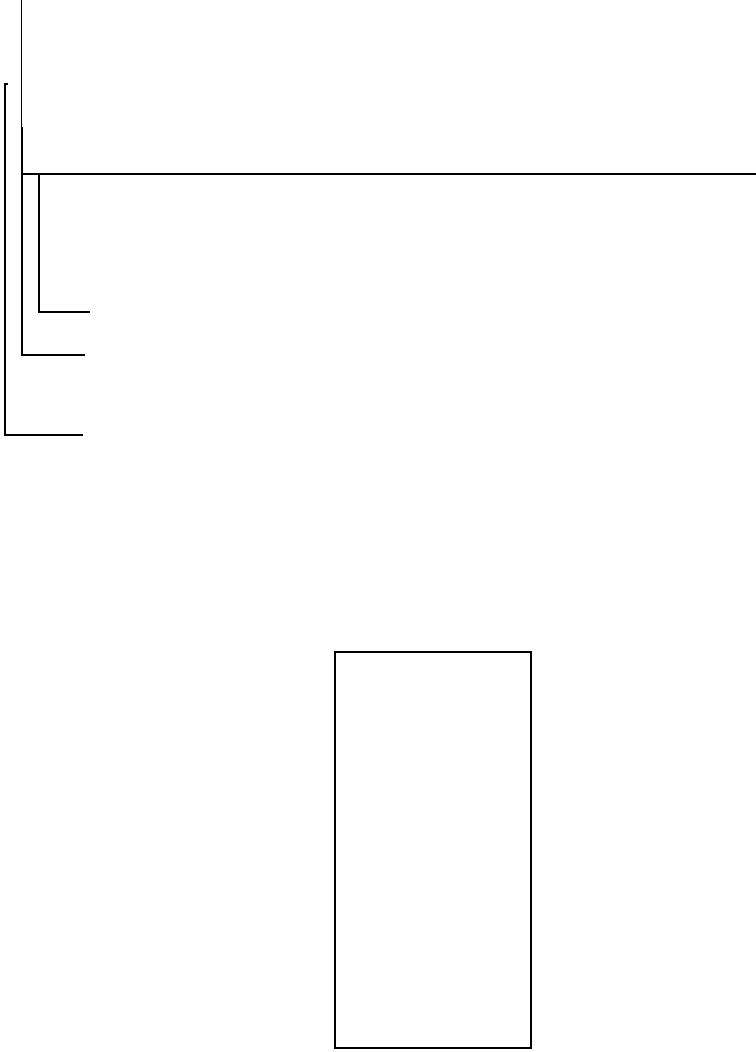
The most likely reasons for error messages to display are described below. If an error message is consistently displayed, contact X-Rite or an Authorized Service Center.

Power-Up Message

"MEMORY LOST" is displayed when the instrument determines that the data in the (battery backed up) RAM has been corrupted, if the

Miscellaneous Messages - continued

"I/O NOT READY - check I/O PIN 5" is displayed when I/O pin 5 is set to "CTS" in modes and the unit is not connected to a printer or computer. Set handshake to "OFF" if unit is not connected to a to a prin n1hu (OFF)21.-62.3.9 -19.2 TD /F2 10.08 0.6620.14381.0990.2827 LA



Print Example 1:

SPECTRAL DATA
w 400.0 S 27.46
w 410.0 S 40.13
w 420.0 S 51.43
w 430.0 S 61.14

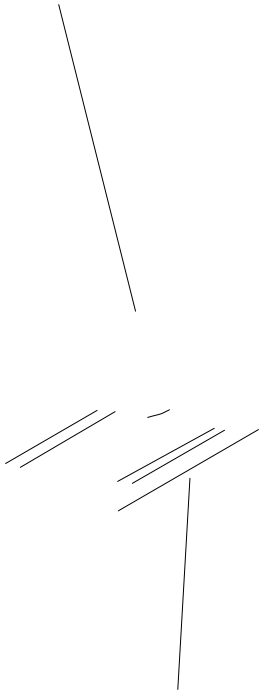
11. Changing Apertures

X-Rite has three different aperture kits available for the 938, and they are listed below.

3) Unscrew the existing aperture **[5]** with the aperture wrench **[6].**

12.

1. Remove old target window **[2]** by pushing downward from top of shoe **[1].**
2. Place the instrument on end and align the target window so that the word "front" runs parallel with the top edge of the shoe **[1]**.
3. Insert one edge (top or bottom) of the new target window **[2]** in the opening of the shoe **[1]**.
4. Place the other side of the target window **[2]** in the shoe **[1]** by snapping into position.



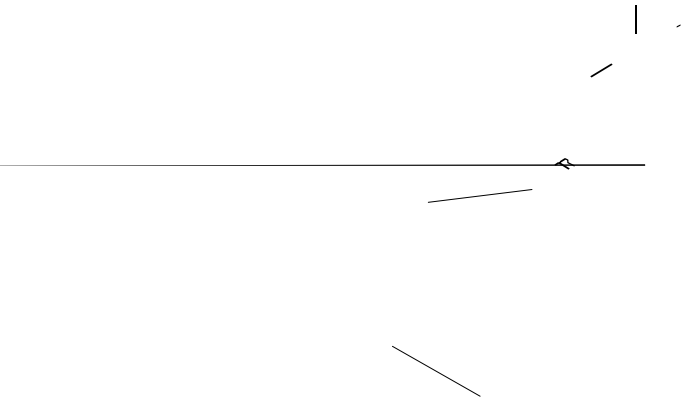
Charge Time: Approx. 14 hours

A3 Factory Presets

Shown below are the factory presets for the Averaging, Colorimetric & Densitometric Operation, I/O, and Format parameters.

A4 Spectrophotometer Stand

X-Rite has an optional mounting fixture available (P/N 968-80). The fixture can hold items that are a maximum of four inches wide, or two inches to the center of the object.



A5 Color Check

The color check procedure will help you track instrument color performance to assure measurement accuracy. Initially, the three patches on the standard should be measured once a day for a period of 10 days to determine the reference vv