

961

SPECTROPHOTOMETER



Operator's Manual



Federal Communications Commission Notice

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

NOTE: Shielded interface cables must be used in order to maintain compliance with the desired FCC and European emission requirements.

Industry Canada Compliance Statement

This Class A digital apparatus complies with Canadian ICES-003.

Cet appareil numérique de la classe A est conforme à la norme NMB-003 du Canada.

AVERTISSEMENT : Des câbles d'interface blindés doivent être utilisés afin de se conformer aux règlements européens et FCC (USA) sur l'émission.

ACHTUNG: Um das Produkt innerhalb der FCC (Vereinigten Staaten) und den europäischen Emissions-Richtlinien zu halten, müssen geschirmte Schnittstellenkabel verwendet werden.

AVISO: Para satisfacer las deseadas regulaciones de emisión para Europa y el FCC, se debe utilizar los cables de interfaz protegidos contra las interferencias electromagnéticas.

AVERTISSEMENT: Des câbles d'interface blindés doivent être utilisés afin de se conformer aux règlements d'émission européens et de FCC (Etats-Unis).

AVVISO: Per conformare con i desiderati regolamentazioni di emissione per Europa ed il FCC, utilizzare i cavi d'interfaccia protetti contro l'interferenze elettromagnetiche.

WARNING: This instrument is not for use in explosive environment.

WARNUNG: Das Gerät darf in einer explosiven Umgebung NICHT verwendet werden.

ADVERTENCIA - NO use este aparato en los ambientes explosivos.

ATTENTION: Cet instrument NE DOIT PAS être utilisé dans un environnement explosif.

AVVERTIMENTO - NON usare questo apparecchio in ambienti esplosivi.

CAUTION: Operational hazard exists if battery chargers other than X-Rite SE30-81 (115V) or SE30-77 (100-240V) is used. Use only X-Rite battery pack SP62-79-33, other types may burst causing personal injury.

VORSICHT: Betriebs- und Verletzungsgefahr besteht bei Gebrauch von anderen Adaptern als X-Rite SE30-81 (115 V) oder SE30-77 (100-240 V). Verwenden Sie nur den X-Rite Akkupack SP62-79-33.

ADVERTENCIA: No use otro cargador de las pilas que no sea la pieza X-Rite SE30-81 (115V) o SE30-77 (100-240V), para evitar el riesgo de mal funcionamiento del equipo. Use solamente las pilas SP62-79-33 de X-Rite, es posible que los otros tipos puedan estallar y causar daños corporales.

ATTENTION: Pour ne pas causer un mauvais fonctionnement de l'appareil, veuillez à utiliser uniquement les chargeurs de batterie X-Rite SE30-81 (115 V) ou SE30-77 (100-240 V). Veuillez aussi à utiliser uniquement la batterie X-Rite SP62-79-33, d'autres batteries pouvant exploser et causer des blessures.

AVVERTENZA: Non usare un altro caricabatterie che non è del pezzo X-Rite SE30-81 (115V) o SE30-77 (100-240V), per evitare il rischio di malfunzionamento dell'apparecchio. Usare solamente gli accumulatori SP62-79-33 di X-Rite, è possibile che altri tipi possano scoppiare e causare danno personale.

The Manufacturer: X-Rite, Incorporated
Der Hersteller: 3100 44th Street, S.W.
El fabricante: Grandville, Michigan 49418
Le fabricant:
Il fabbricante:

Declares that: Spectrophotometer
gibt bekannt daß: 961
avvierte que:
avertit que:
avverte che:



is not intended to be connected to a public telecommunications network.
nicht an ein öffentliches Telekommunikations-Netzwerk angeschlossen werden soll.
no debe ser conectado a redes de telecomunicaciones públicas.
ne doit pas être relié à un réseau de télécommunications publique.
non deve essere connesso a reti di telecomunicazioni pubblici.

CE DECLARATION

Manufacturer's Name: X-Rite, Incorporated
Manufacturer's Address: 3100 44th Street, S.W.
Grandville, Michigan 49418
U.S.A.

Model Name: Spectrophotometer
Model No.: 961

Directive(s) Conformance: EMC 89/336/EEC LVD 73/23/EEC

Warning:

This is a class A product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

Table of Contents

Proprietary Notice	vii
Warranty Information	vii
Section 1 – Overview and Setup	
Instrument Description	1-1
Features	1-2
Unpacking and Inspection	1-2
Packaging Drawing and Parts List	1-2
Installing the Battery Pack	1-3
Applying Power	1-3
Charging the Battery Pack	1-4
Unlatching the Instrument Shoe	1-5
Instrument I/O Serial Interface	1-6
Attaching the Wrist Strap	1-6
Section 2 – User Interface	
What to Expect	2-1
Navigation – Basic Key Operation	2-1
Tab Down Key	2-2
Tab Up Key	2-2
Enter Key	2-2
Escape Key	2-2
Main Menu Key	2-2
Read Key	2-2
Measurement Mode Screens	2-2
Data Storage Information	2-3
Color Data Parameters	2-3
Color Data	2-3
Instrument Indicator Light	2-3
Important Measurement Techniques	2-3
Section 3 – Calibrating the Instrument	
General Information	3-1
Positioning the Instrument on the Reference	3-2
Calibration Procedure	3-3
Section 4 – Instrument Operations	
QA Mode	4-1
Group Numbers	4-1
Storage Operation	4-1
Viewing Stored Sample Data	4-2
Group/Sample Tools	4-2
Analyze Mode	4-4

Section 5 – Service and General Maintenance

Repair Information	5-1
Reading Lamp Replacement Information	5-1
Cleaning the Instrument	5-1
General Cleaning	5-1
Cleaning the Optics	5-2
Cleaning the Calibration Reference	5-2
Replacing the Battery Pack	5-3

Appendices

Instrument Specification	6-1
Error Messages	6-2
Parts List and Packaging	6-3
Changing the Aperture	6-5

Proprietary Notice

The information contained in this manual is derived from patent and proprietary data of X-Rite, Incorporated. This manual has been prepared solely for the purpose of assisting in the use and general maintenance of this instrument.

The contents of this manual are the property of X-Rite, Incorporated and are copyrighted. Any reproduction in whole or part is strictly prohibited.

Publication of this information does not imply any rights to reproduce or use this manual for any purpose other than installing, operating, or maintaining this instrument. No part of this manual may be reproduced, transcribed, transmitted, stored in a retrieval system, or translated into any language or computer language, in any form or by any means, electronic, magnetic, mechanical, optical, manual, or otherwise, without the prior written permission of an officer of X-Rite, Incorporated.

This instrument may be covered by one or more patents. Refer to the instrument for actual patent numbers.

Copyright © 2004 by X-Rite, Incorporated

“ALL RIGHTS RESERVED”

X-Rite® is a registered trademark of X-Rite, Incorporated. All other logos, brand names, and product names mentioned are the properties of their respective holders.

Warranty Information

X-Rite, Incorporated warrants each instrument manufactured to be free of defects in material and workmanship (excluding battery pack) for a period of twelve months. If the fault has been caused by misuse or abnormal conditions of operation, repairs will be billed at a nominal cost. In this case, an estimate will be submitted before work is started, if requested. The unit shall be returned with transportation charges prepaid.

THERE ARE NO WARRANTIES OF MERCHANTABILITY OR FITNESS. THIS WARRANTY OBLIGATION IS LIMITED TO SERVICING THE UNIT RETURNED TO X-RITE, INCORPORATED OR AN AUTHORIZED SERVICE DEALER FOR THAT PURPOSE.

X-Rite, Incorporated offers a repair program for instruments out of warranty. For more information, contact X-Rite Customer Service Department.

Always include serial number in any correspondence concerning the unit. The serial number is located on the bottom of the instrument housing (above the shoe).

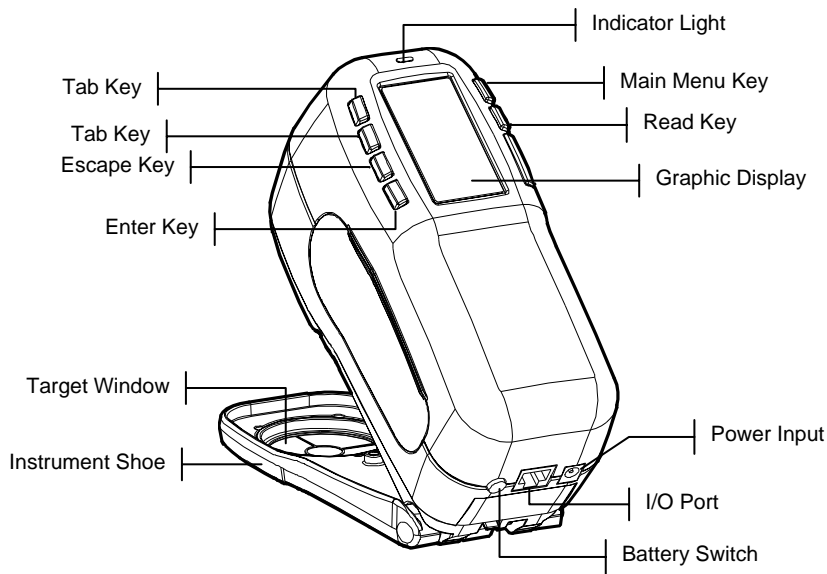
This agreement shall be interpreted in accordance with the laws of the State of Michigan and jurisdiction and venue shall lie with the courts of Michigan as selected by X-Rite, Incorporated.

Overview and Setup

Instrument Description	1-1
Features	1-2
Unpacking and Inspection	1-2
Installing the Battery Pack	1-2
Changing the Aperture Setting	1-3
Applying Power	1-3
Charging Battery Pack	1-4
Unlatching the Instrument Shoe	1-5
Instrument I/O Serial Interface	1-6
Attaching the Wrist Strap	1-6

Instrument Description

The X-Rite 961 Spectrophotometer's compact spectral engine utilizes X-Rite's DRS (Dynamic Rotational Sampling) technology, allowing accurate and precise measurements. This instrument has intuitive keys and a high-contrast graphic display.



Features

Automatic Shut-Off

To increase battery life, the instrument automatically turns itself off when not in use. The instrument turns back on whenever a key is pressed, a measurement is taken, or the adapter is plugged in.

Graphic Display

A high contrast, 256 x 128 pixel graphics display provides a versatile means of displaying the measured data.

Indicator Light

A multi-color LED at the top of the instrument provides visual feedback on the status of measurements.

Unpack and Inspect

After removing the instrument from the shipping carton, inspect it for damage. If any damage has occurred during shipping, immediately contact the transportation company. Do not proceed with installation until the carrier's agent has inspected the damage.

Your instrument was packaged in a specially designed carton to assure against damage. If shipment is necessary, the instrument should be packaged in the original carton. If the original carton is not available, contact X-Rite to have a replacement carton shipped to you.

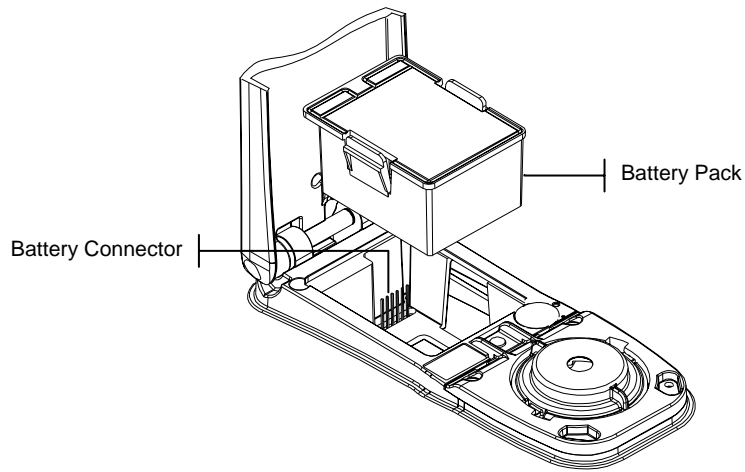
Packaging Drawing and Parts List

Check your packaging contents against your packing list and original order. A detailed packaging drawing and parts list are included in the appendices of this manual.

Install the Battery Pack

The instrument is shipped from the factory with the battery pack removed. The battery pack is located in a carrying case compartment and must be installed before the instrument is used.

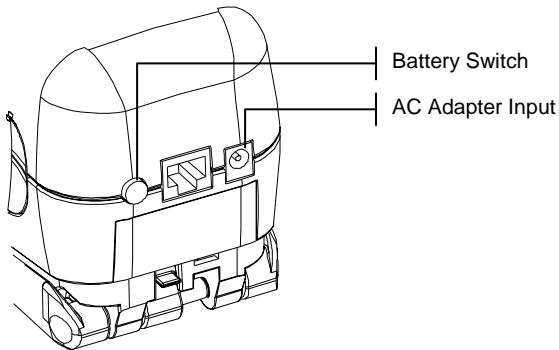
1. Hold the shoe next to the instrument housing and lift upward on the spring-loaded latch (*refer to Unlatching the Instrument Shoe*). Open the shoe perpendicular to the instrument housing.
2. Carefully rotate the instrument over and rest it on its top.
3. Slide the battery pack into the compartment with the battery connector facing down and to the back of the instrument.
4. Press down on the pack until the connector is properly seated and the tabs click into position.



Apply Power

The Battery switch—located on the back of the instrument—turns the instrument off and on during battery operation. When the AC adapter is attached, the instrument remains on and the battery switch has no effect.

Taking a measurement or pressing a key turns the instrument back on during a power-down. However, if the instrument is turned off with the battery switch you must turn it back on with the battery switch.



Charging the Battery Pack

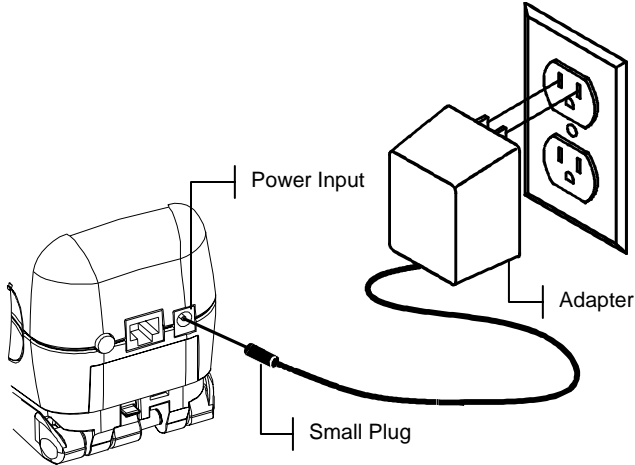
NOTE: The battery pack must be installed before plugging in the AC Adapter.

Only use the AC Adapter supplied or the optional battery charger to charge the battery pack. The battery pack must remain in the instrument at all times to operate.

Before initial “remote” use of the instrument, charge the battery pack for approximately four hours. However, if immediate use is required, the instrument can be operated “tethered” to the AC adapter during battery charging.

To attach the AC adapter:

1. Verify that the voltage indicated on the adapter complies with the AC line voltage in your area. If not, contact X-Rite or an authorized representative.
2. Insert the small plug from the adapter into the power-input connector on the instrument. (If you are using serial cable SE108-92, you may insert the small plug into the power connector at the end of the cable.)
3. Plug the adapter into an AC wall receptacle.

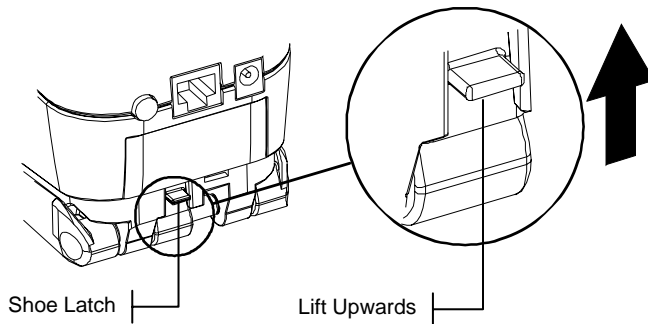


Unlatching the Instrument Shoe

The shoe can be pivoted open 180° from its closed position.

To Unlatch the Instrument Shoe:

1. Hold the shoe next to the instrument housing and lift upward on the spring-loaded latch.
2. Slowly allow the shoe to pivot toward the back of the instrument and release the latch.



To latch the Instrument Shoe:

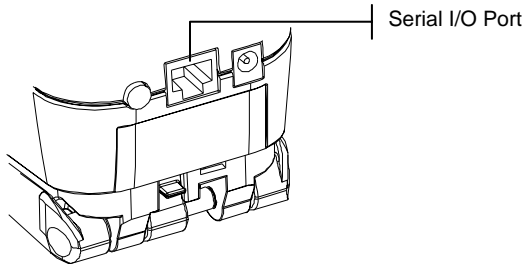
1. Simply close the shoe to the instrument. The latch is spring-loaded and automatically latches to the shoe catch.

Instrument I/O Serial Interface

Your instrument can be connected to a computer or printer using a serial RS-232 interface cable and adapter. X-Rite carries a variety of adapters to meet your requirements.

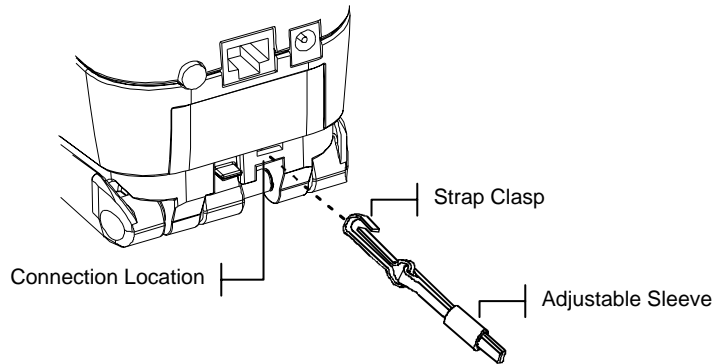
To install the interface cabling:

1. Insert the modular end of the interface cable into the I/O port located on the back of the instrument. The cable connector “clicks” when properly attached.
2. If required, attach an additional adapter to the other end of the cable.



Attaching the Wrist Strap

A security wrist strap is included to safeguard against accidentally dropping of the instrument. The strap is attached to the instrument by simply securing the clasp to the designated location on the back of the housing. Adjust the strap by sliding the sleeve to tighten around your wrist.

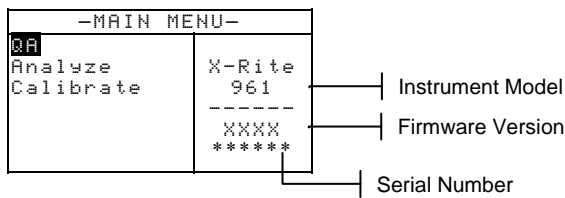


User Interface

What to Expect	2-1
Navigation – Basic Key Operation	2-1
Measurement Mode Screens	2-3
Data Storage Information	2-3
Instrument Indicator Light	2-3
Important Measurement Techniques	2-3

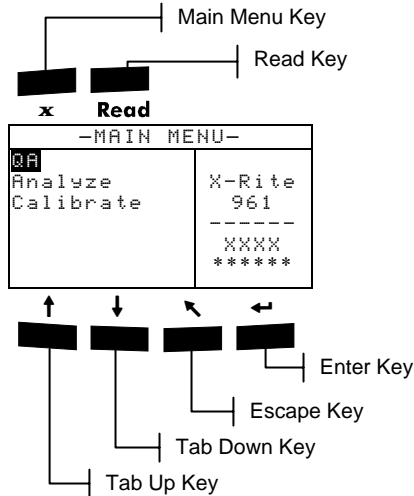
What to Expect

When the instrument is powered-up, the main (top level) screen appears. The main screen consists of two areas, Main Menu and Instrument Data. The left side of the screen lists all available modes. The right side of the screen lists instrument model and firmware version information.



Navigation – Basic Key Operation

Perform reading and menu/option navigation with the five keys arranged around the display screen. Each key has a unique symbol for performing a specific operation.





Tab Down key

Advances the highlighted bar (reverse image) to the next available “tab stop.” A “tab stop” indicates an item that can be acted on further, such as a menu item. Tab stops generally follow a left-to-right or top-to-bottom sequence.



Tab Up key

Performs the same function as the Tab Down key except in reverse order. Tab stops follow a right-to-left or bottom-to-top sequence.



Enter key

Activates the highlighted item. When entering an active mode from the main menu, the active mode is displayed with the highlight on the first required operation in the mode.



Escape key

Backs up the instrument screen one menu level.



Main Menu key

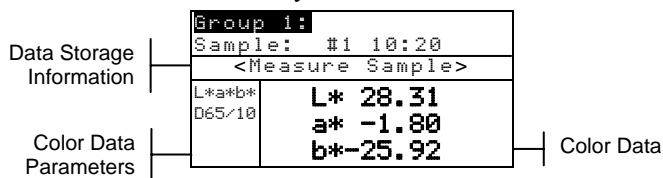
Returns the instrument screen to the main menu. This is a quick exit out of any mode. If any option or value is being modified at the time the key is pressed, the edits are aborted and the previous setting reinstated.

Read key

Initiates a reading when pressed. Note, this function is only activated through an RCI command. Not all applications utilize this functionality.

Measurement Mode Screen

The QA measurement screen consists of three main areas: Data Storage Information, Color Data Parameters, and Color Data. The Analyze screen is the same minus the storage information.



Data Storage Information

In QA mode, this area displays the group #, and sample information associated with stored data. Repeatedly pressing the Enter key ← when **Group#** is highlighted pages through the available groups in the instrument. Repeatedly pressing the Enter key ← when the time stamp (**10:20**) is highlighted pages through the samples stored in the instrument. Pressing the Enter key ← when **Sample** is highlighted activates the sample transmit/delete menu.

This area is not applicable in Analyze mode.

Color Data Parameters

This portion of the screen displays the current parameters for the values displayed in the Color Data Area.

Color Data

This portion of the screen instantaneously displays measurement data for the active measurement mode.

Instrument Indicator Light

The LED located next to the display illuminates various color conditions during instrument measurements.

- Flashing Amber – instrument calibration is required or measurement aborted.
- Solid Amber – measurement is taking place.

Important Measurement Techniques

In order for the instrument to obtain accurate and repeatable measurements, the bottom of the shoe must be flat on the surface to be measured.

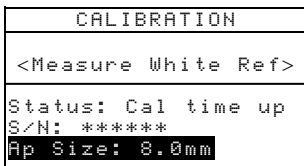
Instrument Calibration

General Information	3-1
Positioning the Instrument on the Reference	3-2
Calibration Procedure	3-3

General Information

Under normal circumstances, the instrument should be calibrated at least once a day.

At the Main Menu, use the Tab Up ↑ or Tab Down ↓ key to highlight **Calibrate**. Press the Enter key ↵ to access the Calibration Menu.



The bottom portion of the calibration screen displays information regarding the calibration status, cal plaque serial number, and instrument aperture size. The status line displays as either Cal OK or Cal time up. Cal time up indicates that calibration is required. Cal Ok indicates that no calibration is required at this time. The serial number displayed on the second line should match the serial number listed on your calibration reference. The aperture size line displays the current size.

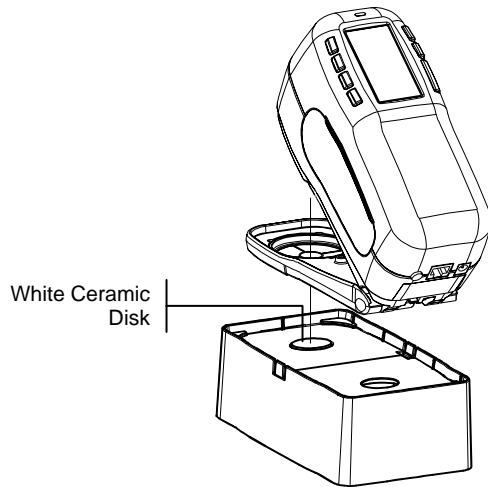
NOTE: Refer to Appendices for a detailed procedure on changing the aperture setting and size.

Positioning the Instrument on the Reference

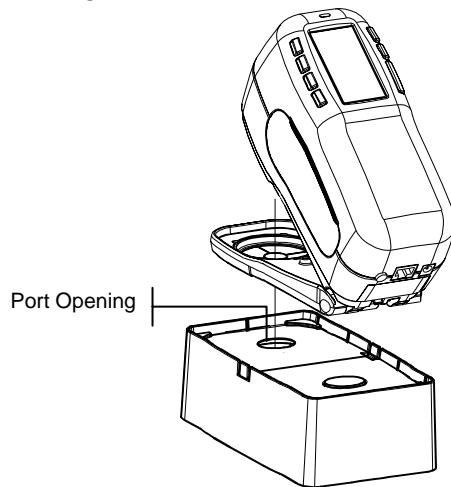
The calibration reference consists of a ceramic disk for white calibration measurements and a trap opening for black calibration measurements. The instrument shoe fits snugly in both positions. *Refer below for proper positioning.*

NOTE: Make sure the calibration reference is clean before use. *Refer to the calibration cleaning procedure in Section Five.*

White Reading Position



Black Reading Position



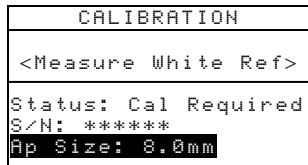
Calibration Procedure

A normal calibration procedure consists of one white measurement followed by one black measurement (two white and two black measurements are required if an aperture change is made). The instrument notifies you when a calibration is required.

NOTE: The instrument must be calibrated with the target window removed when using the instrument with the shoe extended (unlatched).

To perform a calibration:

1. At the Calibration menu screen, position the target window over the white ceramic disk as previously explained.



2. Press the instrument firmly to the shoe. Hold steady until the screen indicates the white calibration is completed. Release instrument when <Success!> is displayed.
3. If an aperture change was made, repeat step two and measure the white reference again.
4. Position the target window over the black port opening as previously explained.
5. Press the instrument firmly to the shoe. Hold steady until the screen indicates the black calibration is completed.
6. If an aperture change was made, repeat step five and measure the black port opening again.
7. Store the calibration reference in a dry, dust free area, away from direct exposure to light.

Instrument Operations

QA Mode	4-1
Analyze Mode	4-4

QA Mode

QA mode is used to store sample measurements in the instrument's database. Before measuring, a sample is assigned to a specific group. After a measurement, the sample is numbered and time stamped. The instrument provides a large amount of RAM for storing samples. Stored data can then be viewed, deleted, or transmitted to a computer.

To access QA mode:

At the Main Menu, use the Tab Up ↑ or Tab Down ↓ key to highlight **QA**. Press the Enter key ↵ to access the QA menu.

Group 1:	
Sample: #1 10:20	
<Measure Sample>	
L*a*b*	L* 28.31
065/10	a* -1.80
	b* -25.92

Group Numbers

Measurements can be assigned to specific groups. The number of groups that are available depends on your particular application. Note: The instrument comes from the factory with one group as the default.

QA Operation

To measure and store a sample:

1. At the QA menu screen, select the desired group (if more than one group is available) by pressing the Enter ↵ key with **Group #** highlighted.

Data Storage Group

Group 1:	
Sample: #1 10:20	
<Measure Sample>	
L*a*b*	L* 28.31
065/10	a* -1.80
	b* -25.92

2. Position the instrument's target window on the sample and take a measurement by lowering the instrument to the shoe and holding. Release the instrument when <Measurement Done> is displayed.

Viewing Stored Sample Data

Stored sample data can be retrieved from the instrument for viewing at a later time.

To view stored sample data:

1. Use the Tab keys $\uparrow\downarrow$ to highlight the sample number and time stamp.
2. Continually press the Enter \leftarrow key to page through stored samples. *To delete or transmit the stored sample, refer to Sample Database Tools.*

Group 1:		Sample number and time stamp
Sample: #1 10:20		
<Measure Sample>		
L*a*b*	L* 28.31	
D65/10	a* -1.80	
	b*-25.92	

Group/Sample Tools

The Group/Sample Tools menu allows you to transmit data to a computer and delete stored sample data.

To access the tools menu:

1. Select the group # location (if used) and stored sample # as discussed earlier.
2. Use the Tab keys $\uparrow\downarrow$ to highlight **Sample**.
3. Press the Enter \leftarrow key to open the Group/Sample menu.

Group 1 - Sample: 4	Selected group and sample
Transmit This Sample	
Transmit Group Samples	
Transmit All Samples	
Delete This Sample	
Delete Group Samples	
Delete All Samples	

Transmit This Sample

Transmits the current sample data out the serial port.

Transmit Group Samples

Transmits all samples that exist in the select group.

Transmit All Samples

Transmits all samples stored in the instrument.

Delete This Sample

Deletes the current sample from the database.

Delete Group Samples

Deletes all samples stored in the selected group.

Delete All Samples

Deletes all samples stored in the database.

4. Use the Tab keys **↑↓** to highlight the desired option and press the Enter key **↵**.
5. Use the Tab keys **↑↓** to highlight **Yes** and press the Enter key **↵** to initiate the selected option.

Analyze Mode

The Analyze mode allows you to take measurements and view the colorimetric data. The resulting color data is not stored in the instrument.

To access the Analyze mode and take a measurement:

1. At the Main Menu, use the Tab keys \updownarrow to highlight **Analyze**.
2. Press the Enter key \leftarrow to access the Analyze mode. Data from the last measurement taken is displayed.

Analyze	
<Measure Sample>	
L*a*b* D65/10	L* 33.65 a* +1.30 b* -35.26

3. Position the instrument's target window on the sample and take a measurement by lowering the instrument to the shoe and holding. Release the instrument when <Measurement Done> is displayed.

Service and General Maintenance

Repair Information	5-1
Cleaning the Instrument	5-1
Replacing the Battery Pack	5-3

Repair Information

The X-Rite® 961 instrument is covered by a one-year limited warranty—excluding battery pack—and should be referred to factory or authorized service center for repairs within the warranty period. Attempts to make repairs within this time frame may void the warranty.

X-Rite provides a factory repair service to their customers. Because of the complexity of the circuitry, all repairs should be referred to the factory (Tel: 1-888-826-3042 or 1-616-534-7663) or an authorized service center.

X-Rite will repair any instrument past warranty. The customer shall pay shipping cost to the factory or authorized service center and repair cost. The instrument shall be submitted in the original carton, as a complete unaltered unit.

Reading Lamp Replacement Information

Due to the circuit complexity and test equipment required, **the read lamp should only be replaced by X-Rite or an authorized X-Rite Service Center.**

The lamp is monitored for intensity, and failure warnings will be displayed if a problem occurs.

Cleaning the Instrument

Your instrument requires very little maintenance to achieve years of reliable operation. However, to protect your investment and maintain reading accuracy, a few simple cleaning procedures should be performed from time to time.

General Cleaning

The exterior of the instrument may be wiped clean with a cloth dampened in water or mild cleaner whenever required.

NOTE: *DO NOT* use any solvents to clean the instrument; this causes damage to the cover.

Cleaning the Optics

The optics should be cleaned once a week in normal environments, and more often in dirty or dusty environments. Carefully lift the instrument and blow short bursts of clean, dry air into the measurement aperture. This should remove any accumulated dust in the optics area.

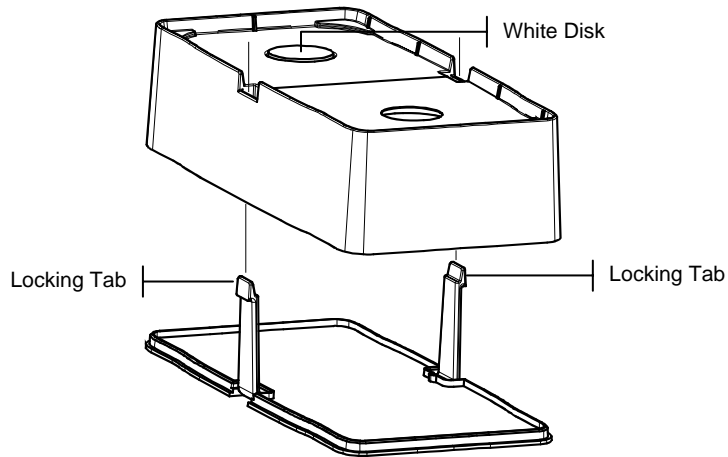
WARNING: DO NOT invert cans that use Freon as a propellant; doing so could cause damage to the optics assembly.

Cleaning the Calibration Reference

The calibration reference consists of a ceramic disk for white calibration measurements and a trap opening for black calibration measurements.

The white ceramic disk can be cleaned periodically using a mild soap and warm water solution, thoroughly rinsed with warm water and wiped dry with a lint-free cloth. Do not use solvents or cleaners of any kind.

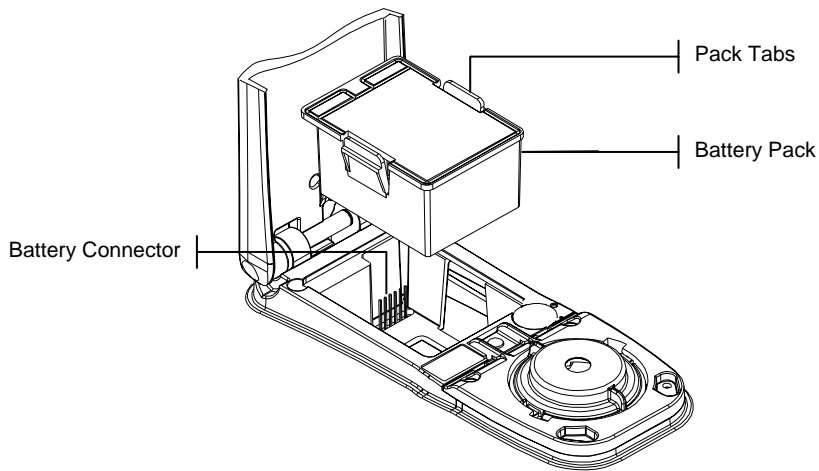
The black trap portion of the reference should be cleaned with clean, dry air from time to time to remove any dust or contamination. The reference can be taken apart for easy cleaning of the black trap by compressing the two locking tabs on both sides of the case with your fingers, and separating the two sections.



Make sure to store the calibration reference in a dry, dust free area, away from direct exposure to light.

Replacing the Battery Pack

1. Unplug the AC adapter and click the battery switch to Off.
2. Hold the shoe next to the instrument housing and lift upward on the spring-loaded latch. Open the shoe perpendicular to the instrument housing. *Refer to Unlatching the Instrument Shoe in Section One.*
3. Carefully rotate the instrument over and rest it on its top.
4. Using your fingers, compress the two tabs located on both sides of the battery pack and remove battery pack.
5. Slide a fresh battery pack into the compartment with the battery connector facing down and to the back of the instrument.
6. Press down on the pack until the connector is properly seated and the tabs click into position.



Appendices

Instrument Specifications	6-1
Error Messages	6-2
Parts List and Packaging	6-3
Changing the Aperture	6-5

Instrument Specifications

Measurement Geometrics	0/45°, DRS spectral engine, choice of optical aperture: 4mm, 8mm, and 16mm
Light Source	Gas-filled tungsten lamp
Illuminant Types (set by RCI)	C, D50, D65, D75, A, F2, F7, F11, & F12
Standard Observers (set by RCI)	2° & 10°
Receiver	Blue-enhanced silicon photodiodes
Spectral Range	400nm – 700nm
Spectral Interval	10nm – measured, 10nm – output
Storage	2,000 Samples
Measurement Range	0 to 200% reflectance
Measuring Time	Approx. 2 seconds
Inter-Instrument Agreement	0.30 ΔE^*_{ab} , based on avg. of 12 BCRA series II tiles 0.50 ΔE^*_{ab} max. on any tile
Short-Term Repeatability	.10 ΔE^*_{ab} max. on white ceramic, standard deviation
Lamp Life	Approx. 500,000 measurements
Power Supply	Removable Ni-metal hydride battery pack; 7.2 VDC rated @ 1250 mAh (P/N SP62-79-33).
AC Adapter Requirements	Domestic: Input 120 VAC / 60 Hz Output 15 Vdc / 700 mA International: Input 100-240 VAC, 50/60 Hz Output 12 Vdc / 2.5 A
Charge Time	Approx. 4 hours – 100% capacity
Measurements Per Charge	1,000 measurements typical
Data Interface	Patented bi-directional RS-232, 300-57,600 baud
Display	128 x 256 pixel graphical LCD
Operating Temperature Range	50° to 104°F (10° to 40°C) 85% relative humidity maximum (non-condensing)
Storage Temperature Range	-4° to 122°F (-20° to 50°C)
Dimensions	4.3"H (10.9cm) 3.3"W (8.4cm) 7.7"L (19.6cm)
Weight	2.4 lbs. (1.1 kg)
Accessories Provided	Calibration Standard, Manual, AC Adapter, Carrying Case
Usage	Indoor only
Altitude	2000m
Pollution Degree	2
Overvoltage	Category II

X-Rite standards are traceable to National Research Council Canada, Laboratory for Basic Standards. This product covered by U.S. and foreign Patents Pending. Specifications and design subject to change without notice.

Error Messages

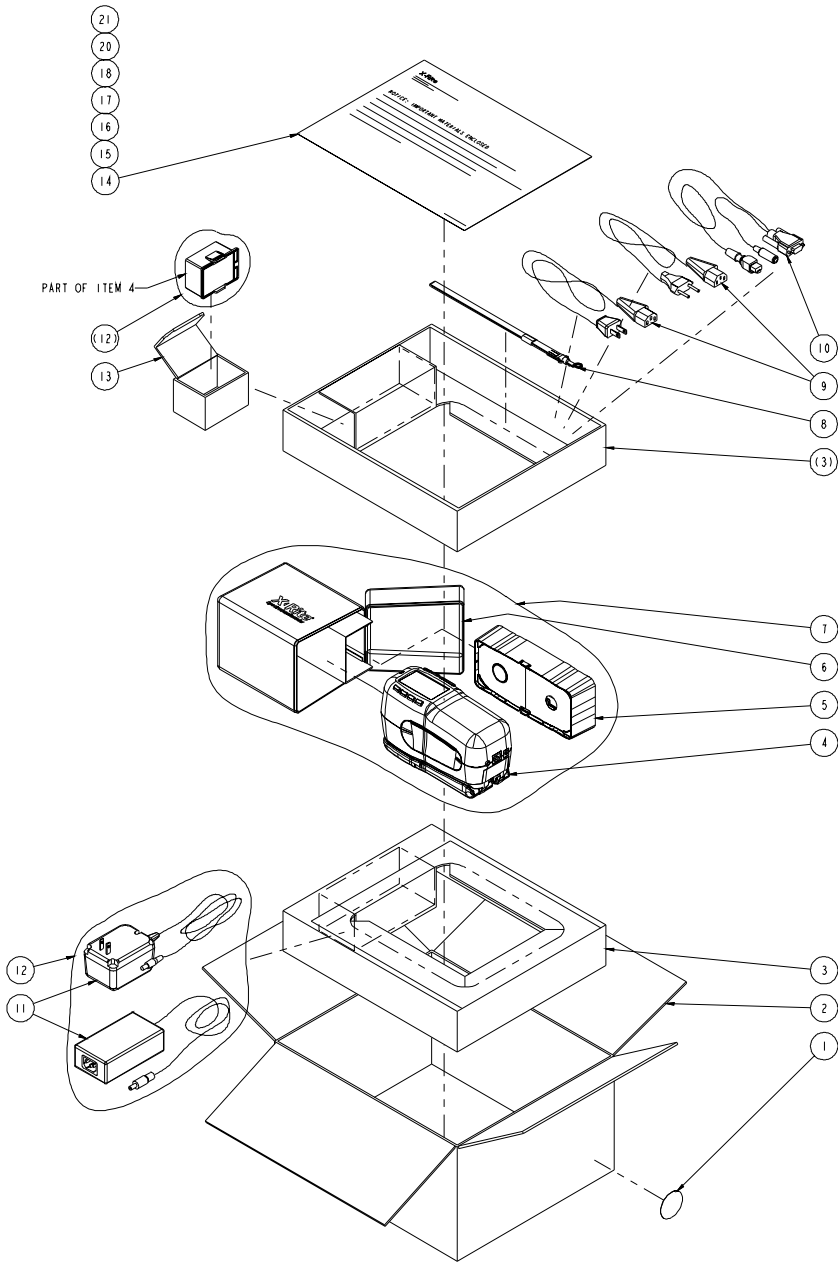
Errors encountered during a measurement are displayed on the instrument screen. All errors are accompanied by a long beep and flashing yellow light. The error message is cleared from the instrument screen by pressing the Enter key **↵**.

Displayed Errors:	Reason
Measurement was aborted by user	Displays with an incomplete measurement or calibration. Instrument was released too soon.
Calibration has timed out	The calibration interval time set in the configuration has been reached. Calibration is now required.
Calibration required	Displays anytime the instrument requires a calibration.
Calibration has failed	Calibration failed. Make sure the instrument is properly positioned on the reference.
Black cal failed	A measurement change was detected from previous measurements. Re-measure black trap.
Was white cal plaque measured Yes No	The instrument wants to verify that the white cal reference was measured. Press Yes if white cal was measured. Press No if white cal was not measured and measure white cal.
The battery is getting low	This warning appears when the battery falls below approximately 25% of full charge. Measurements are still possible, but the battery should be charged soon.
Batteries are dead	Displays when not enough battery power remains to take measurement. The current measurement is aborted.
Batteries are missing	The battery pack is not installed. Instrument will not allow any measurements.
Incorrect Charger Voltage	Wrong charger is connected or charger is bad.
The battery is over-charged	The battery pack is too hot. Remove the battery pack and let it cool.
Lamp is getting weak, replace soon	Reading lamp is at 50% strength or less from its original intensity. Measurements are still possible but the lamp should be replaced soon.
Transmission in Progress	A measurement was attempted during a data transmission from the I/O port. Wait until transmission is completed before measuring.

Parts List

21	1	1	1	1	1	1	SP62-513	BATTERY INSTRUCTION
20	1	1	1	1	1	1	SD01-41	CERTIFICATE OF CONFORMANCE
19	-	-	-	-	-	-	NOT USED	
18	1	1	1	1	1	1	SD01-10	IMPORTANT NOTICE-SERVICE
17	-	-	-	-	-	-	NOT USED	
	-	-	-	1	1	1	SD01-99	TRANSLATED WARRANTY REGISTRATIONS
16	1	1	1	1	1	1	SD01-04	WARRANTY REGISTRATION
	-	-	-	-	-	-	961-500	961 MANUAL
15	-	-	-	-	-	-	NOT USED	
14	1	1	1	1	1	1	SD68-10	PACKAGING ENVELOPE
13	1	1	1	1	1	1	SD200-07	CARTON
12	2	2	2	2	2	2	SD65-09	POLY. BAG-6 x 8
11	-	-	-	1	1	1	SE30-77	POWER SUPPLY, 12V
	1	1	1	-	-	-	SE30-81	AC ADAPTOR-15VDC
10	1	1	1	1	1	1	SE108-92-01	5XX SERIES INTERFACE CABLE
9	-	-	-	-	-	-	NOT USED	
	-	-	-	1	1	1	SD33-15	LINE CORD
8	1	1	1	1	1	1	SP62-99-01	SAFETY STRAP
7	1	1	1	1	1	1	SD65-07	POLY. BAG-12 x 16
6	1	1	1	1	1	1	SD67-11-03	CARRYING CASE
5	1	1	1	1	1	1	962-162	CALIBRATION STANDARD ASSEMBLY
	-	-	1	-	-	1	961L-00-01	INSTRUMENT ASSEMBLY
	-	1	-	-	1	-	961-00-01	INSTRUMENT ASSEMBLY
4	1	-	-	1	-	-	961S-00-01	INSTRUMENT ASSEMBLY
	2	2	2	2	2	2	SD200-880-06	CARTON INSERT
3	2	2	2	2	2	2	SD200-900-01	CARTON
2	1	1	1	1	1	1	SD43-77	CE LABEL
1	1	1	1	1	1	1		
ITEM	QTY 961S	QTY 961	QTY 961L	QTY 961SX	QTY 961X	QTY 961LX	PART NUMBER	DESCRIPTION
961 PARTS LIST								

Packaging



Changing the Aperture

The instrument was designed to allow you to quickly change the aperture and target window. X-Rite provides three aperture kits especially designed for the instrument. *Available kits:* 4mm, 8mm (standard), and 16mm.

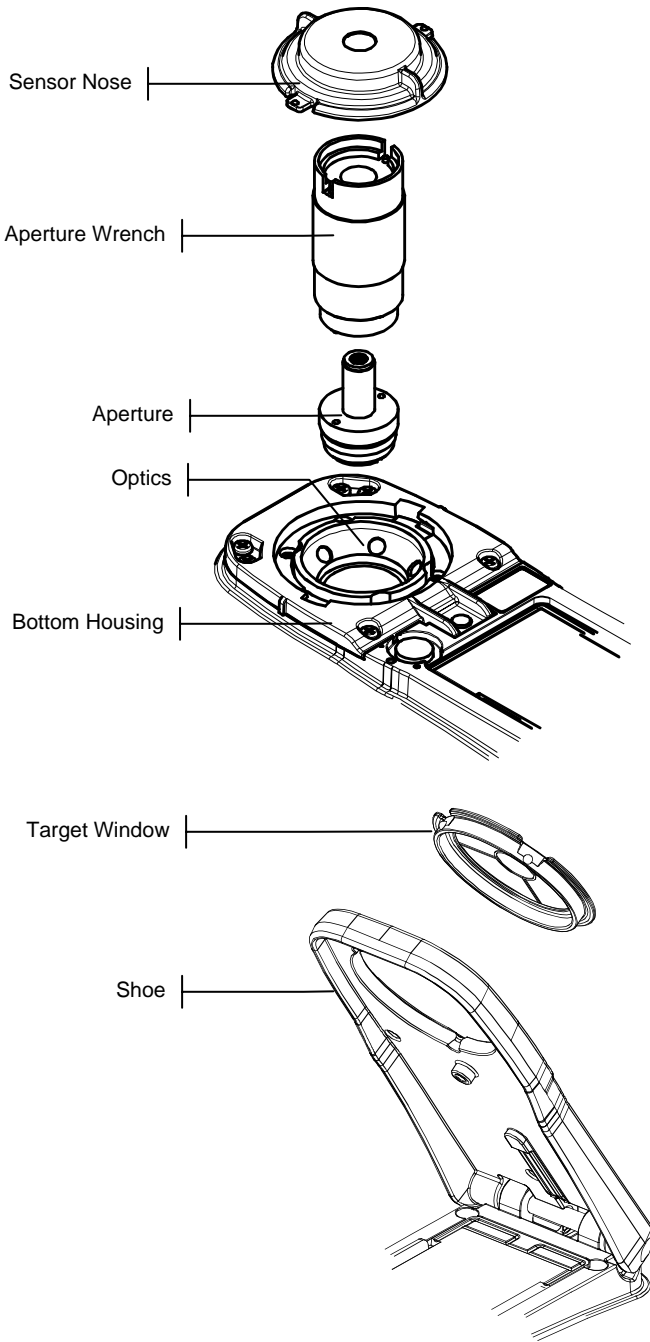
Refer to the next page for illustrations.

To change the aperture size:

1. Unplug the AC adapter and click the battery switch to Off.
2. Hold the shoe next to the instrument housing and lift upward on the spring-loaded latch. Open the shoe perpendicular to the instrument housing. *Refer to Unlatching the Instrument Shoe in Section One.*
3. Carefully rotate the instrument over and rest it on its top.
4. Using your fingers, rotate the sensor nose to the left (counter-clockwise) until it stops.
5. Carefully remove the sensor nose by lifting upwards and set aside.
6. Position the appropriate end of the aperture wrench on the existing aperture and remove by turning to the left (counter-clockwise) until it is free. Set existing aperture aside.

CAUTION: Extreme care should be taken not to contaminate the optics with any dust or dirt when installing the new aperture.

7. Align new aperture over opening in optics and secure by using the appropriate end of the aperture wrench.
8. Position corresponding sensor nose over the optics opening in the bottom housing and rotate to the right (clockwise) until it stops.
9. Using your fingers, press the target window out from the topside of the shoe. Press against the ring and not the clear window.
10. Note the alignment of the new window and snap it into place from the bottom side of the shoe.
11. The aperture setting in the instrument must now be set to match the new size. Refer to the following procedure.



Changing the Aperture Setting

1. At the Main Menu, use the Tab Up ↑ or Tab Down ↓ key to highlight **Calibrate**. Press the Enter key ↵ to access the Calibration Menu.

CALIBRATION
<Measure White Ref>
Status: Cal time up
S/N: *****
Ap Size: 8.0mm

2. Press the Enter key ↵ again to access the Choose Aperture editor.
3. Use the Tab Up ↑ or Tab Down ↓ key to highlight the new aperture size. Press the Enter key ↵ to save selection and exit back to the Calibration menu.
4. Calibrate the instrument to the new aperture size (*refer to Calibration, Section Three*).



X-Rite, Incorporated - World Headquarters

3100 44th Street S.W. • Grandville, Michigan 49418 • USA

www.x-rite.com

Tel: 1-888-826-3042 • Fax: 1-888-826-3043 or (616) 534-0726

International Numbers

Tel: 1-888-826-3039 or (616) 534-7663 • Fax: (616) 534-0723

X-Rite GmbH

Stollwerkstraße 32 • 51149 Köln • Germany

Tel: (49) 22 03 – 91 45-0 • Fax: (49) 22 03 – 91 45-19

X-Rite GmbH

Sochorova 705 • CZ-682 • 11 Vyskov • Czech Republic

Tel: (420) 507-328197 • Fax: (420) 507-328138

X-Rite Asia Pacific Ltd.

Room 808-10 • Kornhill Metro Tower • 1 Kornhill Road • Quarry Bay

Hong Kong • Tel: (852) 2-568-6283 • Fax: (852) 2-885-8610

X-Rite Ltd.

The Acumen Centre • First Avenue

Poynton, Cheshire • England

Tel: 44-0-1625-871100 • Fax: 44-0-1625-871444

X-Rite Méditerranée

Parc du moulin de Massy • 35, rue du Saule Trapu • 91300 Massy • France

Tel: 33-1-69.53.66.20 • FAX 33-1-69.53.00.52

X-Rite Italy Srl

Via per Caronno, 35

21040 Origgio (Va) • Italy

Tel. 0039 02 96734266 • Fax. 0039 02 96730681

X-Rite K.K.

4F, 3-19-18 Shibaura, Minato-ku

Tokyo • 108-0023 Japan

Tel: +81-3-5439-5971 • Fax: +81-3-5439-5972

X-Rite Asia Pacific Ltd. - Singapore Representative Office

14 Science Park Drive • #02-04 The Maxwell

Singapore Science Park • Singapore 118226

Tel: + 65 7788-773 • Fax: + 65 7788-645