Color-Eye® 7000A

Spectrophotometer

Operation Manual

x-rite

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SECTION 1 - Read This First

Scope

The Color-Eye® 7000A Operation Manual contains the information you need to set up the unit, take measurements, and perform maintenance procedures on the spectrophotometer. The manual is presented in five sections:

Section 1: Read This First, describes the basic principles behind the operation of the CE-7000A (Color-Eye® 7000A), and presents all important safeguards.

Section 2: Installation, identifies electrical, space, environmental and cabling requirements for installation of the CE-7000A spectrophotometer.

Section 3: Touch Pad, describes the operation of the two Touch Pad screens: the Main Menu and the Setup Display.

Section 4: Operation, describes how to turn the instrument on and off, install the SCE light trap, use the viewport door release, use the retaining lever, change the sampling aperture, adjust the zoom lens, and use the thin film sample and cuvette holders.

Section 5: Maintenance, provides routine maintenance procedures that can be performed by the user.

Important Safeguards

In addition to the careful attention that we have devoted to quality standards in the manufacture of your unit, your personal safety is a major factor in the design of each instrument we make. Safety is your responsibility too. This section lists the most important hazards, warnings, cautions, and notes that will help you protect your unit and yourself for many years of trouble free operation. Please read it carefully before you operate your unit.

CAUTION: Risk of electrical shock.

CAUTION: Documentation should be consulted in all areas where this symbol is shown.

1. Please Read and Follow Instructions—Read and follow all safety and operating instructions before you attempt to install and operate this unit.
2. Retain This Manual for Future Reference—Once you have read this manual, keep it handy for others to read or refer to when they need to operate the unit.
3. Obey Warnings—Please comply with all warnings and safeguards that we provide in this manual. They have been written to keep you and your unit safe.
4. Choose Proper Power Sources—This product should only operate with the power specified in the Electrical Requirements section of this manual.
5. Do Not Overload Circuits—Do not overload wall outlets or use extension cords with this unit. This can result in a risk of fire or electric shock. Overloaded AC outlets and extension cords are dangerous, and can also affect performance. Periodically examine cords to make certain that they are not damaged, cracked or severely twisted during operation. Cords that show any signs of damage or wear should be replaced immediately.
6. This device is not explosion-proof and should not be used in a hazardous atmosphere with exposure to flammable substances.
7. Protect from Water and Moisture—Maintain electrical safety when you use this unit. Do not use it in an area where there is possible hazard of electric shock from spilled water or other liquids or uncontrolled moisture.
8. Clean Properly—Make certain to unplug the spectrophotometer before you attempt to clean it. Do not use liquid cleaners or aerosol cleaners on your unit. Such cleaners may not be compatible with the painted surfaces, and may actually damage the optics. Use only a slightly

damp, lint-free cloth to clean the surface of the unit. Do not attempt to clean the inside of the viewport or the inside of the unit itself.

9. Do Not Force Objects into the Product—Never push objects of any kind into the viewport or interior of the unit in an attempt to mop up spilled liquids that may have entered these areas. If spills should occur that enter the unit, turn off the unit immediately and disconnect all power sources. You should contact a Service Representative to determine the best way to handle clean up, drying, and return to the factory for damage assessment.

Service

1. Service Properly—With the exception of those procedures given in the Maintenance section of this manual, do not attempt to service this product yourself. If you should attempt unauthorized repairs yourself, you may invalidate the warranty.
2. Call X-Rite when You Have Questions— A full complement of service and applications experts are ready to deliver the finest customer support and service available in the industry. When you contact X-Rite, you contact a group of professionals who are totally dedicated to your individual satisfaction in products and services. Thank you for buying and X-Rite product. We appreciate your business and look forward to working with you.

SECTION 2 - Installation

General

This section identifies the CE-7000A installation and unpacking instructions.

Unpacking the Instrument

Be certain to remove packing material from the zoom selector knob before operating the spectrophotometer.

1. Slide the bench cover door to the rear until it stops (See Figure 2-1).

CAUTION: DO NOT touch the lens with your fingers.

2. Carefully remove the black tape from the rubber shipping block.
3. Remove the rubber shipping block from the zoom lens selector knob.
4. Push the knob in until it clicks three times. You have positioned the lens at the Large Area View (LAV).

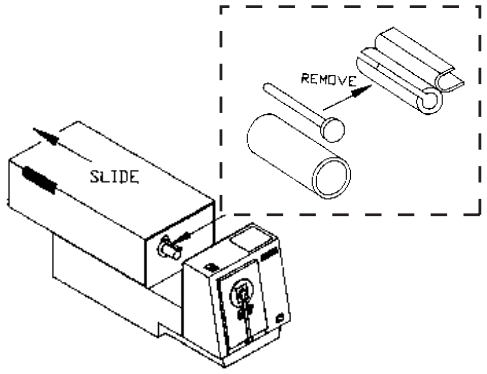


Figure 2-1. CE-7000A Zoom Selector Knob

NOTE: Please keep all packing material. X-Rite will not be liable for damage during the return shipment if repairs are needed**.**

5. Slide the bench cover door toward the front until it stops.
6. Peel off the protective film on the touch pad. This film is present only to protect the touch pad during shipment. Unpacking is complete.

Color Software

If your quality process requires control of the UV component, and you do not currently use the Optiview, Optiview Lite or ProPalette color control software, you should install the Optiview Lite software that has been shipped with your instrument. This software conveniently calibrates the UV component automatically. If you prefer to manually perform the UV calibration, please refer to Section 3 for instructions on manual UV calibration.

Specifications

The following summarizes specific requirements for proper installation.

Electrical Requirements (Standard Power Supply)

AC INPUT POWER	
117 VAC ± 10%	50-60 Hz
230 VAC ± 10%	50-60 Hz

NOTE: The CE-7000A requires a distortion-free, dedicated, power line capable of carrying 10 amps. The neutral leg-to-earth ground must not exceed 2 volts with 0.1 ohm resistance (maximum)**.**

WARNING: The ground circuit for the power outlet must be continuous to the main power panel. The main power panel must be grounded directly to an electrical earth ground. Improper grounding could result in a shock hazard.

Space Requirements

The following dimensions, weight and clearance are supplied so that you can place the spectrophotometer in an appropriate work environment.

DIMENSIONS
Height: ..... 15.25 in (38.7 cm)
Width: ..... 11 in (27.9 cm)
Depth: ..... 28 in (71.1 cm)
Weight: ..... 55 lb (24.95 kg)
Clearance: (from wall) ..... 6 in (15.24 cm)

Environmental Requirements

The following table lists the CE-7000A environmental requirements.

TEMPERATURE AND HUMIDITY	ACCEPTABLE RANGE
Temperature (Operating) Temperature (Storage)	59° F to 90° F (15°C to 32°C) -4°F to 140°F (- 20°C to 60°C)
Operating Relative Humidity	25% to 80% (Noncondensing)

Other Useful Specifications

The following presents other specifications which you may find useful in operating the CE-7000A.

General

Illumination	Pulsed Xenon
Optical Geometry Configuration	D/8 (diffuse)
Spectral Range	360 nm to 750 nm
Wavelength Interval	10 nm
Photometric Range	0%-200%
Photometric Resolution	16 bits, 0.001% R
Baud Rate	9600 (configured at factory)
Measurement Time	1 sec.
Transmission Measurement	Dual Beam, Direct & Total
Wavelength Accuracy	0.1 nm (400 nm to 700 nm)
Wavelength Precision	0.05 nm (400 nm to 700 nm)

Aperture Size

Large Area of View (LAV)	25.4mm (1")
Medium Area of View (MAV)	15mm (0.591")
Small Area of View (SAV)	10mm (0.394") by 7.5mm (0.295")
Very Small Area of View (VSAV)	3mm (0.118") by 8mm (0.315")

Repeatability

<0.01 RMS Delta E, CIELAB (Refer to Note 1 below.)

Inter-instrument Agreement

<0.08 Average Delta E, CIELAB (Refer to Note 2 below.)

NOTE 1: Representative of all instruments' performance using a stable white tile under controlled laboratory conditions.

NOTE 2: Representative of all instruments' performance using the average from the norms of 13 BCRA color tiles under controlled laboratory conditions.

Representative values (described in NOTES 1 and 2) may vary with the type(s) of samples measured.

Data Link Interconnection and Power Cabling

AC Power Cable

The CE-7000A is supplied with a six-foot power cable. Power is applied to the rear of the unit via a three-prong male connector. See Figure 2-2.

CAUTION: The voltage selector is preset at the factory to meet the voltage requirements for your facility. **Do not change this setting.**

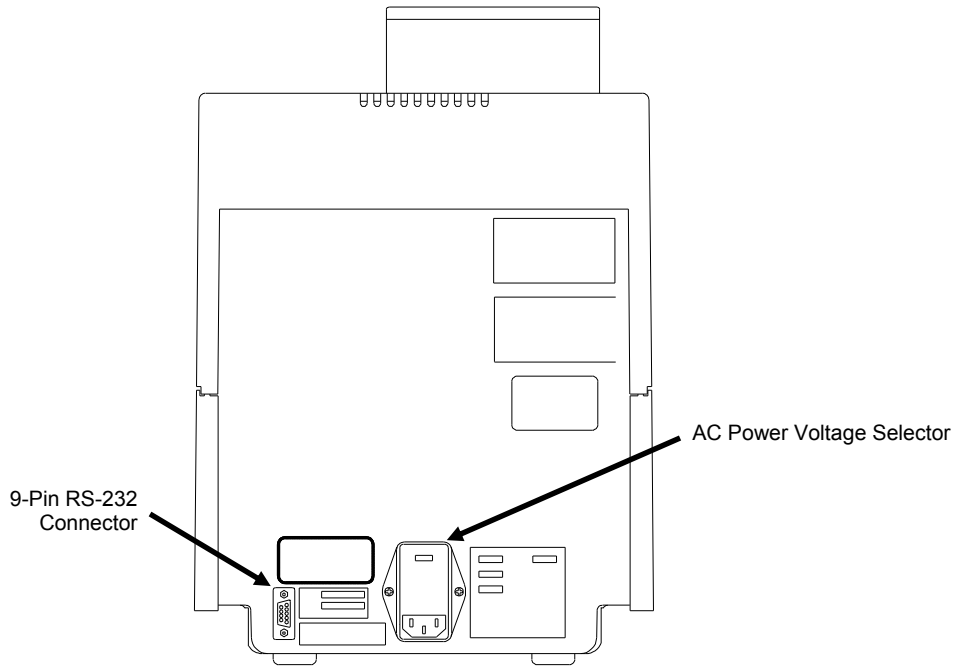


Figure 2-2. Rear of Unit Showing AC Power and RS-232 Connector

Communication Cable

Data is transferred between the CE-7000A and a computer processor via the communication cable. The six foot cable is equipped with male to female 9-pin connector assemblies. See Figure 2-2. for proper connection at the rear panel. The remaining end of the cable connects to a computer communications port.

SECTION 3 – Touch Pad

General

While it is possible to access most instrument options directly from the software programs, the Color-Eye 7000A also provides a touch sensitive LCD display (touch pad) which can also be used to access or change instrument status directly, without changing or leaving your program. The reasons for changing any instrument status is the same whether the software or the manual method is used. The information accessible through the touch pad includes:

Calibration Status
The instrument can be calibrated in either reflectance or transmission mode.

Lens Status
There are four different sized areas of view that the instrument can measure, depending on the sample size.

Aperture Status
There is an aperture status for each of the lens configurations. Both the lens and aperture selections should be the same.

UV Adjustments
The UV adjustment feature allows the user to set up to three custom different sphere illumination conditions. The placement of a UV cutoff filter in the illumination path allows the user to eliminate the UV, adjust for specific amounts of UV or include the full spectral distribution of the light source. This is helpful in the evaluation of optical brighteners or fluorescent colorants.

Specular Component Status
The sphere geometry can be set to include or exclude the sample's specular component.

Operating the Touch Pad

The Touch Pad has two screens: the Main Menu Display and the Setup Display (shown in Figure 3-1). The Main Menu Display shows the current configuration of the instrument. For example, the size of the sample aperture (LAV, SAV, VSAV) appears on the touch pad. The Setup Display allows you to adjust the UV filter and saves the filter locations.

The touch pad contains six "character cells" (referred to from now on as cells) that are present on each display (Main Menu Display and Setup Display). The touch pad cell configuration is shown in Figure 3-1.

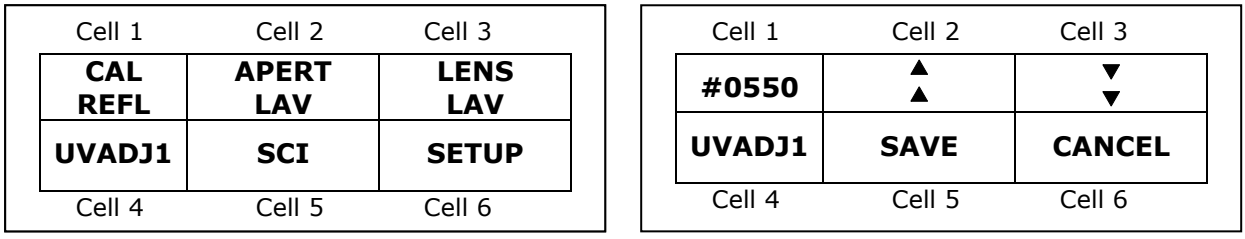


Figure 3-1. CE-7000A Touch Pad Display

NOTE: Whenever you need to activate a touch pad cell, it is important to touch and release the cell rather than touch and hold down that cell.

Main Menu Display

The Main Menu Display shows the current configuration of the instrument. Cells 1, 2, and 3 on the Main Menu Display are for display purposes only and are not touch cells. They act as indicators for the current configuration of the instrument.

Calibration Status- Cell 1

1	2	3
CAL REFL	APERT SAV	LENS SAV
UVADJ1	SCI	SETUP
4	5	6

Cell 1 on the Main Menu Display shows the instrument's calibration status. There are four possible settings for the calibration status:

Calibrated Reflectance Mode	Uncalibrated Reflectance Mode	Calibrated Transmittance Mode	Uncalibrated Transmittance Mode
CAL REFL	UNCAL REFL	CAL TRANS	UNCAL TRANS

Aperture Configuration Status- Cell 2

1	2	3
CAL REFL	APERT SAV	LENS SAV
UVADJ1	SCI	SETUP
4	5	6

Cell 2 on the Main Menu Display shows the instrument's aperture size. There are four possible view settings for the aperture configuration status:

Aperture Large Area View	Aperture Medium Area View	Aperture Small Area View	Aperture Very Small Area View
APERT LAV	APERT MAV	APERT SAV	APERT VSAV

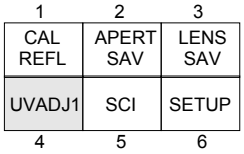
Lens Configuration Status- Cell 3

1	2	3
CAL REFL	APERT SAV	LENS SAV
UVADJ1	SCI	SETUP
4	5	6

Cell 3 on the Main Menu Display shows the instrument's lens area of view. There are four possible zoom lens settings for the lens configuration status:

Lens Large Area View	Lens Medium Area View	Lens Small Area View	Lens Very Small Area View
LENS LAV	LENS MAV	LENS SAV	LENS VSAV

UV Filter Position Status- Cell 4

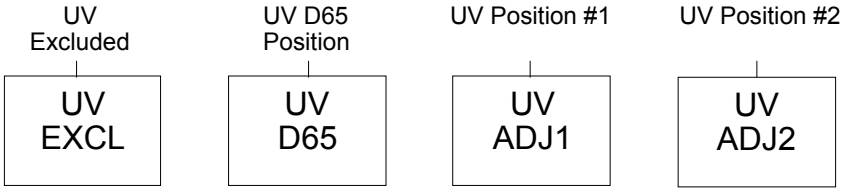


Cell 4 on the Main Menu Display shows the instrument's UV filter position *and* allows you to change the UV Filter Position. The position may be either UV EXCL (UV Excluded) or *one of the three* UV Included positions selected on the UV Setup Display. For more information on setting the UV Filter position for UVD65, UVADJ1, and UVADJ2, refer to "UV Setup- UVADJ1 and UVADJ2" describes on the next page.

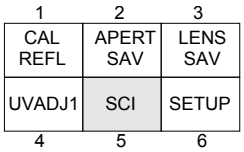
To change the UV Filter Position, touch and release Cell 4 until the position you want is displayed.

NOTE: After you change the UV Filter position, the message "WAIT" appears in Cell 4. Wait a few seconds for movement to stop inside the instrument and for the message to disappear before taking a measurement.

There are four possible position settings for the UV filter status:



SCE/SCI Function Status- Cell 5

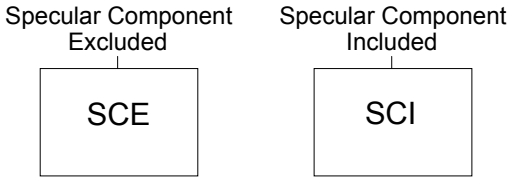


Cell 5 on the Main Menu Display shows the instrument's Specular Component *and* allows you to change the Specular Component.

To change the Specular Component position, touch and release Cell 5 until the setting you want is displayed.

NOTE: After you change the Specular Component position, the message "WAIT" appears in Cell 5. Wait a few seconds for movement to stop inside the instrument and for the message to disappear before taking a measurement.

There are two possible values for the specular component position:



NOTE: CE-7000A must be calibrated for each position of the specular component that you will use.

UV Setup- UVADJ1 and UVADJ2

1	2	3
CAL REFL	APERT SAV	LENS SAV
UVADJ1	SCI	SETUP
4	5	6

The UV Setup display adjusts the UV filter and saves filter locations. UVADJ1 stands for Ultraviolet Adjustment Position #1. UVADJ2 stands for Ultraviolet Adjustment Position #2. Follow these steps:

NOTE: Possible UV Filter locations displayed in Cell 1 may range from 0 to 1020.

1. Touch and release Cell 6 on the Main Menu Display until the Setup Menu is displayed on the Touch Pad. It should look like Figure 3-2.

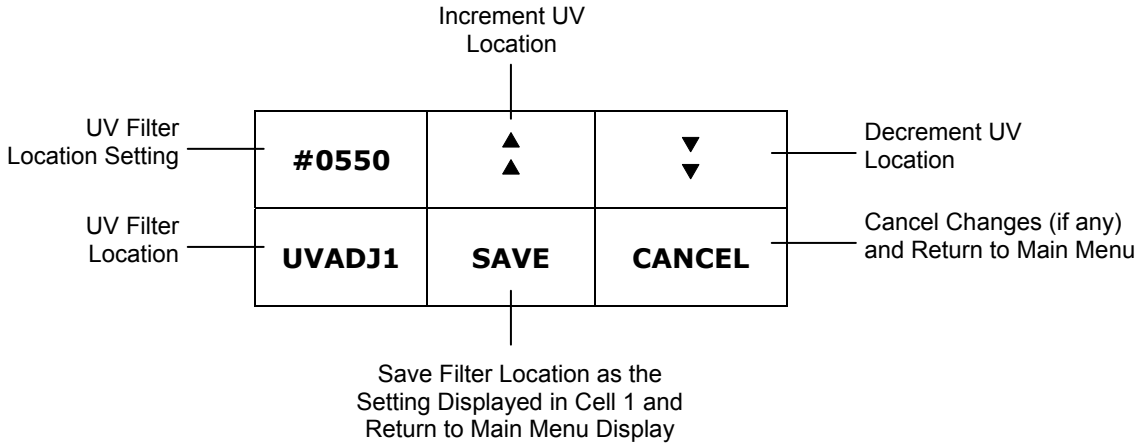


Figure 3-2. Touch Pad UV Filter Setup Display

2. Touch and release Cell 4 until the UV filter location (either UVADJ1 or UVADJ2) that you want to setup is displayed. For example, Figure 3-2 shows UVADJ1 as the selected filter location.
3. The current UV content for the filter location is displayed in Cell 1. Touch and hold Cell 2 to increase the UV content or touch and hold Cell 3 to decrease the UV content of the location.
4. Touch and release Cell 5 to save the filter location. The Main Menu Display appears.
5. Repeat steps through until UVADJ1 and UVADJ2 filter locations have been set up.

   NOTE: To return to the Main Menu Display without making or saving any changes, touch and release Cell 6. The Main Menu Display appears.

UV Setup- D65

The sample is illuminated with a pulsed-xenon source that is conditioned to approximate illuminant D65. This illumination contains ultraviolet light that can excite fluorescence. The Optiview Lite software that was shipped with your instrument contains an option to adjust the ultraviolet component. The Color-Eye 7000A also provides the capability for you to manually adjust the ultraviolet content of the light in order to provide a true D65 illumination.

To use the software to adjust the UV component, follow the instructions provided in the on-line help. To manually adjust the UV component to the value listed on the UV Adjustment Tile included with the instrument, proceed as follows:

NOTE: Before you do the following procedure, make certain that you are in the SCE (specular component excluded) mode of operation, and that the determination of the CIE (Ganz) whiteness index is done with D65 using a 10 degree standard observer.

1. Calibrate the instrument following the software instructions.
2. Touch and release Cell 6 on the Touch Pad until the Setup Menu is displayed. It should look like what is seen in Figure 3-2.
3. Touch and release Cell 4 until the UVD65 filter location is displayed in Cell 4.
4. Mount the UV Adjustment Tile on the sample port.
5. Measure the tile and calculate the CIE (Ganz) whiteness index using the appropriate software package.
6. Compare the measured CIE (Ganz) whiteness index to the CIE (Ganz) whiteness index printed on the rear of the UV Adjustment tile.
7. If the measured index does not match the printed index on the UV tile, adjust the UV content as follows:
    a. If the measured index displayed in the software is *greater than* the CIE (Ganz) whiteness index printed on the tile, decrease the UV component. The UV component will be decreased by 0.1 whiteness with each touch and release of Cell 3.
    b. If the measured index is *less than* the CIE (Ganz) whiteness index printed on the tile, increase the UV component. The UV component will be increased by 0.1 whiteness with each touch and release of Cell 1.
8. Repeat steps through until the measured CIE (Ganz) whiteness index matches the value printed on the rear of the UV Adjustment Tile.
9. Touch and release Cell 5 to save the UVD65 filter location. The Main Menu Display appears.

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SECTION 4 – Operation

General

This section describes how to turn the instrument on and off, install the Specular Component Excluded (SCE) light trap, retaining lever, thin film sample and cuvette holders, change the sampling aperture, and use the viewport door release.

Power On-Off Switch

The CE-7000A AC power on-off switch is located on the front of the instrument. See Figure 4-1. Press the *left* end of the rocker switch to apply AC power. To remove AC power from the unit press the *right* end of the rocker switch. A lamp located inside the switch lights when AC power is applied. The instrument is ready to use when you hear a short beep after power up. If the instrument does not respond to power up, check power connections to the unit and main power availability (breakers, fuses). If these connections are all right, check the unit's fuses. Refer to "Fuse Replacement" in Section 5.

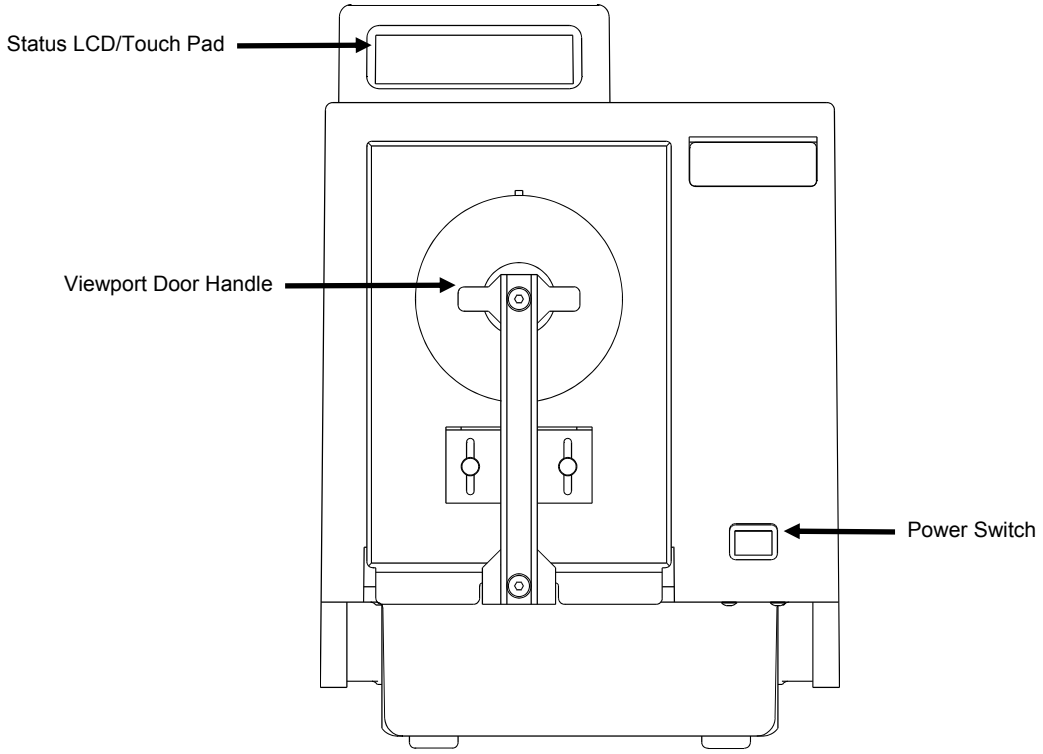


Figure 4-1. Front View Control and Indicator

Calibrating the Spectrophotometer

The Color-Eye 7000A spectrophotometer needs to be calibrated with the white ceramic calibration tile provided with the unit. It is best to calibrate the instrument at the location it is to be used. This will accommodate ambient temperature changes.

Before you Calibrate…

Please note the following before you calibrate the spectrophotometer:

- Calibration is required every 8 hours. It is a good practice to calibrate hourly.
- If the instrument is exposed to rapid changes in ambient temperature, calibrate to accommodate for these changes.
- Make certain that the serial number on the White Ceramic Calibration Tile is the same as the serial number on the instrument. Do not substitute another calibration tile for the one originally supplied.
- If the tile should be broken or become damaged, call X-Rite for advice on how to replace it.

Reflectance Calibration Procedure

1. Touch and release Cell 5 on the Main Menu Display until the desired specular component status (SCE/SCI) is displayed.
2. Select the desired sampling aperture. Refer to "Changing the Sampling Aperture" later in this section.
3. Use the software program to select reflectance mode.
4. Place the Zero Calibration Standard facing the unit so that it completely covers the viewport opening.
5. Use the software program to initiate the zero (black) calibration.
6. Place the White Calibration Tile facing the unit so that it completely covers the viewport opening.
7. Use the software program to initiate the white tile calibration.
8. After calibration return the white calibration tile to it storage area.

Transmission Calibration Procedure

1. Touch and release Cell 5 on the Main Menu Display until Specular Component Included is displayed.
2. Select the Large Area of View (LAV) sampling aperture and Large Area of View (LAV) Zoom Lens position. Refer to "Changing the Sampling Aperture" later in this section.
3. Place the Spectralon Calibration plaque facing the unit so that it completely covers the viewport opening.
4. Install the Thin Film / Transmission sample holder. (If a cuvette is to be used, insert a clean cell filled with distilled water in its holder.) Refer to "Using the Thin Film Sample Holder" later in this section.
5. Use the software program to select transmittance mode and initiate the calibration.

6. After calibration, leave the Spectralon Calibration plaque in the viewport for the remainder of the measurements.

Specular Component Excluded (SCE) Light Trap

The Specular Component Excluded (SCE) Light Trap is installed for reflectance measurements and is usually removed for performing transmission measurements. Transmission measurements should be made using the Transmission Sample Holder in the Specular Component Included (SCI) mode. Refer to "SCE/SCI Function Status- Cell 5" in Section 3 to select SCE or SCI. Install the SCE Light Trap so that rear button feet are inserted first into circular receptacles with the front tilted up slightly towards the rear of the light trap. Then, lower the front of the SCE Light Trap gently into position. To remove the SCE Light Trap, reverse this procedure.

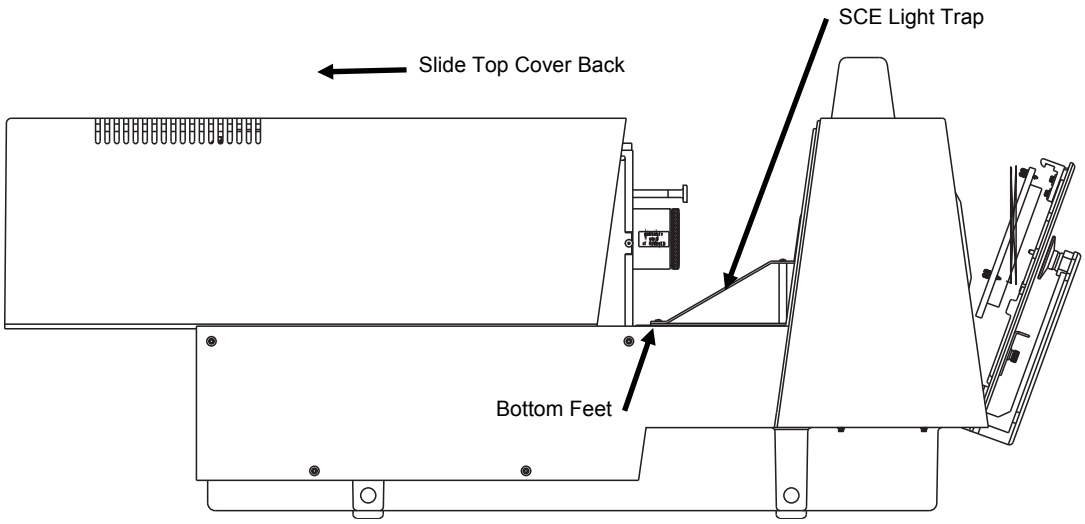


Figure 4-2. Installation of SCE Light Trap

Viewport Door Release

The viewport door release mechanism permits examination of a sample while it is being held in the viewport. The alignment of the sample in the port can be examined as it appears to the instrument by pressing the release mechanism, illustrated in Figure 4-3, and lowering the entire hinged viewport door assembly towards the operator to its rest position.

CAUTION: Do not press down on the viewport door while it is open. Excessive downward pressure could damage the hinge assembly.

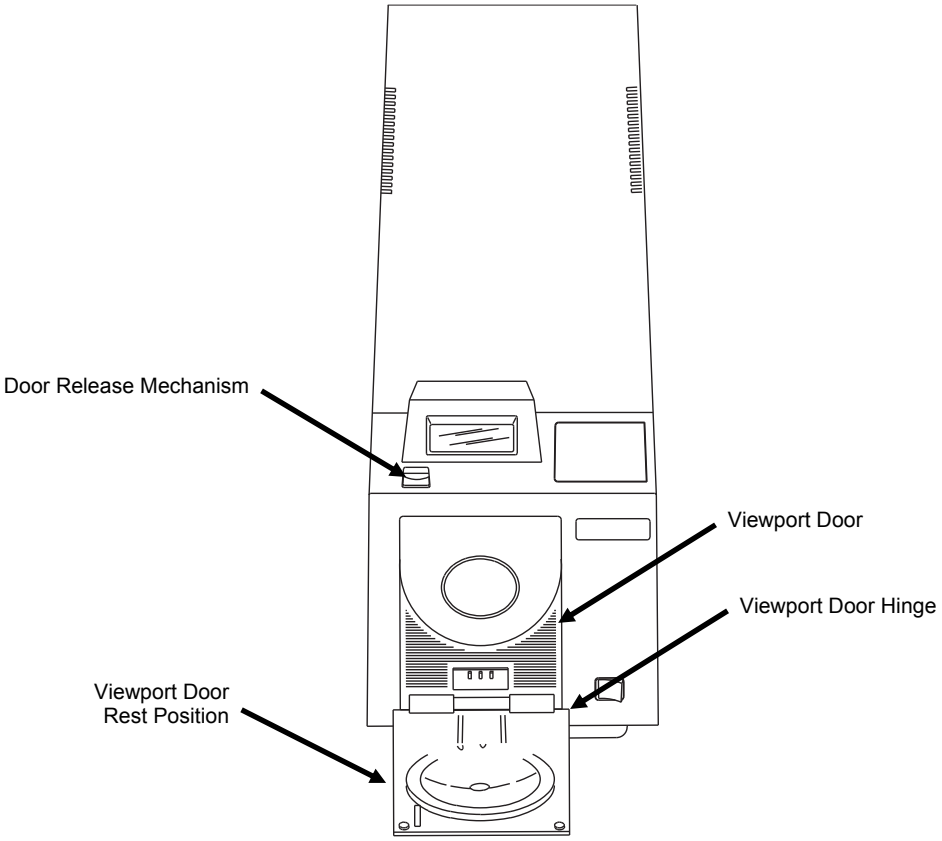


Figure 4-3. Viewport Door Release Mechanism, Resting Position

Retaining Lever

The 7000A is equipped with a lever that holds the sample arm away from the instrument while you change the aperture. It is called the "retaining lever" and is operated using the following steps.

1. Pull the sample arm away from the viewport door. See Figure 4-4.

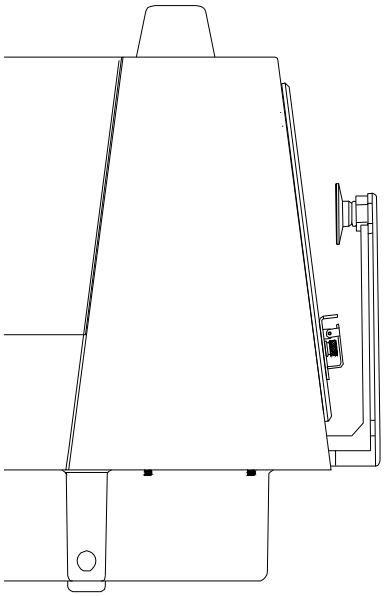


Figure 4-4. Pull Away Sample Arm

2. Rotate the retaining lever upward until it stops. See Figure 4-5.

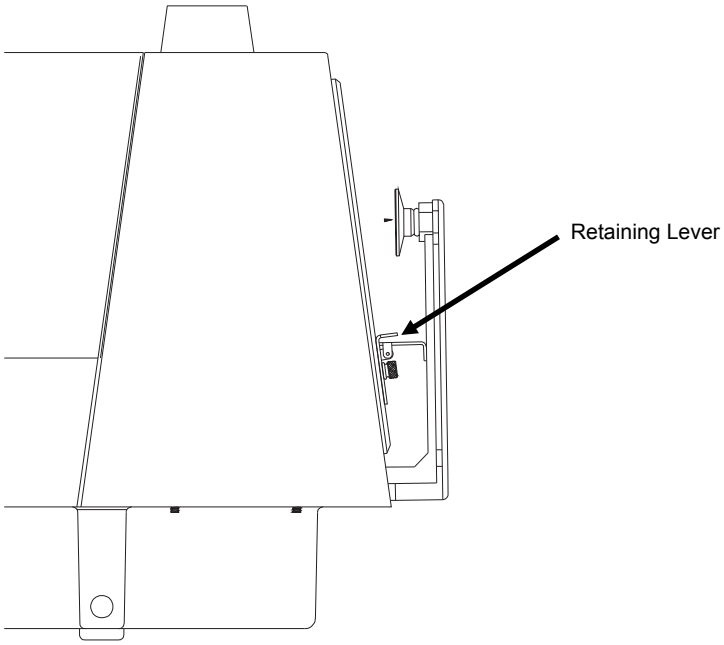


Figure 4-5. Retaining Lever in Place

3. Press down on the viewport door release button and rotate the sample door to the full open position. The aperture can now be either mounted or removed. See Figure 4-6.

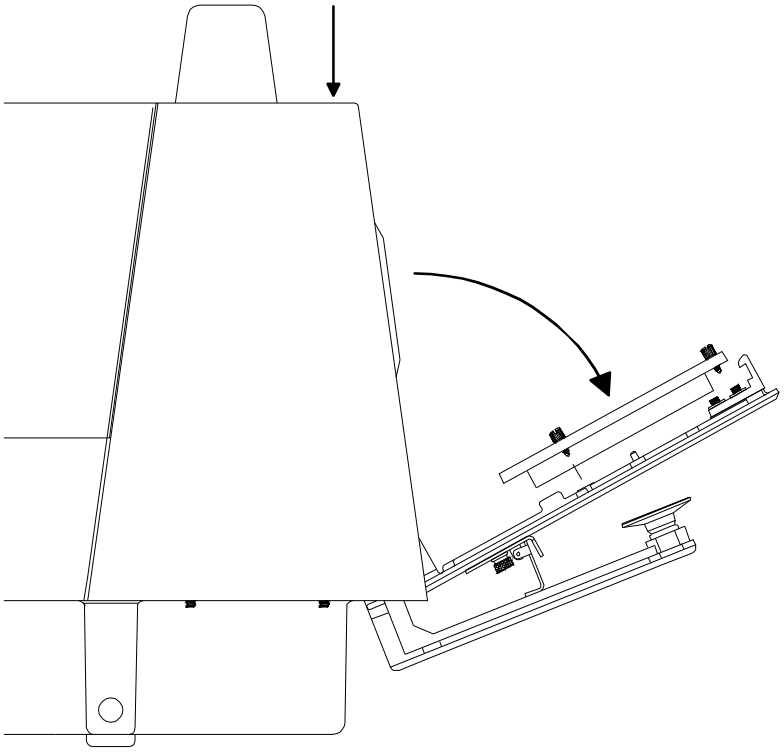


Figure 4-6. Aperture Mounting or Removal

Areas of View

The 7000A is equipped with a lever that holds the sample arm away from the instrument while you change the aperture. It is called the "retaining lever" and is operated using the following steps.

Area of View	Dimensions	Shape
Large (LAV)	25.4 mm (1")	Circle
Medium (MAV)	15 mm (0.591")	Circle
Small (SAV)	10 mm (0.394") by 7.5 mm (0.295")	Oval
Very Small (VSAV)	3 mm (0.118") by 8 mm (0.315")	Rectangle

Each area of view measurement should be made: (1) using the proper size sampling aperture, and (2) with the area of view zoom lens adjusted to the appropriate setting. The following describes the procedures to change a sampling aperture and adjust the zoom lens.

Changing the Sampling Aperture

The procedure to change each of the four sampling apertures is identical. The following description illustrates the procedure to remove the Large Area Aperture (1-inch circle) and replace it with the Very Small Area Aperture (0.118" by 0.315") rectangle.

CAUTION: Throughout the following instructions, it is important to avoid touching the barium reflective coating. Skin oils, scratches or marring the reflector surface may interfere with proper operation.

Do not press down on the viewport door when it is opened. Excess downward pressure may damage the hinge assembly.

1. Raise the retaining lever and rest the sample arm against the retaining lever. See Figure 4-5.
2. Press the door release and open the viewport door.
3. To disengage the Large Area View Aperture from the inner side of the viewport door, turn the three captive thumbscrews counterclockwise. See Figure 4-7.

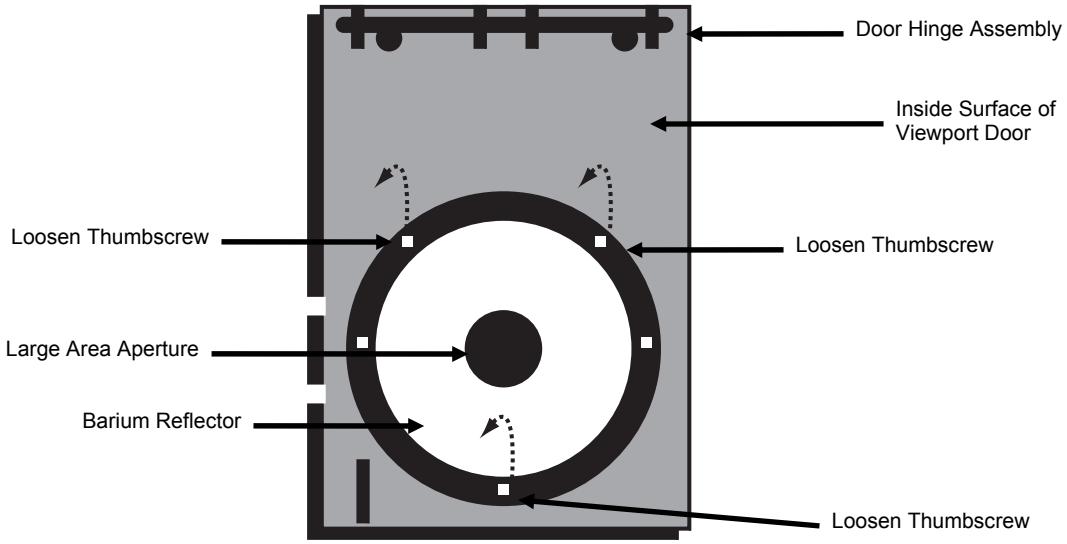


Figure 4-7. Changing the Sampling Aperture, Step 2.

4. Reach under the viewport door and push the Large Area Aperture upward from the front side of the door. Push upward until the aperture is free from the two dowel pins which assist in aperture placement and alignment. See Figure 4-8. After removing the Large Area Aperture, place it in the aperture storage box for safe keeping.

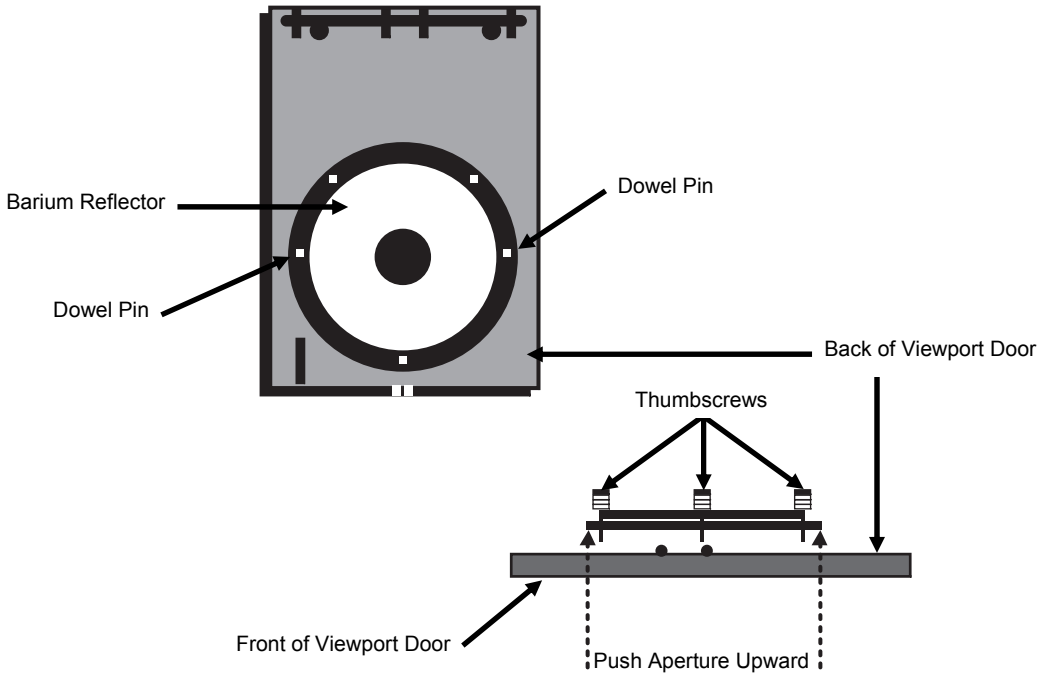


Figure 4-8. Changing the Sampling Aperture, Step 3.

5. Remove the Very Small Area Aperture from storage. Align the two mounting holes with the dowel pins located on the viewport door. Pressing evenly, snap the aperture in place.

Be certain not to exert downward pressure against the viewport door. See Figure 4-9.

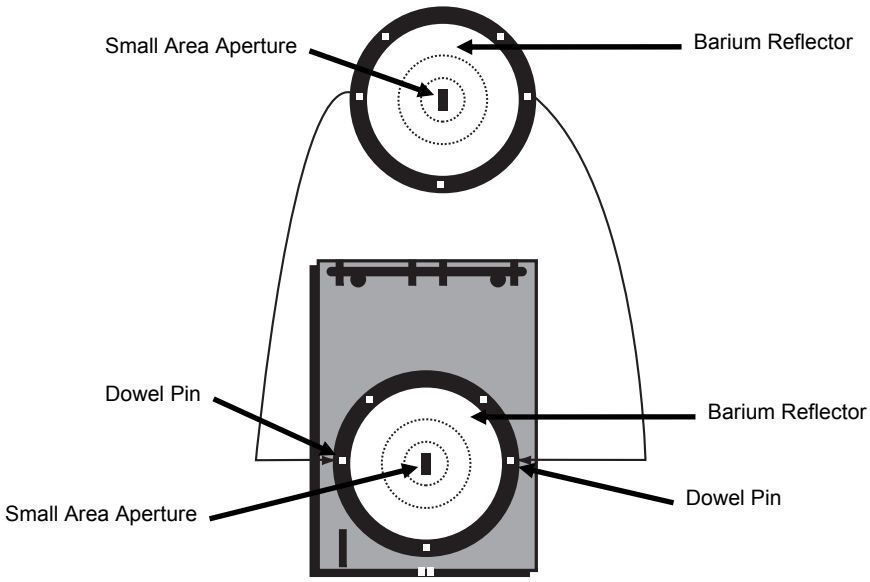


Figure 4-9. Changing the Sampling Aperture, Step 4.

6. To secure the Very Small Area Aperture in place, turn the three captive thumbscrews *clockwise*. See Figure 4-10.

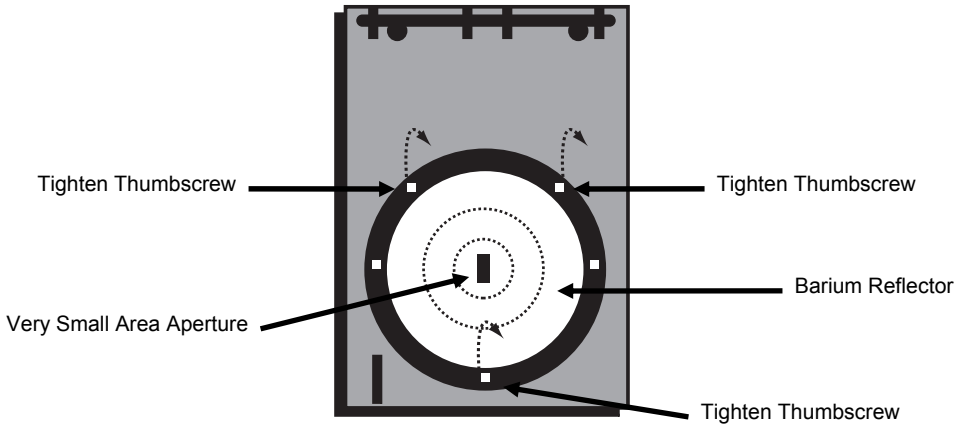


Figure 4-10. Changing the Sampling Aperture, Step 5.

7. Close the viewport door and disengage the retaining lever from the sample arm. Refer to "Adjusting the Area of View Zoom Lens" below for the instructions to adjust the lens to the appropriate position.

   NOTE: The area of view zoom lens is usually repositioned after the area of view aperture is changed. The various apertures are sensed electronically to cue the application software as to which aperture is installed.

Adjusting the Area of View Zoom Lens

The area of view zoom lens is usually adjusted in conjunction with the size of the area of view aperture. The lens may be positioned to each of the area of view settings by adjusting the 4-position selector. These stop positions are sensed electronically to assure the proper setting. The touch pad displays the currently selected Area of View. *Be certain that you have removed all packing material from the zoom lens selector knob before proceeding*. For more information on unpacking the instrument, refer to "Unpacking the Instrument" in Section 2.

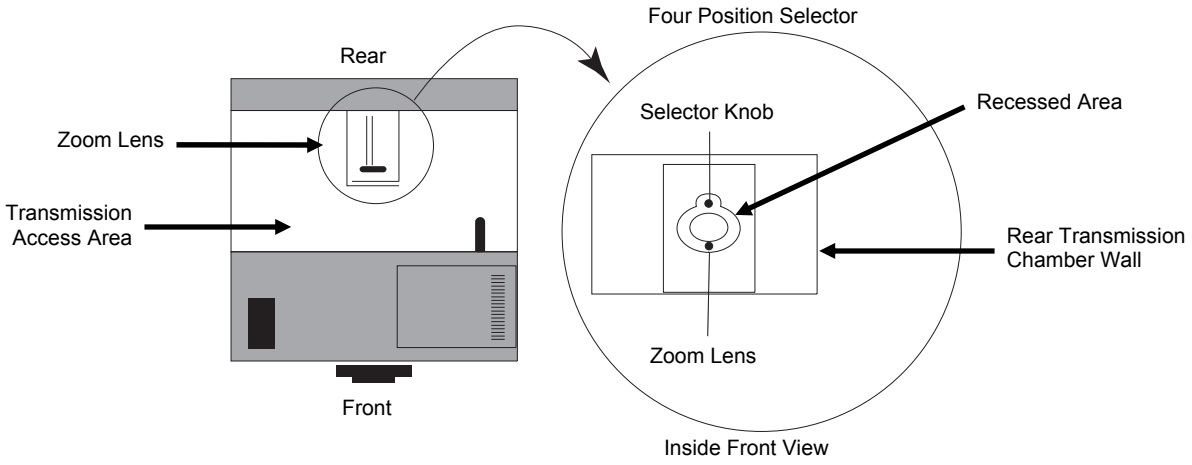
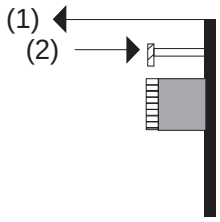


Figure 4-11. Area of View Zoom Lens

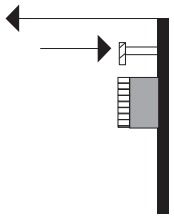
Very Small Area View (VSAV) – First Stop

To set the zoom lens to the Very Small Area View position (first stop), pull the selector knob towards the front of the instrument until the shaft and lens are extended to the maximum (1). Then move the selector knob back gently until it is seated in the first stop (2). This stop may be very near the maximum position. You can be sure that the shaft is positioned in the first stop when that shaft feels as if it is locked into a groove and there is no forward or backward movement (play) when slight pressure is applied.



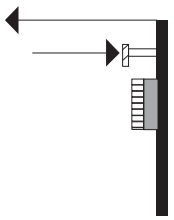
Small Area View (SAV) – Second Stop

To set the zoom lens to the Small Area View position (second stop), set the selector knob to the Very Small Area View (first stop) position and then push the selector knob back one stop. You can be sure that the shaft is positioned in the second stop when that shaft feels as if it is locked into a groove and there is no forward or backward movement (play) when slight pressure is applied.



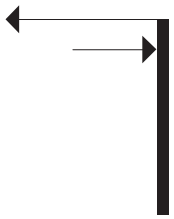
Medium Area View (MAV) – Third Stop

To set the zoom lens to the Medium Area View position (third stop), set the selector knob to the Very Small Area View (first stop) position and then push the selector knob back two stops. You can be sure that the shaft is positioned in the third stop when that shaft feels as if it is locked into a groove and there is no forward or backward movement (play) when slight pressure is applied.



Large Area View (MAV) – Fourth Stop

To set the zoom lens to the Large Area View position (fourth stop), set the selector knob to the Very Small Area View (first stop) position and then push the selector knob back three stops. You can be sure that the shaft is positioned in the fourth stop when the shaft cannot be pushed any further. When in this position, the selector knob and lens are inside the recessed area located in the rear transmission chamber wall.



Using the Thin Film Sample Holder

The thin film sample holder is designed to mount in the CE-7000A transmission compartment. It is used to measure both thin films at both the sphere (total transmission) and at the lens (direct transmission). The unit is designed to operate with the Specular Component Included (SCI) with the Color-Eye 7000A set for Large Area View (LAV).

A total transmission reading should be performed when the sample to be measured is hazy or cloudy. A cloudy sample will transmit light at more angles then a sample that is not hazy. A total transmission reading will make certain that all the light transmitted is measured for an accurate reading.

A direct transmission reading should be performed when the sample to be measured is clear. A clear sample will transmit light at only one angle (called the "direct component angle"). A direct transmission reading will make certain that the light transmitted at this angle is measured for an accurate reading.

Installing the Thin Film Sample Holder

1. Go to the Touch Pad Main Menu. Make sure that SCI is displayed as the specular component setting (Cell 5).
2. On the Main Menu, make sure that LAV is selected as the lens position (Cell 3).
3. Open the Color-Eye 7000A transmission compartment and remove the specular light trap by loosening the silver thumbscrew and pulling the device up and out. (The specular component excluded light trap is the black "ramp-like" metal device that traps the specular component. For more information, refer to "Specular Component Excluded (SCE) Light Trap" earlier in this section.

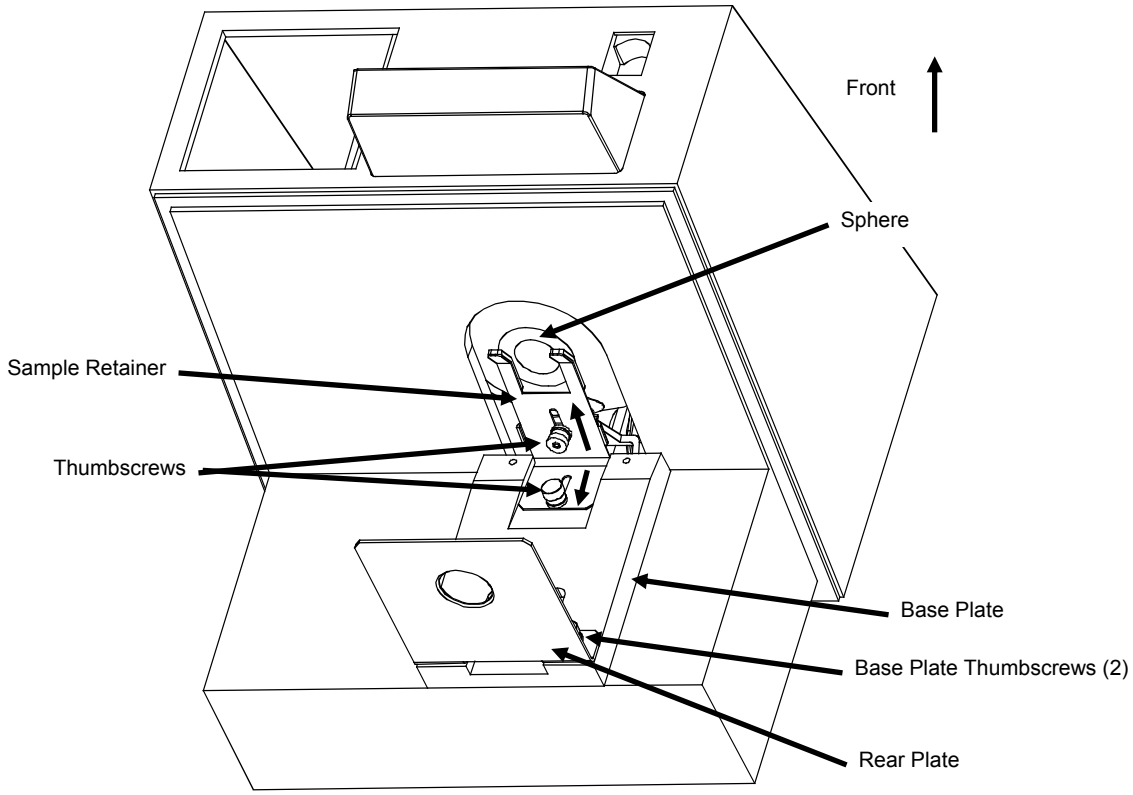


Figure 4-12. Thin Film Holder Installation

4. There are two angled channels on the base plate: the sphere channel and the lens channel. Place the sample retainer into one of the channels of the base plate.

   NOTE: Position the sample retainer at the channel close to the sphere for total transmission measurements or the channel at the lens for direct transmission measurements.
5. Slide the sample retainer forward or backward and up and down to accommodate the size and shape of your sample. Tighten the thumbscrews on the sample retainer after you reach the desired position.
6. The sample retainer is now installed.
7. To remove the sample holder, reverse these steps. (Loosen the thumbscrews, remove the holder, and tighten the thumbscrews.)

Measuring Thin Films

To take total transmission readings on thin films, proceed as follows:

1. Follow the instructions described in "Installing the Thin Film Sample Holder" on the previous page. Be sure to place the sample retainer into the sphere channel of the base plate.
2. Pull back the sample retainer and place a taut thin film sample in the sample holder. See Figure 4-13.
3. Take the measurement.

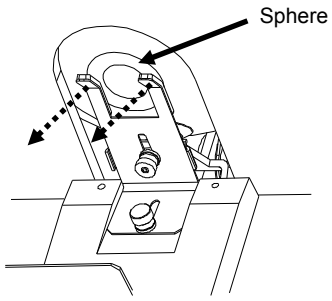


Figure 4-13. Measuring a Thin Film Sample

To take direct transmission readings of thin films, proceed as follows:

1. Follow the instructions described in "Installing the Thin Film Sample Holder" earlier in this section. Be sure to place the sample retainer into the lens channel of the base plate.
2. Pull back the sample retainer and place a taut thin film sample in the sample holder.
3. Take the measurement.

Using the Cuvette Holder

The cuvette holder is designed to mount in the CE-7000A transmission compartment. It is used to measure liquid samples at both the sphere (total transmission) and at the lens (direct transmission). The unit is designed to operate with the Specular Component Included (SCI) with the Color-Eye 7000A set for Large Area View (LAV).

Cuvette Holder Installation

1. Go to the Touch Pad Main Menu Display. Refer to "Main Menu Display" is Section 3 if you are not familiar with the Main Menu Display. Make sure that SCI is displayed as the Specular Component Setting (Cell 5).
2. On the Main Menu, make sure that LAV is selected as the lens position (Cell 3).
3. Open the Color-Eye 7000A transmission compartment and remove the specular light trap by loosening the silver thumbscrew and pulling the device up and out. (The specular component excluded light trap is the black "ramp-like" metal device that captures, or traps, the specular component. Refer to "Specular Component Excluded (SCE) Light Trap" previously in this section.
4. There are two angled channels on the base plate: the sphere channel and the lens channel. Place the cuvette holder into either channel of the base plate.

NOTE: Position the cuvette holder at the channel close to the sphere for total transmission measurements or the channel at the lens for direct transmission measurements.

5. Tighten the thumbscrews on the cuvette holder.

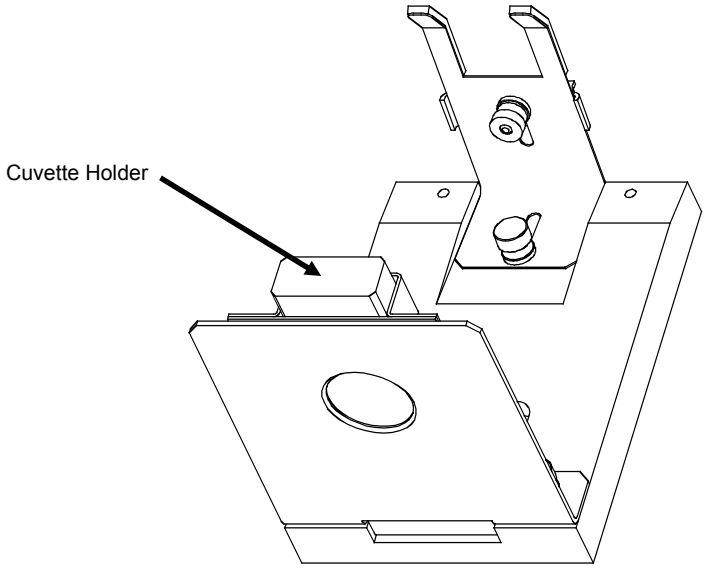


Figure 4-14. 7000A Cuvette Holder Installation

Measuring Liquids

Liquids are measured using the cuvette holder.

To take a total transmission reading, proceed as follows:

a. Follow the instructions described in "Cuvette Holder Installation" on the previous page. Be sure to place the cuvette holder into the sphere channel of the base plate.
b. Take the measurement.

To take a total transmission reading, proceed as follows:

a. Follow the instructions described in "Cuvette Holder Installation" on the previous page. Be sure to place the cuvette holder into the lens channel of the base plate.
b. Take the measurement.

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SECTION 5 – Maintenance

General

This section provides step-by-step routine maintenance and minor repair procedures.

Cleaning the Touch Pad

The touch pad should be periodically cleaned since grime buildup can occur during heavy use. You should keep in mind that the touch pad is covered by a protective film that can be permanently removed if there is excessive grime buildup. However, you should always follow the cleaning procedure first before resorting to removing the film.

Material required

- *Dust-free tissue:* Use a lens tissue which meets *Federal Specification NNN-P-40A*, Type I or equivalent.

1. Turn off the instrument.
2. Gently wipe off the touch pad with a dust free tissue.

Cleaning the Ceramic Calibration Tile

Ceramic standards (calibration tiles) are widely used in color science as standards of reflectance factor. Their principal virtue is the stability of their reflection properties. If they are to serve their intended purpose, it is necessary that the surfaces of these tiles be maintained in a stable condition. The cleaning of any precision optic risks degrading the surface. Therefore, the need for cleaning should be *minimized* by returning the tile to its storage case or covering it with a protective bag when it is not in use. If cleaning is required, the following procedure is recommended.

Material Required

- *Camel's-Hair brush:* Available at most camera, hardware, or art supply stores.
- *Dust-free tissue:* Use a lens tissue which meets *Federal Specification NNN-P-40A*, Type I or equivalent.
- *Distilled water:* Available at most pharmacies.
- *Isopropyl alcohol:* Spectroscopic grade.
- *Soap:* Any non-moisturizing soap.

Routine and Special Tile Cleaning Procedure

CAUTION: Do not touch the white surface of the tile with your fingers while you are cleaning. Natural oils, creams, and other materials found in the hands can alter the optical properties of the tile and can result in an inaccurate calibration.

Lint and other small particles are usually best observed by illuminating the tile with a diffuse light source at an angle so that the light does not produce surface glare. Inspect the tile at an angle rather than looking directly at the tile's front surface.

To remove dust, lint, and invisible gritty particles, proceed as follows:

1. Brush the tile's surface with a camel's-hair brush.
2. Breathe a light mist of condensed vapor at the center of the tile.
3. Immediately wipe the tile's surface *lightly* with lens tissue. Avoid smearing the tile with natural greases and perspiration from the hands by wiping with the untouched center part of the lens tissue.

4. After the tile has been dusted and wiped, it should be inspected again. If the tile is clean, STOP at this point. If any smears or fingerprints are observed, use the cleaning method described in the next paragraph.

Cleaning the UV Adjustment Tile

To clean the UV Adjustment Tile, proceed as follows:

1. Dip the surface of the tile into weak liquid detergent solution.
2. Rub the surface gently with a fresh lens tissue.
3. Rinse with distilled or deionized water.
4. Dry with fresh lens tissue, and store in the tile container.

Cleaning the Zero Calibration Standard

The cleaning of any precision optic risks degrading the surface. The need for cleaning should be minimized by returning the calibration standard to its storage case or covering it with a protective bag when it is not in use. If cleaning is required, the following procedure is recommended.

Material Required

- *Polyethylene lab gloves:* (*Powder-free*) Please wear them. Solvents to be used are harsh to the skin. Skin oils only add to the task of cleaning.
- *Dust-free tissue:* Use a lens tissue which meets *Federal Specification NNN-P-40A*, Type I or equivalent.
- *Dust blower:* Filtered dry nitrogen blown through an antistatic nozzle is best. Bulb type blowers and brushes may be used, but must be very clean to prevent the redistribution of dust.
- *Dilute soap solution:* Avoid perfumed or alkali products. Several drops of green soap (available from most pharmacies) per 100ml of distilled water is acceptable.
- *Distilled water:* Available at most pharmacies.
- *Isopropyl alcohol:* Spectroscopic grade.
- *Acetone:* Spectroscopic grade.
- *Cotton swabs:* Avoid cotton swabs with plastic stems that can dissolve in alcohol or acetone.

Routine Cleaning

Dust on the black glass optics can be very tightly bound by static electricity. Blowing on the optic removes some dust. The remainder of dust can be collected by the surface tension of a wet alcohol swab. The use of acetone promotes rapid drying of the optics to eliminate streaks.

Use the following procedure for routine cleaning.

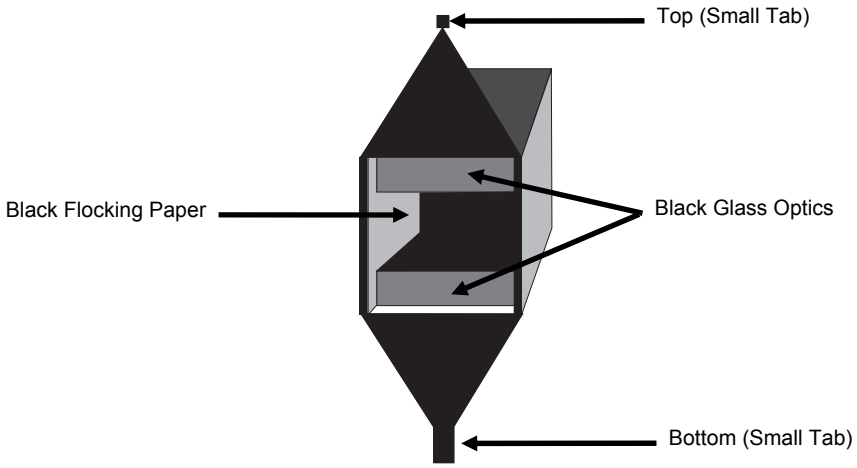

Figure 5-1. Zero Calibration Standard (Light Trap)

1. Blow the dust off the black flocking paper and use a soft brush to remove any persistent particles. Repeat until the flocking is clean.
2. Blow the dust off each black glass optic.
3. If any dust remains on the glass optic, twist a lens tissue around a cotton swab and apply alcohol to the lens tissue using a squirt bottle.
4. Wipe the optic in a *single* path using a gentle figure-eight movement. Repeat the process until the optic is clean.
5. Twist a lens tissue around a *new* cotton swab and apply a few drops of acetone to the *lens tissue* using a squirt bottle.
6. Wipe the optic in a *single* path using a gentle, figure-eight movement. Repeat the process until the optic is dry and streak-free.

Removal of Fingerprints and Light Grease Smears

Fingerprints, oil, grease smears, or water spots should be cleaned *immediately*. Skin acids attack coatings and glass. Cleaning with solvents alone tends to redistribute grime. These contaminants must be lifted from the black glass optical surface with soap or other wetting agent. The part is then rinsed in water and the water removed with alcohol. The use of acetone promotes rapid drying and eliminates streaks.

1. Blow the dust off each black glass optics.
2. Twist a lens tissue around a cotton swab and soak the swab in the prepared in the soap solution prepared in "Materials Required" on the previous page.
3. Wipe the optic in a single direction with a gentle figure-eight movement. Repeat the process until clean.

4. Repeat steps 2 and 3 using *distilled* water only.
5. Repeat steps 2 and 3 using *alcohol* only.
6. Repeat steps 2 and 3 using *acetone* only until the optic is dry and streak-free.

CAUTION: Never use cleaning solutions that contain abrasives. They can easily damage the surface of the black glass optic.

Cleaning the SCE Light Trap

The need for cleaning the SCE Light Trap should be minimized by returning it to its storage case or covering it with a protective bag when it is not is use. If cleaning is required, the following procedure is recommended.

Material Required

- *Non-residue Dust remover:* Filtered dry nitrogen blown through an antistatic nozzle is best. Bulb type blowers and brushes may be used, but must be *very* clean to prevent the redistribution of dust. Some commercially available "canned air" products are useful, but care should be taken to determine if the air has been properly filtered for use with *optical* devices, (<0.2 microns).

Routine Cleaning

Dust can accumulate on the interior surfaces of the SCE Light Trap. Blowing on the SCE Light Trap removes some dust. Use of short blasts of filtered dry nitrogen or an acceptable, commercially available canned air product removes most of the dust.

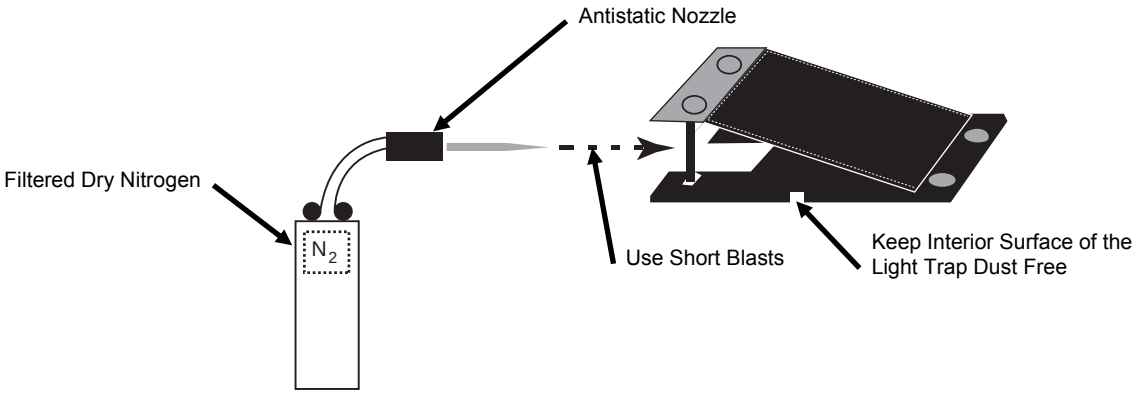

Figure 5-2. Cleaning the SCE Light Trap

NOTE: To minimize chances of dust entering the CE-7000A, please keep the SCE Light Trap in place and the Transmission Access Cover closed except when these items must be removed/opened (e.g., for transmission measurements).

Cleaning the Optical Surface

The following procedures are recommended for cleaning the Area of View Zoom Lens and Fold Mirror.

Material Required

- *Non-residue Dust remover:* Filtered dry nitrogen blown through an antistatic nozzle is best. Bulb type blowers and brushes may be used, but must be *very* clean to prevent the redistribution of dust. Some commercially available "canned air" products are useful, but care should be taken to determine if the air has been properly filtered for use with *optical* devices, (<0.2 microns).

Routine Cleaning of the Area of View Zoom Lens

Dust can accumulate on the surface of the Area of View Zoom Lens. Blowing on the Lens removes some dust. Use of short blasts of filtered dry nitrogen or an acceptable commercially available canned air product removes most of the dust. If the lens surface cannot be cleaned using this technique, contact X-Rite Customer Service Department.

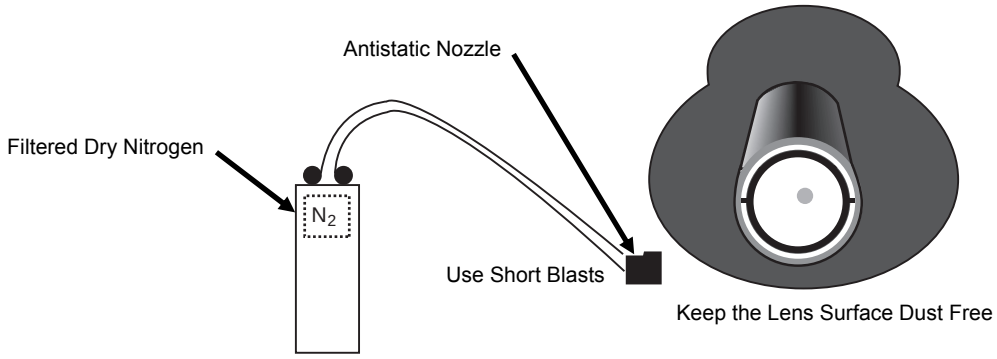

Figure 5-3. Cleaning the Area of View Zoom Lens

Routine Cleaning of the Fold Mirror

Use of short blasts of filtered dry nitrogen or an acceptable commercially available canned air product removes most of the dust.

Pause between each application to allow dust to settle, and then check for any dust that remains. If the fold mirror surface cannot be cleaned using this technique, contact X-Rite Customer Service Department.

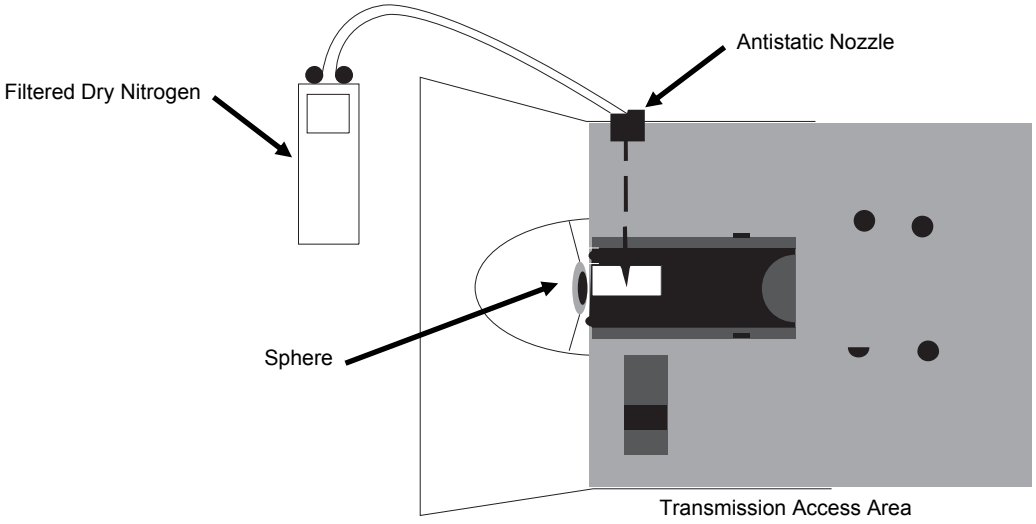

Figure 5-4. Cleaning the Fold Mirror

NOTE: To minimize chances of dust entering the CE-7000A, please keep the SCE Light Trap in place and the Transmission Access Cover closed except when these items must be removed/opened (e.g., for transmission measurements).

Cleaning the Area of View Plate

Material Required

- *Isopropyl Alcohol:* (Spectroscopic Grade) Available from most pharmacies.
- *Lintless Cloth:* Available from most scientific supply houses.

Procedure

1. Fold a clean piece of lintless cloth in quarters and apply a *few* drops of isopropyl alcohol at the tip of the folds.
2. Pull the sample holder arm down.
3. Use the cloth with alcohol to make circular strokes *away from* the area of view aperture port. Make certain that no alcohol seeps to the inside barium-coated surface of the aperture.
4. Clean the circular sample arm toggle pad in a similar fashion.
5. Allow all metal surfaces to dry completely *before* returning the sample arm to its resting position or taking measurements.

NOTE: Failure to allow all surfaces to dry completely before making measurements could result in damage to both the instrument and the material being measured.

NOTE: Care should be taken to avoid touching the external area of View Plate and Toggle Pad with dirty hands. Periodic cleaning of these surfaces will reduce chances of erroneous readings that could result from dirt being transferred from these surfaces to the sample.

Fuse Replacement

The fuses provided with your instrument deliver an electrical safeguard for the instrument's electronics should there be a power surge which traverses the transformer electronics. In the event the instrument does *not* turn ON when power is supplied, make certain that power is available at the plug. If the supply current is present and adequate, check the instrument fuses as follows.

CAUTION: Make certain that the instrument is unplugged and that the power switch has been turned to the off position before performing any operator maintenance. Failure to follow these instructions could result in a shock hazard.

1. The fuses are located in the AC power connector assembly located at the rear of the instrument.

CAUTION: The voltage selector is preset at the factory to meet the voltage requirements for your facility. Do not change this setting.

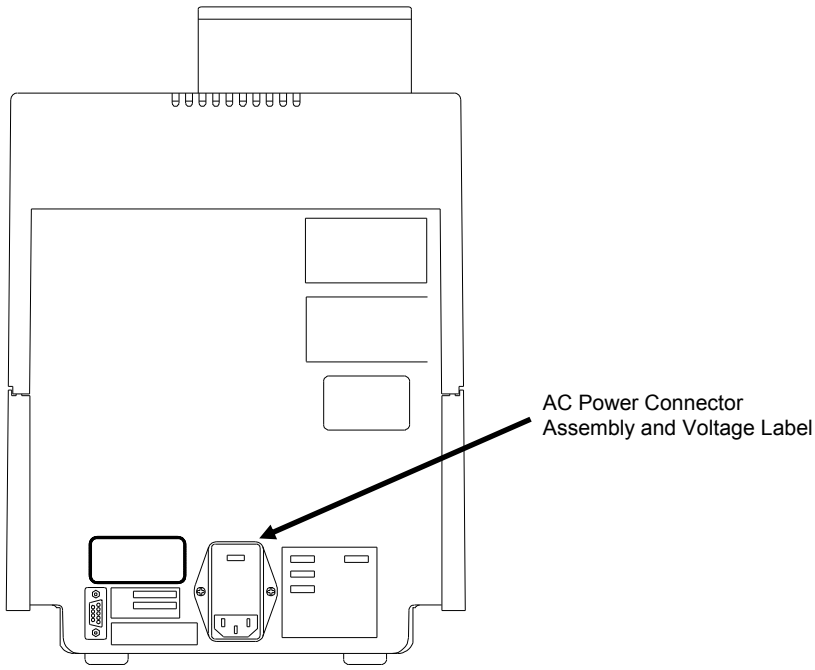

Figure 5-5. AC Power Connector Assembly

2. Make note of the label which indicates the proper voltage selected for your facility.
3. Insert the head of a narrow-bladed screwdriver into the notched top of the AC power connector assembly. See Figure 5-6.

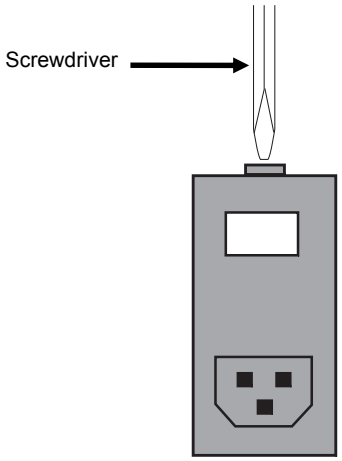

Figure 5-6. Fuse Replacement, Step 3

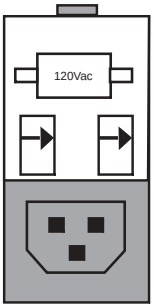

Figure 5-7. Fuse Replacement, Step 4

4. Gently twist the screwdriver until the *upper* portion of the power connector assembly opens, exposing the voltage selector cam and fuse holders. See Figure 5-7.
5. Grasp the top of the fuse holder between the fingernail and tip of the index finger and slide the holder out of the AC power connector assembly. See Figure 5-8.

CAUTION: The voltage selector is preset at the factory to meet the voltage requirements for your facility. Do not change this setting.

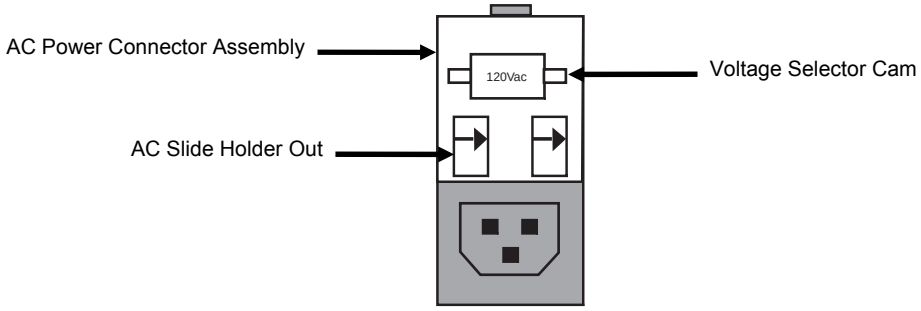

Figure 5-8. Fuse Replacement, Step 5

6. Examine the fuse. See Figure 5-8. If the fuse is blown or defective, grasp the fuse with the thumb and index finger and gently remove it from the holder. Replace the fuse with a new 2-amp, 3AG-type fuse for 110 VAC, or 1-amp, 3AG-type fuse for 220 VAC.

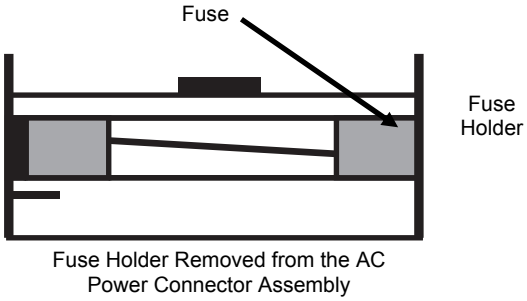

Figure 5-9. Fuse Replacement, Step 6

7. Remove the second fuse holder. Examine its fuse and replace it if necessary.

8. Ensure that the voltage selector cam is positioned to provide the proper voltage. (Refer to the value noted in step 2).

CAUTION: The voltage selector is preset at the factory to meet the voltage requirements for your facility. If the position of the voltage selector cam was accidentally changed during fuse replacement, reposition it to the correct setting noted in step 2. Do not change this setting.

9. Close the upper portion of the AC power connector assembly. To ensure that it is properly closed, press the assembly until it snaps into place. This completes the fuse replacement procedure.

Spare Parts List

If you need to order spare parts, please call your nearest service representative listed on back cover. Please reference the part number you need below.

Description	Part Number
Black Calibration Standard	GM29007900
LAV Aperture Plate	GM59003260
MAV Aperture Plate	A-AP/MA15M7
SAV Aperture Plate	GM59003240
VSAV Aperture Plate	A-AP/VSA387
Reflection Cuvette	A-C/RPC7
RS-232 Cable	GM10034590
Transmission Cuvette	A-OC/T7
Transmission Sample Holder	GM29010300
UV Adjustment Tile	GM27006980

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