

X-Rite[®] 380

Scanning Densitometer

Operation Manual

FCC

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.

Canada

This Class A digital apparatus meets all requirements of the Canadian Interference-Causing Equipment Regulations.

Cet appareil numérique de la classe A respecte toutes les exigences du Règlement sur le matériel brouilleur du Canada.

CAUTION: Operational hazard exists if AC adaptor other than X-Rite SE30-61 (115V) or SE30-62 (230V) is used.

VORSICHT: Es besteht Betriebsgefahr bei der Verwendung von einem Adapter außer X-Rite SE30-61 (115 U) oder SE30-62 (230 U).

AVISO: No use otro adaptador C.A. que no sea la pieza X-Rite SE30-61 (115V) o SE30-62 (230V), por el riesgo de mal funcionamiento del equipo.

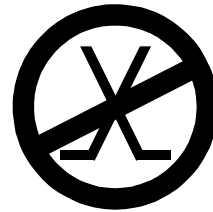
ATTENTION: Ne pas utiliser un autre adaptateur que la pièce X-Rite SE30-61 (115V) ou SE30-62 (230V).

AVVISO: Non usare un altro adattatore C.A. che non è del pezzo X-Rite X-Rite SE30-61 (115V) o SE30-62 (230V), per il rischio di malfunzionamento dell'apparecchio.

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

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

Declares that:	Densitometer
gibt bekannt:	380
advierde que:	
avertit que:	
avverte che:	



is not intended to be connected to a public telecommunications network.
an ein öffentliches Telekommunikations-Netzwerk nicht 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
U.S.A.

Model Name: Densitometer
Model No.: 380

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

NOTE: The device complies to the product specifications for the Low Voltage Directive when furnished with the 230VAC AC Adapter (X-Rite P/N SE30-62), and to UL Standards when furnished with the 115VAC Adapter (X-Rite P/N SE30-61).

Congratulations!

We at X-Rite, Incorporated are proud to present you with the X-Rite 380 Scanning Densitometer. This instrument represents the very latest in microcontrollers, integrated circuits, optics, and display technology. As a result, your X-Rite 380 is a rugged and reliable instrument whose performance and design exhibit the qualities of a finely engineered instrument, which is not surpassed.

To fully appreciate and protect your investment, we suggest that you take the necessary time to read and fully understand this manual. As always, X-Rite stands behind your 380 with a full one year limited warranty and a dedicated service organization. If the need arises, please don't hesitate to call us.

Thank you for your trust and confidence.

X-Rite, Incorporated

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What to do First

This page explains the necessary steps you should take to properly setup and use your X-Rite 380 densitometer.



Find out the basic functions and features of the 380, read General Description & Features.



Make sure that the unit is not damaged and all the accessories are enclosed, read Packaging Checklist.



Become familiar with the typographical conventions, display functions, and general terms used in the manual, read User Interface.



Read Getting Started (Section 1), which explains:

- Applying power.
- Keyboard operation and function.
- Configuration of the unit (beeper, I/O, etc.).
- Setting process control parameters on the 380 to correlate it to the processor.



Install the film guide insert if required, read Film Guide Insert Installation (Section 2).



Measure a processed control film, read Taking Measurements (Section 3.1).



Learn how to view the density values of the strip you just measured, read Viewing Data (Section 3.2).



Continue reading the remaining sections to find out how to send data and other features.

General Description & Features

Description

The X-Rite 380 Densitometer is an automated transmission instrument designed for the quality control of 21 step, sensitometric film strips exposed by an X-Rite Sensitometer.

Film strips are automatically measured using a motorized control mechanism. Last strip data is sorted, and available for viewing or transmitting via the RS232 port.

The densitometer is operated using 4 keys and a interactive 16 character/2-line Liquid Crystal Display. There are 4 channels (for different processors to be monitored). Each strip measured includes 21 steps of density and one manually entered temperature.

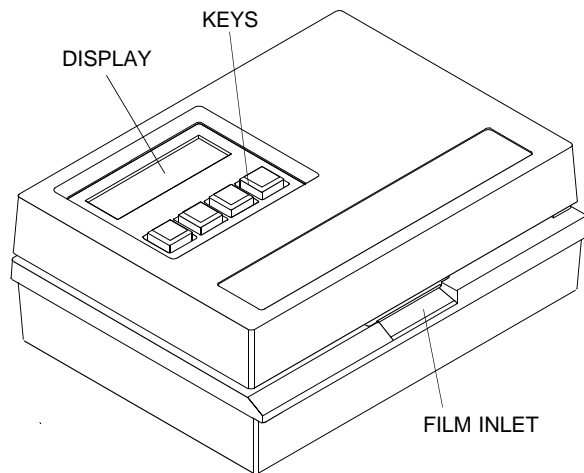
The densitometer measures and stores the absolute density of the steps.

The densitometer comes preset with common process control equations for interpreting the data. Basic equations types are:

- Density at step number.
- Density at exposure level.
- Exposure level at density.
- Contrast.
- Gradient.

The densitometer has an Editor that allows you to set the Hospital Name, Channel Name, and Equation format to best suit your individual requirements.

The densitometer can output a sensitometric curve report to a dot matrix serial printer.



General Description & Features - continued

Features:

- Automated measurement of 21- step sensitometric control strips (8" and larger).
- 4 separate processor channels.
- 21 steps of density and processor temperature are saved for the last strip measured.
- Six user definable fields to interpret data.
- Print out of sensitometric curve (density vs. exposure) for last strip measured.
- Display of density at step number.
- Automatic Data sorting.
- Automatic calibration.
- Simple 4-key operation.
- AC Adapter.
- 16 character by two line, supertwist (Hi Contrast) LCD display.
- RS232 output for RCI, computer, printer, or block I/O formats, with selectable Baud rates. For more information on RS232C and RCI protocol, order the 380 Series RS232C Interface Manual from X-Rite (P/N 380-506).

Packaging Check List

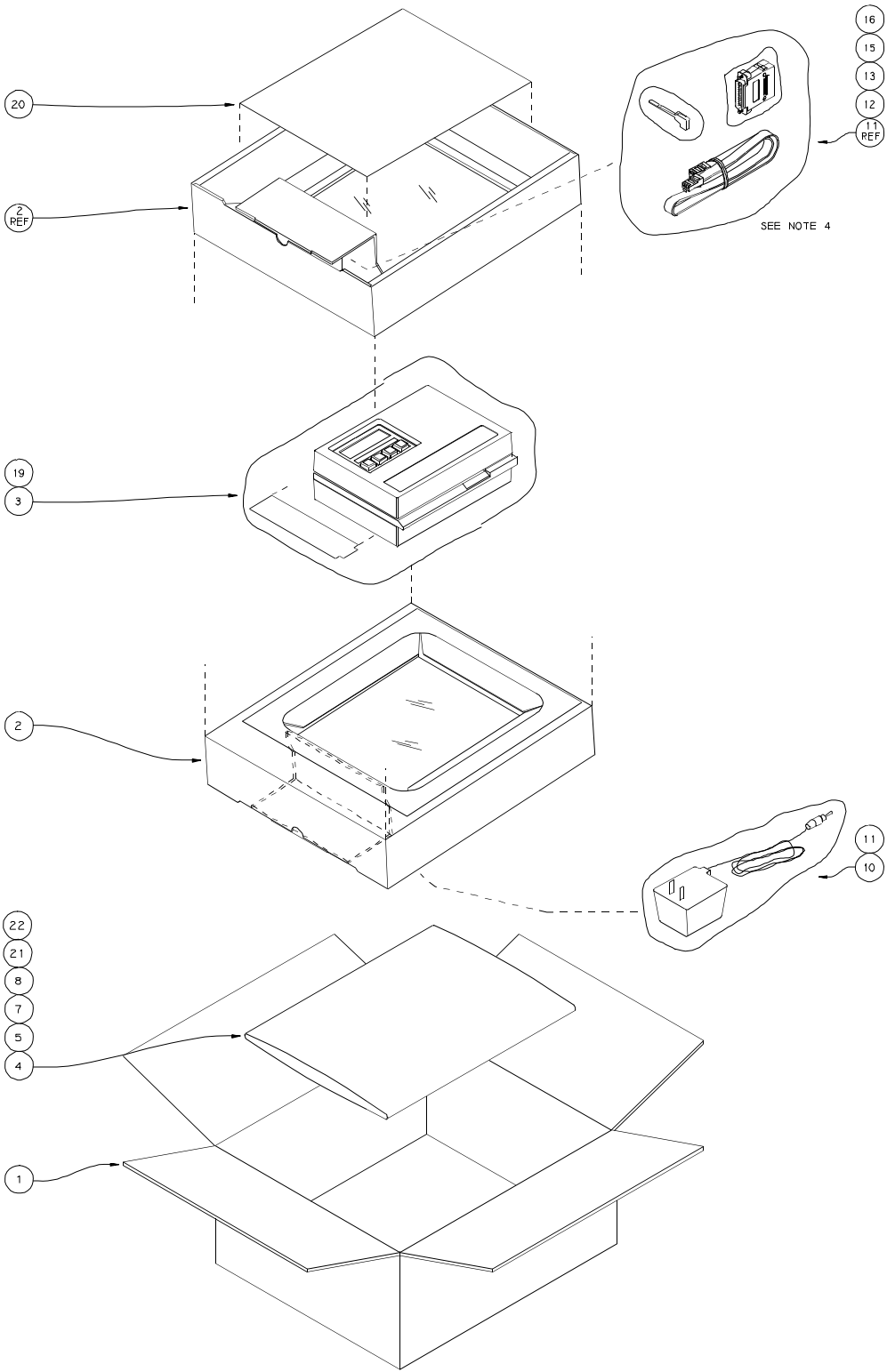
After removing the instrument from the shipping carton, inspect for possible damage. If any damage is noted, contact the transportation company immediately. Do nothing more until the carrier's agent has inspected the damage.

If damage is not evident, check and make sure that all items are included (Refer to the parts list below, and the following page for the packaging illustration).

Your 380 Densitometer was packaged in a specially designed carton to assure against damage. If reshipment is necessary, the instrument should be packaged in the original carton. If the original carton is not available, a new one can be obtained from X-Rite, Incorporated. Refer to the packaging drawing on the following page.

23	1	1	380-00-01	DESITOMETER ASS'Y
22	1	1	SD01-41	CERTIFICATE OF CALIBRATION
21	1	1	381-25	CALIBRATION VERIFICATION STRIP ASS'Y
20	1	1	381-511	UNPACKING NOTICE
19	1	1	SD200-25	SHIPPING SPACER
18	-	-	NOT USED	
17	-	-	NOT USED	
16	-	1	881-91-01	INTERFACE ADAPTOR
	1	-	381-70-01	INTERFACE ADAPTOR
15	1	1	SE108-69-01	INTERFACE CABLE
14	-	-	NOT USED	
13	2	2	SD65-03	PLASTIC BAG
12	1	1	380-25-02	FILM GUIDE INSERT
11	1	1	SD65-13	PLASTIC BAG
10	-	1	SE30-62	AC/DC ADAPTOR, 230VAC 50/60HZ
	1	-	SE30-61	AC/DC ADAPTOR, 115VAC 50/60HZ
9	-	-	NOT USED	
8	1	1	SD01-10	IMPORTANT NOTICE
7	1	1	SD01-04	WARRANTY REGISTRATION FORM
6	-	-	NOT USED	
5	1	1	380-500	OPERATORS MANUAL
4	1	1	SD68-10	PACKAGING ENVELOPE
3	1	1	SD65-07	PLASTIC BAG
2	2	2	SD200-880-06	CARTON INSERT
1	1	1	SD200-880-01	CARTON
ITEM	QTY 380	QTY 380X	PART NUMBER	DESCRIPTION
PARTS LIST				

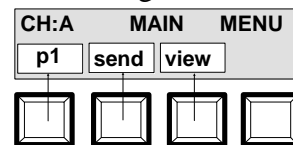
PACKING ILLUSTRATION



User Interface

This section will explain the typographical conventions, display functions, and general terms used in this manual.

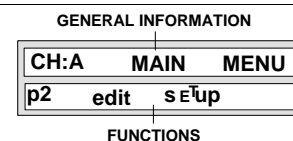
- » The characters in the display above each key dictate which function will be selected or what action will take place when that key is pressed.



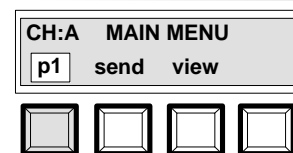
- » Information that will appear in the display will be printed in the manual with arrow marks on each side and in boldface. Ex., **<MEASURING STRIP>**



- » General messages and information telling you what channel, menu, etc. you have active are displayed in uppercase letters. Lowercase letters represent functions that can be activated, changed, etc.



- » When a key is to be momentarily pressed, it will be printed in the manual with brackets on both sides and in boldface. Ex., **[P1]**. Note, in the illustration the function will have a white box around it and the key to be pressed will be tinted.



- » The symbols \uparrow and \downarrow represent the arrow symbols in the display used in the various edit functions. Pressing \uparrow key increments and \downarrow key decrements thru a list of numbers, letters, or symbols available for that function.



- » The term "cursor" is a black line that will appear below a character in the display. In most cases it means that character is active and can be edited via the \uparrow and \downarrow keys. The symbol \rightarrow advances the cursor to the next character to edit.



- » When a procedure is continued on the next page an arrow will appear in the bottom right hand corner of the page.



- » Important notes will be indicated with a hand pointing at the message.



- » A letter (A thru D) is displayed to indicate which channel is being used. Ex., **[CH:A]**
- » The term "Channel Name" is a user defined 10 character name which identifies the processing unit being monitored.
- » The term "Equation" is a building block which allows the user to customize the fields to meet their application.
- » The term "Field" is a display which shows the density data interpreted by an equation. Fields can be named, defined by an equation, and the equations can be given values that describe where the equation is to be applied. Ex.,

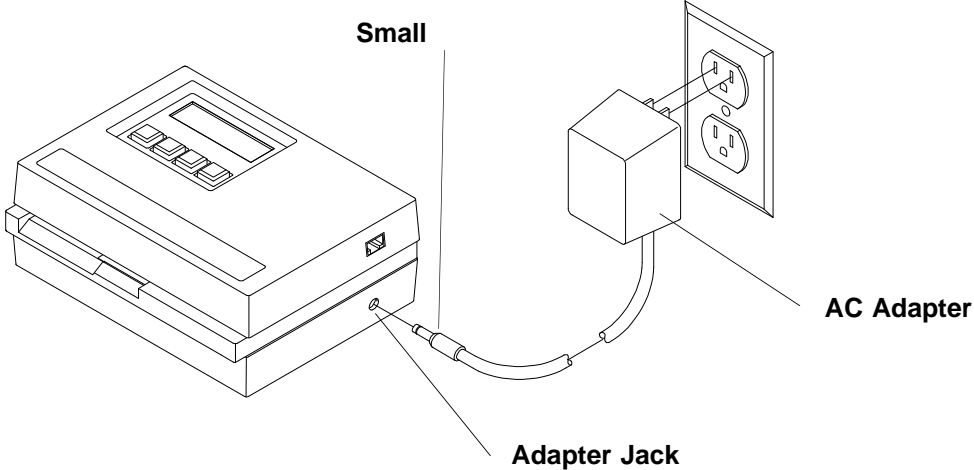
$$B(\text{ase})+\mathbf{Fog} \{\text{it's name}\} = \mathbf{Density} @ \mathbf{step one} \{\text{it's equation \& value}\}$$

1. Getting Started

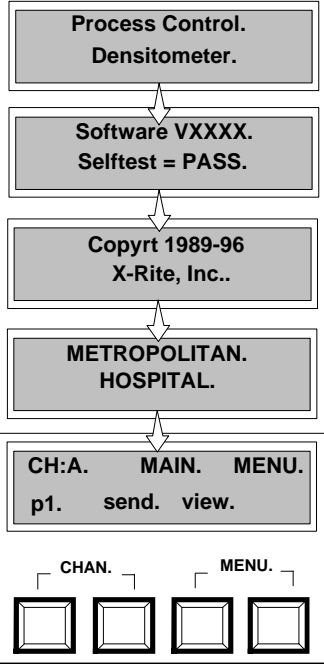
1.1. Applying Power

NOTE: Before plugging in the AC Adapter, make sure the voltage indicated on the AC adapter complies with the AC line voltage in your area. If not, contact X-Rite or an authorized representative.

To apply power, insert the small connector end of the AC adapter into the adapter jack on the instrument. Plug the adapter into an AC wall outlet.

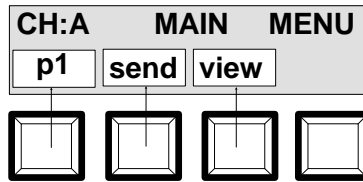


When power is applied, the instrument will perform self test. If the self test is successful, the screen will advance to the Main Menu.

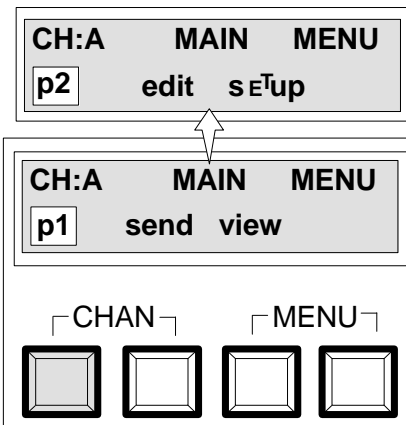


1.2. Keyboard Functions

The characters in the display above each key dictate which function will be selected or what action will take place when that key is pressed.



The *main menu* is contained in two pages. To advance to the next page press [p1] or [p2].



send - allows you to transmit data out the RS232 port.

view - allows you to view the last strip measured. The data is contained in four different pages.

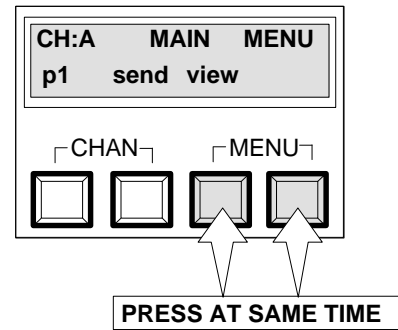
edit - allows you to set the Hospital Name, Channel Name, and Equation format to best suit your individual requirements.

setup - allows you to set the tone, I/O parameters, lamp monitor and temperature format.

Keyboard Function - continued

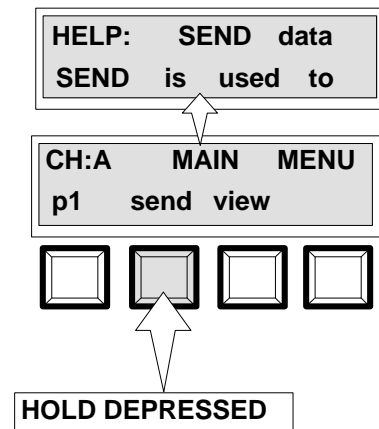


> If you want to return to page 1 of the Main Menu at any point in time, simultaneously press the two keys marked MENU.



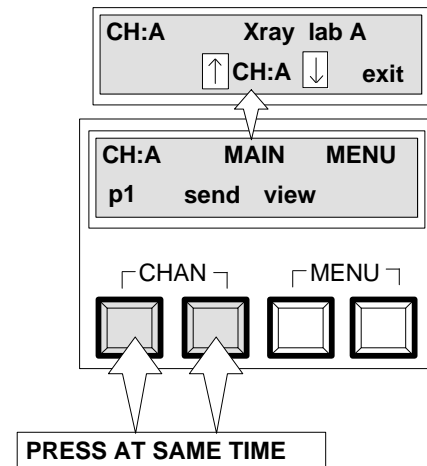
Help Messages:

Most of the functions have a built-in "HELP" message. To activate the help message simply hold the key depressed until the message is displayed, then release. The message can be temporarily paused by pressing the key back down while the message is scrolling.



Channel Selection:

There are 4 channels (A thru D) to select from. To activate channel selection simultaneously press the two keys marked CHANNEL. Press [↑] to increment and [↓] to decrement through the available selections. After selecting a channel, press [exit].



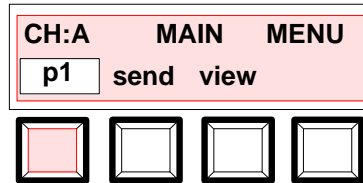
1.3. Setting Up Your 380

Your 380 should be setup (tone, I/O, etc.) before proceeding to strip measurement. The procedures for setting up the unit are shown on the following pages. Refer to Appendix A7 for 380 setup definition.

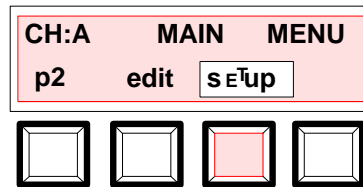
1.3.1 Beeper Loudness

Tone adjusts the beeper loudness (loud, soft, or off).

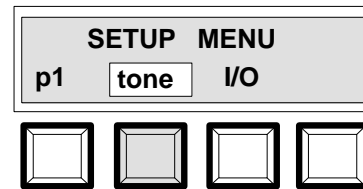
- 1) Press **[p1]**.



- 2) Press **[setup]**.



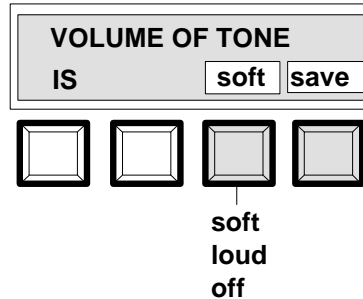
- 3) Press **[tone]**.



- 4) Select loud, soft, or off, press **[soft]**.

Press **[save]** to continue.

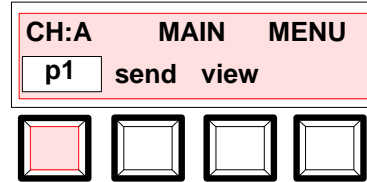
Select another setup function or press MENU keys to exit setup.



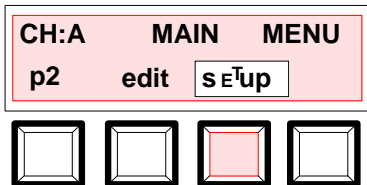
1.3.2 RS232C Setup

I/O allows you to set the RS232 parameters of the I/O port. You can select a preset setting (ex. Epson serial printer) and the 380 will preset all the necessary I/O parameters; or custom, where you have to individually set the I/O parameters (ex. baud, pin-5, format, etc). Refer to Appendix A6 for preset and custom parameter definitions.

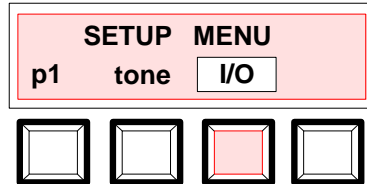
1) Press [**p1**].



2) Press [**setup**].



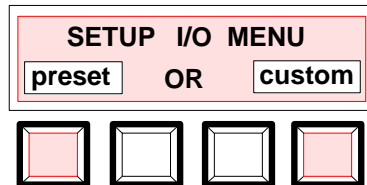
3) Press [**I/O**].



4) Select [**preset**] or [**custom**].

If **preset** is selected go to Step 5.

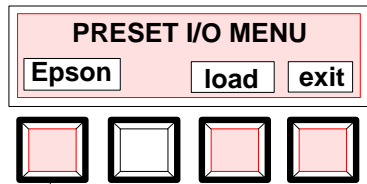
If **custom** is selected go to Step 6.



5) Select output format, press [**Epson**].

Press [**load**] to save selected preset and exit out of I/O preset, or press [**exit**] to not save selected preset and exit out of I/O preset.

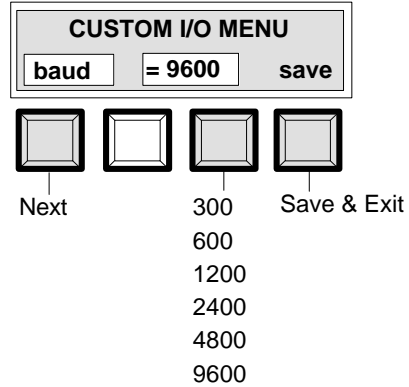
Select another setup function or press the **MENU** keys to exit setup.



RS232C Setup - continued

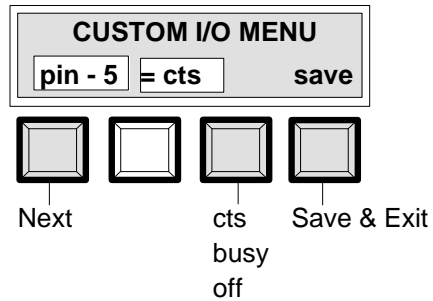
- 6) Select the baud rate, press [=9600].

Press [**baud**] to go to next setup option (Step 7) or press [**save**] to exit setup.



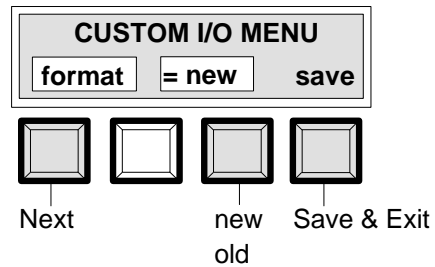
- 7) Select the status of pin-5, press [=cts].

Press [**pin-5**] to go to next setup option (Step 8) or press [**save**] to exit setup.



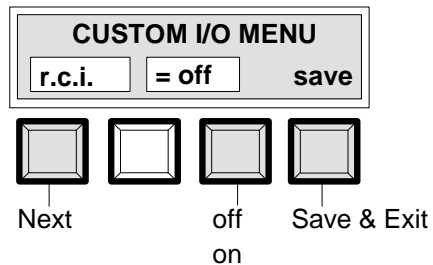
- 8) Select the format status, press [=new].

Press [**format**] to go to next setup option (Step 9) or press [**save**] to exit setup.



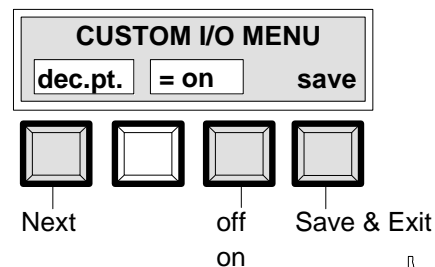
- 9) Select the R.C.I. status, press [=off].

Press [**r.c.i.**] to go to next setup option (Step 10) or press [**save**] to exit setup.



- 10) Select the decimal point status, press [=on].

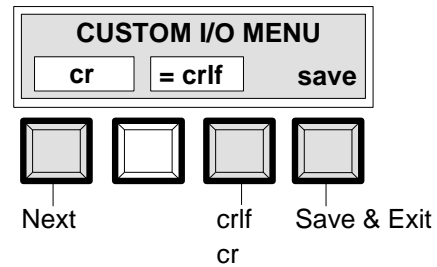
Press [**dec.pt.**] to go to next setup option (Step 11) or press [**save**] to exit setup.



RS232C Setup - continued

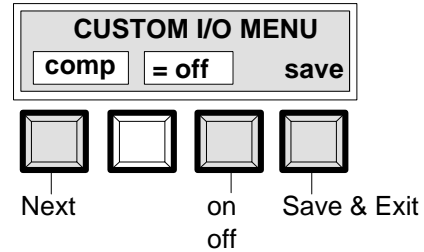
11) Select the delimiter status, press [=crlf].

Press [cr] to go to next setup option (Step 12) or press [save] to exit setup.



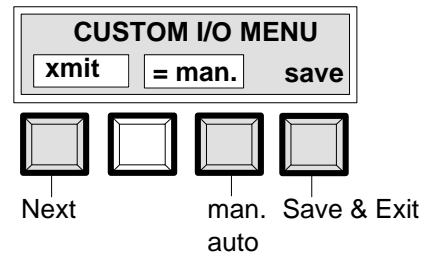
12) Select the format status, press [=off].

Press [comp] to go to next setup option (Step 13) or press [save] to exit setup.



13) Select the xmit status, press [=man.].

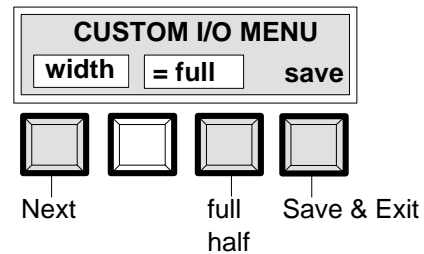
Press [xmit] to go to next setup option (Step 14) or press [save] to exit setup.



14) Select the width status, press [=full].

Press [width] to return to Step 6 or press [save] to exit custom setup.

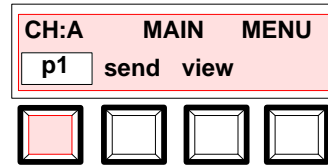
Select another setup function or press MENU keys to exit setup.



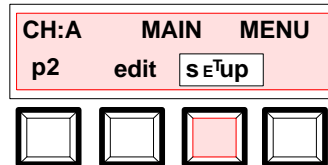
1.3.3 Lamp Counter Reset

Lamp allows you to view the lamp life percentage and reset the lamp hours back to zero. This reset should only be done after replacing the lamp.

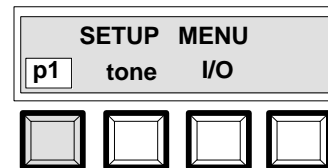
1) Press **[p1]**.



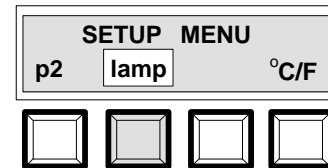
2) Press **[setup]**.



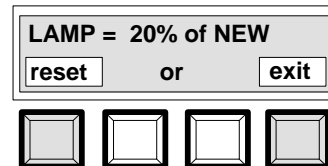
3) Press **[p1]**.




4) Press **[lamp]**.



5) Press **[reset]** to reset counter or press **[exit]** to exit without resetting counter.



If **[reset]** is pressed go to Step 6.

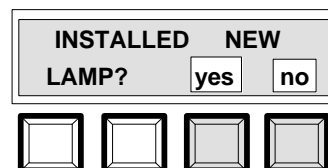
 > If either **[reset]** or **[exit]** is pressed **<CALIBRATING LAMP DRIFT>** will display for approx. 20 seconds.

6) Select **[yes]** to reset lamp or **[no]**.

If yes is selected "Lamp Monitor Reset to 100%" is displayed.

If no is selected "Lamp Monitor Not Affected" will display.

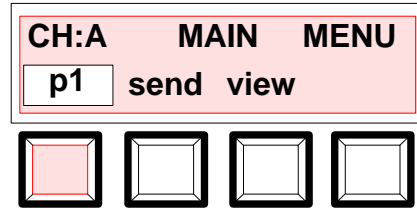
Select another setup function or press the MENU keys to exit setup.



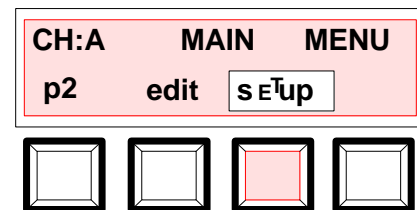
1.3.4 Temperature Units (°C/F)

°C/F allows you to select the temperature format to be used (celsius or fahrenheit).

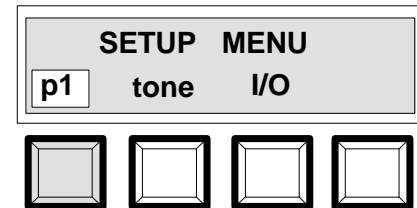
1) Press **[p1]**.



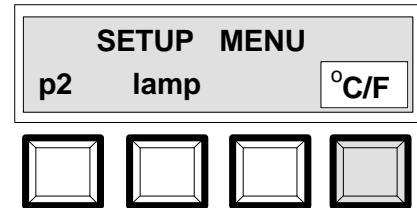
2) Press **[setup]**.



3) Press **[p1]**.



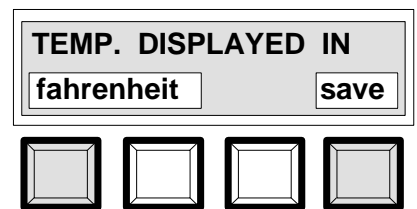
4) Press **[°C/F]**.



5) Press **[fahrenheit]** to select temperature in celsius or fahrenheit.

Press **[save]** to continue.

Select another setup function or press the MENU keys to exit setup.



fahrenheit
celsius

1.4. Process Control

1.4.1 Film Response to Exposure

The 380 densitometer measures film exposed by all X-Rite sensitometers with 21 steps. The sensitometer exposes film with a known quantity of light through a 21-step light modulator. The maximum light is emitted from Step No. 21. Each successive step emits 70.7% of the light emitted from the step adjacent to it (.15 log exposure). The film responds to this exposure in a predictable way called the D-Log E Curve, (Density-Log Exposure Curve). Figure One shows the response of a typical radiographic film exposed by a sensitometer. The portion of the curve that changes most with variations in processing is called the "straight line portion" of the curve.

It is not necessary to plot D-Log E Curves to monitor automatic processors in normal laboratory environments. A simpler method is to record the three values (base+ fog, speed index, & contrast index) on the D-Log E Curve which contain most of the data.

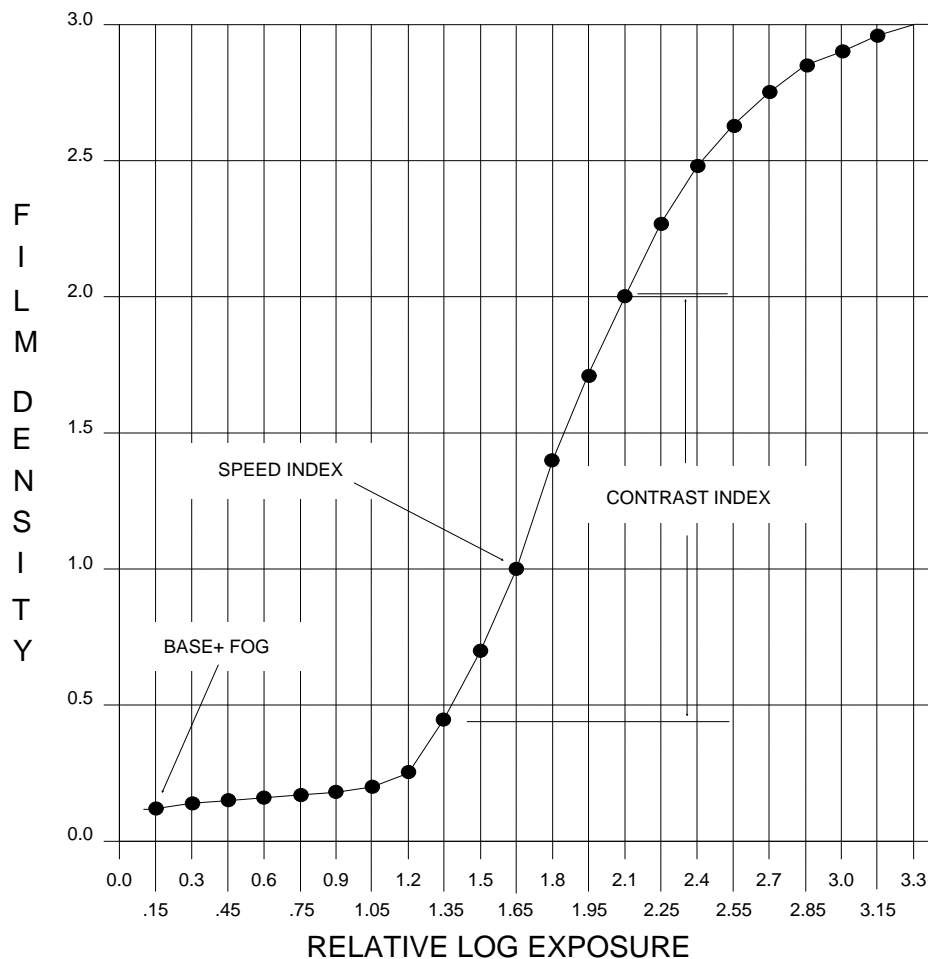


Figure 1. D-Log E Curve

Film Response to Exposure - continued

Base+ Fog:

The least exposed portion of the film is called Base+ fog. It is the base support density plus any silver emulsion density developed in the area where negligible exposure should occur. The 380 is factory preset with Base+ Fog being measured at step 1.

Speed Index:

The step on the exposed film with a density nearest 1.0D+ Base+ fog is called Speed Index. This step is a direct indicator of film speed. Variations in processor conditions are monitored on this step. The 380 is preset to read step 11 as Speed Index.

Contrast Index:

The slope of the straight-line portion of the D-Log E Curve is called Contrast Index. Select the step closest to but not larger than 2.20D. Subtract from this step the step closest to but not lower than 0.45D. Contrast Index is used to monitor processor variations in conjunction with the Speed Index. The 380 is preset to read step 13 as the high density and step 9 as the low density.

1.4.2 Setting Process Control Parameters

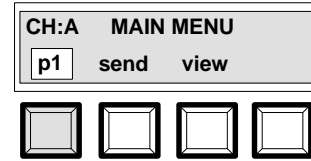
When using a sensitometer with adjustable exposure times (X-Rite 383 or 334), the sensitometer should be adjusted to expose step 11 with density closest to 1.0+ base+ fog. If the sensitometer is not adjustable or the proper densities cannot be located at the correct step numbers, the 380 can be setup to read the densities at different step numbers.

Use the following procedures to change Speed Index and Contrast Index measurement locations, if necessary.

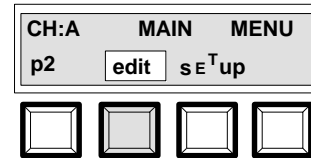
Speed Index Step Selection

Select the channel to edit (refer to Sec. 1.2 for channel selection).

- 1) Press [p1].



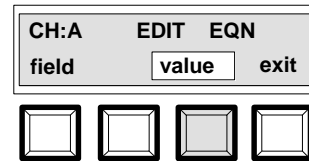
- 2) Press [edit].



- 3) Press [eqn].

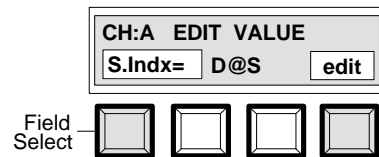


- 4) Press [value].



- 5) If < S.Indx= > is not displayed, press field selection key until it is.

Press [edit] after selecting the Speed Index field.



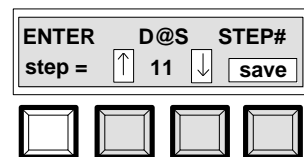
- 6) Enter the desired step# for speed index.

Press [↑] to increment number.

Press [↓] to decrement number.

Press [save].

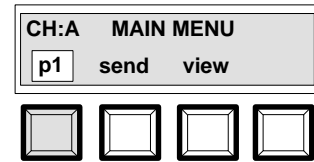
Press the two MENU keys to exit to Main Menu.



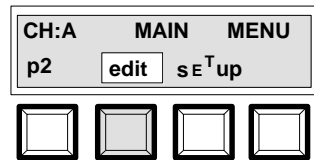
Contrast Index Hi & Lo Step Selection

Select the channel to edit (refer to Sec. 1.2 for channel selection)

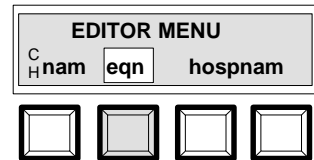
1) Press [p1].



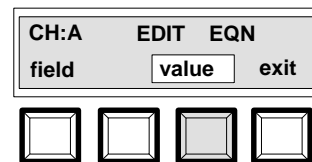
2) Press [edit].



3) Press [eqn].

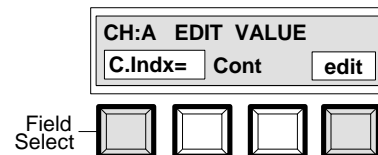


4) Press [value].



6) If < C.Indx= > is not displayed, press field selection key until it is.

Press [edit] after selecting the Contrast Index field.

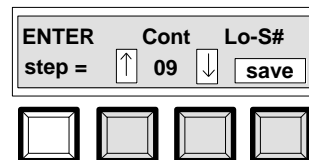


7) Enter the desired step# for Low density.

Press [↑] to increment number.

Press [↓] to decrement number.

Press [save].



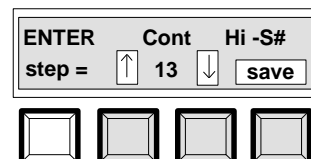
8) Enter the desired step# for Hi density.

Press [↑] to increment number.

Press [↓] to decrement number.

Press [save].

Press the two MENU keys to exit to Main Menu.




1.4.3 Monitoring a Processor

The 380 can monitor a processor on each of its 4 channels (A thru D). The channel names which appear on the print-outs are preset to "Xray Lab A" thru "Xray Lab D." These ten character names may be changed if desired (refer to Section 4.1 Channel Name of the Editing Section).

1.4.4 Establishing Normal Speed Index, Contrast Index, and Base+ Fog

The normal speed index, contrast index, and base+ fog values are established on a representative film, when the processor is considered to be operating in a optimum fashion.

Run several film samples (3 to 5) and determine the average values for speed index, contrast index, and base+ fog. Record the following data on the process control record (available from X-Rite, P/N 306-00):

Developer Temperature:	Temperature of developer solution in processor during processing.
Normal Speed Index:	The density of the step closest to 1.0 plus base+ fog. The step number should remain the same for a given process and film type.
Normal Contrast Index:	Select the step closest to but not larger than 2.20D. Subtract from this step the step closest to but not lower then 0.45D.
 >	Monitor subsequent films on the same step numbers selected for normal speed index and normal contrast index.
Normal Base+ Fog:	Step No. 1 density, the least exposed step on the wedge.
Date:	Month-Day-Year
Processor No.:	Processor Identification
Emulsion No.:	Film Batch Identification
Developer Type:	Developer Vendor Identification
Fixer Type:	Fixer Vendor Identification
Film Type:	Film Vendor Identification
Exposure Color:	Exposure light (blue or green).
Developer Replenishment:	The rate of developer replenishment.
Fixer Replenishment:	The rate of fixer replenishment.
Processor Time:	Film processor time, input-to-output.

A box of film should be set aside from regular stock for exclusive sensitometer use. New film stock will require reestablishment of normal values, because small density changes are possible between film batches.

Running Daily Strips

Control Strips should be processed, measured, and recorded daily. The 380 will automatically measure the 21 densities and calculate the process control parameters. Refer to Section 3.1 for procedure on measuring strips.

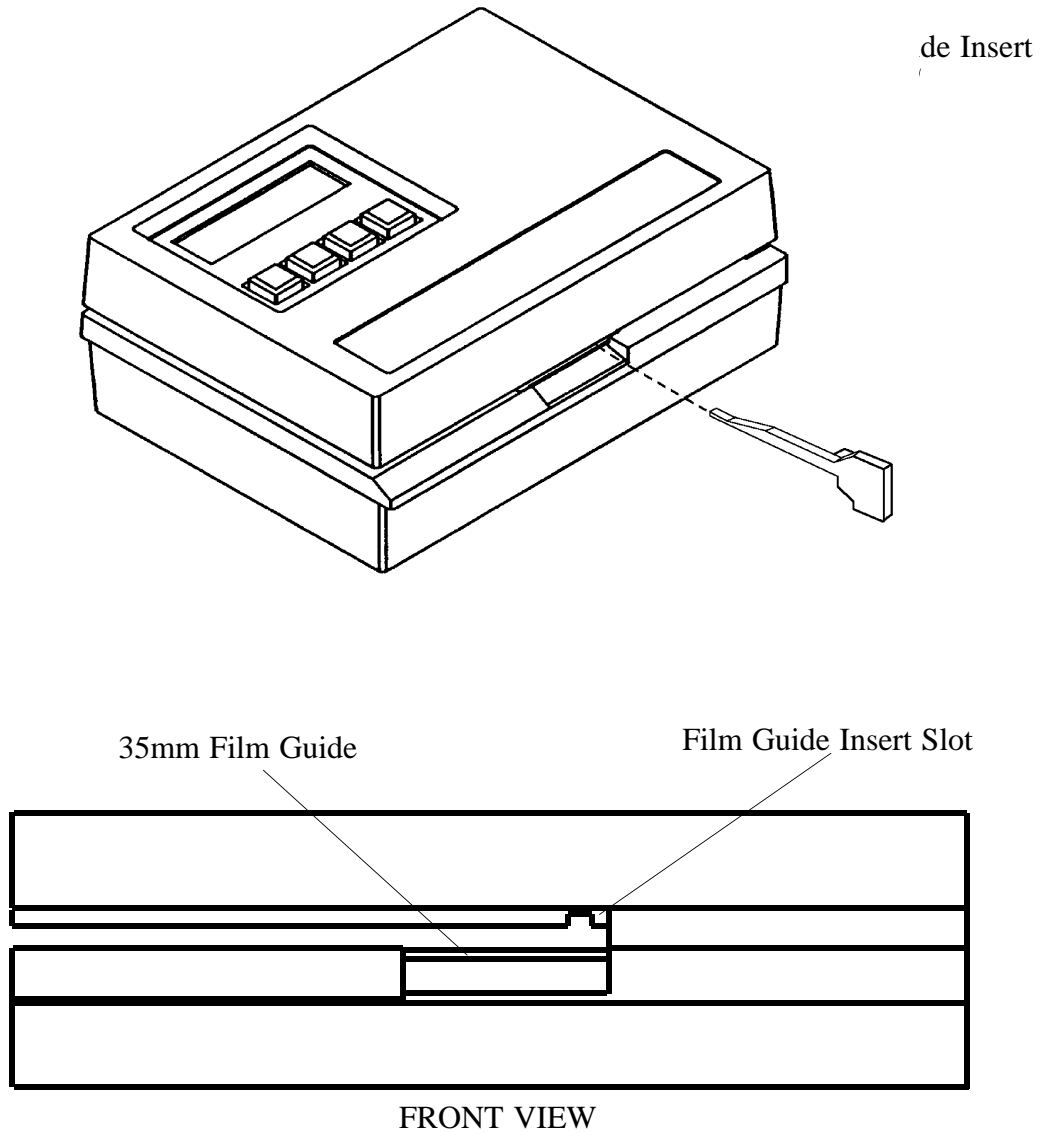
NOTE: The densitometer can store only two references (aims) per channel. If the history plot shows more than one vertical dotted line, it is recommended that you delete all old data that precedes the next to the last vertical dotted line or all data preceding the last dotted line. This will help to eliminate errors in interpreting the data.

2.

Film Guide Insert Installation

The film guide insert must be installed if the X-Rite model 303, 333, or 334 sensitometer was used to expose the film being measured.

- Install film guide insert by sliding into slot just above 35mm film guide (right hand side), see below.



3.

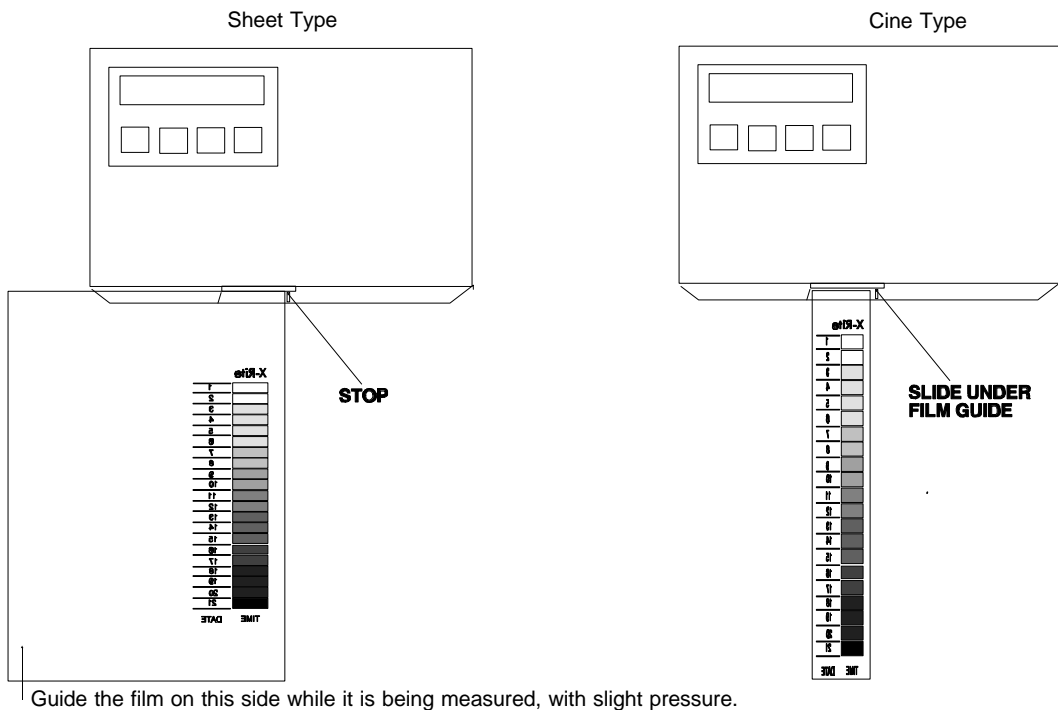
Operation

3.1. Taking Measurements



- > When inserting strips into unit, there must be at least a 1.1 inch (28mm) leader before the outside edge of the first step. Refer to your Sensitometer Operation Manual for the proper method for exposing film.
- > When measuring single emulsion films, insert the strip with the emulsion side down.
- > Before measuring, inspect the film for any pin spots or flaws on the 21 steps. If there is a flaw or spot on a step, it could cause an inaccurate measurement.
- > The exposed film must have a sensitometric exposure with a gamma of .7 or greater on steps 7 thru 15. There must be a visible density difference between each step (density must increase by at least .11D between those steps).

- 1) **For Sheet type film:** Position the side of the strip with the exposed steps tightly up to the stop, then insert film (emulsion side down for single emulsion film) until it rests against the drive rollers and the motor is activated. **Do not release the film**, with slight pressure continually hold the film against the stop (guiding it to prevent any skewing) while the film is being measured. **For Cine type film:** Insert film (emulsion side down) into 35mm slot under the film guide until it rests against the drive rollers, and release when the motor takes hold.



Guide the film on this side while it is being measured, with slight pressure.



- > If the X-Rite model 303, 333, or 334 sensitometer was used to expose the film, the film guide insert must be installed in the 380 to allow for proper film positioning (see Section 2). Cine film exposed on the 303, 333, or 334 must also be guided against the insert (same as sheet film).

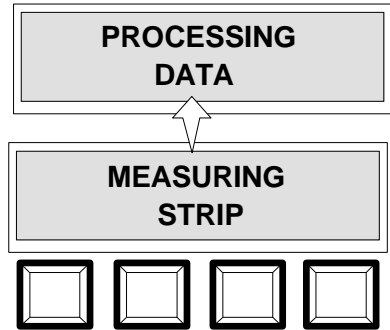


Taking Measurements - continued

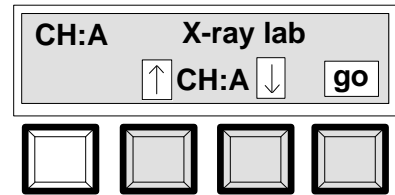
2) <MEASURING STRIP> and then <PROCESSING DATA> is momentarily displayed.



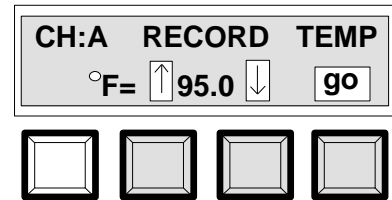
> If <INVALID READING> is displayed, it means that the unit was not able to recognize all 21 steps. It does not mean that the limits were exceeded. Insert film again, if still not recognized, refer to Appendix A3 for more information.



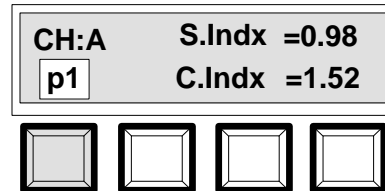
3) Select the channel you want to store the data in using the [↑] or [↓]. Press [go] to advance to next step.



4) The unit prompts you to enter the temperature of the processor solution, using the [↑] or [↓]. Press [go] to store data and advance to next step.




5) Press [p1] thru [p4] to view the measured data. Refer to section 3.2 for further information on viewing data.

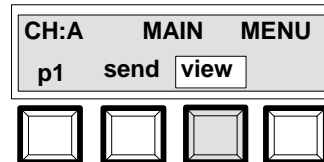


3.2. Viewing Data

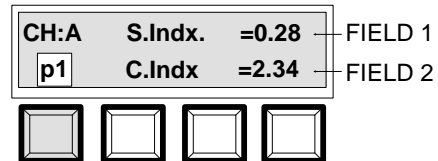
After a film is measured, all 21 steps of density are stored in memory. View allows you to view the 21 density values, gamma (slope of the curve at density value) at .1D increments, and six user definable fields. Fields 1-6 are preset with common process monitoring equations (see Appendix A4, Factory Presets).

 > Disregard step 1 if you are viewing data directly after a measurement.

1) Press **[view]**.

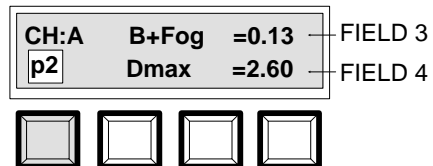


2) Speed Index and Contrast Index values are displayed.



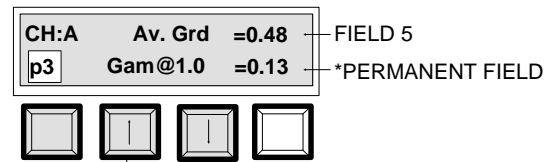
Press **[p1]**.

4) Base+Fog and Density Maximum values are displayed.



Press **[p2]**.

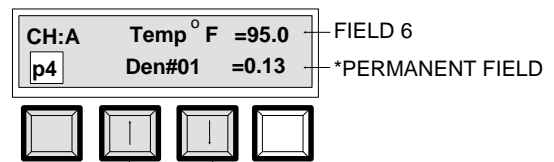
5) Average Gradient and Gamma values are displayed. Other gamma values may be viewed by pressing \uparrow to increase or \downarrow to decrease density value.



Press **[p3]**.

Increases/Decreases the density at which gamma is calculated. The density changes in 1/10th increments.

6) Temperature and density step values are displayed. Other density step values may be viewed by pressing \uparrow to increase step number or \downarrow to decrease step number.



Press **[p4]** to return to page 1, or press the two MENU keys to exit view and return to Main Menu.

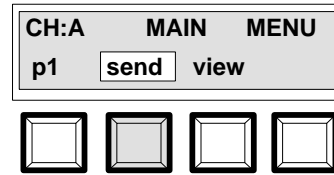
* PERMANENT FIELDS are not user definable.

Increments/Decrements thru steps 1-21

3.3. Sending Data

Send allows you to manually transmit the last measurement taken to a printer. You can select print (sends the 21 density steps), or plot (sends the characteristic curve). The data transmitted is dependant on the printer selected (see Section 1.3.5). Refer to Appendix A6 for serial printer setup and connection.

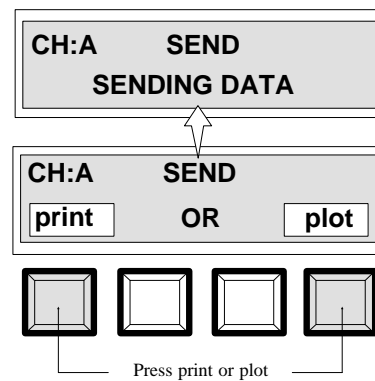
1) Press **[send]**.



2) Press **[print]** or **[plot]**.

If **[print]** was pressed, see print example below.

If **[plot]** was pressed, see plot example on following page.



Print Example

```

step 01 = 0.15
step 02 = 0.15
step 03 = 0.15
step 04 = 0.15
step 05 = 0.16
step 06 = 0.17
step 07 = 0.20
step 08 = 0.27
step 09 = 0.49
step 10 = 0.94
step 11 = 1.44
step 12 = 1.83
step 13 = 2.15
step 14 = 2.37
step 15 = 2.57
step 16 = 2.71
step 17 = 2.78
step 18 = 2.89
step 19 = 2.94
step 20 = 3.02
step 21 = 3.06
    
```

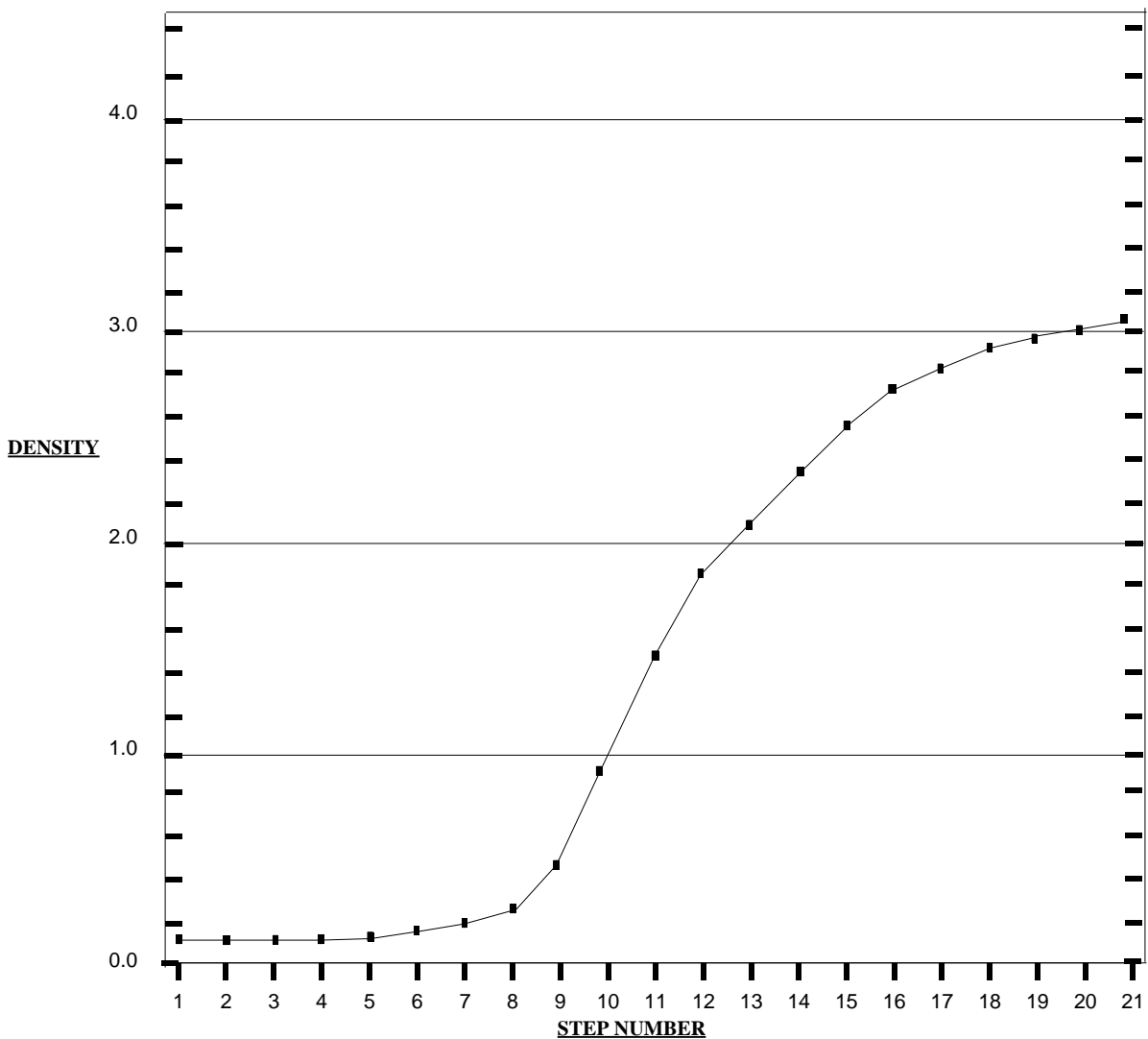
Plot Example



**X-RITE Process Control Densitometer
METROPOLITAN
HOSPITAL**

LOCATION: Xray lab A	BEGIN DATE: XX/XX/XX	GRAPH DATE: XX/XX/XX
TYPE OF FILM:	EMULSION NUMBER:	EXPIRATION:
PROCESSOR:	PROCESSING TIME:	
DEVELOPER:	REPLENISHMENT:	TEMPERATURE: 95.0 F.
FIXER:	REPLENISHMENT:	
EXP. COLOR: BLUE or GREEN	EXP. TYPE: DUAL or SINGLE	

GRAPH OF DENSITY VS. STEP NUMBER



S. Indx = 1.44
C. Indx = 1.66

B+fog = .15
Dmax = 3.06

Av. Grd = 2.77



> The densitometer comes from the factory with the equations already preset. In most cases, you will only use the editor to set the channel names and hospital name. Only advanced users should attempt to edit the equations. Refer to Appendix A4 for factory presets.

The Editor allows you to set the Channel Name (**ch nam**), Equation (**eqn**), and Hospital Name (**hospnam**).

The Equation Editor (**eqn**) allows you to define the equations to be displayed by the densitometer. The equation editor has two main sections, *field* and *value* editing. If you select field, you can edit the entire field (name, equation type, and equation data) in one pass. If you select value, you can only edit the equation data.

The six fields come preset from the factory as:

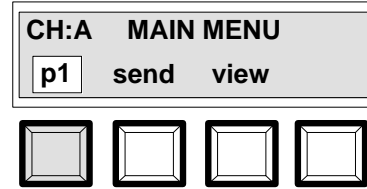
- S.Indx (Speed Index)
- C.Indx (Contrast Index)
- B+ Fog (Base Plus Fog)
- Dmax (Density Maximum)
- Av.Grđ (Average Gradient)
- Temp°F (Temperature Fahrenheit)

4.1. Channel Name (ch nam) Editor

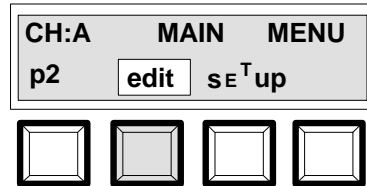


> Select the channel you want to edit (refer to Section 1.2 for channel selection). In this example Channel A will be edited. Refer to Appendix A4 for Factory Presets.

1) Press [p1].



2) Press [edit].



3) Press [CH nam].



4) Enter the channel name (up to 16 characters):

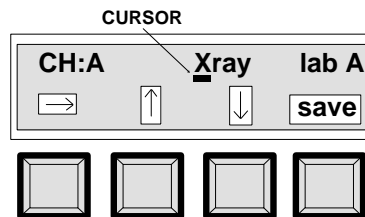
Press [→] to move cursor to next character.

Press [↑] to increment thru character list.

Press [↓] to decrement thru character list.

After entering the channel name, press [save] to save the name and return to step 3.

At step 3 you can select another channel to edit by pressing the channel keys (see Section 1.2), or return to the main menu by pressing the menu keys.



4.2. Equation (eqn) Editor - For advanced users

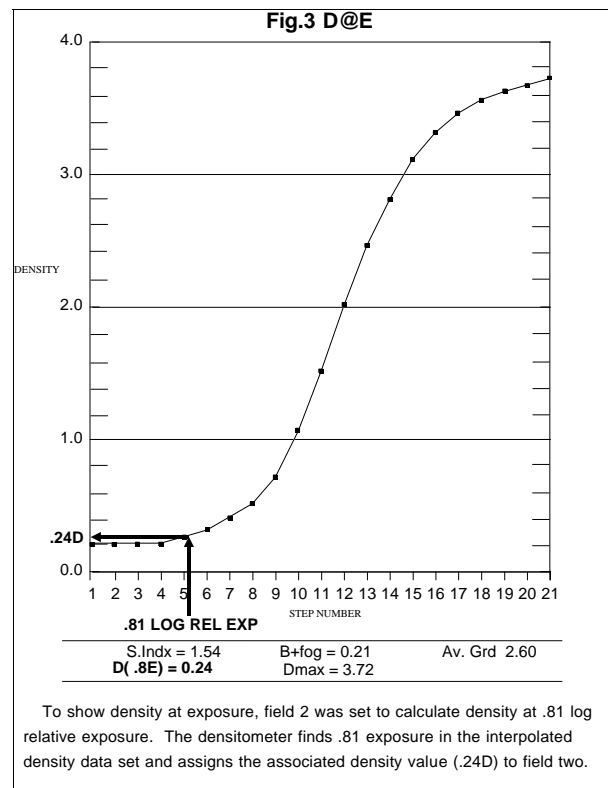
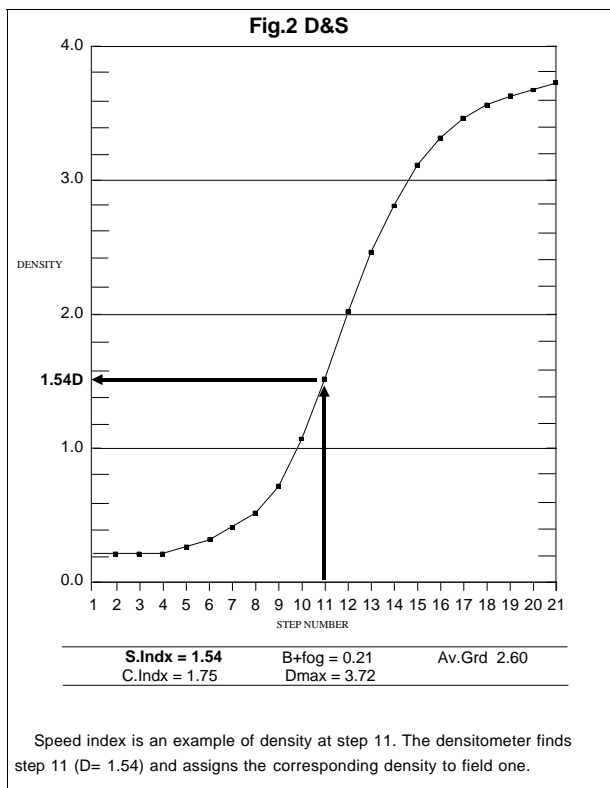
The Equation Editor (**eqn**) allows you to define the equations to be displayed in the six user definable fields (see Appendix A4 for Factory Presets).

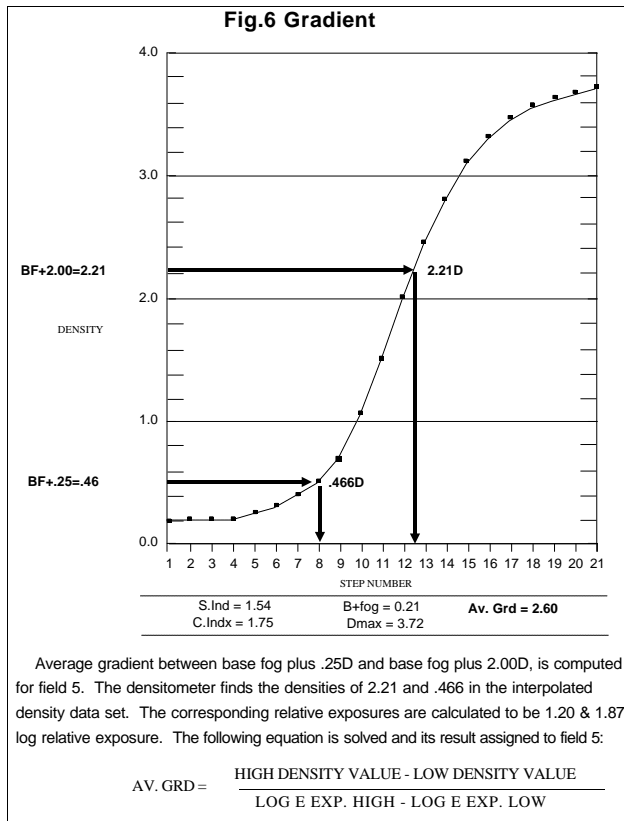
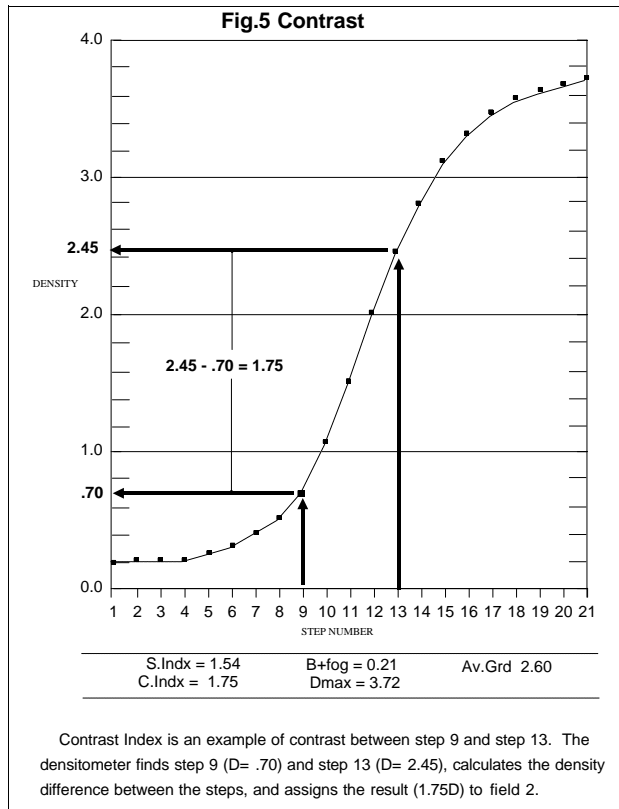
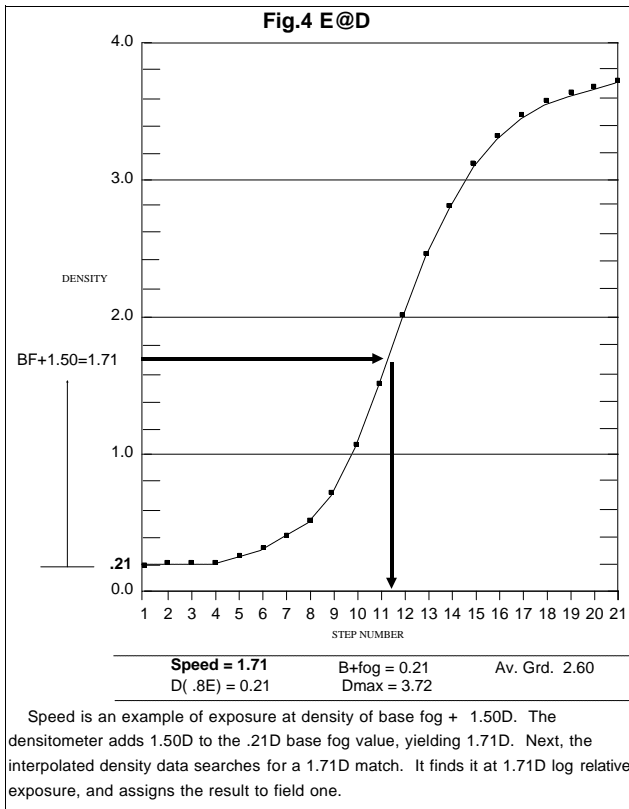
Basic equations types are:

- Density @ Step Number (D@S). Where you enter the Step number and the densitometer computes the Density.
- Density @ Exposure Level (D@E). Where you enter the Exposure Level and the densitometer computes the Density.
- Exposure Level @ Density (E@D). Where you enter the Density and the densitometer computes the Exposure.
- Contrast (Cont). Where you enter the Low Step# and High Step# and the densitometer computes the Contrast.
- Gradient (Grad). There are two methods for computing Gradient:
 - › Using Density = BaseFog + Low & High density (where you enter the Low density and the High density and the densitometer computes the Gradient).
 - › Using Density Absolute = Low & High density (where you enter the Low density and the High density and the densitometer computes the Gradient).
- Temperature (Temp). Sets field to display the temperatures that were manually entered with each measurement. Note, temp available for field 5 & 6 only.

You can individually set the six fields to any of the above equation types.

Figures 2 thru 6 graphically represent the five equations.

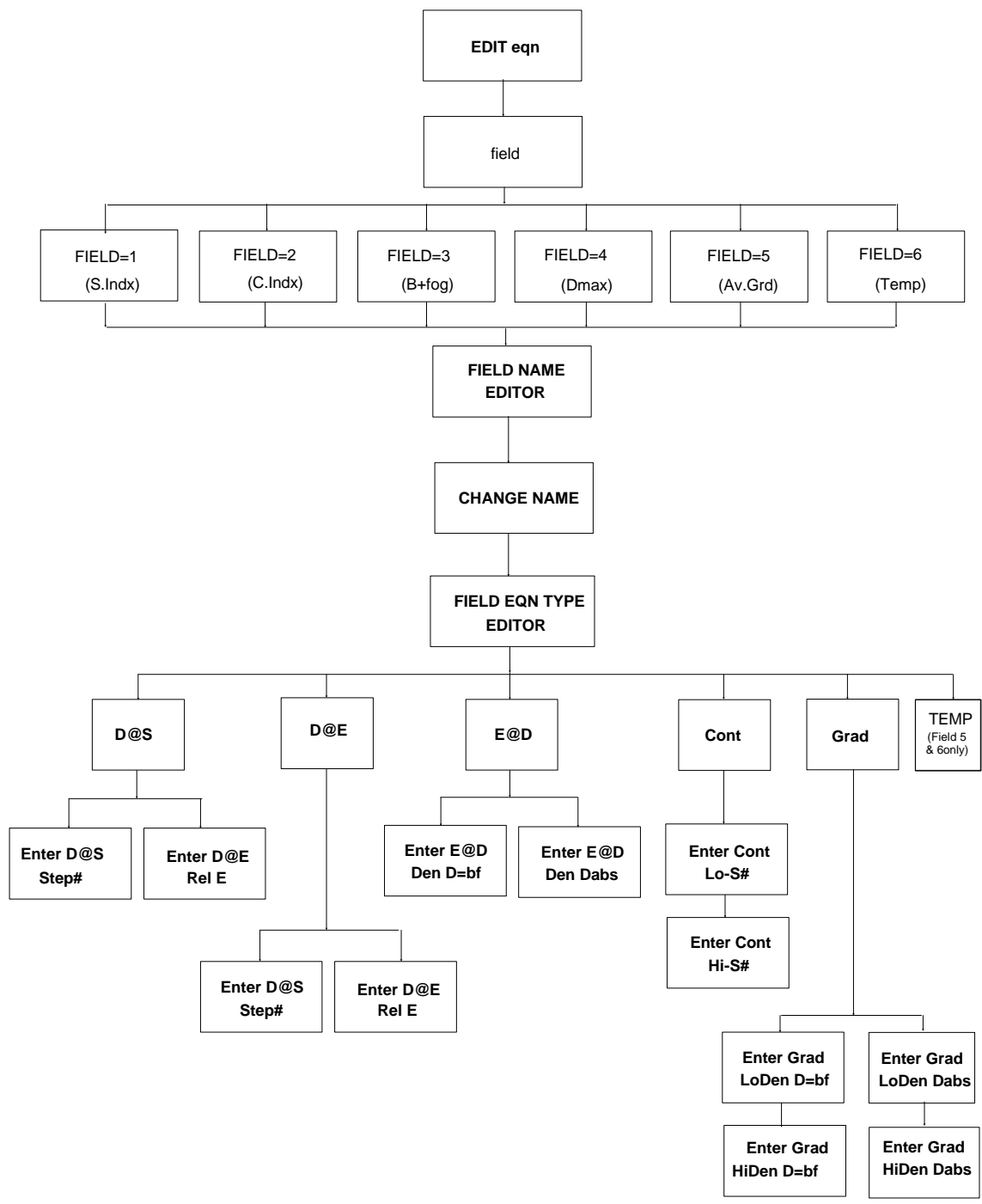




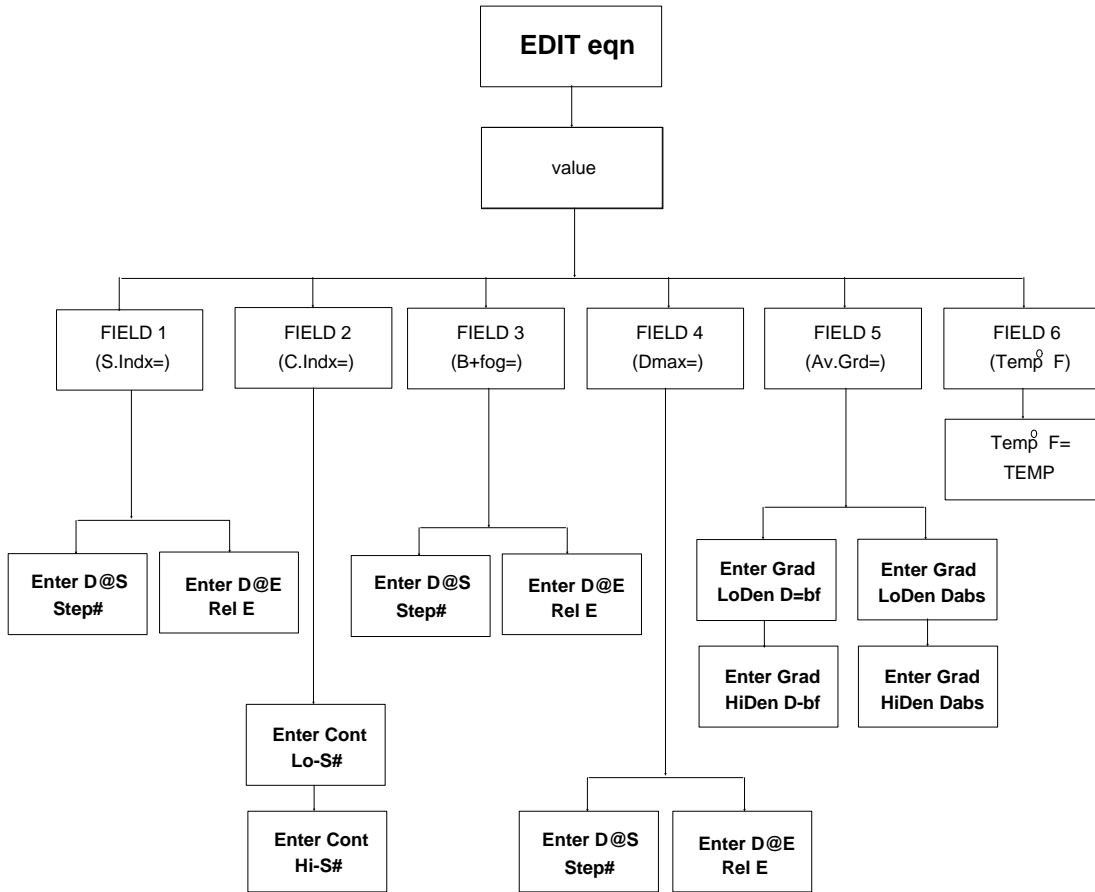
The equation editor has two main sections, *field* and *value* editing. If you select field, you can edit the entire field (name, equation type, and equation data) in one pass. If you select value, you can only edit the equation data.

A flowchart of the field and value edit functions (showing presets) are on the following two pages.

Equation Field Editor Flow Chart




Equation Value Editor Flow Chart







FIELD EDITOR





The Field Editor allows you to edit the entire field; name, equation type, and equation data.

 > Select the channel you want to edit (refer to Section 1.2 for channel selection). In this example Channel A is used. The field name= S.Indx, equation type= D@S, and step= 11.



1) Press **[p1]**.

CH:A	MAIN MENU		
p1	send	view	
			





2) Press **[edit]**.

CH:A	MAIN	MENU	
p2	edit	sE ^T up	
			


3) Press **[eqn]**.

EDITOR MENU			
C H nam	eqn	hospnam	
			





4) Press **[field]**.

CH:A	EDIT	EQN	
field	value	exit	
			

5) Select field to edit, press **[S.Indx]**.

 > Available fields as set by the factory are:
S.Indx, C.Indx, B+ fog, Dmax, Av.Grd, &
Temp.

Press **[edit]** after selecting the field.

CH:A	FIELD = 1		
S.Indx=	edit	exit	
			





6) Enter the field name:

Press **[→]** to move cursor to next character

Press **[↑]** to increment thru character list.

Press **[↓]** to decrement thru character list.

After entering the channel name, press **[save]**.

CH:A	→	↑	↓	S.Indx
				save
				

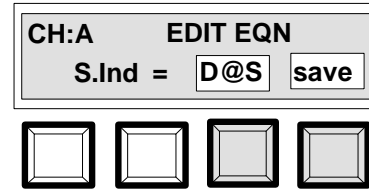
 Continued

Field Editor - continued

7) Select the type of equation, press **[D@S]**.



> Available equations are: Grad (gradient), D@S (Density @ Step), D@E (Density @ Exposure), E@D (Exposure @ Density), and Cont (Contrast) **Refer to the Additional Notes at bottom of page.**



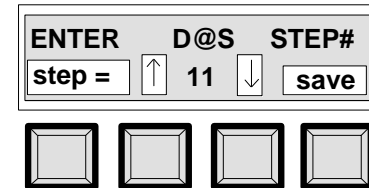
Press **[save]** key to continue.

8) Enter the step# for the equation.

Press **[↑]** to increment.

Press **[↓]** to decrement.

Press **[save]** to save equation data and go to Step 4.



At step 4 you can edit another equation, *or* press **[exit]** to go to step 3, *or* press MENU keys to go to main menu.




Additional Notes:

- > If you select D@S, you can change to D@E computation by pressing **[step]** at step 8.
- > If you select D@E, you can change to D@S computation by pressing **[exp]** at step 8.
- > If you select E@D, you can have density equal to density absolute or density + basefog by pressing **[Dabs]** or **[D= bf]** at step 8.
- > If you select Cont, you have to enter the Low Step# and the High Step# at step 8.
- > If you select Grad, you can have the low and high densities equal to density absolute or density + base fog, by pressing **[Dabs]** or **[D= bf]** at step 8.

VALUE EDITOR

The Value Editor allows you to edit only the equation data.

 > Select the channel you want to edit (refer to Section 1.2 for channel selection). In this example Channel A is used. The field name= S.Ind, equation type= D@S, and step= 11.

1) Press **[p1]**.

CH:A	MAIN MENU		
p1	send	view	
<input type="button" value=""/>	<input type="button" value=""/>	<input type="button" value=""/>	<input type="button" value=""/>

2) Press **[edit]**.

CH:A	MAIN MENU		
p2	edit	SE ^T up	
<input type="button" value=""/>	<input type="button" value=""/>	<input type="button" value=""/>	<input type="button" value=""/>


3) Press **[eqn]**.

EDITOR MENU			
C H	nam	eqn	hospnam
<input type="button" value=""/>	<input type="button" value=""/>	<input type="button" value=""/>	<input type="button" value=""/>

4) Press **[value]**.

CH:A	EDIT EQN	
field	value	exit
<input type="button" value=""/>	<input type="button" value=""/>	<input type="button" value=""/>

5) Select field to edit, press **[S.Indx]**.

 > Available fields as set by the factory are:
S.Indx, C.Indx, B+ fog, Dmax, Av.Grd, & Temp.

Press **[edit]** after selecting the field name.

Refer to "Additional Notes" on previous page.

CH:A	EDIT VALUE	
S.Indx=	D@S	edit
<input type="button" value=""/>	<input type="button" value=""/>	<input type="button" value=""/>

6) Enter the step# for the equation.

Press **[↑]** to increment.

Press **[↓]** to decrement.

Press **[save]** to save equation data and go to Step 5.

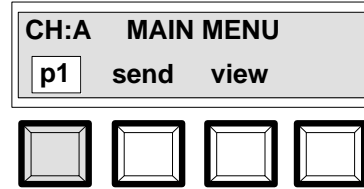
At step 5 you can edit another equation, *or* press **[exit]** to go to step 4, *or* press MENU keys to go to main menu.

ENTER	D@S	STEP#
step =	↑ 11 ↓	save
<input type="button" value=""/>	<input type="button" value=""/>	<input type="button" value=""/>

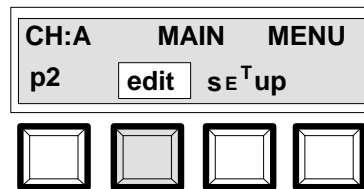
4.3. Hospital Name (hospnam) Editor

Name allows you enter the name of the unit (ex., Metropolitan Hospital). The name will be printed on the characteristic curve each time it is transmitted.

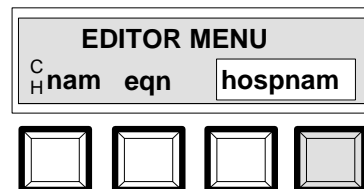
1) Press [p1].



2) Press [edit].

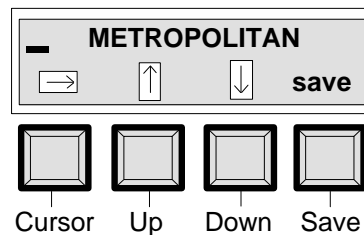


3) Press [hospnam].



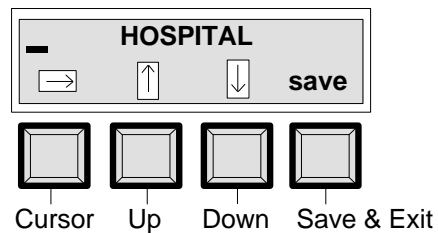
4) Enter the first line of the name (up to 16 characters).

Press [→] to move cursor to next character
Press [↑] to increment thru the character list.
Press [↓] to decrement thru the character list.
Press [save] to continue.



5) Enter the second line of the name (up to 16 characters).

Press [save] to exit.
Select another setup function or press MENU keys to exit setup.

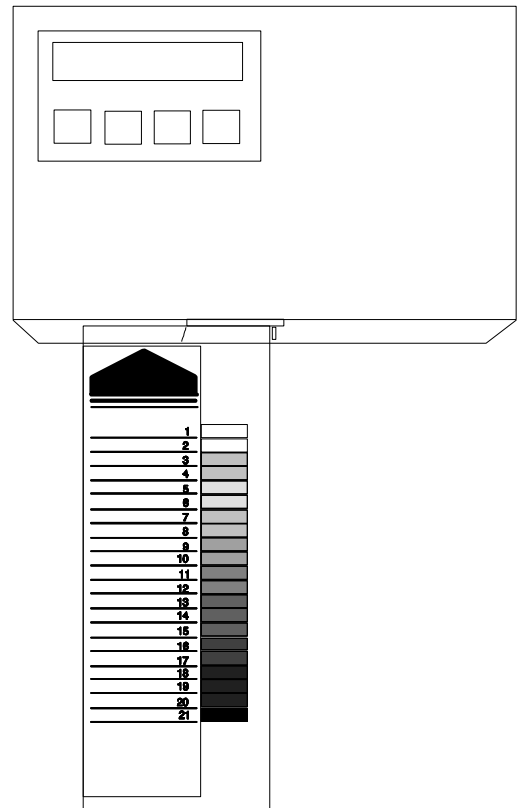


5.1. Calibration Verification

The 381-25 Calibration Verification Reference is a 21 step film designed to be recognized by X-Rite Model 380 Auto-Scanning Transmission Densitometers. This instrument feature automatic calibration and do not require any manual adjustments by the user. The Calibration Verification Reference provides a method to periodically verify and document the performance of your scanning densitometer.

Verification Procedure

1. Insert the verification reference through the scanning densitometer in the direction indicated by the arrow at the top of the film. Refer to Section 3.1 for information on inserting films.
2. The density measured by the instrument may be viewed on the instrument display and compared to the density values printed on the verification reference to verify the calibration of the instrument. Refer to section 3.2 for information on viewing data.
3. A permanent record of the verification measurement can be printed to a serial printer. The printout should be dated and the reference density values recorded at the required steps. Refer to section 3.3 for information on printing data.
4. The values measured by the instrument should be within $\pm 0.03D$ or 2% whichever is greater, compared to the values printed on the reference label. If this is not the case, ensure that the film is not dirty or damaged and remeasure the film. If the values consistently exceed this limit clean the optics per instructions in Section 5.2. If the measured values still do not fall within the specified limit contact your field representative or X-Rite's Technical Service Department.
5. It is recommended that the calibration verification procedure be performed once a week. More frequent verification can be performed if required by local regulations.



› Handle the transmission reference at the edges only. Fingerprints or any other foreign substance on the measurement area will cause errors. Attempts to dust or clean the surface with anything other than a soft camel hair brush may change densities. Minimize change by storing in a dark, cool, and dry place.

Calibration Verification - continued



- > This film is intended for use as a verification film for scanning densitometers and should not be used as a replacement for the transmission reference supplied with other densitometers.
- > The calibration scale on X-Rite scanning densitometers built prior to May, 1991 conformed to ANSI PH2.19-1976 and should be verified with density values converted to this scale per the instructions on the outside of the reference's envelope. Instruments with this calibration scale can be identified by the silver charger jack on the side of the unit. Current instruments have black charger jacks.

5.2. Troubleshooting Chart

Important! Before proceeding with the following troubleshooting chart:

- Make sure strip being measured has been properly inserted and is free of smudges, scratches, and blemishes. Make sure that strips and the unit are free of dust and lint.

Proper antistatic control must be used when replacing the lamp and batteries.

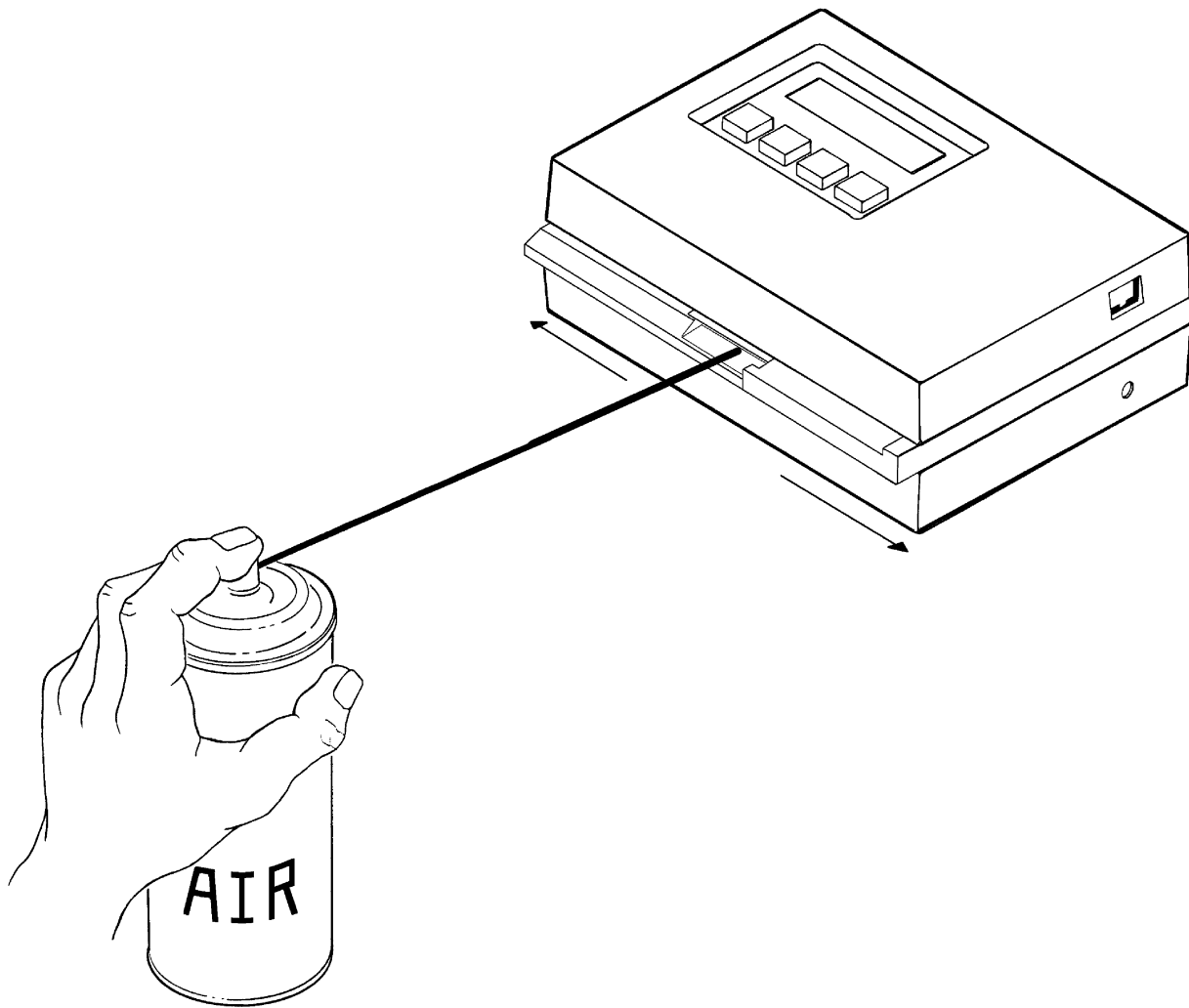
PROBLEM	CAUSE	SOLUTION
Measurement densities incorrect.	Read lamp weak.*	Replace lamp (see Sec. 5.4).
Measurement densities drift.	Read lamp weak.*	Replace lamp (see Sec. 5.4).
Read lamp not working.	Read lamp bad.*	Replace lamp (see Sec. 5.5).
Measurement densities unrepeatabe/incorrect.	Film misaligned.	Reinsert strip.
	Film has blemishes or scratch.	Use different film strip.
< INVALID READING!> is displayed after measurement. (Refer to Appendix A3 for more invalid reading messages)	Film did not have long enough leader (1.1").	Use film with correct leader.
	Exposed region not properly aligned.	Make sure film feeds straight through unit and does not skew.
		Use film guide insert (see Section 2) if film was exposed with a X-Rite 303, 333, 334, or a Cronex sensitometer.
	One or more measurement patches are cloudy, have excessive gradients, or have flecks.	Process and measure a new film. Note: A small clear area in a high density patch causes large errors. This could be caused by dust specs in the sensitometer during exposure. If so, clean sensitometer and process another film.
	Motor drive roller slipping due to restraint or obstruction, or contamination of rollers from reading wet strips.	Remove restraint/obstruction or dry drive rollers with air.
	Film did not meet required exposure criteria.	Adjust sensitometer exposure time to meet requirements (see Section 3.1).

* The instrument has a failure monitor that in most cases will automatically indicate when the lamp needs replacement.

5.3. Optics Cleaning

To remove any dust and lint from the optics and drive wheel assembly, follow the procedure shown approximately once a week.

- 1) Holding can in upright position, insert tube from the canned air into film insertion slot (in front of unit). Make sure the air is clean and free of moisture.
- 2) With back and forth motion spray air into insertion slot from one end to the other. Do this several times. This should remove any accumulated dust and lint.

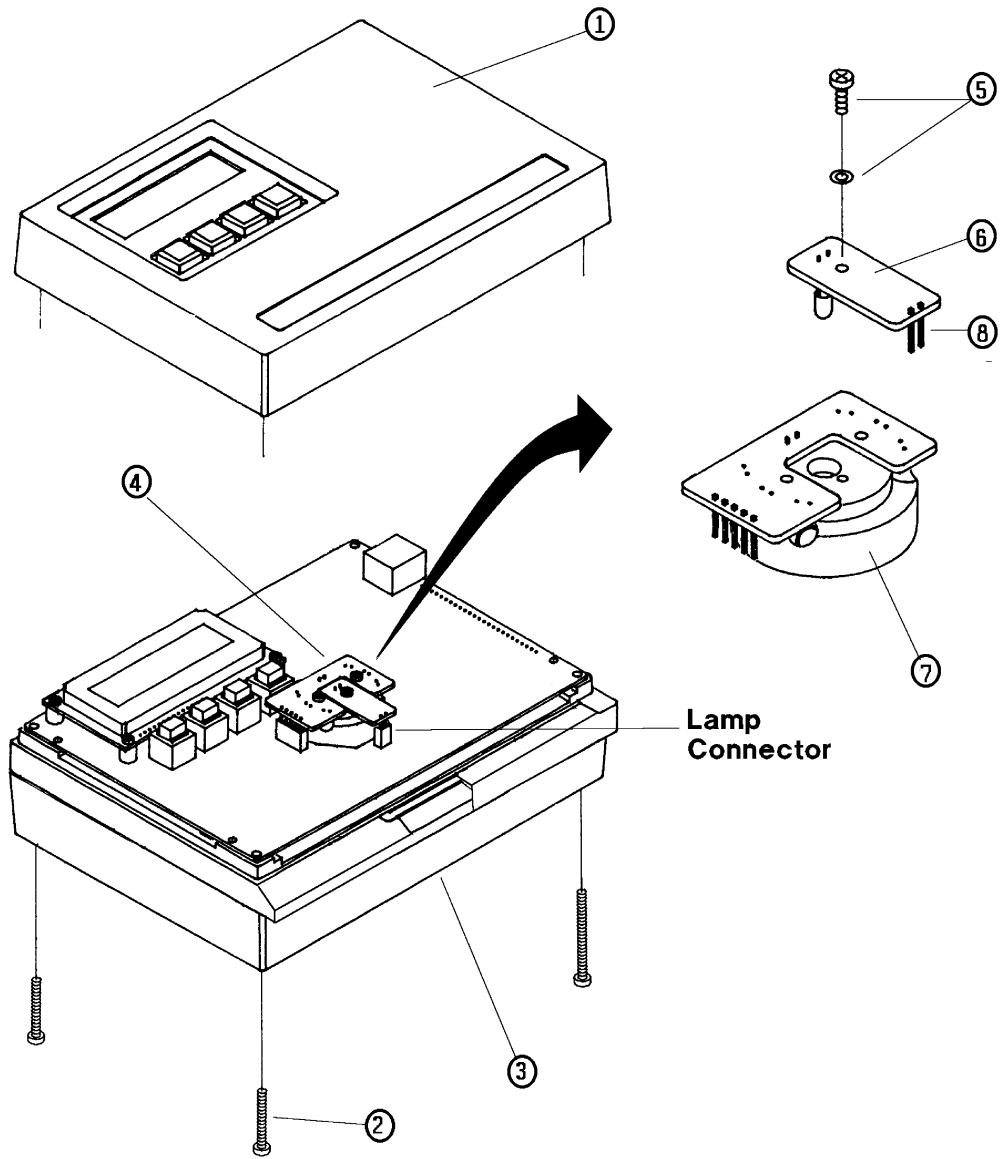


Make sure the air can remains upright.

5.4. Read Lamp Replacement P/N 880-07

- 1) Remove four screws [2] securing the bottom cover [3] with a phillips head screwdriver. Leave bottom cover [3] on.
- 2) Holding top [1] and bottom [2] covers in place, turn unit over so it rests on the bottom cover [3]. Remove top cover [1].
- 3) Locate optics assembly [4] and remove screw and washer [5] in the middle of lamp assembly P.C.B. [6].
- 4) Lift out old lamp assembly [6] and discard.
- 5) Install new lamp assembly [6] by carefully inserting lamp [6] into housing [7] and lamp pins [8] into lamp connectors. Press down gently to make sure connector pins [8] are properly seated.
- 6) Secure lamp screw and washer [5] in place.
- 7) Carefully clean any dust or plastic chips off circuit board and top cover [1] using canned air. Place top cover [1] on instrument.
- 8) Holding the top and bottom covers in place, turn unit over so that it rests on the top cover [1].
- 9) Remove bottom cover [3]. Clean circuit board and bottom cover [3] with canned air then place bottom cover [3] back on instrument.
- 10) Secure bottom cover [3] to instrument with four screws [2] using a phillips head screwdriver. Make sure that the two long screws go on the end with the AC Adaptor jack.
- 11) After lamp is installed, refer to Section 1.3.3 to reset lamp percentage monitor.

Read Lamp Replacement - continued



A1. Specifications

Film	Measures X-Rite 21- step sensitometer formats exposed on 8" length or longer films. The exposed sensitometric film must have a sensitometric exposure with a gamma of .7 or greater on steps 7 thru 15. There must be a visible density difference between these steps (density must increase at least .11 D between each step).
Measurement Speed	1.2" per second
Spectral Response	ANSI Visual
Density Range	0 - 4.5D
Density Accuracy	$\pm .02D$ (0 - 3.00D) (ANSI PH2.19-1986) $\pm 2\%$ (3.01D - 4.00D) When compared to other densitometers, density variations may exist due to calibration and spectral differences.
Density Repeatability	$\pm .01D$ (0 - 3.00D) $\pm 1\%$ (3.01D - 3.50D) $\pm 2\%$ (3.51D - 4.00D)
Voltage Requirements	120VAC Adaptor P/N SE30-61 230VAC Adaptor P/N SE30-62
Dimensions	7.2" x 6.0" x 2.75" 182.8mm x 152.4mm x 69.8mm

A2. Display Abbreviations

Av. Grd	- Average Gradient
B+ Fog/bf	- Base plus Fog
Ch/ch	- Channel
C.Indx	- Contrast Index
cnfg	- configuration
cont	- (in equation setup) a basic contrast equation
Dabs	- Density Absolute
D@E	- Density at Exposure
Den	- Density
Dmax	- Density maximum
D@S	- Density at Step
E@D	- Exposure at Density
eqn	- equation
exp	- exposure
gam	- gamma
gam@D	- gamma at density
Grad	- (in equation setup) a basic gradient equation
HiDen	- High Density
Hi-S#	- High Step Number
INFO	- information
I/O	- Input/Output
Lcd	- liquid crystal display
LoDen	- Low Density
Lo-S#	- Low Step Number
nam	- name
p1	- page 1
p2	- page 2
p3	- page 3
Rel E	- Relative Exposure
S.Indx	- Speed Index

A3. Error Messages

ERROR MESSAGE	REASON	SOLUTION
Press [help] key on the instrument to receive one of the following six invalid reading messages.		
< UNRECOGNIZABLE STRIP>	Film did not have long enough leader (1.1").	Use film with correct leader.
	Exposed region not properly aligned.	Make sure film feeds straight through unit and does not skew.
		Use film guide insert (see Section 2) if film was exposed with a X-Rite 303, 333, or 334 Sensitometer.
	One or more measurement patches are cloudy, have excessive gradients, or have flecks.	Process and measure a new film. Note: A small clear area in a high density patch causes large errors. This could be caused by dust specs in the sensitometer during exposure. If so, clean sensitometer and process another film.
	Motor drive roller slipping due to restraint or obstruction, or contamination of rollers from reading wet strips.	Remove restraint/obstruction or dry drive rollers with air.
	Film did not meet required exposure criteria.	Adjust sensitometer exposure time to meet requirements (sec. 3.1)
< EARLY SWITCH RELEASE>	Switch was released before reading began.	Do not remove strip until after reading.
< FILM STRIP TOO LONG>	Film strip being measured is too long.	If excess film exists on either end of exposed area, cut off. Make sure to leave at least 1.1" leader from beginning of first region.
< TOO MANY REGIONS>	More than 28 regions on exposure. Mottled exposure areas often produce many regions.	1) Avoid placing these regions in leader; 2) feed in reverse direction; or 3) cut off mottled end.
< REQUIRED CALIBRATION>	Unit detected zero drift greater than $\pm .01D$.	381 automatically recalibrated after message was displayed. Run strip again.
< A/D HARDWARE FAILURE>	A/D conversion time failure.	If occurs repeatedly, service unit.



Error Messages - continued

ERROR MESSAGE	REASON	SOLUTION
< WARNING REPLACE LAMP!>	Lamp output is less than required intensity. Measurement accuracy of unit is questionable at this point.	Replace lamp immediately, see Section 5.3.
< CHECK PRINTER>	Incorrect printer selected in setup.	Select correct printer, see Section 1.3.2.
	Printer is not connected or off line.	Connect printer or turn printer on line.

A4. Factory Presets

CHANNEL NAMES

"Xray lab A" - "Xray lab D"



> All four channels (A-D) have the same name with corresponding letters.

<u>FIELD NO.</u>	<u>FIELD NAMES</u>	<u>EQN TYPE</u>	<u>EQN VALUE(S)</u>
1	"S. Indx"	D@S	Step 11
2	"C. Indx"	CONT	Step 9 & Step 13
3	"B+ Fog"	D@S	Step 1
4	"Dmax"	D@S	Step 21
5	"Av. Grd"	GRAD	.25D+ bf & 2.00D+ bf
6	Temp °F	TEMP	N/A

HOSPITAL NAME

"METROPOLITAN HOSPITAL"

I/O PRESETS

Printer preset is "180si"

baud = 9600

pin-5 = cts

format = new

r.c.i. = off

dec. pt = on

cr = crlf

comp = off

xmit = man.

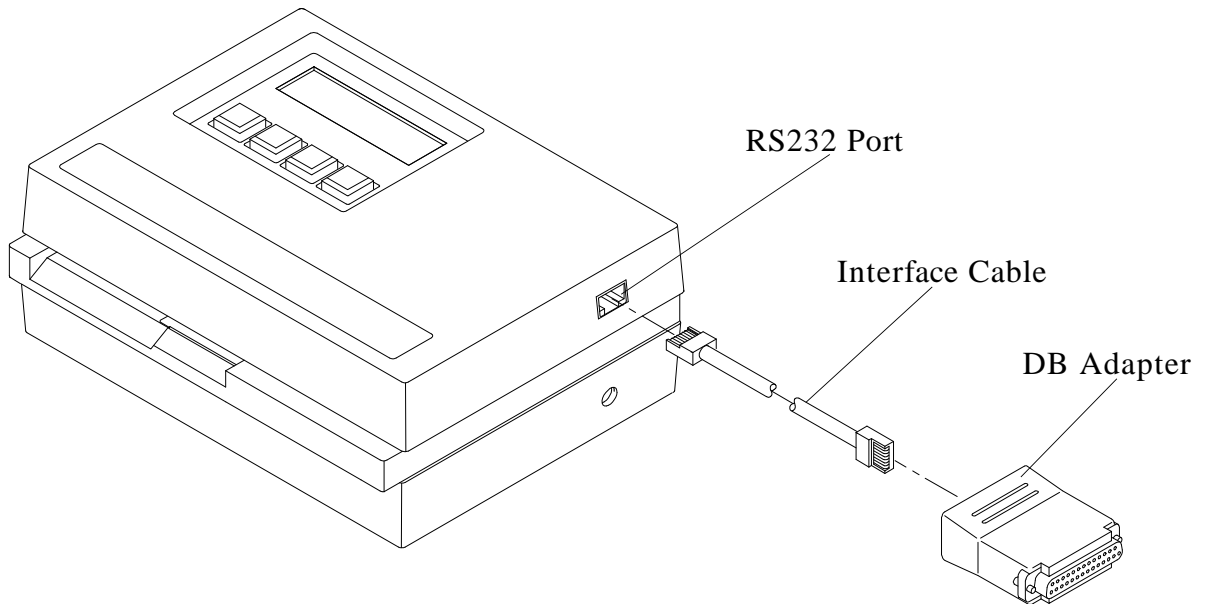
width = full

A5. Accessories

X-Rite does carry a variety of "DB" type adapters and cables for interfacing your densitometer. Ask your X-Rite representative or call X-Rite, Inc. to find out which adapter or cable will best meet your requirements.

380 Series RS232C Interface Manual P/N 380-506

Connecting the Interface Cable and Adapter



A6. Setup Definition

The setup is contained in two pages: Page 1 (tone & I/O); and Page 2 (lamp & °C/F).

PAGE 1

- **Beeper Loudness (tone)** - adjust the beeper loudness (loud, soft, or off).
- **RS232 parameters (I/O)** - sets the parameters of the I/O port.

You can select a *preset* setting for a specific format output such as: Epson serial printer, Diconix serial printer, 180si serial printer, Seiko serial printer, 301 Format, Data Interchange Format (for exchanging data with programs such as: DBase, etc.). See chart on next page.

You can also select a *custom* setting, where you individually set the parameters:

- » **Baud Rate** - determines the output rate (characters per second) of the I/O port. Available rates are: 300, 600, 1200, 2400, 4800, and 9600.
- » **Pin5** - determines the status of pin 5 of the I/O port. It can be set to off, busy, or CTS (Clear To Send). Pin 5 should normally be set to off, if it is not going to be used.
- » **Format** - when set to old, the data will be output as: space, density, space, density. When format is set to new, the data will be output as: density, space, density, space.
- » **R.C.I.** - enables or disables Remote Control Interface. RCI allows the ability to remotely control the densitometer. Refer to the 380 Series RS232C Interface Manual (available from X-Rite, P/N 380-506) for further information on RCI.
- » **Decimal Point** - enables or disables the decimal point during output.
- » **Carriage Return/line Feed** - varies the delimiter at the end of each line. Can be set to carriage return and line feed or carriage return only.
- » **Computer** - when set to off, the data will be output as: step number, space, equals, space, density, and then the delimiter (as determined by the carriage return/line feed setting).

Ex. Step# 01 = n.nn < CR> Step # 02 = n.nn < CR>

When comp is set to on, the data will be output as determined by the format setting, and after the last step, the delimiter (as determined by the carriage return/line feed setting).

Ex. n.nn n.nn n.nn n.nn ... < CR>

- » **Transmit** - enables or disables data from being transmitted automatically after a reading is taken.
- » **Width** - when set to half width, will cause the printer to print the graphics at half the normal width. When set to full, the printer will print the graphics at full width.

You can load a preset and then use custom to change the individual settings of the selected preset.



I/O Preset Parameter Chart

I/O PRESET	BAUD	pin-5	FORMAT	r.c.i.	dec.pt	CR	COMP	XMIT	WIDTH
Epson	9600	CTS	NEW	OFF	ON	CRLF	OFF	MANUAL	FULL
Diconix	9600	CTS	NEW	OFF	ON	CRLF	OFF	MANUAL	FULL
Seiko	9600	CTS	NEW	OFF	ON	CRLF	OFF	MANUAL	HALF
D.I.F.	9600	BUSY	NEW	ON	ON	CRLF	OFF	MANUAL	FULL
301 (Emulation)	300	CTS	OLD	OFF	OFF	CR	ON	AUTO	FULL
180si	9600	CTS	NEW	OFF	ON	CRLF	OFF	MANUAL	FULL
X-Read	2400	OFF	NEW	ON	OFF	CRLF	OFF	MANUAL	FULL
Stylus	9600	CTS	NEW	OFF	ON	CRLF	OFF	MANUAL	FULL
Canon1	9600	CTS	NEW	OFF	ON	CRLF	OFF	MANUAL	FULL
Canon2	9600	CTS	NEW	OFF	ON	CFLF	OFF	MANUAL	FULL

PAGE 2

- **Lamp counter (lamp)** - resets the lamp hours back to zero. This should be done after replacing the lamp. You can also check the percent of life remaining for the lamp.
- **Temperature Format (°C/F)** - allows either celsius or fahrenheit to be displayed and printed. Temperature format should be selected at initial setup and not changed.

A7. Proprietary Notice

The information contained in this manual is derived from patent and proprietary data from X-Rite, Incorporated. This manual has been prepared solely for the purpose of assisting operation and maintenance personnel in their use and general maintenance of the 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 it for any purpose other than installing, operating, or maintaining the equipment described herein.

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This instrument is covered by the following U.S. and foreign patents: # 4,591,978; 5,062,714; 5,118,183; and other patents pending.

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X-Rite® is a registered trademark of X-Rite, Incorporated.
All other trademarks, registered trademarks, and products mentioned are the property of their respective holders.

A8. Limited Warranty

X-Rite, Incorporated warrants each unit manufactured to be free of defects in material and workmanship for a period of twelve months. THERE ARE NO WARRANTIES OF MERCHANTABILITY OR FITNESS. THIS WARRANTY OBLIGATION IS LIMITED TO SERVICING THE UNIT RETURNED TO X-RITE, INCORPORATED FOR THAT PURPOSE AND EXCLUDES THE LAMP.

The unit shall be returned with transportation charges prepaid. If the fault has been caused by misuse or abnormal conditions of operations, repairs will be billed at a nominal cost. In this case, an estimate will be submitted before work is started, if requested.

A Warranty Registration Card is enclosed with each instrument. The purchaser should fill in the card completely and return it to X-Rite, Incorporated postmarked no later than ten (10) days from date of receipt. The card registers your system with us for warranty coverage. Once your unit is registered, we are able to maintain a file to help expedite service in case it is needed. Always include serial number in any correspondence concerning the unit. The serial number is located on the bottom of the unit.

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.



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