

FLUKE®

Biomedical

Nuclear Associates 07-444

Little Genius Scanning Densitometer

Operators Manual

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Section 1

Introduction

1.1 Product Description

The Model 07-444 Little Genius scanning densitometer is designed to be used with a Nuclear Associates sensitometer to monitor film-processing performance. Little Genius is a battery and/or line operated unit capable of automatically scanning 21 Step films and making single point density measurements.

The Little Genius measures and displays the step densities of a 21-step film. It calculates and displays base + fog, maximum density, speed index, average gradient, relative speed and contrast index of the processed film.

Model 07-444 allows the user to label and store measurement data for up to 20 film processors. The measurements can be downloaded to an IBM PC compatible computer or printer via the RS-232 interface, located on the back panel of the units.

The stand-alone or graphics mode with its control chart features provides a quick method for tracking daily film processor performance. Control chart values for 31 daily measurements with up to 20 processors can be stored in the Little Genius. Control charts may be as either index or gradient values. Control charts and D log E curves may be output directly to a printer via the RS-232 interface.

1.2 Specifications

Film	Measures Model 07-417 or X-Rite Model 21-step sensitometer format in scan mode.
Range (Density)	0 to 4.0 OD
Accuracy (Density)	0 to 3 OD \pm 0.02 OD units; .3.0 OD to 4.0 OD \pm 1%
Repeatability (Density)	\pm 0.02 OD units
Power	<p>Line: 110 VAC with AC power converter</p> <p>Part 14-301 (USA, Japan) Input: 117 VAC, 60 Hz, 12 W Output: 9 VDC, 500 mA</p> <p>Part 14-399 (Europe) Input: 230 VAC, 50 Hz Output: 9 VDC, 500 mA, 4.5 VA</p> <p>Part 14-415 (UK) Input: 230 VAC, 50 Hz, 12.6 VA Output: 9 VDC, 680 mA</p> <p>Part 14-415, Part 14-416 (Australia)</p>
Battery	Six (6) 1.5 V alkaline
Displayed Message Batteries	"Low Battery" Battery is below threshold unit will not operate - Replace Batteries
Spectral Response	Centered at approximately 540 nm

Aperture Size	1.0 and 2.0 mm
Operating Conditions	10°C to 40°C (50°F to 104°F) Maximum humidity of 90% non-condensing
Dimensions (H x W x D)	2.75 in x 3.2 in x 7.1 in (7 cm x 8.1 cm x 18 cm)

1.3 Receiving Inspection

Upon receipt of the unit:

1. Check the shipping carton(s) and their contents for in-shipment damage. If damage is evident, file a claim with the carrier and notify Fluke Biomedical at 440.248.9300.
2. Check that all items listed on the packing slip are present and in good condition. If any items are missing or damaged, contact Fluke Biomedical at 440.248.9300.

1.4 Storage

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

1.5 Routine Cleaning

Do not immerse the Model 07-444 Miniscan Scanning Densitometer. The unit is not waterproof. Liquid could damage the circuits. The unit should be kept clean and free from dirt and contamination. The unit may be cleaned by wiping with a damp cloth using any commercially available cleaning or decontaminating agent.

1.6 Procedures, Warnings, and Cautions

The equipment described in this manual should be used only by persons who have been trained in the proper interpretation of its readings.

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

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

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

Indicated battery and other operational tests must be performed prior to each use to assure that the instrument is functioning properly. If applicable, failure to conduct periodic performance tests in accordance with ANSI N323-1978 (R1983) **Radiation Protection Instrumentation Test and Calibration**, paragraphs 4.6 and 5.4, and to keep records thereof in accordance with paragraph 4.5 of the same standard, could result in erroneous readings or potential danger. ANSI N323-1978 becomes, by this reference, a part of this operating procedure.

Section 2

Getting Started

2.1 Power

The Scanning Densitometers may be powered by batteries (with six 1.5 V alkaline batteries) or by AC line power. An AC adapter is supplied with each unit. Connection for the adapter is located on the rear panel of the unit.

2.2 Controls

The Little Genius Scanning Densitometer has four top panel controls:

1. An **OFF/ON** Power Switch.
2. A Push-button. (UP arrow)
3. A Push-button. (DOWN arrow)
4. An **ENTER** Push-button.

The Power Switch turns instrument power ON or OFF. When power is turned ON, the unit performs an instrument self-check. When power is turned OFF, the unit saves all parameters and values entered during the setup procedure.

NOTE

Refer to **Section 4 - Setup** for procedures for entering setup values and parameters.

The Push-button scrolls down through menu selections. The Push-button scrolls up through menu selections. The **ENTER** Push-button accepts the displayed selection, parameter, value, etc.

2.3 Display

A single-line, 16-character LCD Display displays measurement data, calculated values, and user instructions.

2.4 RS-232 Interface

Access to the RS-232 Interface is via a phone jack located on the backside of the case top of the densitometer. The interface is compatible with an IBM-compatible personal computer or a serial printer. Connection to a parallel printer requires the use of a serial to parallel converter. The RS-232 connector pinouts are listed in Table 2-1. Communication Parameters are set through the Setup Program (refer to **Section 4 - Setup**).

2.5 Operating Modes

Setup Mode

The Setup Mode allows the user to:

- Make a single point measurement
- Enter a Facility Title
- Calibrate the unit with a step wedge
- Clear the data log
- Set RS-232 and other communication parameters
- Set Graphics mode and control chart parameters
- Enter information into the data log
- Send all logged data out the communication port

Section 4 - Setup contains detailed information about the Setup Mode and specific setup procedures.

Table 2-1. RS-232 Connector Pinouts (DB-9 Pin)

Pin	Signal
2	Transmit Output
3	Receive Input
8	DTR (Data Terminal Ready) Output
6,4	DSR (Data Set Ready) Input
5	Ground Signal

Single Measurement Mode

The Single Measurement Mode allows the user to make single step density measurements. The procedure for making a single step measurement is outlined in **Section 5 - Operation**.

Scan Mode

The Scan Mode is the normal mode of operation for the Little Genius densitometer. Using this mode, measurements of sensitometry films can be made and the results calculated, displayed, and stored for later reference. Specific procedures for performing the Scan Mode functions are outlined in **Section 5 - Operation**.

Automatic Power down Mode

The densitometer automatically switches to a Power down Mode when there is no user interaction (i.e., pressing keys) for a period of ten (10) minutes. This is a power conserving function and does not affect the data stored in memory.

To reactivate the densitometer, turn the unit OFF and then back ON.

NOTE

The Automatic Power down function is NOT activated when the densitometer receives power through the AC Power Converter.

Section 3

Functional Description

This Section provides an overview of the functions performed by the Little Genius. Table 3-1 provides an explanation of some of the terms used throughout this Instruction Manual.

3.1 Optical Density Measurement

The primary function of the Little Genius is to measure the optical density of test film that has been exposed on a Nuclear Associates or X-Rite sensitometer. This consists of “21 step” measurements and a base + fog measurement. The Densitometer is also capable of single-point measurements. In the single measurement mode, the film is manually positioned with continuous display update.

3.2 Calculation of Significant Values

The Little Genius uses the readings taken during a measurement cycle to calculate/determine:

- Average Gradient
- Relative Speed
- Contrast Index
- Speed Index
- Maximum optical density

$$AG = \frac{(BF + AG_{HiOD}) - (BF + AG_{LoOD})}{(LRE_{BF+2.0}) - (LRE_{BF+0.25})}$$

Average Gradient (AG) is defined as:

$$RL = \frac{1}{(LRE_{BF+1.0})}$$

Relative Speed (RS) is defined as:

Calculating Average Gradient (AG) and Relative Speed (RS) is performed as follows:

1. Calculate (BF + AG Hi OD), (BF + AG Lo OD), and (BF + 1.0) where:
 BF = Base Fog value.
 AG Hi OD =
 AG Lo OD =
2. Using interpolation if necessary, find the log relative exposure (LRE) corresponding to the each of the values calculated in Step 1.
3. Determine AG and RL using the values calculated in Steps 1 and 2 in the appropriate equation.

The Contrast Index is defined as the density difference between the low contrast reference step and high contrast reference step, a second point near the top of the straight-line portion of the curve. For most film screen combinations, the High contrast reference point is step number 13 or 14, and the Low contrast reference point is step 8.

The Speed Index density step is that step which produces a density closest to 1.0 above base + fog. For most film screen combinations, the Speed Index is step number 10 or 11 and represents a density of approximately 1.20. The same step is used for all measurements using the same film type.

The speed reference step and contrast reference steps for each file in the data log is set from the Setup Program (refer to **Section 4 - Setup**).

3.3 Displaying Data

When operating the Little Genius in the stand-alone mode (i.e., Control Charts on), an automatic comparison is made between the control chart items and the control chart limits defined in the chart file. A value that exceeds its limit is flagged with either an "H" if the value is high or an "L" if the value is low. When this condition is detected *Chart Rng Error* is displayed. See the Control Chart Setup on page 4-9 for further details.

On completion of a measurement cycle, the following values are available for display using the Δ and Δ front panel keys:

1. The Density Value at each of the 21 steps, displayed as:
Step XX X.XX Δ
2. The base + fog value, displayed as:
Base + Fog X.XX Δ

Table 3-1. Explanation of Terms

Term	Explanation
Densitometer	Instrument which measures optical density of exposed X-Ray film.
Optical Density	Diffuse transmission density; measure of light blocked by exposed film.
Base + Fog (BF)	Inherent density of a processed film plus additional density due to age or environmental conditions.
Speed Index	Density step with optical density closest to 1.00 + BF; generally Step 10 or 11.
Contrast Index	Density difference between contrast reference point (generally Step 13 or 14) and speed index.
Sensitometer	Instrument used with a step wedge to precisely expose X-Ray film.
Step Wedge	Step tablet; wedge which provides varying optical densities, each marked with a step number; the density of each step increases with increasing step numbers. The Nuclear Associates step tablet provides 21 steps with a step marker at the mid-point of each step; Step No. relates to the log relative exposure as: Log Relative Exposure = Step No. X 0.15
RS	Relative Speed.
LRE	Log Relative Exposure; related to Step No. for Nuclear Associates step wedge as: Log Relative Exposure = Step No. X 0.15
AG	Average Gradient.
D_{max} .	Maximum Optical Density; largest optical density reading.

3. The contrast index value is displayed as:
Cnt Index X.XX.
4. The speed index value is displayed as:
Spd Index X.XX.
5. The maximum optical density value is displayed as:
Dmax X.XX
6. The average gradient is displayed as:
Ave Grad X.XX
7. The relative speed is displayed as:
Rel Speed X.XX
8. The temperature is displayed as:
Temp XXX.X.

3.4 Data Logging

The Model 07-444 Little Genius densitometer stores measurements and other related information for up to 20 film processors. The information is stored in a buffer file and is accessible for display and/or reporting. The data log is continuously battery backed-up and should be manually cleared prior to each series of new readings.

The control chart mode provides additional storage of up to 31 daily values for the chart items and related information for each of the 20 log files. The control chart files should be cleared prior to new baseline measurements. These files are used to provide control chart printouts.

3.5 Data Retrieval

All logged measurement data and calculated values that have been logged are available for display. Logged data can be scrolled through using the front panel keys.

3.6 Data Reporting

Data reporting can be setup as automatic or manual through the Setup Program (refer to **Section 4 - Setup**).

1. In the automatic mode, data is automatically sent to the RS-232 port after the completion of each measurement cycle. The Temperature Entry prompt, if active in the Setup Mode, is ignored in the Automatic Mode (i.e., the user is not prompted to enter the Temperature prior to data transfer).
2. The user can initiate communication of selected data, either logged data or data for the last measurement cycle, by selecting *Send Data* using the front panel keys (refer to **Section 5 - Operation** for details).

3.7 Setup Program Functions

Setup Mode Functions include:

- Making a single point measurement
- Entering a Facility Title
- Calibrating the optical density with a step wedge
- Clearing the data log
- Setting RS-232 and other communication parameters
- Entering information into the data log
- Setting the step wedge type
- Setting the graphics and control chart parameters
- Sending all logged data out the communication port

Detailed information and specific procedures available from the Setup Mode are outlined in **Section 4 - Setup**.

3.8 Calibration

The calibration function, accessible through the Setup Program, allows the user to calibrate optical density using a reference step wedge (supplied with each unit). The calibration value is entered from the front panel and then read from the Reference Step Wedge. Refer to **Section 6 - Calibration** for more information.

Section 4 Setup

**NOTE**

In the event of a static discharge induced lock-up of the densitometer, it is necessary to reset the unit by cycling the power (i.e. place the power switch to the OFF position, then to the ON position). The unit will power up in the normal operating mode.

The Little Genius densitometer uses a menu-driven Setup Program. The procedures outlined in this Section start at the Setup Menu, step through the applicable procedure, and return to the Setup Menu. Figures 4-1, 4-2, and 4-3 illustrate screen flow within the Setup Program.

To use the Setup Program:

1. Make sure the Power Switch is in the OFF position.
2. Press and hold the **ENTER** push-button while turning the Power Switch to the ON position. The following message will be displayed:
Self testing...
3. When the unit has completed the self-test, the following Setup Menu label will be displayed:
Single
4. Press  or  to scroll through the Setup Menu labels.
5. Follow the procedures outlined in this section to edit the applicable setup parameters/values.
6. Exit the Setup Program as follows:
 - a. Press  or  to scroll through the Setup Menu labels until Exit Setup Menu is displayed.
 - b. Press **ENTER**. The unit will return to the Scan Mode.

NOTE

Selecting *Single* from the Setup Menu allows the user to make single step density measurements. This procedure is outlined in **Section 5 - Operation**. Selecting *Calibrate* from the Set-Up Menu allows the user to calibrate the optical density using a step wedge. This procedure is outlined in **Section 6 -Calibration**.

4.1 Entering a Facility Title

This procedure allows the user to enter an alphanumeric string of characters for the Facility Title. The entered title is printed each time data output is sent to a printer.

1. Press **←** or **→** to scroll through the Setup Menu labels until *Facility Title* is displayed.

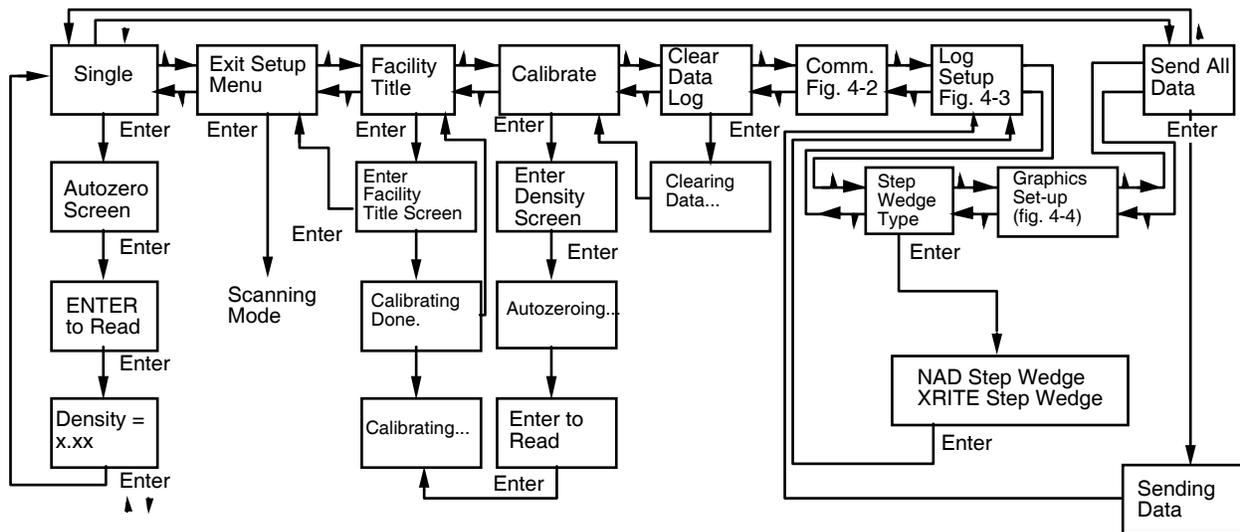


Figure 4-1. Setup Menu

2. Press **ENTER**. The current title, with a cursor under the first character, will be displayed. If no title is stored, you will see [_____].
3. To Enter/edit the Facility Title the following steps are followed:
 - a. Press **←** or **→** to scroll through the available character set.
 - b. Press **ENTER** to select the displayed character; the cursor will move to the next character.
 - c. Repeat Steps a and b as required to enter up to 20 characters, including spaces.

NOTE

After the 20th character is selected, by pressing **ENTER**, the display will return to the Setup Menu and *Exit Setup Menu* will be displayed.

4.2 Clearing the Data Log

This procedure clears the data log of all stored information.

1. Press **←** or **→** to scroll through the Setup Menu labels until *Clear Data Log* is displayed.
2. Press **ENTER**. The following message will be displayed:
Clearing Data...
3. After a few seconds, the display will return to the Setup Menu and *Calibrate* will be displayed.

4.3 Setting Communication Parameters

From the Communications Menu, the user can set/edit the following parameters:

- Output Type (Factory Setting: Computer)
- Output Mode (Factory Setting: Manual)
- Baud Rate (Factory Setting: 9600)
- Parity (Factory Setting: None)
- Word Length (Factory Setting: 8 bits)
- Handshaking (Factory Setting: DSR Ignored)

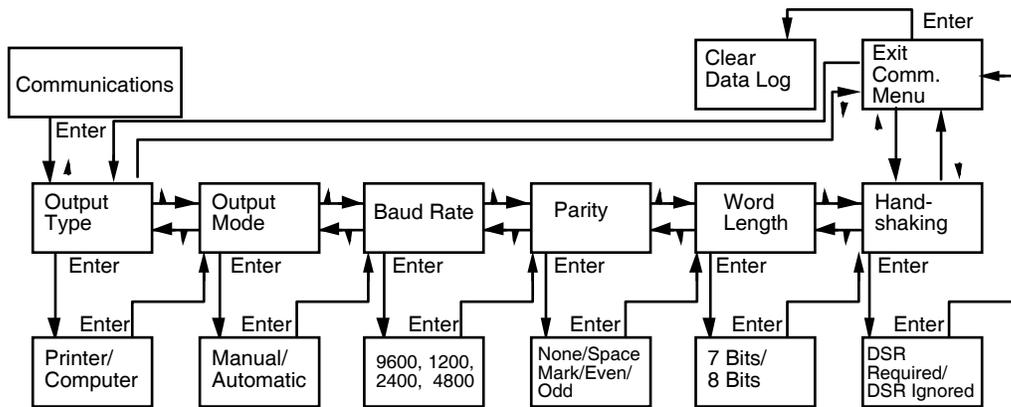


Figure 4-2. Communications Menu

Use the following procedure:

1. Press **↑** or **↓** to scroll through the Setup Menu labels until *Communications* is displayed.
2. Press **ENTER**. The following message will be displayed:
Output Type.
3. Follow the procedures outlined below to edit applicable setup parameters/values.
4. Exit the Communications Menu as follows:
 - a. Press **↑** or **↓** to scroll through the Setup Menu labels until *Exit Com. Menu* is displayed.
 - b. Press **ENTER**. The display will return to the Setup Menu and *Clear Data Log* will be displayed.

Output Type

The selected output type tells the Densitometer whether the RS-232 port is connected to a computer or a printer:

1. Press **↑** or **↓** to scroll through the Communications Menu until *Output Type* is displayed.
2. Press **ENTER**. The currently selected output type will be displayed.
3. Press **↑** or **↓** to scroll through the available output types (Printer or Computer).
4. When the output device you are using is displayed, press **ENTER** to make the selection. The display will return to the Communications Menu and *Output Mode* will be displayed.

Output Mode

In the Manual Mode, data is transmitted upon user command to send data; in the Automatic Mode, data is transmitted upon completion of the measurement cycle.

1. Press **←** or **→** to scroll through the Communications Menu until *Output Mode* is displayed.
2. Press **ENTER**. The currently selected output mode will be displayed.
3. Press **←** or **→** to scroll through the available output modes (Automatic or Manual).

NOTE

When Automatic is the selected mode, user temperature entry is not permitted, regardless of whether it is enabled/disabled from the Log Setup Menu.

4. Press **ENTER** to select the displayed output mode. The display will return to the Communications Menu and *Baud Rate* will be displayed.

Baud Rate

1. Press **←** or **→** to scroll through the Communications Menu until *Baud Rate* is displayed.
2. Press **ENTER**. The currently selected baud rate will be displayed.
3. Press **←** or **→** to scroll through the available baud rates (9600, 1200, 2400, and 4800).
4. Press **ENTER** to select the displayed baud rate. The display will return to the Communications Menu and *Parity* will be displayed.

Parity

1. Press **←** or **→** to scroll through the Communications Menu until *Parity* is displayed.
2. Press **ENTER**. The currently selected parity will be displayed.
3. Press **←** or **→** to scroll through the available choices (*None, Space, Mark, Even, and Odd*).
4. Press **ENTER** to select the displayed parity. The display will return to the Communications Menu and *Word Length* will be displayed.

Word Length

1. Press **←** or **→** to scroll through the Communications Menu until *Word Length* is displayed.
2. Press **ENTER**. The currently selected word length will be displayed.
3. Press **←** or **→** to scroll through the available choices (*7 bits or 8 Bits*).
4. Press **ENTER** to select the displayed word length. The display will return to the Communications Menu and *Handshaking* will be displayed.

Handshaking

1. Press **←** or **→** to scroll through the Communications Menu until *Handshaking* is displayed.
2. Press **ENTER**. The currently selected choice will be displayed.
3. Press **←** or **→** to scroll through the available choices (*DSR Required or DSR Ignored*).
4. Press **ENTER** to select the displayed choice. The display will return to the Communications Menu and *Exit Com. Menu* will be displayed.

4.4 Log Setup

From the Log Setup Menu, the user can:

- Set/edit the File Name
- Set/edit the Contrast Reference Step
- Set/edit the Speed Reference Step
- Enable/disable the temperature entry function for each of 20 files

Use the following procedure:

1. Press **←** or **→** to scroll through the Setup Menu labels until *Log Setup* is displayed.

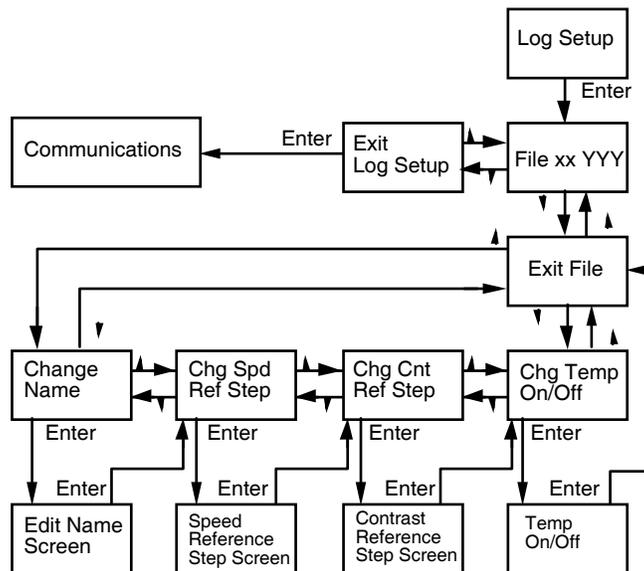


Figure 4-3. Log Setup Menu

2. Press **ENTER**. The Log Setup Menu will be displayed:
File 01 YYYYY.
where YYYYY is a 20 character or less name previously entered for the File 01.

NOTE

YYYYY will be blank if the File 01 has not been previously named.

3. Press **←** or **→** to scroll through the Log Setup Menu labels until the name of the file to be edited is displayed:
File XX YYYYY.
where XX is the File No. and YYYYY is a 20 character or less name previously entered for the File.

NOTE

YYYY will be blank if the file has not been previously named.

4. Press **ENTER**. The File Parameters Menu will be displayed:
Change Name.
5. Press *or* to scroll through the parameters available for editing.
6. Follow the procedures outlined in this section to edit applicable setup parameters/values.
7. Exit the File Parameters Menu as follows:
 - a. Press *or* to scroll through the File Parameters Menu labels until *Exit File XX* is displayed, where XX is the number of the active file.
 - b. Press **ENTER**. The display will return to the Log Setup Menu and File XX will be displayed, where XX is the number of the next file available for editing.
8. Exit the Log Setup File Menu as follows:
 - a. Press *or* to scroll through the Log Setup Menu labels until *Exit Log Setup* is displayed.
 - b. Press **ENTER**. The display will return to the Setup Menu and *Communications* will be displayed.

Entering a File Name

1. Press *or* to scroll through the File Parameters Menu until *Change Name* is displayed.
2. Press **ENTER**. The current file number and name, with a cursor under the first character of the name, will be displayed.
3. Enter/edit the file name as follows:
 - a. Press *or* to scroll through the available character set.
 - b. Press **ENTER** to select the displayed character; the cursor will move to the next character.
 - c. Repeat Steps a and b as required to enter 8 characters.

NOTE

When the 8th character is selected by pressing **ENTER**, the display will return to the File Parameters Menu and *Chg. Spd Ref. Step* will be displayed.

Changing the Speed Reference Step

NOTE

The Speed Reference Step is factory set to Step 11.

1. Press *or* to scroll through the File Parameters Menu until *Chg. Spd Ref. Step* is displayed.
2. Press **ENTER**. The following will be displayed:
Spd Ref. Step: XX
where XX is the step currently set as the speed reference step.
3. Press *or* to increase/decrease the displayed Step No.

4. Press **ENTER** to select the displayed Step No. The display will return to the File Parameters Menu and *Chg. Cnt Ref. Step* will be displayed.

Changing the Contrast Reference

Step

NOTE

The Contrast Reference Step is factory set to Step 13.

1. Press *←* or *→* to scroll through the File Parameters Menu until *Chg. Cnt Ref. Step* is displayed.
2. Press **ENTER**. The following will be displayed.
Cnt Ref. Step: XX
where XX is the step currently set as the contrast reference step.
3. Press *←* or *→* to increase/decrease the displayed Step No.
4. Press **ENTER** to select the displayed Step No. The display will return to the File Parameters Menu and *Exit File XX* will be displayed, where XX is the active file.

Changing the Average Gradient

O.D.

NOTE

The Average Gradient high and low O.D. s are factory set as follows:

Grad OD Hi:2.00

Grad OD Lo:0.25

1. Press *←* or *→* to scroll through the File Parameters Menu until *Chg. Avg Grad* is displayed.
2. Press **ENTER**. The following will be displayed.
Grad OD Hi:2.00
3. Press *←* or *→* to increase/decrease the value of the cursor. Press **ENTER** to accept the current cursor value and advance the cursor to the next digit. When the entry has been completed, the display will advance to *Grad OD Lo:0.25*.
4. Press *←* or *→* to increase/decrease the value of the cursor. Press **ENTER** to accept the current cursor value and advance the cursor to the next digit. When the entry has been completed, the display will advance to the next chart item.

Changing the Relative Speed O.D.

NOTE

The Relative Speed O.D. is factory set as follows:

Speed O.D.:1.00

1. Press *←* or *→* to scroll through the File Parameters Menu until *Change Rel Speed* is displayed.
2. Press **ENTER**. The following will be displayed.
Speed O.D.:1.00
3. Press *←* or *→* to increase/decrease the value of the cursor. Press **ENTER** to accept the current cursor value and advance the cursor to the next digit. When the entry has been completed, the display will advance to the next chart item.

Enabling/Disabling Temperature Entry

1. Press **←** or **→** to scroll through the Main Menu until *Chg. Temp On/Off* is displayed.
2. Press **ENTER**. The currently selected choice will be displayed: either *Temperature On* or *Temperature Off*.
3. Press **←** or **→** to scroll through the available choices (*Temperature On* or *Temperature Off*).
4. Press **ENTER** to select the displayed choice. The display will return to the File Parameters Menu and *Exit File XX* will be displayed, where *XX* is the active file.

NOTE

User temperature entry is only permitted when the unit is in the Manual Mode. Therefore, if the unit is in the Automatic Mode, the temperature entry prompt will not be displayed after a film is scanned, regardless of whether it has been enabled/disabled in this procedure.

4.5 Sending Data to the Output Port

1. Press **←** or **→** to scroll through the Setup Menu until *Send All Data* is displayed.
2. Press **ENTER**. The message *Sending Data...* will be displayed, followed by transmission of all data to the output port. The data will be sent to the selected output device (printer or computer running Film-Pro software).
3. After completing the data transmission, the display will return to the Setup Menu and *Log Setup* will be displayed.

4.6 Step Wedge Type

This procedure allows the user to select the type of step image that will be scanned. The type may be changed by the user at any time without affecting previous readings. The selections are *Nuclear Associate Step Wedge* and *X-Rite Wedge*. Scanning of step images produced by Model 07-417 Dual Color Sensitometer or model 07-419 Dual Flash Sensitometer must be made with the NAD Step Wedge selection.

1. Press **←** or **→** to scroll through the Main Menu labels until *Step Wedge Type* is displayed.
2. Press **ENTER**. The current selection will be displayed.
3. Press **←** or **→** to scroll through the available selections (*NAD Step Wedge* or *X-Rite Wedge*).
4. Press **ENTER** to select the displayed output mode. The display will return to the Setup Menu and *Log Setup* will be displayed.

GRAPHICS MODE SETUP

The Graphics Mode offers the user the opportunity to set the Little Genius for stand-alone operation. In this mode both D log E curves and control charts may be selected, allowing direct output to a printer. The control chart feature provides a quick method of tracking daily film processor performance over a 31-day period. The control chart mode may be activated or de-activated by the user.

1. Press **←** or **→** to scroll through the Main Menu labels until *Graphics Setup* is displayed. Press **ENTER**.
2. Press **←** or **→** to scroll through the available selections (*D log E Setup*, *Ctrl Chart Setup*, *Exit Graph Setup*).
3. Press **ENTER** to make the selection.

4.7 D log E Setup

This procedure allows the user to select the units, either log relative exposure or step number, which represent the X - axis (horizontal). The grid lines within the graph may be selected to be on or off. The main menu selection *Print D log E* allows the user to print the curve for the active log file.

Grid Lines On Off

The grid lines that appear within the D log E graph may be turned on or off.

1. Press **or** to scroll through the Graphics Setup labels until *D log E Setup* is displayed.
2. Press **ENTER**.
3. Press **or** to scroll through the available selections until *Grid Lines On Off* is displayed.
4. Press **ENTER**. The current selection will be displayed.
5. Press **or** to scroll through the available selections (*Grid Lines On, Grid Lines Off*).
6. Press **ENTER** to select the displayed output mode. The display will return to the D log E Setup Menu and *Chg. LRE/Step Num.* will be displayed.

Change LRE/STEP NUM.

The user to may select the units, either log relative exposure or step number, which represent the X - axis (horizontal) on the printout.

1. Press **or** to scroll through the Graphics Setup labels until *D log E Setup* is displayed. Press **ENTER**.
2. Press **or** to scroll through the available selections until *Chg. LRE/Step Num.* is displayed.
3. Press **ENTER**. The current selection will be displayed.
4. Press **or** to scroll through the available selections (*Log Rel Exposure, Step Numbers*).
5. Press **ENTER** to select the displayed output mode. The display will return to the D log E Setup Menu and *Exit D Log E* will be displayed.

Control Chart Setup

The control chart feature provides a quick method of tracking daily film processor performance over a 31-day period. The control chart mode may be activated or de-activated by the user. When the control chart mode is activated, the user is prompted to enter the date upon power up. All control chart data is date stamped. The user has complete control over the baseline and deviation values for each chart item. Control charts for up to 20 processors (chart files) may be stored and maintained for subsequent printing.

Each chart file can be independently cleared. Once the control chart file is full, i.e. 31 - daily scans have been saved, subsequent scans cause the oldest to be cleared, and the latest to be saved. This assures that the previous 31 daily scans are always available for printing. See **PRINTING CONTROL CHARTS**, Section 5.6 for further details.

1. Press **or** to scroll through the Main Menu labels until *Graphics Setup* is displayed. Press **ENTER**.
2. Press **or** to scroll through the available selections until *Ctrl Chart Setup* is displayed. Press **ENTER**.
3. Press **or** to scroll through the available selections (*Chg. Chart On/Off, Pick Chart File, Cng. Chart Display, Exit Chart Setup*)
4. Press **ENTER** to make the selection.

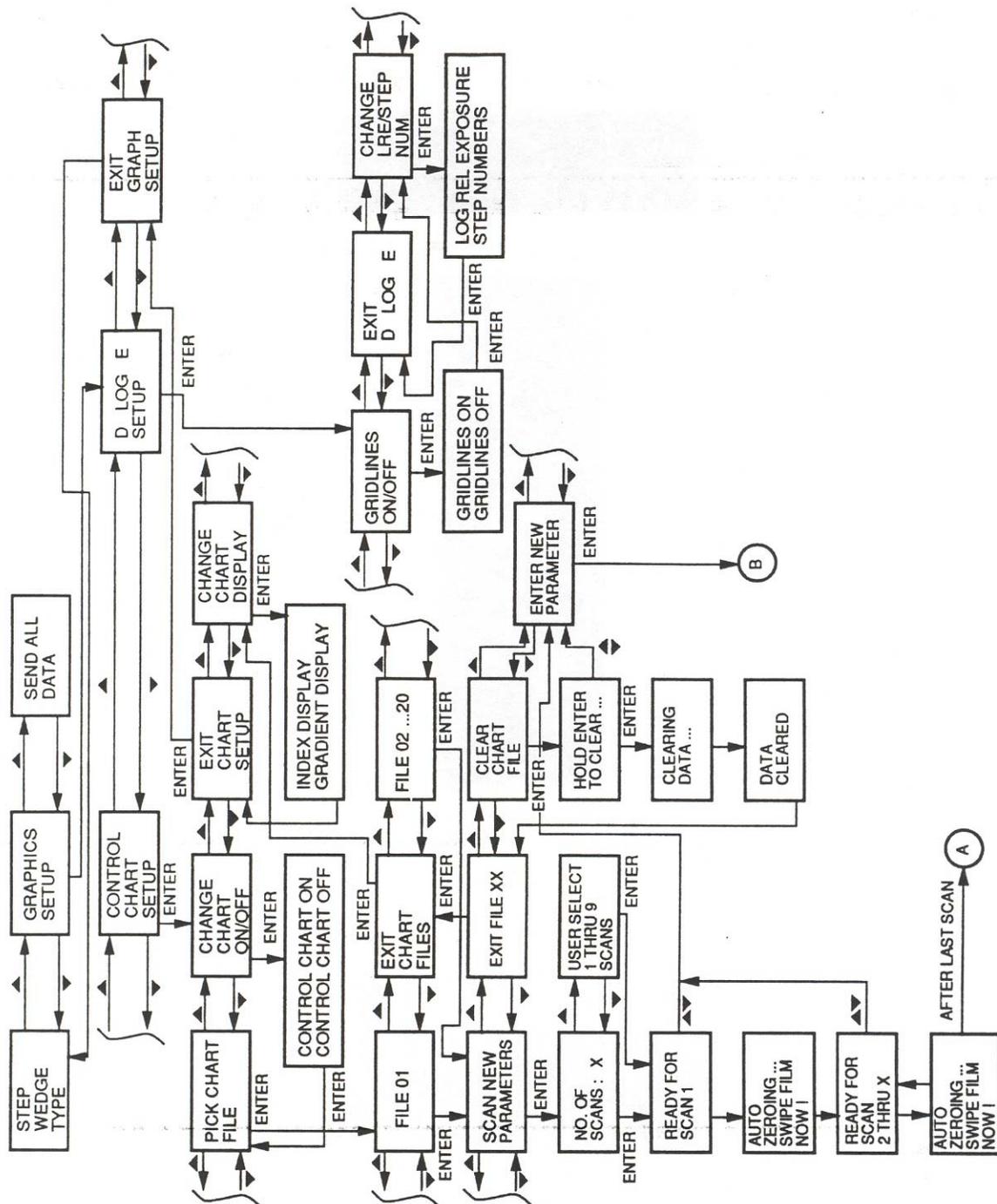


Figure 4-4. Control Chart Setup Menu

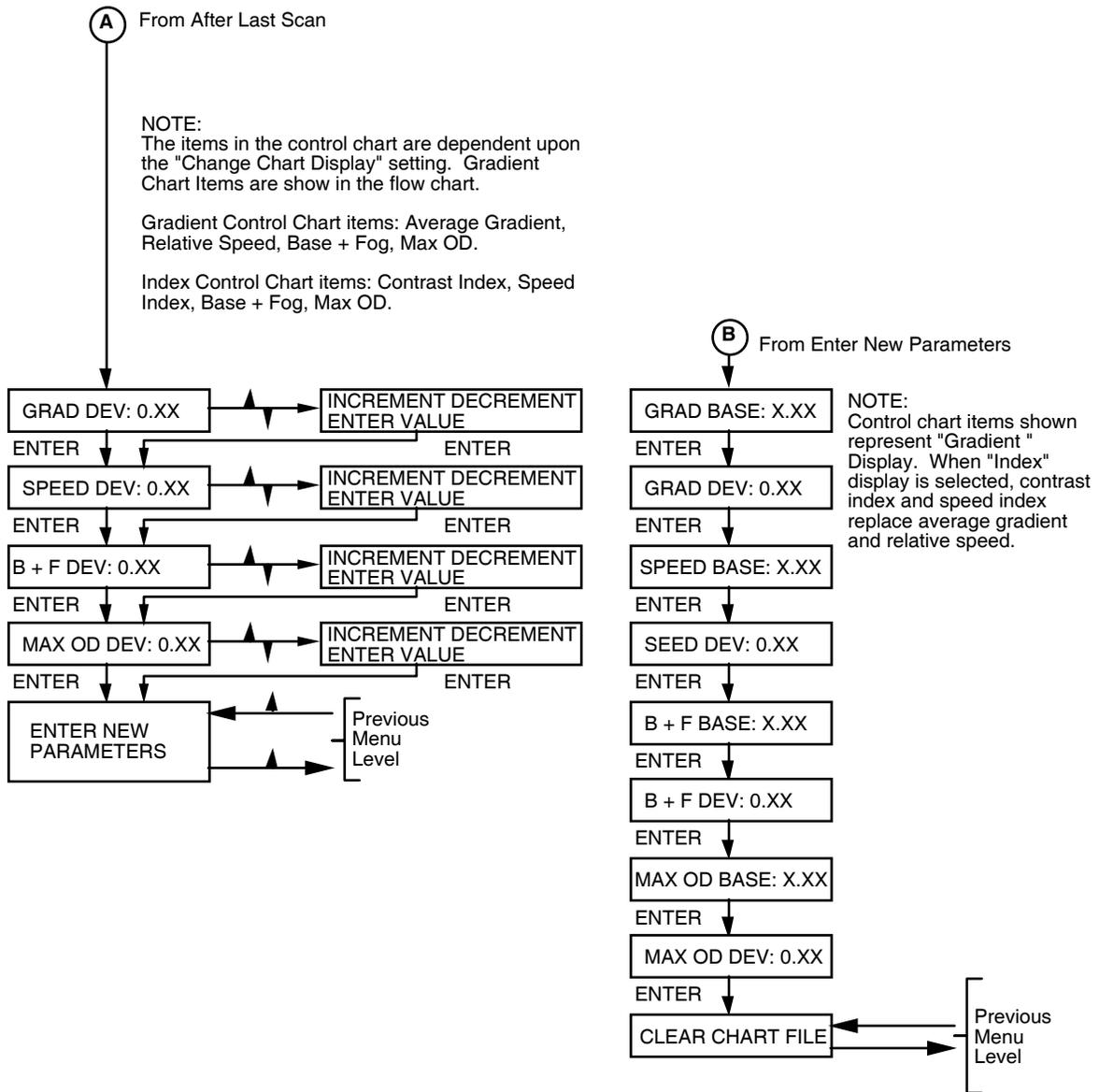


Figure 4-4. Control Chart Setup Menu (Continued)

Control Chart Mode ON/OFF

The user may select the control chart mode on, which allows data to be stored and compared to baseline measurements and enables all control chart features. The control chart off selection disables all control chart features and prompts, however, previously stored chart data is not affected.

Follow the steps under control chart setup before proceeding.

1. Press **or** to scroll through the Graphics Setup labels until *Ctrl Chart Setup* is displayed. Press **ENTER**.
2. Press **or** to scroll through the available selections until *Chg. Chart On/Off* is displayed. Press **ENTER**.
3. The current selection will be displayed.
4. Press **or** to scroll through the available selections (*Ctrl Charts On, Ctrl Charts Off*).
5. Press **ENTER** to select the displayed output mode. When the control charts on selection is made, *Verify day/month/year* (i.e. 1 Jan. 93) is displayed. The user is required to enter the date. Press **or** to increment or decrement the day, press **ENTER**, repeat for month and year.
6. The display will return to the Control Chart Setup Menu and *Pick Chart File* will be displayed.

Change Chart Display

The *Change Chart Display* menu selection allows the user to choose between Gradient and Index Control Charts. This setting affects the display of all chart files, as well as items contained in the output to the printer.

The gradient control chart contains the following items:

- Average Gradient
- Relative Speed
- Base & Fog
- Max OD

The index control chart contains the following items:

- Contrast Index
- Relative Speed
- Base & Fog
- Max OD

Follow the steps outlined in control chart setup before proceeding.

1. Press **or** to scroll through the Graphics Setup labels until *Ctrl Chart Setup* is displayed. Press **ENTER**.
2. Press **or** to scroll through the available selections until *Chg Chart Display* is displayed. Press **ENTER**.
3. The current selection will be displayed.
4. Press **or** to scroll through the available selections (*Index Display, Gradient Display*).
5. Press **ENTER** to select the control chart method displayed.
6. The display will return to the control chart setup menu and *Exit Chart Setup* will be displayed.

Chart File Setup

This procedure allows the user to setup, maintain, and selectively clear the control chart files. The setup of these files includes the automatic (*Scan New Params*) or manual (*Enter New Params*) entry of the following parameters in Tables 4-1 and 4-2.

Table 4-1. Index Chart File

Chart Item		Range	Default Setting
Contrast Index		0.00 - 4.00	
	Baseline Deviation	0.02 - 3.98 (1)	1.25 0.15
Speed Index		0.00 - 4.00	
	Baseline Deviation	0.02 - 3.98 (1)	1.00 0.15
Base + fog		0.00 - 4.00	
	Baseline Deviation	0.02 - 3.98 (1)	0.20 0.02
Max. OD		0.00 - 4.00	
	Baseline Deviation	0.02 - 3.98 (1)	3.00 0.15

Table 4-2. Gradient Chart File

Chart Item		Range	Default Setting
Average Gradient		0.00 - 9.99	
	Baseline Deviation	0.02 - 9.97 (1)	2.00 0.15
Relative speed		0.00 - 3.00	
	Baseline Deviation	0.02 - 2.98 (1)	1.00 0.15
Base + fog		0.00 - 4.00	
	Baseline Deviation	0.02 - 3.98 (1)	0.20 0.02
Max. OD		0.00 - 4.00	
	Baseline Deviation	0.02 - 3.98 (1)	3.00 0.15

NOTE

The deviation range is dependent on the baseline value; the deviation must be less than half the baseline value. This limit allows the control chart to contain two deviation intervals above the baseline and two below the baseline.

Follow the steps under control chart setup before proceeding.

1. Press **or** to scroll through the Graphics Setup labels until *Ctrl Chart Setup* is displayed. Press **ENTER**.
2. Press **or** to scroll through the available selections until *Pick Chart File* is displayed. Press **ENTER**.
3. The first chart file, *File 01*, will be displayed.
4. Press **or** to scroll through the available selections (chart files 01 through 20, *Exit Chart Files*).
5. Press **ENTER** to select the displayed chart file.
6. Press **or** to scroll through the available selections (*Scan New Params, Enter New Params, Exit File 01*).

Scan New Parameters

This procedure allows the user to automatically setup the parameters in a chart file by scanning films processed under optimum processor conditions. In this mode the user may select from 1 - 9 sensitometer films that are averaged to determine the baseline values for each chart item. Upon completion, the user is prompted to enter the deviation or accept the default deviation for each item (refer to “**SET-UP AND USE WITH X-RITE STEP WEDGES**” on page 4-16 for X-Rite info).

Follow the steps under chart file setup before proceeding.

1. Press **or** to scroll through the selected file setup functions until *Scan New Params* is displayed. Press **ENTER**.
2. *No. of scans: "X"* will be displayed. Where "X" is the previously selected no. of scans (from 1 to 9), the default is 5. Press the UA or DA to increment or decrement and press **ENTER** to select the desired no. of scans and begin the process.
3. *Ready for scan 1* will be displayed. Press **ENTER**, *Auto zeroing...* will be displayed. Upon completion of the auto zero phase...
4. Scan the film(s) according to step wedge type selection as follows:

4.8 Step Wedge Type - Nuclear Associates

Swipe film now! Will be displayed.

Load the film from the top of the unit, oriented so that step 1 (lowest density measured first, and gently swipe it toward the bottom of the unit. The display of an error message may indicate an erroneous scan, repeat this step if necessary.

4.9 Step Wedge Type - X-Rite

ENTER when ready will be displayed.

Load the film from the top of the unit, oriented so that step 1 (lowest density) is measured first, slide the film into position so that the measurement area is between the film edge and the first step in the base + fog region. Press **ENTER**. *Pull film now!* will be displayed. Gently swipe it toward the bottom of the unit. The display of an error message may indicate an erroneous scan, repeat this step if necessary.

NOTE

The X-Rite wedge is read via pattern recognition and therefore the user must be consistent and careful in scanning the wedge.

5. *Analyzing data...* will be displayed.
6. *Ready for scan 2, 3, etc.* will be displayed, repeat the scanning technique described above until the previously selected number of scans has been completed.
7. The previous or default value will be displayed *Grad Dev (or CIndx Dev): 0.XX*. Edit the entry by pressing *←* or *→* to increase or decrease the value at the cursor. Press **Enter** to accept the current cursor value and advance the cursor to the next digit. When the entry has been completed the display will advance to the next chart item.
8. The previous or default value will be displayed *Speed Dev (or SIndx Dev): 0.XX*. Edit the value as previously described.
9. The previous or default value will be displayed *B + F Dev: 0.XX*. Edit the value as previously described.
10. The previous or default value will be displayed *Max OD Dev: 0.XX*. Edit the value as previously described. When the entry has been completed *Enter New Params* is displayed.
11. To exit file, press *←* or *→* to scroll through the available selections until *Exit File XX* is displayed. Press **ENTER**.
12. To review the chart file values, press *←* or *→* to scroll through the available selections until *Enter New Params* is displayed. Press **ENTER**. Continue to press **ENTER** to review each items baseline and deviation. See section ENTER NEW PARAMETERS for further description.

Enter New Parameters

This procedure allows the user to manually setup the parameters in a chart file. User entry for each baseline and deviation value may be entered. This mode may also be used at any time to review the various values without changing them.

Follow the steps under chart file setup before proceeding.

1. Press *←* or *→* to scroll through the selected file setup functions until *Enter New Params* is displayed. Press **ENTER**.
2. The previous or default value will be displayed *Grad Base (or CIndx Base): X.XX*. Edit the entry by pressing *←* or *→* to increase or decrease the value at the cursor. Press **Enter** to accept the current cursor value and advance the cursor to the next digit. When the entry has been completed the display will advance to the next chart item.
3. The previous or default value will be displayed *Grad Dev (or CIndx Dev): 0.XX*. Edit the value as previously described.
4. The previous or default value will be displayed *Speed Base (or SIndx Base): X.XX*. Edit the value as previously described.
5. The previous or default value will be displayed *Speed Dev (or SIndx Dev): 0.XX*. Edit the value as previously described.
6. The previous or default value will be displayed *B + F Base: X.XX*. Edit the value as previously described.
7. The previous or default value will be displayed *B + F Dev: 0.XX*. Edit the value as previously described.
8. The previous or default value will be displayed *max OD Base: X.XX*. Edit the value as previously described.
9. The previous or default value will be displayed *Max OD Dev: 0.XX*. Edit the value as previously described. When the entry has been completed *Clear Chart File* is displayed.
10. To exit file, press *←* or *→* to scroll through the available selections until *Exit File XX* is displayed. Press **ENTER**.

11. To review the chart file values, press **←** or **→** to scroll through the available selections until *Enter New Params* is displayed. Press **ENTER**. Continue to press **ENTER** to review each item's baseline and deviation.

Clear Chart Files

This procedure allows the user to selectively clear a particular chart file. This feature is useful when a new baseline is established and the file contains outdated measurements.

Follow the steps under chart file setup before proceeding.

1. Press **←** or **→** to scroll through the selected file setup functions until *Clear Chart File* is displayed. Press **ENTER**.
2. *Hold ENTER to Clear...* is displayed. Press and hold **ENTER** to clear the selected file. Press **←** or **→** to abort the clear command.
3. *Clearing Data...* is displayed. Upon completion *Data Cleared* is displayed.
4. *Exit File XX* is displayed. Press **ENTER** to exit the chart file.

Set-Up And Use With X-Rite Step Wedges

Little Genius may be used to evaluate test films generated by X-Rite sensitometers. A specific technique is required to properly scan these types of films. Little Genius can resolve images over a wide range of exposures and scanning rates.

There are two types of X-Rite sensitometers that produce step wedges that can be read by the Little Genius. Although the image produced by both units is nearly identical, the placement of the image on the test film is different. One unit provides an image with the steps centered at approximately 7 mm from the edge of the film, while the other unit places the image at 18 mm from the edge of the film. Two film guides are supplied with Little Genius, one for the 7 mm type and another for the 18 mm type. The standard film guide (18 mm type) is also used for the Nuclear Associates type step wedges (see Figure 4-5).

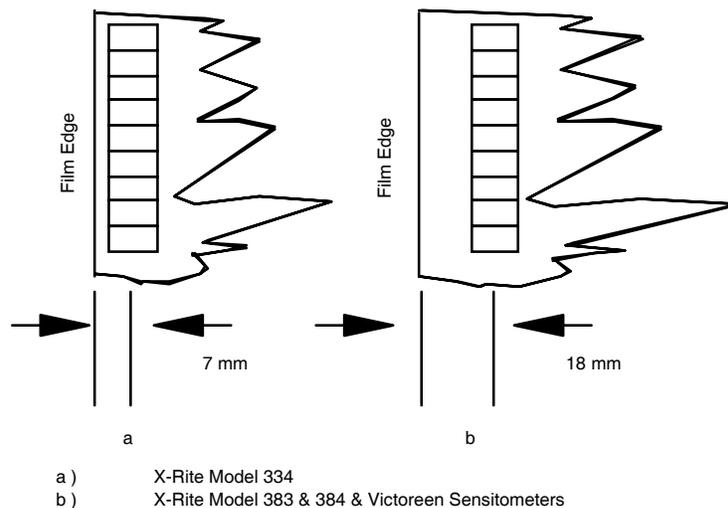


Figure 4-5. Standard Film Guide

4.10 Selecting The Appropriate Film Guide

Examine a sample film and determine the distance from the film edge to the center of the step wedge image. Select either the 7 mm or the 18 mm film guide and install by pressing the guide into the light table (see Figure 4-6).

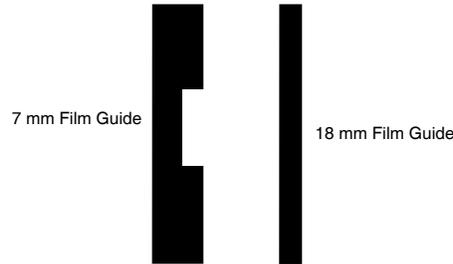


Figure 4-6. Film Guide Selection

4.11 Selecting The Step Wedge Type

1. Place the Power Switch into the OFF position.
2. Press and hold the **ENTER** push-button while turning the Power Switch to the ON position. The following message will be displayed: *Self testing...*

When the unit has completed the self-test, the following setup Menu label will be displayed: *Single*

3. Press the up arrow or down arrow to scroll through the Main Menu labels until *Step Wedge Type* is displayed.
4. Press **ENTER**. The current selection will be displayed.
5. Press the up arrow or down arrow to scroll through the available selections (*NAD Step Wedge* or *X-Rite Wedge*) until *X-Rite Wedge* is displayed.
6. Press **ENTER** to select *X-Rite Wedge*. The unit will operate in the X-Rite Wedge mode indefinitely, until manually re-selected by the user.

4.12 X-Rite Scanning Technique

Use the following procedure to make automatic 21-step density measurements:

1. Turn the Power Switch to the ON position. The following message will be displayed: *Self testing...*
2. After the self-check is complete, the active File No. will be displayed.
3. Press the up arrow or down arrow key to scroll the display to *Scan Film*.
4. Press **ENTER**. The unit will auto zero and display the following message: *Auto zeroing...*

NOTE

The film must not be positioned in the densitometer while the unit is auto zeroing.

Upon completion of the auto zeroing cycle, *ENTER when ready* will be displayed.

5. Within 5 seconds, load the film from the top of the unit, oriented so that step 1 (lowest density) is measured first (see Figure 4-7).

NOTE

The unit will time-out after 5 seconds and the scan cycle must start over from step 3.

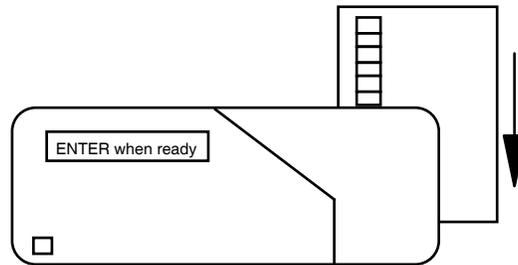


Figure 4-7. Film Orientation

NOTE

User must leave sufficient space between Stop #1 and the edge of the film so that the Little Genius can read B+F w/o reference (see figure on the following page).

6. Slide the film into position so that the measurement area (aperture) on the densitometer is between the film edge and step 1, in the base+fog region (see Figure 4-8).

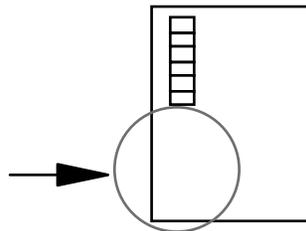


Figure 4-8. Film Position

7. Press **ENTER**. *Pull film now!* will be displayed. Gently swipe the film toward the bottom of the unit. The scan rate should be between 1 and 5 seconds. If the film is swiped too slowly, i.e. over 5 seconds, or too quickly, under 1 second, the message *Couldn't resolve* will be displayed. Adjust your swipe speed accordingly, and repeat the scanning process.

NOTE

The unit will time-out after 5 seconds and the scan cycle must start over from step 4.

NOTE

Position the film so that the lowest density steps enter the Densitometer first, i.e., Step 1 - 21. Avoid jerky movement of the film through the Densitometer.

8. When 21-steps and base + fog measurements are complete, the unit will display the following message:

Analyzing Data...

9. When data analysis is complete, if Chg. Temp On is selected in the Log Setup Menu, the following will be displayed:

Temp = 000.0

10. Enter a value for the temperature as follows:

Press **←** or **→** to scroll through the available digits (0 - 9).

Press **ENTER** to select the displayed digit; the cursor will move to the next character.

Repeat Steps a and b as required to enter three digits.

11. When data analysis and temperature entry (if applicable) is complete, the File No. and name will be displayed. If the automatic transmit mode is selected (see **Section 4 - Setup**), the data will be automatically transmitted through the RS-232 port.

NOTE

The data, including the entered temperature, is available for display using the **←** or **→** keys. (Refer to **Displaying Logged Data.**)

12. Repeat Steps 3 through 12 as necessary to make additional measurements.

NOTE

After Auto Zeroing is complete, the measurement must be made within approximately 5 seconds.

NOTE

Observe the display while swiping the film, if *analyzing data...* is indicated on the display before the step image passes completely over the aperture the unit will **not** resolve the image. Increase the swipe speed slightly to correct this problem.

Maximum resolution is achieved by adjusting the swipe speed so that the step image passes over the aperture just before the message *analyzing data* is shown on the display. A film swipe speed of 3 seconds permits the unit to acquire the maximum number of samples, prior to analyzing the data.

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Section 5 Operation



NOTE

In the event of a static discharge induced lock-up of the densitometer, it is necessary to reset the unit by cycling the power (i.e. place the power switch to the OFF position, then to the ON position). The unit will power up in the normal operating mode.

This Section provides step-by-step procedures for the making single-step density measurements, including:

- Making 21-step density measurements
- Displaying logged data
- Reporting logged data

NOTE

Refer to Section 7 - Maintenance and Troubleshooting for a description of Displayed Error Messages.

5.1 Single Step Measurements

Use the following procedure to make single step density measurements:

1. Make sure the Power Switch is in the OFF position.
2. Press and hold the **ENTER** push-button while turning the Power Switch to the ON position. The following message will be displayed:
Self testing...
3. When the unit has completed the self-test, the following setup Menu label will be displayed:
Single.
4. Press **ENTER**. The unit will auto zero and display the following message:
Auto zeroing...
5. After zeroing is complete, the density will be displayed:
Density = 0.00
6. Position the film or step wedge so that the area to be measured is over the aperture (Figure 5-1).

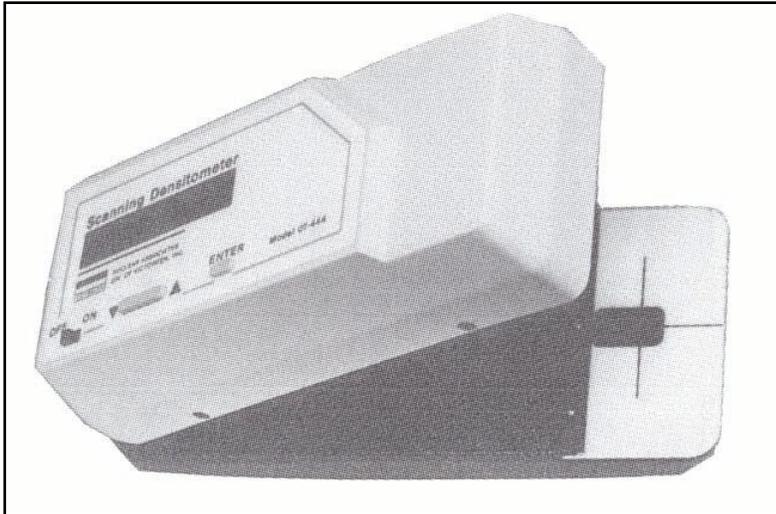


Figure 5-1. Aperture Location

NOTE

After Auto Zeroing is completed, measurements must be made within approximately 30 seconds.

7. Repeat step 6 as necessary to make additional measurements.

5.2 Automatic 21-Step Measurements

Use the following procedure to make automatic 21-step density measurements: (refer to “**SETUP AND USE WITH X-RITE STEP WEDGES**” for X-Rite info)

1. From the power off state, turn the Power Switch to the ON position. The following message will be displayed:
Self testing...
2. After the self-check is complete, the active File No. will be displayed.
3. Press **←** or **→** to scroll the display to *Scan Film*.
4. Press **ENTER**. The unit will auto zero and display the following message:
Auto zeroing...

Step Wedge Type - NAD

Swipe film now! will be displayed.

Load the film from the top of the unit, oriented so that step 1 (lowest density measured first, and gently swipe it toward the bottom of the unit. The display of an error message may indicate an erroneous scan, repeat this step if necessary.

Step Wedge Type - X-Rite

ENTER when ready will be displayed.

Load the film from the top of the unit, oriented so that step 1 (lowest density) is measured first, slide the film into position so that the measurement area is between the film edge and the first step in the base + fog region. Press **ENTER**. *Pull film now!* will be displayed. Gently swipe it toward the bottom of the unit. The display of an error message may indicate an erroneous scan, repeat this step if necessary.

NOTE

Position the film so that the lowest density steps enter the Densitometer first, i.e., Step 1 - 21. Avoid jerky movement of the film through the Densitometer.

5. When 21-steps and base + fog measurements are complete, the unit will display the following message:
Analyzing Data...
6. When data analysis is complete, if *Chg. Temp On* is selected in the Log Setup Menu, the following will be displayed:
Temp = 000.0
7. Enter a value for the temperature as follows:
Press *←* or *→* to scroll through the available digits (0 - 9).
Press **ENTER** to select the displayed digit; the cursor will move to the next character.
Repeat Steps a and b as required to enter three digits.
8. When data analysis and temperature entry (if applicable) is complete, the File No. and name, selected in Step 7, will be displayed. If the automatic transmit mode is selected (see **Section 4 - Setup**), the data will be automatically transmitted through the RS-232 port.

NOTE

The data, including the entered temperature, is available for display using the *←* or *→* keys. (Refer to **Displaying Logged Data**.)

9. Repeat Steps 3 through 12 as necessary to make additional measurements.

NOTE

After Auto Zeroing is complete, the measurement must be made within approximately 5 seconds.

5.3 Displaying Logged Data

The Densitometer allows the user to view all stored data for the active file. In order to view data for a specific file, the file must be selected as the active file.

1. Press *←* or *→* to scroll the display to *Select Log Entry*.
2. Press **ENTER**. A File No. and name will be displayed:
File XX YYYY
where XX is the currently active File No. and YYYY is the name of the currently active file as entered in the Setup Program.
3. Press *←* or *→* to scroll the list of files.
4. Press **ENTER** to select the file to activate. The following message will be displayed:
Entry selected
The File No. and File Name will be re displayed.

5. Press **↓** to scroll down through logged data as follows:

NOTE

Press **↑** — to scroll up through logged data.

- a. Press **↓**. The following will be displayed:
base + fog X.XX D
 - b. Press **↓**. The following will be displayed:
Step 1 X.XX D
 - c. Repeat Step b as required to display density values to Step 21.
 - d. Press **↓**. The following will be displayed:
Temp XXX.X D
 - e. Press **↓**. The following will be displayed:
Rel. Speed X.XX
 - f. Press **↓**. The following will be displayed:
Ave Grad X.XX
 - g. Press **↓**. The following will be displayed:
DmaxX.XX D
 - h. Press **↓**. The following will be displayed:
Spd Index X.XX D
 - i. Press **↓**. The following will be displayed:
Cnt Index X.XX D
 - j. Press **↓**. The following will be displayed:
Send Data
 - k. Press **↓**. The following will be displayed:
Select Log Entry
 - l. Press **↓**. The following will be displayed:
Scan Film
 - m. Press **↓**. The File No. and Name will be re displayed.
6. Repeat Steps 1 through 5 as necessary to view additional files.

5.4 Reporting Logged Data

Use the following procedure to send all data logged in the currently active file to the output port:

1. Press **↓** or **↑** to scroll the display to *Select Log Entry*.
2. Press **ENTER**. A File No. and Name will be displayed:
File XX YYYY
where *XX* is the currently active File No. and *YYYY* is the name of the currently active file.
3. Press **↓** or **↑** to scroll the list of files.
4. Press **ENTER** to select the file to activate. The following message will be displayed:
Entry selected
The File No. and Name will be re displayed.
5. Press **↓** or **↑** to scroll the display to *Send Data*.

6. Press **ENTER**. The following message will be displayed:
Sending Data...
7. When transmission is complete, the File No. and Name will be re displayed.
8. Repeat Steps 1 through 7 to output data from other files as necessary.

5.5 Printing a D Log E Curve

The Little Genius allows the user to output a D Log E curve directly to a printer. See the D log E Setup section for further description.

1. Press **←** or **→** to scroll through the menu until *Select Log Entry* is displayed. Press **ENTER**.
2. The active file will be displayed as *File XX* or a previously entered user label. Press **←** or **→** to scroll through the file list and press **ENTER** to select the displayed file.
3. *Entry selected...* will be displayed, followed by the currently active file. Press **←** or **→** to scroll through the menu until *Print D Log E* is displayed. Press **ENTER**.
4. The message *Sending data...* will be displayed.

5.6 Printing Control Charts

The Little Genius allows the user to output the control charts directly to a printer. See the Control Chart Setup section for further description.

1. Press **←** or **→** to scroll through the menu until *Select Log Entry* is displayed. Press **ENTER**.
2. The active file will be displayed as *File XX* or a previously entered user label. Press **←** or **→** to scroll through the file list and press **ENTER** to select the displayed file.
3. *Entry selected...* will be displayed, followed by the currently active file. Press **←** or **→** to scroll through the menu until *Print Ctrl Chart* is displayed. Press **ENTER**.
4. The message *Sending data...* will be displayed.

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Section 6 Calibration

The 5-Step Reference Step Wedge is used to calibrate the Densitometer. The calibration point is generally Step 4.

The following procedure allows calibration of the optical density of the Scanning Densitometer:

1. Be sure the Power Switch is in the OFF position.
2. Press and hold the **ENTER** push-button while turning the Power Switch to the ON position. The following message will be displayed:
Self testing...
3. When the unit has completed the self-test, the following Setup Menu label will be displayed:
Single.
4. Press *←* or *→* to scroll through the Setup Menu until *Calibrate* is displayed.
5. Press **ENTER**. The current calibration density is displayed with the cursor under the first digit of the density value:
Density = X.XX
6. Edit the density value as follows:
 - a. Press *←* or *→* to increase/decrease the value at the cursor.
 - b. Press **ENTER** to select the displayed value; the cursor will move to the second digit.
 - c. Press *←* or *→* to increase/decrease the value at the cursor.
 - d. Press **ENTER** to select the displayed value; the cursor will move to the third digit.
 - e. Press *←* or *→* to increase/decrease the value at the cursor.
 - f. Press **ENTER** to select the displayed value; the unit will auto zero and display the following message:
Auto zeroing...
7. After zeroing is complete, the following message will be displayed:
ENTER to read.
8. Position the step wedge so that the area to be measured is over the aperture, with the emulsion side UP.
9. Press **ENTER**. The following message will be displayed:
Calibrating....
10. When calibration is complete, *Calibrating done* will be displayed briefly. The display will then return to the Setup Program Menu and *Facility Title* will be displayed.
11. Scroll through the Setup Menu until the message *SINGLE* is displayed. Measure each step to verify the correct calibration.

NOTE

After Auto Zeroing is completed, the measurement must be made within approximately 30 seconds.

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Section 7

Maintenance and Troubleshooting

7.1 General



NOTE

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

As with any precision instrument, certain precautions and periodic maintenance procedures are necessary. Observe the following:

1. Keep the underside of the photo head clean, using alcohol and a soft cloth as required. **DO NOT, UNDER ANY CIRCUMSTANCES, USE ANY OTHER SOLVENT.**
2. Periodically check the alignment of the aperture and the photo head. Misalignment may be due to:
 - a. Dropping the instrument.
 - b. Using excessive pressure to hold the instrument closed.
 - c. Letting the top section "slam" in the open position.

NOTE

If the photo head and aperture are severely out of alignment, return the unit to Fluke Biomedical for service.

7.2 Photo Head Alignment

Proper photo head alignment is critical. Adjustments can be made by slowly tightening or loosening the four (4) adjustment screws, visible when holding the top section of the unit open.

Proper adjustment is achieved when the photo head is parallel to the surface of the light table and the gap is just wide enough to allow the film to slide through with slight resistance. Always check the calibration after making photo head adjustments.

7.3 Displayed Error Messages

Refer to Table 7-1 for a description of error messages that may be displayed during operation or setup of the Densitometer.

Table 7-1. Displayed Error Messages

Message	Description	Corrective Action
<i>Low Battery</i>	Battery voltage is below threshold; unit will not operate.	Replace batteries.
<i>DSR Invalid</i>	DSR line (DTR from computer) indicates that the computer is not ready to accept data.	Check that DTR line from computer is connected properly. Disable DSR via Setup Program.
<i>Scanning Halted</i>	Scanning process halted for one of following reasons: <ul style="list-style-type: none"> - Text on film edge. - Jerky movement of film through Densitometer. - Improperly positioned step wedge on test film. - Very dim marks on the test film. - Missing marks above steps on test film. 	Slide film in edgewise to prevent text from passing over the measurement area. Smooth movement of test film through densitometer. Check that distance from edge of film to center of step is 16.1 mm. Increase exposure of test film. Check that test film is properly marked.
<i>Too Many Marks</i>	More than 21 step marks detected.	Check that test film is properly marked.
<i>Invalid Data</i>	One or more of 22 readings is greater than 4:005. B + F value = 0.00 The relative speed is not calculated. The average gradient is not calculated.	Determine incorrect value by viewing log file (X.XX indicates an erroneous value). NOTE: If any of 22 readings are above 4.00, the relative speed and average gradient are not calculated.
<i>Couldn't resolve</i>	21 steps could not be identified for one of the following reasons: <ul style="list-style-type: none"> Jerky movement of film through the densitometer. Improperly positioned step wedge on test film. 	Repeat the scan Smooth movement of test film through Densitometer. Check that distance from edge of film to center of step is 16.1 mm.
<i>Timed Out</i>	Film not read within 20 seconds.	Position film and take reading within 20 seconds.

7.4 Battery Replacement

Use the following procedure to replace the batteries:

1. Turn the On/Off Switch to the OFF position.
2. Unplug the unit from the power converter.
3. Remove the bottom cover plate by removing the four screws securing it to the unit.
4. Remove and discard the used batteries.
5. Insert 6 AA alkaline replacement batteries, observing proper polarity.

NOTE

Use only Alkaline batteries to ensure operation of the unit.

6. Replace and secure the bottom cover plate using the screws removed in Step 3.

7.5 Lamp Replacement

Use the following procedure to replace the lamp.

1. Turn the On/Off Switch to the OFF position.
2. Unplug the unit from the power converter.
3. Remove the bottom cover plate by removing the four screws securing it to the unit.
4. Remove the two screws on the lamp circuit board.
5. Remove and discard the used lamp.
6. Install the new lamp.
7. After soldering the new lamp in place, trim the excess leads from the lamp on the bottom side of the board.
8. Replace and secure the lamp circuit board using the screws removed in Step 4.
9. Replace and secure the bottom cover plate using the screws removed in Step 3.

7.6 Replacement Parts

Replacement parts are listed in Tables 7-2.

Table 7-2. Lamp PCB Replacement Parts (169040)

Reference	Part No.	Description	Qty
LMP2	680041A	LAMP	1
D12	65-139	OPTOELECTRIC DIODE	1
BAT	750003	MN1500, 1.5v AA ALKALINE BATTERY	6

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