“The Little Genius”
Scanning Densitometer
Nuclear Associates Model 07-444

Introduction
“The Little Genius” stands head and shoulders above all other densitometers when it comes to performance, reliability and economy. The only hand-held scanning densitometer in the industry with built-in scanning and single-point (spot) measurement capability, it literally does the work of two densitometers.

Applications
“The Little Genius” measures and stores daily film data for up to 20 different x-ray film processors for 31 days in its own built-in memory. Use it to generate and print control charts and D-Log-E curves directly to a printer without using external software and a computer. Set base-line (target) and tolerance levels for each control chart parameter either manually or automatically by scanning and averaging up to 9 different film strips. So smart, it reads not only our film strips, but “the other guys” too.

Specifications
Measuring range 0 to 4.0 OD units
Accuracy 0 to 3.0 OD ± 0.02 OD units; 3.0 to 4.0 OD ± 1%
Repeatability ± 0.02 OD units
Power requirements 6 AA batteries, 1.5 V alkaline; 110 VAC with AC power converter
Spectral response Centered at 540 nm
Aperture size 1.0 and 2.0 mm
Dimensions 3.2 (w) x 7.1 (d) x 2.75 in (h)
(8.1 x 7 x 18 cm)
Weight 2.8 lb (1.3 kg)

Optional accessories
RS-232 Interface Cable, 7 ft (2m) (Model 802013)
9-Pin Adapter (Model 169072)
25-Pin Adapter (Model 169071)

<table>
<thead>
<tr>
<th>Available model(s)</th>
<th>Description</th>
<th>Typical geo. region</th>
</tr>
</thead>
<tbody>
<tr>
<td>07-444 “The Little Genius” Scanning Densitometer</td>
<td>includes RS-232 interface cable, and a 9-pin and 25-pin adapter</td>
<td></td>
</tr>
<tr>
<td>07-446 “The Little Genius” Scanning Densitometer</td>
<td>includes AutoSTPP X-Ray Film Processor QC Software, RS-232 interface cable, and a 9-pin and 25-pin adapter</td>
<td></td>
</tr>
</tbody>
</table>

Non-Powered Serial Parallel Converter
(Model 88-444)

Available AC adapters (specify with order)
14-301 110 VAC 9 VDC 500 mA USA, Japan
14-399 230 VAC 9 VDC 500 mA Europe
14-415 230 VAC 9 VDC 500 mA UK
14-415 and 14-416 adapter 230 VAC 9 VDC 500 mA Australia

Features
• Saves time
• Increases accuracy of readings
• Provides vital information in seconds
• Includes built-in scanning and single-point measurement capabilities
• Available with AutoSTPP X-Ray Film Processor QC Software

For additional information, please contact Cardinal Health, Radiation Management Services customer service at 440.248.9300, 800.850.4608, or fax: 440.349.2307; located at 6045 Cochran Road, Cleveland, Ohio 44139-3303, USA.

Tested. Meets applicable standards.
Hand-Held Deluxe Digital Clamshell Densitometer
Nuclear Associates Model 07-443

Introduction
Get all the benefits of state-of-the-art features in a compact, hand-held unit. Become a “speed reader” with this accurate, rugged portable Clamshell Densitometer. It has today's most-wanted features for “go-anywhere” quality control testing...from darkroom to darkroom, and from lab to field.

Applications
It's easy to use. Just lift the “shell” and insert the test film; close the “shell” and press the READ button. The measured optical density appears on the three-digit liquid crystal display. The self-contained light source makes it convenient to use...anywhere.

A carrying/storage case and a calibrated five-step density tablet are included.

Features
- Two aperture choices: 1 and 2 mm
- Easy touch pads
- Battery operated
- Easy read display

Specifications
- **Range**: 0.0 to 4.0 OD
- **Accuracy**: ± 0.02 OD
- **Reproducibility**: ± 0.01 OD
- **Temperature range**: 50°F to 104°F (10°C to 40°C)
- **Apertures**: 1 and 2 mm
- **Measuring length**: Throat: 5.3 in (135 mm)
- **Display**: Three-digit, .5 in LCD with a low-battery indicator
- **Zero range**: Auto zeros to density 0.0
- **Sensor**: High-efficiency silicon photodiode
- **Controls**: Zero pushbutton: zeros unit
  Power on/off switch
  READ pushbutton: initiates READ sequence
  Calibration control: screwdriver adjustable 20-turn potentiometer used to calibrate against a known step tablet
- **Light source**: When turned on during measurement, provides extremely long life with minimum spectral and intensity degradation. Reduces heating to a minimum
- **Power requirements**: Four 1.5 V AA batteries (approx. 3,000 exposures)
- **Dimensions**: 3.2 (w) x 7.1 (d) x 2.4 in (h)
  (8.1 x 18 cm x 6.1 cm)
- **Weight**: 1.81 lb (0.82 kg)

Optional accessories
- **Rechargeable AA NiCad Battery** (Model 87-443-2000). Battery life: approximately 1,200 to 1,500 read-cycles, per recharge
- **Battery Charger** (Model 87-443-1000)
- **Battery and Charger Kit** (Model 87-443-2140), includes four AA NiCad batteries and one battery charger
- **Carrying Case** (Model 89-443)

Available model(s)
07-443 Hand-Held Deluxe Digital Clamshell Densitometer, includes five-step density tablet and carrying case

For additional information, please contact Cardinal Health, Radiation Management Services customer service at 440.248.9300, 800.850.4608, or fax: 440.349.2307; located at 6045 Cochran Road, Cleveland, Ohio 44139-3303, USA.

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07-443-ds rev 2 10 mar 03
**Hand-Held Dual-Color Sensitometer**  
Nuclear Associates Model 07-417

**Introduction**

This compact, precision instrument is ideal for maintaining consistent, high-quality film processing. By evaluating control films on a daily basis, the technologist can identify processor variations before they affect clinical radiographs. Also, processing conditions in multiprocessor departments may be standardized. In the past, this was difficult in departments using varied film-screen combinations in different areas. With this sensitometer, proper exposure of either blue- or green-sensitive x-ray film is easily accomplished, with no need for internal adjustments.

Nuclear Associates’ Hand-Held Dual-Color Sensitometer features a 21-step density wedge with 0.15 OD increments. The 21 density-gradient steps are numbered for convenience. An innovative, dual-color, electroluminescent light source provides precisely-controlled repeatable exposures. The desired color is selected with a front-panel switch.

**Applications**

To make an exposure, the platen is raised and a sheet of film is inserted beneath it until the film stops are reached. The platen is lowered and the exposure switch is depressed. An audible buzzer is activated during the exposure. To prevent double-exposures, a two-second delay is engaged before the next exposure can be made. When battery replacement becomes necessary, the unit will not expose film. Battery life is approximately 10,000 exposures.

Processor variations are monitored by comparing the control film to previously processed films. Speed, contrast, and base-plus-fog values can be graphically plotted for easier comparison.

**Specifications**

- **Light source** Dual-color electroluminescent  
  Blue 455 nm ± 10 nm; green 520 nm ± 10 nm
- **Repeatability** ± 0.04 OD log exposure from unit to unit
- **Stability** ± 0.02 OD log exposure per year at 10º to 45ºC
- **Exposure area** 21 steps, each 5 x 10 mm
- **Tablet densities** 0.05 to 3.05 OD in 0.15 OD increments
- **Exposure time** Adjustable, 50 to 500 ms typical
- **Exposure adjustment** Separate external screwdriver adjustments ± 0.5 OD on each color
- **Controls** Push-to-expose button with buzzer monitor and two-second delay to prevent double exposures
- **Blue/Green rocker switch**
- **Power switch**—none required. Unit draws no power on standby
- **Power requirements** Two 9 V alkaline transistor batteries
  Optional AC power converter  
  Approximate battery life 10,000 exposures
- **Dimensions** 5.25 (w) x 7.625 (d) x 3.625 in (13.34 x 19.37 x 9.21 cm)
- **Weight** 2.5 lb (1.14 kg)
- **Optional accessories**
  Carrying Case (Model 89-417)
  Available model(s)
  07-417 Hand-Held Dual-Color Sensitometer

**Features**

- Repeatability: ± 0.04 OD log exposure from unit-to-unit
- Stability: ± 0.02 OD log exposure per year at 10º to 45ºC
- Numbered, 21-step density wedge

**Available AC adapters (specify with order)**

<table>
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<tbody>
<tr>
<td>14-407</td>
<td>110 VAC 12 VDC 400 mA</td>
<td>USA, Japan</td>
</tr>
<tr>
<td>14-431</td>
<td>230 VAC 12 VDC 640 mA</td>
<td>Europe</td>
</tr>
<tr>
<td>14-432</td>
<td>230 VAC 12 VDC 640 mA</td>
<td>UK</td>
</tr>
<tr>
<td>14-432 and 14-416 adapter</td>
<td>230 VAC 12 VDC 640 mA</td>
<td>Australia</td>
</tr>
</tbody>
</table>

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07-417-ds   rev 2   26 mar 03
## Portable Digital Thermometer
### Model 07-402

**Introduction**

This hand-held thermometer is a battery-powered unit with a detachable immersion probe. Temperature readings appear in Centigrade or Fahrenheit with ± 0.5% accuracy. The LED display eliminates problems that can result from the misreading of stem-type thermometers.

**Applications**

Detachable immersion probes are time-savers for x-ray departments that have several film processors. The use of multiple probes, each remaining in a specific tank, also eliminates the possible cross-contamination of chemicals. This improved version of the digital thermometer includes many convenient features and capabilities. You can quickly and easily display the lowest and highest temperatures measured by the probe since the unit was turned-on. Our digital thermometer also enables you to “freeze” the current temperature reading on the display. The thermometer display can be easily illuminated, making it perfect for use in the darkroom. You can also program the Portable Digital Thermometer for auto or manual shut-off.

The Portable Digital Thermometer (Model 07-402) is a shock resistant, solid-state unit that needs no adjustments to maintain accuracy. Calibration is traceable to the National Institute of Standards and Technology (NIST)*. The unit includes a high-impact plastic case with a recess for storing one probe, and is equipped with a power jack that will accept the optional AC power supply. The jack should be used when the unit will be in use for extended periods of time (in order to prevent battery failure).

**Specifications**

- **Temperature range**: -40°F to 300°F (-40º to 150°C)
- **Resolution**: 0.1°F
- **Accuracy**: ± 0.5% over entire range
- **Display**: Four-digit LED, plus decimal point

* Factory re-calibration available.

### Optional accessories

- **Immersion Probe** (Model 07-403)
- **Waterproof Probe** (Model 07-401), will not be damaged in chemistry or water

### Available model(s)

- **07-402** Portable Digital Thermometer, with one probe

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## B-D Digital Thermometer
### Model 07-404

More sensitive and responsive than glass thermometers. Just depress the ON/OFF button... immerse the thermometer... and a beep-signal will indicate the measurement is complete. The digital reading remains on display even when the thermometer is removed. After the measurement is recorded, turn the power off.

A convenient “memory feature” remembers the last temperature reading, even after the thermometer has been turned off. The long-life battery will last for thousands of readings (about 300 hours). A Low Battery Indicator will be displayed when battery needs replacing.

**Specifications**

- **Temperature range**: 90°F to 108°F
- **Accuracy**: ± 0.2°F
- **Power**: 1.55 VDC alkaline battery
- **Dimensions**: 0.75 (w) x 5.1 (l) x 0.43 in (t) (19 x 130 x 11 mm)
- **Weight**: 0.35 oz (10 mg)

### Available model(s)

- **07-404** B-D Digital Thermometer

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* For additional information, please contact Cardinal Health, Radiation Management Services customer service at 440.248.9300, 800.850.4608, or fax: 440.349.2307; located at 6045 Cochran Road, Cleveland, Ohio 44139-3303, USA.

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Film Processor
Quality Control Kit
Nuclear Associates Model 18-445

Introduction
Thorough, precise film processor quality control is an important part of ensuring the acquisition of high quality radiographs, while minimizing radiation exposure to patients. Our goal is to provide you with the equipment you need to detect changes in image quality before they become significant enough to affect diagnosis or radiation dose to patients.

The Film Processor Quality Control Kit (Model 18-445) includes:

• Hand-Held Dual-Color Sensitometer (Model 07-417)
• Hand-Held Deluxe Digital Clamshell Densitometer (Model 07-443)
• Portable Digital Thermometer (Model 07-402)
• Basics of Film Processor QC Videotape (Model 49-780)
• Carrying Case (Model 89-423)

Available model(s)
18-445 Film Processor Quality Control Kit

Contains the essential tools for performing the necessary QC tests

For additional information, please contact Cardinal Health, Radiation Management Services customer service at 440.248.9300, 800.850.4608, or fax: 440.349.2307; located at 6045 Cochran Road, Cleveland, Ohio 44139-3303, USA.
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The Digital Densitometer is an easy to use precision instrument that quickly measures the optical density of film. And with its optional RS-232 interface, you have the capability to automatically transfer the data to a computer for storage and retrieval.

Constructed of rugged steel and compact enough to fit on any crowded worktable, it offers exceptional accuracy (± 0.02 optical density). The optical density value is displayed in bright LED numerals on the detector arm. The sample table is 6.125 x 10.50 inch with a 4.75 x 5.50 inch illuminated section. It will accommodate film up to 14 x 17 inch and provides ample room for positioning any selected area under the detector.

The detector is a hermetically-sealed silicon photodiode. The detector lamp is at full brilliancy only during the actual measurement, thus preventing heating problems and ensuring very long lamp life with minimum wavelength shift or other degradation. When necessary, the lamps are easily replaced. The densitometer includes a five-step optical density tablet.

Specifications

Density range 0.00 to 4.5 D
Accuracy ± 0.02 density. Reference tablet supplied
Response time Two seconds at 3.00 density
Zero drift Negligible
Apertures supplied 1, 2, and 3 mm D. Anodized aluminum
Throat 8.2 in length (21 cm). Easily measures to center of 14 x 17 in (35.6 x 43 cm) film
Illuminated table 4.75 x 5.50 in (12 x 14 cm)
Diameter of aperture holder (area obscured) 0.730 in
Spectral response 5000-5500 Å peak of bell-shaped curve
Detector illumination Incandescent lamp with spectral compensation filter. Lamp is at full brilliancy only during measurement
Table illumination Four #37, low voltage, wedge-base lamps

Digital readout Three 0.4 inch high light-emitting diode (LED) numerals on detector arm
Detector Hermetically-sealed, silicon photodiode
Zero control Allows wide range adjustment for different apertures and density subtraction
Power 110/220 V, 50/60 Hz
Dimensions 6.3 (w) x 13.4 (d) x 4.9 in (h)
(16 x 34 x 12.5 cm)
Weight 7 lb (3.2 kg)

Optional accessories
Carrying Case (Model 89-424)
Apertures, set of three (Model 07-413)
Replacement Lamp (Model 07-424-1000)
Step Tablet (Model 07-424-9996)
RS-232 Interface Cable, 7 ft (2m) (Model S02013)
9-Pin Adapter (Model 169072)
25-Pin Adapter (Model 169071)

Available model(s)
07-424 Digital Densitometer, includes step tablet
07-424-220 Digital Densitometer, 220 V, includes step tablet
07-440 Digital Densitometer with RS-232 interface, includes step tablet
07-440-2200 Digital Densitometer with RS-232 interface, 220 V, includes step tablet

For additional information, please contact Cardinal Health, Radiation Management Services customer service at 440.248.9300, 800.850.4606, or fax: 440.349.2307; located at 6045 Cochran Road, Cleveland, Ohio 44139-3303, USA.

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