Revealer® Solid State Personal Alarming Dosimeter
Inovision Model 41277

Introduction
The Model 41277 Revealer is a personal dosimetry card that measures dose and dose rate in real time with audible and visual alarms that alerts the user immediately that a preset radiation level has been surpassed. With its credit card size and only three buttons needed to operate the device, the Revealer is the smallest and easiest to use electronic dosimeter available.

Applications
The Revealer and software track occupational doses for workers and visitors exposed to radiation in nuclear medicine, brachytherapy, radiation therapy, PET facilities, nuclear research facilities, airline flight crews, and HAZMAT teams where there is a need for an alarm level below 10 µSv/hr and energies above 50 keV are of concern.

The Revealer is a personal dosimeter that is the cornerstone of a complete dosimetry system. With the badge reader and Windows based database management system, an entire department’s detailed dose history can be stored and managed.

The Revealer dose history records are downloaded to a personal computer via the Revealer Dosimeter Reader with user-friendly Windows based software. Dose Manager Software allows transfer of the user’s personal data from the dosimeter memory. Retrieval of the stored data and detailed dose history are easily managed.

Features
- Electronic dosimeter with LCD display and large nonvolatile memory
- Measures dose equivalent Hp(10) according to International Commission on Radiation Units (ICRU) 39
- Measures dose from 1 µSv to 10 Sv; dose rate from 1 µSv/hr to 1 Sv/hr
- Stores daily, monthly, quarterly, yearly, and 5-year cumulative doses
- 3400 hour operation typical on single battery
- Dosimeter includes protective vinyl pocket and pocket clip
- Badge reader and database management software available
- Available in rem units

Audio & visual alarms
Stores 5-year personal dose history
Credit card size and lightweight
Uses standard watch battery
Rugged, shock-proof, and decontaminable
PC enabled database management
Windows® based software
Specifications

Detector  Energy compensated silicon diode detector (an arrow indicates the detector location)

Radiation detected  Gamma and x-ray from 50 keV to 2 MeV

Overall accuracy  ± 15% from 60 keV to 1.25 MeV; ± 30% from 50 keV to 2 MeV

Sensitivity  0.03 CPS per µSv/h, or 130 counts/mSv

Range
- Dose 1 µSv to 10 Sv
- Dose rate 1 µSv/h to 1 Sv/h

Alarms  70 dB buzzer with specific sound according to alarm type (dose or dose rate)
Flashing red LED (1 flash per second)
Flashing pictogram alarm, display of the threshold exceeded and the peak rate

Adjustable alarm thresholds  Current dose, day/month/quarter doses from 10 µSv to 10 Sv; Dose rate from 10 µSv/hr to 1 Sv/hr

Data storage  Complete identification of badge wearer and dosimeter

Last 100 doses  Measurements in presetable time intervals, daily doses over the last 3 months, monthly doses over the last 5 years
Cumulative doses for the day, the last 30 days, the last 90 days, the last 12 months, the last 60 months, the working life time
Dates and values of the last 6 measurements exceeding alarm thresholds

Battery  Standard lithium battery CR2450 (3 V, 540 mAh)

Battery life  3400 hours, 5 months in continuous operation, 1 year for 8 hr daily operation

Battery backup  Complete chronological data: doses, overflows, wearer identification and badge identification, for 10 years without battery, in an EEPROM memory

Typical energy dependence
Irradiation on PMMA phantom
Range of Cesium 137
R[Hp(10)] = 1.04 “µSv”/µSv

Dimensions  3.5 (w) x 0.3 (d) x 2.2 in (h) (8.9 x 0.8 x 57 cm)
Weight  0.11 lb (0.05 kg)

Optional accessories
Revealer Dosimeter Reader Kit (Model 41278), consists of reader, AC adapter, and Dose Manager software

Available models
41277  Revealer Solid State Personal Alarming Dosimeter, includes a protective cover, pocket clip, battery, and instruction manual

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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41277-ds rev 3 26 mar 03
Bleeper mR
Radiation Monitor
Model 05-106

Introduction
The slim, compact Bleeper mR is the ideal personal monitoring device for alerting personnel to the presence of radiation in medical, industrial or research settings. It accurately measures and displays the radiation dose received.

Applications
The only control is a switch to turn off and reset the instrument, making Bleeper mR extremely easy to use. For added safety, the switch is recessed. An easy-to-read LCD display provides a continuous indication of accumulated dose. The loud “bleep” sounds every 15 to 30 minutes on background and becomes more frequent as dose rate increases, becoming a continuous sound in high radiation fields. A series of quiet “clicks” indicates it is properly functioning. Bleeper mR is an enhanced version of the highly popular Bleeper III and utilizes the same proven technology.

Specifications
Bleep rates for background radiation
Approx. 1 bleep every 15 to 30 minutes. 1 mR/h: approx. 1 bleep every 20 seconds. 100 mR/h and above: continuous signal to at least 60 Sv/h (6000 R/h)
Energy range 45 keV to 6 MeV (± 25%)

Dose rate response Linear to 5 R/h (± 20%)
Display LCD 0.1 mR to 999,999.9 mR
Battery Three alkaline batteries, size AAA. Typical battery life is 1 year
Temperature range - 4º to + 122ºF (- 20° to + 50°C)

Available model(s)
05-106 Bleeper mR Radiation Monitor
05-106-2200 Bleeper µSv Radiation Monitor

Bleeper III
Personal Radiation Monitor
Models 05-104

- Provides a continuous indication of gamma or x-ray dose rate
- Pocket-size... lightweight

Here is a simple, convenient instrument for alerting personnel to the presence of ionizing radiation. It provides a clear, audible indication of gamma and x-ray dose rates. No controls or adjustments are required.

The instrument operates continuously, giving a bleep every 15 minutes for normal background radiation, increasing with the dose rate to a continuous tone when high radiation doses are present. This compact unit slips easily into the pocket, where it is firmly held by a clip.

Specifications
Sensitivity to background radiation
Approx. 1 bleep per 15 minutes. 1 mR/hr: approx. 1 bleep per 20 seconds. 100 mR/hr and up: continuous signal (to at least 6000 R/hr)
Energy range 30 keV to 10 MeV
Temperature range - 4º to 122ºF (- 20° to + 50°C)

Batteries Two alkaline AAA. Battery life approx. 1 year
Construction Plastic case with clip
Dimensions 1 (w) x 5.5 (d) x 0.63 in (t)
Weight 0.17 lb (0.08 kg)

Available model(s)
05-104 Bleeper III Personal Radiation Monitor

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05-106-ds rev 1 11 mar 03
Direct Reading Pocket Dosimeters
Models 06-007 to 06-686

Introduction
Direct-Reading Pocket Dosimeters are rugged, precision instruments designed specifically for measuring accumulated quantities of gamma and x radiation. In use, the dosimeter is normally clipped to a pocket or to the outside of a lead apron. By checking the dosimeter reading periodically, the wearer is able to determine the exposure received during specific procedures. By knowing where and when greater-than-normal exposures occur, the wearer can identify the source and take quick, corrective action. We currently offers five dosimeters. Each dosimeter has a color-coded clip that signifies its range. This will help the user to identify the dosimeter (i.e. black clip = 0 to 200 mR, blue clip = 0 to 5 R, etc.), and ensure that the intended dosimeter is utilized.

Applications
Direct-Reading Pocket Dosimeters are extremely easy-to-use. To read the integrated exposure, the user looks through the dosimeter eyepiece while pointing the unit toward any external light source. The exposure is determined by the position of a hairline fiber against a graduated scale. A Dosimeter Charger (Model 06-912) is used to re-zero the dosimeter.

The 0 to 200 mR Low-Energy Dosimeter is the most popular type for measuring personal radiation doses in hospital applications including fluoroscopy, portable radiography and angiography. Our dosimeters are ideal for nuclear medicine and health physics applications. All Direct-Reading Pocket Dosimeters are hermetically-sealed using state-of-the-art plastics and epoxy resins. These reliable, high-quality devices meet ANSI specifications N13.5 and N322, as well as military requirements.

Specifications

<table>
<thead>
<tr>
<th>Radiation detected</th>
<th>Gamma and x-radiation from 20 keV to 2 MeV</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ranges</td>
<td>0-200 mR to 600 R</td>
</tr>
<tr>
<td>Energy response</td>
<td>See response curve:</td>
</tr>
<tr>
<td></td>
<td>160 keV to 2 MeV: ± 10%</td>
</tr>
<tr>
<td></td>
<td>40 keV to 160 keV: + 20%, - 10%</td>
</tr>
<tr>
<td></td>
<td>20 keV to 40 keV: + 20%, - 30%</td>
</tr>
<tr>
<td>Accuracy</td>
<td>Within ± 10% of true exposure</td>
</tr>
<tr>
<td>Rate response</td>
<td>Dose rate independent for gamma and x-radiation</td>
</tr>
<tr>
<td>Electrical leakage</td>
<td>Less than 0.5% of full scale for 24 hours at 50°C</td>
</tr>
<tr>
<td>Relative humidity</td>
<td>Up to 90%</td>
</tr>
</tbody>
</table>

Detector
Fiber electrometer mounted in an electrically-conducting plastic ion chamber

Material
Detector housing
Very low permeability plastics; hermetically-sealed

Clip
Glass fiber-filled, high-strength plastic

Dimensions
0.6 in Ø x 4.5 (l) (1.5 x 12.4 cm)

Weight
0.06 lb (0.03 kg)

Available model(s)

<table>
<thead>
<tr>
<th>Model 06-007</th>
<th>Direct-Reading Pocket Dosimeter, 0 to 200 mR; Black Clip</th>
</tr>
</thead>
<tbody>
<tr>
<td>06-007-2200</td>
<td>Direct-Reading Pocket Dosimeter, 0 to 2 mSv; Black Clip</td>
</tr>
<tr>
<td>06-611</td>
<td>Direct-Reading Pocket Dosimeter, 0 to 5 R; Blue Clip</td>
</tr>
<tr>
<td>06-622</td>
<td>Direct-Reading Pocket Dosimeter, 0 to 20 R; Green Clip</td>
</tr>
<tr>
<td>06-638</td>
<td>Direct-Reading Pocket Dosimeter, 0 to 200 R; Yellow Clip</td>
</tr>
<tr>
<td>06-686</td>
<td>Direct-Reading Pocket Dosimeter, 0 to 600 R; Red Clip</td>
</tr>
</tbody>
</table>

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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06-007-ds rev 1 11 mar 03
Dosimeter Accessories
Models 06-201 to 06-912

Multi-Dosimeter Checker

- Allows simultaneous testing of up to five or six direct-reading pocket dosimeters
- $^{137}$Cs source requires no license. The Multi-Dosimeter Checkers consist of a plastic cylinder containing either five or six holes surrounding a central, hermetically-sealed, 9 $\mu$Ci $^{137}$Cs source

This device makes checking dosimeters easy. Properly charged and zeroed dosimeters are placed in the cylinder and exposed for the required period of time, depending on their range. Typically, a six-hour exposure of a properly-calibrated dosimeter will yield a reading from 25 to 35 mR.

**Note:** The hole diameter of Model 06-201 is larger than the hole diameter of Model 06-201-5000.

**Specifications**

<table>
<thead>
<tr>
<th>Radioactive source</th>
<th>9 $\mu$Ci $^{137}$Cs source</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cylinder materials</td>
<td>Cylinder material is PVC</td>
</tr>
<tr>
<td>Dimensions</td>
<td>Checkers 2.5 in Ø x 2.5 (h)</td>
</tr>
<tr>
<td></td>
<td>Hole Model 06-201 0.6 in Ø x 2.5 in (d) (1.6 x 6.4 cm)</td>
</tr>
<tr>
<td></td>
<td>Hole Model 06-201-5000 0.807 in Ø x 2.5 (d) (2.1 x 6.4 cm)</td>
</tr>
</tbody>
</table>

Dosimeter Charger and Storage Case Kit

- Convenient and cost-effective

Here you get the standard Dosimeter Charger (Model 06-912) in a rugged leatherette-covered case that holds up to 12 dosimeters. A chart conveniently affixed inside the case permits quick identification of each dosimeter and its user. The charger can be easily removed for battery change.

**Specifications**

<table>
<thead>
<tr>
<th>Dimensions</th>
<th>5.25 (w) x 9.5 (d) x 5 in (h) (13.34 x 24.13 x 12.7 cm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weight</td>
<td>5 lb (2.3 kg)</td>
</tr>
<tr>
<td>Available model(s)</td>
<td>06-907 Dosimeter Charger and Storage Case Kit</td>
</tr>
<tr>
<td></td>
<td>06-907-1000 Dosimeter Storage Case without Charger</td>
</tr>
</tbody>
</table>

Dosimeter Charger

- For zeroing direct-reading dosimeters

This transistorized power supply zeroes all direct-reading dosimeters. A safety spring in the charging socket prevents damage from excessive pressure on the dosimeter. A protective cap keeps the socket free of dust and moisture when charger is not in use. One standard 1.5 V “D” cell battery (not included) permits thousands of chargings.

**Specifications**

<table>
<thead>
<tr>
<th>Dimensions</th>
<th>4 (w) x 4 (d) x 3 in (h) (10 x 10 x 7.6 cm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weight</td>
<td>1 lb (0.45 kg)</td>
</tr>
<tr>
<td>Available model(s)</td>
<td>06-912 Dosimeter Charger</td>
</tr>
</tbody>
</table>
Introduction
The Prima is a dual-range, pocket-sized, continuous warning device that sounds when the user is entering a radiation area or moving from one radiation field to another of different intensity. This lightweight (4 ounce) unit can be clipped to a shirt, lab coat, belt or lead apron. The Prima responds to radiation by emitting a short, constant-pitch “chirp” at a frequency that varies with changes in radiation intensity. A high and low-rate switch allow the user to adjust the monitor for the environment in which it will be used.

Applications
For gamma radiation areas, the Prima emits approximately 1 chirp per minute (low sensitivity) or 10 chirps per minute (high sensitivity) in a 10 mR/hr field, as measured with $^{137}$Cs. In addition to warning the wearer of different radiation intensities, the Prima can be hand-held and used to identify contaminated equipment, locate radioactive sources, or to train new radiation personnel.

As an x-ray monitor, the Prima may help reduce exposure during fluoroscopy. In the presence of x-radiation, the unit functions as an indicator of relative radiation intensity. By slight shifts in position (to reduce the “chirping” rate), the fluoroscopist can avoid some personal exposure. The Prima also helps locate leakage or excessive stray radiation. The monitor alerts the user when a radiation area is being entered and when movement from one radiation field to another of different intensity has occurred.

Specifications

<table>
<thead>
<tr>
<th>Features</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Features</td>
<td>The rugged plastic case has a positive-closure clip for easy attachment to a garment or belt</td>
</tr>
<tr>
<td>Detector</td>
<td>Silicon diode</td>
</tr>
<tr>
<td>Power requirements</td>
<td>One 9 V alkaline battery provides approximately six months under normal 8 hours/day operation</td>
</tr>
<tr>
<td>Dimensions</td>
<td>2.2 (w) x 3.4 (h) x 1 in (t) (5.6 x 8.6 x 2.5 cm)</td>
</tr>
</tbody>
</table>

| Weight | 0.25 lb (0.11 kg) |

<table>
<thead>
<tr>
<th>Optional accessories</th>
</tr>
</thead>
<tbody>
<tr>
<td>Check Source. $^{137}$Cs, 10 µCi. Flat disc, 1 inch diameter (Model 62-103)</td>
</tr>
</tbody>
</table>

| Available model(s) | 05-205 Prima IIB Personal Radiation Warning Monitor, with volume control |

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