

# Ion Chamber Survey Meter with Beta Slide

## Inovision Model 451B



- High sensitivity measurements of exposure and exposure rate
- Available with dose equivalent energy response (SI units)
- Fast response to measure radiation from leakage, scatter beams and pinholes
- Ergonomic, anti-fatigue handle with replaceable grip and wrist strap
- Sliding shield for alpha and beta discrimination
- Excel add-in for Windows® for data logging and selection of instrument operating parameters (optional)
- Low noise chamber bias supply for fast background settling time
- Bright, highly visible colors
- Easy touch keys

### Introduction

The Model 451B state-of-the-art ion chamber survey meter is a hand-held battery operated unit designed for use in both rugged and normal environments. The Model 451B measures alpha, beta, gamma and x-ray radiation. The Model 451B employs microprocessor and LCD technology and features a rugged ionization chamber with a mylar window and protective steel mesh. An integral beta shield serves as an equilibrium thickness for photon measurements. The ergonomic handle, features a large diameter cushioned grip and is designed to reduce fatigue associated with extended use. The case is constructed of lightweight, high strength materials and is sealed against moisture. The user must specify R or Sv when ordering.

The display features an analog bar graph, 2.5 digit digital readout, low battery and freeze mode indicators. User controls consist of an ON/OFF button and a MODE button. The unit is auto-zeroing and auto-ranging. The display features circuitry that automatically activates the backlight in low ambient light conditions.

The RS-232 interface can be connected directly to a computer for use with the Excel add-in for Windows, enhancing the functionality of the instrument. The software allows for data retrieval, user parameter selection and provides a virtual instrument display with audible (requires sound card) and visual alarm indication. The software may be customized by the user for specific applications.

### Applications

The Model 451B is ideal for site surveys and a wide range of medical and health physics applications. It is regularly used by Police and Fire Departments, x-ray manufacturers, government agencies, state inspectors, emergency response and HAZMAT teams, nuclear medicine labs, hospital radiation safety officers, and nuclear power industry.

### Features

- Ideal for a wide range of applications including NDT, x-ray, and environmental
- Battery operated
- Auto-ranging and auto-zeroing
- RS-232 communications interface
- Measures rate and dose simultaneously
- Tripod mount for stationary, area monitor applications
- Freeze mode indicates peak reading
- Programmable flashing display and audible alarm
- Automatic, ultra-bright LCD
- Excel add-in for Windows (optional)

## Specifications

**Radiation detected** Alpha above 4 MeV, Beta above 100 keV, and Gamma above 7 keV

### Operating ranges

0 to 5 mR/h	or	0 to 50 $\mu$ Sv/h
0 to 50 mR/h	or	0 to 500 $\mu$ Sv/h
0 to 500 mR/h	or	0 to 5 mSv/h
0 to 5 R/h	or	0 to 50 mSv/h
0 to 50 R/h	or	0 to 500 mSv/h

**Accuracy** Within 10% of reading between 10% and 100% of full scale indication on any range, exclusive of energy response. Calibration source is  $^{137}\text{Cs}$

### Detector

**Chamber** 349 cc volume air ionization

**Chamber wall** 246 mg/cm<sup>2</sup> thick phenolic

**Chamber window** 1.7 mg/cm<sup>2</sup> mylar, protected by steel mesh, 46 cm<sup>2</sup> detection area

**Beta slide** 440 mg/cm<sup>2</sup>

**Controls** ON/OFF and MODE

**Automatic features** Auto-zeroing, auto-ranging, and auto-backlight

### Response time

Range	Response
0 to 5 mR/h (0 to 50 $\mu$ Sv/h)	8 sec
0 to 50 mR/h (0 to 500 $\mu$ Sv/h)	2.5 sec
0 to 500 mR/h (0 to 5 mSv/h)	2 sec
0 to 5 R/h (0 to 50 mSv/h)	2 sec
0 to 50 R/h (0 to 500 mSv/h)	2 sec

**Power requirements** Two 9 V alkaline, 200 hours operation

**Warm-up time** One minute

**Display** LCD analog/digital with backlight

**Analog** 100 element bar graph 6.4 cm long. Bar graph is divided into 5 major segments, each labeled with the appropriate value for the range of the instrument

**Digital** 2.5 digit display is followed by a significant zero digit depending on the operating range of the instrument. The units of measurement are indicated on the display at all times. Digits are 0.25 in (6.4 mm) high. Low battery and freeze indicators are also provided on the display

### Modes

**Integrate mode** Operates continuously 30 seconds after the instrument has been turned on. Integration is performed even if the instrument is displaying in mR/h or R/h

**Freeze mode** Will place a tick mark on the bar graph display to hold on the peak displayed value. The unit will continue to read and display current radiation values

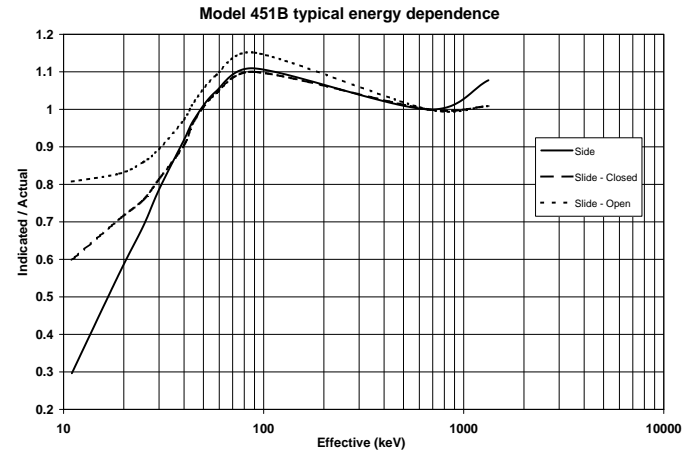
## Environmental

**Temperature range** - 4° to + 158°F (- 20° to + 70°C)

**Relative humidity** 0 to 100%, @ + 60°C

**Geotropism** Less than 1%

### Typical energy dependence



**Dimensions** 4 (w) x 8 (d) x 6 in (h) (10 x 20 x 15 cm)

**Weight** 2.5 lb (1.11 kg)

### Optional accessories

**451 Assistant for Excel** (Model 451EXL), includes RS-232 interface cable

**Single Unit Carrying Case** (Model 190HPS)

**Multiple Unit Carrying Case** (Model 190HPC)

**Check Source**,  $^{238}\text{Uranium}$ , 0.064  $\mu\text{Ci}$ , impregnated 2 x 2 in yellow card (Model 450UCS)

### Available Model(s)

**451B-RYR** Ion Chamber Survey Meter with Beta Slide and standard chamber

**451B-DE-SI-RYR** Ion Chamber Survey Meter with Beta Slide and dose equivalent chamber

Suffix designation RYR = red/yellow/red

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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451B-ds rev 4 26 mar 03

# Pressurized $\mu$ R Ion Chamber Survey Meter

## Inovision Model 451P



### Radiation Safety

- High sensitivity  $\mu$ R measurements of exposure and exposure rate
- Available with dose equivalent energy response (SI units)
- Fast response to measure radiation from leakage, scatter beams and pinholes
- Ergonomic, anti-fatigue handle with replaceable grip and wrist strap
- Excel add-in for Windows® for data logging and selection of instrument operating parameters (optional)
- Low noise chamber bias supply for fast background reading
- Bright, highly visible colors
- Easy touch keys

### Introduction

The Model 451P state-of-the-art ion chamber survey meter is a hand-held battery operated unit designed for use in both rugged and normal environments. The Model 451P features a pressurized ionization chamber, providing enhanced sensitivity and improving energy response to measure gamma and x-ray radiation. The Model 451P employs microprocessor and LCD technology. The ergonomic handle, features a large diameter cushioned grip and is designed to reduce fatigue associated with extended use. The case is constructed of lightweight, high strength materials and is sealed against moisture. The user must specify R or Sv when ordering.

The display features an analog bar graph, 2.5 digit digital readout, low battery and freeze mode indicators. User controls consist of an ON/OFF button and a MODE button. The unit is auto-zeroing and auto-ranging. The display features circuitry that automatically activates the backlight in low ambient light conditions.

The RS-232 interface can be connected directly to a computer for use with the Excel add-in for Windows, enhancing the functionality of the instrument. The software allows for data retrieval, user parameter selection and provides a virtual instrument display with audible (requires sound card) and visual alarm indication. The software may be customized by the user for specific applications.

### Applications

The Model 451P is used in a wide range of medical and health physics applications. The Model 451P was designed to measure leakage and scatter around diagnostic x-ray and radiation therapy suites. Also, the Model 451P is ideal for site surveys and is regularly used by x-ray manufacturers, government agencies, state inspectors, research labs, biomedical technicians, and in airports for baggage inspection equipment maintenance.

### Features

- Ideal for a wide range of applications including NDT, x-ray, and environmental
- Battery operated
- Auto-ranging and auto-zeroing
- RS-232 communications interface
- Measures rate and dose simultaneously
- Tripod mount for stationary, area monitor applications
- Freeze mode indicates peak reading
- Programmable flashing display
- Automatic, ultra-bright LCD display
- Separate integrate mode
- Excel add-in for Windows (optional)

## Specifications

**Radiation detected** Beta above 1 MeV, Gamma and x-rays above 25 keV

### Operating ranges

0 to 500 $\mu$ R/h	or	0 to 5 $\mu$ Sv/h
0 to 5 mR/h	or	0 to 50 $\mu$ Sv/h
0 to 50 mR/h	or	0 to 500 $\mu$ Sv/h
0 to 500 mR/h	or	0 to 5 mSv/h
0 to 5 R/h	or	0 to 50 mSv/h

**Accuracy** Within 10% of reading between 10% and 100% of full scale indication on any range, exclusive of energy response. Calibration source is  $^{137}\text{Cs}$

**Detector Chamber:** 300 cc volume pressurized air ionization chamber to 8 atmospheres or 125 psi

**Controls** ON/OFF and MODE

**Automatic features** Auto-zeroing, auto-ranging, and auto-backlight

**Response time** Analog response time from 10% to 90% of reading for a full scale step increase is dependent on operating range. Response time for a step increase in radiation exposure rate from background:

Step increase, background to	Time to reach 90% of final value
400 $\mu$ R/h	4.8 sec
4 mR/h	3.3 sec
10 mR/h	4.3 sec
40 mR/h	4.5 sec
100 mR/h	2.7 sec
1 R/h	2 sec
4 R/h	2.7 sec

The following table shows time measured from 10% to 90% of final value for a step increase or decrease in exposure rate such that a range change does not occur. These values are the response times for the various ranges:

Range	10% to 90%
0 to 500 $\mu$ R/h (5 $\mu$ Sv/h)	5 sec
0 to 5 mR/h (50 $\mu$ Sv/h)	2 sec
0 to 50 mR/h (500 $\mu$ Sv/h)	1.8 sec
0 to 500 mR/h (5 mSv/h)	1.8 sec
0 to 5 R/h (50 mSv/h)	1.8 sec

**Power requirements** Two 9 V alkaline, 200 hours operation

**Warm-up time** Less than two minutes for initial operation when the instrument is in equilibrium with ambient temperature

**Display** LCD analog/digital with backlight

**Analog** 100 element bar graph 2.5 inch (6.4 cm) long. Bar graph is divided into five major segments, each labeled with the appropriate value for the range of the instrument

**Digital** 2.5 digit display is followed by a significant zero digit depending on the operating range of the instrument. The units of measurement are indicated on the display at all times. Digits are 0.25 inches (6.4 mm) high. Low battery and freeze indicators are also provided on the display

## Modes

**Integrate mode** Operates continuously 30 seconds after the instrument has been turned on. Integration is performed even if the instrument is displaying in mR/h or R/h

**Freeze mode** Will place a tick mark on the bar graph display to hold on the peak displayed value. The unit will continue to read and display current radiation values

## Environmental

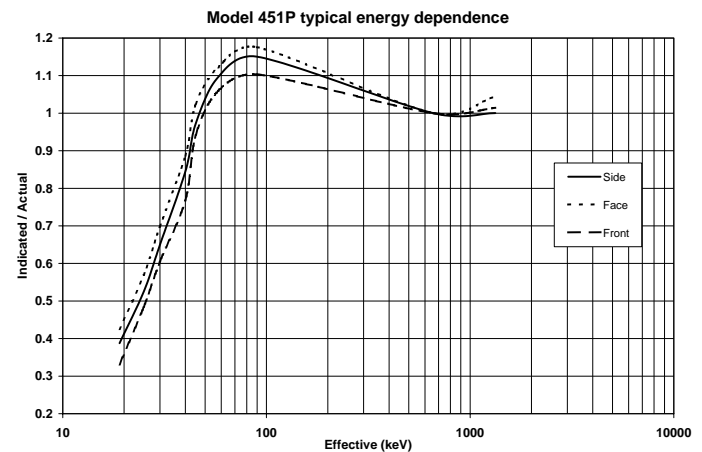
**Temperature range** - 4° to + 122°F (- 20° to + 50°C)

**Relative humidity** 0 to 100%

**Geotropism** Negligible

## Typical energy dependence

$^{16}\text{N}$ itrogen gamma rays are 110% to 120% of indicated readings as determined at the University of Lowell



**Dimensions** 4 (w) x 8 (d) x 6 in (h) (10 x 20 x 15 cm)

**Weight** 2.4 lb (1.07 kg)

## Optional accessories

**451 Assistant for Excel** (Model 451EXL), includes RS-232 interface cable

**Single Unit Carrying Case** (Model 190HPS)

**Multiple Unit Carrying Case** (Model 190HPC)

**Check Source,  $^{137}\text{Cs}$ , 10  $\mu$ Ci. Flat disc, 1 inch diameter** (Model 62-103)

## Available model(s)

**451P-RYR** Pressurized  $\mu$ R Ion Chamber Survey Meter with standard chamber

**451P-DE-SI-RYR** Pressurized  $\mu$ R Ion Chamber Survey Meter with dose equivalent chamber

Suffix designation RYR = red/yellow/red

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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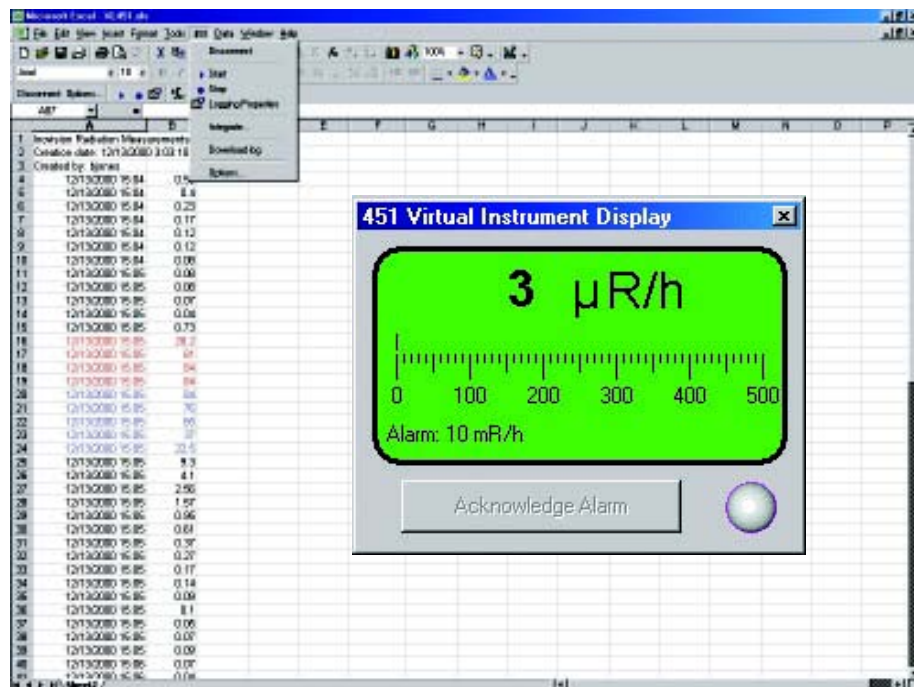


# 451 Assistant for Excel

## Model 451EXL

RS

Radiation Safety



- Complete remote radiation information management for Model 451P and 451B Ion Chamber Survey Meters
- Color-coded data provides quick identification for radiation levels and alarm acknowledgment status

## Introduction

The 451 Assistant for Excel is an Excel Add-in, a program that adds optional commands and features to Microsoft® Excel. The 451 Assistant provides remote control for many of the 451 functions, real-time data logging with user defined alarm parameters and a real time virtual instrument display. The 451 Assistant automatically loads with Excel once it is installed.

The 451 Assistant data logging function automatically records real time measured data in an active Excel worksheet. Each measurement in the data log is automatically placed in the active worksheet cell, then the active cell moves down to the next row of cells where it will place the next set of measured data. Each recorded measurement is time and date stamped. The 451 Assistant provides user configurable audible and visual alarms for the real time logged data. The picture and data shows radiation levels above the preset alarm in red, the blue data represents the radiation level below the alarm that has not been acknowledged. The black data shows when the alarm was acknowledged. See Control Options for more details.

The 451 Assistant for Excel allows the user to configure the 451's internal data logging and alarm settings. It may also be used to download the 451's internal data log and saves it in an Excel worksheet where it can be easily graphed for quick trend analysis.

The 451 Assistant provides automatic timed integrated dose measurement over a user defined integration period or user controlled integrated dose measurement. After the integration timer has expired or the user has stopped integration, the 451 Assistant retrieves the integrated dose from the 451 and inserts the integrated dose in the active worksheet cell and the average dose rate is placed in the next cell to the right.

## Applications

This Model 451EXL information management software program is ideal for the facility Radiation Safety Officer or anyone responsible for maintaining a permanent record of spills and accidents for adherence to state and NRC requirements. The remote control of the 451 series of Ion Chambers may be accessed by any computer on your facility network providing remote information management.

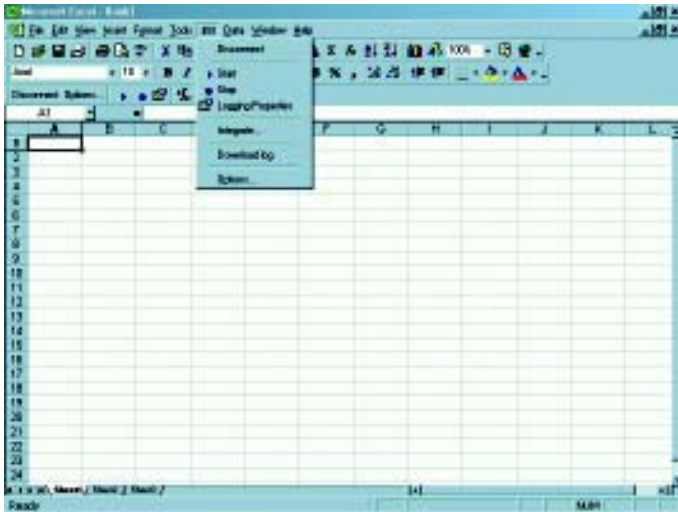
## Features

- Real time data logging in protected Excel worksheet
- Virtual instrument display with audible and visual alarm indication
- Remote user definable alarm settings
- Downloads 451's internal data log into Excel worksheet
- Provides remote control and instrument configuration
- Complete on-line help speeds learning
- Compatible with Windows® 95, 98, ME®, NT® 4.0, 2000, XP® and Excel 97, 2000
- Package includes manual, diskette set, and 25 ft RS-232 cable, Model 1020039000

## Specifications

### Controls

The 451 Assistant menu and toolbar provide an interface for the user to remotely control the 451, configure the 451, download the 451's internal data log and start / stop real time data logging and integrated dose measurements



**Connect / Disconnect** Connects or disconnects the 451 to the computer's communication port

**Start / Stop** Starts and stops computer data logging. When data logging is started, logged data is placed in the active Excel worksheet and the worksheet is protected to provide data security

**Logging Properties** Allows the user specify computer data logging parameters. The data logging sample interval (2 seconds to 999 hours), total data logging period (2 seconds to 49 days) and computer data log alarms may be specified through this menu. These parameters are independent of the 451's internal data logging functions

**Integrate...** Allows the user to select timed integrated dose measurement or user controlled integrated dose measurement. The user may also specify the integration period for timed integration from 1 minute to 999 hours. When timed integrate mode is selected, the 451 Assistant for Excel stops the integrated dose measurement after the specified integration period has expired

When timed integrate mode is not selected, the user controls the integration period and the integration time is displayed in real time. The integrated dose and average dose rate are recorded in the active Excel worksheet when integration is complete

**Download Log** The 451 is capable of internally logging data at a user defined interval from 1 to 255 seconds with a total capacity of up to 2700 data points. This feature allows the user to download the 451's internal data log into the active Excel worksheet

**Options** Allows the user to change many properties of the 451 Assistant for Excel and several of the 451s' properties. The user may configure the various visual and audio alarm features of the 451 Assistant for Excel for each data point that is logged. The 451 Assistant can be configured to use 2 or 4 alarm states. The four alarm states are acknowledged normal (below alarm level), unacknowledged normal, acknowledged alarm and unacknowledged alarm. The user may also select the communication port used by the 451 (default is COM1). The 451's internal data logging parameters and alarm settings may also be changed from the Options menu



### System requirements

- Windows 95, 98, ME, NT 4.0, 2000, or XP
- Microsoft Excel 97 or 2000
- One serial port (COM1 through COM4)

### Available model(s)

**451EXL** 451 Assistant for Excel

**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.** Specifications are subject to change without notice.

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451EXL-ds rev 3 11 mar 03

# Low Energy RF Shielded Survey Meter

## Victoreen® Model 440RF/D



Radiation Safety



- CRT leakage measurement
- Ideal for applications in high RF fields
- Measures low energy radiation exposure down to 12 keV

### Introduction

The Model 440RF/D Low Energy RF Shielded Survey Meter is a highly sensitive, low energy, RF shielded survey meter suited for fast, accurate measurements of background and other low radiation levels. Survey meter design is based on CMOS microprocessor technology. The Model 440RF/D has Electrical Industrial Association approval and is designed to meet the radiation sensitivity and measurement geometry requirements for television receivers set forth by the US Department of HEW. 21 CFR 1020.10 requires “Radiation exposure rates produced by a television receiver shall not exceed 0.5 milliroentgens per hour at a distance of five centimeters from any point on the external surface of the receiver,” as measured in accordance with this section.

### Applications

The Model 440RF/D RF shielded instrument is the basis of measurement for radiation exposure in the color television industry. This instrument is also used to measure radiation from radar and transmission towers where RF may be present.

### Features

- Meets 21 CFR 1020.10 Television Receiver and 21 CFR 1020.40 Cabinet X-ray Systems requirements for radiation surveys
- Insensitive to 20 mW/cm<sup>2</sup> RF fields
- Resolves 0.02 mR/h from 15 kilovolt x-rays
- Auto-zeroing
- CMOS design for stability and performance
- Batteries accessible from outside instrument
- Available in SI units

## Specifications

**Radiation detected** Beta ray above 150 keV and gamma ray and x-ray above 12 keV

**RF response** No response in RF fields up to 20 mW/cm<sup>2</sup>

### Operating ranges

#### 440RF/D exposure rate in five overlapping ranges

0 to 1, 0 to 3, 0 to 10, 0 to 30, and 0 to 100 mR/h

#### 440RF/D-SI dose equivalent rate in five overlapping ranges

0 to 10, 0 to 30, 0 to 100, 0 to 300, and 0 to 1000  $\mu$ Sv/h

**Response time** 90% of final indication in:

Range	Response
0 to 1 mR/h (0 to 10 $\mu$ Sv/h)	7 sec
0 to 3 mR/h (0 to 30 $\mu$ Sv/h)	7 sec
0 to 10 mR/h (0 to 100 $\mu$ Sv/h)	5 sec
0 to 30 mR/h (0 to 300 $\mu$ Sv/h)	5 sec
0 to 100 mR/h (0 to 1000 $\mu$ Sv/h)	5 sec

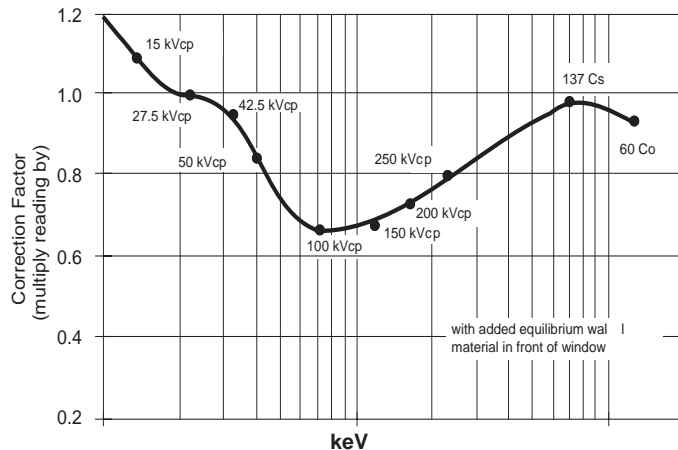
**Accuracy** Within 10% of reading between 10% and 100% of full scale indication on any range, exclusive of energy response. Calibration at 21 keV x-ray (27.5 KVCP, 0.9 mmA/HVL)

**Geotopism** Within 2% of full scale in any orientation

### Typical energy dependence

**X-ray and gamma ray** Within 10% from 12.5 to 42 keV

Maximum response peak of + 40% at 100 keV. Within 10% at <sup>137</sup>Cs and <sup>60</sup>Co with added equilibrium wall



## Environmental

**Temperature range** 68° to 104°F (20° to 40°C)

**Relative humidity** 0 to 95%, non-condensing

**Pressure dependence** Internal software-controlled pressure transducer and temperature sensor automatically apply standard air density correction factors from 70 to 106 kPa to the unsealed ion chamber

**Initial stabilization** Approximately 30 seconds

**Detector** Internal ionization chamber 3.56 cm diameter by 5.87 cm long, cross sectional area 10 cm<sup>2</sup> volume, with 1.5 mg/cm<sup>2</sup> aluminized mylar window and an external magnesium window 13 mg/cm<sup>2</sup> thick. Center of ion chamber volume is 5 cm from the plane determined by the tips of three plastic bumpers

**Display** 3.7 in (9.5 cm) meter scale, marked 0 to 3 and 0 to 10

**Power requirements** Five 9 V batteries; 200 hours operation. Three in parallel configuration for electronic supplies and 2 in series configuration for - 18 V chamber bias

**Controls** Single rotary switch for power and range switching and spring-loaded check source switch

**Zero adjust** Auto-zeroing

**Check source** Built-in operational uranium check source provides constancy check of instrument

**Housing material** All metal, splash-proof

**Dimensions** 5 (w) x 8 (d) x 10.8 in (h) (12.7 x 20.3 x 27.6 cm)

**Weight** 6.8 lb (3.1 kg)

**Shipping volume and weight** 2.5 cu ft (0.071 m<sup>3</sup>) 13.3 lb (6.05 kg)

### Available model(s)

440RF/D Low Energy RF Shielded Survey Meter

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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440RFD-ds rev 3 26 mar 03



# Panoramic Survey Meter

## Victoreen® Model 470A



Radiation Safety

### Introduction

The Model 470A Panoramic Survey Meter is designed to be used in and around medical facilities for many low level radiation monitoring activities. The Model 470A has a very low energy response (down to 10 keV). That makes it ideal for diagnostic x-ray suites, including mammography. Since this meter can measure up to 1000 R/h, it is also ideal for radiotherapy facilities. The Cutie Pie style of this meter allows it to sit on three legs for long-term monitoring or to be used as a hand-held survey meter with the convenient grip handle.



- Cutie pie style with tripod for long-term monitoring
- Low level radiation monitoring for diagnostic x-ray and radiotherapy suites
- Available in SI units

### Features

- Measures all energies over 2 pi solid angle
- Collimator provided for directional identification
- Twelve overlapping rate ranges from 3 mR/h to 1000 R/h full scale
- Energy corrected from 8.0 keV to 2.0 MeV
- Integrated exposures from 3 to 1000 mR full scale

### Applications

The Model 470A is popular in health physics instrumentation. Solid state IC technology is utilized to simplify circuitry, reduce weight and increase reliability. Designed to provide the user with convenience as well as measurement accuracy, the Model 470A has numerous applications in the health physics field. Certainly its outstanding features will suggest many other areas beside diagnostic x-ray and radiotherapy suites where it can be used to great advantage.

### Specifications

**Radiation detected** Alpha above 8 MeV, beta above 120 keV, gamma and x-ray above 10 keV

#### Operating ranges

**Rate** 12 overlapping ranges: 0-3, 10, 30, 100, 300, 1000 mR/h, and R/h

**Integrate** 6 overlapping ranges: 0 to 3, 10, 30, 100, 300, 1000 mR or 0 to 30, 100 and 300  $\mu$ Sv/h, 0 to 1, 3 and 10 mSv/h; 0 to 30, 100 and 300 mSv/h, 0 and 1, 3 and 10 Sv/h; 0 to 30, 100 and 300  $\mu$ Sv, 0 to 1, 3 and 10 mSv

**Accuracy** Within 10% of reading between 10% and 100% of full scale indication on any range, exclusive of energy dependence, and exclusive of recombination effects at high rates. Calibrated at  $^{137}\text{Cs}$

**Response time** 8 sec on 3 mR/h range; 3 sec on 10 mR/h range; 2 sec on 30 mR/h range; 1.5 sec on 100 and 300 mR/h range

**Geotropism** Within 2% of full scale any orientation

**Typical energy dependence** (Gamma or x-ray) Within 15% from 10 to 300 keV with base chamber only. Within 10% from 40 keV to 2 MeV with equilibrium sleeve

#### Environmental

**Temperature range** - 22° to + 122°F (- 30° to + 50°C) using alkaline batteries below 0°C

**Temperature response** Within 0.2%/°C

**Relative humidity** 0 to 99%, non-condensing

**Initial stabilization time** < 1 minute due to dielectric absorption

**Detector** Unsealed air ionization chamber made of expanded polystyrene with 275 cc vol. and 17 mg/cm<sup>2</sup> wall. Cylolac equilibrium sleeve and cap, 500 mg/cm<sup>2</sup>

**Display** 3.125 in (7.9 cm) taut band meter

**Construction** Strong, lightweight Cylolac case

**Power requirements** Two 1.5 V "D" cell batteries and four 22.5 V No. 505 batteries

**Battery life** "D" cell batteries on mR range; more than 150 hr at 24 hr/day, 210 hr at 8 hr/day On R/h range, 85 hr at 24 hr/day or 120 hr at 8 hr/day

No. 505 batteries shelf-life (approx. 1 year)

Battery check function built-in

**External controls** 3 position function switch, 8 position range switch, zero set and adjust knob. Internal: collecting voltage "check" switch, coarse zero adjustment, calibration adjustment

**Internal controls** Collecting voltage "check" switch, coarse zero adjustment

**Dimensions** 5.125 (w) x 11 (d) x 9.50 in (h) (12 x 28 x 24 cm)

**Weight** 4 lb (1.8 kg) net, 10 lb (4.5 kg) shipping

**Check source** Natural Uranium mounted on end cap

#### Optional accessories

**Carrying Case** (Model 470-168)

#### Available model(s)

**470A Panoramic Survey Meter**

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.

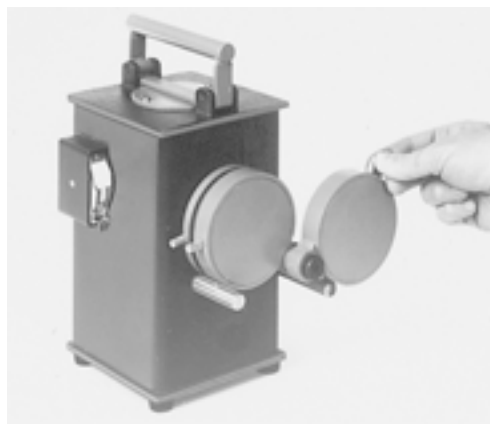
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# Gamma Survey Instrument Calibrator\*

## Model 64-773

- Eliminates the expense, inconvenience, and work-time lost when sending such instruments to an outside calibration service
- Sturdy, easy-to-use
- Safe, accurate calibration



Gamma Survey Instrument Calibrator with one attenuator removed from radiation path



Gamma Survey Instrument Calibrator with three attenuators in place

### Features

- Self-contained  $^{137}\text{Cs}$  source
- Calibrates instruments with ranges up to 2000 mR/hr
- Calibration traceable to NIST
- Attenuators eliminate repositioning for different scale measurements
- Can be padlocked in closed position for safety

### Specifications

**Dimensions** 5 (w) x 5 (d) x 8.50 in (h)  
(12.7 x 12.7 x 21.6 cm)

**Weight** 52 lb (23.6 kg)

#### Available model(s)

**64-773** Gamma Survey Instrument Calibrator

### Introduction

This sturdy, easy-to-use device permits the safe, accurate calibration of instruments used for surveying gamma radiation. It enables users of dosage-measuring equipment to perform routine checks at will or as necessary to meet the regulations of the NRC and Agreement States.

The heavy-duty lead container holds 165 mCi of  $^{137}\text{Cs}$ , encapsulated at one end of a control rod. Since  $^{137}\text{Cs}$  has a long half-life (30 years), there is no need to calculate a correction factor for at least 1 to 2 years after the instrument is shipped.

### Applications

The source can be kept in either of two positions: stored or exposed. In the fully-shielded “stored” position, radiation at the container’s surface is less than 200 mR/hr; at 1 meter away it is less than 10 mR/hr. In the “exposed” position, the source faces a 36° (horizontal) x 20° (vertical) port at the shield’s side. The radiation field can be varied by means of three built-in attenuators (transmission factors 0.25, 0.10, and 0.10). These permit calibration of three meter scales, each at 20% and 80% of full scale, using only one source-to-meter distance measurement. The source is moved from “stored” to “exposed” merely by raising the control rod. For safety, the  $^{137}\text{Cs}$  source cannot be removed from its shield, except by the manufacturer.

A built-in tape measure helps determine the distance from the  $^{137}\text{Cs}$  source to the instrument being calibrated. A padlock (not included) can be used to prevent unauthorized use of the equipment. A convenient carrying handle is included.

**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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