

ISOTOPE IDENTIFICATION SYSTEM

Model # RAD-ID-935



"Until recently, NaI detectors have lacked the ability to accurately identify mixed isotopes. Now, our proprietary process identifies multiple nuclides with quantified results in real time. One affordable gamma spectroscopy system can alarm & identify with ease."

Applications:

Homeland Security
Confirmation of First Responders
Radionuclide Identification
Quality Control
Radiation Safety
Survey Meter
Safeguards
Trending / Histogramming
Monitoring of Nuclear Transportation
Pedestrian Traffic
Border Patrol

Hold_Up Measures
Dose Rate Meter
Employee Education
Portal Monitoring
Nuclear Medicine
Passenger and Freight Monitoring
Treaty Compliance
Environmental Waste Monitoring
Site Redemption
Decontamination
Health Physics

Features:

- First Nuclear Detection System to Identify Multiple Isotopes in Real Time
- Isotope Specific and Full Dose Rate in Real Time
- Superior Resolution / Highest Sensitivity
- Modular Internal and External Gamma and Neutron Detector Systems
- Time-Slice Analysis of Radionuclide Activity (1 second intervals)
- Search, identify and quantify moving targets
- Identifies in High Backgrounds
- Easy / Detail / MCA / Surveillance modes
- One Button Calibration
- Dose Rate Meter operation

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TECHNICAL ASSOCIATES

7051 ETON AVENUE * CANOGA PARK, CA 91303 TELEPHONE (818) 883-7043 * FAX(818) 883-6103

\$Revision: 1.1 \$

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SAM System Description

The SAM system from Berkeley Nucleonics (Model 905, 925, 935) was designed to be an easy to use, fast and accurate tool for gamma and neutron detection. The system uses a single NaI detector and an optional ³He detector with proprietary MCA technology to provide true spectroscopic performance. Through a simple menu driven interface, the user can set up the system to monitor for gross counts above background, specific isotopes, or any peaks in the spectrum. The SAM contains a simple display presentation that gives users of all technical skill levels the ability to survey areas, perform QC of material shipped or received, identify and quantify radio-isotopes, monitor material/pedestrians/vehicles, perform dose calculations and handle general purpose gamma spectroscopy. SAM sensitivity exceptionally better than any other NaI system due to a proprietary acquisition technique (QCC) and low level detection algorithms.

Alarm thresholds can be set globally or on an isotope by isotope basis (library has the capability of storing over 90 isotopes). Both audible and visual alarms are available. The system incorporates both RS-232 (point to point) and RS-485 (up to 250 units in a multi-drop, daisy chained configuration) communication interfaces. Units can be connected to a PC system for centralized monitoring and logging. The AC powered system can be used as a tabletop unit or wall mounted with vertical tilt adjustment. The battery powered systems offer the latest in power management technology to assure users many uninterrupted hours of field use. Internal and larger external detector options make this system useful for all applications.

The system may be operated very simply by people who have no understanding of nuclear spectroscopy. The same unit also has full MCA capability and sophistication for extracting detailed isotopic information and analysis demanded by a health physicist. The SAM systems use a display unmatched in the industry. It is a FSTN graphic display with CCFL back lighting. This recent display technology offers easy viewing in indoor and outdoor lighting conditions. The SAM systems will search for any one or more of a list of isotopes selected from the master library, any unknown peaks that might occur (sum peaks, escape peaks, unselected peaks, etc.), total or integral gross counts above background (over the entire 0-4 MeV energy range) or any combination of the above. Time slicing allows the user to set detection intervals, and look at activity in high background environments. Transitory radiation events are captured and stored instead of becoming lost in counting statistics.

Basic Mode

In the basic mode, horizontal bars are displayed corresponding to specified isotopes. When a predetermined, user-set peak to-background ratio is exceeded, a verification spectrum begins to be stored, referred to as a trigger event. Alarm thresholds or triggers are set in standard deviations above background (sigmas). As long as the trigger is present the spectrum continues to collect. Isotopes are ordered with the highest activity listed first (on top) and lesser active isotopes following. The list is updated and re-ordered every second. When the trigger increases (indicating a return to normal background) the accumulation of the verification spectrum will stop and perform an analysis. Real alarm events are captured and stored for reference and review (approximately 400 alarm events may be held in memory). A complete report of the data is stored and the screen will display a histogram with the identified isotopes highlighted. The status line is updated to show the last trigger event and total number of trigger events stored during the collection interval.

Review Mode Detail Key

In the review mode, up and down arrows can be used to view any stored alarm events. As the arrows are pressed the screen shows the peak time slice of the standard main screen display associated with the alarm. By pressing the detail key the current alarm display is replaced by a display of the verification spectrum associated with the event. The spectrum will have the region that generated the alarm highlighted.

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Surveillance Mode

The surveillance mode alarms in the presence of radionuclides, identifies the alarm and categorizes the materials accordingly. (Medical Isotopes, Nuclear Materials or Industrial Isotopes) The surveillance mode also contains a dose rate display that gives the user measured dose rate along with the isotope break down or individual contributions to the total dose rate. For example, the SAM may alarm with the following display - 300 mR/hr field (composite or total) with a Co-57 contribution of 125 mR/hr, Cs-137 117 mR/hr, an unknown peak or radionuclide contributing 58 mR/hr. The total or composite dose rate is the sum of the component parts. Independent dose rate trigger and display thresholds can be set for each isotope in the library.

Password Protected

The SAM systems have a utilities menu that allows for password protection of most features. A non technical inspector may be provided a SAM system for a single purpose, and the manager may choose to password protect modes of operation, modification of isotopes and regions of interest, set alarm thresholds, calibration, clock, calendar, etc. The start-up settings can be configured by the manager, and thereby forcing the users to operate the SAM in a single, uniform way.

Library

All SAM systems contain a 93 nuclide library of isotopes with expansion capability to 128 isotopes. All SAMs include a built in library editor to add/delete/modify isotopes. The Quantum MCA (Windows based) software packages allow you to create/modify libraries on a PC and download them into a SAM.

Nuclear Materials

The SAM spectroscopy system is designed to quickly identify and quantify (in real time) radionuclides as well as detect and quantify neutron activity (counts per minute). Many organizations involved with anti-terrorist activities, international safeguards point-of-entry, border-crossings, and emergency response have found the speed and accuracy of the SAM systems to be qualified for detection and location of sensitive nuclear materials.

The Model 935 with an internal NaI detector and an internal ³He neutron detector lends itself well to law enforcement and emergency response groups. This hand-held system configuration gives the user unmatched capability in a surveillance system. Additionally, it has no external cables and immediately starts collecting and analyzing spectra with application of power.

Sample MCA Reports

Contact the factory for a variety of sample MCA reports which illustrate the SAM performance. SAM MCA reports can be printed directly from your SAM controller to a printer without the need for a computer. This feature is particularly useful for printing reports outside the laboratory, where alarms may have security implications. MCA reports highlight some of our SAM system acquisition characteristics, including the best resolution obtainable with NaI detectors and the tremendous peak to background/signal to noise achievable in count times as short as one second.

Ruggedized Detectors with Handles or Wall Mounts

The tube base is a photomultiplier tube base that provides high voltage for the Sodium Iodide detector and receives the detector signal. It is ruggedized within the detector enclosure and can withstand dropping. Additionally, users are offered a cushioned handle to facilitate positioning, handling or moving the ruggedized system. An alternative for fixed installations is an 'all attitude' mounting bracket for precise positioning of the detector system. This mounting bracket provides users a convenient method of fixing the detector position, location and orientation. BNC's NaI(Tl) detector systems offer resolution equal to or better than 7% on Cs-137. They use right circular cylinder scintillators of 1.5x2.0, 2.0x2.0, or 3.0x3.0 inches.

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Detector Shielding and Temperature Stabilization

BNC offers a shielding option to several detectors. This shielding option consists of 1mm Pb (lead) and 1mm Cd (cadmium). This tubular shield is embedded in the rugged detector enclosure. This shield is particularly well suited for background reduction. Also, BNC offers temperature stabilization, a detector option that thermally stabilizes the NaI detector to maintain calibration during of temperature changes from 0°C-50°C. A circular heating element is embedded in the rugged detector enclosure. All temperature stabilized detectors include shielding. Contact the factory regarding your application.

Neutron Detector

BNC offers a 4 inch, moderated ³He Neutron detector as an internal option to the Model 935 hand-held controller. Neutron presence is indicated with a flashing yellow light and a digital read-out giving neutrons/minute in real time.. The internal neutron detector is a 20 atmosphere tube surrounded with a UHMW polyethylene moderator for optimum efficiency. The neutron detector option offers a thermal neutron sensitivity of 12.7 cps/nv and an effective volume of 10.42 cubic centimeters. He-3 detectors are optimized for the detection of slow neutrons and are very effective in the detection of fission cross sections of sensitive nuclear material U-233, U-235, Pu-239 etc. Contact the factory regarding your application.

Internal NaI Detector

BNC offers an internal NaI gamma detector in the Model 935 controller. This option is particularly useful for one-handed operation and offers users a complete, battery powered system with no visible cables or connectors. This option offers maximum convenience and easy of use in a handheld, portable system.

GAMMA Dose Rate Firmware

BNC offers standard on Model 935 and as an option on Model 905, Gamma Dose Rate Firmware package. This firmware option offers real time dose rate, accumulated dose over a period of time, isotopic breakdown of accumulated dose.

Full Range of Accessories

BNC offers many accessories (printer package, arctic temperature (0°to-50°C) controller, etc.) to accompany your SAM system. Contact the factory for your specific needs.



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