AT6101C

SPECTROMETER

The instrument can be used for spectral gamma and neutron radiation scanning outdoors and indoors with GPS positioning, carried by a person in a backpack or in a case.

Spectral radiation scanner
with GPS positioning

Features

- *Lightweight backpack design with a hip belt and chest belt to evenly distribute the weight and make it easy to carry for long periods*
- *The complete system in its enclosure is rugged, moisture-proof, rain-proof and durable design for use in rough conditions*
- *Backpack detection system can be used turned on behind a windshield in a moving vehicle as a radiation detection system*
- *Easy user interface (automatic/manual reset background, automatic /manual start/stop radionuclides identification)*
- *Gamma-ray detector based on NaI crystal*
- *The Neutrons detector based on two He-3 tubes with polyethylene moderator (BDKN-05)*
- *System is scalable in volume and in number of detectors MCA, voltage divider and LED stabilization system in the tube base*
- *Highly-sensitive detection at a distance of both gamma and neutron sources (1-25) nSv/hr above background gamma and 40 nSv/hr for neutrons of Cf-252 using both gamma and neutron detectors simultaneously*
- *Data collection unit pocket size handheld PC (HPC)*
- *Connection to HPC via Bluetooth interface*
- *Data evaluation software on HPC: Real time spectrum recording, dose rate calculation and isotope identification, audio alarms if elevated radiation, sound pattern depending of the isotope identified*
- *Integrated GPS positioning*
- *Storing spectra and count rates for about 40 hours of scanning*
- *Fast response time (update 300 ms)*
- *Alarm annunciation: Audio signal, voice output on HPC speaker or wireless headset, visual indication on HPC's screen*
- *HPC is used as an external panel that is placed in a bag on a belt without cable's connections*
- *Ability to process scanning data on a desktop computer*
- *Each system accompanied by "ATAS Scanner" software (WindowsXP compatible) for data acquisition and interpretation using spectra waterfall and count rate diagrams*
- *Ability to integrate video data with measurements*
- *Operating time is 15-30 hours (with additional removable battery pack)*
- *Rechargeable batteries may be easily swapped in the field*
- *Operating temperature range is -20 ÷ +50C*
- *Backpack and case complies with IP54*
- *HPC complies with IP67 (-30 ÷ +60C)*

Application

- *Environmental and room monitoring*
- *Monitoring of illicit trafficking of radioactive sources and nuclear materials*
- *Radiation map-making*
- *Geological survey*
- *Scientific research*
- *Emergency*
- *Nuclear Security*
- *Safeguards*

Specification

Detection components

Gamma: BDKG-11 - large volume NaI detector, ∅63×63 mm
Neutron: (two variants of smart probes)
BDKN-01 - He-3 counter in polyethylene moderator
BDKN-05 - two He-3 counter in polyethylene moderator ∅30×360mm
In smart probes built-in 512 channel MCA, LED stabilization, HV supply, voltage divider, amplifier
MCA setup parameters for each smart probe kept in erasable programmable read-only memory (EPROM)

Data processing and display

HPC (model: Recon 400XL) with the following configuration:
Windows Mobile 2005 (English version)
400 MHz processor, 512 MB of non-volatile RAM
Integrated Bluetooth interface
Battery life at least 15 hours
Integrated GPS receiver (SIRF-Start III chipset)

Accessories

Car power adapter
Battery extender pack (10000mAh)
Additional rechargeable battery pack for HPC
Belt Carrier
Optional: Vehicle Cradle for HPC with 12V charger
Wireless Bluetooth headset
Special belt with holder

Detailed technical parameters of gamma spectrometer and neutron detector

Gamma detector requirements
NaI detector, 63 mm diameter, 63 mm thickness
Resolution: < 9% for Cs-137 (661.6 keV)

MCA requirements

512 channels
Two, user selectable energy ranges:
Low energies: 20-1600 keV
High energies: 45 - 3000 keV
Linearization of the energy scale to have maximum deviations of < 1% up to 1 MeV and < 2-3 % up to 3 MeV

Stabilization requirements

Continuously operating stabilization with low frequency LED signal (not visible)
Additional temperature sensor at the crystal

Gamma sensitivity

12700 cps/$\mu Sv \cdot h^{-1}$ for Am-241
1960 cps/$\mu Sv \cdot h^{-1}$ for Cs-137
1030 cps/$\mu Sv \cdot h^{-1}$ for Co-60
270 cps on 0.08 μSv/h background radiation

Neutron sensitivity

BDKN-01 - 8.5 cps/(neutron$\cdot c^{-1} \cdot cm^{-2}$) for Cf-252
BDKN-05 - 32 cps/(neutron$\cdot c^{-1} \cdot cm^{-2}$) for Cf-252

Data collection and processing

Data transmission to data collection computer via Bluetooth interface
MCA software on HPC (GUI: Russian / English)
Real time isotope identification and waterfall radiation scaning data processing
Radiation map-making

Weight and dimensions

The backpack size is 25 liters (45x33x25 cm)
The case size is 32 liters (53x44x18 cm)
The weight is less than 7.5 kg

The instrument is capable of real time identifying radioisotopes listed below:
- Nuclear Materials: U-233, U-235, U-238 (covering HEU, LEU, NU, DU) - all indicated as U-235, Np-237, Pu-239 (Pu-239 weapon graded, Pu-239 reactor graded).
- Medical radioisotopes: Ga-67, Tc-99m, In-111, I-123, Cr-51, I-125, I-131, Xe-133, Tl-201; F-18.
- Industrial radioisotopes: Co-57, Co-60, Ba-133, Cs-137, Ir-192, Eu-152, Am-241, Se-75.
- Naturally occurring radioactive materials (NORM): K-40, Ra-226, Th-232 (e.g. fertilizer, tiles, ceramics).
- Bremsstrahlung (indicated as b-rad).

Results of isotope ID:
- Identified isotopes shown on the screen
- Voice messages naming identified isotopes and its category

Audio signal:
- Audible beep repetition rate, which is proportional to the gamma count rate
- Voice messages about results of isotope ID (isotopes and category) and other important information (e.g. low battery supply, GPS signal)

Documentation (Russian and English)
- User manuals for the instrument and software (in the language specified in the order).
- Technical manual.
- Training materials.
- Short checklist of operations procedure

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