Series G3050

RadSearch: Radioactivity and Decommissioning Monitor

Introduction

RadSearch is a device for measuring and quantifying radiation in the environment. It is particularly applicable to decommissioning and nuclear cleanup activities. *RadSearch* is capable of searching for, locating and quantifying radioactivity distributed on surfaces, within equipment and in pipe work and determining radiation dose in the environment. It consists of a detection head with a combined lanthanum bromide ($LaBr_3$) scintillation detector and photomultiplier, video camera and distance measuring laser range-finder system.

MANUAL MODE

An operator can initiate manual scanning to search a specific surface or piece of equipment. *RadSearch* is very flexible and can be used to quantify a wide range of radionuclides using its medium resolution lanthanum bromide scintillation detector. Specific radionuclides can be preselected and regions of interest established to cover parts of or the entire detection gamma ray spectrum. Spectral data is archived and can be reanalysed at a later time for alternative radionuclides.

SCAN MODES

RadSearch can be set to scan an area automatically and locate radioactivity on surfaces and inside components. The measured distribution and intensity of the radioactive source is overlaid onto a video image. A variety of fields of view (FOV) can be selected and the device can be set up to search an entire room or region over a period of several hours.

RadSearch is readily transportable and is normally operated from a tripod, to which the internal pan and tilt mechanism is mounted. It can be unpacked from the transport case and deployed in less than ten minutes. Alternatively, the detector head may be mounted on other devices, such as mobile carts. This enables the *RadSearch* to be deployed remotely into areas of high radiation background. *RadSearch* can contribute to reducing the exposure of operators to radioactive sources in decommissioning and radioactive cleanup operations.

RadSearch employs an one-inch lanthanum bromide scintillation detector that provides the advantages of medium range resolution, high sensitivity and wide dose rate range. The lanthanum bromide detector is mounted in a tungsten shield with a small aperture tungsten collimator.

The detection, motion control and analysis electronics are located in the detector head. The external components consist only of a power supply unit, which provides low voltage DC to the detector head, and a ruggedized notebook computer on which the control and data analysis software is located. A single combined power and Ethernet cable links the detector head to the external electronics.

For autonomous operation, *RadSearch Remote* offers the addition of a 2.4/ 5 GHz wireless Ethernet link with an on-board PICO ITX processor offering remote functionality and data storage. *RadSearch Remote* is powered via an intelligent “hot-swap” battery pack with integral back-up supply for un-interrupted operation.

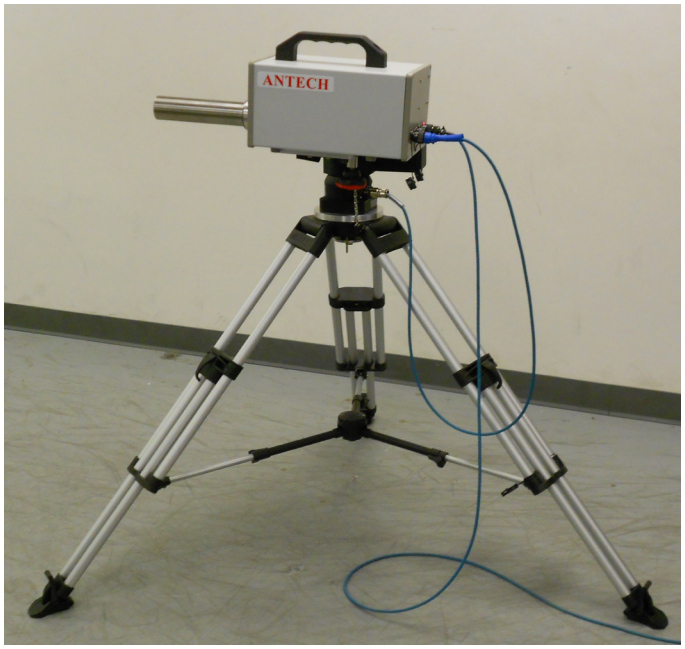

Fig 1. The ANTECH G3050 RadSearch

Fig 2. The ANTECH G3050 RadSearch Remote showing the antenna for wireless communication and the “hot-swap” battery pack

Features

- Lanthanum bromide scintillation detector with medium resolution, high detection sensitivity and wide dose rate range
- Tungsten shielded and collimated detector aligned with CMOS video camera
- Energy range 30 keV to 2000 keV
- High resolution CMOS camera with auto-focus
- Laser range-finder (0.05 m - 65 m natural surfaces)
- Detector and anciliaries environmental rating to IP65
- Ethernet communication to external laptop computer
- A single cable of up to 80 metres connects the detector with the remote rugged laptop computer (workstation) - 40 m cable as standard
- Detector head can operate via mains power supply (PSU) or using an optional 24V battery, a 2.4/ 5GHz wireless Ethernet link and an on-board PICO ITX processor
- Optional intelligent “hot-swap” battery pack (supplied with additional battery and charging unit)

Benefits

- Lightweight, flexible, medium resolution system that can be readily deployed in the field and in contaminated buildings (deployment time < 10 minutes, one person)
- Identifies a wide range of radionuclides and records gamma-ray spectra for archive purposes and potential future analysis
- Directly measures gamma-ray dose rate and activity
- Reduces operator exposure to radioactivity
- Software operates on any standard PC employing Windows XP, Vista and Windows 7 with Ethernet connectivity
- Performs far field assay of objects and surfaces with 18° detector FOV with collimator barrel removed or 4° detector FOV with barrel fitted
- Rugged PC with solid state drive and long battery life supplied as standard
- Optional autonomous wireless operation enables measurements to be conveniently performed in locations where mains power is not readily available
- Built-in back-up alows continuous, uninterrupted measurement, even during battery “hot-swap”

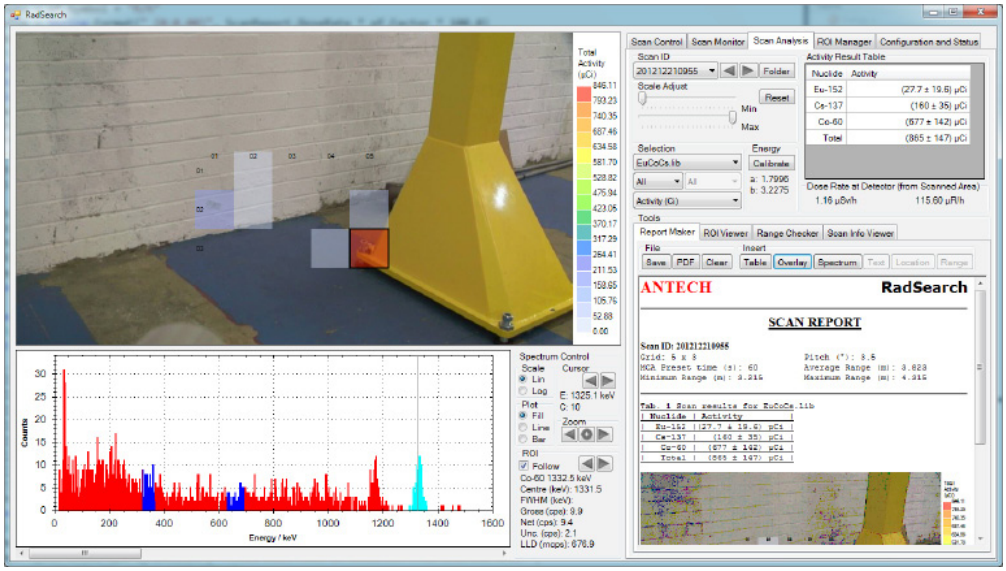

Fig 4. Scan Analysis screen showing overlay display and results tables

Fig 3. RadSearch deployed showing PSU and ruggedized notebook computer

Specification

Scanning angle	± 180° degrees pan, ± 90° tilt
Spectral range / Collimator viewing angle	18° full sensitivity (collimator barrel removed); 4° (collimator barrel installed)
Dose Rate range	0-500 mGy/hr for ^{137}Cs (At higher dose-rate with barrel plug)
Operating range	<1 µCi to 0.5 Ci for ^{137}Cs in detectorfield of view at 1 metre
Energy range	~30 keV to 2000 keV
Operating voltage	110 - 230 VAC, 50 - 60 Hz (wide ranging) or 24 VDC
Detector	$LaBr_3$ (1 inch x 1 inch)
Component weight	20 kg Detector head (without collimator barrel); 4.1 kg Collimator barrel; 13 kg Pan-tilt unit; 7 kg Collapsible tripod; 2.7 kg Ruggedized notebook computer
Options	24V battery; 2.4/ 5GHz wireless Ethernet link and on-board PICO ITX processor; 45 kg Portable battery unit with in-built back-up (in wheeled case); 45 kg Spare battery with charging unit (in wheeled case)