ORTEC® News

Spring/Summer 2008

Welcome to the *ORTEC* Newsletter

In this issue we cover a diverse range of topics from Low Background Gamma Spectroscopy through to Fluorescence Lifetime Spectroscopy. Also included are features on a variety of our products and systems as well as information on forthcoming conferences and events we will be attending.

As always, we hope you find this newsletter useful and appreciate any feedback on how we could make improvements, or if you have any specific topics you would like us to cover in subsequent issues.

Inside this issue:

Low Background Gamma Spectroscopy

HPGe gamma spectrometry is a powerful technique both for the measurement of low environmental levels of radioactivity and sample dating through the quantification of naturally occurring radionuclides. However, an important consideration in making such measurements is the level of background radiation and the steps which can be taken to reduce it to as low a level as possible; with background usually defined as the spectrum in the detector with no source or sample present. The radiation causing this background comes not only from the detector and shield materials, but also from cosmic ray interactions with them.

Why is background important? First of all, full energy peaks of nuclide specific gamma rays in the background spectrum can mask the presence of these peaks in the sample. The presence of non peak background increases Minimum Detectable Activity (MDA), a measure of the quality of spectra which can be obtained from any detector. The resolution (R), background (B) and efficiency of the detector (ε) are all related to MDA at any given energy ($_E$) as follows:

$$MDA_E \sim \sqrt{(R_E B_E)} / \varepsilon_E$$

It is important to note that the MDA is also proportional to the detector resolution and inversely proportional to efficiency, so it's worth choosing as large a detector as possible, with good resolution and efficiency specifications over the energy range of interest. Equally vital is choosing a detector with geometric efficiency to match the sample. For example a flat ORTEC GEM-FX detector for thinly sliced core samples or a well detector to maximise efficiency on small sized samples.

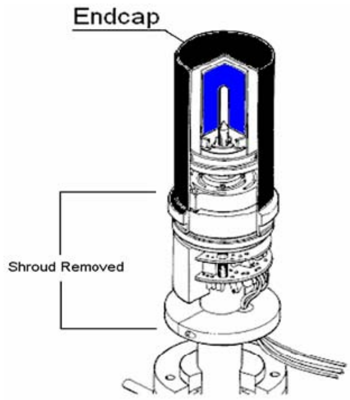


Figure 1 - Carbon Fibre Endcap

Let's talk now about the background itself, starting with that emanating from the shield and cosmic rays. Contributions from these sources can be minimised by choosing a suitable lead shield with walls and lid made from 100mm low background lead, 50mm sliding lead undershield, and a graded z liner of tin and copper to reduce lead x rays.

What steps can be taken to reduce background in the detector? At the heart of the detector/cryostat assembly is an HPGe crystal, mounted inside a copper cup, and connected to a cooling rod. The rod protrudes down through a preamplifier assembly into the liquid nitrogen dewar. The crystal and cooling rod are maintained at cryogenic temperatures and insulated from the outside world by a vacuum containing sieve material. There is also a detector endcap surrounding the crystal and maintaining the vacuum (Figure 1). ...cont

Low Background Gamma Spectroscopy...continued

In an ORTEC low background (LB) detector, the detector cup, pedestal and cooling rod are all manufactured from low background Oxygen Free High Conductivity (OFHC) copper, the flange from low cobalt steel, and the sieve material is replaced by activated charcoal. In an important new development, detector endcaps are now manufactured from carbon fibre, having previously been made from either low background aluminium or magnesium. Carbon fibre is intrinsically very low background and since the endcap is a large body of material close to the crystal the use of carbon fibre has significantly improved the performance of ORTEC LB detectors. The improvement in performance is shown in figure 2, which compares carbon fibre and low background aluminium endcaps.

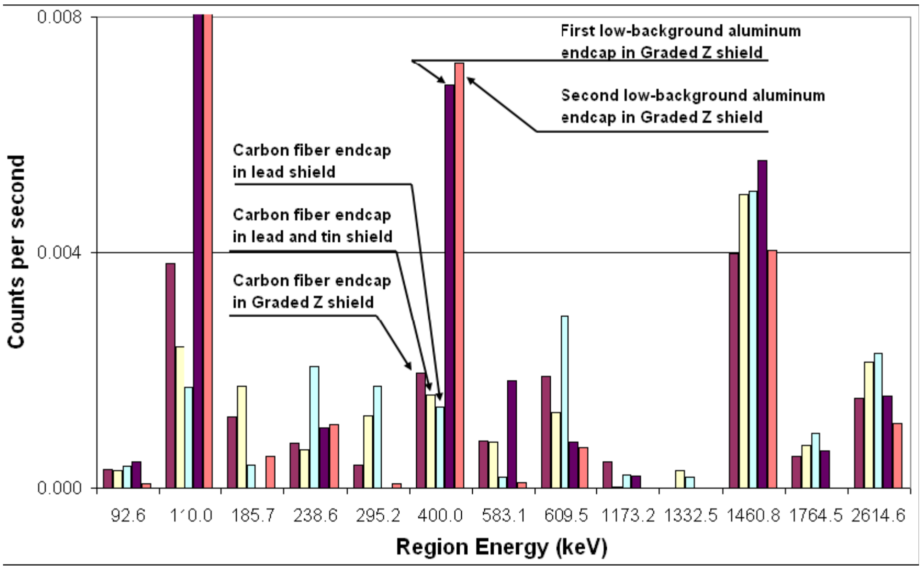


Figure 2 - Comparison between Aluminium & Carbon Fibre

ORTEC XLB (extra low background) detectors incorporate all these refinements, but also have a 2cm thick aged lead shield behind the detector cup. This shields the crystal from any background originating from preamplifier components.

The ultimate in low background is called the 'Low low background' or LLB. In this design a different approach is used to eliminate any background from preamplifier components, with the preamplifier assembly positioned remotely away from the detector, and outside the lead shield altogether. The dewar and cooling rod are connected to the detector in a J shape arrangement as shown in figure 3.

ORTEC can also manufacture custom designs to suit particular low background requirements, usually based around the standard options described above. An example is a variation of the LLB, in which the detector, cooling rod and dewar are in the more typical vertical arrangement. In this case the remote preamplifier is positioned outside the lead shield, directly below the sliding undershield of the lead shield, saving floor space in the lab.

In terms of cooling, liquid nitrogen and a traditional 'streamline' cryostat is usually the best way to achieve the lowest background possible, although, there is a compromise choice for users who want the convenience of electrical cooling, plus reduced background, but don't necessarily need the lowest background possible. They may find the reduced background pop top capsule suitable, also known as 'RB'.

ORTEC RB detectors are constructed from the low background materials described above including the new carbon fibre endcap. Sieve material is used in the capsule to maintain adequate pumping of the vacuum, but the crystal is partially shielded from it by the OFHC copper cup.

Further information can be found in the following technical papers:
http://www.ortec-online.com/papers/inmm2006-118.pdf
http://www.ortec-online.com/pdf/iec.pdf
http://www.ortec-online.com/papers/char_and_app.pdf

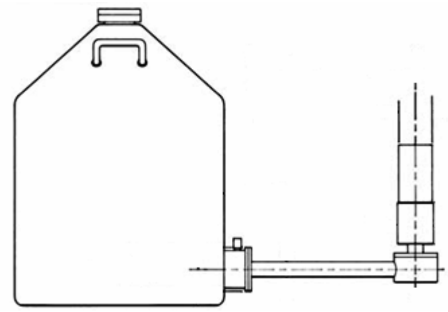


Figure 3 - J-shaped Cryostat

Positron Lifetime Spectroscopy for Materials Analysis

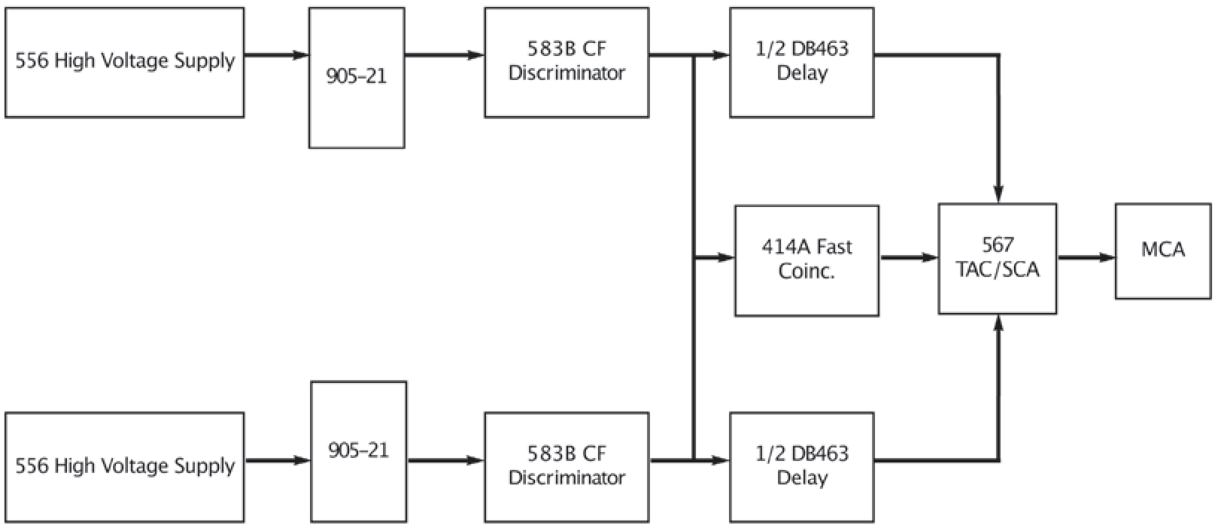
The existence of the positron, first predicted by Dirac, was experimentally identified in the 1930s. The positron is the antiparticle of the electron. A positron collision with an electron results in the annihilation of both particles and the emission of two characteristic 511-keV gamma rays.

This phenomenon is useful to test predictions of quantum theory with regard to the differences between electron and positron interactions with matter. In addition, the positron has proven to be a useful tool in the study of various structures and processes. The lifetime of the positron is a measure of the local electron density at the point of annihilation. The annihilation can be easily detected by virtue of the gamma rays emitted.

Positron lifetime techniques are among the few methods sensitive to voids on the mono-atomic scale. Historically, defect studies in metals have been a major application area for positron lifetime techniques. In more recent years, this work has extended to defect studies in alloys and non-metals. In addition, some biological systems can now be studied with the aid of positrons.

Chemical properties of certain polymers and the specific surface areas of finely divided powders are being determined by the variation and range of positron lifetimes. An application note "Characterisation of Polymers: Free Volume Effects" is included on our web-site which discusses Free Volume measurements in polymers using Positron Annihilation Lifetime Spectroscopy, see http://www.ortec-online.com/pdf/palsan70.pdf

The illustration below shows the configuration of a complete Positron Annihilation Lifetime Spectroscopy (PALS) system using standard ORTEC Nuclear Instrumentation Modules (NIM) plus two ORTEC 905-21 Fast Plastic Scintillation Detectors.



In the PALS system illustrated above the model 583B Constant-Fraction Differential Discriminator provides both energy selection plus generates the timing pick-off signals for the 511keV annihilation photons detected by the Plastic Scintillation detectors.

The model 414A Fast Coincidence unit is used to generate a gating signal for the model 567 Time to Amplitude Convertor (TAC) so that only valid annihilation events are processed by the TAC. The TAC produces an analogue output pulse whose amplitude is proportional to the time difference between the two timing pick-off signals.

Finally the analogue output signal from the TAC is passed to a Multi-Channel Analyser (MCA) where it is digitised to produce the histogram display of the lifetimes of the annihilation events. Timing resolution of the order of a few hundred picoseconds is achievable with the PALS system.

The availability of positron sources plus the widespread use of NIM electronics in many facilities makes the set-up of a positron lifetime system an attractive proposition for a teaching or research laboratory.

Waste Assay Systems for Magnox South, Sizewell A Site

In February this year ORTEC successfully won a contract to supply a state-of-the-art Low Level Waste Assay system to Magnox South at the Sizewell A site in Suffolk. The contract from Magnox was for the supply of an ORTEC QED System to be used for the assay of waste drums and other items as part of the decommissioning program at Sizewell.

QED System

A QED system essentially incorporates three, mechanically cooled (LN_2 free) HPGe detectors within a low background shielded chamber. Simultaneous data acquisition is commenced using all three detectors positioned in close proximity to the container/drum being assayed. The container/drum is continuously rotated throughout the measurement to reduce the impact where the waste matrix is not homogenous. Input of data and control of the measurement is via the ORTEC Isotopic-32 Waste Characterisation software. Isotopic-32 also performs the data analysis of the spectra generated to produce a single analysis report for each assayed container.

The combination of the excellent efficiency obtained by data collection using three HPGe detectors simultaneously, plus the low background achieved by mounting both the detectors plus the waste container within the shielded chamber, enable the system to achieve extremely low limits of detection.

QED is specifically designed for the assay of Low Level waste to free-release levels and Magnox were particularly interested in the systems capability to perform nuclide specific assays to both Low-Level Waste (LLW) and "Free-Release" levels. A key benefit was that the system can be used to assay waste in situations where there is no "fingerprint" information of the waste stream available.

Another contributing factor in Magnox's decision to purchase the QED system was the site's widespread use of ORTEC's GammaVision software in their District Survey Laboratory (DSL) and site laboratory Gamma Spectroscopy systems. Experience with GammaVision, which has a very similar Graphical User Interface (GUI) to the Isotopic-32 software, was seen to offer a significant benefit in terms of operator take-up of the system, training and ongoing support.

trans-SPEC and ISO-CART Waste Assay System

In addition to the QED system Magnox also purchased an ISO-CART Waste Characterisation system incorporating the Trans-SPEC-100 LN_2 free, battery powered HPGe detector system.

The ISO-CART was selected for de-commissioning applications where assay of materials was required but where it would be most practical and cost effective to perform the measurement in-situ.

As the ISO-CART system also utilises the Isoptopic-32 software, this also will allow for operators to be easily cross-trained on both the QED and ISO-CART systems at minimal cost.

Configured with the hand portable Trans-SPEC-100 system the ISO-CART essentially offers a Waste Assay/ Characterisation system that can be deployed virtually anywhere on site and can even be configured to operate remotely if required.

Desktop NaI Well Detector - Poole Hospital

The Nuclear Medicine Department of Poole Hospital provides both therapeutic and diagnostic services to patients. Sodium Iodide (NaI) spectroscopy is employed in a number of non-imaging diagnostic procedures carried out by the in-vitro laboratory of the department. In each of the methods a specific radioisotope or mix of radioisotopes needs to be accurately counted, for example:

- Glomerular Filtration Rate (GFR) kidney analysis - Chromium 51
- Schilling test for Vitamin B12 absorption - Cobalt 57
- Red cell mass and blood plasma volume measurement – Chromium 51 + Iodine 125
- Where necessary NaI spectroscopy can be used for wipe testing in the control of any suspected contamination in the labs.

Figure 1 - digiBASE & NaI detector

In 2007, ORTEC were contacted by Dr Kat Dixon, Clinical Scientist at the Hospital to supply a gamma counter with MCA to replace their original, aged system. Subsequent discussions between Dr Dixon and her colleagues resulted in the proposal of a new system comprising of a NaI 'Well' detector mounted in a desktop lead shield, connected to the digiBASE MCA unit. Ordinarily, we would recommend that ORTEC's Maestro-32 emulation software would easily meet requirements but in this instance Dr Steve Perring and Dr. Dixon had developed their own Visual Basic software to manage the data provided by the ORTEC system. The Visual Basic programs call different JOB files to be run from the ORTEC Maestro-32 software. They then read the resultant ORTEC Spectrum files to determine the number of counts within a specified region of interest and perform calculations with this data.

Figure 2 - Lead Shield

A standard BP51/2 detector and photomultiplier tube (PMT) were selected as the most appropriate for the 4ml sample containers in standard use in the lab. This provided a good fit to the well dimensions and sufficient active crystal dimensions to ensure the energy resolution and sensitivity was appropriate for the intended applications.

The ORTEC digiBASE is a 14-pin PMT tube base which combines a miniaturised preamplifier and internally generated detector high voltage with powerful digital signal processing, multichannel analyser, and other special features — all contained in a low-power (<500 mA), lightweight (280g), compact-sized (63mm diameter x 80mm length) tube base with a USB connection (see figure 1). Everything needed to connect to the detector is included in the tube base. The self-contained compact features of the unit proved ideal for this application.

We used the model G5 lead shield (see figure 2) that has proven generally popular for this type of environment. At approximately 98Kg it is feasible to mount the shield on a medium-heavy duty lab bench. The shield features two main sections:

- The detector crystal protrudes into the upper main shielded cavity space.
- The detector is clamped in a nylon ring allowing the photomultiplier tube section and digiBASE to reach into the non-shielded lower section (see figure 3). The USB cable feeds through an opening in this lower section to the PC.

Dr. Dixon commented that in addition to the improvements in energy resolution and sensitivity from their previous system, the swing lid on the shield is an added benefit. This lid is securely mounted to the steel casing ensuring minimal effort to users and the elimination of the health and safety risks of free mounted lids.

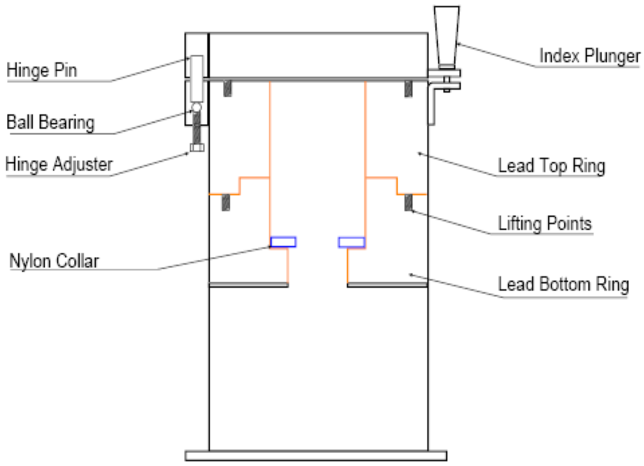


Figure 3 - Lead Shield drawing

The Worlds Best Radiation Identifier Shrinks !!!

Back in 2004 we released a unique product, the Detective High Resolution Radiation Identifier.

The Detective was like no other radiation identifier available in that it incorporated a High Purity Germanium (HPGe) detector coupled to a miniature, high reliability battery powered cryogenic cooler.

This combination provided a system with the performance of a laboratory grade HPGe detector system but in a portable, rugged package. In addition, the Detective incorporated all the signal processing electronics and an extremely powerful isotope identification software package originally developed by Lawrence Livermore National Laboratory (LLNL).

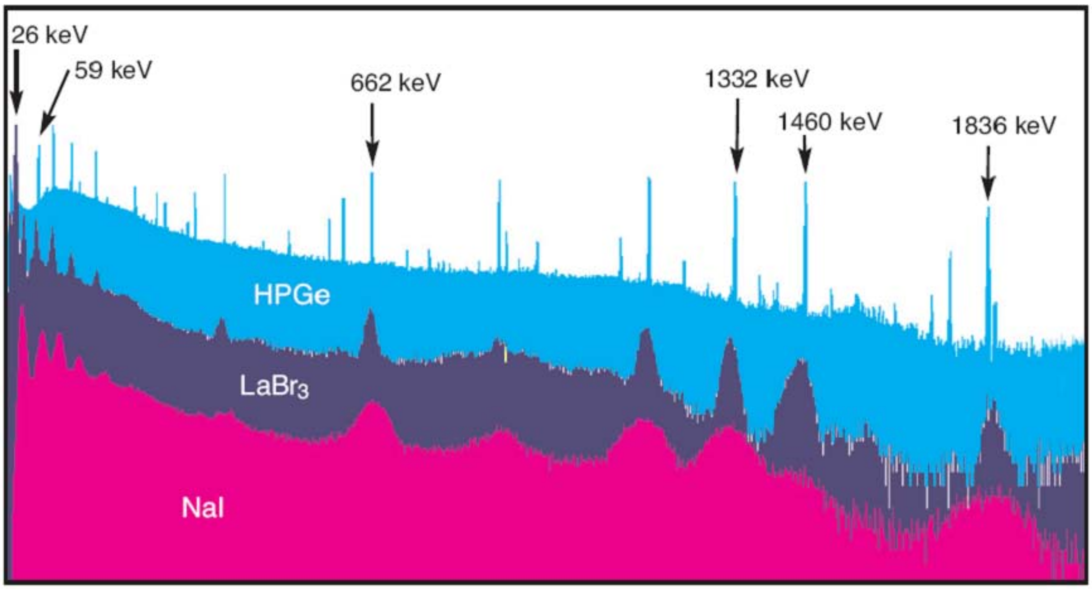
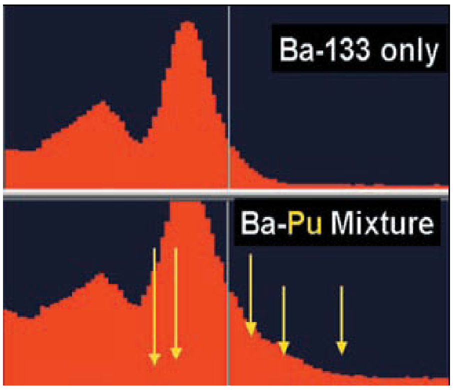


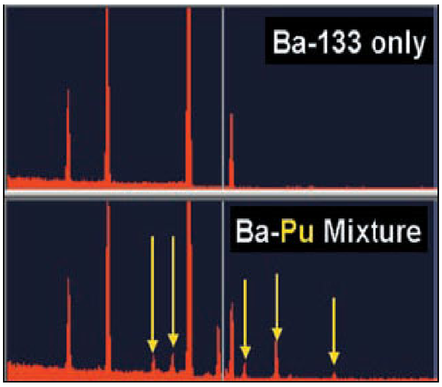
Figure 1 - Comparison for LaBR3(Ce), NaI(TI) & HPGe spectra

Even compared to the very latest scintillation detector technologies such as Lanthanum Bromide ($LaBr_3$), HPGe offers far better energy resolution (selectivity) as illustrated in Figure 1, where the gamma spectrum from the same source has been collected using Sodium Iodide (NaI), $LaBr_3$ and HPGe detector systems.

The illustrations below show an even more compelling example of why HPGe detector technology is currently the only solution when you need unequivocal identification of radioactive material. The illustrations show an expanded region of gamma energy spectra taken first of a ^{133}Ba source alone and then, in a representation of a potential "masking" scenario, with Pu added.



NaI Identifier Spectrum



HPGe Detective Spectrum

On the left is the spectra taken using the NaI radiation identifier and on the right is spectra taken from the same sources but using the Detective. As you can see in the "masking" situation the NaI system simply cannot separate the Ba from the Pu whereas with the Detective system we can clearly see five of the Pu peaks allowing for identification of the material.

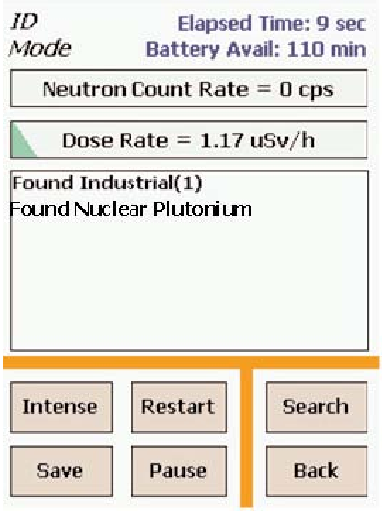
The performance of the Detective system is now well proven with hundreds of units deployed world-wide. However, for certain applications the size and weight of the Detective can make it impractical to use. Now we have a solution to this problem, enter the Micro-Detective!

Micro-Detective has all the performance of the Detective-EX using the same HPGe detector crystal and incorporating an internally mounted neutron detector but with a 50% reduction in size and 40% reduction in weight.

MicroDetective

While the key objective with the Micro-Detective development was to reduce the size and weight of the system we have also added additional features. The Micro-Detective is even more rugged than the Detective-EX, is water-spray resistant and has an improved sunlight readable TFT display.

Also the Micro-detective now includes all the battery charging circuitry internally so all that is required to charge its internal Lithium Ion battery is a 12 volt DC supply. USB and Wi-Fi communication (Wi-Fi can be disabled) and GPS are included as standard plus the system includes both Secure Digital (SD) and Compact Flash (CF) slots for further expansion.



All the existing Detective and Detective-EX models will continue to be available but for those applications where minimum weight and size and maximum usability is essential the Micro-Detective is the solution.

Weatherproof Housing for NaI Measurements

ORTEC was recently asked to put together special housing for a Sodium Iodide (NaI) detector which could be easily lowered down a borehole, used in the field for extended periods of time, help reduce background count time and allow for the detector cable to be disconnected from the housing.

The resulting product (Figure 1) is a rugged, weatherproof and corrosion resistant detector housing for ORTEC 905 series NaI detector. It includes a lifting "ring" for use in bore-hole measurements and is fitted with a bulkhead mounted connector to allow the MCA/PMT Base cable assembly to be disconnected at both ends. The housing can be supplied for use with any ORTEC model 905 Series NaI detector and either a digiBASE, digiDART/DIM-296 combination, or MicroNomad/296 combination (Figure 2).

Figure 1 - Plastic Detector Housing

Historically customers have commented that the digiBASE plus NaI detector combination is not always suitable for extended field use as the digiBASE is powered via a USB connection from a PC and thus counting time is limited to the battery time of that PC. ORTEC are now able to offer a stand-alone, external battery pack which provides power for the digiBASE, thus negating the need for a PC, other than to set the count running. The battery pack includes a 3-way Off/On/Charge switch to control the power supply to the digi-BASE and charging of internal battery. Contained within the pack is an internal USB hub powered directly from the re-chargeable battery.

Figure 2 - Housing with MicroNomad & external battery pack

A front panel mounted USB Output connector on the battery pack allows connection to digiBASE USB port via standard USB cable whilst a similarly mounted Input connector allows connection to a PC for computer control of the digiBASE and viewing of data.

The PC can be disconnected from the battery pack USB Input connector at any time and any data acquisition in progress will continue. The PC can be reconnected simply by reconnecting USB Input cable.

Application Spotlight: Fluorescence Lifetime Spectrometry

Fluorescence Lifetime Spectrometry (FLS) is a popular technique used by biologists, chemists, biochemists, and biophysicists to study molecular structure and molecular interactions. It can also be used to identify the presence of specific molecular species.

In the simplest spectrometers, a pulse of light is directed at the sample to excite the molecules into a higher energy state. The excited molecules typically decay back to their lower energy state by emitting a photon. Since the probability of decay is an exponential function of time, the observed rate of fluoresced photon emission from the sample is given by:

$$R = (N_0/\tau)\, e^{-t/\tau}$$

Where:
R = rate in photons/s
N_0 = number of molecules excited by the light pulse
t = observed time of photon emission
τ = characteristic decay time constant of the excited molecule.

The logarithm of the observed emission rate can be plotted versus time to obtain a straight line, whose slope is $-1/\tau$. This defines the lifetime, τ, of the excited state.

For molecules of interest, τ typically falls in the range from 10 ps to 10 ns. The value of τ is primarily determined by the structure of the molecule, but it is also affected by the environment surrounding the molecule.

Thus, the measurement of the fluorescence lifetime can be used to study molecular structure and interactions. It can also be used to identify the presence of specific molecular species, or measure concentrations of ions which quench the fluorescence decay.

The functional diagram for a typical fluorescence lifetime spectrometer is illustrated in Fig. 2. This system is able to measure lifetimes from nanoseconds to microseconds.

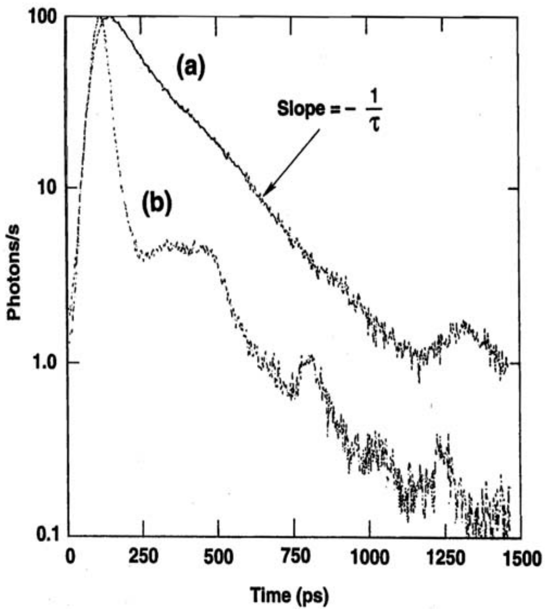


Fig. 1. (a) The Fluorescence Decay Diphenylbutadiene in Butanol (τ = 128 ps) (b) The Instrument Response Function (τ = 0) (Courtesy of Dr. John Kauffman, University of Missouri-Columbia)

A pulsed laser excites fluorescence in the sample, and individual fluoresced photons are detected by the microchannel plate photomultiplier tube. The time spectrometer records the profile of fluorescence decay by measuring the time interval between the laser pulse (sensed by the photodiode) and the fluoresced photon detected in the microchannel plate PMT.

The beam splitter delivers a portion of the laser pulse to the sample while simultaneously feeding a large fraction of the light pulse to a fast photodiode. The function of the photodiode is to sense "time zero", the time at which the excitation pulse hits the sample. A monochromator is usually inserted between the sample and the microchannel plate detector to select the desired wavelength of fluoresced photons from the sample.

In the microchannel plate PMT, the fluoresced photon causes ejection of a single electron from the photocathode, and this photoelectron is accelerated by the voltage applied to the microchannel plate structure. As the electron hits the walls of the microchannel tube, it knocks out more electrons.

This electron multiplication process is repeated numerous times as the group of electrons cascades along the tube towards the positive anode. When the group of electrons arrives at the anode, it generates a negative polarity pulse with amplitude on the order of 20 mV and a width of approximately 400 ps FWHM (Full Width at Half Maximum). Further amplification of the microchannel plate PMT output is necessary before the pulse can be used to generate a precise timing signal.

The amplifier section of the Model 9327 Amplifier and Timing Discriminator provides that function, with a gain and rise time that are matched to the microchannel plate signal. At the output of the amplifier section the pulse is still extremely narrow (~600 ps FWHM). The amplitude also varies over a wide range, because of fluctuations in the electron multiplication yields in the microchannel plate PMT. The difficult task of deriving the timing information

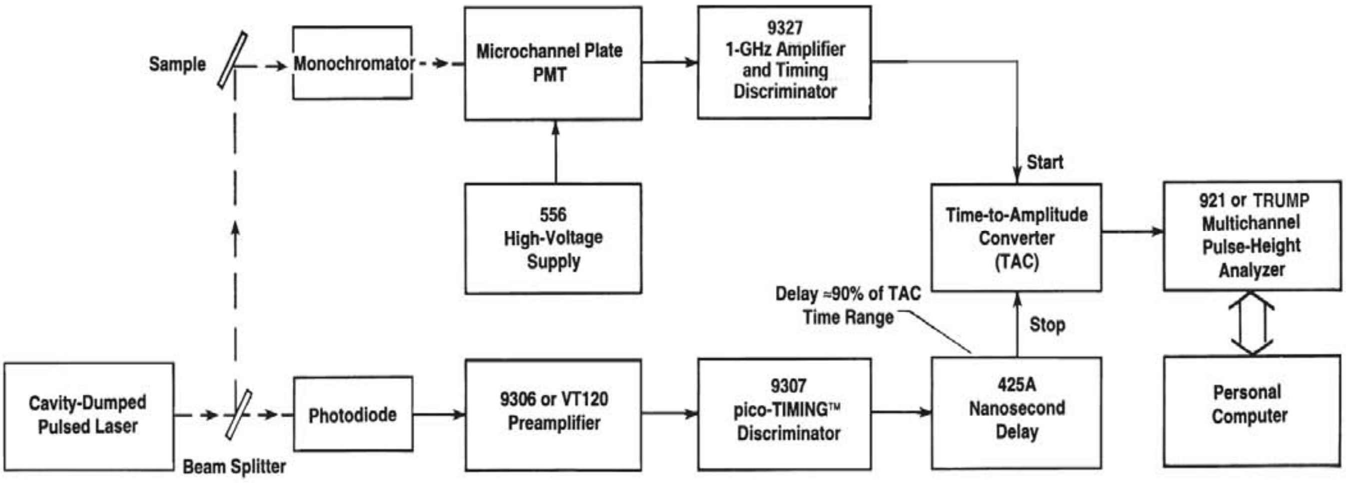


Figure 2 - Functional block diagram of typical Fluorescence Lifetime Spectrometer

from these narrow pulses, in spite of their varying amplitudes, is handled by the timing discriminator. A special technology employing ultra-fast circuits enables the timing discriminator to define the arrival time of these narrow pulses with picosecond precision, while exhibiting negligible sensitivity to the amplitude variations.

Detecting the arrival of the laser pulse is somewhat easier, because the pulse consists of a large number of photons. Usually a fast photodiode provides adequate sensitivity to convert the detected laser pulse into a fast electronic pulse. The timing discriminator accurately defines the arrival time of these pulses with negligible sensitivity to the amplitude fluctuations.

These “Start/Stop” logic pulses from the timing discriminators are passed to a Time-to-Amplitude Converter (TAC). The TAC converts the time difference between the Start and Stop pulses to produce a linear output pulse whose amplitude is proportional to the time difference. This TAC output pulse is then subsequently passed to a Multi-Channel Analyser (MCA) which histograms each input pulse into its internal memory according to its amplitude.

As an alternative to the conventional TAC-MCA approach described above, this function can be duplicated by substituting with a Time Digitiser (TD) or Multi-Channel Scaler (MCS). These units offer much higher data rates compared to the TAC-MCA approach but with reduced time resolution.

For further information please see Application Note AN50 - http://www.ortec-online.com/application-notes/an50.pdf

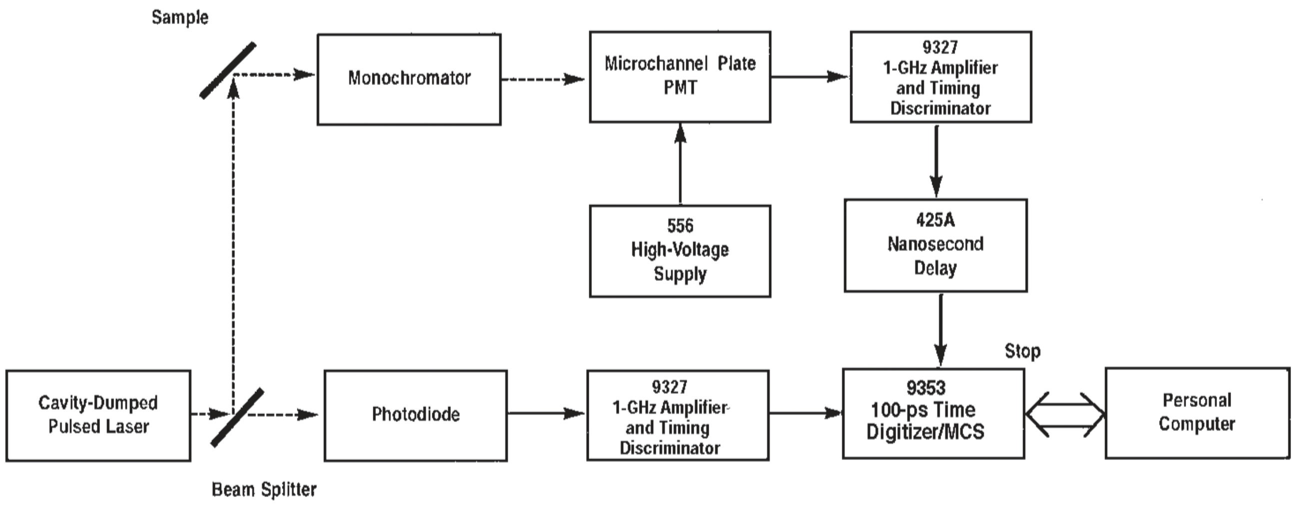


Figure 3 - Functional block diagram of Fluorescence Lifetime Spectrometer using a Time Digitiser/MCS

Airborne and Vehicular Surveys using Ge & NaI Detectors

High purity germanium (HPGe) and sodium iodide (NaI) detectors have both been used for many years in airborne and vehicle based surveys. Such surveys have been used mainly to measure man made and naturally occurring isotopes in the environment; however homeland security applications have also become important in recent years.

The main advantages of NaI detectors are that they are fairly sensitive and available in large volumes. The resulting number of counts means they can be interrogated at high frequency with relatively good counting statistics, so that sufficiently accurate data can be collected on the move. NaI also has good resolution compared to many other techniques with an added bonus that detectors can be operated at ambient temperature.

A practical example of using sodium iodide in surveying is the ORTEC NaI-SS system. It uses one or more NaI detectors in a mobile radiation search setup, primarily to uncover illicit transportation of radioactive material or locate lost sources. Also included are He3 detectors, to identify neutron flux from special nuclear material, GPS, laptop computer and data analysis software. The system is housed in two Pelican cases, which can be placed into a car boot or roof carrier. Alternatively, it can be carried in an aircraft for aerial surveys.

The main advantage of using germanium or HPGe detectors is increased resolution. At 662 keV, which is the principal gamma ray energy line for ^{137}Cs, the resolution or Full Width Half Maximum (FWHM) for HPGe is typically less than 1 keV. By contrast, the FWHM for NaI detectors at the same energy is typically 50-60 keV. This superior resolution translates through to well resolved peaks in the energy spectrum with easier identification and quantification of the nuclides in the area being surveyed.

An organisation with a great deal of experience in airborne and vehicular surveys is the Scottish Universities Environmental Research Centre (SUERC) based in East Kilbride. They have undertaken surveys using both sodium iodide and germanium detectors and used combinations of the two detector types where appropriate.

Figure 1 shows data obtained by the SUERC during an airborne survey of Wigtown Bay in South West Scotland. The survey used an 8 litre NaI detector and a single 50% relative efficiency ORTEC GMX detector. The spectra shown were collected approximately 60m above a salt marsh containing a ^{137}Cs inventory of 150-200 kBq/m^2 in the top 30cm of material.

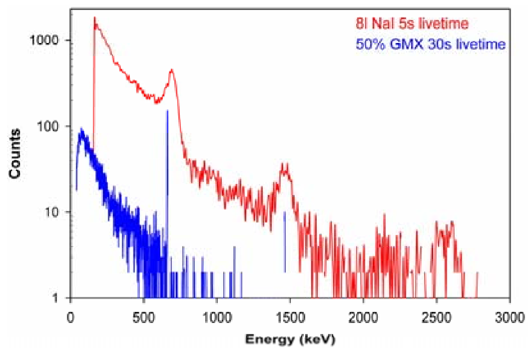


Figure 1 - Airborne survey of Wigtown Bay

The spectra illustrates the different detector properties. The NaI spectrum clearly shows the ^{137}Cs peak at 662 KeV, but the peak itself is quite broad and sits on a large continuum of counts, which even at these relatively high environmental levels is a significant proportion of the total counts within the peak. By contrast, the ^{137}Cs peak in the HPGe spectrum is extremely well resolved, and it is also possible to resolve peaks from some of the other nuclides in the salt marsh.

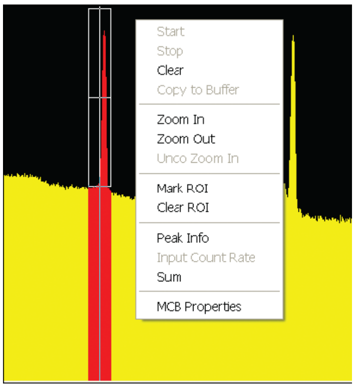
When in operation, germanium detectors need to be cryogenically cooled and the most common way of achieving this is through a liquid nitrogen cryostat and dewar. Liquid nitrogen is difficult to transport and the dewars can be heavy and bulky, obvious disadvantages in airborne surveys.

In the last few years miniaturised Stirling cylce coolers have been developed and used with ORTEC HPGe detectors. These coolers use less power than conventional mechanical cryogenic coolers, they can also be moved and rotated to any aspect during use. A recent development has combined a Stirling cycle cooler, large area HPGe detector, and Multi Channel Analyser into a compact and rugged device called the Interchangeable Detector Module or IDM. The IDM has been designed for long reliable service, interchange ability, and incorporates a low frequency rejecter to improve spectrum resolution in noisy environments. It shows great promise for future airborne and vehicular surveys.

Thanks to SUERC for allowing the inclusion of their data in this article. Further information from www.gla.ac.uk/suerc.

Improved Gamma-ray Measurements, Analysis & Reporting

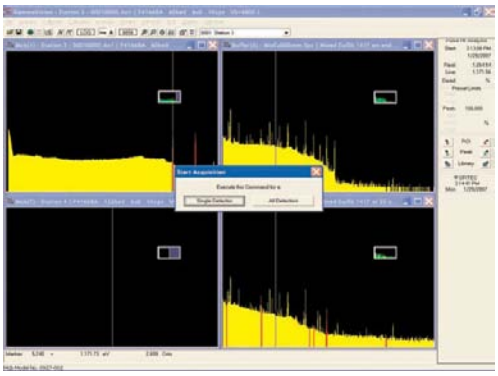
GammaVision is ORTEC's fully featured software package for the measurement, analysis and reporting of gamma spectroscopy samples and is used in applications from ^{210}Pb dating to monitoring nuclear power stations. It is aimed at those users looking to run analysis and calibration operations more advanced than those offered by our standard software – Maestro-32.



Version 6.07 was released earlier this year bringing with it some new functions which will hopefully help to enhance the software and make it yet more user-friendly. Some of these functions include:

- **ROI Analysis Engine** operates across the entire spectrum, performing an ROI analysis on user marked ROIs and a modified WAN32 analysis (no peak stripping or directed fit) on the unmarked regions. The engine will work for both live and archived spectra.

- **Total Uncertainty Algorithm** – previously limited to the type of distribution users could apply to specific uncertainty terms, with GammaVision V6.07, the user can now define their uncertainty terms and decide how to propagate them. Furthermore, there is the option of treating the additional uncertainty as a uniform or normal distribution and the software will apply the correct mathematical propagation of the Total Uncertainty.



- The **Multiple Detector Interface** allows for your entire gamma spectroscopy laboratory to be visible within the GammaVision-32 program interface, viewing up to 8 Detector and 8 Buffer windows simultaneously for a total of 16 interactive windows. Controlling multiple detectors, visually comparing spectra, and viewing multiple MCB properties is now easier than ever, with up to 250 detectors being connected to GammaVision.

Further additions to the menu functions with new **'Hot' Buttons** and a **Create PBC function** added to the menus all work together to enhance user-interaction. Significantly, this version of GammaVision has been through an exhaustive Validation and Verification process to ensure compliance with all necessary quality assurance standards. The new features are sure to improve the performance of your lab.

GammaVision is unique in the industry. It is the only program allowing the user to complete data acquisition, analysis, reporting, archive and quality assurance, all within a single package.

UK Sales Team

Trevor Hatt, UK Sales Manager

Tel: 0118 936 1224
Email: trevor.hatt@ametek.co.uk

Nigel Rimmer, Sales Engineer, North

Tel: 01244 677746
Mobile: 07971 063709
Email: nigel.rimmer@ametek.co.uk

Shane Toal, Sales Engineer, South & Ireland

Tel: 0118 936 1239
Mobile: 07818 097235
Email: shane.toal@ametek.co.uk

Clare Payne, Sales & Marketing Co-ordinator

Tel: 0118 936 1223
Email: clare.payne@ametek.co.uk

AMETEK®
ADVANCED MEASUREMENT TECHNOLOGY
Spectrum House
1 Millars Business Centre
Fishponds Close
Wokingham
RG41 2TZ

Shane Toal - Sales Engineer

We are pleased to announce the appointment of Shane Toal to the ORTEC sales team. Shane will be working as our Field Sales Engineer in the South UK and Ireland regions.

Shane is a physicist with a PhD in semiconductor device processing and brings with him many years experience specialising primarily in the area of technological cold plasma systems. For the last seven years Shane has been the European Technical Representative for the commercial and research interests of a Japanese producer of industrial RF generation equipment and atmospheric plasma systems. Shane provided technical support to semiconductor equipment OEMs and more recently was responsible for a number of R&D collaborations with aerospace, medical, academic and defence partners.

Commenting on his new role Shane said, "Of course, this represents quite a change for me but the ORTEC products and client base offer a fascinating mix that I am very excited about. What might have been a challenging transition in other circumstances has so far turned out to be a thoroughly enjoyable experience. The skills and positive attitude of my colleagues coupled with the impressive ORTEC operation has helped me to get up and running with relative ease. Arriving from a non-sales background, it is great to find that the UK Sales Team apply such a strong consultative and applications based approach to dealing with enquiries."

Trevor Hatt - UK Sales Manager added, - "It has taken some time to fill this position and I am pleased to have waited for the right person to come along. Shane has an excellent technical background with in depth experience working with a variety of clients over a wide range of industries. I am confident that he will make a valuable contribution to the UK team."

Forthcoming Exhibitions & Training Courses

We have a stand at the following shows, and will be happy to discuss any product requirements you may have:

- Technology Show at Dounreay, 5th June
- Nuclear Spectrometry Users Forum, NPL, 17th June
- Technology Show at Sellafield, 30th September

GammaVision Training Course

The 2008 GammaVision training course ran in April and as with previous years was well received. The next course to run in the UK will be in 2009 but if you wish to attend a course sooner than that, we have one running from our German office in June.

Please contact Clare Payne if you would like to attend or find out more about any of these events.