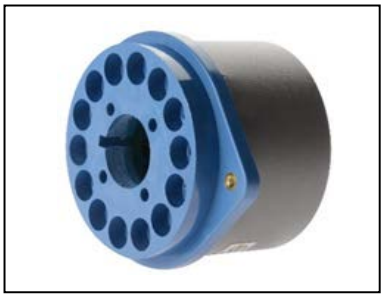
1K Multi-Channel Analyser Base

TYPE: 1KMCA51

FEATURES:

- Compact and low cost model 1KMCA in socket.
- Low Power Consumption.
- Universal connectivity to a wide range of PCs and laptops
- Unlike ISA / PCI cards, it stands outside a PC
- Power requirement: 5V, ~560 mA through USB cable directly (No external power supply required).
- Latest MCA data acquisition & analysis software, Anuspect – Gamma Spectroscopy software is offered with this MCA.



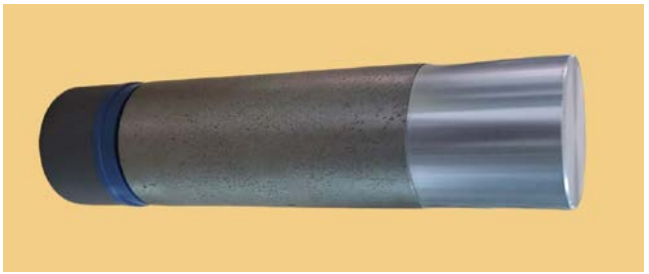
1KMCA socket

The **1KCA51** is a low cost high performance multi-channel analyser (MCA) base designed for gamma ray spectroscopy applications with NaI (Tl) scintillation detectors. The base consists of a high voltage power supply (HVPS) capable of supplying up to 2000V and a preamplifier. The unit is compatible with standard 14 pin detectors using 10 stage PMTs. 1KMCA51 is very easy to use and the unit is powered by USB 2.0 or above. The unit uses histogram mode acquisition and data channels are 16 bits. This MCA is offered with a powerful off-line processing spectrum analysis software.

SPECIFICATIONS:

Conversion Gain	: 1024 channels
Power Consumption	
Voltage	: 5V @56mA
Dead Time	: 9 µs
Pulse Pair Resolution	: 9 µs
Detector Voltage Range	: 0 to 2000V
Maximum Frequency	: 70kHz
Count Rate linearity <5%	: up to 60 kHz
Connections	
USB type	: 2.0 or higher
Connector	: micro USB type AB

Warm up time	: 1s
Temperature (operating)	: 5 - 55 ^{0}C
Temperature (storage)	: - 40 - 60 ^{0}C
Weight	: 100g

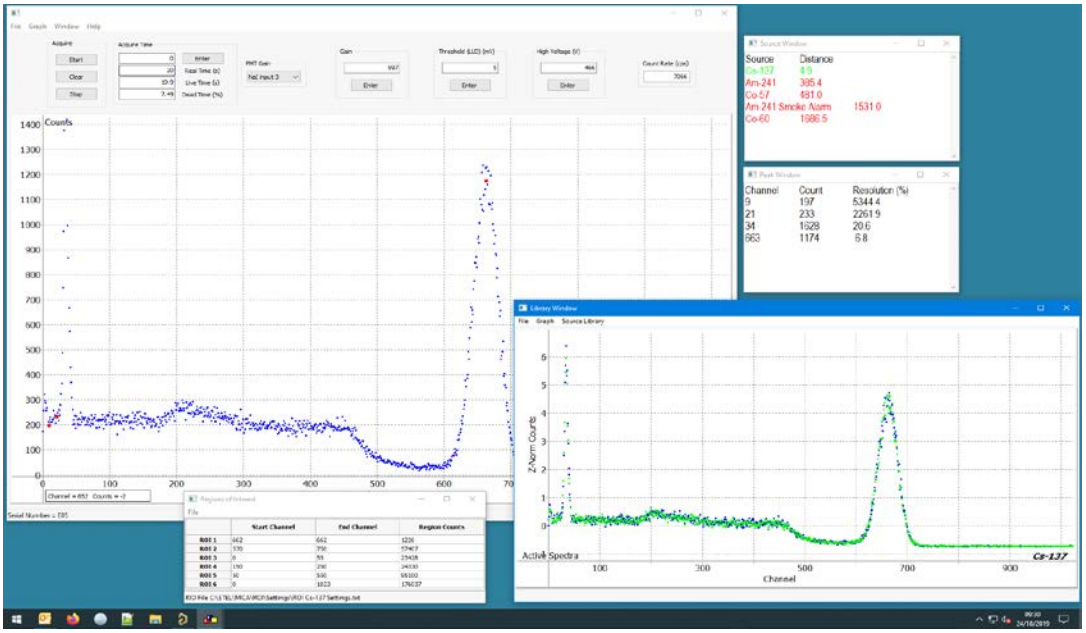


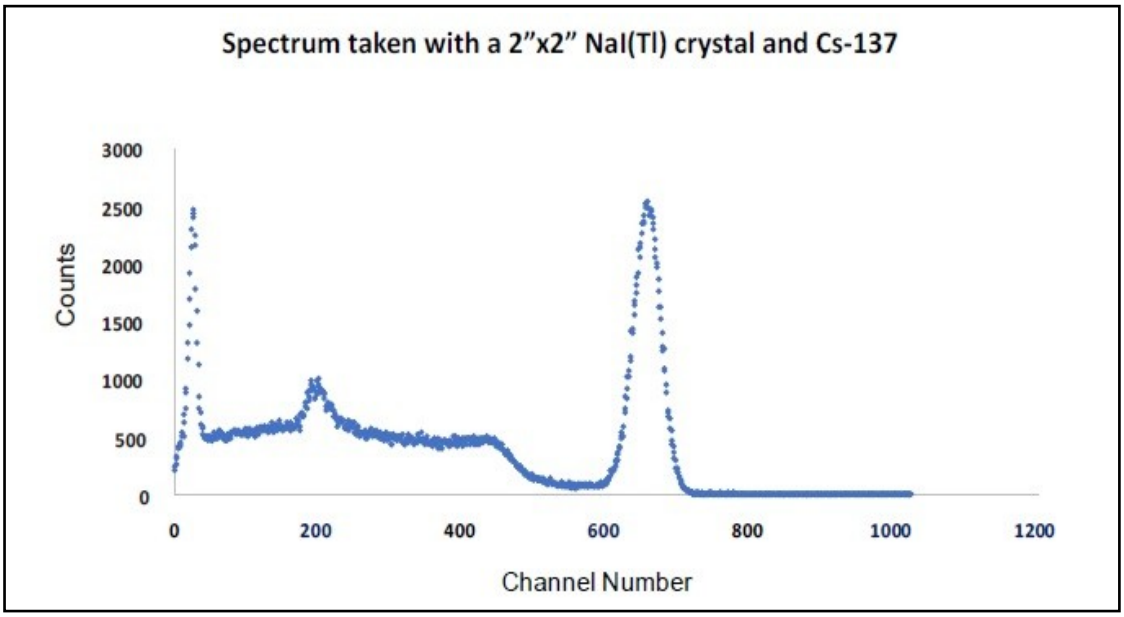
1KMCA connected with 2”X2” NaI detector

Primary Software Features:

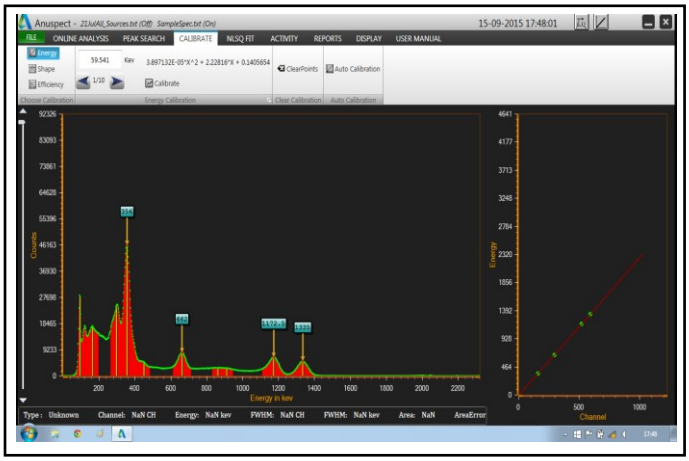
The MCA base is supplied with an open source ‘MCA Application’ software with the following features:

- Ability to set high voltage on the photomultiplier (0-2000V).
- Ability to set threshold on the internal ADC (equivalent of adjusting the Lower Level Discriminator, LLD).
- Ability to set acquire time.
- Manual start and stop of measurement run.
- Automatic charting of counts vs channel.
- Automatic saving of data in text files for subsequent analysis/export.
- Ability to select multiple regions of interest and real time peak resolution calculations.
- Ability to save spectra in an ANSI N42.42 file format.





PHA spectrum, linearity chart by using LaBr detector



PHA spectrum, linearity chart by using NaI detector

Secondary Software Features:

- Ideal software solution for advanced gamma spectroscopy application
- User interface panel for setting hardware (MCA) parameters
- Spectrum display (standard/zoomed, Linear/Log scale)
- Optimized peak search algorithm
- Nonlinear least-square fit of peaks with exponential tailed model
- Option for automatic addition of peaks at channels with high residue after fit based on user's criteria.
- Energy, peak shape and efficiency calibration
- Nuclide identification and activity calculation
- Comprehensive report generation for analysis results.

File Menu: For spectrum file saving & loading multiple format options have been given to the user. Additionally calibration files (* cal), previously saved, can be loaded for energy, shape, efficiency calibration.
Edit Analysis Library: This option is used to create and update nuclide libraries that are used for qualitative and quantitative analysis of radio nuclides.
Options are provided for the following functions :

1. Add new nuclide/gamma line
2. Delete existing nuclide/gamma line
3. Import new library
4. Save library in text format.

Peak Search: A standard peak search algorithm is implemented for offline analysis. The peaks are marked on the spectrum as follows:

- Adding & deleting a peak
- Peak info
- Peak report.

Shape Calibration: This analysis program calibrates peak fitting models consisting of polynomial background, Gaussian peak; optional smoothly joined exponential tail on low energy side or both high & low sides.

- Poly background + Gaussian
- Poly background + Gaussian + Low exponential tail
- Poly background + Gaussian + Low exponential tail + High exponential tail.

Energy Calibration: The energy calibration is computed from a linear least squares fit of channel number v/s energy.

Efficiency Calibration: This option is for calibrating the efficiency of the spectrometer. With the provided dps values at known peaks for a known nuclide, efficiency is calculated using the equation involving dps, cps & gamma abundance. Both, log polynomial and power equations are supported.

Non Linear Least Square Fit:
Earlier calibrated shape model will be fitted for all the peaks in the spectrum.

Activity:
Compute Activity: This option is for calibrating the activity of unknown Samples if the efficiency calibration isavailable.
Report Generation : The various reports that are displayed in this windows are:

- Peak Reports
- Activity Calculation Report

Display: Option related to spectrum display window can be accessed from this menu.

Display Cursor: Checking on this box displays a cursor on the screen. Information regarding the energy, counts and the position of the cursor (channel no.) is displayed on screen besides the cursor.

Zoom In: Select the zoom in option and a window appears at the top displaying the area currently zoomed. Drag the mouse to select the rectangle of interest.
Zoom Out: Exits the zoom mode.
Grid View: Spectrum view displays the entire spectrum & peaks information. ROI view displays information related to select ROI only.

Advantages:
The USB-MCA is designed with state of art technologies to meet the stringent requirements of nuclear instrumentation and hence offers many distinct advantages including the following:

- Excellent MCA performance in terms of resolution, DNL, etc.
- Universal connectivity to a wide range of PCs and notebook computers.
- Unlike ISA/PCI cards, it stands outside a PC.
- Simple to install, operate and handle.
- Low power operation, operates with USB bus power only.

PC Configuration Requirements:

- Operating system-Windows XP with SP3 or higher
- CPU-Higher than Pentium-4
- Memory - 2GB RAM
- Graphics Hardware-DirectX9.0C or higher (optional).

Applications:
The USB-MCA is useful for high resolution pulse height analysis (up to 8K channels) and high count rate systems (with a typical dead time of 7 μsec maximum). The hardware with associated software installed in a pc makes state of art Multi-Channel Analyzer system. It is useful for high resolution X-ray and gamma ray spectrometry work in following areas:

- Isotope research
- Nuclear reactors
- Accelerators
- Universities
- Other R&D.

Important Note: 1) Processing Software is offered by Nucleonix systems, based on the technology received from B.A.R.C., Mumbai.
2) MCA base offered by Nucleonix systems is of ET Enterprises make