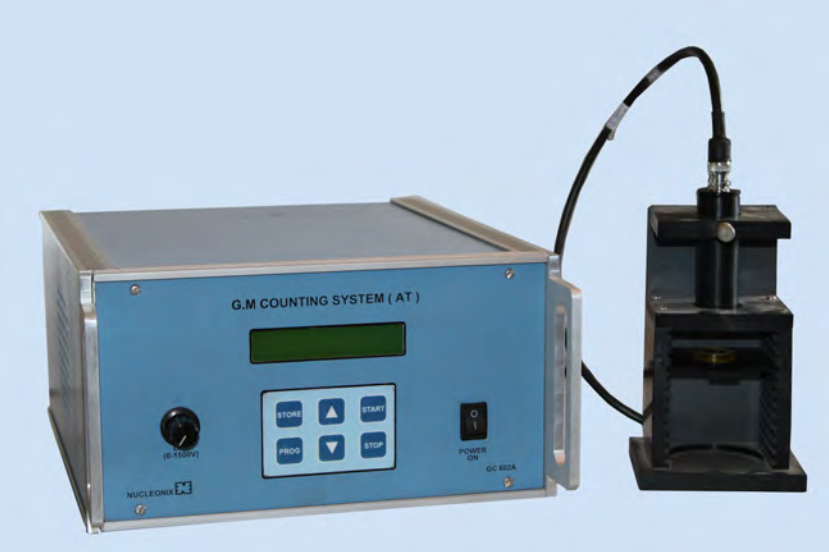
GEIGER COUNTING SYSTEM

TYPE: GC 602A



FEATURES:

- Ideal choice for teaching labs in physics stream.
- 20 x 2 LCD dot-matrix display for counts, elapsed time and HV.
- Single Board Design Approach.
- Counts capacity 999999, preset time 9999 s.
- Variable HV (0-1500V), 1mA.
- Built –in parallel port for direct data printing.
- Built –in serial port for data downloading into PC.
- Store and Recall facility for data counts.

Geiger Counting system type GC602A manufactured by NUCLEONIX is an Advanced Technology based versatile integral counting system designed around eight bit microcontroller chip. This system is highly recommended for research work, apart from, its usefulness in the academic fields for teaching.

This counting system can be useful for carrying out a number of Nuclear Physics experiments such as Characteristics curve of a G.M. Detector, to verify the inverse square law for Gamma Radiation, determination of Beta Absorption correlation factor, efficiency of G.M. Counter for Beta Radiation, determination of the back scattering factor of a material for beta rays etc,. if it is used in a teaching lab.

SPECIFICATIONS

G.M. Input (From G.M.Counter) :

(a) Polarity : Negative

(b) Amplitude : 250 mV (min)

Resolving Time : 6 micro sec (approx)

EHT Output : Variable EHT using ten turn pot upto a maximum of 1500 volts at 1mA. Line and load regulation better than 0.05%. Ripple less than 10mV (rms).

Display : 20x2 LCD dot-matrix display has been provided to indicate data counts, Elapsed Time and EHT.

Modes of operation: Preset count & Preset time modes.

Counts Capacity: 999999 counts

Preset time : (0-9999) sec.

Data Storage: Upto 1000 readings

Command Buttons: START, STOP, PROG, STORE, INC & DEC command buttons have been provided on the front panel key pad.

Programmability: Includes selection of Preset Time, Storing / Recalling of data, Starting and stopping of acquisition, lable assignment for data counts BG(Background), ST (Standard) & SP (sample) etc,.

Printer Port: Built-in centronics port facilities connection to a printer for direct data printing selectively.

USB Serial Port: Built-in USB serial port facilitates data down loading into PC.

Paralysis Time: A choice of three paralysis times 250, 350 and 550 micro sec plus OFF position selected through PROG key.

Socket: MHV connector for connecting to G.M. Detector.

Power: Unit is powered through a 12v Adaptor at Dc Power socket.

Mechanical Dimensions : 236mm(W)X133mm(H)X246mm(D)

List of Experiments that can be done using GC602A are give below.

1. Study of the characteristics of a GM tube and determination of its operating voltage, plateau length /slope etc.
2. Verification of Inverse Square Law for y- rays.
3. Study of nuclear counting statistics.
4. Estimation of Efficiency of the G.M. detector for

   (a) Gamma source & (b) Beta Source.
5. To Study Beta Particle Range and Maximum Energy (Feather Analysis).
6. Backscattering of Beta particles.
7. Production and Attenuation of Bremsstrahlung.
8. Measurement of short half-life.

ACCESSORIES FOR GEIGER COUNTING SYSTEM

TYPE: GC602A

(a) End Window G.M. Detector [Type : GM 120]

GM 120 is a Halogen Quenched End Window GM Detector, supplied by NUCLEONIX. It is suitable for general purpose GM Counting applications and for conducting G.M. Experiments. Its operating voltage is approximately 500V. It has got a very wide plateau length and plateau slope is better than 6% per 100V. It is enclosed in a PVC cylindrical enclosure for protection & supplied. An MHV socket provided on one side of the PVC enclosure facilitates one to connect to detector socket on rear panel of the counting system.

SPECIFICATIONS :

Application: Suitable for Beta sample Counting.

Operating Voltage Range : (450 - 650V).

Tube Dimensions: Max. overall length 2.125 inches.

Max. Diameter: 0.59 inches.

Gas filled: Ne + Hal

End Window: Mica 2.0 mg/cm sq. density.

Gamma Sensitivity : 18 cps / mR/hr.

(b) End window G.M. Detector [Type: GM 125]

GM 125 is a Halogen Quenched, wide End Window GM Detector, supplied by NUCLEONIX. It is highly recommended for swipe sample counting of Beta samples by health Physics labs. Its operating voltage is approximately 500V. It has good plateau length and plateau slope. Its operating voltage is approximately 500V.

It is enclosed in a PVC cylindrical enclosure for protection & supplied. An MHV socket provided on one side of the PVC enclosure facilitates one to connect to detector socket on rear panel of the counting system.

SPECIFICATIONS :

Application : Suitable for Beta sample Counting.

Operating Voltage : Range : 450 - 750 V.

Tube Dimensions : Max. over all length 1.93 inches.

Gamma Sensitivity : 50 cps / mR/hr with Co-60.

Background with 40mm lead shielding : < 20cpm.

Efficiency at (1 cm): (typical)

(a) For Tl-204 $\simeq$ 5%.

(b) Sr-90 +Y90 $\simeq$ 15% (combined).

Max. Diameter : 1.13 inches.

Gas filled : Ne + Hal.

End Window : mica 2.0 mg/cm sq. density.

(c) Stand for G.M. Detector [Type: SG200]

Stand for G.M. tube type SG 200 has been designed to hold end window G.M. tubes. This stand can be housed inside the lead shielding if required. It has both sample and absorber trays. The position of these trays can be adjusted from the end window of the detector. The stand made up of acrylic sheet is precisely milled for sliding-in of sample and absorber trays.

Sample tray is designed to hold planchets or disc type radioactive standard source (Beta or Gamma). Aluminium absorber discs can be interposed between the source and the detector for attenuating the radiation as seen by the detector.

This stand is an essential accessory for connecting end window G.M. tube to any of the G.M. counting systems manufactured by NUCLEONIX.

(d) Source Kit – 1 [Type: SK 210]

Source Kit-1 type SK 210 offered by NUCLEONIX contains one each of Beta and Gamma sources. These are low active disc sources of the order of 2 to 10 micro curie for Gamma & Beta. Gamma source disc is evaporated and sealed on 25mm dia X 5mm thick plastic disc.

Whereas Beta source disc is evaporated & sealed on 25mm X 10mm thick plastic disc and covered with 10mg/ sq.cm aluminized mylar film. This source kit is an ideal choice along with G.M. counting system for educational institutions & Research labs. Source kit containing the disc sources is offered in an acrylic box of dimensions 86mm X 46mm X 25mm (approx).

(e) Aluminum Absorber Set [Type: AA270]

Aluminum Absorber Set Type: AA 270 offered by NUCLEONIX consists of absorber discs in different thicknesses ranging from 20 to 300 mg/cm.sq. Each of these absorbers is mounted in an individual plastic frame, which exactly fits into the absorber tray of the G.M. stand.The diameter of each disc is approximately 50 mm including the frame.

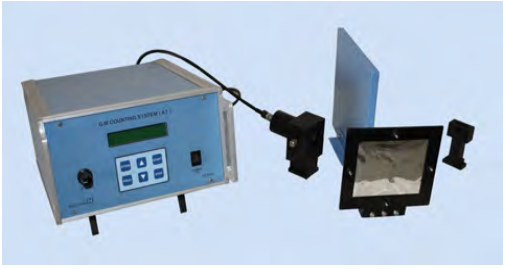
There is identification number for each disc printed on it. A chart showing the identification number and thicknesses of the disc in grms per unit area is given in the absorber box which is made up of acrylic sheet. All these discs are housed in this acrylic box. This absorber set will be useful in studying the Beta particle range & maximum energy.

(f) Lead castle with door for G.M detector LS- 240

This consists of 40mm lead shielding cylindrical rings assembly with required number of middle rings of assembly parts. There is a hinged door in the bottom ring through which sample can be loaded in to the G.M stand sample tray.

A 1mm aluminum lining is provided on the inside surface of the lead shielding. When it is dispatched from here usually it is packed in wooden boxes. So, on unpacking there parts could be assembled as shown in the enclosed drawing.

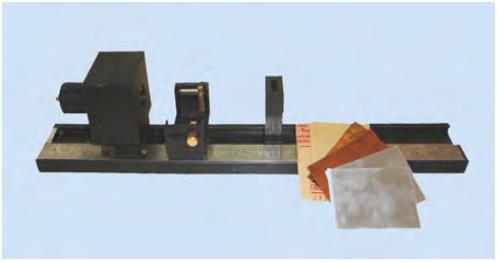
(g) Absorber/Scatterer Set [TYPE: AS 272]



(For Back Scattering of Beta Particles Experiment)

Description: The absorber / scatterer set consists of 15 Aluminum foils, the thickness of each foil being 0.05mm. For increasing the thickness of the scatterer, the required number of aluminum foils is to be stacked together and put in the frame provided.

(h) Absorber Set [Type: AS 273]

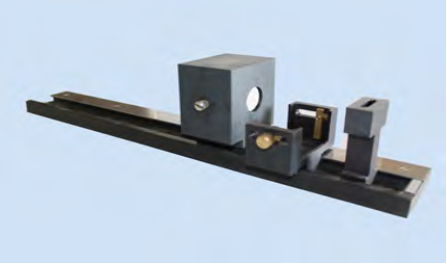


(For Production and Attenuation of Bremsstrahlung Experiment)

Description: The absorber set consists of the following combination of materials:

1. Aluminium (0.7 mm thickness) & Perspex (1.8 mm thickness) .
2. Perspex (1.8 mm thickness) & Copper (0.3 mm thickness).
3. Aluminium (0.7 mm thickness) & Copper (0.3 mm thickness).

(i) Sliding Bench [Type: SB201/SB205]



SB201 is meant for use with GM120 Detector.
SB207 is meant for use with GM125 Detector. Sliding bench SB207 is designed specially for the purpose of mounting bench the G.M counter accessories for doing the experiments in a most convenient fashion. This essentially consists of a bench with sliding groves with a graduated S.S scale fixed on one side of it. Scale has graduations both in cm & inches upto 50cm/20 inches. There are three vertical sliding mounts, one for mounting of End Window G.M detector, Second is 'Absorber Holder' & Third is 'Source Holder' & source mounts. Each of these mounts can be positioned along the slide scale to have required distance between the end window to the source with absorber mount interposed in between. End window detector is housed in PVC enclosure with MHV socket fixed on to it.

Head of the Dept.

Approved By