

INSTRUCTION

MANUAL

GAMMA RAY SPECTROMETER



TYPE : GR612

NUCLEONIX SYSTEMS PRIVATE LIMITED

Plot No : 162 A & B, PHASE II, I.D.A.Cherlapally, Hyderabad - 500 051

Phone: +91-40-27263701, 040-27262146, 040-68888777, Fax: 040 – 27262146

FAX : 27262146,E-mail : info@nucleonix.com

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UNPACKING

Gamma Ray Spectrometer Type :GR 612 has been thoroughly tested and is despatched in ready to operate condition. However, on unpacking and prior to operation, it is advisable to check visually and make sure that there is no visible damage caused in transit.

If any damage to the instrument is observed, do not switch ON the unit and report the matter immediately to :

Customer Support Division
NUCLEONIX SYSTEMS PRIVATE LIMITED
Plot No : 162 A & B, PHASE II,
I.D.A.Cherlapally,
HYDERABAD - 500 051.

Ph: 91-040-27263701, 32918055, 32914548FAX : 27262146,

e-mail : info@nucleonix.net (or) info@nucleonix.com

In all correspondance regarding the instrument, please mention the type, serial number of the unit.

Also if you find any short supply and missing items, not tallying with the packing slip, the same is to be reported immediately by e-mail/FAX and all the original packing is to be preserved intact till the matter is settled.

CHAPTER - I

INTRODUCTION

GAMMA RAY SPECTROMETER TYPE : GR 612 manufactured by Nucleonix Systems is a state-of-art microcontroller based modular unit consisting of LV Power supply card, High Voltage Card, Linear Amplifier card, Single Channel Analyser and Controller based Timer/Counter Cards housed into a single enclosure.

The Gamma Ray Spectrometer GR 612 essentially accepts the input pulses from a Scintillation Detector which gives out electrical pulses proportional in amplitude to the incident Gamma energy. Low Voltage unit provides the necessary LV supplies to power up the circuits for their functionality. The High Voltages card provides the necessary bias for scintillation detector. The detector output amplified by Linear Amplifier is fed to the Single Channel Analyser for pulse height analysis. The output events from SCA are counted for a preset time in Controller card. SCA is an important unit in GRS which scans the entire Gamma Spectrum. Controller card has built-in Six digit serial counter & under programme control it can store the data in CPS, CPM & counts for preset time mode. It has three modes of data. Readings upto 1000 readings can be stored and recalled on to the LCD dotmatrix display. Also data counts can be printed directly onto a printer through printer port or downloaded into a PC through serial port under software control.

Gamma Ray Spectrometer GR 612 manufactured by NUCLEONIX is widely useful for teaching & research labs in Universities & R&D labs in the field of Nuclear & Radiation physics experiments and this system also can be used for Radiochemistry work & also in Nuclear power plants for Gamma sample counting.



CHAPTER - II

SPECIFICATIONS

1. HIGH VOLTAGE PCB

- a. Output voltage variable continuously from 0 to 1500 volts.
- b. Output current (maximum) 1mA.
- c. Load and Line Regulations : better than 0.05% of full scale
- d. Indefinite overload and short circuit protections and self recovery.
- e. Output ripple less than 25 mV.
- f. Dimensions : Two bit Module.
- g. HV is adjustable by ten turn helipot with knob.
- h. HV indication is provided on a 20x2 LCD DOT MATRIX DISPLAY

2. LINEAR AMPLIFIER PCB

- a. Input Polarity : Positive or Negative
- b. Total Gain (Typical) : 500 (approx)
- c. Output (Unipolar) : 0V to 8V (usable recommended Linear range)
- d. Max. Output (Unipolar) : 12V (Saturation Level)

3. SINGLE CHANNEL ANALYSER PCB

- a. Input : Unipolar or Bipolar with a +ve leading edge 0 to 10V
- b. Output Pulse Polarity : Positive
Pulse Amplitude : +5V
Pulse Width : 0.5 micro sec
- c. LLD output pulse amplitude : +5V
Output pulse width : 0.5 micro sec
Base line variable by : 10 turn helipot / Dial
Base line variation : 0 to 10 V by helical potentiometer
- d. Window width continuously : Variable by helical potentiometer / Dial
Window : 0-1V in WINDOW mode
ULD range : 0-10V in NORMAL mode
- e. LLD, ULD & MODE switch, controls have been provided on front panel

4. COUNTER TIMER PCB

- a. Display : 20x2 LCD dotmatrix display has been provided to indicate data counts & Elapsed time
- b. Preset time : 0-9999 seconds
- c. Command Buttons : START, STOP, PROG, STORE, INC & DEC command buttons have been provided on the front panel key board
- d. Modes of Data Acquisition : a. Counts for a preset time b. CPS c. CPM
: Programmable through switch control buttons
- e. Preset Time Selection : Upto 1000 readings
- f. Data storage : includes selection of preset time storing / recalling of data, starting and stoping of acquisition, lable assignment for data counts such as BG (back ground), ST (standard) and SM (samle).
- g. Programmability :
:
- h. Serial port : This module additionally has built-in RS232C serial port for down loading the data into PC.

5. EXPERIMENTS :

- a Study of energy resolution characteristics of a scintillation spectrometer as a function of applied high voltage and to determine the best operating voltage.
- b Study of Cs-137 spectrum and calculation of FWHM & resolution for a given scintillation detector.
- c Study of Co-60 spectrum and calculation of resolution of detector in terms of energy.
- d Energy calibration of Gamma Ray Spectrometer (Study of linearity).
- e Spectrum analysis of Cs-137 & Co-60 and to explain some of the features of Compton edge and backscatter peak.
- f Unknown energy of a radioactive isotope.
- g Variation of energy resolution with gamma energy.
- h Variation of gamma intensity as a function of distance (Verification of inverse square law).
- i Activity of a Gamma Source (Relative Method).
- j Activity of a Gamma Source (Absolute Method).
- k Mass Absorption Coefficient.

6. APPLICATIONS :

The system finds wide range of applications in nuclear research and academic fields which include analysis of Gamma Radiation, Identification of unknown isotopes and their relative abundance. Measures the strength of Radioactivity of sample. Useful in radiotracer techniques. Can be used for protein bound iodine studies in medicine using well type scintillation detector etc. Swipe sample counting in Health Physics Labs.

SCINTILLATION DETECTOR :

Scintillation detector with flat type NaI crystal of 1"X1" or 1 1/2" X 1 1/2" or 2" X 2" or 3"X3" flat or well type detector of 1 1/2" X 1 1/2" or 2" X 2" of NUCLEONIX make or its equivalent is compatible to GR612. The output of these units (taken from preamplifier) is POSITIVE for all Nucleonix make Scintillation detectors. Hence the input polarity of the amplifier in GR612 is to be selected for POSITIVE. Scintillation detector preamplifier required LV supply of 12V is drawn from the GRS rear panel. So, also the HV bias supply for the PMT of the detector assembly is also drawn from GRS rear panel. Preamplifier of the scintillation detector is a charge integrating type of preamplifier which gives out positive output. This output from scintillation detector is fed to input (BNC) of the amplifier part of the Integral GRS(I).

SERIAL PORT (RS232C) (OPTIONAL) :

Built-in serial port facilitates stored data transfer under PC programme control. This transferred data can be further processed if required by the user in PC.

(D) ACCESSORIES

SCINTILLATION DETECTOR (S) :

Scintillation detector with flat type NaI crystal of 1"X1" or 2" X /2" or 3" X 3" well type detector of 2" X 2" or 3" X 3" of NUCLEONIX make or its equivalent is compatible to GR611(I). The output of these units (taken from preamplifier) is POSITIVE for all Nucleonix make Scintillation detectors.

Hence the input polarity of the amplifier in GR611M (I) is to be selected for POSITIVE. Required LV supply of -12V for the scintillation detector, is drawn from the GRS rear panel through a LV cable. Also the HV bias supply for the PMT of the detector assembly is drawn from GRS, HV module. Preamplifier of the scintillation detector is a charge integrating type of preamplifier.

Nucleonix Systems offers wide range of NaI Scintillation Detectors of different sizes both with flat & well type crystals, to meet the requirements of wide range of users for Gamma ray spectrometry measurements.

Scintillation detectors offered include 1"x1", 2"x2" & 3"x3" NaI integral assemblies with built-in pre-amplifiers. These detector assemblies give excellent stability, superior performance & good resolution in the range of 8.0 to 9.5% for Cs-137. Scintillation detectors of other sizes can also be offered against user specific requirements



GAMMA REFERENCE STANDARD SET TYPE GS 290

Gamma Reference Standard Set Type: GS290 consists of a set of FIVE Gamma sources evaporated & sealed on 25mm dia x 5mm plastic disc covering SIX photo peak energies in the range of 2 to 5 micro curie. A reference chart for this is given below. The accuracy of these sources is in the range of +/-10%. All these disc sources are enclosed in a box made of polished wood acrylic sheet and supplied.



Isotope	Energy MeV	Nominal activity	Half life
Co-57	0.123	2-5 μ Ci	273 Days
Ba-133	0.36 (Main)	2-5 μ Ci	7.5 Years
Na-22	0.511; 1.280	2-5 μ Ci	2.6 Years
Cs-137	0.662	2-5 μ Ci	30 Years
Co-60	1.17; 1.33	2-5 μ Ci	5.3 Years

LEAD CASTLE FOR SCINTILLATION DETECTOR -LS 250

This consists of 40mm lead shielding cylindrical rings assembled according to the detector. There is a provision in the bottom ring through which system connections are given to the detector, which is placed in the lead shield.



1- Inch detector (8 lead assembling parts)



2 - Inch detector (9 lead assembly parts)



3 - Inch detector (10 lead assembly parts)

The top ring has a holding knob through which sample can be loaded on to the scintillation detector, and this closes the lead castle from top side.

CHAPTER - III

FRONT PANEL & REAR PANEL CONTROLS

FRONT PANELS AND INDICATIONS

FRONT PANEL CONTROLS AND INDICATIONS :

POWER ON SWITCH :

This is a miniature ROCKER switch which is used to power the unit. When the switch is put 'ON' the mains AC power, is made available to the unit.

EHT (0-1500V) :

This is knob or ten turn dial to be rotated in the clockwise direction for increasing HV which is applied to the Scintillation Detector, through a rear panel connector. Current HV value is indicated on the LCD dot-matrix display.

INTELLIGENT KEY PAD:

- (a) **PROG key button** : This key is an important one which facilitates the user to programme the operation of the instrument for different modes / conditions. More details are covered under "OPERATING INSTRUCTIONS" in CHAPTER IV.
- (b) **START key button** : This is used for starting of acquisition and printing, once all the programme parameters have been set.
- (c) **STOP key button** : This key can be used to terminate acquisition and printing whenever required. In the normal course acquisition will stop automatically at the end of preset time and the data printing will stop once the end serial number setting for printing has reached.
- (d) **INC/DEC key button** : These keys are used while setting the programme parameters to increment and decrement a value or to change the option selected to another value available.
- (e) **STORE key button** : This key is used for storing the readings or data values in the following way, in the manual mode of storing only.

At the end of acquisition for a preset time if user presses this button, data counts and with or without EHT will be stored and the Sl.No. in the display increments to the next value.

In CPS/CPM modes the current CPS/CPM is saved on pressing this button.

OPERATIONAL CONTROLS OF FRONT PANEL

- | | | |
|----------------------|---|---|
| GAIN COARSE | : | Rotary control to vary the gain of the amplifier in three steps viz. 1,2,4,8,16 and 32 |
| FINE | : | A ten turn helipot control to provide continuous variation in the gain of the unit. |
| MODE (Switch) | : | Three way rotary control to select any one of the three modes of SCA operation |
| INT | : | In the integral mode the pulses of amplitude exceeding the base line (LLD) setting will be made available at the output. ULD is ignored in this mode. |
| NORMAL | : | In this mode of the upper level and the lower level helical potentiometers are independently variable from 0 to 10 V and an output is generated for pulses analysed between these two levels. This mode is useful for wide window applications. |

WINDOW : In the "Differential" mode the unit operated as a high resolution narrow window of 1 volt analyzer. Therefore pulses exceeding the base line setting (above LLD) and within the window setting will be available at the output. In this mode LLD is called as BASE LINE.

LOWER LEVEL DISCRIMINATOR : Ten turn potentiometer to vary from 0 to 10V

UPPER LEVEL DISCRIMINATOR / WINDOW : In 'NORMAL' mode this control is called ULD and this gets triggered when the input pulse height is above the ULD setting. Dial corresponds to (0-10V) for ten turns. SCA output is allowed if the input pulse height is below the ULD setting.

In 'WINDOW' mode this control is called WINDOW and ten turns variation corresponds to (0-1V) i.e., one turn is equal to 100mV window. WINDOW is usually set to one turn (100mV) for scanning of an isotope for its energy Vs Count rate output. This window always overrides on the baseline.

NORMAL MODE OF ANALYSIS : This mode of operation is recommended when the user wants to count a wide energy band of any isotope. Both LLD & ULD corresponds to (0-10V) for ten turns and user can bracket the region of interest and count the sample. In this mode SCA gives output for each of the input pulses lying above LLD and below ULD.

INT MODE OF ANALYSIS : This is integral mode of operation SCA generates output for all the input pulses just above the LLD threshold. It ignores the ULD setting. Any application requiring this kind of situation, user can set to this mode.

WIN MODE OF ANALYSIS : This mode of operation is recommended when the user wants to calibrate the Gammaray spectrometer or when one would like to scan the gamma spectrum of an isotope or when wants to counts for a narrow band of energies.

In this mode LLD is called 'Base line' and ten turns corresponds to (0-10V). ULD is called WINDOW & ten turns corresponds to (0-1V). That means each turn corresponds to 100mV Window. In this mode window overrides (sits) on the baseline and all the input pulses above baseline and within the window set are counted. That is SCA gives output for pulses between (BASELINE) and (BASELINE+WIN).

e.g. If baseline is at 1.0V (Dial at 1.0) & WIN dial at 1.0 (100mV window). For input pulses above 1.0V but below 1.1V, SCA output is generated.

LCD DOTMATRIX DISPLAY :

This is a 20 X 2 alpha numeric LCD dotmatrix and responds to all the commands from the keypad and displays programme parameters, data counts, preset and elapsed times etc.,

REAR PANEL CONTROLS AND INDICATIONS :

TO PRINTER (Optional) : This is a 25 pin D-female connector through which one can connect a printer (with centronics interface cable) for direct printing of data.

SERIAL PORT (RS232) (Optional) : This is a circular I/O connector having RS232 compatible signals for serial data communication to a P.C. Under software control from a PC, the stored data reading from this unit can be downloaded into PC.

MAINS SOCKET : This is a three pin socket, where mains cord is plugged & 230V, AC, 50Hz is applied.

FUSE : AC mains fuse provided to protect the transformer & secondary side circuits in case of over load condition.

5PIN I/O TEST SOCKET : All LV voltages have been brought out onto this as test points for checking low voltage supplies.

HV OUT : This is a UHF socket from where HV output is taken to scintillation detector.

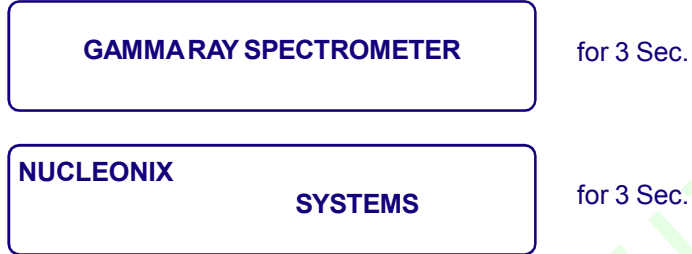
LV OUT : This is 5 pin I/ socket from where LV supply to scintillation detector pre-amplifier is taken.

CHAPTER - IV

OPERATING INSTRUCTIONS

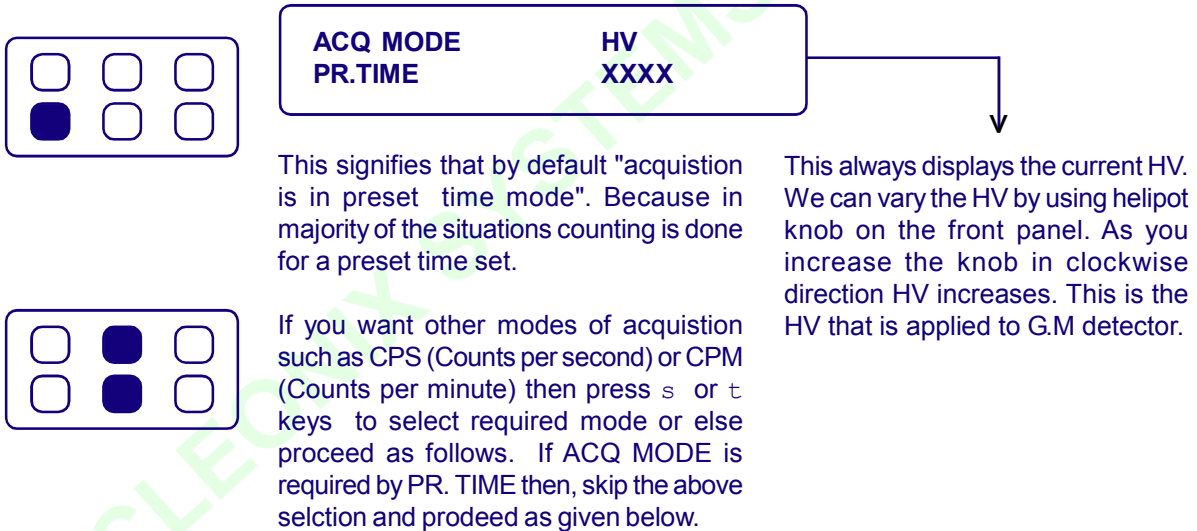
4.1 INSTRUCTIONS ON INTELLIGENT KEYPAD COMMANDS

When we switch on the unit, the display will show up,



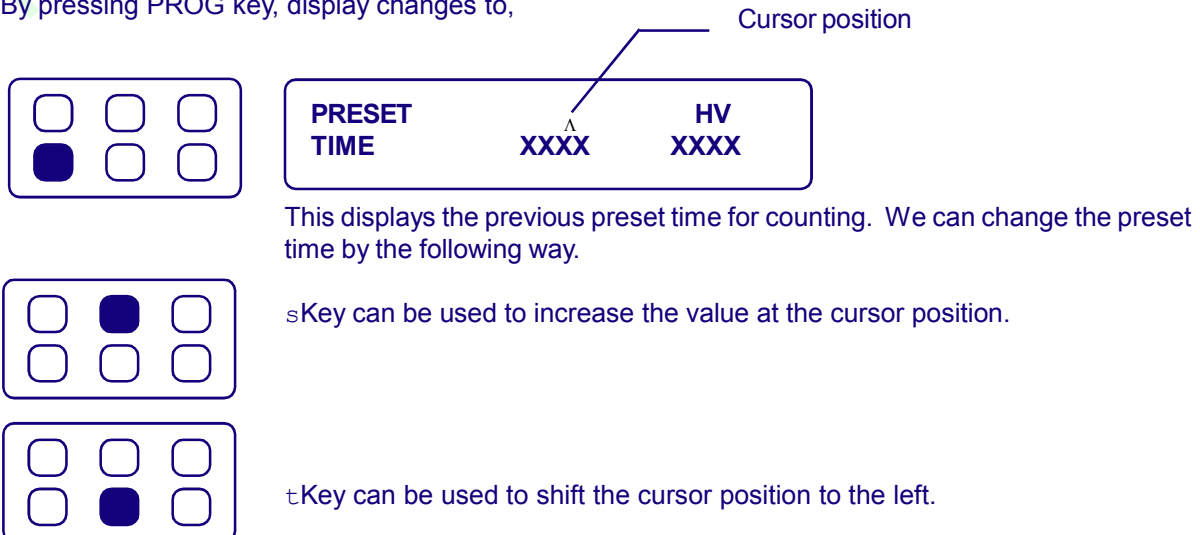
4.1.1 ACQUISITION MODE SELECTION

By default, display changes to,

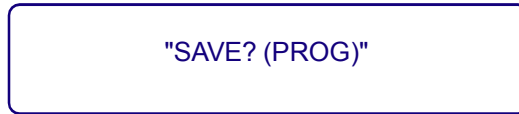


4.1.2. PRESET TIME SETTING

By pressing PROG key, display changes to,



* Now steps (4.2.3), (4.2.4) & (4.2.5) as given below can be skipped by ** Normal users. One can keep pressing "PGROG" key till you find



This signifies that the set (programmed) parameters and their values are to be saved for operation of the equipment. User can save the parameters by pressing s or t key. If these parameters are not saved, system will take and work according to the earlier programmed parameter.

Once programme parameters are saved user will find the display as

4.1.3. NUMBER OF READINGS

This displays the number of Readings taken during acquisition and also displays the HV

By pressing PROG key again display changes to,



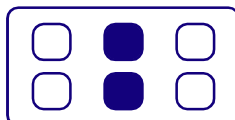
4.1.4. LABEL ASSIGNMENT FOR A DATA READING

Lable assignment is required and will be quiet useful for Researchers and Health physicists who may be counting Beta/Samples or research samples. They will record background count, a reading with standard source and followed by this number of readings with different samples. So, a feature for lable assignment has been added in the micro controller software,

BG = Background
ST = Standard
SP = Sample

Before acquisition for each reading lable is to be assigned. If same lable is to be continued after a particular assignment, then user need not do any thing, the same lable will continue till such time one changes it.

By pressing PROG key, display changes to,



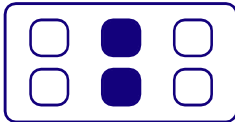
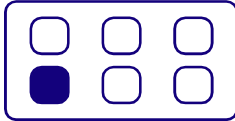
XX:

Lable can be changed by using s or t keys, options are SP (Sample), ST (Standard), BG (Background).

4.1.5. ITERATION PROGRAMMABILITY FOR A READING :

Iteration programmability is another useful feature that has been provided. Sometimes user may like to iterate a reading 2 or 3 times. The system allows this and it displays averaged reading only, at the end of two or three iterations. Acquisition for iterations once initiated will go till all the iterations are completed. Users intervention is not required.

By pressing PROG key, display changes to,

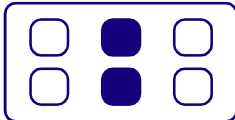
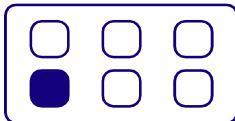


By default '1' is displayed. Number of iterations can be changed by using s or t keys.

4.1.6. SAVING PROGRAMMED PARAMETERS

All the programmed parameters are to be saved by the user before he can start acquisition. Without saving, the system will use the previous parameters for acquisition.

By pressing PROG key, display changes to,



SAVE?

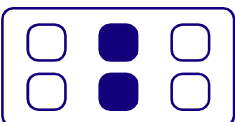
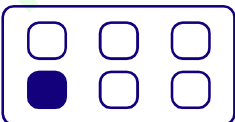
To save the above parameters press s or t keys

"OK" will be displayed on saving of parameters (PRG)

4.1.7. RECALL DATA READINGS

This is a very useful feature that has been provided in this unit. At the end of storing/saving of a set of readings, this feature will enable the users to recall the readings on to the display, from the SI.No. set in the "RECALL" mode.

By pressing PROG key, display changes to,



SI.No.

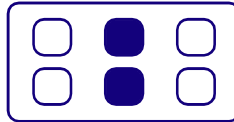
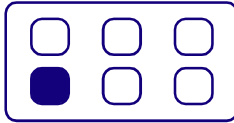


No. of counts

Recall serial number can be changed by s or t keys.

4.1.8. END SL.NO. "DATA READING" FOR PRINT OPTION :

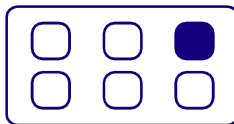
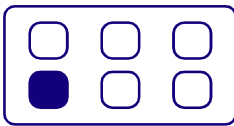
This option facilitates that user to Erase the memory completely
By pressing PROG key, display changes to,



By pressing **s** or **t** keys we can Erase the Memory

4.1.9. FOR PRINTING DATA

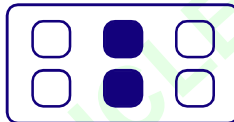
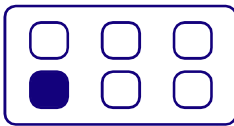
By pressing PROG key, display changes to



Now connect the Printer and Press START to print the data.

4.1.10. FOR STORING DATA (AUTO OR MANUAL)

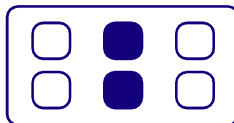
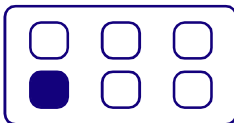
This option facilitates the user to store the Data automatic or manual
By pressing PROG key, display changes to



By pressing **s** or **t** keys we can change to AUTO or MANUAL mode

4.1.11. FOR STORING DATA (WITHOUT HV OR WITH HV)

This option facilitates the user to store the Data with HV or without HV
By pressing PROG key, display changes to



By pressing **s** or **t** keys we can store data with HV or without HV

Menu	Options
ACQ mode	Pr. Time CPS CPM
Preset Time	----
Sl.No. (A/O)	----
Label	■ ■ SP ST BG
Iteration	1 / 2 / 3
Save? (PRG)	OK / skip
Recall	----
END NO. (PRINT)	----
PRINT DATA	----
STORE DATA	AUTO MANUAL
HV	----

CHAPTER - V

PC COMMUNICATION (Optional)

Serial Data Communication software for downloading data Gamma Ray Spectrometer to PC can be provided separately at extra cost. Necessary instructions for using this software have been provided in the file (in CD/floppy).

NUCLEONIX SYSTEMS PVT LTD

CHAPTER - VI

BLOCK DIAGRAM DESCRIPTION

Refer to the block diagram, given in the following page. It consist of Scintillation detector SD 151 or its equivalent, Low Voltage, High Voltage PCB, Linear Amplifier PCB, Single Channel Analyser PCB & Controller PCB all these PCBs are housed inside GR612. The Scintillation Detector connected to the main electronics unit is called as Gamma Ray Spectrometer. This unit is essentially used for studying the Gamma Ray Spectra of Gamma isotopes.

SCINTILLATION DETECTOR

It consists of a Sodium Iodide crystal optically coupled to a photomultiplier. It has got three connectors, UHF, circular I/O or Minihex & BNC connector. The high voltage (operating voltage) required for the detector is fed from the HV PCB and is connected to the UHF connector. Minihex / 5 pin I/O connector is used to feed in the low voltages to pre-amplifier from rear panel of GRS. The output of the detector is given to the linear amplifier input through a BNC cable. Scintillation detector of NUCLEONIX make or its equivalent can be connected to NUCLEONIX Gamma Ray Spectrometer electronic unit.

LOW VOLTAGE PCB

Low Voltage PCB receives secondary, Voltage Outputs from the transformer and generates the following +15V, -15V, +24V, +5V which are used by various circuit PCBs. All these supply voltages are generated using 3 Terminal regulator ICs.

HIGH VOLTAGE PCB

It will generate 0 to 1500V. It has got HV out (UHF connector) and the ten turn dial / helipot for changing the EHT continuously from 0 to 1500V. It can deliver upto a maximum current of 1mA. Line & Load regulation is better than 0.001%. HV indication is provided on a 20x2 Dot Matrix Display. It is designed using a DC to DC converter type of circuit.

Output from the HV PCB is fed to Scintillation Detector through a UHF cable for biasing of the detector.

Typically detector bias to scintillation detector can be from 600V to 900V.

SINGLE CHANNEL ANALYSER

Single Channel Analyser receives the input from Pulse Amplifier output. SC PCB essentially scans the input pulses for differential pulse height analysis and givesout TTL output pulses for the windowed pulses. Output from SCA PCB is fed to Controller PCB for counting purpose.

COUNTER TIMER PCB

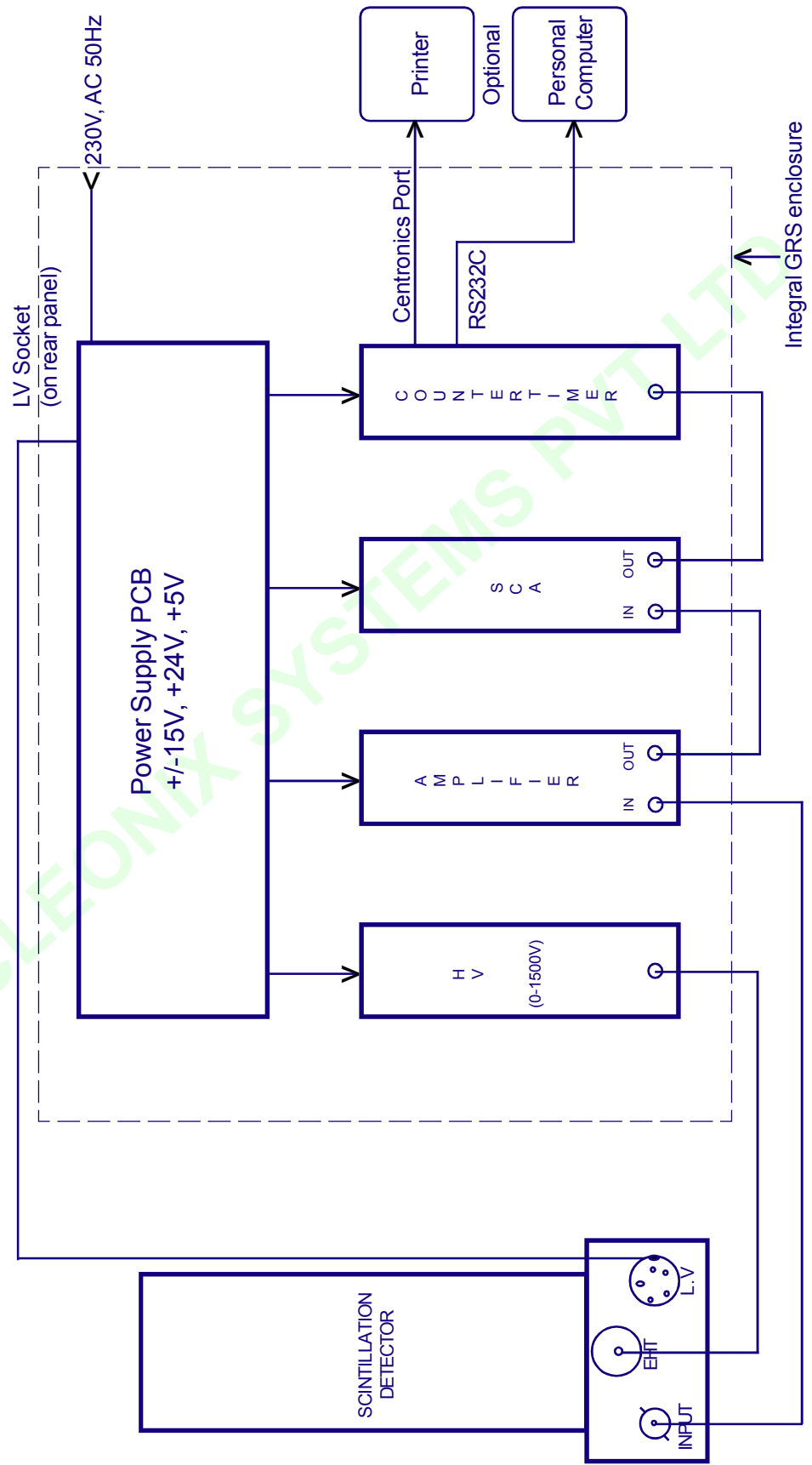
Controller PCB can count the events for a preset time. Elapsed time and counts are indicated on the 20x2 LCD displays. Input can accept input pulses of POS or NEG polarity of unipolar / bipolar or TTL pulse.

Integral GRS Front Panel has keypad buttons for operation and is designed around a microcontroller. It can acquire data in three modes of operation namely

a. Preset Scaler b. CPS c. CPM.

Readings upto 1000 can be stored and recalled back onto the display. Further unit has built-in printer port for direct data printing and serial port for downloading of readings to PC.

BLOCK DIAGRAM OF GAMMA RAY SPECTROMETER (INTEGRAL MODEL)
TYPE : GR612



CHAPTER - VII

SYSTEM INTERCONNECTIONS / INTEGRATION

For system interconnections, please refer to the interconnection table given on the following page.

The other optional accessories that can be connected to this system are printer which can be used for printing data counts stored. Also a PC if user wants to download the data into PC.

Essentially the following cables are used :

1. UHF to UHF cable 01 No
 2. LV cable (5 pin I/O connector Cable) 01 No
 3. Signal cables (BNC to BNC) 03 No
- Required for interconnection.

OPTIONAL CABLES

4. Printer cable 01 No
5. Serial port cable 01 No

Usually the Gamma Ray Spectrometry System GR612 is shipped / despatched in ready to use condition.

System interconnection are to be made as per the table given on the following page, which include connections between scintillation detector to the main counting system & connections on the unit itself.

GAMMA RAY SPECTROMETER INTEGRAL SYSTEM INTER CONNECTION DETAILS

S.No.	Type of Cable	Signal from	Signal to
01.	UHF to UHF high voltage cable (1.5 metre length)	EHT output from UHF socket on rear panel of GRS	Scintillation detector UHF socket
02.	LV cable with two end Circular I/O to Circular I/O connector.	LV signal on R.P of Instrument	LV signal to Scintillation detector Circular I/O Connector.
03.	Signal Cable (BNC to BNC) 1 or 1.5 meter long	Scintillation Detector (O/P BNC)	AMP Input BNC recepticle on F.P / R.P of Instrument
04.	Signal Cable (BNC to BNC) 0.3 or 0.5 meter long	AMP OUTPUT BNC to	SCA IN (BNC)
05.	Signal Cable (BNC to BNC) 0.3 or 0.5 meter long	SCA OUT (BNC) to	COUNT IN (BNC)
06	A.C mains cord	230V, AC, 50Hz, Power socket	Instrument socket on R.P

OPTIONAL CONNECTIONS

07.	25 pin D-25 pin D cable	Rear panel GRS	To printer
08.	3/5 pin circular I/O connector to 9/25 pin D-connector	Rear panel GRS	To PC Serial Port

CHAPTER - VIII

MAINTENANCE

OPERATING INSTRUCTIONS

Before using the GAMMA RAY SPECTROMETER (GR612) system for Normal testing user has to follow the instructions given below.

1. Make sure all interconnections are made properly. All dials, rotary switches, rocker switches, BNC sockets are in good condition.
2. If any damage happened to the system, report the matter immediately to:

Customer Support Division
NUCLEONIX SYSTEMS PVT. LTD.
Plot No. 162 A & B, Phase II
I.D.A. Cherlapally,
Hyderabad - 500 051. for further action/help
Ph : 91-040-27263701 FAX : 91-040-27262146
e-mail : info@nucleonix.com

3. Before switching ON the system keep all the controls to default settings as mentioned below.
 - a.
 - i. ON Rocker switch to OFF position
 - ii. HV adjust knob to complete anti-clockwise direction (0 volts)
 - b.
 - i. COARSE GAIN switch to ()
 - ii. Fine gain to 'minimum'
 - iii. Polarity to 'POS' (AMP IN)
 - c.
 - i. MODE to 'WIN'
 - ii. LLD/Baseline dial to 'min' position
 - iii. ULD/Window dial to 1.0 (= 100mV)
 - d. HV dial to minimum to start with.
4. Now place the Scintillation detector closely onto the left of the Integral Gamma Ray Spectrometer unit. If Lead Castle is ordered with this, then assemble the Lead Castle by placing the Scintillation detector inside the lead shielding (for details on assembly refer to the Lead Castle LS240 folder/manual).
5. Switch On the system, apply the high voltage to the detector by rotation the HV knob / ten turn pot in the clock wise direction.
6. Place a source (Cs₁₃₇) on top of the Scintillation detector, observe the Amplifier output in a good oscilloscope(60 MHz/100 MHz) in 1V / DIV sensitivity.
7. Now adjust the 'Gain' (reduce if required) or slightly the fine gain knob dial such that the photpeak amplitude (ht) of CS-137 as observed in the oscilloscope is in the range of 2.5V to 3.0V. (For this output of amplifier is to be fed to oscilloscope)
8. Now restore AMP output connection to SCA INPUT and scan for the gamma spectrum of Cs-137 isotope by taking the readings. For this vary the BASELINE (LLD) control dial in steps of 10 small divisions (which is equal to 100mV) starting from 0.00, 0.10, 0.20, 0.30..... etc., one would observe peak counts, between 2.5V & 3.0V baseline setting.
Here for each SCA setting counts are stored in EEPROM of Controller PCB for a preset time of 10 to 50 sec or as desired by user. For programming and using the keypad refer to command instructions in detail. PRESET TIME is to be selected such that countrate is fairly in the range of 5000 count/preset time near peak (approx).

9. From the above readings stored/acquired user can find out the resolution of the Scintillation detector, for Cs-137 (Refer to Chapter IV(b) for more details and one can find linearity of the spectrometer by placing other isotopes and counting)
Once the above is carried out the spectrometer is calibrated and is ready for use.
At this stage user will have information on Energy Vs Baseline voltage from the linearity graph.
10. Now user can place his actual sample for counting.
 - a. If it is a known energy then select the LLD & ULD & MODE (either NOR for wider energy band counting, WIN mode for narrower energy band counting) appropriately and do the sample counting.
 - b. If it is unknown energy one has to scan the entire range by operating in WIN mode then identify the energy band, after which actual sample counting could be carried out.
11. This system has the facility for connecting to a printer for data printing and also data readings could be downloaded into PC.
Also the readings could be saved at the end of each acquisition and recalled back on to display for visualisation.

MAINTENANCE

When faults occur only an experienced technician should be entrusted with the servicing work.
Whenever a fault occurs which is beyond the local services facilities the matter should be referred to :

CUSTOMER SUPPORT DIVISION
NUCLEONIX SYSTEMS PRIVATE LIMITED
Plot No : 162 A & B, PHASE II, I.D.A. Cherlapally,
Hyderabad - 500 051. Ph: 91-040-27263701, 32918055, 32914548
FAX : 91-040-27262146

In all correspondence regarding the GRS , kindly mention the serial number along with month/year of purchase.

PREVENTIVE MAINTENANCE :

The following preventive measures should be taken at regular intervals.

1. Keep the unit free from dust and moisture as excessive amounts of those will result in surface leakage paths interfering with the functioning of the circuits. Clean compressed air should be used to blow off the dust.
2. Ensure that the printed circuit is firmly seated in its connecting socket. Press it in position if necessary.
3. Visually inspect the components for deterioration. Burnt out or heavily overloaded resistors will show a charred or tarnished look. Leaky or highly deteriorated electrolytic capacitors are some times characterised by a corroded appearance. In case a burnt out or over loaded resistor or burnt or burnt out tantalum capacitor is detected they are to be replaced.

CHAPTER –bX

CONTACT US FOR AVAILING SERVICES

Postal/Mailing Address (Phone / Fax / Email)

Nucleonix Systems Pvt Ltd.
Plot No. 162 A&B, Phase II, I.D.A.,
Cherlapally, Hyderabad - 500 051, Telangana, India.
Phone: + 91-40-27263701, 040-27262146, 68888777
Mobile: 7331104480, 7331104481, 7331104482
Fax : + 91-40 - 27262146
Email : info@nucleonix.com

**For any information, Contact by email is always appreciated.
(This will help us to respond to you quickly)**

Marketing Department :

a) Sales / Commercial Information / Field installation and servicing

For any Commercial, Price information, Product information, customer coordination & quotation of our products customer related commercial services, please contact front office marketing staff through the listed Email Ids or Phone Nos. given below

Whom to Contact:

Business Executives:	Contact Numbers	Contact by E-mail ID
1.U.Sulochana (Sr. Business Executive)	Mob:7331104481, Ph-040-27263701	info@nucleonix.com
2. R.Maniram (Business Executive)	Mob:7331104481, Ph-040-27263701	info@nucleonix.com
3. Ch.Gayatri (Business Executive)	Mob:7331104481, Ph-040-27263701	info@nucleonix.com

Note: Our business executives will also connect you to concerned Engineer or General Manager for any technical clarifications if required

b) Factory Services

For **Servicing and Calibration** factory services & follow up on the above jobs including dispatch related/payment related issues of serviced & calibrated items please contact

Ms.B.Sravani
(Executive services)

Mob:7331104482

E-mail: info@nucleonix.com

She will also connect you to concerned engineer or general manager if required, for any clarifications & deficiencies in services

c) Dispatch Related Issues (Production Items)

For dispatch related issues of your ordered equipments, including delays, purchase order related document deficiencies, payment proofs, dispatch docket details and bills etc.,contact

Ms.V.Anusha / Renuka
Devi (Executive Dispatch)

Ph:040-27263701, Ex-26

E-mail: info@nucleonix.com

d) Product Technical Information / Clarifications

Whom To Contact:

Contact any front office "Business Executive"- He/She will take your details and connect you to concerned product engineer for any technical clarifications. Best thing is to email your technical queries and obtain the reply, rather than on telephone.

You can also contact General Manager or Director (Tech) if required.

e) Marketing Manager

On business matters for all your marketing services / techno commercial requirements about Nucleonix Products contact:

Bhaskara I.V.

Mob:8019662500

Land lines : 91-40-27263701, 91-40-68888777

Email: info@nucleonix.com

f) General Manager

Dr.M.S.R.Murthy PhD (Nuclear physics)

Land line: 91-40-27263701, 91-40-68888777

Email: info@nucleonix.com

Contact General Manager for all sales / servicing and technical information including customer support related issues, on the delays, gaps & lapses by our staff. Contact G.M. regarding field installations & field servicing jobs schedule etc.

g) H.R -Incharge

Contact her regarding, job vacancies, sending resume for employment, H.R. related issues etc. contact

Ms. M.Swarna Jyothi

Mob:7331104480

Email: recruit@nucleonix.com

h) Director -Technical

Mr. J. Dheeraj Reddy

Email: jdreddy@nucleonix.com

Mobile No :+91-7674009005

Contact him for, any Technical Information and clarifications on products, which cannot be answered by General Manager / Customer support executives.

For any technical deficiencies in products, related issues & suggestions on product improvements you may contact by email or telephone. This will help the company to improve the product & serve you better.

Dealer's complaints, on commercials, lapses by our commercial staff, or any other discrepancy, or you like to give any feedback on any Nucleonix staff doing any wrong thing against cleaner / ethical business principles / practices can be complained to any of the directors or managing director.

i) Director - IT

Mr. J. Nishanth Reddy

Email: nishureddy@yahoo.com; info@nucleonix.com

Mobile No. +91-9966691000

For any deficiencies in product software's, related issues, & any suggestions or improvisations in software's can be contact by email or telephone. This will help the company to improve the product & serve you better.

j) Managing Director

Shri. J.Narender Reddy (Managing Director)

Email : jnreddy@nucleonix.com; info@nucleonix.com

Contact Managing Director for, Foreign relations, International Business co-operation, Joint ventures, Exports, Dealership in other countries, Policy matters, Technology tie-ups etc.

k) Dealers Complaints :

Dealers complaints, on commercials, lapses by our commercial staff, or any other discrepancy, or you like to give any feedback on any Nucleonix staff doing any wrong thing against cleaner / ethical business principles / practices can be complained to any of the directors or managing director.

**An innovative company working towards excellence
in the field of Nuclear Instrumentation**



NUCLEONIX SYSTEMS PVT. LTD.

Plot No.162 A & B, Phase-II, IDA, Cherlapally, Hyderabad-500051 INDIA.

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E-mail : info@nucleonix.com website : www.nucleonix.com