

GEGC2A

GPS Enabled Geiger Counter

Firmware Revision: 0.79

User Guide

IMPORTANT SAFETY INFORMATION: The product described in this user guide is intended to be used as an indicator only. On no account should it be relied upon or used in safety critical or medical applications and, in the event it does not perform as expected, RHDC Services Ltd may not be held liable.



WARNING: The GEGC2A uses a Geiger–Müller tube that is biased at 400VDC. To avoid electric shock, do not disassemble the unit.

BATTERIES: Use AAA alkaline batteries only such as Energizer E92.

1 Scope

This document describes how to use the GEGC2A (GPS Enabled Geiger Counter model 2A).



Figure 1. GEGC2A (GPS Enabled Geiger Counter

2 Important Notes

Please read the following important notes before using this product.

1. The unit must be kept dry. Do not use in the rain or damp.
2. Use Alkaline batteries only such as Energizer E92 or an equivalent.

3 Introduction

The GEGC2A is a hand-held Geiger counter that measures the level of hard-Beta and Gamma radiation with optional logging of results and GPS co-ordinates. Using this instrument, the user can quickly survey an area or path, then overlay the results onto a map to show the location of any contaminated areas or create a graph showing radiation level vs time.

The instrument records data in KML format onto a PC compatible media card (FAT32 only). This enables the results to be viewed on a standard PC using any compatible mapping software. For example, the output file can be opened directly in Google Earth as shown below.

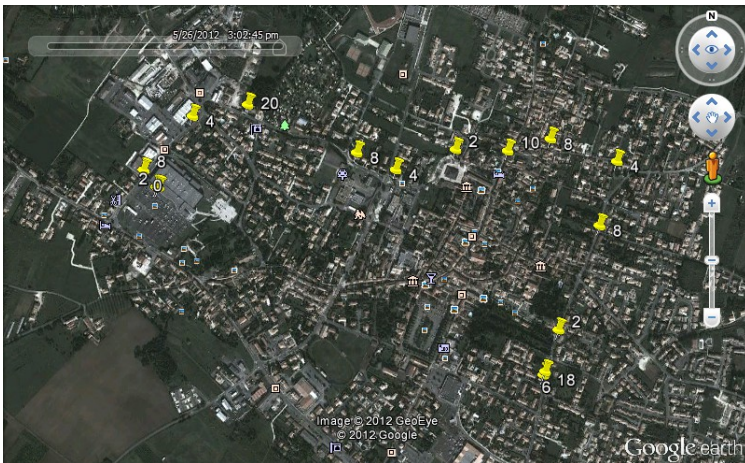


Figure 2. Google Earth map of data generated by the GEGC2A

4 Technology

At the heart of the instrument is a thin-walled Geiger–Müller tube that is sensitive enough to measure background levels of radiation. The module is extremely low-power and by itself can operate for many weeks on one set of batteries (without GPS logging). This technology combined with a GPS receiver, graphic display and other components delivers a compact device with a wide range of applications.

5 Specifications

The GEGC2A specifications are shown below.

Gamma Sensitivity ⁶⁰ Co	48 cps/μR/s
Gamma Sensitivity ¹³⁷ Cs	41 cps/μR/s
Working range	0.004-40 μR/s
Min Sensor Dead Time	95 μs
Gamma range	0.054-1.25 MeV
Tube Operating Voltage	400 Volts
Case Dimensions (mm)	104 x 60 x 21
Battery Type	2 x AAA
Battery Life (GPS On) <small>See Note</small>	>24 hours
Battery Life (GPS Off) <small>See Note</small>	>1,000 hours

Note. Specifications subject to change without notice. Battery life varies according to radiation level.

6 Controls

The image below shows the main controls of the GEGC2A.



Figure 3. GEGC2A Controls.

7 Getting Started

Insert two AAA Alkaline batteries. The display will become active. Press the "Right" navigation button and the display will change to resemble the example below.

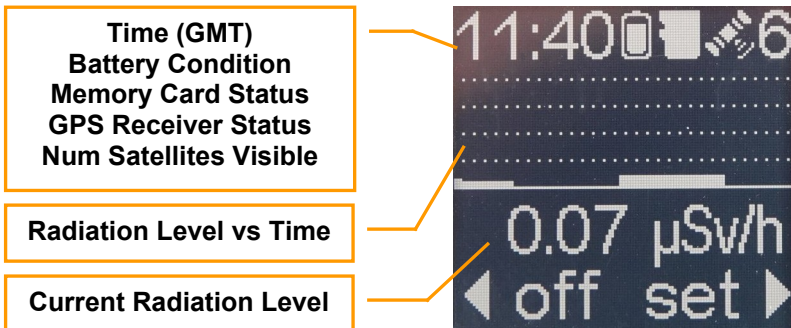


Figure 4. GEGC2A Controls.

8 Settings

The following sections describe the settings that can be changed by a user.

8.1 Units

Units can be either microsieverts per hour ($\mu\text{Sv/h}$) or Counts Per Minute (CPM).

The CPM setting simply means the number of counts that the Geiger-Müller (GM) tube detected per minute. Micro-Sieverts per hour is an estimated dose rate based on the GM tube specifications.

NOTE. As stated on the front cover, the GEGC2A is strictly for use as an indicator and must not be used for any safety or medical purposes.

8.2 Sound

When sound is "ON", the unit will make a click on each beta or gamma ray detection. If this is not required, it can be turned off.

8.3 Logging

This setting controls logging of data to a memory card.

Note. Changes to this setting only take effect after a power cycle (unit off then on). Also, for logging to be possible, a FAT32 formatted card must be inserted into the card slot before the unit is turned on.

There are three Logging settings.

1. "off" where the readings are not logged.
2. "on (no gps)" where the unit will log the radiation level in intervals but without GPS co-ordinates.
3. "on with gps" where the unit will create two logs, one of radiation level vs time and one of radiation level vs GPS co-ordinates.

Note. When using GPS, the unit must have a good view of the sky and a few minutes will be required for an initial GPS lock to be obtained. During this period, the green "GPS Lock" LED will flash and the display will indicate how many satellites are currently acquired.

Once sufficient satellites have been acquired, the correct time will be displayed (in GMT), the green "GPS Lock" LED will illuminate solidly and logging will start.

After turning the unit off (left nav. switch) any open log files will be closed. The Micro SD card can then be removed and files transferred to a PC.

9 Data Files

Depending on the "logging" setting, one or two different files may be created per on / off cycle as detailed in the following sections.

9.1 Time Log Format

IMPORTANT. For logging to work, the unit's internal Real Time Clock (RTC) must be set using its GPS receiver. If the display shows a time of 00:00 in the top left hand corner, proceed as follows.

1. Enable the GPS receiver by changing setting "logging" to "on with gps".
2. Cycle the unit's power using the navigation switch and wait for the green "GPS Lock" LED to illuminate solidly (can take up to 5 minutes).
3. Confirm the correct time is now shown on the display (in GMT).
4. If GPS logging is not required (to extend battery life) change setting "logging" to "on (no gps)" then cycle the unit's power using the navigation switch.

In the event the RTC has not been set (00:00 shown on the display top left), no data will be recorded.

If logging is enabled, the RTC has been set and a correctly formatted card (FAT32) was inserted before the unit was switched on, a text file with name RADxxxx.txt will be created and data will be written to it in the following format where CPM stands for Counts Per Minute.

Unix Timestamp	Date (UTC)	Time (UTC)	CPM
1647167383	12 Mar 2022	10:29:43	23
1647167401	12 Mar 2022	10:30:01	3
1647167421	12 Mar 2022	10:30:21	20

The unit will then record the CPM value periodically to create a record of radiation level over time. Once the unit is turned off, any open log file(s) will be closed.

Do not remove the memory card whilst the unit is operating as this may result in the entire file or some of its data being lost. Always shut the unit down using the left navigation button before removing the card.

Note. At low count rates, the interval will be extended to improve accuracy. Therefore, when plotting the data, please use the UNIX timestamp as well as the CPM value.

9.2 KML Log Format

If the "logging" setting is set to "on with gps", once GPS lock is obtained (green LED on solid) a second file RADxxxx.kml will be created into which CPM values and GPS co-ordinates will be written in KML format.

This second file can be opened directly in applications that support KML file import such as Google Earth.

Note. Readings will reflect the average value measured between points. Therefore, if more precision is required, the unit should be moved more slowly. If more positional accuracy is required, a good view of the sky is required with ideally the number of satellites showing as 9 (top right value on display).

10 Debug Port

The debug port is for use during manufacturing only and should be left unconnected.

Do not connect headphones or any other cable to this port.

11 Limitations

This instrument is not calibrated nor qualified in any way for medical or safety use.

Thus, this instrument must be used for educational purposes only and any results should be considered as experimental.