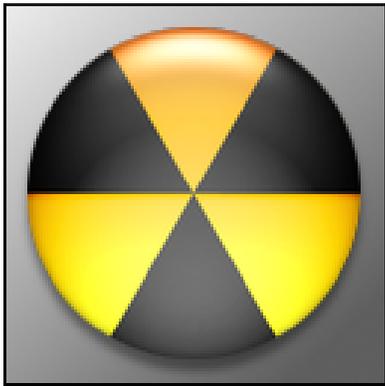


Digital Geiger Counter



This manual helps you start using Digital Geiger Counter. First install the software, and start exploring what you can do with it.

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The Device

Digital Geiger Counter is useful for detecting and measuring radioactivity and performing nuclear experiments. It has wide ranging applications for the industry, scientific and education.

Some of the applications include: classroom demonstrations and experiments, emergency services and domestic preparedness, HAZMAT and compliance verification, dirty bomb screening and EMT's.

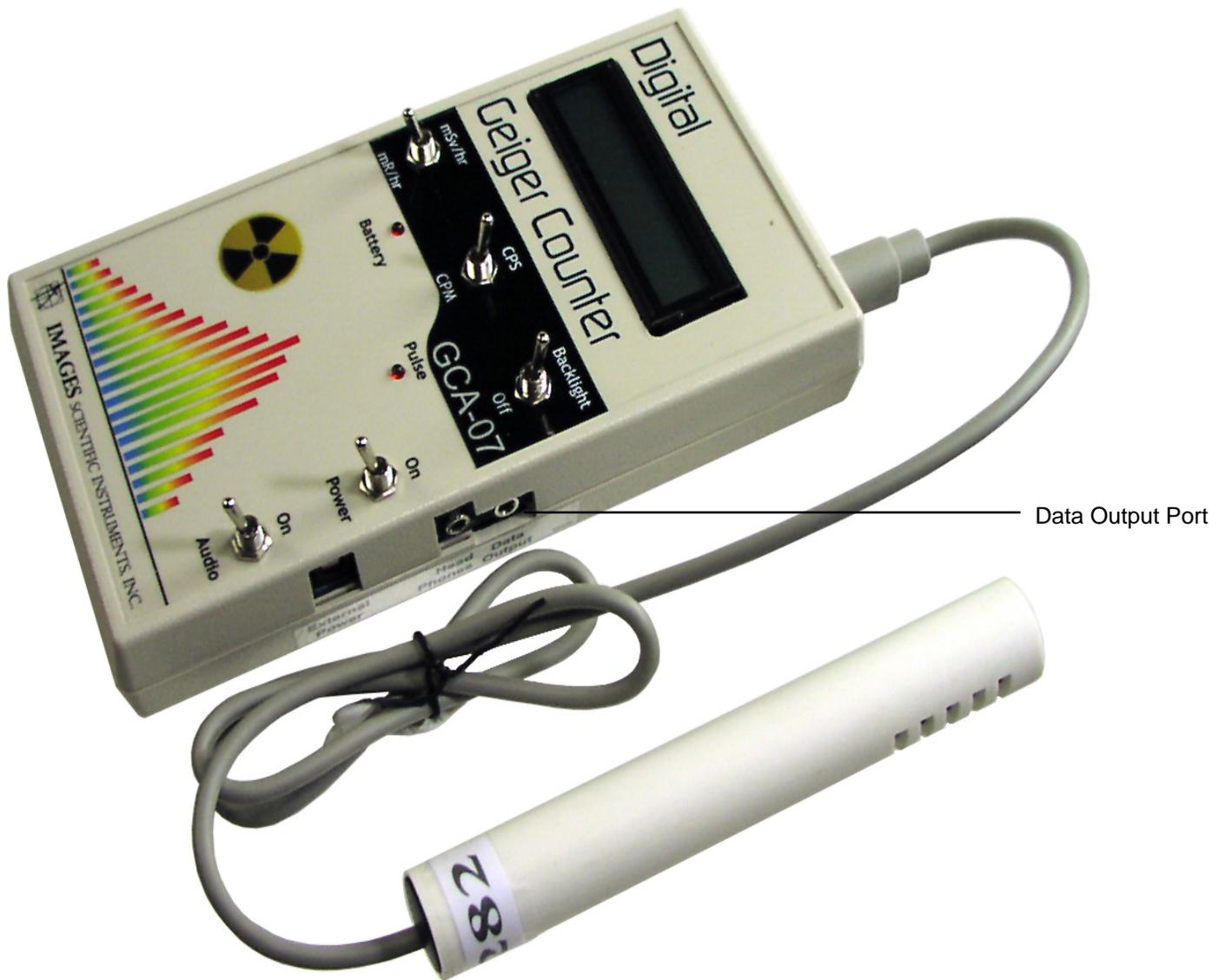
Digital Geiger counter has a 16 character by 2 line LCD digital display. The digital display shows the Count Per Timing Mode; either Second (CPS), Minute (CPM) or 5 Minute on line one and the equivalent radiation level on line two.

In addition to secondary indicators that produce an audio click and LED blink each time a radioactive particle is detected. Digital information (Counts Per Second (CPS)) may be sent serially through the com port, to the software program for charting and recording the measured radiation over time.

Uses

- Survey Meter.

Device description



The USB-TTL cable shown to the left connects your digital Geiger Counter (GCA-07W is shown as an example above) to the Windows PC computer.

Connect the USB Cable and install the drivers for the USB-TTL cable before trying to connect the digital Geiger counter to the PC. Once the cable drivers are installed, the PC will see the USB cable connection as a COM Port. Typically COM Port 7. However the exact COM Port for your USB cable may be different on your computer. You must select the USB-TTL Cable COM Port in the software for the device to operate.

The 3.5MM plug is plugged into the Data Output Port of the digital Geiger Counter. The USB end is plugged into the computer. Select the proper COM in the Images Radiation Charting and Monitoring Software and you're ready to go.

The Software

The Digital Geiger Counter software is useful for monitoring radiation. The software constantly monitors for the Counts Per Second (CPS) values and plots them on the Graph. It also calculates radiation levels and plots them along with the CPS values.

The software also allows capturing values for different time units (i.e., Seconds, Minutes, Hours or Days). One can also set alarm levels for CPS/Radiation Levels. If the values cross the specified levels, the software issues a visual and an audible alert.

Features

- Digital Geiger Counter incorporates the convenience of Windows functionalities, which helps you run the program in multi-tasking mode. You can run the program in the background mode, while you multi-task.
- The software incorporates pleasing interface. The special arrangement of controls makes using the software easier than ever.
- The software constantly displays vital values such as CPS, Accumulated Counts, Time Left, Number of Points, Radiation Level, etc.
- The software allows to save the data to a file, which is in delimited (CSV) form, and can be imported in many applications including excel, word, etc.

Installing

Step 1: Launch the setup

Launch the setup from the CD (or from the hard drive if you have downloaded the setup)

Step 2: Select an install location

Select the appropriate install location by clicking on “Change Directory” button on the setup screen. You can also skip this step and proceed.

Step 3: Select a program group

Type-in an appropriate program group, if you want the program to be installed to a different program group.

Step 4: Finished

The program installation is finished! You can launch the program from the start menu.

If you have trouble

If you have trouble installing the software, contact us with details of the problems you are facing.

The Main App

Interface description

The main interface comprises of following components:

- The main graph on which the values will be plotted.
- Time options frame. This allows user to select different time units (Second, Minute, Hour, Day) For example, if you set the time unit to Second, then the program will count the radiation levels per second, and plot. If you set it to Minute, the program will count radiation levels per minute, and plot.
- Graph type frame. This allows user to switch between different views of graph (Line Chart, 3D Line Chart, Bar Chart and 3D Bar Chart).
- Plot frame. This comprises of the Start button which starts the capturing and plotting process. When capturing is in progress, the same button will act as a Stop button, which stops capturing and plotting process.
- Graph frame. This comprises of a Clear button which clears the graph, a Save button which saves values to the active file, a Save As button which allows to select a different file for saving, and Viewer button which launches the Viewer.

- mR/hr frame. This comprises of a textbox which displays current radiation level.
- Serial Port frame. This comprises of a combo box which allows com port selection.
- Status frame. This comprises of an LED which displays the status of the program.
The status LED changes according to the activity. When no capturing is in progress, the LED will be Off and status will be Stopped. When the program is receiving values, the LED will be Blue and status will be Receive. When program is writing the values, the LED will be Green and status will be Write.
- Others frame. This comprises of a Print Chart button which allows to prints the current plot, a Settings button which opens the Settings dialog, an About button which displays the information about the program, and an Exit button which quits the program.
- Real Time Data frame. This frame displays various real time values such as Counts Per Second (CPS), total accumulated count (if the program is running on modes other than Second), time left before next update, and total number of points captured.

Did you know?

You can change the color of the graph by Settings ► Color Settings.

Always Save

Frequently save your files. Nobody likes to spend 10 hours again to obtain a plot, simply because one forgot to save!

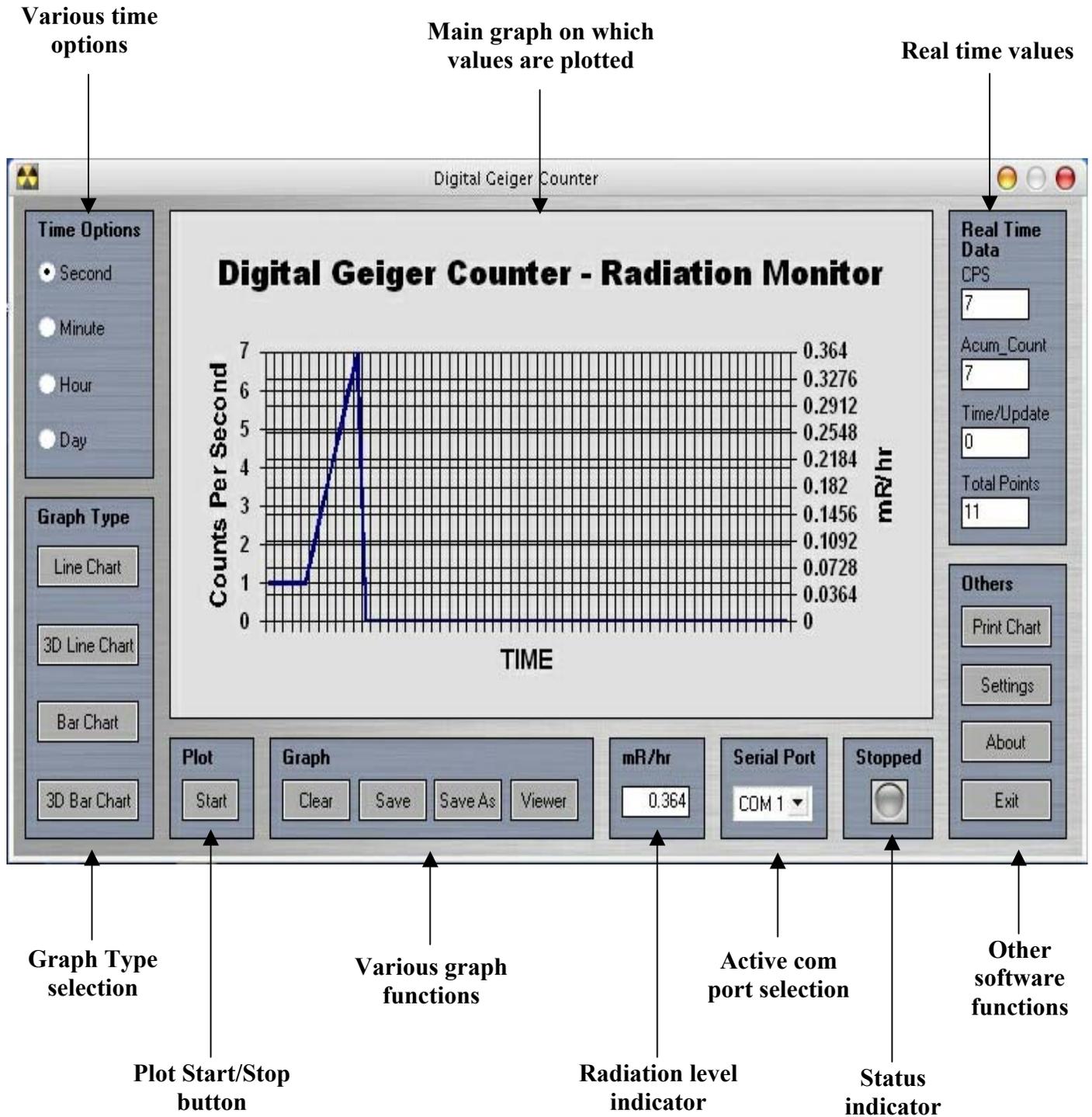
There is still a hope

We knew this would happen so we've kept a backup system. Even if you forgot to save (or the computer went for a spin), you can retrieve the values. Jump to the troubleshooting section for how to do this.

If this is boring you

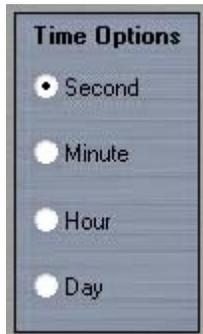
If you are so eager that you just can't wait to read all this, then we've got something for you. Check out the animated tutorials which show you how to do everything, by a set of animated sequences. You can find the tutorials in the CD, in the <Manual\Main App> and the <Manual\Viewer> folders.

Interface description



Capturing

Step 1: Select appropriate time unit



Before starting to capture, select the time unit you want. Once the capturing is started, changing time unit will clear all the data!

Step 2: Select the com port



Select the com port in which you've plugged the cable. Selecting incorrect com port will cause the program to function improperly.

Step 3: Start!



Click on Start button in the plot frame. The capturing will start.

If you have trouble

If you have trouble capturing the values, first of all check the serial cable. Then check whether the Geiger Counter is turned on or not.

Changing Time Units

Step 1: Stop the capturing process, if already in progress

Before changing time unit, be sure that the capturing process is not in progress. If it is in progress, stop the process by clicking on Stop button, and then save the data, if required. Changing the time unit will clear all the data.

Step 2: Select the time unit

Select time unit you want from the Time Options frame. The change in the time unit will also be reflected in various areas such as axis labels, radiation level units, update time, etc.

For example, when you are working with seconds, the program will accumulate the data for each second and plot CPS (Counts Per Second) as well as mR/hr values. When you are working with minutes, the program will accumulate the data for each minute and the values will be CPM (Counts Per Minute) as well as uR/hr.

Step 3: Done!

The time unit is successfully changed. You may now proceed towards capturing.

Step 1: Select the graph type



The software allows user to select from four graph types, for comfortable viewing. They are Line Chart, 3D Line Chart, Bar Chart, 3D Bar Chart. You may change the graph type anytime, even while the capturing is in progress.

Changing the graph type will not affect the values plotted in any way. You can change the graph type by clicking the appropriate graph type button from the Graph Type frame.

Step 2: Done!

The graph type is now changed.

Changing Graph Types

Printing

Step 1: Select proper graph type

Before printing, select proper graph type which you feel will be more suitable while printing. One more thing, printing from the main app will only allow printing last 60 points. If you want more comprehensive print options, you may print from Viewer. So print from the main app when and only when you need to print while the plotting is in progress.

Step 2: Click on Print



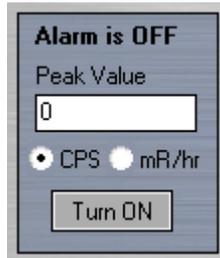
Click Print Chart button in the Others frame. This will lead to the printer selection/setup dialog. Select appropriate printer, change the preferences, enter the number of copies and click on Print. You may also print to a file, by checking print to file option there.

Step 3: Done!

Collect your print(s) from the printer tray.

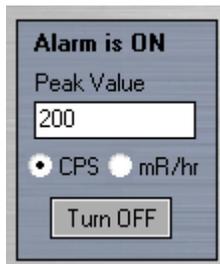
Step 1: Go to Settings dialog

On Others frame, click on Settings button. This will lead to the Settings dialog. In Settings dialog, there will be an Alarm section which looks like below.



Step 2: Enter a peak value and turn ON the alarm

Enter a peak value in CPS or mR/hr unit. You can select the appropriate unit from the options below the Peak Value textbox. If the alarm status is "Alarm is OFF", then click on the Turn ON button. So now it will look like below.



Step 4: Save settings!

Click on Save button on the Settings dialog. Now the alarm is set.

Setting Alarm

Did you know?

When desired peak level will be reached, the program will attract the attention by giving an audio visual indication.

You must know!

Remember that software will not convert mR/hr unit of peak value. So if you've set a peak value of 100 mR/hr and you are working in modes other than Second, the peak value will be 100 uR/hr and not the converted one.

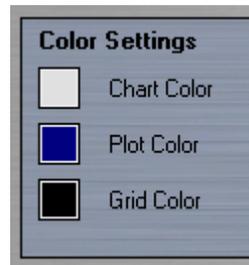
How to turn it off?

To turn alarm off, go again to the Settings dialog and click on Turn OFF, in the Alarm section. Then click on Save.

Color Settings

Step 1: Go to Settings dialog

On Others frame, click on Settings button. This will lead to the Settings dialog. In Settings dialog, there will be a Color Settings section which looks like below.



Step 2: Select colors

The program allows selecting different colors for background of the chart, the plot and the grid. Click on color button in front of each setting, to get a color selection dialog box. The color selection dialog box will allow user to select a color from a range of colors, and even allow creating a custom color.

Step 3: Save settings!

Click on Save button on the Settings dialog. The new color settings are immediately reflected in the main app.

Did you know?

These color settings are also used for the Viewer.

Don't do that!

Never try to modify the file GeigerCounter.ini manually, if you are not sure what you're doing.

Step 1: Go to Settings dialog

On Others frame, click on Settings button. This will lead to the Settings dialog. In Settings dialog, there will be Unit Options section which looks like below.



The program allows you to select between two unit types – Standard US and Systems International. If you select Standard US, the program will work with the units-mR/hr and uR/hr. If you select Systems International, the units will be converted to mSv/hr and uSv/hr, respectively.

Step 2: Select the unit

Select your desired unit option.

Step 3: Save settings!

Click on Save button on the Settings dialog. New unit settings will be reflected in the main app.

Unit Settings

Did you know?

$mSv/hr = (mR/hr)/100,$
 $uSv/hr = (uR/hr)/100.$

and

Changing Chart Title

Step 1: Go to Settings dialog

On Others frame, click on Settings button. This will lead to the Settings dialog. In Settings dialog, there will be a Chart Title section which looks like below.



The screenshot shows a dialog box with a title bar that says "Chart Title". Below the title bar is a text input field containing the text "Digital Geiger Counter - Radiation Monitor".

Step 2: Enter chart title

Enter the appropriate title you want.

Step 3: Save settings!

Click on Save button on the Settings dialog. The new chart title will be immediately reflected in the graph.

Did you know?

You can restore the factory settings, by going to the Settings dialog and clicking on the Defaults button.

But I don't want to save

If you don't want to save the settings you have changed, simply click on Close button.

Saving Files

Step 1: If you have not yet saved

If you have not yet saved the file (you want to save for the first time), then click on the Save button in the Graph frame (which looks like below).



The program will then ask for a file name. Enter your desired file name and click on save in the dialog. The data will be saved to the file.

Step 2: If you have saved once

If you want to save data to the same file, just click on Save. If you want to save data to a new file, click on Save As, and program will ask for a new file name.

Step 3: Saved!

The data is saved. You're safe.

Did you know?

Default extension for saved files will be .Gcp (Geiger Counter Plots).

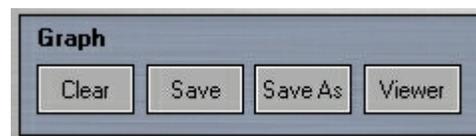
Clearing

Step 1: Save important data

Before clearing the plot, save important data to the file, if required. All the values will be deleted once you clear the plot.

Step 2: Clear

Click on Clear button, in the Graph frame.



Step 3: Cleared!

All the values will be deleted, and all the counts are reset. You are ready to start a new plot.

Interface description

The viewer interface comprises of following components:

- The main graph on which the values will be plotted.
- Navigation panel. This allows the user to navigate through the different parts of the graph. Navigation buttons-First, Previous, Next, Last are provided. A textbox displaying current range of the set is placed on the left. A slider is provided, to freely navigate through the plot. On the right, a textbox displaying total number of points is placed.
- Graph functions frame. This allows user to load graphs, print graphs and exit the Viewer.
- Scaling-Compression frame. This frame comprises of four scaling options-0.5X, 1X, 60X and 3600X. This is useful when you want to get a summary of the points, for a minute or an hour.

Suppose you have loaded a Seconds plot with 36000 plots. So the plot comprises of 36000 seconds. 0.5X will display the points with 30 divisions on the axis. 1X will display the points with 60 divisions on the axis. 60X compression will display one average point per every 60 points in the file (so that'll be average of a minute), and a total of 600 points. And 3600X will

The Viewer

display one average point per every 3600 points in the file (so that'll be average of an hour), and a total of 10 points.

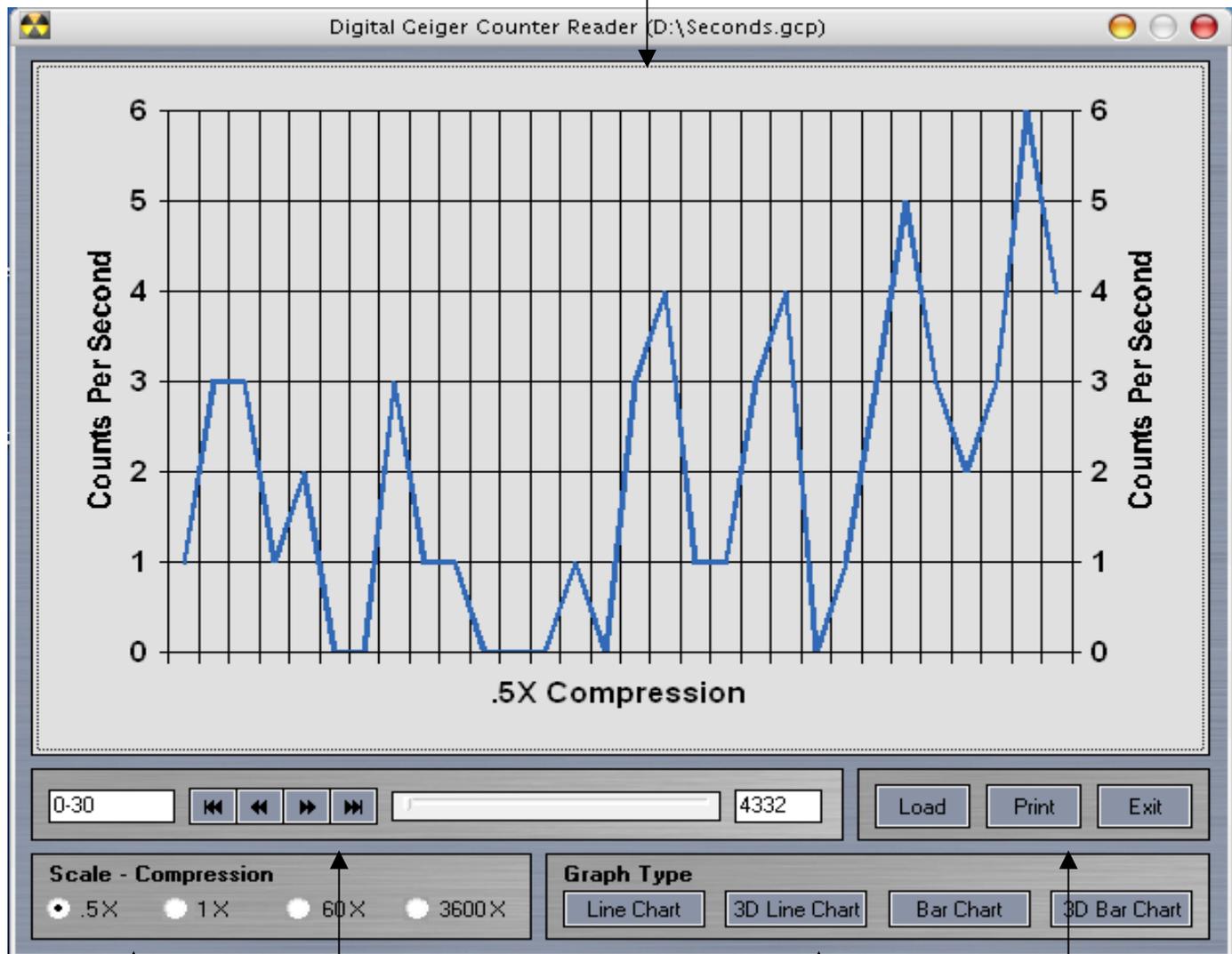
- Graph type frame. This allows user to switch between different views of graph (Line Chart, 3D Line Chart, Bar Chart and 3D Bar Chart).

Did you know?

Plotting will be stopped when you launch the Viewer. So keep this in mind before launching the Viewer.

Interface description

Main graph on which values are plotted



Scaling factor selection

Navigation panel

Graph type selection

Other graph functions

Loading Files

Step 1: Click on Load

Click on the Load button.



Step 2: Select the file to load

Select the file you want to load, in the file loading dialog box.

Step 3: Loaded!

The values in the file will be plotted in the graph. You can change scaling factors and graph types for your viewing pleasure.

Navigating

Step 1: If you want precision

To precisely navigate through the graph, use the slider.



Step 2: Doing it through buttons

You can use the Previous/Next button to navigate. It will shift 10 values in the plot. Clicking on First/Last button will move the plot to beginning/end respectively.

Step 3: Where am I?

You can see the current position (the range of the current set of points) in the leftmost textbox. The rightmost textbox will display the total number of points.

Step 4: That's it!

You're done with navigating.

Working with Scaling

Step 1: Decide what you want to see

Decide the scaling factor by which you want to see the plot. Selecting 0.5X will magnify the plot by 2X. Selecting 1X will display the plot as it is.

Selecting 60X will display one point instead of every 60 points, averaging the values of them. The number of points displayed will be (total points/60). So ultimately, this will display average counts per minute.

Selecting 3600X will display one single point instead of every 3600 points, averaging the values of them. The number of points displayed will be (total points/3600). So this option will display average counts per hour.

Step 2: Select the scaling factor

Select the scaling factor you want, from the Scaling-Compression frame.



Step 3: Done!

The graph will be scaled according to the option you have selected.

Step 1: Select the graph type



The software allows user to select from four graph types, for comfortable viewing. They are Line Chart, 3D Line Chart, Bar Chart, 3D Bar Chart.

Changing the graph type will not affect the values plotted in any way. You can change the graph type by clicking the appropriate graph type button from the Graph Type frame.

Step 2: Done!

The graph type is now changed.

Changing Graph Types

Printing

Step 1: What you see is what you get

Before printing, select proper graph type which you feel will be more suitable while printing. Also select the compression factor and the range of the data points you want to print. Ultimately, the output will be what it is on the screen.

Step 2: Click on Print



Click on the Print button. This action will launch the printer selection/setup dialog. Select appropriate printer, change the preferences, enter the number of copies and click on Print. You may also print to a file, by checking print to file option there.

Step 3: Done!

Collect your print(s) from the printer tray.

Importing in Excel

Step 1: Click on Open

While in Microsoft Excel, click on Open. Locate the folder in which the required file is present. In the File Type combo, select the option “All files”. Select the required file and click on Open. Text Import Wizard will show up.

Step 2: Select data type

In the text import wizard step 1, select the option Delimited and click Next (do not change any other options). In step 2, check the option Comma and then click on Next. In step 3, just click on Finish.

Step 3: Imported!

The file contents have been successfully imported. Very first number indicates time unit (1-seconds, 2-minutes, 3-hours and 4-days). All the other elements in first column are the CPS (or CPM/CPH/CPD) values. The second column contains the radiation levels, corresponding to the counts.

Troubleshooting

Problem 1: I am seeing weird colors. Other settings such as title/alarm are not working, too.

Check for the file GeigerCounter.ini. If it is misplaced, then go to Settings dialog, click Defaults to restore the factory settings, and save. You can also enter your custom values.

Problem 2: The status label remains Receive and the LED glows blue, but nothing is happening.

This means that the program unable to receive any values from the com port you have selected. Check whether you have selected the right port or not. If you have selected the right port, then check for the serial cable. If the cable appears okay, check whether the Geiger Counter is turned on or not.

Problem 3: Oops! I forgot to save (or my computer just went for a journey to mars).

Cool down. The program saves each and every value you plot, to a file called Temp.Gcp (which can be found in the program folder itself). The values will be written inside the file. You can copy the file Temp.Gcp, to your desired location and rename it. But make sure you don't launch the program before doing this. Because the

program clears the Temp.Gcp file on startup. So once you've launched the program, God help you!

Problem 4: Where's my com port?

If you are unable to see any com ports in the com port combo box, then there may be three problems. One, another instance of the software may already be running (so close that). Two, another program may be using the com port (so close that program). Three, there may not be a free com port!

Problem 5: Settings won't save!

If you change the settings, but they are never saved, then probably the GeigerCounter.ini file is set read only. Right click on the file and uncheck the read only checkbox. This problem also occurs when you are accessing the program from a CDROM.

If you still can't solve it

If there is any problem which you are unable to solve, then mail us with the full details of the problem, to:

imagesco@bellatlantic.net

Sample Experiment

Radioactive Decay Experiment Using TV Screen Dust

The dust wiped from the front of a television screen is radioactive.

Here's why

Every cubic meter of air contains a certain number of dust particles and radon atoms. Radon is radioactive and does not bond with other atoms. When Radon decays, it becomes an atom of polonium with a + charge. The polonium is attracted to any nearby particle of dust and will quickly attach itself. The polonium-dust still retains its +ve charge and is attracted to the negatively electrostatic charged surface of a TV screen. This is why TV screen dust always appears to be more radioactive than other dust.

The dust contains short-lived radon-222 decay products (polonium-218, lead-214, bismuth-214, and polonium-214). The radioactivity is due to these radioactive decay products attached to tiny dust particles.

Collecting Dust

Wipe the front of a TV screen with a Q-tip or tissue paper dampened with rubbing alcohol, collecting as much dust as possible. Bring the sample as close as possible to the GM tube of the Digital Geiger Counter. Using the graphing program you can record the radioactive decay.

The chart below shows the radioactive decay using a one hour time base.

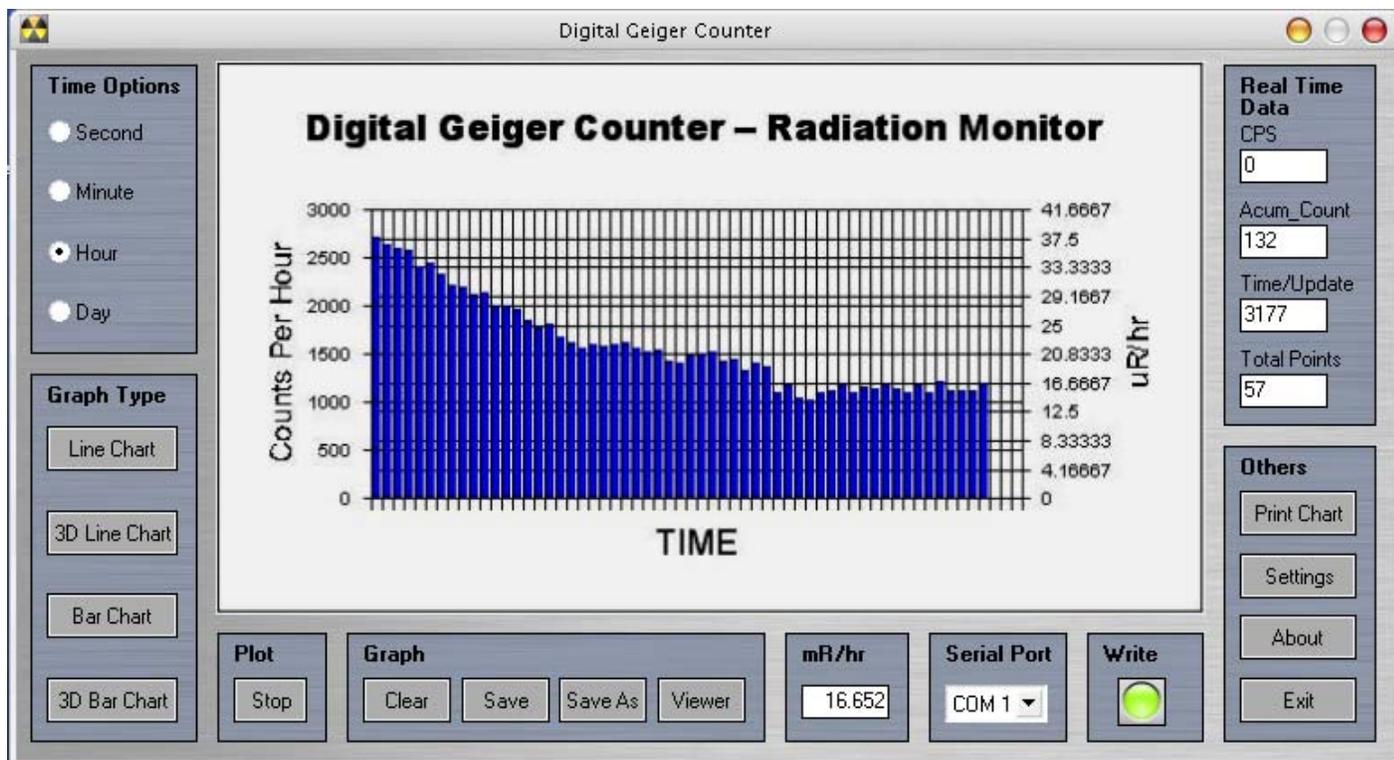


Chart of Radioactive Decay of TV Screen Dust

Particle Decay Sequence of Radon

- Radon-222 alpha decay ▶ Polonium-218, half life 3.8 days.
- Polonium-218 alpha decay ▶ Lead-214, half life 3 minutes.
- Lead-214 beta decay ▶ Bismuth-214, half life 20 minutes.
- Bismuth-214 beta decay ▶ Polonium-214, half life 200 microseconds.

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