

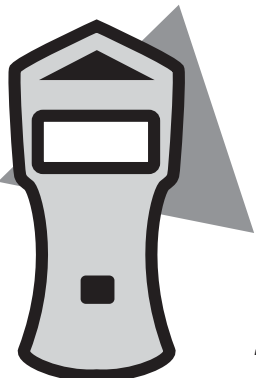
# GAMMA-SCOUT®

## Radiation Detector with USB-Port



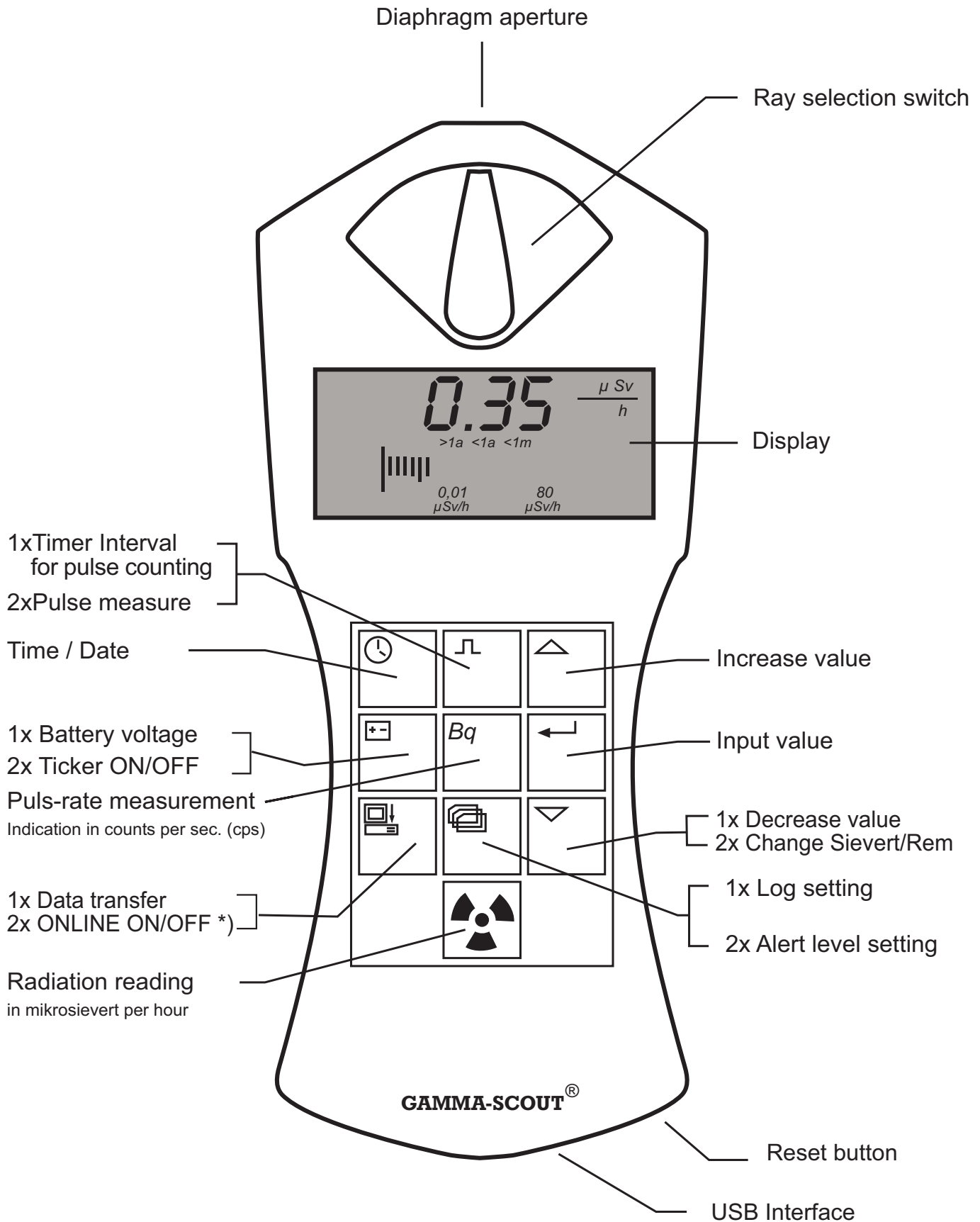
**GAMMA-SCOUT®**

A product of  
**GAMMA-SCOUT Ltd.**



*...reliable radiation measurement!*





\*) Only for ONLINE-Model

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## Features of GAMMA-SCOUT®- Radiation Meter

- **Measuring by pushbutton:** One push of a button is enough to start radiation measurement.
- **Large scale:** GAMMA-SCOUT® is calibrated across a wide scale (0.01 up to 1,000.00 µSv/h)
- **Tested precision instrument:** Each GAMMA-SCOUT® radiation meter is subjected to a final test supervised by the institute of radiation protection of a government controlled university of applied technology.
- **All ray types:** In contrast to normal radiation meters, GAMMA-SCOUT® can reliably measure not only gamma rays, but alpha and beta rays as well.
- **Change Sievert to Rem:** The dose rate may be displayed in Sievert or Rem
- **Permanent operation for years:** GAMMA-SCOUT® is monitoring the radiation day and night and is logging the data for later download. Because of sophisticated electronics, the battery is lasting for years.
- **Data storage:** GAMMA-SCOUT® stores all registered pulses in its internal memory, and keeps them ready for you to use when desired.
- **Evaluation by computer:** The software delivered with the GAMMA-SCOUT® enables you to evaluate the measuring data with a computer.
- **Compact design:** GAMMA-SCOUT® is very compact in its dimensions, and small enough to fit a pocket.
- **Certification:** GAMMA-SCOUT® has been tested by TÜV (German Technical Control Board) for device safety. It meets all European CE standards as well as the "FCC 15 standard" of the USA. GAMMA-SCOUT® may be carried on aircraft.

## GAMMA-SCOUT® w/alert

- **GAMMA-SCOUT® w/alert:** This model features an audible alert when radiation level exceeds a user-programmed threshold.
- **Accumulated dose:** GAMMA-SCOUT® can be used as (accumulated) dose meter as well.
- **Alarm level at dose level:** GAMMA-SCOUT® can give an acoustic alarm, when a user programmed threshold for the accumulated dose is exceeded.
- **Ticker:** The user can set on an acoustic ticker, beeping with each gamma pulse detected (increasing to a cascade in case of growing radiation).

## GAMMA-SCOUT® ONLINE

- **Cyclical data transmission:** This model has been designed for transmitting data cyclically.

## Operating conditions, technical notes, CD and user's guide

This device complies with part 15 of the FCC rules. Operation is subject to the following conditions:

- **This device may not cause harmful interference.**
- **This device must accept any interference received, including interference that may cause undesired operation.**

Please take all the care that is necessary in connection with radioactivity, and observe the radiation protection regulations.

This manual was updated and printed in December 2005. Furthermore the manual is found on the CD and on our website [www.gamma-scout.com](http://www.gamma-scout.com) as a PDF-file for free download. The version on our web-page is updated regularly while the CD-version and this document are fixed in Dec. 2005.

Enclosed is a CD ROM, which contains

"Gamma-Scout-Toolbox Release 3.30", the data-converting software for

© Microsoft-Windows based Personal Computers working with the operating systems

© WIN NT4.0, © WIN 2000/2003, © WIN XP

(The software is available in German and English version)

© ACROBAT-Reader installation files for © Microsoft-Windows

USB-driver

Installation hints

Manuals in different languages

Please register at our website

[www.gamma-scout.com](http://www.gamma-scout.com)

to get further information about important modifications.

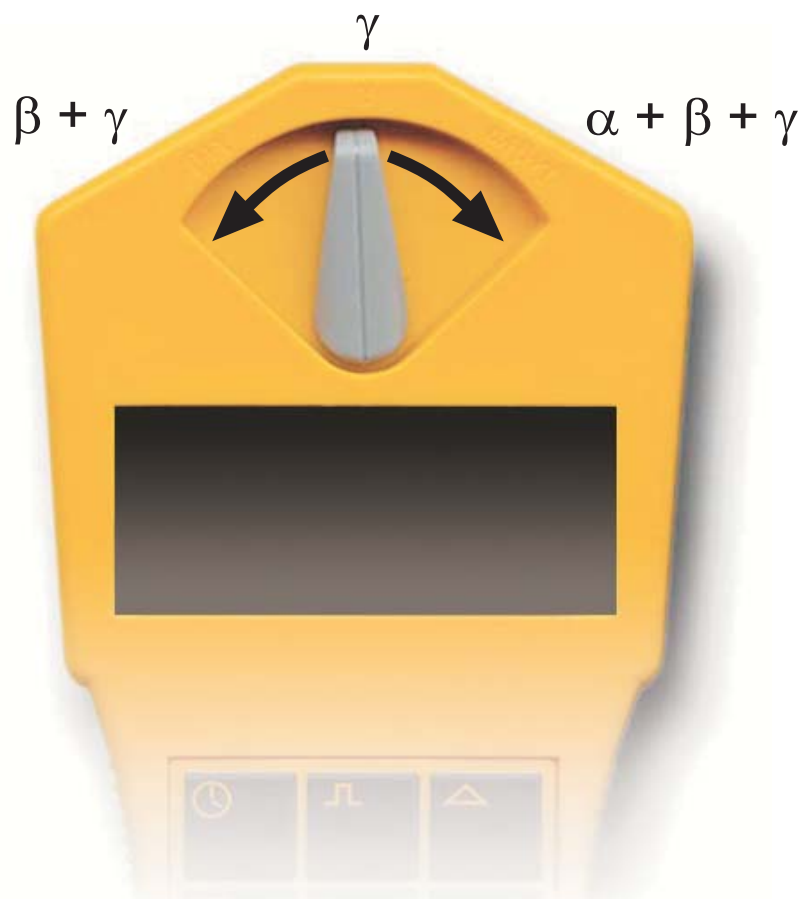
Your GAMMA-SCOUT® is equipped with a Geiger-Müller counter tube enabling you to detect not only gamma rays but alpha and beta rays as well.

With the ray selection switch you can limit the ray types you want to measure:

- Set the selection to centre position ( $\gamma$  symbol) if you want to detect gamma rays only. With the switch in this position, an aluminium plate screens the counter tube window against alpha and beta rays.
- Turn the switch to the left, i.e. counterclockwise (to the  $\beta + \gamma$  symbols) if you want to measure gamma and beta rays but no alpha rays. Now, an aluminium foil screens the counter tube window against alpha rays.
- Turn the switch to the right, i.e. clockwise (to the  $\alpha + \beta + \gamma$  symbols) if you wish to measure all three ray types. This switch position opens the counter tube window for access by the three types of ray.




For normal measuring, place the ray selection switch at center position. Alpha and beta rays are limited in range to a few centimetres or metres, and can therefore be detected only when very close to the radiation source.

This also explains why it makes little sense to keep the ray selection switch constantly open - an added reason being that the counter tube window may be damaged in this exposed position.




In standard mode, GAMMA-SCOUT® informs you quickly and reliably about current radiation exposure. Within the operational measuring range of GAMMA-SCOUT® the pulses per period are converted to equivalent dose by the ratio 96 [pulses per minute /  $\mu\text{Sv}$  per hour].



### Indicating current radiation

- Pressing the  button puts GAMMA-SCOUT® into standard mode, and its display shows you the present radiation in microsievert per hour - not only as a value but, also in the form of a bar chart. Note that for a small radiation value, this bar chart appears only as a single line. In order to visualize the volume of detected radiation, there is a bar diagram on the groundline of the display using symbols as >1a (stay for more than 1 year until accumulation of the legal maximum of 20 mSv p. a.), <1m (less than 1 month for accumulation) etc.
- For to change from  $\mu\text{Sv}$  to Rem start from mode "measure radiation". Press button  and confirm unit with button . All data will be displayed in the selected unit.

### Indicating average over the past day from 00.00 until 24.00

- Pressing the  button a second time causes the average radiation over the last day (midnight to midnight taken from the GAMMA-SCOUT® clock) to be displayed for a few seconds, again in microsievert per hour. The **H** symbol in the display will blink. Note that this function is not available for up to 48 hours after first putting the device into operation.

### Automatic alert level

- When exceeding the user programmed alert level, GAMMA-SCOUT® generates an audio alert (a beep every 2 seconds) and displays the blinking  icon. This icon continues blinking after radiation fall back until the user has deleted it by pressing the  button twice.

### What does a "microsievert" mean?

In physics, three types of radioactive rays are known: alpha, beta and gamma rays. They differ not only in their physical characteristics but also in their effects on humans. To make these three ray types comparable in their effects on humans, a value has been created which defines the biological effects of rays: it is referred to as dose equivalent whose unit is the sievert (called equivalent dose).

#### 1 REM = 0,01 Sievert (Sv)

Based on the counted radiation pulses, the different components of a radiation mix are converted into a common measure for the biological effect. To reflect this Cs 137 is used.

Conversion into the dose equivalent refers to the gamma quantum of the Cs 137 radionuclide with a quantum energy of approx. 1.2 MeV (megaelectron volt).

Relation of GAMMA-SCOUT®: 96 pulse per minute = 1.0  $\mu\text{Sv}/\text{h}$

**Normal values of exposure to radiation, limit values**

For individuals with professional exposure to radioactive sources, in the EU there are two legal upper limits.

In case of any close up to these limits the individuals have to exit their exposure for some time to cool down.




Accumulated dose limit is 20 mSv.

Dose rate limit is 6 mSv p.a. (assuming 2000 working hours per year) = 3 µSv/h.

Natural environment at Heidelberg, Germany has a radiation level of about 0.1 - 0.2 Mikro-Sv/h.

Below the digits of the detected dose on the display, a bar chart is visualizing how long the user may stay in this environment, until he accumulates the x-ray load of 20 mSv p.a., the mentioned upper level for professionally X-ray exposed people.

**Operating range of GAMMA-SCOUT®**

GAMMA-SCOUT® is used to control x-ray impact at home and on the job. Very strong x-ray load above 1000 µSv/h (nuclear core conditions) cannot be measured with this technique. In case of overflowing this upper limit, GAMMA-SCOUT® displays (N.N.N.N...) and sets the  icon into the display. Reset the  icon by double-pressing the  button. Data from overflow-status is marked with (\*) in the download table.












## Pulse counting

GAMMA-SCOUT® can also be used as a normal Geiger counter, in this case it simply counts the number of pulses received without converting them into the sievert unit. This function is always of advantage if the measuring values are to be integrated into existing processes and procedures or if the measuring process itself is to be demonstrated or checked.

GAMMA-SCOUT® stores the received pulses in its internal memory.



## Switching on the pulse count

- Press the  button to switch GAMMA-SCOUT® to the pulse count mode. The display then shows the pulse symbol. Counting did not yet start. A second pressing of the button will start the counting.
- Press the  button if you want to set a measuring time:
  - For the measuring time to count in seconds, press the  button once.
  - For the measuring time to count in minutes, press the  button twice.
  - For measuring time to count in hours, press the  button three times.
- Now set the exact value of the desired measuring time, using the  and  button.
- Start measuring by pressing the  button a second time. The pulse symbol flashes in the display during the measuring time.
- If a measuring time was set, the pulse symbol flashes until the end of the measuring time, after which it is steady again. The display now shows the number of pulses counted for the programmed interval. Example: 900 pulses / h = 0.25 counts / second
- You can stop measuring in two ways:
  - by pressing the  button once again. The measuring result remains visible in the display;
  - by choosing another mode of operation. This makes the measuring result disappear.

## Pulse rate measuring

In the pulse rate measuring mode, the pulses registered by the counting tube are continuously measured and converted into a pulse rate. The unit of this pulse rate is cps (counts per second).

Info: Counts per second is not exactly the same as „activity” of the nucleus, given in Becquerel.



## Indicating the pulse rate

Press the  $[Bq]$  button to switch to the pulse rate measuring mode. The  $\#$  symbol will flash for the duration of measuring. After measuring, the  $\#$  symbol is steady again.





Pulse rate measuring gives the average number of pulses per second. Since radiation intensity may strongly fluctuate on a short-term basis, this indication of average rate will of course be the more exact the longer the measuring is done.

GAMMA-SCOUT® gives you a first result within a few seconds, then automatically prolongs the measuring time up to 4096 seconds in order to produce as exact an average value as possible.














Example: 1024 pulses after 4096 seconds  
= 0.25 pulses / second

GAMMA-SCOUT® has an integrated quartz clock whose display you can activate by pushbutton. Time and date are used to register the measured radiation. The PC- supported software has a feature to synchronize the GAMMA-SCOUT® date and time with your PC-clock (see page 20). The GAMMA-SCOUT® clock serves to file data.


### Indicating time and date

- Press the  button to call the time. The display shows the time according to setting plus the  symbol.
- Press the  button a second time to call the date. The display shows the date according to setting plus the  symbol.



### Setting the time

- First, call the time by pressing the  button. Then press the  button to set the hours. Both hour digits flash in the display. With the  and  buttons, set the hours forwards / backwards as desired. Confirm the set value with the  button.
- Press the  button a second time to set the minutes. Both minute digits flash in the display. With the  and  buttons, set the minutes forwards / backwards as desired. Confirm the set value with the  button.
- If you wish to set the seconds as well, press the  button a third time. The display shows the two minute digits together with the flashing digits for the seconds. With the  and  buttons, set the seconds forwards / backwards as desired. Confirm the set value with the  button.

### Setting the date

- Press the  button twice to call the date display. See description "setting the time".




You can stop the setting of the clock at any time by pressing the  button. For stopping the year setting, press the  button a fourth time.

GAMMA-SCOUT® is powered by a Lithium/Thionyl chloride cell of 2.7-3.7 voltage.

The device will continue functioning until the cell voltage is down to 2.7. When the voltage drops below this value, the battery symbol will appear in the display. The stored data should then be read from the internal memory. Nevertheless, the data will be retained even at total breakdown of voltage, and can then be read when the device is serviced.

### Indicating the battery voltage

Press the  button to have the existing battery voltage indicated. The display will show the cell voltage available when the electronic system is under maximum load.

### Battery change

The battery is soldered on the circuit board to prevent any data loss.

In case the user wants to integrate a battery by himself, the basic parameters can be restored by pressing the reset-button after having changed the battery.



**By opening the GAMMA-SCOUT the warranty will be lost !**


### Reset button

In case of a blank display (for example because of an exposure to powerful high frequency fields) the user may restart the device by pressing the reset button. You may find this button in the lower opening of the case besides the USB interface. To prevent a touching by error and thus deleting all EEPROM data this button can only be reached from upside on the board. Any reset will set the clock on factory standards.

**Attention: The reset may delete your filed data.**

### Ticker

A double click of the button  will display the word 'On', i.e. the ticker can be switched on now. Touching the button  will switch on the ticker and the symbol "speaker" is displayed.

In case the ticker had been switched on already, the double click would have displayed the word 'Off'. Using the button  would have switched off the ticker and the displayed "speaker" will disappear.

With the ticker switched on, GAMMA-SCOUT® is making a beep for each pulse detected. Increasing radiation therefore will shift the single beeps to a growing cascade. The beeps are using 1000 times more power than the monitoring operation. Therefore we switch off the ticker internally after 10 minutes of use. If the ticker feature is used once per day, the power consumption still is in the limits of the long lasting battery. More ticker use, and this is filed, will cause a maintenance fee in case of battery change.

**Exceeding alert level threshold of the dose rate (Alert Version)**

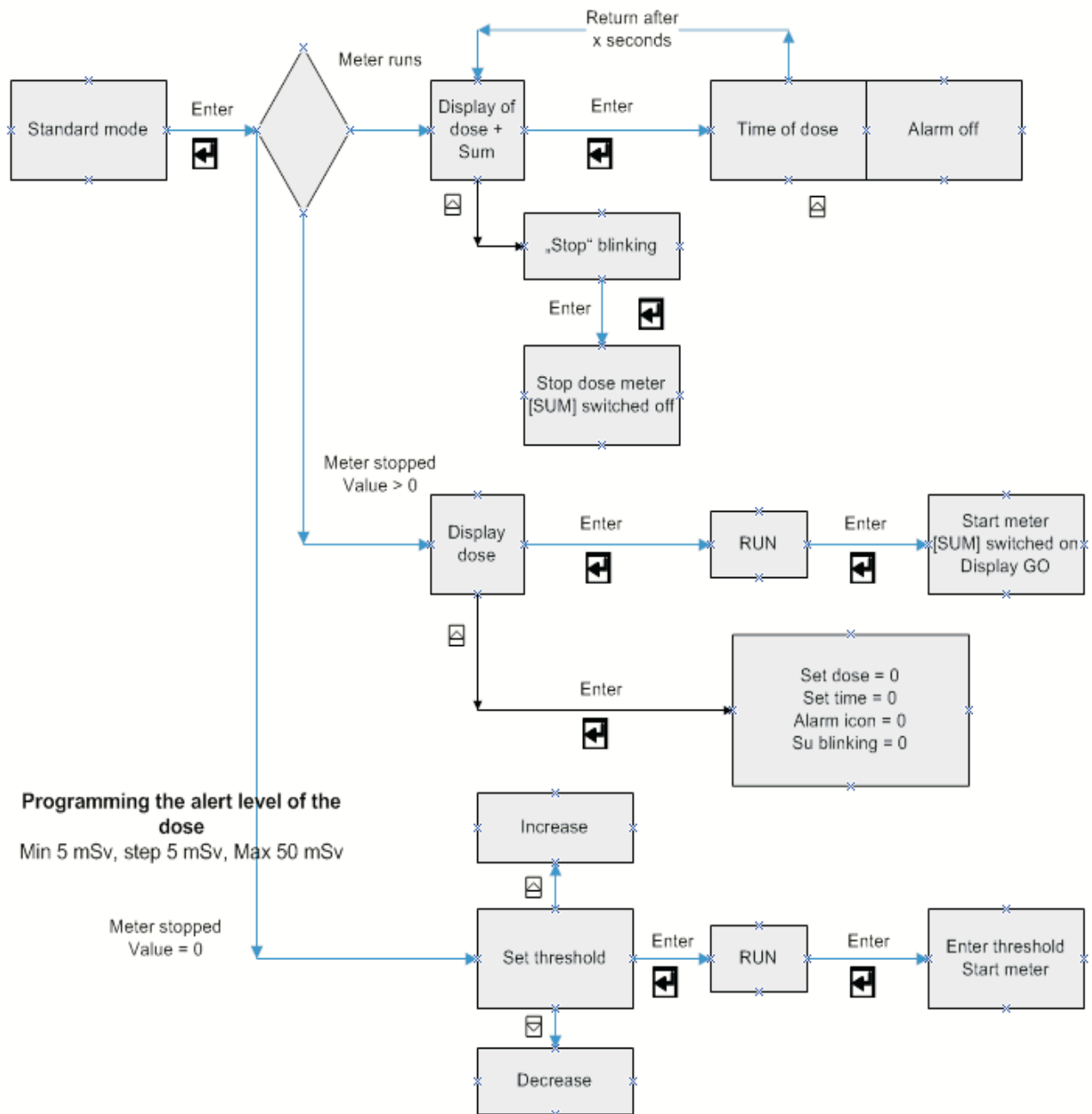
GAMMA-SCOUT®w /ALERT features an audio beep that sounds when radiation levels exceed a specific user-programmed level. The default alert level is 5 µSv/h . Along with the audio alert, the display will also show the  $\Delta$  icon.

**Programming the alert level of the dose rate**

The  $\square$  button pressed once is for control of the protocol (see page 12). A second pressing changes to status "alert level programming". The set level is displayed. The button  $\Delta$  increases , the button  $\nabla$  decreases the threshold. The new value is displayed blinking. The lowest possible value is 1.0 µSv/h. The step change is 1.0 µSv/h. The maximum possible alert level is 80 µSv/h. Press the button  $\square$  to save the new selected level.

**Display and reset of the dose (acumulated dose)**

The dose is displayed X.XX mSv, values of less than 0.01 mSv display 0.00 mSv. Start, stop, restart, and deleting of the dose display follow the chart below :








GAMMA-SCOUT® automatically logs the number of pulses measured, and stores this data in its internal memory. This data can be read and processed by a personal computer.

The logging process is factory-set so that GAMMA-SCOUT® will accumulate the pulses each week, storing them as weekly values. On this basis, the capacity of the memory is sufficient to log the weekly values over a period of 10 years.


As the following table shows, you can also set shorter logging intervals, with corresponding reductions in the storage capacity:

Logging interval	Display	Storage capacity
1 week	7d	Approx. 10 years
1 day	1d	Approx. two years
1 hour	1h	four weeks
10 minutes	10 min	Approx. four days
1 minute	1 min	Ten hours

### Data log setting

- Press the  button to switch to log mode. The display shows the log symbol . Briefly, the bargraph will appear in addition, indicating how much log memory is still available. Each bar equals 4% of memory.
- By pressing the  button, you select more frequent logging and, consequently, shorter logging intervals.
- By pressing the  button, you select less frequent logging and, consequently, longer logging intervals.
- By pressing the  button, you enter the finally selected value of logging interval.

GAMMA-SCOUT® automatically prolongs the logging interval to a week as soon as the memory capacity is more than 3/4 full. You can transfer the logged data to a personal computer at any time, and then clear the memory of your GAMMA-SCOUT® for fresh use. The next section gives you detailed information on this subject.

Using the "GammaToolBox"-software, you can transfer the data (Gamma-Hex-Dump), which GAMMA-SCOUT® has logged in it's memory to a personal computer and convert them into list- or graphical form for further processing. Connect your GAMMA-SCOUT® with the USB port of your personal computer, install the USB-driver and press the  button on the GAMMA-SCOUT's® control panel to set the device into data transfer mode.

## System requirements

For use of "GAMMA-TOOLBOX", the System must meet the following requirements:

© MS-Windows PC with a USB interface. Gamma-Tool Software is supporting the following operating Systems at the moment; ©WIN NT 4.0, ©WIN 2000/2003, ©WIN XP.

## Data download cable

The cable between the USB-PC-interface and the USB-Port of the GAMMA-SCOUT® is in the box. Please connect the fitting ends to the devices before installation of the USB-driver.

To connect USB-cable please open the little cap on the button of your GAMMA-SCOUT®, there a USB-connector to the personal computer is found.

## Software installation:

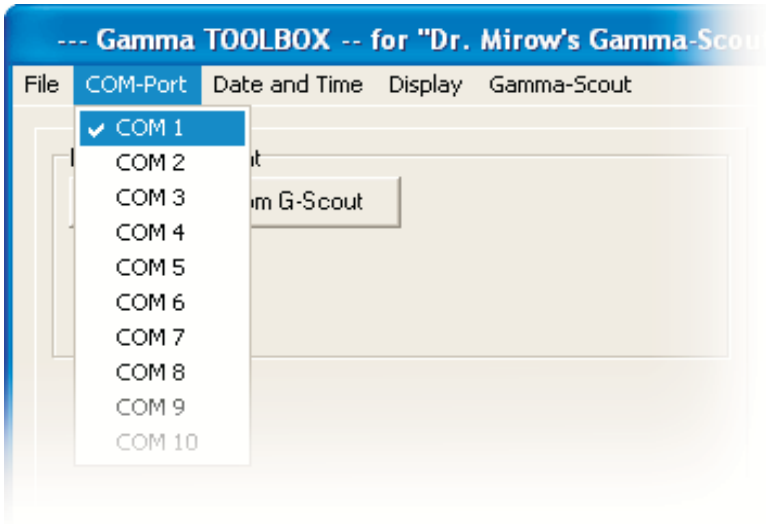
1. On the CD can be found
  - the USB-driver for ©MS-Windows and the GammaToolBox-software
  - the installation-routine (see picture below) and
  - the multilanguage manuals with actual information.
2. Installation
  - Put the CD-ROM into your CD-drive
  - The installation-routine starts automaticly (when autostart-function is enabled)
  - Otherwise start „Autorun.exe” from the CD's-root-path manually by doubleclick.



3. In case of using the software for data reading, start GAMMA-TOOLBOX software by double-clicking "GammaTool.exe" within the directory where you have installed the software on your harddrive. If you wish, you can create a corresponding icon on your desktop.

**Using the download software**


Start your GAMMA-TOOLBOX software from the harddisk via click on "GammaTool.exe". When you start the program for the first time you will be requested to choose any serial port of your computer. The program will use this preselected port later on. The USB-port is mirrored as a COM-port within your system and appears within the selection-box. Make shure to connect to the appropriate COM-port which is assigned to your USB-port ! Otherwise no data will be transferred.

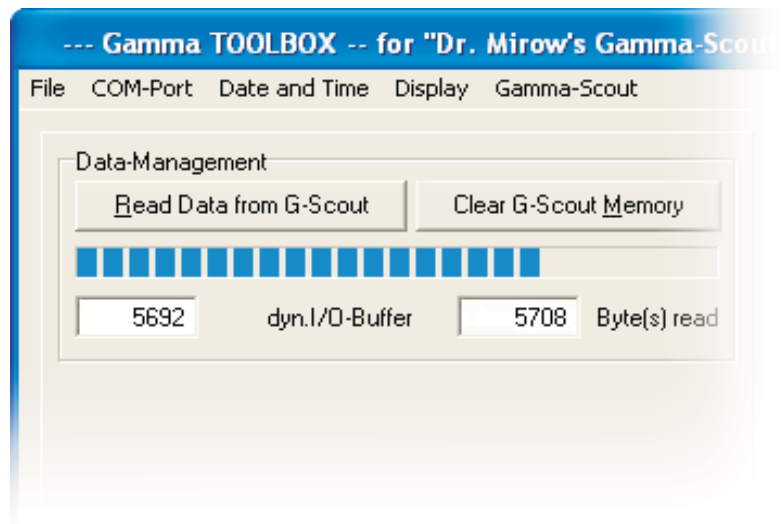


If the port is not present, or already used by any other device, an error message window will appear. Please install first the USB-drivers from the CD after connecting your GAMMA-SCOUT® USB-version, The drivers are found in the directory 'USB' on the CD. After connecting the USB-port to the device® MS-Windows comes up with an installation deamon. Follow the suggested steps using the CD's USB-directory as driver-source. Please ignore error messages regarding the device driver and Microsoft-certification.

Every time you start the program please be sure your GAMMA-SCOUT® is connected via the previous selected port of your computer. If the USB-port is not recognized by® MS-Windows as a COM-port, please restart the whole system. After connecting the device to your personal computer via USB, the port to the GAMMA-SCOUT® should be initialized. If you change the USB-port you will have to reinstall the USB-drivers casually.

**Data transfer**

Click "Read G-Scout"-Button to start data transfer from the memory of GAMMA-SCOUT® to your PC. If the data transfer cable is not connected properly, or GAMMA-SCOUT® has not been set in data transfer mode by pressing the  button on its keyboard, an error message will pop up on your screen.



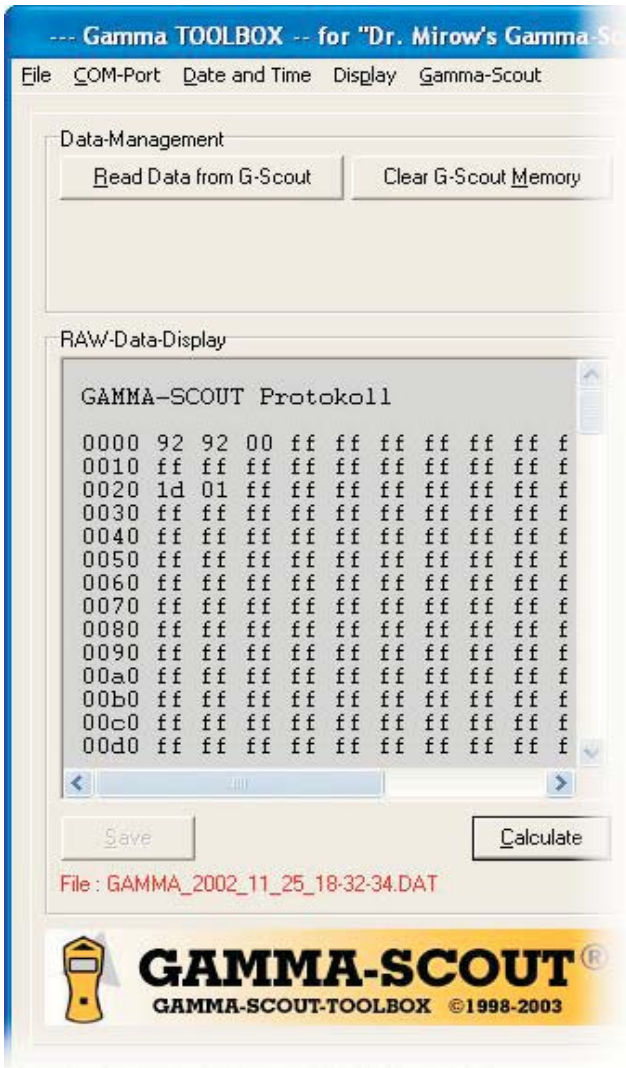


Raw-data display


The transferred data is now visible in Raw-Data-Display. The generation of the raw-data is filing this data in the directory where the gamma-toolbox software has been installed. This automatic

generation of the raw-data is using the names  
 „GAMMA\_YYYY\_MM\_DD\_Hr-Min-Sec.dat”  
 and  
 „GAMMA\_YYYY\_MM\_DD\_Hr-Min-Sec.csv”  
 Via the button „Save” the user can store these two files in a directory and name of his own choice.

Klick on the button „Calculate”, the data are displayed as readable table on the same screen as the raw-data (ctn. p.17).



**Serial port mode and energy consumption**

In „PC-Serial port mode” the energy consumption of GAMMA-SCOUT®’s battery is increased. Do only activate this mode when Gamma-Toolbox requests you by info-window. Save battery life of your GAMMA-SCOUT® and switch from ”serial-port-mode” back to ”measuring-mode” by pressing the button  on GAMMA-SCOUT® panel. If the user forgets to switch back to „measuring-mode”, GAMMA-SCOUT® will switch back automatically after 3 minutes of not using the interface.

## The log-file

In case of a problem with reading or converting the raw data (hexa-decimal) to the table ready to read, the software must protocol this problem in the „log file”. Typically, the software does not pop up this log file.

In raw-data calculation the checking results of the particular data-strings are written into a log-file. Click button "Save Log-File", if you want to save this file.



Exit this step via button „Close”.

**Reading, filing, charting data**

After the raw-data have been converted into table-format (see page 15), the following window is displayed. Data may be printed or saved via "Save calculated data" as text file (.txt). Choose file name and target directory. The file will be formatted automatically. Data may be converted to graphics on screen via the button "Show data in graphical display".

Calculated Data

---

**Gamma-Scout -- Calculation of Raw-Data --**

---

**"File : GAMMA.DAT"**

---

**The ID of your Gamma-Scout is : 009299**

---

**Measurements with overflow  
of the counter-tube  
(max. 80 Microsievert per hour) are signed with "".**

**[cps] means 'Counts Per Second' (Impulses Per Second)**

---

**PROCESSED DATA :**

---

Nr.	Range	from	to	Impulses	Rate [cps]
1	Set/Tm.	14:00 01/22/03	14:05 01/22/03	0000000092	0.307
2	Set/Tm.	14:05 01/22/03	14:07 01/22/03	0000000033	0.275
3	Set/Tm.	14:07 01/22/03	11:25 01/23/03	0001084416	14.142
4	Week	11:25 01/23/03	11:25 01/30/03	0000000773	0.001
5	Week	11:25 01/30/03	11:25 02/06/03	0000000240	0.000

---

Gamma-Scout ID : **009299**

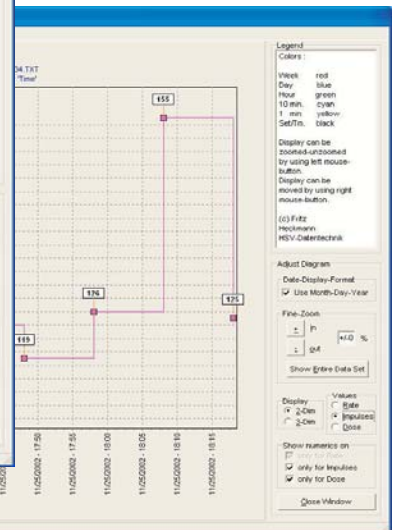
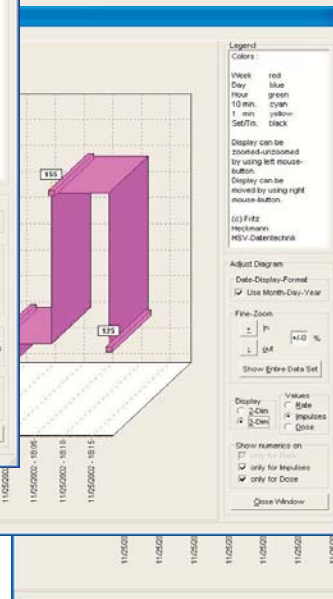
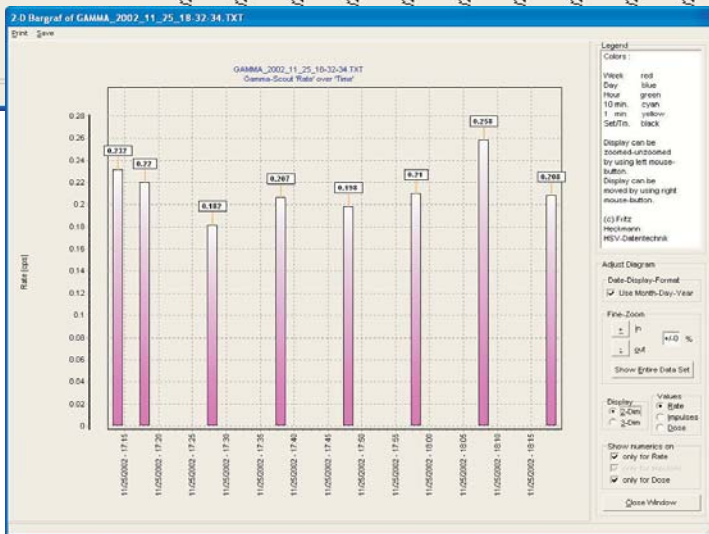
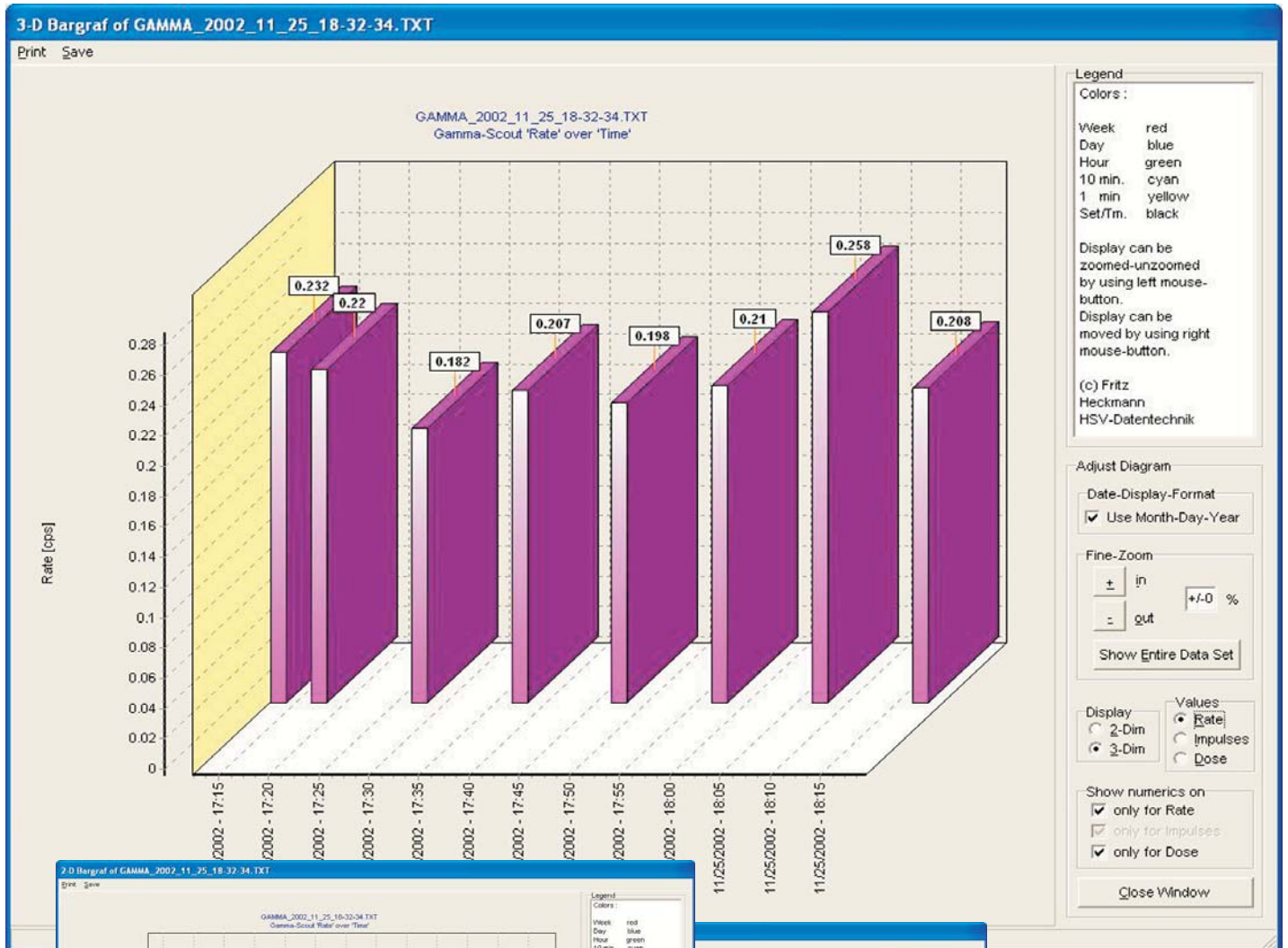
Save calculated data

---

Show data in graphical display

### Graphical display of data

Data can be displayed in two- or three dimensional form as pulse-rate-, pulse- or dose-rate-chart. These charts are printable and can be saved as Bitmap (.BMP) or windows metafile format (.WMF).

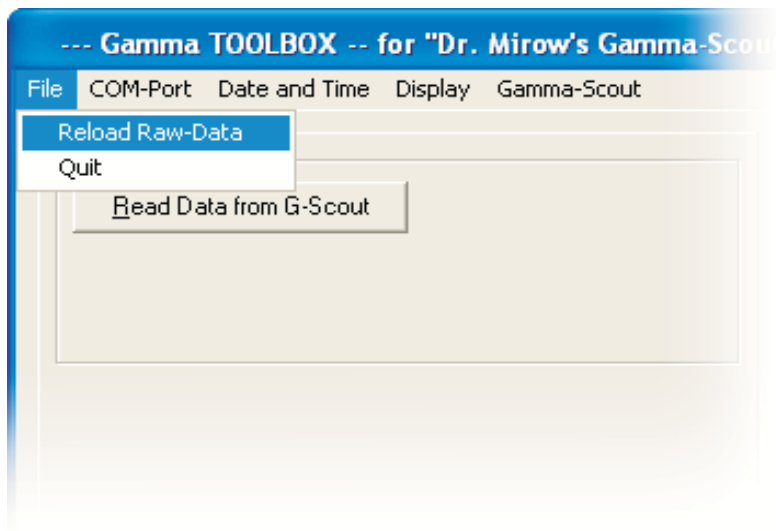


## Export of data to Excel

If you wish to handle GAMMA-TOOLBOX generated csv-file data (see page 15) with "© Microsoft Excel", you can import it as explained in Gamma-Toolbox, „Gamma-Scout / Info CSV-Files”.

## Menu options

The functions in the main-menu are "File", "COM-Port", "Date and Time", "Display" and "Gamma-Scout".

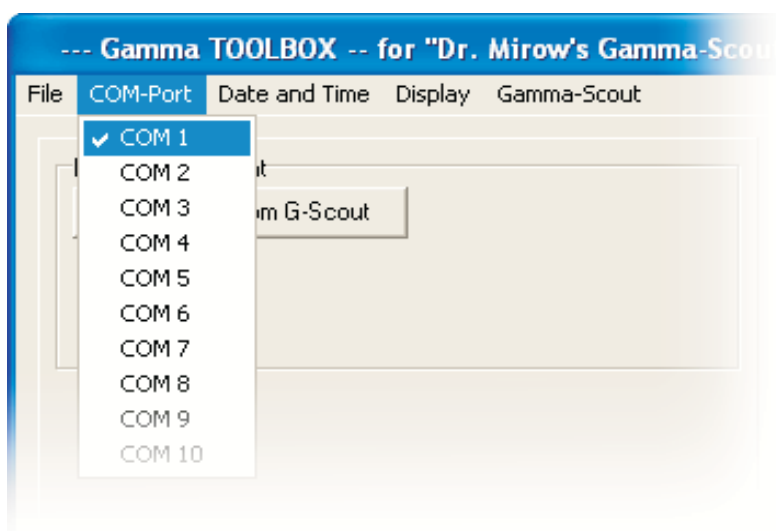


- **File / Reload Raw-Data :**

Choose „Reload-Raw-Data” to call data previously stored.

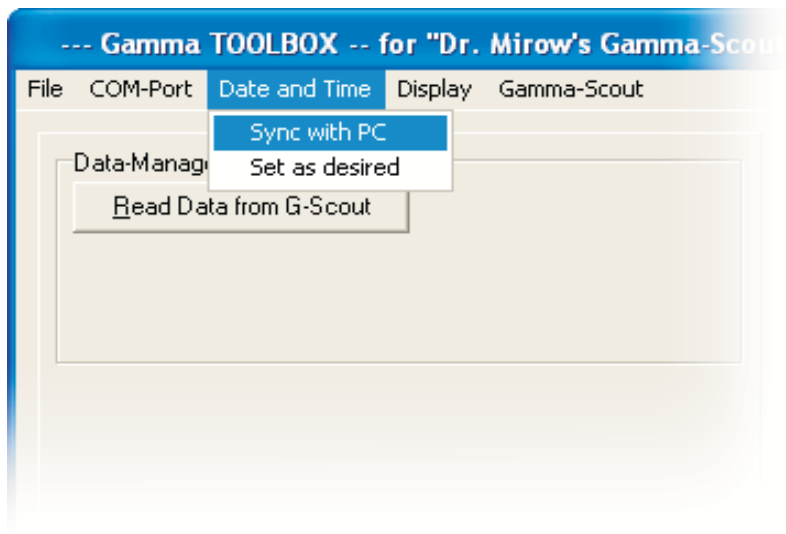
- **File / Quit :**

Choose "Quit" to exit program.



- **COM-Port :**

Choose the number of serial-port of your computer, which is connected to GAMMA-SCOUT®. USB-ports appear as (higher) COM-ports.



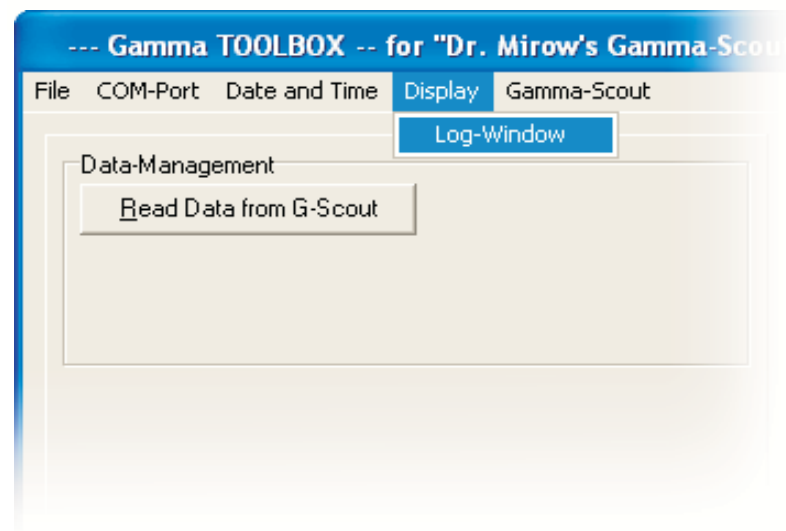
### Date and Time

- **Sync with PC :**

Choose „Sync with PC” to synchronize time and date of GAMMA-SCOUT® with your PC.

- **Set any time :**

Choose "Set any time" to set date and time of GAMMA-SCOUT® by your choice (i.e. in different time zones).



### Display

- **Log-Window :**

Select "LOG-Window".  
Now the screen reporting the data conversion procedure will pop up.

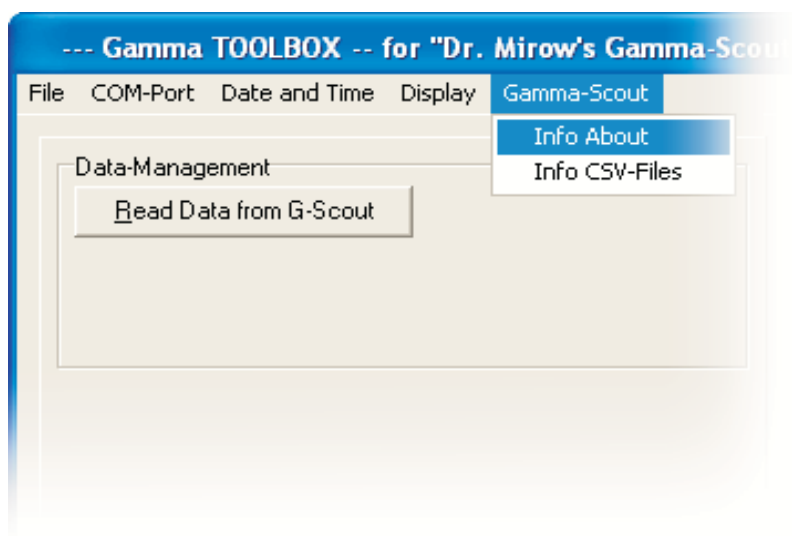
### ONLINE Model

- **ONLINE-Model "Display data" :**

Using this menu-function another window will appear showing the transmitted data from the online-model to the pc.

For further information please have a look to our homepage.

## Help



### Gamma-Scout

- Info About (Where and how to get help):

Choose menu „Info About” to get information about the operating system of your PC and your GAMMA-SCOUT, the version number and the manufacturer of GAMMA-TOOLBOX-software. If you need help the help-desk <gamma@hsv-datentechnik.de> must know this system information.

- Info CSV-Files :

Choose menu „CSV-Files” to get more information about the ”csv-file”, which Gamma TOOLBOX generates to make possible further editing in ©Microsoft-Excel.

### Error messages:

Com-Port not available

During the first time reading data from the device the following possibility of errors exist:

- *The USB-driver found on the CD is not installed or only partly installed*

Use FTDIUNIN.EXE from the CD to uninstall the USB driver completely. Then reinstall USB drivers.

- *The ToolBox Software cannot find the assigned COM-Port*

The USB-driver assigns a virtual COM-Port 1...10. If the needed port is used by other software yet (e.g. BlueTooth from Mobile-Phones) , please uninstall the third-party software and drivers first, reinstall our USB-drivers and then the third party software again.

If the download program runs to an undefined status, error messages will be displayed.

If you request help from

**<gamma@hsv-datentechnik.de>**

please report this error messages and your system parameters.

### **Radiation above the operating range**

If GAMMA-SCOUT® measures dose rates  $> 1000$  microsievert / h, these values are marked with (\*) within the print-outs of our software.

If this overflow occurs over a longer interval, the sum of the entire interval will be marked with (\*).

### **I/O-port of the GAMMA-SCOUT®**

The drivers for the USB-connection can be found on the CD in a subdirectory called "USB".



Display	Liquid-crystal display (LCD), 4-digit, numeric with dimension, quasi-analogue logarithmic bar chart. Operating mode indicators	
Ray detector	End-window alpha-beta-gamma detector counting tube according to the Geiger-Müller principle Stainless steel housing with neon halogen filling Measuring length 38.1 mm, measuring diameter 9.1 mm Mica window 1.5 to 2 mg/cm <sup>2</sup> Gamma sensitiveness 96 pulses per minute at Cs 137 radiation = 1µSv/h in energy band of ambient radiation Zero rate <10 pulses per minute with screening by 3mm Al and 50mm Pb Operating temperature -20 bis +60°C, operating voltage approx. 450 V Calibrated scale 0.01 µSv/h up to 1,000.00 µSv/h	
Ray types	α (alpha)	from 4 MeV
	β (beta)	from 0.2 MeV
	γ (gamma)	from 0.02 MeV
Ray selection	α + β + γ	without shielding
	β + γ	Al foil approx. 0,1 mm, shields off α completely
	γ	Al shielding approx. 3 mm Shielding off α completely and β to 2 MeV, weakens γ less than 7%
Recycling		We recycle cost free returned devices
Power-consumption	On average less than 10 microamperes	
Memory	2 Kbyte	
Housing	impact-resistant Novodur plastic	
Dimensions	Length 163 mm x width 72 mm x height 30 mm	
Interference protections	European CE standard, US-standard FCC15	
Service	Dr. Mirow/GAMMA-SCOUT Abtsweg 15, D-69198 Schriesheim Fax ++49 6220 / 6640 E-Mail: drmirow@gamma-scout.com	
State	30.Dec.2005 (Right of modification reserved)	

Scientific definitions see "[www.hpa.org.uk/radiation/glossary](http://www.hpa.org.uk/radiation/glossary)".

Physical Term	New Unit	Old Unit	Relation
Aktivität	Becquerel (Bq) 1 Bq = 1/s	Curie (Ci)	1 Ci = $3.7 \cdot 10^{10}$ Bq 1 Bq = $2.7 \cdot 10^{-11}$ Ci = 27 pCi
Ion Dose I	Coulomb / kg	Röntgen (R)	1 R = $2.58 \cdot 10^{-4}$ C/kg 1 C / kg = 3876 R
Energy Dose D	Gray (Gy)	Rad (rd)	1 rd = 0.01 Gy 1 Gy = 100 rd
Equivalent Dose H	Sievert (Sv)	Rem (rem)	1 rem = 0.01 Sv 1 Sv = 100 rem

### ONLINE Model

The ONLINE Model has been designed to transmit data cyclically from the GAMMA-SCOUT® to a connected PC.

More information is to be found on our homepage in the Internet.

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# Dr. Mirow / GAMMA-SCOUT

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**GAMMA-SCOUT®**



*...reliable radiation measurement!*