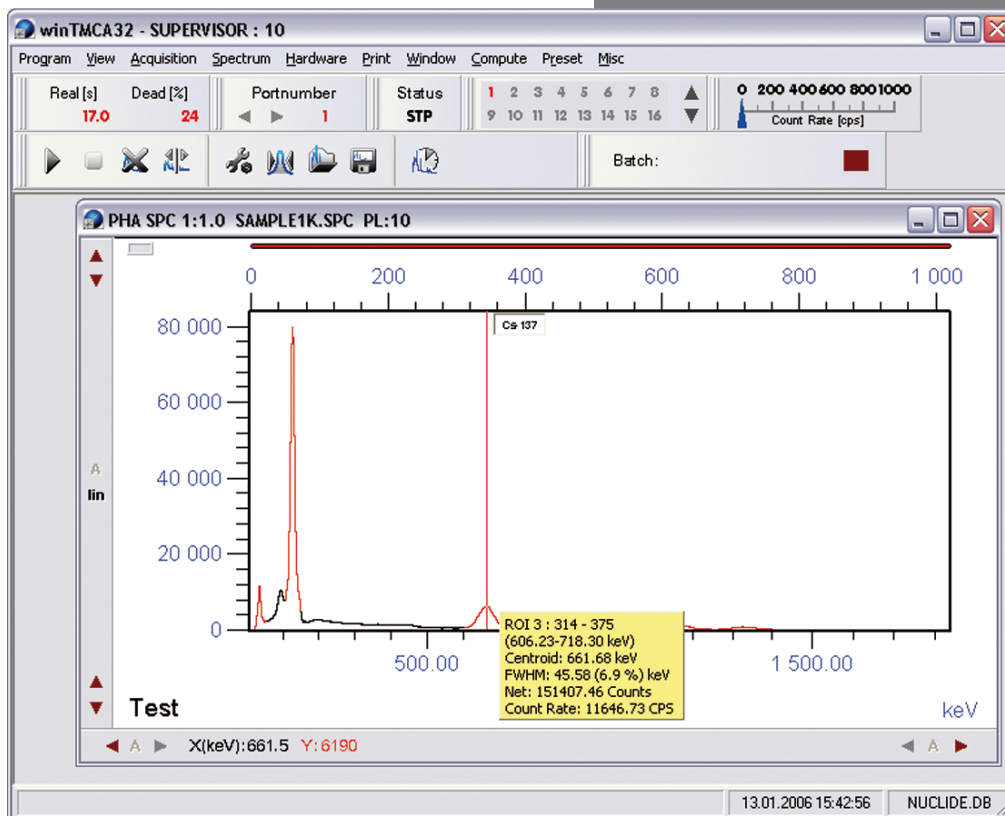


winTMCA 32



winTMCA 32

User Manual



This document is changed in accordance with the ICx Technologies Quality Management system. Changes are archived.

Revision winTMCA 32/en/1.2.1(5861)/Jun2010
Product winTMCA 32
Language English (en)
Version 1.2.1 (5861)
Latest Change June 07, 2010 at 09:35 (UTC+0200h)



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Chapter

1

Introduction

1 Introduction

[Manufacturer](#)

[Hardware and software requirements](#)

[Installation issues](#)

[Available acquisition hardware and their technical data](#)

1.1 Manufacturer

winTMCA32 is developed and distributed by

ICx Technologies

1.2 Hardware and software requirements

The following items are required for the use of winTMCA32:

- personal computer (IBM or compatible) with either Pentium or a faster processor with a minimum frequency of 200 MHz
- hard disk with at least 20 MB free disk space
- dMCA- respectively external acquisition hardware nanoSPEC or identiFINDER
- VGA graphic card
- MS-Windows[®] version 9x, ME, NT, 2000 or XP

1.3 Installation issues

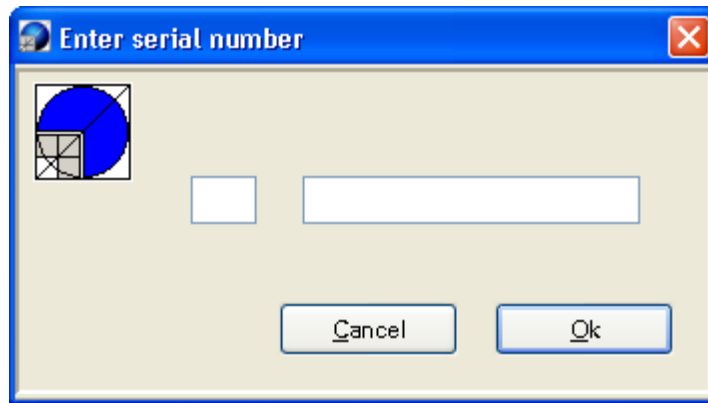
Insert the winTMCA32 distribution CD into your CD-ROM drive. Select the desired winTMCA version on the CD (for example "winTMCA32 nanoSPEC English") with the windows[®] explorer and open the directory. Start the program SETUP. EXE in the selected folder and follow the instructions of the installation program.

After installation, the sub directories "NUCDATA", "CONFIG" and "SPECTRUM" are located in the selected or newly created directory. All [nuclide databases](#) used by the winTMCA32 software are stored in the NUCDATA directory. The SPECTRUM directory serves as default directory for saving spectra.

In the CONFIG directory all files corresponding to the actual configuration as for example [batch-](#), [menu-](#) and [button files](#) are located. The names of these sub directories must not be changed.

When you start the winTMCA32 software for the first time after installation, a dialog window appears. Now enter the serial number which is found on the CD cover.

Attention! If you use the operating system Windows-NT and Windows-2000, you must have administrator rights to enter the serial number successfully.



After having entered the serial number you must confirm by clicking the OK button. If the input is correct the dialog window closes and winTMCA32 starts. If you enter an invalid serial number, an error message appears.

The serial number must be entered only once and is user independent.

1.4 Available acquisition hardware and their technical data

[plug-in cards](#)

[external acquisition hardware](#)

1.4.1 Plug-in cards

[dMCA-card](#)

1.4.1.1 dMCA-card

The winTMCA32 software automatically detects the dMCA card.

Technical data:

Type	32 Bit PC/PCI card
Size	160 mm × 107 mm (dMCA4) 305 mm × 107 mm (dMCA8)
Power	+5 V, 600mA (max. for dMCA4) +5 V, 800mA (max. for dMCA8)
Inputs	LEMO connectors (depending on module)
Spectra parameters	spectra length: 4-65535 channels bits per channel: 24 storage capacity: 4194304 channels

1.4.2 External acquisition hardware

[identiFINDER](#) [nanoSPEC](#)

1.4.2.1 identiFINDER

Initialize the identiFINDER with a configuration file named [TMCAINIT.TXT file](#). In order to communicate with a identiFINDER the file must contain the following lines:

```
r=0
p=1,F,c,96
```

c refers to the COM port number, to which the infrared adapter is connected, for example 1 for COM1, 2 for COM2 etc.

Technical data:

Size	230 mm × 90 mm × 70 mm
Power	4 batteries/storage batteries type AA, LR6, 1,2-1,8 V
Spectroscopy specifications	resolution 1024 (NaI), 4096 (CdTe) channels differential Nonlinearity = 0.1/0.2 % over 99 % of the channels integral Nonlinearity = 0.05% over 99% of the channels spectra memory: 256 spectra á 1024 channels
Amplifier	digital filter
High Voltage	+50 to +1275 V

1.4.2.2 nanoSPEC

Initialize the nanoSPEC with a configuration file named [TMCAINIT.TXT file](#). In order to communicate with a nanoSPEC the file must have the following lines:

```
r=0
p=1,N,c,384
```

c refers to the COM port number to which the nanoSPEC is connected, for example: 1 for COM1, 2 for COM2 etc.

Technical data:

Size	117 mm, Ø 62 mm
Power	4 batteries/storage batteries type AA, LR6, 1,2-1,8 V
Spectroscopy specifications	resolution 512-2048 channels differential Nonlinearity = 1 % over 98 % of the channels integral Nonlinearity = 0.05% over 98% of the channels spectra memory: 16 spectra á 1024 channels
Amplifier	1 µs shaping time gain software selected (x1...4)
High voltage	software selected +50 to +1200 V

Chapter

2

Software specifications

2 Software specifications

The MCA software winTMCA32 has the following attributes:

- display of 1...64 [spectra windows](#)
- at maximum 4 000 000 channels per spectrum (depending on RAM)
- 32 bits per channel signed (that means the maximum range of the channel contents is -2147483647...+2147483648)
- x-axis [calibration](#) with a polynome in the at maximum fourth degree
- [linear, logarithmic and inverse square scaling of the channel height axis](#)
- spectra manipulation: [add](#), [subtract](#), [multiply](#), [divide](#), [smooth](#) and [rescale](#) channels using a polynome in the at maximum second degree
- spectra evaluation: [integration](#) via gauss fit, [peak search](#)
- [definition up to 128 ROIs](#) (regions of interest) for each spectrum
- selectable nuclide database for online display within the spectrum
- [nuclide database editor](#)
- [acquisition modes](#): PHA (pulse height analysis)¹, MULPHA (multiple PHA)¹, STABIL (stabilized)¹, MCS (multi channel scaling)¹, DOSIS¹, DUAL^{1,3}, RAWDATA¹, WINDOW¹, LIST²
- [pre-set](#) acquisition time depending on: real time, dead time corrected acquisition time (live time), total count rate, channel maximum, next channel (MCS)
- user [configurable menu headers](#) and [buttons](#)
- [user administration](#) protected by pass word
- configuration is stored (i.e. window sizes, positions, etc.) in the windows registry
- [setting up acquisition hardware parameters](#)¹
- integrated interpreter to build user specific program- and acquisition runs containing the following functions:
 - usage of variables
 - conditioned instructions (IF...THEN...ELSE)
 - FOR-loops
 - calculator function
 - ASCII communication via serial interface with any advice
 - DDE communication with other programs
 - configurable menu inputs
 - screen respectively printer outputs using ASCII layout files
 - parallel execution of maximum 64 batch files
- [editor](#) to create and alter batch files, spectra etc.
- [ROI evaluation module](#) containing efficiency consideration for NaI detectors³
- 3D display of two parametric spectra (matrices)³

¹depending on acquisition hard ware

²in preparation

³optional

Chapter

3

Operating winTMCA32

3 Operating winTMCA32

In order to operate the winTMCA32 software a mouse or comparable input device is necessary. But you can also call up many functions by using the keyboard.

[Starting instructions](#)

[Main program](#)

[Menu header](#)

[Tool bar](#)

[Changing graphical user interface](#)

[Batch files](#)

3.1 Starting instructions

Start the program winTMCA32 by double clicking on the symbol which was created on the desktop during installation, or by selecting the file "winTMCA32.EXE" in the installation path via START ⇒ EXECUTE ⇒ SEARCH. But the program can also be started by direct selection using the windows explorer.

The programs [DBEDIT.EXE \(nuclide data base editor\)](#) and [winTMCAEDIT.EXE \(editor\)](#) are not connected with the desktop.



Starts the MCA software winTMCA32.



Starts the [nuclide database editor](#).



Starts the [editor](#) which handles [batch files](#), spectra, text files...

3.2 Main Program

When the winTMCA32 program is started, the main window is displayed. It is divided into various sections:

[menu header](#)

[tool bar](#)

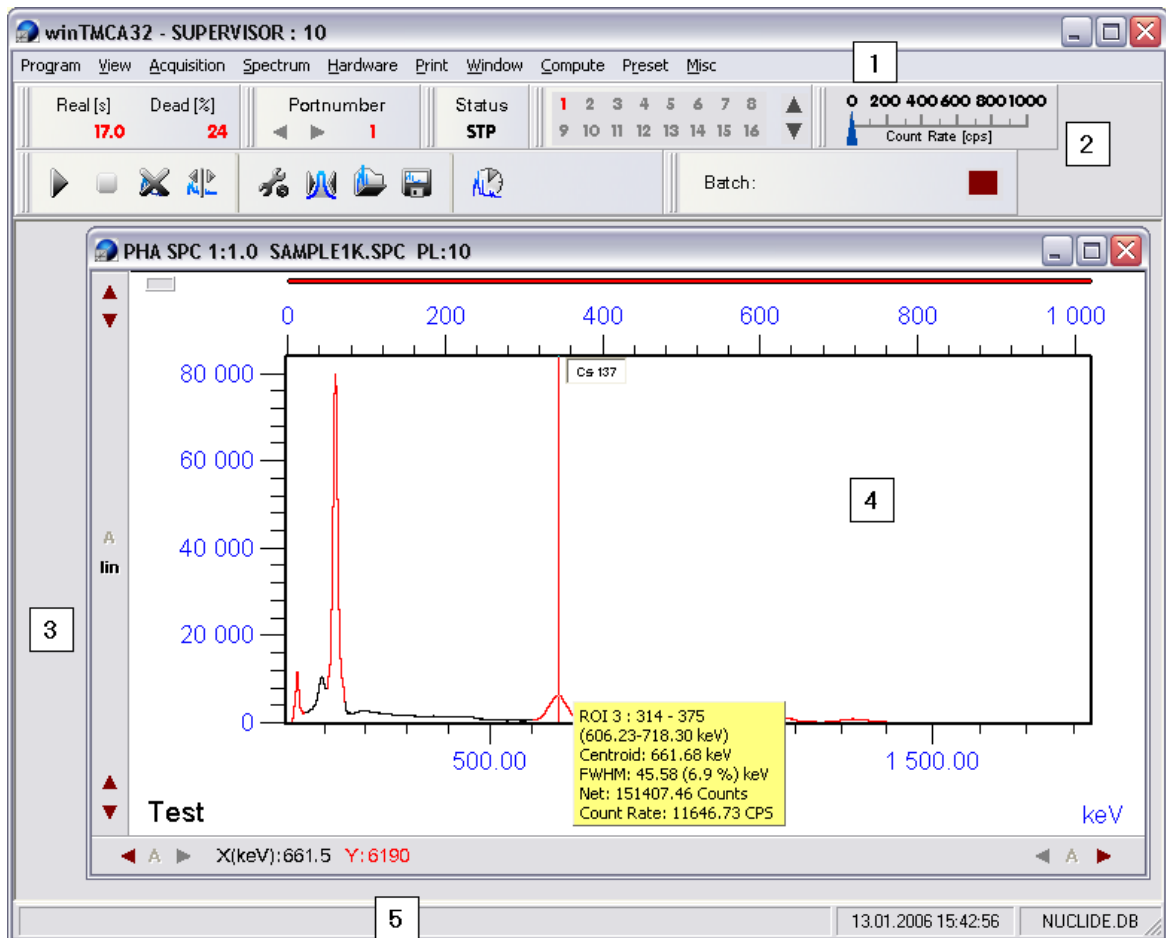
[spectrum display](#)

[spectrum window](#)

output line

The [menu header](#) shows the various commands. The [toolbar](#) contains abbreviations and measurement displays. You can open up to 64 [spectra windows](#) in the [spectra display area](#). And you can use an output line, where various status messages and

comments can be displayed beyond the spectrum display area.



3.3 Menu Header

You specify the menu header optionally by editing the [menu file](#). This file depends on user name, if the [user administration](#) is activated. The [program menu](#) and [view menu](#) are always available. The menu items [Acquisition Menu](#), [Spectrum Menu](#), [Hardware Menu](#), [Print Menu](#), [Window Menu](#), [Compute Menu](#), [Preset Menu](#), [Miscellaneous Menu](#) and [nanoSPEC/identiFINDER Menu](#) are declared in the [definition file MENU.DEF](#) and can be specified by the user.

3.3.1 Program Menu

The program menu does not depend on the [menu configuration file](#) and is always available.

You can select the following registers:

[winTMCA information](#)
[Select nuclide database](#)
[Select language](#)
[Help](#)
[Exit](#)

The following three menu items are optional (i.e. they are normally not selectable). They provide options to specify different users. Each user can have his own [customized menubar](#) and [buttons](#). If [user administration](#) is activated, the actual user name registered for windows will be searched and its configuration files will be loaded. If the name does not exist, no menu and button files are loaded.

If you wish to install user management, please contact target systemelectronic for further information.

[Register User](#)

[Change Password](#)

[User Administration](#)

3.3.1.1 winTMCA information

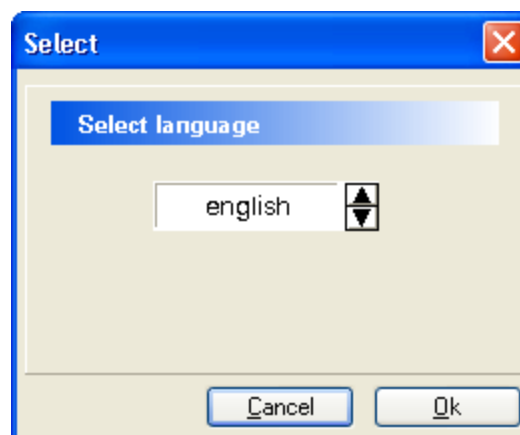
Shows the version of the operating system and the modules which are used by the winTMCA32 program.

3.3.1.2 Select nuclide database

Enables you to select the [nuclide database](#) which is used for online display in the spectrum. The nuclide databases are located in the NUCDATA directory. By default only the file NUCLIDE.DB is available.

3.3.1.3 Select language

Enables you to select the language for the winTMCA32 software. These settings take effect to all modules and programs as for example the winTMCA32 editor or the winTMCA32 help files.



You can select between german, english or french.

3.3.1.4 Help

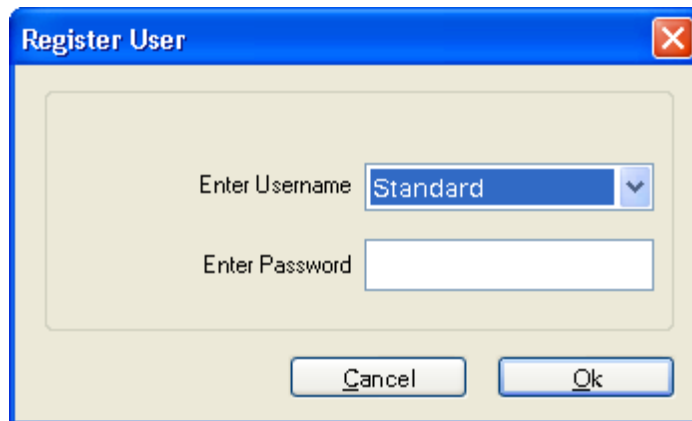
Starts the winTMCA32 help. By selecting an object or an area within the winTMCA32 a help text pops up.

3.3.1.5 Exit

Terminates the program.

3.3.1.6 Register User

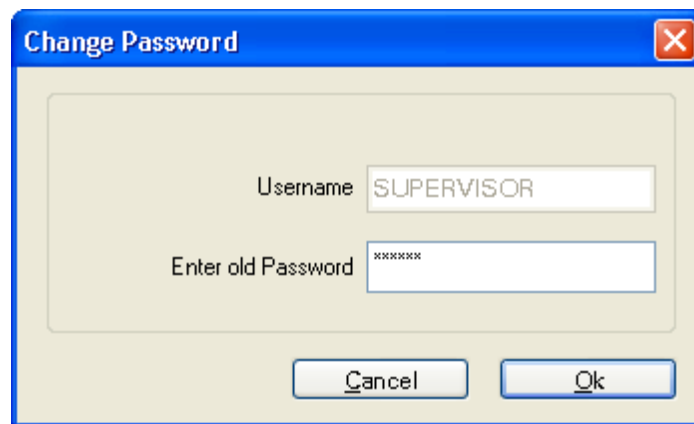
This command enables the user to register. Enter the name of the user to be registered or select it from the list in the upper text field. The password corresponding to the selected user must be entered in the text field ENTER PASSWORD.



When you click the OK button the window closes and the password is checked. If the password is correct, the menu and button list specified for this user are loaded and user name and user priority are displayed in the caption of the [winTMCA32 main window frame](#). If the wrong password was entered, an error message is displayed. Clicking the CANCEL button terminates the user registration at any time.

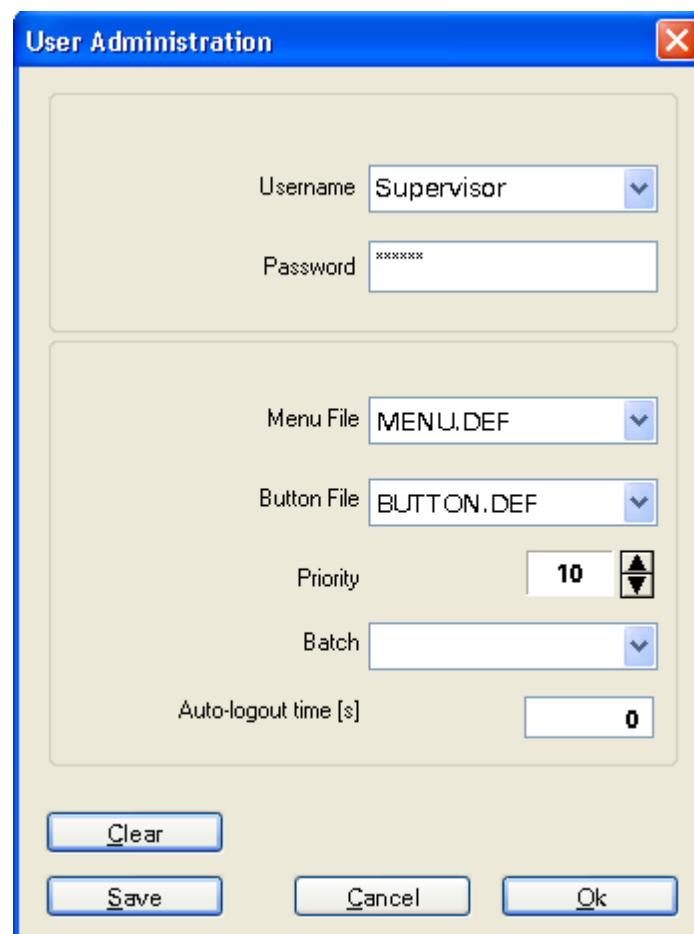
3.3.1.7 Change Password

This command enables the user to change the password of the actual registered user. The input form corresponds to the [Register User](#) input form with the difference that no user can be selected in the upper text field. In order to change the password, you enter the actual password in the lower text field. After clicking the OK button and if the password was correct, you enter a new password in the text field ENTER NEW PASSWORD. After clicking the OK button the user is prompted to enter the new password once again, to prevent any typing errors. A final click on the OK button closes the input form and the new password is accepted. You can cancel this process at any time by clicking the CANCEL button.



3.3.1.8 User Administration

This menu item enables the user management and registration of new users. It is only available for users having a priority of 10, otherwise this menu is not activated. In order to change the configuration of an existing user, select the name from the user list. The [menu file](#) and [button file](#) assigned to the selected user are displayed in the fields MENU FILE and BUTTON FILE. You can change them by selecting a different file from the list of files. In the password field the password of the selected user is displayed encrypted. You change it by entering a new password in the text field. In the user priority field you can change the user priority (1, 5, 10). In order to register a new user enter a name in the upper text field and specify password, priority, menu and icon list as described above. In the field BATCH you can select a batch file, which is always executed if the corresponding user has registered. This allows to realize user specific configurations. In the field AUTO-LOGOUT TIME you enter the time interval (in seconds), after which the registered user is logged out if the winTMCA32 program is idle.

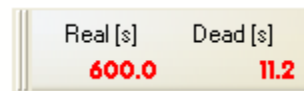


The image shows a 'User Administration' dialog box with a blue title bar and a close button (X) in the top right corner. The dialog is divided into two main sections. The top section contains a 'Username' dropdown menu set to 'Supervisor' and a 'Password' text field containing seven asterisks. The bottom section contains a 'Menu File' dropdown menu set to 'MENU.DEF', a 'Button File' dropdown menu set to 'BUTTON.DEF', a 'Priority' spinner box set to '10', a 'Batch' dropdown menu, and an 'Auto-logout time [s]' text field set to '0'. At the bottom of the dialog are four buttons: 'Clear', 'Save', 'Cancel', and 'Ok'.

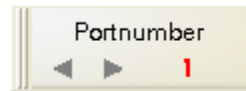
3.3.2 View Menu

This menu is like the [program menu](#) independent of the [menu configuration file](#). It can be used to attach or delete objects in the [tool bar](#). This menu can be deactivated to prevent the user from making changes (see [Preferences](#) in [Miscellaneous Menu](#)).

Real time



Port number



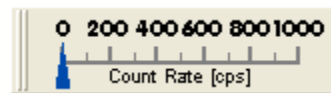
Status



Window Selection



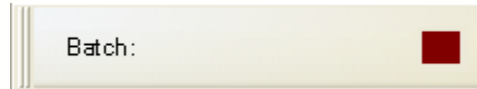
Count rate



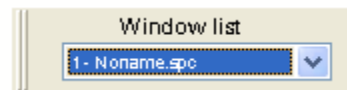
Buttons



Batch status



Window list



3.3.3 Acquisition Menu

This menu item as well as the following items are declared in the default [menu definition file MENU.DEF](#) and can be specified by the user. The default features in the acquisition menu are:

- [Start](#)
- [Stop](#)
- [Mode](#)
- [StartAll](#)
- [StopAll](#)

3.3.3.1 Start

Starts the measurement on the selected acquisition port. The port number is displayed in the [icon object port number](#).
(command: START)

3.3.3.2 Stop

Stops the measurement on the selected acquisition port.
(command STOP)

3.3.3.3 Start All

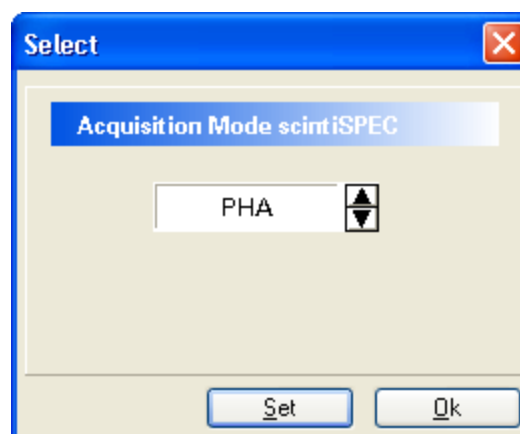
Starts the measurement on all available acquisition ports.
(command: STARTALL)

3.3.3.4 Stop All

Stops the measurement on all available acquisition ports.
(command STOPALL)

3.3.3.5 Mode

Opens a window which enables you to change the data acquisition modes.



Depending on your acquisition hardware, you can select the following modes:

- **PHA** (pulse height analysis): Every value is assigned to one channel. The channel content is incremented by one if a corresponding signal is counted.
- **STABIL**: corresponds to the PHA mode, but within this mode the spectrum of the active acquisition port is stabilised by software. This serves to compensate the drift of preamplifier or amplifier and parameters like temperature, for example.
- **MCS STO** (multi channel scaling store): All signals within a time interval are registered in one channel. If several acquisition runs take place, the contents of the channels are erased.
- **MCS ADD** (multi channel scaling addition): This mode is analogous to the MCS STO mode. The difference is that the channel contents are not erased but added up if more than one acquisition run takes place.
- **MULPHA**: PHA spectra which are measured in consecutive time intervals Δt will be stored in a matrix. For a spectrum assigned to the acquisition channel more than one sub spectrum must be defined. Every sub spectrum corresponds to a matrix row. After the given time interval Δt , the next spectrum in the following row (with successor spectrum

number) is used.

- **DUAL**: mode for two parametric data acquisitions.
- **DOSIS**: special type of MCS mode, where the counted signals (from a dose rate probe) are sampled via TMCA2 acquisition channel.
- **RAWDATA** (only dMCA): Displays raw data, which are located at the input of DMCA acquisition channel (digital oscilloscope)
- **WINDOW** (only dMCA): The detector signals are displayed after use of the digital filter.

3.3.4 Spectrum Menu

This item contains a number of commands referring to spectra administration. All commands are related to the spectrum which is assigned to the active [spectrum window](#).

[Clear](#)

[Energy Calibration](#)

[Length](#)

[Save](#)

[Save as](#)

[Load](#)

[Definitions](#)

[ROIs](#)

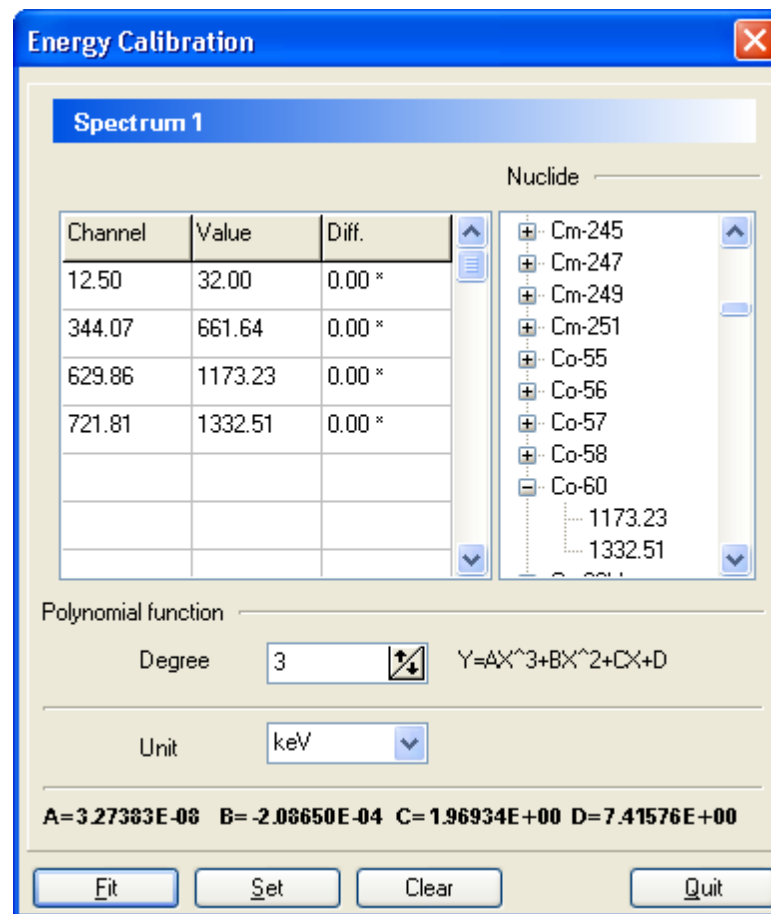
[Clear marked peaks](#)

[Select spectrum](#)

[Select sub spectrum](#)

3.3.4.1 Energy calibration

With this command you calibrate the x-axis of the actual spectrum. Therefore you can use a polynomial function in the third degree at maximum. In the input form you can up to 20 channel-energy pairs.



You can enter the channel values by typing in floating point values or double clicking on the cursor position in the spectrum. If the cursor is located within a ROI, the integration centroid is inserted. If you enter the channel value by double clicking into the spectrum the input focus is set to the respective VALUE field.

If the desired nuclide is not visible in the nuclide list this list can be extended by typing the initial letter(s) of the specific nuclide. If you type e.g. 'CS' each nuclide in the selected nuclide database (show in the status bar of the winTMCA32) beginning with 'CS' will be added to the list. If you just type 'C' this is true for all nuclides beginning with 'C'.

Once all channel energy pairs are specified the degree of the polynomial can be adjusted using the DEGREE selector. The button FIT initiates the fit procedure which determines the coefficients for the function. If the fit succeeds the resulting function will be displayed in the spectrum window. Additionally the coefficients will be show at the bottom of the energy calibration window.

The differences between the data and the fitted function is displayed in the column DIFF. The fit will use the error of the peak centroid if a ROI is defined for that peak. This is indicated by a '*' behind the difference value. Pushing the SET buttons accepts the fit.

In the UNIT field you select the unit for the channel axis from a list. If you want to use other units you have the option to create a file named XUNIT.TXT which must be located the \CONFIG directory. Within this file all units must be listed one beneath the other. If this file exists its unit list will be loaded instead of the default one.

(command ENERGYCALIBRATION)

3.3.4.2 Clear

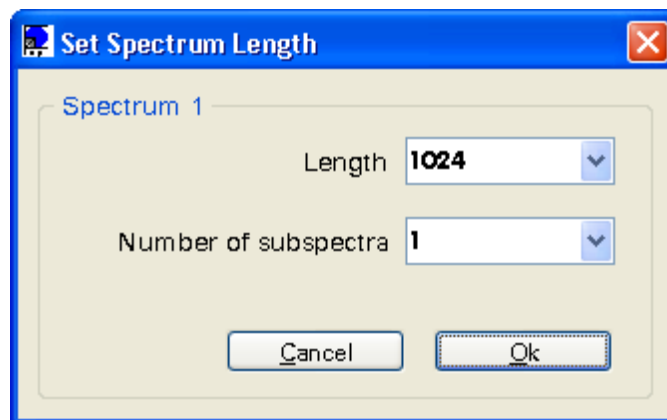
Erases the content of the actual spectrum. This execution requires confirmation.

If not stored, the acquisition data will be lost!

(command: CLEAR)

3.3.4.3 Length

This command changes the number of channels and sub spectra of the actual spectrum. You can select values from the list in the LENGTH field of the input form or enter an optional value.



With sub spectra a spectra matrix is defined, the x-dimension of the matrix is the length and the y-dimension is the number of sub spectra. Spectra matrices are required for MULPHA and DUAL [mode](#).

The maximum channel number (length) and the maximum sub spectrum number is 4 000 000 channels.

Please note that the total number of channels from the resulting matrix dimension does not exceed 16777216, for example 4096x4096.

(command LENGTH)

3.3.4.4 Save

You store the actual spectrum by specifying its spectrum name and spectrum path. The default spectra path is \SPECTRUM. If the name of the spectrum is not specified, it will be stored under NONAME.SPC. If a spectrum with the same name already exists, a warning appears.

(command SAVE)

3.3.4.5 Save as

The default dialog box for file selection appears and enables you to change path and file name. The selected file name will be entered as spectrum name. The chosen file path is used as new spectra path for the actual spectrum.

(command SAVEAS)

3.3.4.6 Load

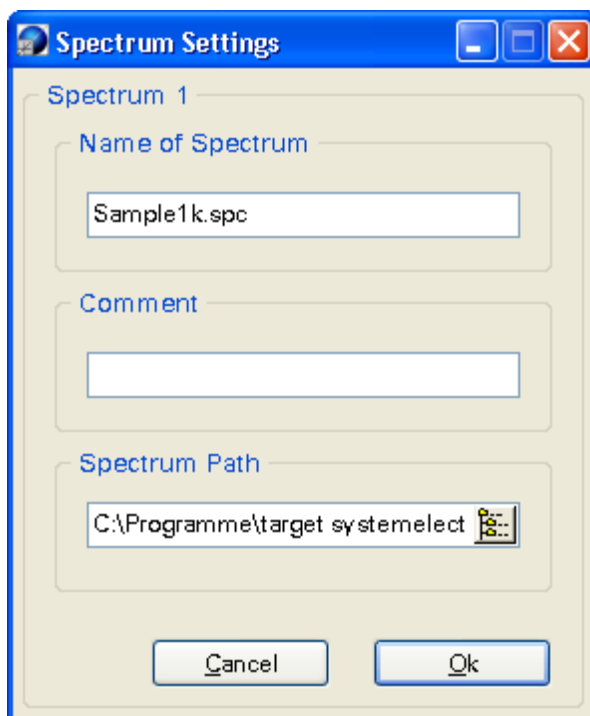
You load an existing spectrum file by using this command. You can also select spectra with the windows explorer via "drag and drop" and load them to the [spectra windows](#).

(command LOAD)

3.3.4.7 Definitions

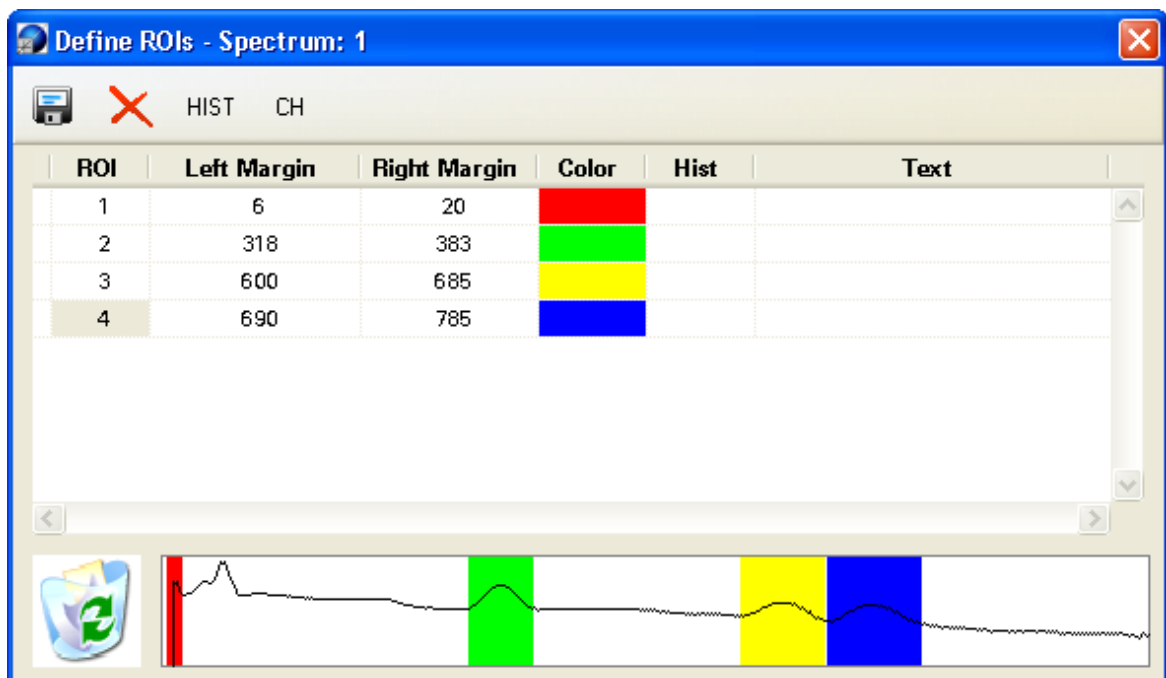
When you use this dialog box spectrum name, comment and the path for saving the spectrum are specified. You can type in the path or select it by clicking the icon next to the text file. If the entered path does not exist it will be created.

(command DEFINITIONS)



3.3.4.8 ROIs

A dialog box is opened which enables you to create and alter ROIs (regions of interest) in the actual spectrum. The defined ranges within the spectrum are highlighted.



Adding a region of interest is done via right mouse context menu, the menu appears by right-mouse-clicking into the table.

Choosing **Add** from the context menu adds a new ROI to the list, choosing **Delete** deletes the selected ROI. It is also possible to delete a ROI using the "Drag and Drop" function: just click on the selected ROI and drag it into the recycle bin, keeping the mouse button pressed. Over the recycle bin, release the mouse button.

In the fields **Left Margin** and **Right Margin**, you alter the margins by typing in a value or double clicking the desired channel in the spectrum.

A preview window is displayed beneath the ROI list, where the actual spectrum is displayed in logarithmic scale. Adding or deleting a ROI is directly reported in the preview window. To transfer changes to the actual spectrum the **Save** button has to be clicked.

In the **Color** field you can choose from 16 colors to highlight the ROI in the spectrum.

By activating the check box in the **Hist** field you fill the ROI with the selected color. By default only the wrapping curve is highlighted.

The **text** field enables the user to display an optional text over the region of interest in the spectrum.

Changes have to be confirmed by clicking the **Save** button before they are taking effect in the spectrum.

Clicking the **Delete** button deletes all ROIs in the spectrum.

Clicking the **CH** or **E** button enables the user to display the ROI margins in channels or in energy values.

To close the window the user has to click on the close symbol in the upper right corner.

(command DEFINEROI)

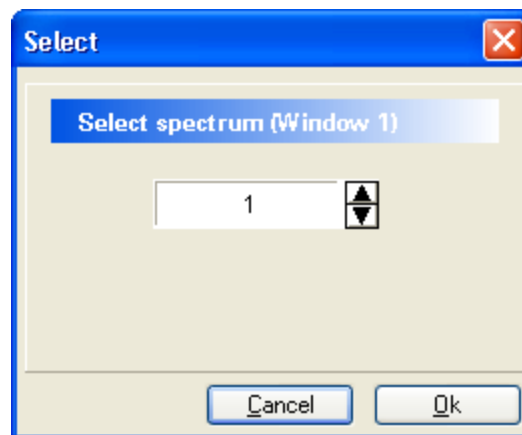
3.3.4.9 Clear marked peaks

This command erases peaks which were marked as a result of the menu command [PEAKSEARCH](#).

(command CLEARPEAKS)

3.3.4.10 Select spectrum

Enables you to select the spectrum corresponding to the actual [spectrum window](#).



You can display the same spectrum in more than one spectrum window.

(command SELECTSPECTRUM)

3.3.4.11 Select sub spectrum

This dialog window enables you to select the sub spectra to be displayed in the actual [spectrum window](#). You type in the sub spectrum number directly and confirm it by clicking the SET button, or you can use the $\uparrow\downarrow$ -keys to change the sub spectrum number. The cursor keys have an automatically repetition function. Pressing the OK button closes the input form.

(command SELECTSUBSPECTRUM)

3.3.5 Hardware Menu

This item contains the hardware set up for acquisition hardware.

(command SETUP)

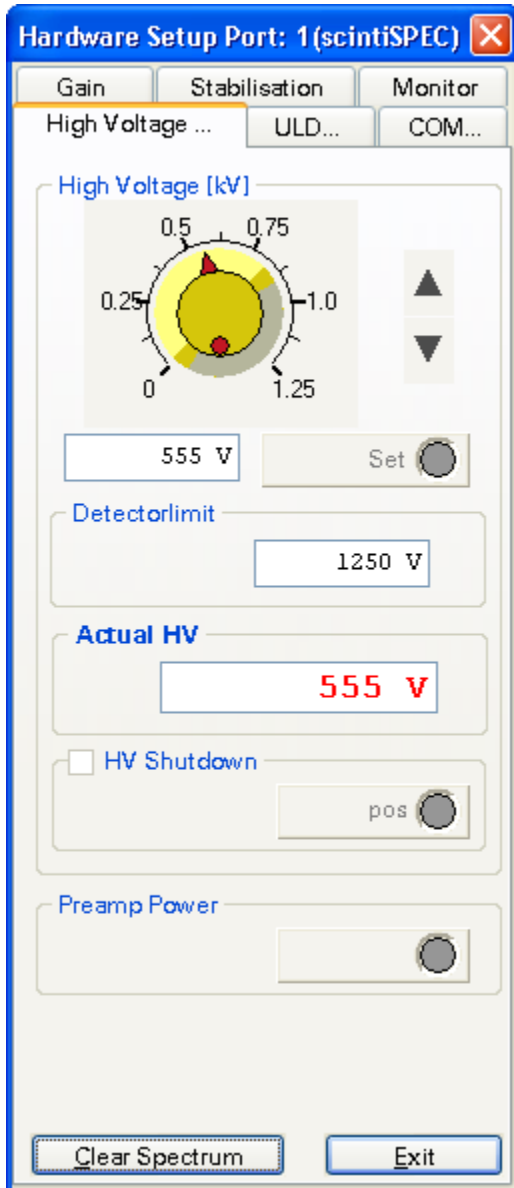
[High Voltage...](#)

[ULD...](#)

[COM...](#)

- [Gain](#)
- [Stabilisation](#)
- [Coincidence](#)
- [Pole Zero](#)

3.3.5.1 High Voltage...



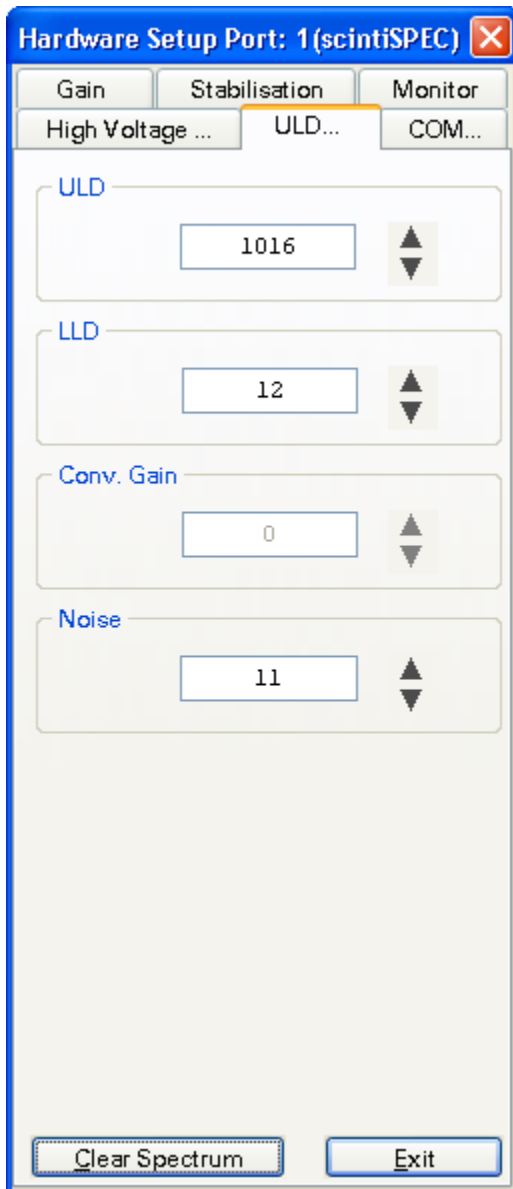
HIGH VOLTAGE

You can alter the high voltage of the measurement hardware by turning the potentiometer with the mouse cursor kept pressed. But you can also click the cursor keys or type in the desired high voltage value in the text field. If you choose to type in the new HV value, you have to confirm the input by pressing the ENTER button (↵).

PREAMP POWER (dMCA)

In order to activate (light green LED) or deactivate (dark green LED) the preamplifier press the PREAMP POWER button.

3.3.5.2 ULD...



You can type in all values within this input form and confirm by pressing the ENTER key (↵) or you can use the slider by keeping the left mouse button pressed and moving the mouse cursor in the fields.

ULD (upper level discriminator)

ULD discriminates the upper level of the signal acquisition. The voltage, which may not be exceeded by the signal in order to be registered, is defined here.

Please note that the settings 0 to 255 don't belong to a channel directly, but 0 relates to the lowest channel and 255 to the top channel. When you use a nanoSPEC (1K) 0 is related to 0 and 255 to 1024

Using scintiSPEC ULD is given in channel values.

LLD (lower level discriminator)

The LLD discriminates the lowest level of signal acquisition. Which means the lowest voltage required for a signal to be registered is defined here. Like ULD the set ups 0 – 255 are not directly related to the channels.

In order not to discriminate a channel you put the lower LLD to 0. With the nanoSPEC the set up remains the same as in the ULD mode. Using scintiSPEC LLD is given in channel values.

CONVERSION GAIN

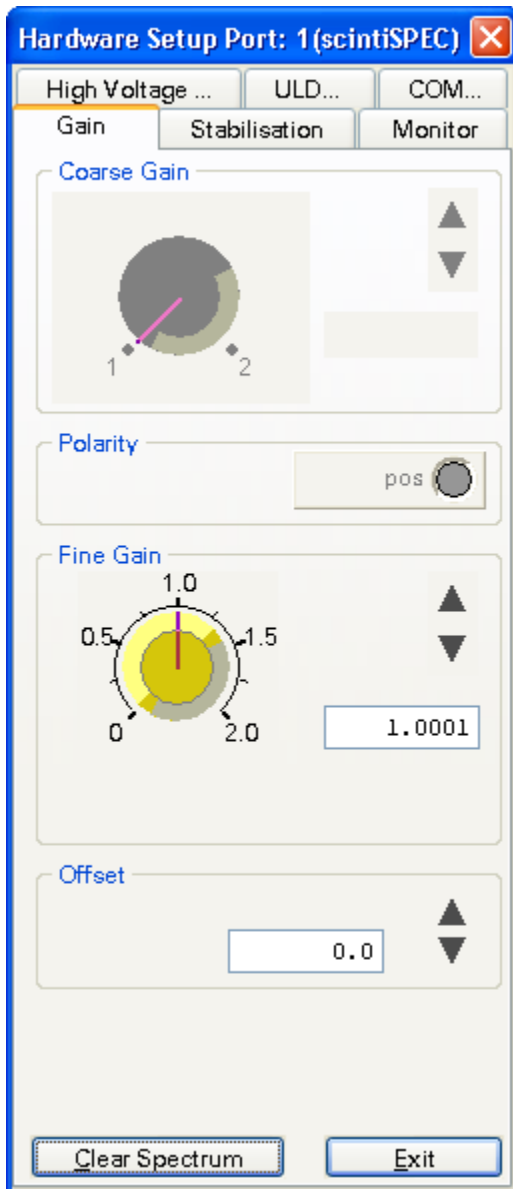
Conversion gain defines the number of channels for spectra acquisition, thus the relation of channels and voltage. The value varies from 0 to 255. The smaller the value the bigger the number of channels used. When you use nanoSPEC, 255 means a spectrum with 512 channels, 0 a spectrum with 2048 channels.

Please note that the [spectrum length](#) can be set independently of conversion gain. If the spectrum's length is smaller than the conversion gain, it will not be possible to display the whole spectrum acquired. Thus, the spectrum length should equal the conversion gain.

NOISE

Noise defines which of the signals registered are events and which are noise. Only events which give a higher voltage value than the noise value will be registered. In principal, NOISE works like LLD but events beyond the noise level are not considered for the dead time and base line calculations. The higher the value, the bigger the noise level which has to be surpassed by a signal in order to be registered as an event.

3.3.5.3 Gain

**COARSE GAIN**

Sets up the coarse gain for the acquisition hardware. The adjustment range depends on the hardware type. If more adjustment ranges exist you can choose between them. You select the desired gain factor by clicking on it or by clicking the cursor keys on the right margin.

POLARITY (only dMCA)

This option enables you to adapt the acquisition hardware to the polarity of the detector signals. You can recognize the expected polarity on the LED color and on the button legend.

negative polarity: NEG (red LED)
positive polarity: POS (green LED)

FINE GAIN

The fine gain is a gain factor which is applied to the input signals via software algorithm. The fine gain does not depend on acquisition hardware. The acquisition port must be set to the STABIL mode. You can select the fine gain factor between 0 and 2 (using scintiSPEC fine gain is set between 0.722 and 1.625). A factor of 2 refers to a gain factor of 1, the factor of 1 refers to 0.5 etc. .

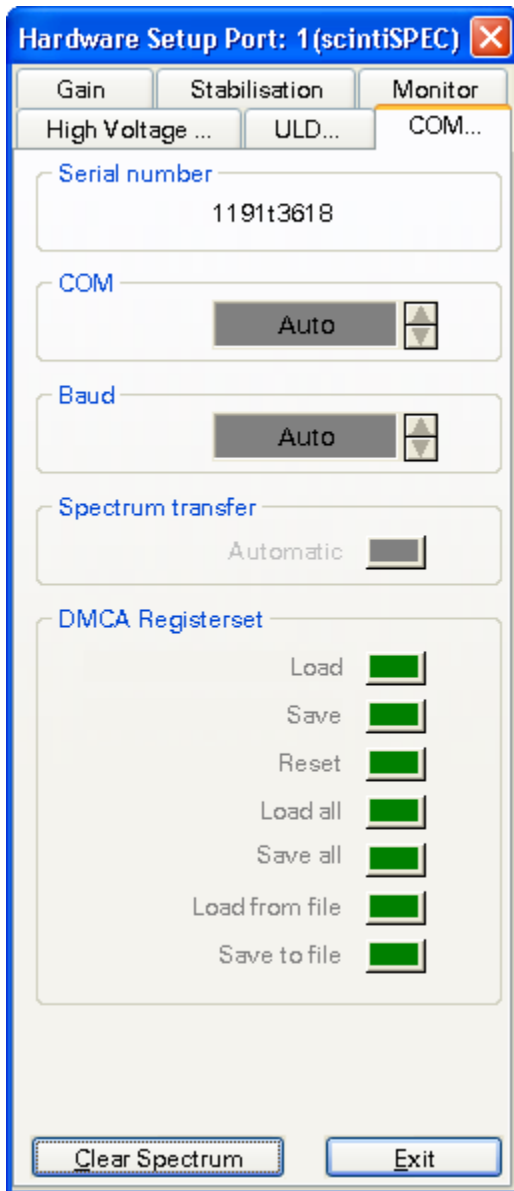
Attention: When you use the fine gain the number of channels is reduced, because only gain factors ≤ 1 are allowed.

You can type in the fine gain and confirm by pressing the ENTER (↵) key, but you can also move the button with the mouse or use the cursor buttons. These cursor buttons are changing the value about 10^4 each time with automatically repetition.

OFFSET

The use of channel offset is like the fine gain only allowed in the STABIL mode. You can type in the value or enter it by clicking the cursor buttons with the mouse. The cursor buttons change the value about 0.1 each time with automatically repetition.

3.3.5.4 COM...

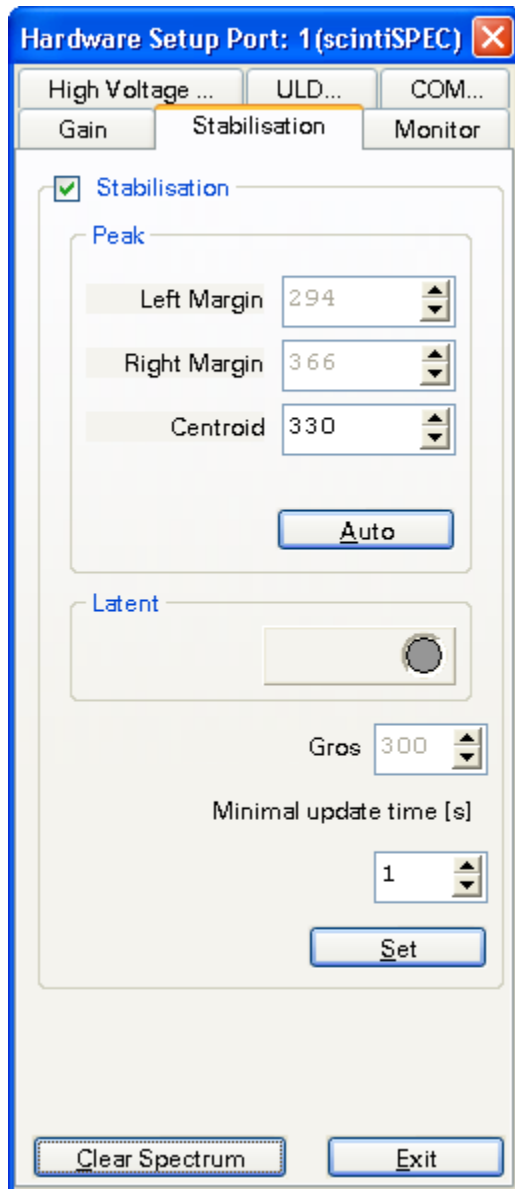


COM (only nanoSPEC, identiFINDER)
This dialog window enables you to choose a serial COM port.

BAUD (only nanoSPEC, identiFINDER)
You can specify the serial transfer rate to the acquisition hardware. Default values are 38400 for nanoSPEC and 9600 for identiFINDER.

DMCA REGISTERSET (only dMCA)
When you use the button SAVE you can store the complete hardware setup of the dMCA card in the windows registration database. When you use LOAD it can be loaded from there. Clicking RESET sets all parameters to their default values. By clicking the buttons LOAD ALL and SAVE ALL you load or store the set up for all dMCA cards within the system.

3.3.5.5 Stabilisation



The stabilisation controls the [fine gain](#) factor via software in such a way that the centroid of a chosen peak keeps its channel. In this way the drift of detector and (pre-) amplifier are compensated. The [acquisition mode](#) must be set to **STABIL**. (If you use scintiSPEC stabilisation is done by PHA mode)

Only the centroid of a peak existing in the spectrum can be kept in its channel. Therefore the [fine gain](#) factor is varied.

Clicking the STABILISATION button with the mouse activates the stabilisation. Then you have to enter the peak parameters to the dialog window. LEFT MARGIN and RIGHT MARGIN fixes the spectrum range whose centroid is used for stabilisation. You should select the range around the peak in a way that the peak lies in the range even if the drift is small. CENTROID refers to the centroid of the integration range. For determining the centroid no background correction is done. This means that with descending or ascending background the centroid and the peak maximum do not have the same values.

If scintiSPEC is used only the centroid value has to be entered, left margin and right margin are set automatically.

You enter the values by typing in or by double clicking on the desired channels within the spectrum.

By pressing the AUTO button you determine these values automatically, if the spectrum cursor is located within a peak with enough statistics.

The value given by the GROS field determines the number of events which have to be registered in the defined range until a new centroid and [fine gain](#) factor will be calculated. Setting the GROS value to 0 deactivates the stabilisation!

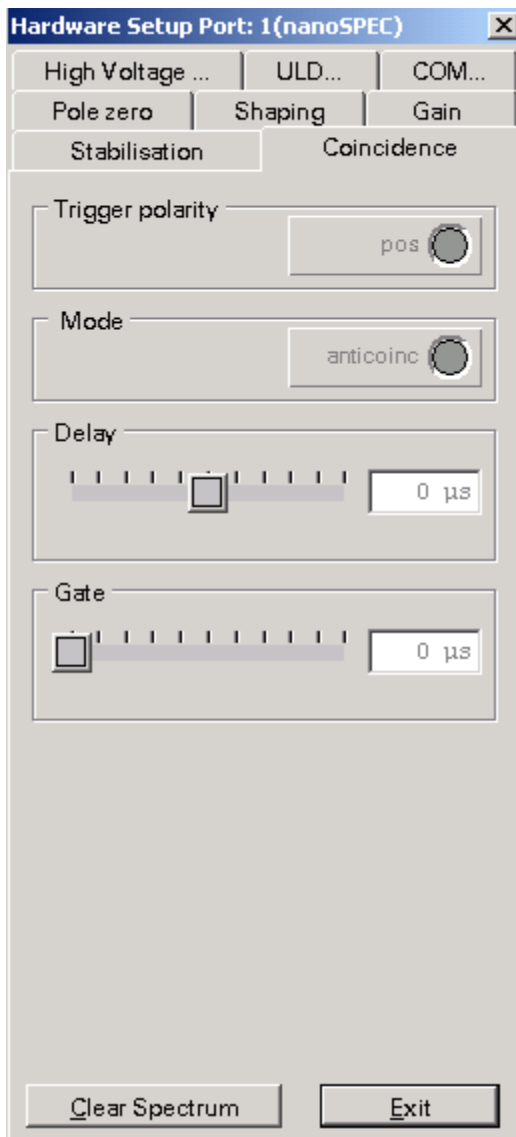
(If scintiSPEC is used the GROS value is always set to 300).

Default values for GROS are within the range of 300 and 500. The statistical error of centroid calculation sinks with rising number of events. Otherwise more time is used until the required events are registered and the fine gain factor is corrected.

Clicking the LATENT button activates the background stabilisation. This means that stabilisation is active even if no acquisition takes place. (scintiSPEC does not allow background stabilisation.)

You have to confirm all parameters by clicking the SET button.

3.3.5.6 Coincidence (only dMCA)



This dialog allows the registration of events depending on an external triggering signal, which must be connected to the input of each acquisition port.

With the button **TRIGGER POLARITY** you choose between the positive (light green LED) and the negative (light red LED) flank.

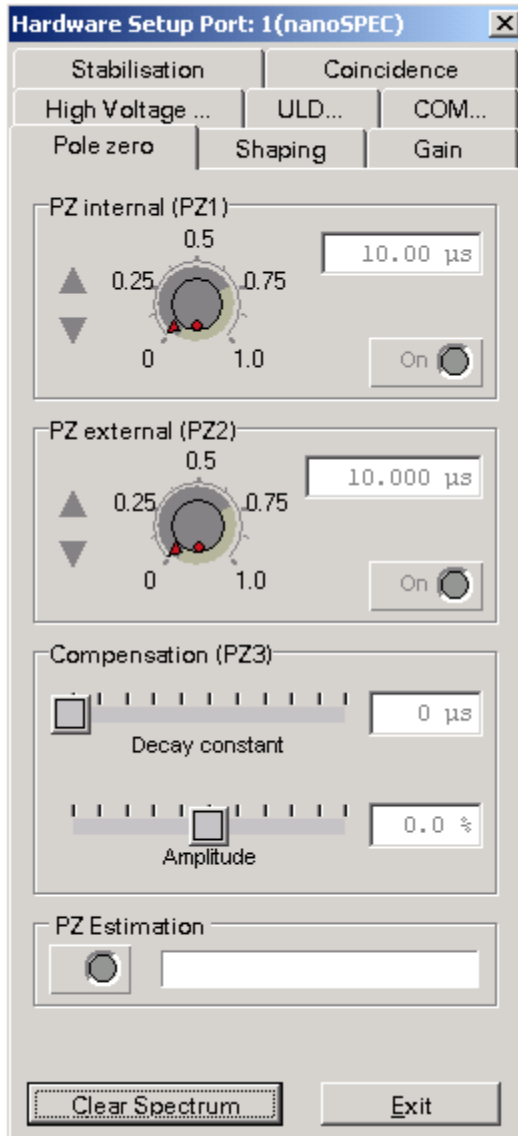
With the **MODE** button you select between trigger mode COINC (coincident) and ANTICOINC (anti-coincident). In the COINC mode an event is only registered if a corresponding triggering signal exists. In ANTICOINC mode the event is registered if no triggering signal is given.

When you use the **DELAY** slider a delay between event and triggering signal is set. If a positive time is given it means that the triggering signal must lie before the event. A negative time means that the event lies before the triggering signal.

The parameter **GATE** sets up the time interval for the triggering signal. That means that in the COINC mode an event is only registered if it lies within this time interval which is located before or after the triggering signal, as preset by delay time.

You change values for DELAY or GATE by using the slider or by typing the values into the text field. You have to confirm by pressing the ENTER (↵) key.

3.3.5.7 Pole Zero



You determine the decay constant of the internal differentiation stage by specifying **PZ INTERNAL** (PZ1). This value is preset by manufacturer and should not be changed.

With **PZ EXTERNAL** (PZ2) the decay constant of the detector preamplifier can be compensated.

In order to set up these values, you move the corresponding control knob with the mouse or type in the values directly, confirmed by pressing the ENTER (↵) key.

The parameter **COMPENSATION** (PZ3) serves to compensate the signal outbreaks.

3.3.6 Print Menu

Printer Setup This command opens the default printer dialog window.

(command PRINTERSETUP)

Spectrum Prints the active spectrum with regard to the same attributes for displaying (grid, display area,...)

(command PRINTSPECTRUM)

3.3.7 Window Menu

Tile Changes the size of [spectra windows](#) such, that there is no overlapping of spectra windows in the [spectra field](#). Because of the minimum size of the spectra windows depending on the size of the [winTMCA32 main window](#) and the number of visible spectra windows, an overlap may occur.

(command TILE)

Cascade Makes the [spectra windows](#) overlap in cascade form. Only the title bars of the hidden windows are visible.

(command CASCADE)

Arrange icon This command arranges icons horizontally in the lower left part of the window. Windows minimized to icon size can be moved in the [spectra window](#).

(command ARRANGEICONS)

Close all Closes all visible [spectra windows](#).

(command CLOSEALLWINDOWS)

3.3.8 Compute Menu

The compute menu contains various commands referring to different calculation events of a spectrum.

[Integrate](#)

[Add spectrum](#)

[Subtract spectrum](#)

[Multiply spectrum](#)

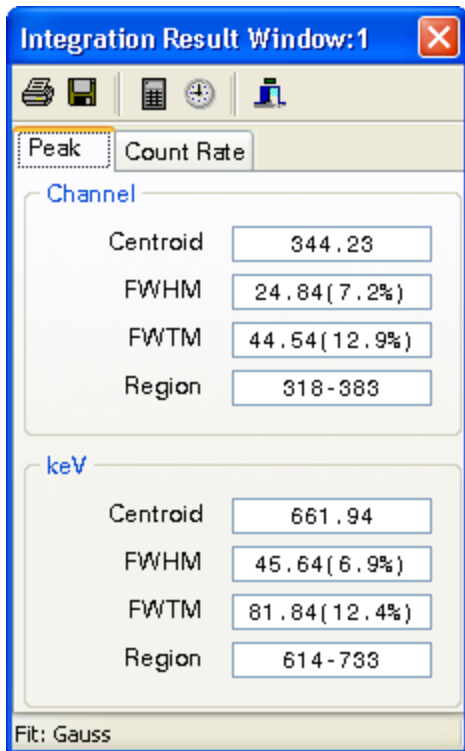
[Divide spectrum](#)

[Rescaling x-axis](#)

[Smooth spectrum](#)

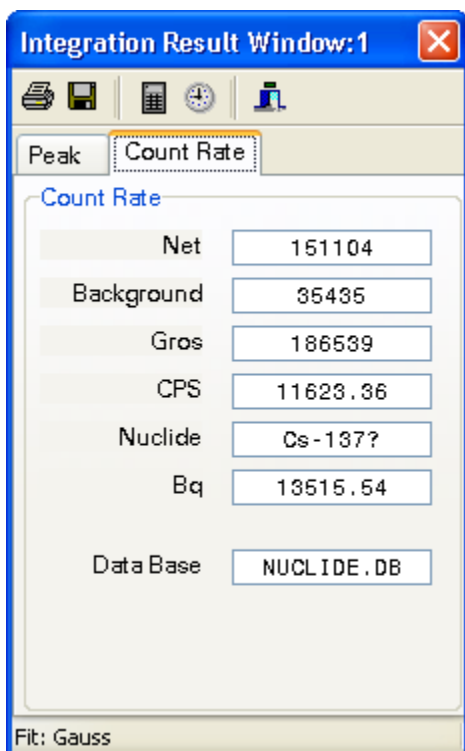
[Peak search](#)

3.3.8.1 Integrate



Integrates the area within a [ROI](#) or between 2 marking lines if the position marker is within the area which has to be integrated.

The first page of the result window is shown on the left. In the channel area the centroid (corrected by background) is displayed, also the full width of half maximum (FWHM), the full width of tenth maximum (FWTM) and the integration area. If an [energy calibration](#) was done before, the results for the corresponding energy units are also given below.



On the second page the number of net events, which means the background corrected area, the number of background events (BACKGROUND), the number of total events (GROS) and the net count rate (CPS) in counts per second are displayed. If the peak centroid lies within the range of a peak energy of one of the nuclides in the selected [nuclide data base](#), the name of the nuclide will be displayed. Therefore, it is required that the CHECK field of this line in the [nuclide database](#) is activated. The Bq-field shows the activity calculated from the net count rate, the efficiency factor of the nuclide database line was taken into consideration.

In the symbol bar, the following functions are given:



Prints the integration results, the default printer is used.



Stores the integration results in a file in the .\CONFIG directory. The file name corresponds to the spectrum name, but the file extension is set to "INT". If the integration results for the same spectrum are stored again the data will be appended to the file.



Executes a new integration.



Executes a new integration every second. If you click this button once again this function is deactivated.



Closes the result window.

Comment:

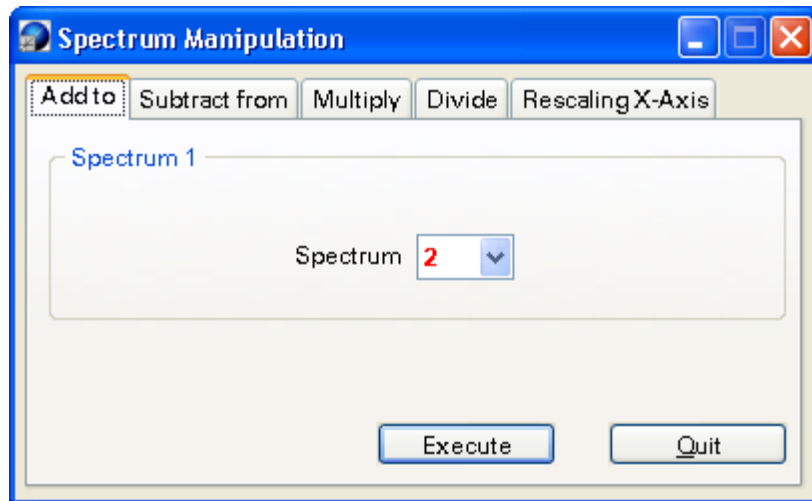
The integration algorithm tries to make a gauss fit into the area (in the spectrum the curve of this function can be seen). As background an iterative calculated background spectrum is used. If the fit isn't successful, the net counts are calculated by a geometric procedure. For background calculation a straight line is used which is determined by five channels in the integration area margins.

(command INTEGRATE)

3.3.8.2 Add spectrum

This command enables you to add another spectrum channelwise to the actual one. You select the spectrum to be added by typing in the spectrum number or by using the cursor buttons. The acquisition times of the chosen spectrum are added to the times of the actual spectrum.

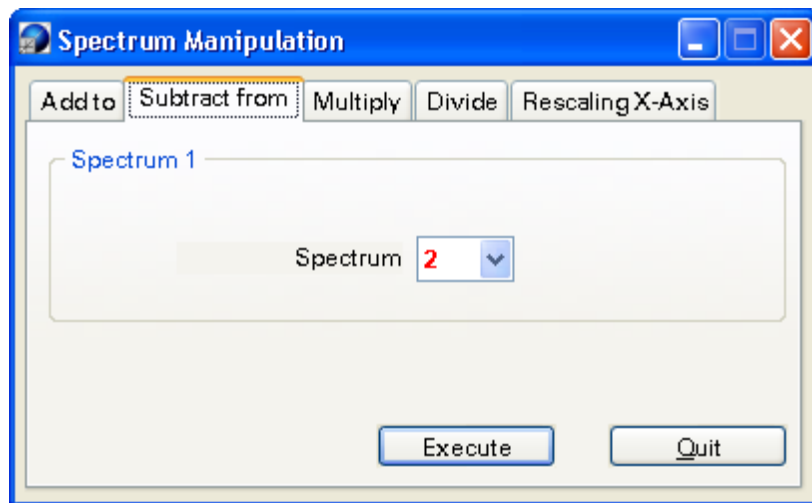
(command ADDSPECTRUM)



3.3.8.3 Subtract spectrum

This command enables you to subtract a spectrum from the spectrum in the actual window channelwise. You select the spectrum to be added by typing in the spectrum number or by using the cursor buttons.

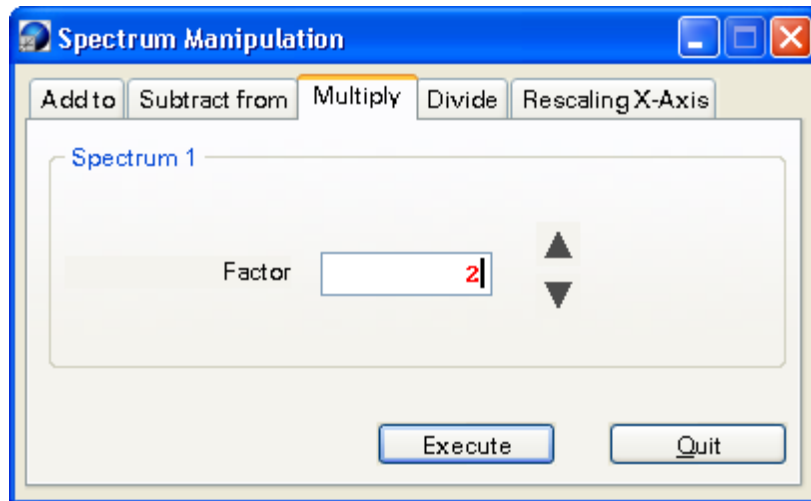
(command SUBTRACTSPECTRUM)



3.3.8.4 Multiply spectrum

If you use this command the channel contents of the spectrum displayed in the active window are multiplied by a chosen factor. This factor can be a floating point value, but the resulting channel contents are rounded up. Use the cursor buttons to select the factor or type it in directly. The acquisition times are also multiplied.

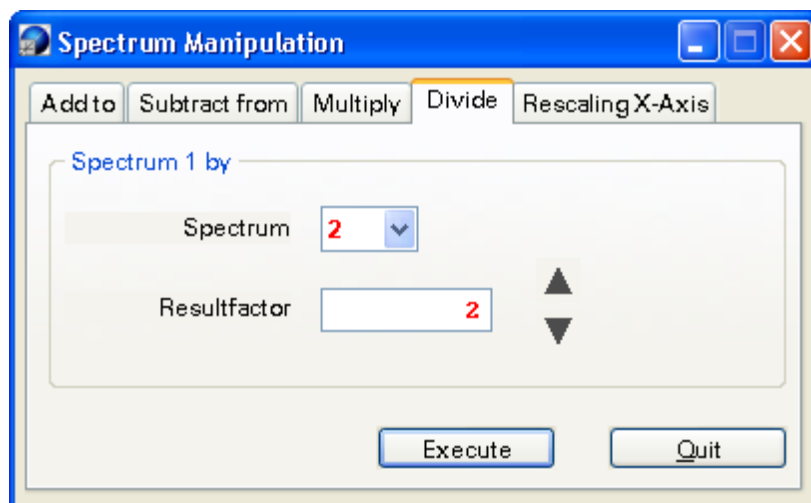
(command MULTIPLYSPECTRUM)



3.3.8.5 Divide spectrum

This command divides the spectrum in the active window through the chosen spectrum. The division is executed channelwise. If you divide through 0 the result is also 0. The resulting channel contents are multiplied by the result factor and rounded up.

(command DIVIDESPECTRUM)



3.3.8.6 Rescaling x-axis

This command rescales the channel axis of the active spectrum. The channel contents are distributed corresponding to the rescaling function. This function is a polynome in the second degree. You can type in the function parameters directly or they are calculated by typing in one till three channel pairs. In order to get from one mode to the other one the channel box in the bottom left corner must be activated. If the box is activated you can type in the channel pairs, if the box is not activated you can enter the function parameters.

- input of channel pairs

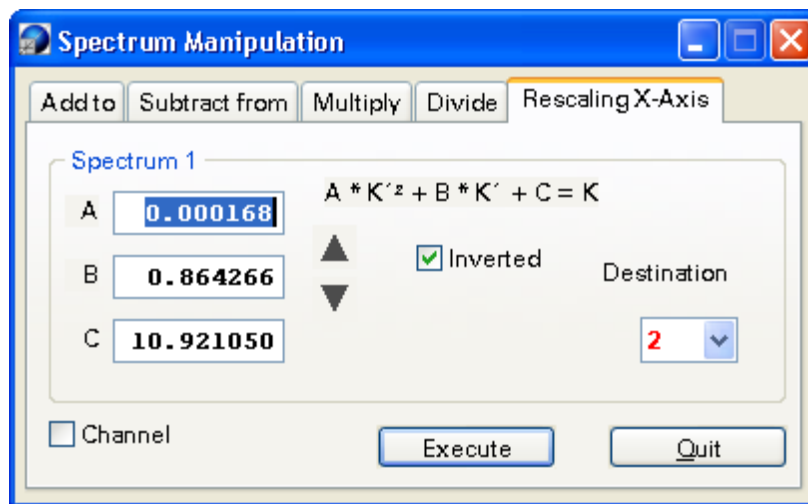
You can enter the channel pairs directly or by double clicking the corresponding channel

in the spectrum. If the cursor is located within a [ROI](#) the centroid of the ROI is entered to the field. C1, C2, C3 are the momentary channels, C1', C2' and C3' the desired channels. If only values for C1 and C1' are chosen, only one off set is calculated. For a straight line through the origin only C2 and C2' can be given.

- input of function parameters

You enter the polynome coefficients A, B, and C. You determine if the coefficients shall be applied to the inverse function by checking INVERTED. The corresponding function is displayed in the window. The rescaled spectrum is displayed in the [spectrum window](#) whose number is shown in the DESTINATION SPECTRUM field. You enter the number by typing in or by selecting it with the cursor buttons. By clicking OK you execute the rescaling process.

(command RESCALESPECTRUM)



3.3.8.7 Smooth spectrum

This command serves to smooth the spectrum in the active window, which means that the statistical fluctuations from the neighboring channels are reduced. For each spectrum channel K_x the channel contents of $2n+1=m$ channels distributed symmetrically around the channel are taken into consideration.

Each of them is weighed, and the sum you get is normalized and assigned to the corresponding channel.

Formula:

$$\overline{K_x} = \frac{\sum_{i=0}^{m-1} w_i \cdot K_{x-n+1}}{W_i}$$

In the program winTMCA32 $n = 11$. That means that 23 channels are taken into consideration. The following weighing factors are used: (from the left to the right channel) 285, -114, -285, -285, -165, 30, 261, 495, 705, 870, 975, 1011, 975, 870, 705, 495, 261, 30, -165, -285, -285, -114, 285.

The sum of these weighing factors is 6555 ($= \sum w_i$).

(command SMOOTHSPECTRUM)

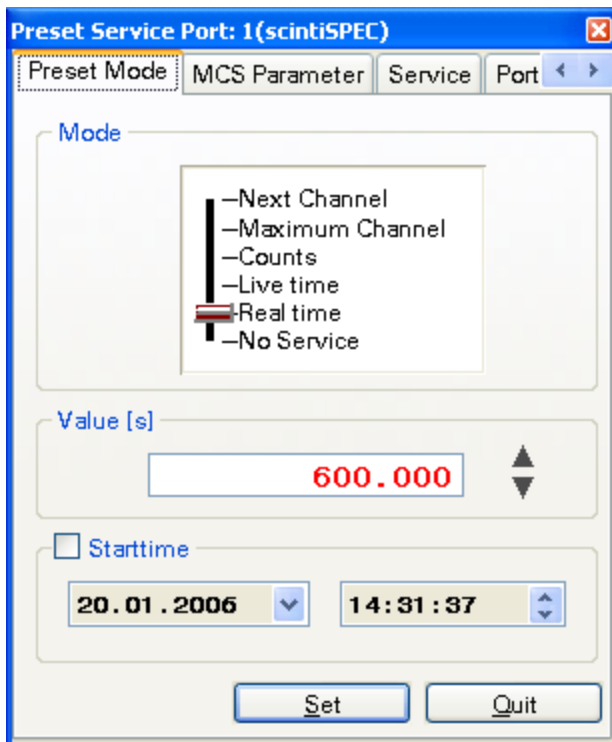
3.3.8.8 Peak search

This function tries to find peaks within the spectrum channel per channel via gauss fit. You change the [peak search sensitivity](#) in the [MISCELLANEOUS menu](#). The peaks found are marked in black, which enables you to set [ROIs](#).

(command PEAKSEARCH)

3.3.9 Preset Menu

By selecting the item SERVICE a dialog appears. In this dialog, acquisition time, actions after acquisition etc. are preset for acquisitions at the active port.



The following parameters can be altered by the customer, depending on how the acquisition should be stopped.

MODE

The following modes allow to set conditions for terminating acquisitions.

- **REAL TIME**

Acquisition stops when the preset real time is over.

- **LIVE TIME**

Acquisition stops when the preset live time (acquisition time containing dead time correction) is over.

- **COUNTS**

Acquisition stops when the preset number of counts within the spectrum are registered.

- **MAXIMUM CHANNEL**

Acquisition stops when a channel content has reached the preset value.

- **NEXT CHANNEL (only with acquisition mode DOSIS)**

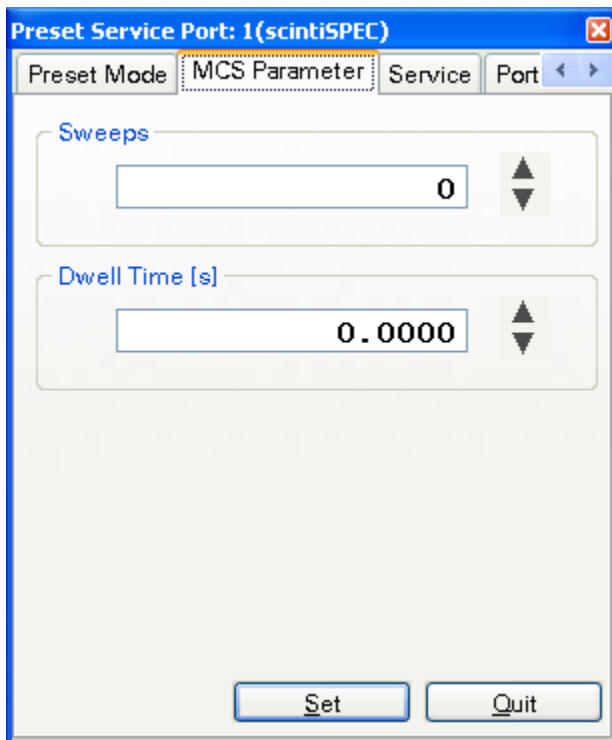
If you use this mode no condition for stopping acquisition is set but user specific actions for dwelling next channel are allowed.
(see register SERVICE below)

VALUE

In this field, you can enter a preset value for time or counts. You can also use the cursor buttons which alter the value about ± 1 .

STARTTIME

You can enter the acquisition starting point. The left field refers to date, the right one to time. This option is only available if the STARTTIME box is activated. Please note that in this case the program winTMCA32 cannot be terminated without the loss of this information.



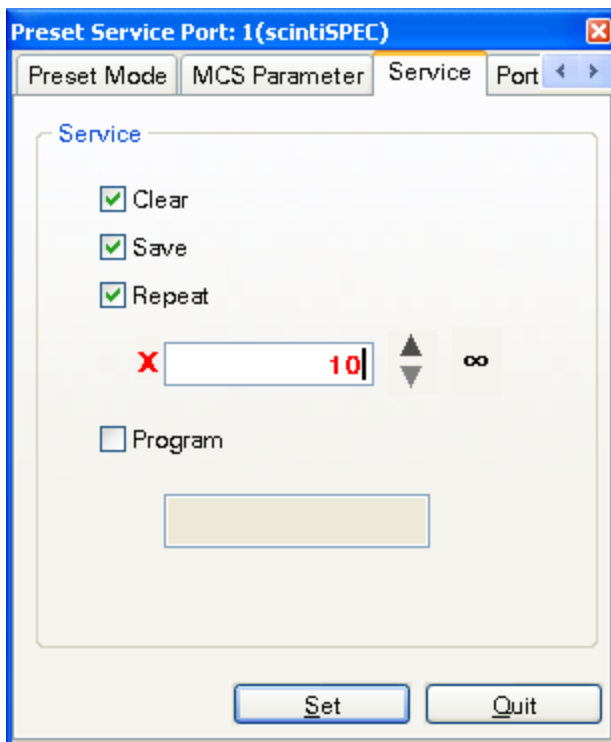
The register **MCS PARAMETER** only refers to the MCS acquisition mode.

SWEEPS

You can preset the number of acquisition runs in the MCS mode by specifying this parameter. One run ends when the end of the spectrum is reached by dwelling through the channels.

DWELLTIME

Dwell time gives the time (in seconds) during which events in the actual channel will be added up. When this time is reached it will be dwelled to the next channel.



When you use the input form **SERVICE** you can preset services which have to be executed after acquisition stops. In order to activate these services, the corresponding box must be activated.

CLEAR

Spectrum is erased after acquisition.

SAVE

Spectrum is stored after acquisition. If no name was entered, the spectrum is saved as NONAME.SPC.

REPEAT

When the REPEAT box is activated, you can enter the number of repetitions to the lower field. By using the ∞ button you repeat the acquisitions until they are terminated. After the acquisition, the spectrum extension is automatically incremented by one, whereby the first extension is "000". If no name was given for the spectrum, it is automatically set to "NONAME.000". After the next acquisition, the name is "NONAME.001". If SAVE is activated, a series of continuous acquisitions can be saved singularly. If REPEAT is selected, CLEAR is activated automatically. If CLEAR is deactivated, also the function REPEAT is no more active.

PROGRAM

If program is activated, you can enter a program name to the program field. After acquisition is finished, this program will be executed. This file can be a windows executable file or a winTMCA32 [batch file](#) executed by winPROC.

3.3.10 Miscellaneous Menu

The miscellaneous menu contains the following items:

[Editor](#)

[WinPROC Monitor](#)

[WinPROC Error Wait](#)

[Peak Search Sensitivity](#)

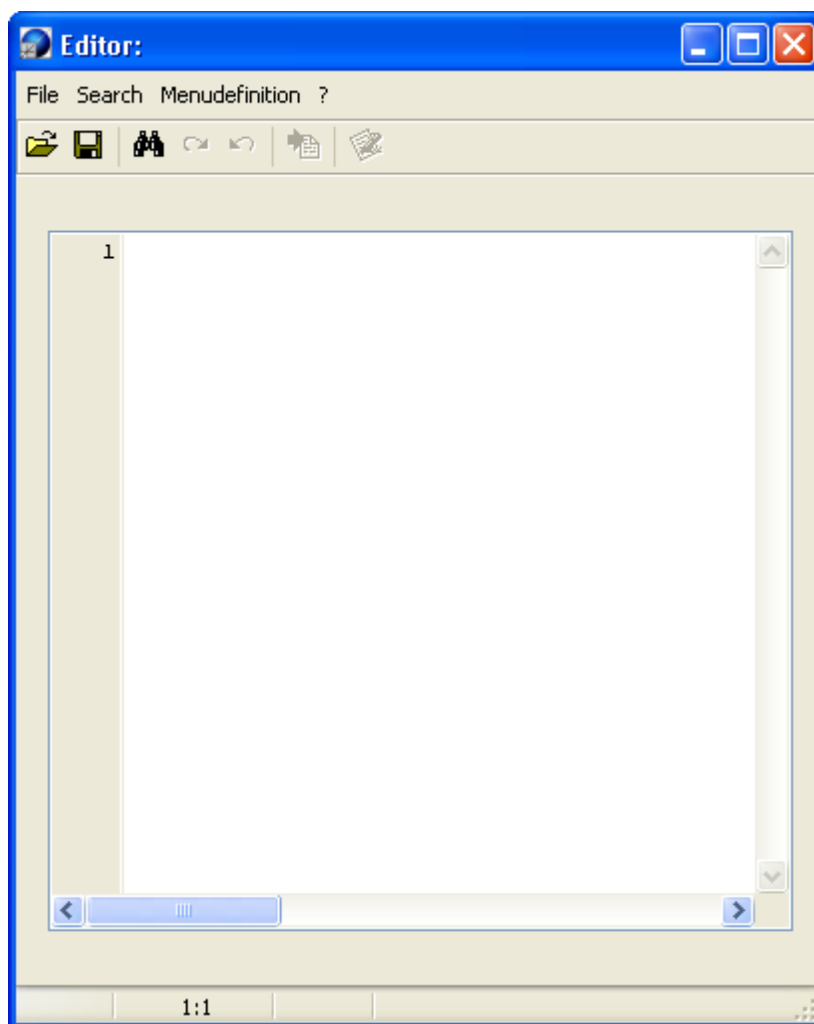
[Execute Batch](#)

[Preferences](#)

3.3.10.1 Editor

Selecting this item opens the winTMCA32 editor. When you create [batch files](#) you should always use this editor, because batch files acquire fixed line length. The editor takes this automatically into consideration. But you can also use this editor to create and alter ASCII files like [menu](#) and [button definition files](#), spectra etc... .

(command: WINTMCAEDIT)



The editor is an independent program, so you can use more than one editor. The symbol bar of the editor enables the following functions:



(LOAD) Opens the default file selection box for loading an existing file to the editor. The following selections can be made :

- [batch file](#) (extension ".WPB")
- temporary file (extension ".INF")
- [menu definition](#) (extension ".DEF")
- gain table (extension ".GTB")
- spectrum (extension ".SPC")
- text file (extension ".TXT", ".VAR", ".DAT")

(menu command FILE ⇒ LOAD)



(SAVE) This dialog enables you to save the editor content by using a chosen file name and selected path.

(menu command FILE ⇒ SAVE)



(PRINT) Prints the editor text via default printer.

(menu command FILE ⇒ PRINT)



(SEARCH) Searches for strings within the editor text.



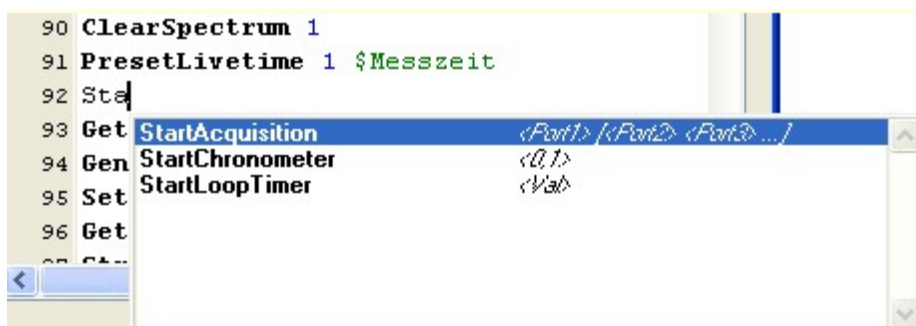
(UNDO) Undoes the last change.



(RELOAD MENUS) This option is only available if [menu definitions](#) are created. If the menu definition file which is already used by winTMCA32 is changed by the customer, this command reloads the menu definition file. Please note that the changed file must be saved before.

The actual cursor position is shown in the display field using the format LINE/COLUMN.

If you create a [batch file](#) and enter more than two characters to the editor, a selection list containing all available commands appears. You can enter these commands by pressing the RETURN (↵) key. If the command is entered completely, the required parameters are displayed.



The menu command INFO displays the version of the operating system and the program version of the editor.

3.3.10.2 WinPROC Monitor

Opens a window which enables you to observe the execution of [batch files](#) and control them stepwise.

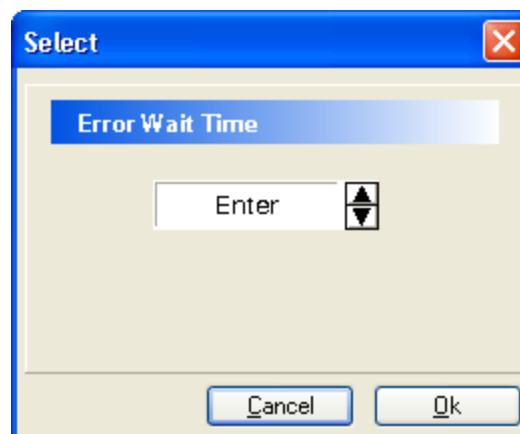
(command SHOWWINPROCMONITOR)

For detailed description of the winPROC monitor see [Program winPROC](#).

3.3.10.3 WinPROC Error Wait

This input form enables you to influence the behavior of the error message window. The default value is ENTER which means that the error message waits during [batch file](#) execution until you confirm by clicking the OK button. Alternatively, you can choose values between 1 and 5 seconds. In this case, the message is only displayed for the selected time and disappears automatically.

(command: ERRORWAITTIME)



3.3.10.4 Execute Batch

Opens a dialog box which enables you to execute [batch files](#), to continue or cancel their execution. Batch file commands can be entered.

(command: WINPROC)



- NEW

In the field BATCH you type in the name of the [batch file](#) or select one by clicking the folder symbol until a file selection box appears. You enter the port number corresponding to the batch file to the PORTNUMBER field. You can change it by clicking the cursor buttons. When you click START the batch file is executed.

- CONTINUE

The execution of a [batch file](#) which was stopped before, can be continued. If you enter the port number (by typing in or by clicking the cursor keys) the name of the batch file which was interrupted is displayed in the BATCH field. If no active batch file with the corresponding port number was interrupted, the field will stay empty. You can continue the execution of the selected batch file by clicking the CONTINUE button.

- TERMINATE

After the port number is entered, the [batch file](#) corresponding to the port number will be displayed in the BATCH field. If the field stays empty, no batch file is active. When you click the TERMINATE button the execution of the batch file is terminated, if the execution was interrupted before.

- EXECUTE

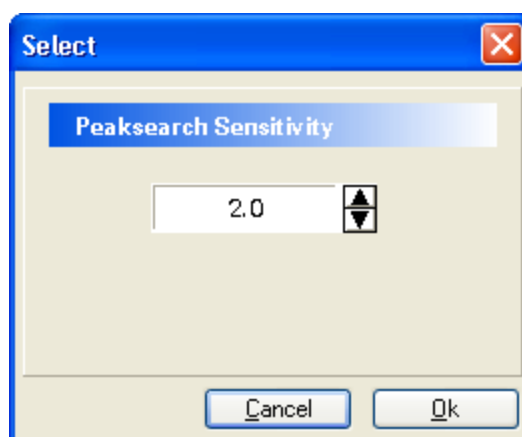
This input form allows the interactive execution of batch file commands. Therefore you have to type the commands into the input line or select one by using the selection list. This selection list contains the last 15 commands which were entered. You start the execution by clicking the EXECUTE button.

You close the dialog window by clicking the OK button.

3.3.10.5 Peak Search Sensitivity

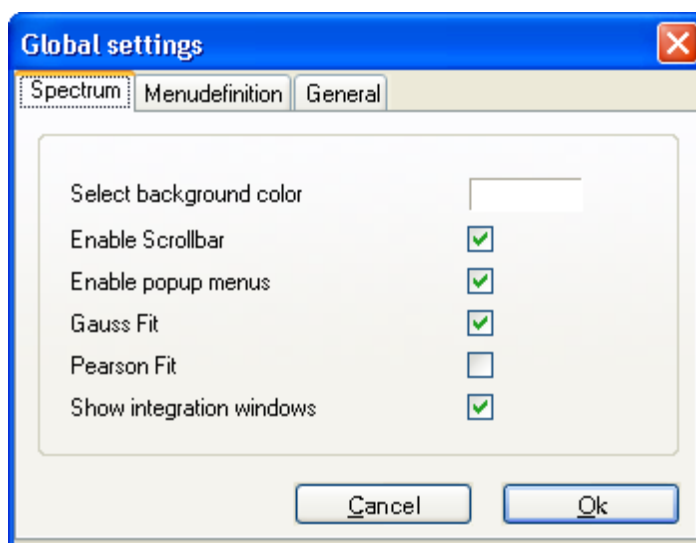
Influences the sensitivity of the [peak search](#) algorithm. The values 3, 2.5, 2, 1.5, 1, 0.5 can be selected. In order to identify the smaller peaks, a lower value must be entered.

(command: PEAKSEARCHSENS)



3.3.10.6 Preferences

On the first page of this dialog box (**SPECTRUM**) global settings for all [spectra windows](#) can be made. When you use SELECT BACKGROUND COLOR the actual setting of the spectra windows is super scribed. Clicking the color display field displays a color selection box.



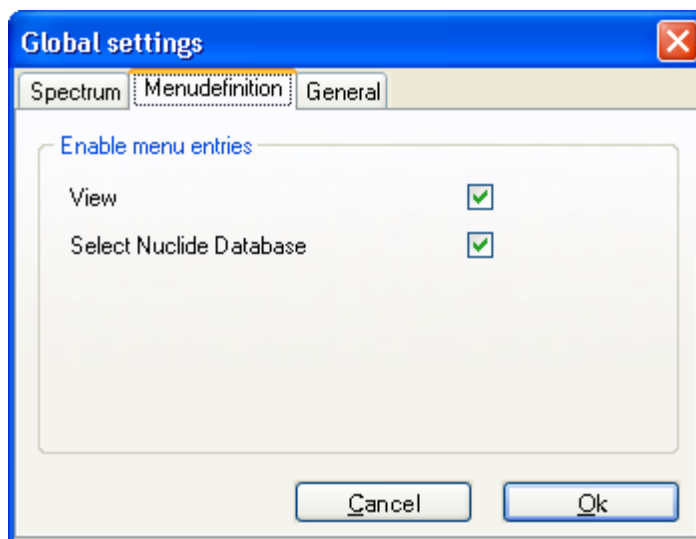
The control field ENABLE SCROLLBAR enables the [horizontal](#) and [vertical scrollbar](#) for all [spectra windows](#).

Within the control field ENABLE POPUP MENUS you select if a [popup menu](#) is available by clicking the right mouse button within the [spectrum area](#).

The control field Gauss Fit enables the gauss fit for the integrate command (batch command and menu command). This is the default integration setting.

The control field Pearson Fit enables the pearson fit for the integrate command (batch command and menu command).

The second dialog side (MENU DEFINITION) allows it to activate or deactivate the VIEW menu and the SELECT NUCLIDE DATABASE item (in the PROGRAM menu) to avoid changes made by other users.



(command PREFERENCES)

3.3.11 nanoSPEC/identiFINDER Menu

Load actual spectrum

Loads the actual spectrum of the nanoSPEC, nanoPROBE or identiFINDER connected to the actual port from the acquisition memory.

Load top spectrum

The top spectrum, i.e. the spectrum that was saved last to the spectra memory (FIFO) of the nanoSPEC, nanoPROBE or identiFINDER connected to the actual port is loaded from the spectra memory.

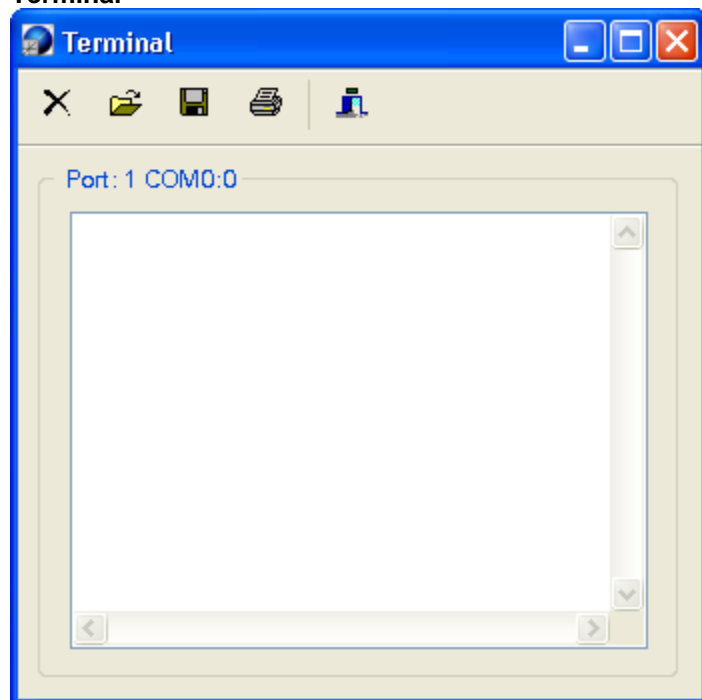
Remove top spectrum

Erases the spectrum of the nanoSPEC, nanoPROBE or identiFINDER connected to the actual acquisition port, which was saved last, from the spectra memory.

Save all spectra to disk

Loads all spectra from the spectra memory of nanoSPEC, nanoPROBE or identiFINDER connected to the actual acquisition port. The spectra data in spectrum <V> is lost!

Terminal



Opens the terminal window which enables you to enter commands for nanoSPEC, identiFINDER etc. on the actual acquisition port. This terminal enables you to set up or question the internal [hardware parameters](#) and test the communication.

3.4 Tool Bar

The visibility of the objects contained by the tool bar is determined by selection within the [VIEW menu](#). You can arrange the objects in the tool bar as you like. Click the left margin of the object and keep the left mouse button pressed while you move within the tool bar. When you double click onto the margin and keep the left mouse button pressed, the object can be seated on the screen at pleasure. The arrangement and visibility of the objects within the tool bar are saved to the windows data base.

[Real Time](#)

[Port Number](#)

[Status](#)

[Window Selection](#)

[Count Rate](#)

[Buttons](#)

[Batch Status](#)

[Window List](#)

3.4.1 Real Time

This object displays the elapsed acquisition and dead time for the actual port. You can choose between real or live time (dead time corrected acquisition time) display by clicking the caption. For dead time display, you can select between seconds or %.



This object is available in the winTMCA32 [Toolbar](#).

3.4.2 Port Number

This object displays the port number of the actual acquisition port. By using the cursor buttons you change the port number, if more than one port is given and the corresponding spectrum is visible.



This object is available in the winTMCA32 [Toolbar](#).

3.4.3 Status

Displays the acquisition status of the actual acquisition port:

- **STP:** acquisition is stopped.
- **ACQ:** acquisition is active.



This object is available in the winTMCA32 [Toolbar](#).

3.4.4 Window Selection

You can activate or deactivate the corresponding [spectra windows](#) by using the numbered buttons of this object. If a window is visible, the corresponding number is set to black, if the window is invisible, it is set to gray. If a visible spectrum window is the actual window, its number is displayed in red.

If you press the button of a spectrum which is visible but not the actual window it becomes the actual window. When the button is pressed again, the window is deactivated. When an acquisition port corresponds to a spectrum and the acquisition is active, the background color of the corresponding window button changes to yellow.

Clicking the cursor buttons on the right displays the window buttons of the remaining windows.

The buttons can be operated alternatively with the help of the keyboards. The upper eight visible buttons refer to the keys 1...8, the bottom keys to the keys $\hat{u} + 1...8$.



This object is available in the winTMCA32 [Toolbar](#).

3.4.5 Count rate










This object displays the complete count rate of the actual acquisition port. The display area is changed automatically. If an acquisition for this port is active, you can select between logarithmic and linear display



This object is available in the winTMCA32 [Toolbar](#).

3.4.6 Buttons

You configure the object BUTTONS analogous to the menu bar by editing the corresponding [configuration file](#). This configuration file depends on user name, if user administration is activated. 12 buttons can be defined at maximum. The default configuration which is available after installing the software is now explained.

	Starts acquisition on the actual acquisition port. (command: START)
	Stops acquisition on the actual acquisition port. (command: STOP)
	Erases the actual spectrum. The execution of this command requires confirmation. (command: CLEAR)
	Enables you to change spectra length and number of sub spectra . (command: LENGTH)
	Opens the hardware setup menu . (command SETUP)
	Integrates the marked area within the actual spectrum. (command: INTEGRATE)
	Opens a dialog to select spectra files for the actual spectrum window . (command LOAD)
	Saves the spectrum in the actual window. The actual spectra attributes as name, path, etc. are used. (command SAVE)
	Shows the PRESET menu . (command PRESET)

These buttons can be operated by the mouse or with help of the keyboard (↑ and F1...F12).

This object is available in the winTMCA32 [Toolbar](#).

3.4.7 Batch status

This object displays the name of the active [batch file](#), which is started with port number corresponding to the actual [spectrum window](#).

The LED of the object shows the following state:

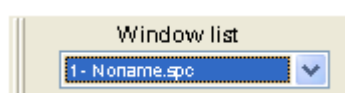
- dark red color
No batch file with port number 0 is active (normally system batch files are running on port 0).
- light red color
A batch with port number 0 is executed.
- dark green color
The repeated execution of the loop batch file (name must be LOOP.WPB) is activated.
- light green color
The loop batch file LOOP.WPB is executed right now.



This object is available in the winTMCA32 [Toolbar](#).

3.4.8 Window List

In the selection list of this object, all visible [spectra windows](#) with corresponding spectra names will be listed. Choosing an entry from the list brings the corresponding window to front.



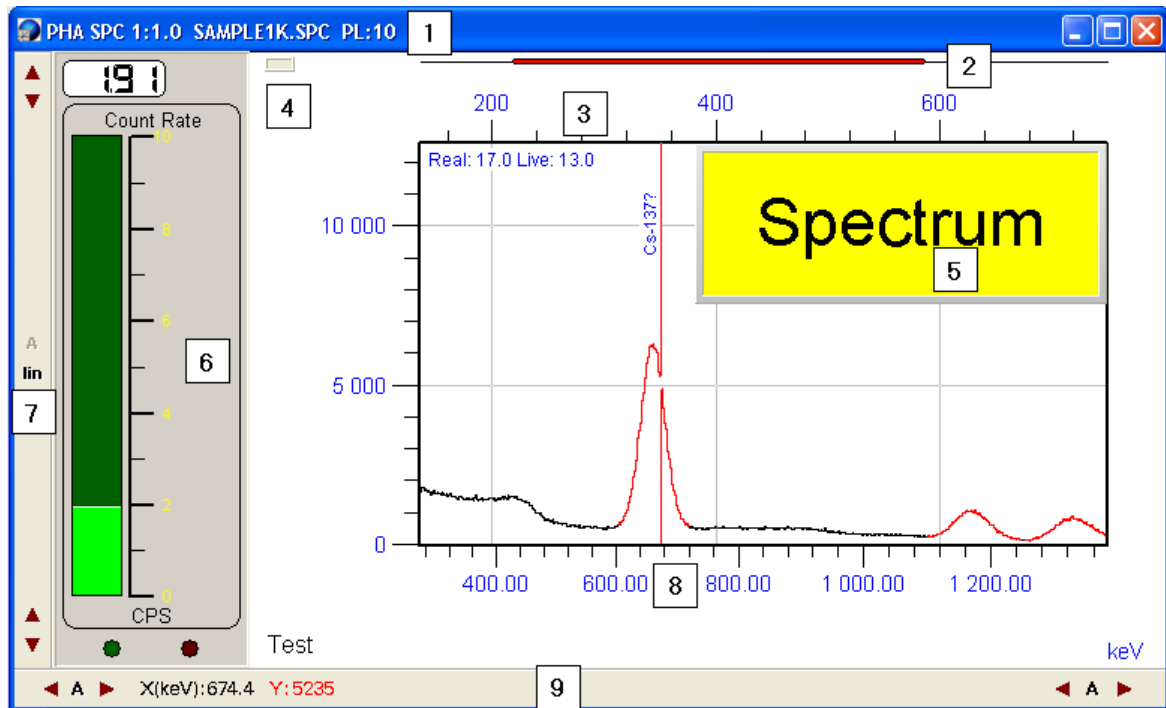
This object is available in the winTMCA32 [Toolbar](#).

3.5 Spectrum Window

Spectra are displayed in spectra windows within the spectra area of winTMCA32. These spectra windows can be positioned and scaled within this area as you like. Size and position are saved to the registration data base when winTMCA32 is terminated. A

maximum of 64 spectra windows can be used, whereby the maximum number of spectra windows displayed without overlap depends on screen solution and form size of winTMCA32.

On the following pages, some elements of the spectrum window are described. In order to operate them a mouse must be used.



The spectrum window contains the following items:

- [spectrum header](#)
- [spectrum display](#)
- [vertical scroll bar](#)
- [horizontal scroll bar](#)
- [meter](#)
- [text window](#)
- [spectrum window context menu](#)

3.5.1 Spectrum header

In the spectrum header ([1 in figure spectrum window](#)) the following information is displayed:

- acquisition [mode](#), if an acquisition port is connected to the spectrum (here: STABIL)
- window number (WN), spectrum number (SN) and sub spectra number (SUN) which use the format (WN):(SN):(SUN) (here: 1:1:0)
- spectrum name, if the name was fixed before ([SPECTRUM](#) ⇒ [DEFINITIONS](#))
- [preset settings](#), if an acquisition port is connected to the spectrum and [preset settings](#) were defined before ([PRESET](#) ⇒ SERVICE). The following format is used:
(PM):Value R:(MD):(VD)

with

- (PM) preset mode: available values are PR (Preset Real time), PL (Preset Live time), PC (Preset Counts) and PM (Preset Maximum Channel)
- (MD) Number of repetitions, if repetitions were set
- (VD) Number of remaining runs to be repeated, if repetitions were set

Example:

PR:200 R:10:6, which means "Preset Real time" =200 s, 10 repetitions whereby 4 were executed. If the number of repetitions is unlimited, this will be shown by **R:∞**.

3.5.2 Spectrum display

Within the spectrum display, various objects will be displayed, some of them can be faded in and out, if required.

The red beam ([number 2 in figure spectrum window](#)) on top of the spectrum shows size and position of the displayed spectra area in relation to the complete [spectrum length](#). If the beam covers the whole area, the complete spectrum can be seen.

The range over the spectrum ([number 3 in figure spectrum window](#)) serves to display the channel information to the corresponding displaying area.



If an [energy calibration](#) was carried out the corresponding energy scale ([number 8 in figure spectrum window](#)) is displayed then at the bottom of the spectrum. If the energy unit on the upper end of the cursor line is set to "keV" the name of the nuclide with an energy line within the cursor range will appear. The [nuclide database](#) can be called up via [PROGRAM](#) ⇒ [SELECT NUCLIDE DATABASE](#). The default file is NUCLIDE.DB. Please note that only nuclide lines are displayed which have their CHECK fields in the [nuclide database editor](#) activated.


The rectangle field in the upper left corner [number 4 in figure spectrum window](#) of the window shows that an acquisition port is connected to the spectrum displayed by the window. If an acquisition is active on this port, the color of the inner area of this field changes from gray to yellow.

3.5.3 Vertical scroll bar




By using the vertical scrollbar ([number 7 in figure spectrum window](#)) you can influence the minimal and maximal values for [spectrum display](#):

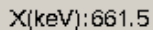



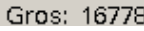
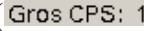
The upper cursor buttons  serve to set up the maximum display, the bottom buttons to change the minimum display. Any change of these values disables the automatical minimum/maximum scale. By clicking the button  the auto scale is activated again.

The display mode for the vertical spectra axis is selected via the button . You can choose between LIN (linear), LOG (logarithmic), and SQR (square). The caption of the button displays the actual mode.

3.5.4 Horizontal scroll bar

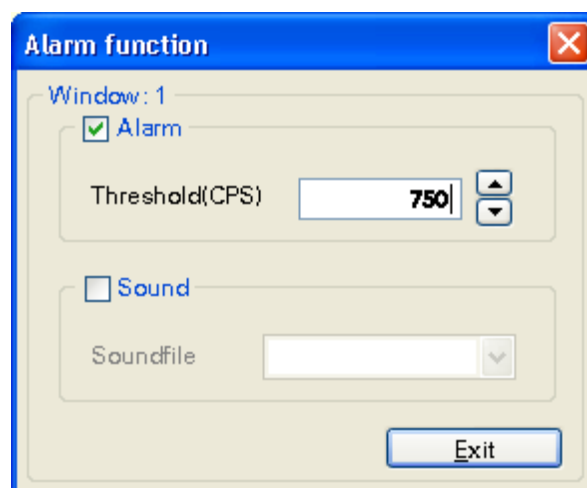
The horizontal scroll bar ([number 9 in figure spectrum window](#)) enables you to influence the left respectively right margin of the [spectra display](#). You can push the display margin into cursor direction by using the corresponding cursor buttons  . When you click the button  the minimum respectively maximum channel is used as margin.

Additionally, the position of the spectra cursor (vertical red line) is displayed within the scroll bar using the form . If an [energy calibration](#) was carried out the position is displayed in energy units, otherwise in channels. If the x-axis is declared as time axis using days (d) or hours (h), the display of the cursor position can be changed between the formats hours and date by mouse clicking on the x-position.

Within the [vertical scroll bar](#), the number of events for the channel onto which the cursor is positioned is also displayed () , alternatively the number of total counts within the spectrum () or the gross count rate () can be selected.

3.5.5 Meter

Within the [spectrum window](#) a meter can be displayed ([number 6 in figure spectrum window](#)), which shows the count rate or the refresh rate by displaying the window. In the count rate display an alarm function can be activated. If you double click the meter, a dialog window pops up. In order to use the alarm function, the ALARM field has to be activated by mouse click on the checking box. You enter the threshold to the THRESHOLD (CPS) field by typing in or using the cursor buttons. Values above this threshold will start the alarm. In this case, the LED on the bottom left margin of the meter changes its color from dark red to light red. Additionally, a .WAV file from the ./CONFIG directory can be selected in the SOUNDFILE field, which will be rendered if the count rate limit is exceeded. In order to use this function, a sound card with adapted speakers is necessary.



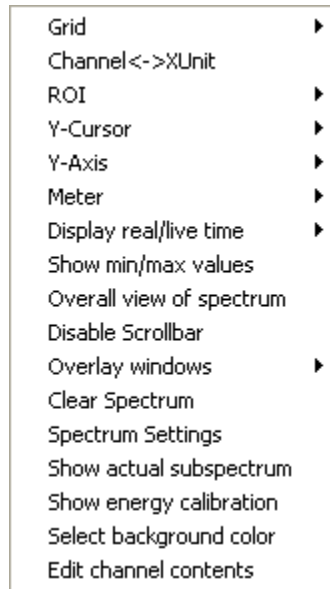
3.5.6 Text window

The text window ([number 5 in figure spectrum window](#)) can only be activated or changed with the help of [batch files](#) (batch file command SETSPECTEXTWINDOW). Clicking onto the text window spreads it to its maximum size which is the whole size of the

[spectrum window](#). Clicking again resets the window size.

3.5.7 Spectrum window context menu

When you click the right mouse button a context menu pops up which allows the following selections and setups:



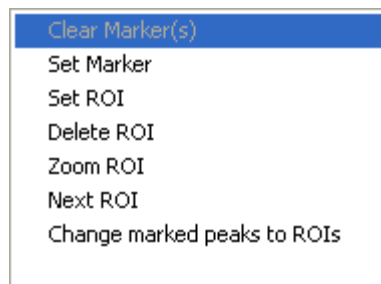
- **GRID**

When you use this menu item the grid for spectrum display can be activated.



If an [energy calibration](#) was carried out, the grid for the x-axis can be arranged for the channel- or energy-axis.

- ROI



CLEAR MARKER(S)

Erases earlier defined markers within the spectrum.

SET MARKER

Sets a marker to the actual cursor position. Previous defined markers will be erased. The markers serve to select a range within the spectrum to [integrate](#) or [define a ROI](#).

SET ROI

If two markers were set using this menu item, a [ROI](#) can be defined in between these markers. In this case, the markers will be erased automatically.

DELETE ROI

Erases a [ROI](#) if the cursor is located within.

ZOOM ROI

If the cursor is inside a [ROI](#), the spectrum view is expanded so that the ROI is displayed in the whole window.

NEXT ROI

If the cursor is within a [ROI](#) and more than one ROI is defined, the next ROI on the right of the actual ROI is displayed to expand the whole window. If the last ROI is reached the next one will be the first ROI on the left side.

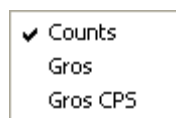
CHANGE MARKED PEAKS TO ROI Defines all peaks found by [COMPUTE](#) ⇒ [PEAKSEARCH](#) as [ROI](#) and colors them red.

- **CHANNEL ↔ ENERGY**

This menu item is only available if an [energy calibration](#) was carried out. For the cursor display in the [vertical scroll bar](#) you can select between energy or channel representation.

- **Y-CURSOR**

This menu item enables you to select how the channel contents of the channel having the cursor within are displayed.



You can select between channel contents (COUNTS), complete counts over all spectra ranges having the same color as the cursor channel (GROS), or the complete count rate over all spectra ranges having the same color as the cursor channel but with dead time corrected acquisition time (GROS CPS). These values will be displayed within the [vertical scroll bar](#).

- **Y-AXES**

This menu item enables you to select the display mode for the [vertical scroll bar](#).



You can select between the modes LIN (linear), LOG (logarithmic) and SQR (square).

- **METER**

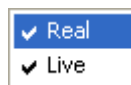
This menu item enables you to activate a [meter](#) within the [spectrum window](#). You can select between the modes COUNT RATE and REFRESH RATE.



In the mode COUNT RATE, the whole count rate for the spectrum is displayed. In the mode REFRESH RATE the frequency for screen refresh is displayed.

- **DISPLAY REAL/LIVE TIME**

With this menu item the real and/or the dead time corrected acquisition time in the upper right corner of the spectrum is displayed.

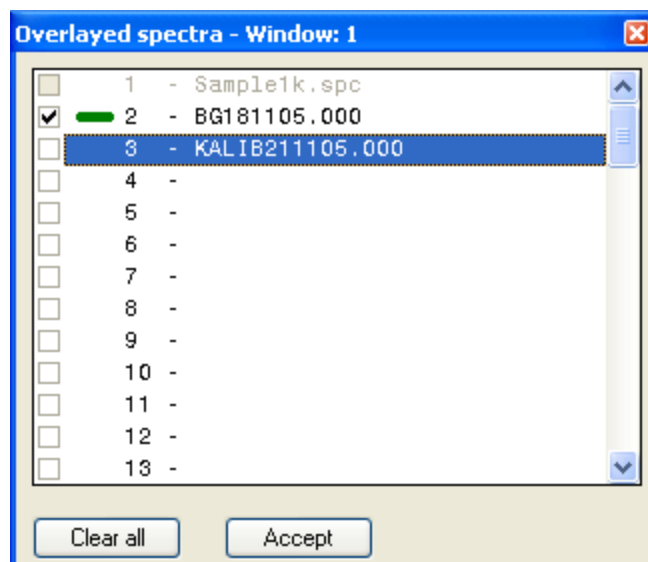
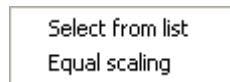


- **DISABLE SCROLLBAR**

The [vertical](#) and [horizontal scroll bar](#) are enabled or disabled.

- **OVERLAY WINDOWS**

Other spectra can be overlaid within the actual spectrum and compared directly. By using the menu item SELECT FROM LIST a dialog window opens which enables you to select one or more [spectra windows](#) from the list.



The spectra corresponding to the selected windows are displayed with a relative scaling. This serves to compare spectra with significant different channel contents. When you select EQUAL SCALING the overlaid spectra are displayed having the same y-axes scaling as the actual one.

If overlaid spectra are printed out the names of the overlaid spectra are listed after the

printout.

ATTENTION! Only spectra having the same length can be overlaid!

- **SPECTRUM SETTINGS**

Opens the dialog for spectrum settings.

- **SHOW ENERGY CALIBRATION**

When this menu item is activated the energy calibration function is displayed within the spectrum window instead of the spectrum, provided that an energy calibration was carried out.

- **SELECT BACKGROUND COLOR**

Opens a dialog box for color selection in which the background color for the spectra window can be chosen.

- **3D**

This menu item allows the plane display of a two dimensional spectrum on the screen. This menu item is only available if more than one sub spectrum is defined for the actual spectrum. This option must be enabled by a special winTMCA32 series number.

- **EDIT CHANNEL CONTENTS**

If the vertical and horizontal scroll bars are activated and the display mode COUNTS was selected for the y-cursor, an input form is opened, which enables you to specify the channel contents of the cursor channel. The changes must be confirmed by pressing the ENTER (↵) key.

3.6 LOG file

All user actions done by menu commands or buttons are recorded in the LOG file supplied with date and time. The file is created each day within the \CONFIG directory and uses the format LOGddmmy.TXT (dd=day, mm=month, y=last number of the year). LOG files, which are older than seven days, are erased automatically.

Additionally, all exceptions and all executed batch file commands can be recorded. In order to activate this function, you have to use the batch file command *SetWinprocDebug*.

Chapter

4

Changing graphical user interface

4 Changing graphical user interface

In this section, the [menu files](#) and [button files](#) which enable you to adapt the functions of the winTMCA32 software are described. You can use these files in connection with the [user administration](#) and for creating user profiles.

[Adapting the menu header](#)

[Adapting the buttons](#)

4.1 Adapting the menu header

If the [user administration](#) is not activated, the menu definition file MENU.DEF in the \CONFIG directory is used for the [menu header](#) definitions when winTMCA32 is started. If user administration is active, individual menu definition files can be assigned to the users. Those files will be loaded automatically if the user logs in. The menu definition files must have the format M*.DEF to distinguish them from the button definition files.

Menu definition files are ASCII files. You can create or alter them with the help of the [winTMCA32 editor](#), for example. The file registers must have the following format:

```
m "menu register" "command"
m.n "menu text" "command"
```

Thereby "m" refers to the number of the menu register in the menu header and "n" to the number of the menu item within the menu register "m". These numbers must start at 1 and have no gaps between them. The "menu text" refers to the text which should be displayed for the corresponding menu item. Text should be set in quotation marks (" "), if it contains blanks.

"command" refers to an internal menu command, to a [batch file](#) or to a windows program (the program name should be entered with program name and, if required, with path).

Examples:

1 "acquisition"	Defines the (main) menu register ACQUISITION.
1.1 "start" START	Defines the menu item START which is connected to the internal command START.
1.2 "stop" "winproc STOP -p=1"	Connects the menu item STOP to the execution of the batch file STOP.WPB.
1.3 "calculator" CALC.EXE	Connects the menu item CALCULATOR to the windows calculator program CALC.

4.2 Adapting the buttons

Analogous to the [menu definition file](#) the BUTTON.DEF file in the \CONFIG directory is used for assigning actions to the [buttons](#) without active [user administration](#). If the user administration is used all button definition files must have the format "B*.DEF" to distinguish them from menu definition files.

Button definition files are ASCII files that can be created and altered using the [winTMCA32 editor](#), for example. The registers must have the following format:

m bitmap-filename "command" "text"



"m" is the button number. Values are available from 1 – 12, whereby the position number within the icon object is fixed. The bitmap file refers to a file from the .\CONFIG directory which must contain the desired bitmap. The bitmap size for one button must be 28 × 28 pixels, whereby three bitmaps must be given for the modes "not pressed", "deactivated" and "pressed", so the effective size is 28 × 84 pixels. In the figure above the SETUP.BMP bitmap from the .\CONFIG directory is displayed. "command" must be one of the internal menu commands, a [batch file](#) or a windows program (the complete program name and, if required, the path must be given). "text" is an optional text which will be displayed if the mouse is dwelled on the button. This text should be set between quotation marks (" ") if it contains blanks.

Chapter

5

Batch files

5 Batch files

When you use batch files you can specify acquisition executions, including interactive data input, communication with external acquisition hardware, communication with other windows programs and the representation of results. Batch files are ASCII files and therefore can theoretically be read and handled by every text editor. The line length is fixed to 128 characters, whereby shorter lines must be filled with spaces. The fixation of line length allows an easier access to any line within the batch file. In order to avoid troubles when creating or executing batch files, it is advisable to use the winTMCA32 editor, which automatically takes care that the right format (recognizable by extension .WPB) is used.

Batch files must be located in the .\CONFIG directory, otherwise they will not be executed.

5.1 Batch structure

Every batch file consists of two sections, the first one contains the [commands](#), in the second one the variables are declared. The sections must be separated by the keyword "VARIABLES". At runtime, the commands in the first part are executed by the winTMCA32 program sequentially from top to bottom. Please note that each line can only contain one command, and the command key word has to be placed at the beginning. The variables which are used in the command part have to be defined in the declaration part and only one variable can be declared in each line using the format:

Name Type (Value)

NAME fixes the variable name, which is chosen freely by the user and does not contain any blanks.

TYPE must have the following format:

%f	floating point numbers
%d	integer numbers
%s	strings
%c	characters
%b	logical value

VALUE allows an optional starting value for a variable to be set. If strings are used, they should be set in quotation marks ("), in particular if they contain spaces. For logical values a 0 or a 1 can be used, but also TRUE or FALSE.

Example:

```
weight %f 12.234
status %s "confirm weight"
weightvariable %s "weight"
```

```
textline %s
OK %b FALSE
```

In order to get access to the value of a variable in a command line, you set a "\$" in front of the variable name. Also "\$\$" can be used.

Example:

```
SETPAR textline $weight
```

With this command, the value "weight" (here: 12.234) is assigned to the variable "textline".

The command line

```
SETPAR textline $$weightvariable
```

leads to the same result, because \$WEIGHTVARIABLE, which has the value WEIGHT, is evaluated first.

It is possible to use arrays within batch files. An array must be declared within the variables section:

```
arrayname[n] type value
n...array length
```

For example:

```
TestArray[2] %d 1,2
```

Within the command section *\$TestArray1* gives access to the first element; *\$TestArray2* gives access to the second one.

The variable names and commands are not case sensitive, which means that there is no difference between lower and upper case letters.

If a batch file is started, a port number has to be assigned, which can be within the range of 1 to 99. This port number defines the relations to other active batch files. If there exists already another active batch file with the same port number, the execution of the old batch file is stopped until the new started batch file has finished. Batch files with various port numbers can be executed simultaneously. At runtime, a temporary copy of the batch file to be executed is created and the variables and their starting values are copied to this temporary file. The file name has the format *PORT_nn.INF*, "nn" refers to the port number of the batch file (e. g. 01, 02...). If variables are changed during execution, only the temporary file is affected, but not the batch file. After execution, the temporary file is completely erased.

5.2 Batch commands

<N> and <V> are used as parameters for batch file commands, whereby <N> respectively <N1>, <N2>... refers to variables names, and <V> respectively <V1>, <V2>... refers to values which can directly be assigned to variables or via evaluation of variables (\$variable name).

ActivateStabilisation <V1> <V2>

Enables or disables the software stabilization on port <V1>=1,2,... .The acquisition mode

must be set to "STABIL". <V2> denotes the number of events necessary to calculate a new fine gain factor. This number must be within the range specified by the command *SetStabilisationParameter*. Setting <V2> to zero disables the stabilization.

If you use scintiSPEC please note that stabilization is activated or deactivated by the command *SetStabilisationParameter*.

AcquisitionStatus <N> <V>

This command checks if there is an active acquisition on port <V>=1,2,... .

If acquisition is active, a 1 is assigned to variable <N>, otherwise a 0.

If you want to know if a batch is active at the moment use the batch command

CheckBatchActive.

AddLoopTask <V1> <V2> <V3> (<V4> <V5>)

Adds Batch <V1> to the list of batches to be continuously repeated. <V2> sets the port number, <V3> the time interval (in seconds) between the executions as a real number.

With parameter <V4> a starting point can be set using the format "dd.mm.yyyy hh:mm:ss". With <V5> an additional parameter for calling up the batch file can be given (as for example "-e").

AddSecondsToDate <N> <V1> <V2>

Adds an amount of seconds <V2> to the value of variable <V1> and assigns the result to a new variable <N>. Variable <V1> must have the following format: dd.mm.yy hh:nn:ss.

Each time unit must consist of two characters.

AddSpectrum <V1> <V2>

The counts of each channel of spectrum <V1> are added to the corresponding channel of spectrum <V2>. The command is only executed if both spectra have the same length.

AddVariable <V1> <V2> <V3> <V4>

Variable <V2> is added to batch file <V1> (with or without extension). <V3> defines the variable type (%f, %d ...) and <V4> the value of the new variable. If the command is executed in file <V1>, variable <V2> is also added to the temporary file.

AppendFile <V1> <V2> <V3> (<V4>)

This command opens the text file <V2> and appends the line <V3> at the end of the file. If the specified file does not exist, it is generated automatically. The file search path is the same as of spectrum <V1> (see *SetSpectrumPath*).

Exception: If <V1> is set to zero, the \CONFIG directory will be selected. If a value is given for the optional parameter <V4>, <V3> and <V4> will be joined together with a blank between them. The resulting line will be added to the file.

AutoScale <V>

Scales the axes of spectrum window <V>=1,2... automatically.

Break <V>

This command will terminate a *FOR...NEXT* loop. The execution of the loop will be continued after the command *NEXT <V>*. <V> refers to the loop parameter.

Cancel

Cancels the batch file execution.

ChannelToEnergy <N> <V1> <V2>

Converts for spectrum <V1> channel <V2> into energy if an energy calibration was done before. The result will be assigned to <N>.

See also [energy calibration](#).

CheckBatchActive <N> <V>

Checks if there is a batch running on port <V>=1,2,... If an active batch is found, the variable <N> will be set to one, otherwise to zero.

If you only want to know if an acquisition is active use the batch command *AcquisitionStatus*.

CheckCursorInRoi <V1> <N1> <N2> <N3> <V2>

This command checks if there is a special channel (<V2>≠0) or the cursor (<V2>=0) of the spectrum window <V1> within a ROI. The internal ROI number will be assigned to <N3> if the channel or cursor is within a ROI, <N1> and <N2> will be set to the left respectively right margins (in channels) of the ROI. If no ROI was defined, <N3> will be set to -1 and <N2> to zero.

You define ROIs with the batch commands *MkNaIROI* or *DefineEnergyROI*, but you can also create ROIs choosing Spectrum ⇒ ROIs in the winTMCA32 menu header.

CheckStabil <N> <V>

Checks if the software stabilisation of acquisition port <V> with acquisition mode STABIL is active. If no peak (i.e. a peak suited to calculate the stabilisation parameters) was found, <N> will be set to zero, otherwise to one.

You activate the stabilisation with the batch command *ActivateStabilisation*. Please note that stabilisation parameters must be set (batch command *SetStabilisationParameter*)!

You can also activate the stabilisation or set the parameters by selecting the stabilisation register from the hardware menu in the winTMCA32 menu header.

CHKPeak <V1> <N1> <N2> <V2> <V3>

Calculates the fine gain and offset values for energy calibrated spectrum <V1> and assigns them to variables <N1> and <N2>. Therefore you can enter two energy values <V2> and <V3>, and the peaks found will be assigned to them. If only one energy value is used, <V3> must be set to zero. In this case the first peak found (peak search is started from the right margin) is set to the given energy <V2> and the fine gain is calculated by "pulling" this peak to this energy.

ClearAllSpectra

All spectra windows are cleared.

ClearChronometer <V>

Resets one of the two chronometers (<V>=0,1) of the winTMCA32 software back to zero. The chronometer or stopwatch can be reset while running.

ClearNanoActSpec <V>

This command erases data from the acquisition memory of the nanoSPEC connected to port <V>

ClearNanoTopSpec <V>

Clears the spectrum, which was saved at last, from the spectra memory of nanoSPEC connected to port <V>.

ClearSpectrum <V1> (<V2> <V3>)

Clears the channel contents of the selected spectrum <V1>=1,2,... . Optionally, more than one spectrum can be erased at the same time (<V2> etc).

CloseExcelWorksheet

Closes the excel worksheet opened with batch command *OpenExcelWorksheet*. An [example](#) is given in the appendix.

CloseIPCConnection

Closes the connection opened with batch command *OpenIPCConnection*.

CloseMessageWindow

This command closes a message window created by the command *ShowMessage*.

CloseWinTmca

This command terminates winTMCA32.

ConfigCOM <V1> <V2> <V3> <V4> <V5>

Enables the configuration of a serial interface <V1>=1,2,... for communication with an external device. The parameters can be set to standard values, e. g. Baud-Rate <V2>: 1200, 2400, ..., 9600, 14400, 19200, etc., parity <V3> : N (None), O (Odd), E (Even), bits per character <V4>: 7 or 8 and stop bits <V5>: 1 or 2.

ConnectMCSAuxSpectrum <V1> <V2>

If mcs mode is used the mcs spectrum of spectrum <V1> will be displayed in spectrum <V2> (see also *DisconnectMCSAuxSpectrum*)

ConnectUDP <V>

Connects spectrum <V> with the acquisition port server given by the command *SetPortUDPInfo*.

ConvertDate <N> <V>

Converts the date given by <V> (format DD.MM.YYYY) into a real number, the integer part gives the number of days since 1899, the decimal places the time as a fraction of the actual day. The result is assigned to variable <N>.

ConvertDateTime <N> <V>

The date/time given by <V> (format DD.MM.YYYY HH:NN:SS) is converted to real format (see *ConvertDate*).

ConvertTime <V>

The time given by <V> (format HH:NN:SS) is converted to real format (see *ConvertDate*).

CustomTimeWaitComString <V1> <N> <V2> <V3> <V4> <V5> <V6>

Analogous to the *WaitComString* command, but enables the user to modify the waiting time for response. <V3> is the string which is sent to the device on com port <V1>. The

waiting time is set by <V4> and <V5> where <V4> gives the minutes and <V5> the seconds. The maximum waiting time is 1 minute 59 seconds. The parameter <V6> is optional. If <V6> is set to 1 then a CHR(10) is sent at the end of the string. For <V4>="^" every text is accepted as an answer.

DataInput <V1> <V2>

Displays a user defined input dialog with caption <V1>, which allows assignment of values to variables located in a temporal file, i.e. the temporary copy of the batch file being serviced. The variables must be predefined in a file <V2> (standard extension "*.VAR").

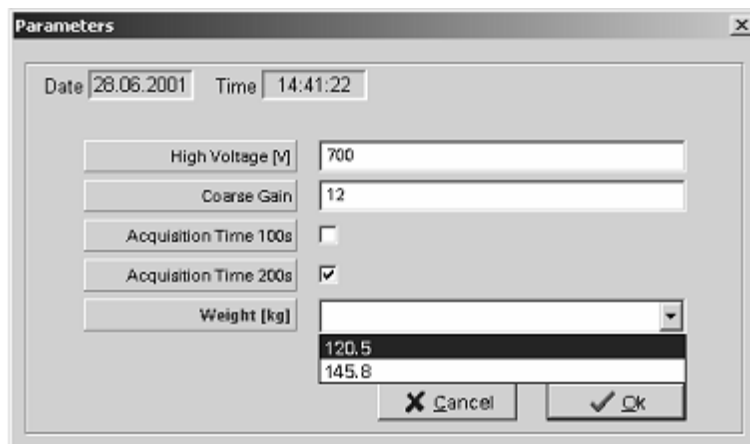
This file must have the following structure:

```
"High Voltage [V]" HV vcr
"Coarse Gain" Gain vcr
"Acquisition Time 100s" Time1 vcr 1
"Acquisition Time 200s" Time2 vcr 1
"Weight [kg]" Weight vcb [g1,g2]
```

First a description text which will be displayed must be given, then the name of the variable from the temporary file of the batch. At last the attributes for the assigning values. These attributes can contain a maximum of four characters, which must be listed without spaces between them. "v" refers to "visible", "c" to "changeable", "r" to "requested" and "b" to "box" which means a selection list. All four characters can be given but the attribute can also be left. In the resulting window the actual values of the variables will be shown. You can change them depending on their defined attributes. The changed values will be assigned to the temporary file. Please note that they are lost if the batch has finished and these values were not stored before.

The following file entry leads to the selection window below:

```
DataInput Parameters DATA.VAR
VARIABLES
HV %d 700
Gain %d 12
Time1 %b 0
Time2 %b 1
Weight %f
g1 %f 120.5
g2 %f 145.8|
```



If you declare variables as logical variables (%b), a "checkbox" appears in the input window instead of a text field. You can set a group number additionally behind the attributes. If more variables have the same group number, only one can be selected, all the others are automatically deactivated.

If a selection list is used, the desired values must be entered in rectangular brackets [] behind the attributes.

You can use variable names and text, if you choose variable names, the actual variable value is entered to the list. If the attribute "c" is not given, the values from the list can only be selected but the customer is not able to enter new values.

DBSetNuclideTestFlag <V1> <V2> <V3>

You can activate (<V3>=1) or deactivate (<V4>=0) the "CHECK"-flags of nuclide <V2> in the nuclide database <V1>. Activated flags are taken into consideration by the representation of nuclide names at cursor position in the spectrum window, and by the evaluation of spectra with the optional module NAJCALC.

DDEChangeTopic <V>

Sets the TOPIC preferences for connection to DDE server to value <V> (see *DDEConnectServer*).

DDECloseConnection

Closes the DDE connection to server.(Connection is opened using the command *DDEConnectServer*)

DDEConnectServer <N> <V1> <V2> (<V3>)

This command opens a DDE (dynamic data exchange) connection to another windows program which is used as DDE server. This default windows communication channel allows the client (here: winTMCA32) to read items from the server side and to change them. You can also transmit makro commands if this is allowed by the server. In order to set the connection, the program path must be entered by <V1> and the name of the server program by <V2>. The parameter <V3> is optional and allows to declare the "topic" parameter for DDE connection (case sensitivity!). This serves to select more item plains if this is supported by the server. **If <V3> is not used, <V3> is set to it's default value "system"**. If the connection to the DDE server can be built, the variable <N> is set to 1, otherwise to 0. With winTMCA32 a second DDE channel can be used, the commands for this option are DDEAux... (DDEAuxConnectServer, for example). Connection must be closed with the *DDECloseConnection* command!

DDEExecuteAndWait <N> <V1> <V2>

This command erases the content of item <V1> of a DDE server, delivers command <V2> and waits for the server changing the value of item <V1> as a fact of command <V2> (see also *DDEConnectServer*). The new value of the item is assigned to variable <N>. If the value doesn't change within ten seconds, the command will be cancelled and an error message will appear.

DDEExecuteMakro <V>

Delivers makro command <V> to DDE server (see *DDEConnectServer*).

DDEPokeData <V1> <V2>

Sets item <V1> from the DDE server to value <V2>.
(see *DDEConnectServer*)

DDERequestAndWait <N> <V1> <V2>

This command waits for DDE server (see *DDEConnectServer*) setting item <V1> to value <V2> (maximum waiting time: 30 seconds). If this happens in time, variable <N> is set to one, otherwise to zero.

DDERequestData <N> <V>

The content of item <V> of the DDE server is assigned to variable <N>.
(see *DDEConnectServer*)

DecayTime <N> <V1> <V2> <V3>

Calculates the time [s] for radioactive decay, until the starting activity <V1> has fallen to the value <V2> at a half life time <V3> given in seconds. The result is assigned to variable <N>.

DecryptString <N> <V>

This command decrypts string <V> which was encrypted by the command *EncryptString*. The result is assigned to variable <N>.

DefineEnergyROI <V1> <V2> <V3>

A ROI is defined in spectrum <V1> ranging between energy <V2> and energy <V3>, <V3> has to be larger than <V2>. In order to use this command, you have to carry out an energy calibration before.

You can also define ROIs with the batch command *MkNaIROI* or by selecting Spectrum ⇒ ROIs in the winTMCA32 menu header.

DeleteAllROIs <V>

Erases all defined ROIs (region of interest) in a spectrum <V>. ROIs are defined with the command *DefineEnergyROI* or *MkNaIROI*.

DeleteLoopTask <V1> <V2> (<V3>)

Deletes the loop batch <V1> on port <V2> from the list of batches to be continuously repeated. <V3> is optional. If the loop batch <V1> does not exist an error message is displayed on the screen. If <V3> is set to 1 this error message is suppressed.

DisableScrollbar <V>

Disables the horizontal and vertical scroll bar in spectrum window <V>.

DisableSpectrumSelection

Disables the spectrum selection window within the icon bar.

DisconnectMCSAuxSpectrum <V>

If mcs mode is used the mcs spectrum of spectrum <V> is displayed in spectrum <V> (see also *ConnectMCSAuxSpectrum*).

EnableAutoTransfer <V1> <V2>

Enables (V2=1) or disables (V2=0) for acquisition port <V1> the REMOTE acquisition mode.

EnableGaussFit <V>

For <V>=1 (this is the default setting) the gauss fit is used within the batch file command *Integrate* and the menu command *Integrate*. <V>=0 disables the gauss fit.

EnableMenuBar <V1> <V2>

Enables (V2=1) or disables (V2=0) the menu items within the tool bar. The following menu items can be used (=V1):

BATCHMENU
 TIMEMENU
 PORTMENU
 ACQSTATUSMENU
 WINDOWSELECTMENU
 RATEMETERMENU
 BUTTONMENU
 WINDOWLISTMENU

EnablePearsonFit <V>

Setting <V>=1 enables the pearson fit for the batch- and menu command *Integrate*. <V>=0 disables the pearson fit.

EnableScrollbar <V>

Enables the horizontal and vertical scroll bar in spectrum window <V>.

EnableSpectrumSelection

Enables the spectrum selection window within the icon bar.

EncryptString <N> <V>

String <V> is encrypted and assigned to variable <N>.

EnergyCalibration <V1> <V2> <V3> (<V4>... <V9>)

Executes an energy calibration within spectrum <V1> by assigning channels to energies. At least one combination (<V2>, <V3>) must be pre-set. The coherence between energy E and channel C is given by a polynome in the fourth degree:

$$E = a \cdot C^3 + b \cdot C^2 + c \cdot C + d$$

Optionally, up to 3 more combinations can be assigned. Calibration with only one pair results in a straight line (a=b=d=0) crossing the origin (C=0 ⇒ E=0). Two combinations result in a straight line (a=b=0) etc.

An energy calibration can also be done by selecting Spectrum Menu ⇒ Energy Calibration from the winTMCA32 menu header.

EnergyToChannel <N> <V1> <V2>

Converts energy <V2> to channel for spectrum <V1>. The result is assigned to variable <N>.

Please note that an energy calibration has to be carried out before!

Eval <V1> <N> (>V2>)

This command executes mathematical calculations, the result is assigned to variable <N>. The following operations can be performed:

sin (sine), con (cosine), tan (tangent), sqr (evolve a root), log (logarithm), ln (natural logarithm), abs (absolute value), trunc (the integer part of a real number is given) a^b (exponentiate), as well as the fundamental rules of arithmetic "*", "/", "+", "-", and the use of brackets "(", ")".

You can enter values in the default format (i.e. 1.2345) or in the exponential format (i.e. 1.2345e+1), whereby a "." must be used instead of a ",". Optionally, the output format of the result variable can be given by parameter <V2>. The format declaration must be "%n.mf" for default format and "%n.me" for exponential format. "m" refers to the decimal places and "n" to the total character number of the result. If "n" is bigger than the total resulting character number, the absent characters are filled up with blanks.

Example:

Eval ln(\$Value) Result %.3f

By using the variable
Value %f 10
this leads to Result "2.303".

Using the format "%10.3e" the value " 2.303" is assigned to variable RESULT.

ExecuteIPCMacro <VG>

Delivers macro command <V> to the server program opened by batch command *OpenIPCConnection*.

FileExists <V1> <V2> <N>

This command checks if file <V2> (without path declaration) already exists. If the file was found, <N> is set to one, otherwise to zero. The file search path is the same as of spectrum <V1>. If <V1> is set to zero, the \CONFIG directory will be selected.

You set the spectrum path by using the batch command *SetSpectrumPath* or by selecting Spectrum Menu ⇒ Definitions from the winTMCA32 menu header.

FindFile <N> <V1> <V2>

Searches for file name <V2> in directory path <V1>, including all sub directories. If the file exists, the file path is assigned to variable <N>.

FindFist <N1> <N2> <V1> <V2>

This command searches for a file having the attributes <V2> within the spectrum directory of spectrum number <V1>. If the search was successful and a file was found the name of the file is assigned to variable <N2> and a "1" is assigned to variable <N1>. If no such file exists a "0" is assigned to variable <N1>. If more files having the attribute <V2> exist they can be given out by the command *FindNext*.

FindNext <N1> <N2>

For the next file having the attributes given by the command *FindFirst* is searched. If the search was successful a „1" is assigned to variable <N1> and the name of the file is assigned to variable <N2>. If the search was not successful a "0" is assigned to variable <N1>.

FloatingMeanValue <N> <V1> <V2> (<V3>)

With this command you can use one of the ten memory cells reserved for mean values

($\langle V1 \rangle = 1 \dots 10$) in order to evaluate a floating mean value for acquisition values etc. . The mean value of the last $\langle V2 \rangle$ values is evaluated. In order to initialize memory cells the number of the values to be evaluated must be given by $\langle V3 \rangle = 3 \dots 20$, the starting value is $\langle V2 \rangle$. If the function is called up again without the declaration of parameter $\langle V3 \rangle$ a new mean value is evaluated. The respective mean value is assigned to variable $\langle N \rangle$.

FormatDateTime $\langle N \rangle$ $\langle V1 \rangle$ $\langle V2 \rangle$

The date or time information given by $\langle V2 \rangle$ is set to format $\langle V1 \rangle$ and written to variable $\langle N \rangle$. You can use the following formats:

dd	Day
mm	Month
yy	Year (two place number)
yyyy	Year (four place number)
hh	Hour
nn	Minutes
ss	Seconds
zzz	Milliseconds

Here is an example for formatting date/time:
"dd.mm.yyyy hh:nn:ss:zzz"

For $\langle V \rangle$... **Next** $\langle V \rangle$

"FOR" in connection with "NEXT" allows it to construct loops where one command can be executed more than once.

The loop parameter $\langle V \rangle$ must have the following format:

Var = Start TO Stop (STEP...)

whereby "Var" declares the variable of type %d, "Start" and "Stop" are the start and end values of the loop parameter. "STEP" refers to the step with. The default step width is one, but another can also be used. If "Stop" < "Start", STEP must be set to a negative value.

If you want to terminate a FOR-NEXT-loop before "Stop" is reached, the batch command *Break* must be used.

E.g.:

```
For I=$Start To $Stop
Eval $Result+1 Result
Next I
```

```
For I=10 to 1 Step -1
Eval $Result+$I Result
Break I
Next I
```


GenerateSPCName <N> <V1> <V2> <V3> <V4> (<V5>)

Generates a name for spectrum <V1> and assigns it to variable <N>. The name is created in different ways, depending on the text alignment parameter <V2>. If you create the name with the string variables <V3> and <V4>, <V2> must be set to "%s%s". Before, after and between the strings specified by the variables, a text can be inserted. If you used only one variable, the second one must be set to "@". In the text arrangement (<V2>), only one "%s" is allowed. Usually, the extension is enumerated from "000" to "999". By setting the optional parameter <V5> to "ASCII", the numbers are represented as letters (0 = A ... 9 = I).

GetAcquisitionMode <N> <V>

This command assigns the acquisition mode of spectrum <V> as numerical value to variable <N>. The following values can be assigned:

VALUE	ACQUISITION MODE
1	PHA
2	MCSADD
3	MCSSTORE
4	LIST
5	MULPHA
6	DUAL
10	DOSIS
13	STABIL
18	REMOTE
24	RAWDATA
25	WINDOW

GetActualDateTime <N>

Assigns the actual date as real number to variable <N> (see also *ConvertDate*).

GetActualMCSValue <N> <V>

This command assigns the last value written into spectrum <V> during virtual MCS-acquisition to variable <N>.

GetActualPort <N>

Assigns the active acquisition port to variable <N>.

GetActualSpectrum <N>

Assigns the spectrum number of the active spectrum of the winTMCA32 software to variable <N>.

GetActualSubSpectrumNumber <N> <V>

Assigns the actual subspectrum number of acquisition port <V> to variable <N>, if the acquisition port is set to the MULPHA acquisition mode.

GetActualWindow <N>

Assigns the number of the actual spectrum window to variable <N>.

GetBaselineLength <N> <V>

Assigns the actual hardware parameter "baseline length" of acquisition port <V> to variable <N>.

GetChannel <N> <V1> <V2>

This command assigns the channel content of channel <V2> in spectrum <V1> to variable <N>.

GetChronometerTime <N> <V>

Assigns the elapsed time of chronometer <V>=0,1 to variable <N> in the following format: "hh.nn.ss". Each time unit consists of two characters.

GetCoarseGain <N> <V>

The variable <N> is set to the coarse gain factor of port <V>.

GetConversionGain <N> <V>

The variable <N> is set to the actual hardware parameter conversion gain of port <V>.

GetDate <N>

The actual date is assigned to a string variable <N> in the following way; dd.mm.yyyy" (y → year, m → month, d → day).

GetDateTime <N>

Assigns the actual date and time to string variable <N> in the following way: "dd.mm.yy hh:nn:ss" (y → year, m → month, d → day, h → hour, n → minute, s → seconds).

GetDayOfWeek <V>

As result value the first two letters of the actual day of the week are assigned to variable <N>.

GetDBLClickString <N1> <N2>

If text is declared as "selectable" in a layout file used by the batch command *ShowFormattedPage*, the form closes by double clicking on the text. The command *GetDBLClickString* checks if the form was closed in that way. In this case <N2> is set to 1, the text is assigned to variable <N1>. Otherwise <N2> is set to 0, <N1> to „".

GetDeadTime <N> <V>

The actual dead time of spectrum <V> is assigned to variable <N>.

GetDLLBoolean <N> <V>

Assigns the contents of a boolean memory cell <V> to a variable <N>. "FALSE" is represented as 0, "TRUE" as 1. 64 of these memory cells are available in winTMCA32. The return value is 1 (true) or 0 (false). This value can also be displayed in the [information window](#) of the winTCA32 using a LED.

GetDLLFloat <N> <V>

Assigns the contents of a floating point memory cell <V> to variable <N>. 64 of these memory cells are available in winTMCA32. The value can be displayed in the

[information window](#) of winTMCA32 as real number or beam display in connection to *SetDLLFloatMaxValue*.

GetDLLMaxFloatValue <N> <V>

The maximum value of a floating point memory cell <V> set with *SetDLLFloatMaxValue* is assigned to variable <N>. This value is used for normalization to 100% by the beam display in the [information window](#).

GetDLLFloatPercentageAlarm <N> <V>

Assigns the alarm threshold (in %) for the internal numerical memory variable <V>=1,2,...64 given by the command *SetDLLFloatPercentageAlarm* to variable <N>. This value will be displayed as beam in the [information window](#) of the winTMCA32 program. IF the value of the memory variable is smaller than the percent value, the beam is green, if the value exceeds the percent value the beam becomes red.

GetDLLString <N> <V>

The value of the internal logical text variable <V>=1,2,...64 is assigned to variable <N>.

GetDwellTime <N> <V>

Assigns the dwell time of port <V> to variable <N>.

GetEnergyCalibration <V> <N1> <N2> ...<N7> <N8>

This command assigns the four energy/channel pairs used for *energy calibration* of spectrum <V> to the variables N1, N2 ... N8, where N1, N3, N5 and N7 refer to the channel values, N2, N4, N6 and N8 to the energies.

Please note that an energy calibration has to be carried out before!

GetEnergyCalibrationCoefficients <V> <N1> <N2> <N3> <N4>

Assigns the energy calibration coefficients from spectrum <V> to variables N1...N4. Coefficient A is assigned to N1, B to N2, C to N3 and D to N4 (see *EnergyCalibration*).

GetFineGain <N> <V>

Assigns the fine gain value of port <V> to variable <N>.

GetHV <N> <V>

Assigns the hardware parameter HV of port <V> to variable <N>.

GetIPCItemData <N> <V>

The content of item <V> is written to variable <N>. Please note that a connection has to be opened before (using the command *OpenIPCConnection*).

GetLivetime <N> <V>

Assigns the actual acquisition time (with dead time correction) of spectrum <V> to variable <N>.

GetLLD <N> <V>

Assigns the hardware parameter LLD (LowerLevelDiscriminator) of port <V> to variable <N>.

GetMCSAuxSpectrum <N> <V>

Variable <N> gives the number of the spectrum which contains the mcs spectrum of spectrum <V> (see also *ConnectMCSAuxSpectrum*).

GetMCSChannelNumber <N> <V>

This command assigns the actual channel number of virtual MCS-acquisition of spectrum <V> to variable <N>.

GetMinMaxAverageValue <V1> <V2> <V3> <V4> <V5> <N1> <N2> <N3>

This command determines the minimum- <N1>, the maximum- <N2>, and the average <N3> value of the channel contents ranging from channel <V2> to channel <V3> in spectrum <V1>. <V4> refers to the scale factor and <V5> to the offset value.

GetNanoDailyMeasurementStart <N> <V>

If the daily repeated measurement for nanoSPEC on port <V> is activated, the starting time of the measurement can be assigned to variable <N>. The time format is "dd.mm.yyyy hh:nn:ss". The date refers to the next day when measurement starts.

GetNanoMeasurementStart <N> <V>

If a starting point for measurement with nanoSPEC on port <N> is given, this starting point will be assigned to variable <N> using the format "dd.mm.yyyy hh:nn:ss".

GetNanoNumberOfRuns <N> <V>

This command assigns the number of runs given for nanoSPEC on port <V> to variable <N>.

GetNanoSystemTime <N> <V>

Assigns the system time of nanoSPEC on port <V> to variable <N>, using the format "dd.mm.yyyy hh:nn:ss".

GetNetLiveCPS <N> <V1> <V2> <V3>

This command assigns the net count rate of all ROIs of spectrum <V1> having the color <V2> to variable <N>. For background all regions having the color <V3> will be taken into consideration. If <V2> = <V3> no background consideration is used. The following colors can be used:

BLACK, MAROON, GREEN, OLIVE, NAVY, PURPLE, TEAL, GRAY, SILVER, RED, LIME, YELLOW, BLUE, FUCHSIA, ACQUA, WHITE

Alternatively a 3-byte hexadecimal value can be specified, to adjust the RGB-color-intensity for blue, green and red. In this case, the number must be declared with "0x" in front of it.

Example:

"0xFF0000" refers to red, "0x00FF00" to green, etc.

GetNoiseLevel <N> <V>

The actual hardware parameter noise level of port <V> is assigned to variable <N>.

GetNumberOfPorts <N>

The number of all actual available acquisition ports is assigned to variable <N>.

GetNumberOfSubSpectra <N> <V>

Assigns the number of subspectra of spectrum <V> to variable <N>.

GetPresetTime <N> <V>

Assigns the maximum acquisition time for port <V>, given by batch commands *PresetLivetime* or *PresetRealtime*, to variable <N>.

GetPZExternal <N> <V>

Assigns the value of hardware parameter "pole zero (PZ external)" of acquisition port <V> to variable <N>.

GetRealTime <N> <V>

Assigns the acquisition time (real time) of spectrum <V> to variable <N>.

GetROIInfo <N1> <V1> <V2> <N2> <N3> <N4> <N5>

This command gives information of ROI <V2>=1,2...128 in spectrum <V1>. If the ROI is not defined, <N1> is set to 0, otherwise to 1. (A ROI is defined with the batch commands *DefineEnergyROI* or *MkNaIROI*.)

The following parameters are assigned:

left margin → <N2>

right margin → <N3>

ROI color → <N4>

If histogram mode is set, a 1 is assigned to variable <N5>, otherwise a 0.

GetSDate <N>

Assigns the actual date to a string variable <N> with the following format: "ddmmy" (d → day, m → month, y → year).

GetSerialNumber <N> <V>

The serial number from the acquisition device on port <V> is written to variable <N>.

GetServiceMode <N> <V>

The PRESET mode for acquisition port is assigned to variable <N>. The values assigned are:

value	preset mode
1	real time
2	live time
3	total counts
5	maximum

GetShapingTime <N> <V>

The hardware parameter shaping time of port <V> is assigned to variable <V>.

GetSpectrumComment <N> <V>

The comment line of spectrum <V> is assigned to variable <N>.

GetSpectrumExtension <V1> <N> (<V2>)

Assigns the file extension of spectrum <V1> to a string variable <N>, if a filename was specified for this spectrum. Usually, the *GenerateSpcName* command enumerates the extension from "000" to "999". When you set the optional parameter <V2> to "ASCII" the numbers are represented as letters (0 = A ... 9 = I).

GetSpectrumLength <N> <V>

The length of spectrum <V> is assigned to <N>.

GetSpectrumPath <N> <V>

Assigns the directory name of spectrum <V> to variable <N>.

You set the spectrum path by using the batch command *SetSpectrumPath* or by selecting Spectrum Menu ⇒ Definitions from the winTMCA32 menu header.

GetStartDateTime <N> <V>

The starting point of the last acquisition of spectrum <V> is assigned to variable <N>. Format "dd.mm.yyyy hh:nn:ss" is required.

GetStopDateTime <N> <V>

The stopping point of the last acquisition of spectrum <V> is assigned to variable <N>, using the format "dd.mm.yyyy hh:nn:ss".

GetSubSpectrumNumber <N> <V>

The actual number of sub spectra of spectrum <V> is assigned to variable <N>.

GetTime <N>

Assigns the actual time to string variable <N> in the following format: "hh:nn:ss" (h → hour, n → minute, s → seconds).

GetTimeSinceLastStabilisation <N> <V>

This command assigns the time since last successful stabilisation (in seconds) of spectrum <V> to variable <N>.

Stabilisation is enabled with batch command *ActivateStabilisation*. Please note that *Stabilisation Parameter* must be set!

GetTopLength <N> <V>

The hardware parameter "top length" of port <V> is assigned to variable <N>.

GetULD <N> <V>

The hardware parameter ULD (upper level discriminator) of port <V> is assigned to variable <N>.

GetUserName <N1> <N2> <N3> <N4>

The name of the actual user is assigned to variable <N1>, if the user registry is activated. In this case the user priority will be assigned to <N2>, the menu definition file to <N3> and the button file to <N4>.

GetWorkingDirectory <N>

The path of the .CONFIG-directory is assigned to variable <N>.

Goto <V>

The execution of the batch file will jump to a given label <V>.

A ":" must be added in front of the label, for example:

```
Goto Label
```

```
...
```

```
:Label
```

HalfLiveCorrectedActivity <N> <V1> <V2> <V3>

The activity from the beginning <V1> for a time interval <V2> (in seconds) is corrected, the half life time <V3> (in seconds) is taken into consideration.

HideStatus

Closes the communication window opened by the command *ShowStatus*.

HideWindow <V>

This command closes spectrum window <V>=1...64 respectively the [information window](#) (<V=0>).

If <V> ... (Else...)

This function allows the execution of following commands depending on the boolean term <V>. If <V> is "TRUE", the following instructions will be executed, otherwise the instructions after ELSE. If ELSE does not exist, the next following command after the IF-instruction will be executed. If more than one instruction should be executed, all commands must be set in brackets "{", "}". Note that no command can be in the same line as a bracket. For boolean terms the following operators can be used:

= (equal), < (smaller), > (bigger), <= (smaller or equal), >= (bigger or equal), != (unequal), AND (and), OR (or), XOR (exclusive or), ! (negation).

If these operators are used, the range has to be marked with brackets, for example:

```
if ($A>3) and !($B<=10)
```

```
{
instruction 1
```

```
...
```

```
}
```

```
else
```

```
{
instruction 2
```

```
...
```

```
}
```

In this example, instruction 1 and the following will be executed if the value of variable A is greater than 3 and variable B is greater than 10. Otherwise, instruction 2 and the following will be executed.

Optionally the operator "In" can be used. This operator checks if a value lies within a value range. The syntax therefore is given by

```
If $A in [$B..$C]
```

This is equivalent to

If ($\$A \geq \B) and ($\$A \leq \C).

Ifdef <V> ... (Else...)

Checks if a value is assigned to the variable which was transmitted with name <V>. If this is true the following instructions are executed, otherwise the instructions after ELSE (if ELSE exists).

Ifndef <V> ... (Else...)

Checks if a value is assigned to the variable which was transmitted with name <V>. If this is **not** true, the following instructions are executed, otherwise the instructions after ELSE (if ELSE exists).

ImportInExcelWorksheet <V>

This command imports the contents of text file <V> into the excel file opened with batch command *OpenExcelWorksheet*.

Within text file <V> the value has to be written under the corresponding column name.

The file name <V> can be given with or without path. If it is given without path it has to be placed within the winTMCA32 directory.

If it is placed somewhere else you have to enter the name including the path.

Here you will find an example for inserting values into an excel file.

Incpair <N> <V>

Adds value <V> to variable <N>.

IncrementExcelWorksheetRow

This command increments the actual row number within an excel worksheet opened by the command *OpenExcelWorksheet*.

Here you will find an example for inserting values into an excel file.

IncrementSpectrumName <V>

This command increments the file extension of spectrum <V> by one, if it consists of numbers.

InsertItemInExcelWorksheet <N1> <N2>

This batch command inserts value <N2> into column <N1>, where <N1> gives the name of the column. Before you are able to insert values you have to open the excel worksheet using the command *OpenExcelWorkSheet*. If you want to insert more than one value into one column you have to increment the row number using the batch command *IncrementExcelWorksheetRow*.

In the appendix you will find an [example](#) for inserting values into an excel file.

Integrate <V1> <N1> <N2> <N3> <N4> <N5> <V2> (<V3>)

The peak area (that means the number of counts with considered background) is evaluated. The spectrum number is given by parameter <V1>. To fix integration margins the energy <V2> for a channel within the ROI can be given or the left (<V2>) and right (<V3>) margins of the integration area. The peak centroid is assigned to variable <N1>, the full width of half maximum (FWHM) to <N2>, the net area (corrected by background) to <N3>, the gross area to <N4> and the number of background events to

<N5>.

If there was no energy calibration for this spectrum <V2> and <V3> are interpreted as channel numbers.

In order to determine the peak area it is tried to describe the peak form fitting a gauss function $\Gamma(x)$,

$$\Gamma(x) = e^{-\frac{(x-x_0)^2}{2\sigma^2}}$$

If the fit is not convergent, the background is determined by adapting a straight line. In addition to that, the mean of several channel contents of the left and right margins is evaluated.

You can also integrate an area by selecting Compute Menu \Rightarrow Integrate from the winTMCA32 menu header.

LoadDMCASetup <V1> <V2>

Loads the setup file <V2> for acquisition port <V1>. (only dMCA card!).

LoadNanoActSpec <V>

Loads the current spectrum stored in the acquisition memory of external connected nanoSPEC, nanoPROBE or identiFINDER in spectrum <V>.

LoadNanoAllSpecs <V>

Loads all spectra from the spectra memory of nanoSPEC, nanoPROBE or identiFINDER on acquisition port <V>. Thereby the spectra data of spectrum <V> are lost!

LoadNanoTopSpec <V>

Loads the actual spectrum stored in the spectrum memory of external connected nanoSPEC, nanoPROBE or identiFINDER in spectrum <V>.

LoadSpectrum <V1> <V2>

Loads spectrum file <V2> into spectrum window <V1>. Only spectra within the specified directory can be loaded (see *SetSpectrumPath*).

MaximizeSpecTextWindow <V>

Maximizes the spectrum text window of a spectrum <V> to full window size. This text window is created with the command *SetSpecTextWindow*.

MaximizeSpecWindow <V>

This command enlarges spectrum window <V> to its maximum window size.

MinimizeSpecTextWindow <V>

Minimizes the spectrum text window of a spectrum <V> to its original size. This text window is created with the command *SetSpecTextWindow*.

MinimizeSpecWindow <V>

Minimizes spectrum window <V> to its minimum window size.

MkNaIROI <V1> <V2> <V3> (<N1> <N2> <N3>)

Creates a region of interest (ROI) in a spectrum <V1> symmetrically around energy <V2> which is taken as centroid. The margins are calculated automatically. The standard resolution of 7% of the ¹³⁷Cs 662 keV peak and its energy-dependence are taken into consideration. By assigning a value greater than 1 to the factor <V3> it is possible to enlarge the width of the ROI. (But spreading the ROI reduces its resolution.) A factor of 2 doubles the width of the ROI. Optionally, three other variables can be specified, to which the left <N1> respectively the right <N2> margin of the ROI and the earlier defined energy <N3> can be assigned.

You can also define a ROI by using the batch command *DefineEnergyROI* or by selecting Spectrum Menu ⇒ ROIs from the winTMCA32 menu header.

MultiplySpectrum <V1> <V2>

All channel contents of spectrum <V1> are multiplied by factor <V2>.

OpenExcelWorksheet <V1> <V2> <V3>

This command opens an excel worksheet. <V1> sets the name (including path) of the excel file and <V2> the name of the worksheet. Setting parameter <V3> to 1 means that the excel file is opened if it is already existing. <V3> = 0 will delete the existing file. If the excel file is opened you can insert values using the batch commands *InsertItemInExcelWorkSheet* or *ImportInExcelWorkSheet*.

In the appendix you find an [example](#) for inserting values into an excel file.

OpenIPCCConnection

Opens the connection to the server program <V>. If the connection was opened successful the variable <N> is set to 1, otherwise it is set to 0.

Please note that the program <V> has to be already opened when you use this batch command. (You can open the program using the command *WinExec*).

OverwriteString <N> <V1> <V2> (<V3>)

This command overwrites a string given by <V1> with another string <V2>. The result is assigned to variable <N>. Normally <V2> is placed at the beginning of <V1>. If the command line contains the optional parameter <V3>=R the text is seated on the end of the original string.

PeakSearch <V1> <V2>

Enables the peak search for spectrum <V1>. This function tries to find peaks within the spectrum channel per channel via gauss fit. The peak search sensitivity is set by parameter <V2> (0.5 ... 3). In order to identify smaller peaks, a lower value must be entered.

The peaks which were found are marked as ROIs.

PreampPower <V1> <V2>

Enables (<V2>=1) or disables (<V2>=0) the preamplifier of acquisition port <V1>.

PresetCounts <V1> <V2>

Acquisitions on port <V1> will be stopped if count rate <V2> is reached.

(See also Preset Menu ⇒ [Services](#) in the winTMCA32 menu header.)

PresetDwelltime <V1> <V2>

Pre-sets the dwell time for MCS-mode acquisition for the active port <V1>. The time in seconds is given as real number <V2>. The time resolution for MCS compatible hardware as the dMCA card is $\leq 1 \mu\text{s}$.

PresetLivetime <V1> <V2>

Pre-sets the acquisition time <V2> (dead time corrected) of an acquisition port <V1> in seconds. Acquisitions will be stopped if this time is reached.

(See also Preset Menu \Rightarrow Services in the winTMCA32 menu header.)

PresetMaximumCounts <V1> <V2>

Acquisitions of port <V1> will be stopped if the content of one channel reaches the given rate <V2>.

(See also Preset Menu \Rightarrow Services in the winTMCA32 menu header.)

PresetNextChannel <V>

With this command, the preset mode NEXTCHANNEL is set. This allows it to respond to the channel changes within a batch file in connection to a &-operator.

PresetRealtime <V1> <V2>

Pre-sets acquisition time <V2> in seconds (real number) of an acquisition port <V1>. The accuracy of time preset depends on hardware and is within the range of 100 ms and 1ms.

(See also Preset Menu \Rightarrow Services in the winTMCA32 menu header.)

Print <V1> <V2> <V3> (<V4>)

String <V2> read from file <V1> in the .\CONFIG directory can be displayed for a certain time <V3> (in seconds) in the status bar at the bottom of the winTMCA32 program window. If an optional text <V4> is defined, <V4> will be attached to <V3> separated by a space. If <V2> is set to zero the filename given by <V1> will be ignored and only the optional text <V4> will be displayed.

PrintFormattedPage <V1> <V2>

This command enables the customer to create customized single or multi page printouts. The layout is specified in the layout file <V1>.

If any variables of the temporary copy of the batch file should be used in the printout, the name of the temporary file must be specified as parameter <V2>, e. g. : If the batch is running on port 1, the name of the temporary copy is "PORT_01.INF".

BEGINHEADER	Defines the beginning of a command block appearing at the top of each page
ENDHEADER	Defines the end of the page header block. It is possible to define headers at any place in the layout file. Older header settings are replaced on the pages after definition.

TEXTOUT

- xpos
- ypos
- csize
- bold
- underline
- position
- text
- format

This command is used to customize position and appearance of a string. All parameters must be specified and all numerical values are real umbers. As decimal symbol a "." is used instead of an ",".

xpos – horizontal position

ypos – vertical position

csize – specifies the font size in pars pro mille of the page height.

bold – text is printed bold, if this parameter is set to 1 (0 = normal)

underline – text is underlined, if parameter is set to 1 (0 = normal)

position – specifies the alignment of the string with respect to the desired X/Y-position. L aligns text on the left, R on the right and C centers text on the specified x-position.

text - specifies the text to be printed. Any variables located in the temporal file to be printed must be prefixed with a "\$"-character, for example: \$NUCLIDE1.

format – this optional parameter allows the specification of the output format for floating point numbers according to the "C"-conventions (e. g. : %.2f)

DRAWLINE

- x1pos
- y1pos
- x2pos
- y2pos
- width

Draws a single line.

x1pos, y1pos – specifies the origin

x2pos, y2pos – specifies the end of the line

width - specifies the line thickness in per mil of the page height

DRAWFRAME

- x1pos
- y1pos
- x2pos
- y2pos
- width

Draws a rectangle.

x1pos, y1pos – specifies the upper left corner in percent of the side width respectively height

x2pos, y2pos – specifies the lower right corner of the rectangle

width – specifies the line thickness in per mil of the page height

DRAWGAUGE

- xpos
- ypos
- xwidth
- ywidth
- color
- value

A gauge is printed out on the current page.

xpos,ypos – specifies the upper left corner of the spectra printout.

xwidth,ywidth – specifying the width respectively height of the outer frame.

color – specifying the color which is used for the gauge beams.

The following 16 colors are available:

0	black
1	dark red
2	green
3	olive green
4	dark blue
5	violet
6	blue green
7	gray
8	light gray
9	light red
10	light green
11	yellow
12	blue
13	lilac
14	light blue
15	white

value – gives the %-value which is considered for the gauge beam.

DRAWSPECTRUM

- spcnr
- xpos
- ypos
- xwidth
- ywidth
- grid

This command prints a spectrum on the actual page.

spcnr - denotes the number of the spectrum to be printed

xpos, ypos – specifies the upper left corner of the spectrum printout

xwidth, ywidth – specifies width and height of the spectrum printout

grid – if the parameter is set to 1 the spectrum is printed with a grid (0 no grid is printed)

BEGINTABLE

Defines the beginning of a table. After this command the elements table columns are specified by the TABLETEXTOUT-command.

ENDTABLE

Marks the end of a table definition.

- SAVEX Stores the actual x-position for later use.
- SAVEY Stores the actual y-position for later use.
- TABLETEXTOUT This command specifies the contents of a table column and can only be used in connection with variables located in the temporary copy of the batch file being executed. These variables must be numbered consecutively (e. g. \$NUCLID1, \$NUCLID2,...).
- xpos
 - start_ypos
 - delta_y
 - csize
 - bold
 - underline
 - position
 - start_index
 - end_index
 - delta_index
 - text
 - format
- xpos** – specifies the horizontal position of the column on the page
- start_ypos** – specifies the vertical position of the first row of the column on the page.
- delty_y** – specifies the interval between the rows of the columns.
- csize, bold, underline, position** – see TEXTOUT
- start_index** – specifies the variable that should be used in the first row (e. g. if start_index is 5 the variable "\$variable5" would appear in the first row.
- end_index** – specifies the variable terminating the column
- delta_index** – specifies the interval of the used variables (e. g. if set to 2, only variables having even respectively uneven numbers will be used)
- text, format** – see TEXTOUT

position parameters:

There are two different ways of specifying a position on the page.

- **absolute positioning:** the number specifying the position must be real and represents the position in per cent of the available page width (x-position) resp. page height (y-position).
- **relative positioning:** allows the usage of the internal variables x, y storing the coordinates of the lower right corner of the last printed object. These can be used with an offset, i.e. an integer value in per cent of page width resp. height (e g : X+10.5, X-5.2, etc). Positions saved with "SAVEX" of "SAVEY" can be used with an optional offset too (e. g. SAVEX+10)

SETFONT • fontname	This command changes the character set of the printout. fontname – displays the WINDOWS [™] - fontname
-----------------------	---

PrintTextFile <V1> (<V2> <V3>)

The specified text file in <V1> is printed out on your default printer. It is possible to

assign a caption <V2> and a commentary <V3> to the printout.

ReadCOMString <V> <N>

A string is read via a serial interface <V>=1,... and assigned to a string variable <N> using the FIFO (First In /First Out)-principle. If the FIFO memory is empty, a space " " will be assigned to the variable. As text line margin a CR (carriage return= hex. 0D) is expected by the function.

ReadFromFile <N> <V1> <V2>

Reads the line <V1> of file <V2> and assigns the value to variable <N>. <V2> must be found in the ./CONFIG directory.

ReadidentiFINDERResults <V>

The identiFinder spectrum analysis results are read from file <V> (which must be located in the ./CONFIG directory).

The variables \$NUCLID, \$NUCTYPE and \$NUCPERC were read out and assigned to the temporary PORT_xx.INF file where they are incremented automatically (e.g. \$NUCLID1, \$NUCTYPE1, \$NUCPERC1, \$NUCLID2...). NUCLID gives the nuclide name (e. g. "Cs-137"), NUCTYPE the nuclide type (e. g. IND. for industrial), NUCPERC gives the probability [%] that the nuclide is within the spectrum.

ReadLineFromFile <N1> <N2> <V1> <V2>

Reads line number <V2> of file <V1> and assigns the value to variable <N2>. The search path of file <V1> is the ./CONFIG directory. If the function is successful a "1" is assigned to variable <V1>, otherwise "-1".

ReadSampleResults <V>

This command reads the result files created by the program "NAJCALC.EXE" (optional) so that the contents can be used within batch files. The files (<V> = "NAJCRES.TXT" or "NAJQRES.TXT") are read by the line. The contents (i.e. values) are assigned to variables in the temporary copy of the batch file being executed. Nuclide specific parameters as nuclide name and activity are assigned to variables of the same name, which are incremented automatically.

E.g.: If the first line of the result file looks like "NUCLID=Cs-137" the following entry in the temporary file would look like "NUCLID1 %s Cs-137".

The nuclide name of the second line would be assigned to the variable "NUCLID2".

It is not necessary, that the variables are listed in the variable section of the batch file, because they are generated in the temporary file automatically, if the declarations are missing.

Result values like NETSUM, ERRORSUM, NETCOUNTS etc. are also assigned to the variables of the same name in the temporary file of the actual batch file.

ReadVar <V>

Reads the stored values from a file <W> and assigns them to their respective variables within the temporary copy of the batch file being executed.

ReceiveNanoString <V> <N>

The reply from nanoSPEC on port <V> is assigned to variable <N> (see also *SendNanoString*).

Remove <V1> <V2>

Erases the file <V1> within the working (.\\CONFIG) directory. <V2> is an optional parameter. If <V2> is used, the file <V1> in the spectrum directory of spectrum <V2> is removed.

RenameFile <N> <V1> <V2>

Changes the name of a file from <V1> to <V2>. If the function is successful, a 1 is assigned to variable <N>, otherwise a 0.

Replace Character <N> <V1> <V2> <V3>

Character <V2> within string <V1> is replaced by character <V3>. The resulting string is assigned to variable <N>.

RescaleSpectrumXAxis <V1> <V2> <V3> <V4> <V5> <V6> <V7>

This command rescales the channel axis of the spectrum displayed in spectrum window <V1>.

The rescaled spectrum will be displayed in spectrum window <V2>. The channel contents are distributed corresponding to the rescaling function:

$$K' = A * K^3 + B * K^2 + C * K + D$$

The polynomial coefficients A, B, C and D are given by <V3>, <V4>, <V5> and <V6>. If the coefficients shall be applied to the inverse function

$$K = A * K'^3 + B * K'^2 + C * K' + D$$

<V7> must be set to 1, otherwise to 0.

ResetService <V>

Deletes all preset-adjustments for port <V>.

Rpbt <V> <N1> <N2>

The value of variable <N1> within batch file <V> can be assigned to a variable <N2> within the temporary copy of the batch file being executed.

SaveDMCASetup <V1> <V2>

The DMCA hardware parameters of port <V1> are written to file <V2> (which is stored in the ./SETUP directory). Using the batch command *LoadDMCASetup* reloads the configuration.

SaveFileAs <N1> <N2> <N3> <V1> <V2> <V3> <V4>

This command calls up the default file open box for saving files. <V1> defines the window caption, <V2> the file type i.e. text file, <V3> the default extension (i.e. "*.TXT"). The file path is specified by <V4>. If a file was chosen, <N1> is set to 1, the file name is assigned to <N2>, and the file path to <N3>. If the dialog was cancelled, a 0 is assigned to <N1>.

SaveORTECSpectrum <V1> <V2>

Saves spectrum <V1>=1,2,... to the spectra directory using filename <V2> and ORTEC format. If <V2> is set to ''', the file name will be set to its spectrum name (default

NONAME.SPC).

SaveSpectrum <V1> <V2> (<V3> <V4>)

Saves spectrum <V1>=1,2... using file name <V2> to the spectra directory . If <V2> is set to "", the file name will be set to its spectrum name (default NONAME.SPC). If there are any sub spectra defined, the range of sub spectra can be set with the optional parameters <V3> and <V4>, sub spectra from <V3> to <V4> will be stored. If all sub spectra should be stored, <V3> and <V4> must be set to -1.

SaveVar <V1> <V2>

Stores the actual values of specified variables to a file <V2>. Before using this command, the variables that are to be stored must be specified in a declaration file <V1>. For the structure of this file see *DataInput*. All variables will be stored in the same format as in temporary files.

SelectSpectrumFile <N1> <N2> <N3> <V1> <V2> (<V3> <V4>)

This function calls up the "file open" - dialog box for loading a spectra file. The caption of the window is determined by <V2>. Parameter <V3> fixes the file type (i.e. spectra file), <V4> the default file extension (i.e. "*.SPC"), <V1> specifies the spectrum number. The corresponding spectra path is used as a search path. After finishing the dialog a 1 is assigned to variable <N1> if a file was selected. If the dialog is cancelled, a 0 is assigned to <N1>. If selection was successful the filename is assigned to <V2> and the file path to <V3>.

SelectFile <N1> <N2> <N3> <V1> <V2> <V3> <V4>

This command displays the "file open"- dialog box. For declaration of parameters see *SaveFileAs*.

SendCOMChar <V1> <V2>

Sends a single character <V2> via a serial interface <V1>. Non printable characters are sent as hexadecimal numbers with "0x" as prefix (e. g. : CR is sent with <V2>="0x0D").

SendCOMString <V1> <V2>

Sends a string <V2> via serial communication port <V1>. The string is terminated by CR.

SendMessage <V1> <V2> <V3>

This command sends a windows-information to all applications. <V1> declares the information number (4 byte), <V2> and <V3> are information parameters. If hexadecimal values were chosen as parameters, they have to be marked with a "0x" at the beginning.

SendNanoString <V1> <V2>

This command sends line <V2> to nanoSPEC on COM port <V1>.

SetAcquisitionDate <V1> <V2>

Presets the starting point <V2> for acquisition on port <V1>. At this point the winTMCA32 has to be opened. Time format is given by "dd.mm.yyyy hh:nn:ss" (y → year, m → month, d → day, h → hour, n → minute, s → seconds).

SetAcquisitionMode <V1> <V2>

This command allows the changing of acquisition mode for port <V1>. <V2> can be set

to the following modes:

PHA, MCS, MCSSTO, LIST, MULPHA1, MULPHA2, DUAL, DOSIS, STABIL and REMOTE.

SetAlarmParameter <V1> <V2> <V3> <V4> (<V5>)

An alarm threshold <V4> for spectrum <V1> can be defined, parameter <V2> enables (V2=1) or disables (V2=0) alarm. <V3>=1,0 enables or disables the acoustical alarm, if acoustical alarm is activated, a wave file can be specified by parameter <V5>.

(See also Meter.)

SetBaseLineLength <V1> <V2>

The hardware parameter "baseline length" of port <V1> is assigned to <V2>.

SetBGIntegrationChannels <V>

Changes the number of channels which were taken into consideration for determining the background straight line with the alternative integration method. By default five channels on the right and on the left integration margin are used.

SetBGStabilisation <V1> <V2>

This command enables (<V2>=1) or disables (<V2>=0) the background software stabilisation on acquisition port <V1> ("STABIL"-mode), i.e. spectra are stabilised, even if the system is not acquiring data.

SetChannel <V1> <V2> <V3> <V4>

Sets the content of channel <V3> of sub spectrum <V2> of spectrum <V1> to value <V4>.

SetCoarseGain <V1> <V2>

Changes the hardware parameter coarse gain of acquisition port <V1> to any value <V2>.

SetCOMOutputLine <V1> <V2>

This command enables you to set or reset DTR- and RTS output of COM-port <V1>. <V2> can be set to the following values: "CLR DTR" refers to "reset DTR", "SET DTR" to "set DTR", "CLR RTS" to "reset RTS", and "SET RTS" to "set RTS".

SetCompensationAmplitude <V1> <V2>

The hardware parameter "compensation amplitude" of port <V1> is set to value <V2>.

SetCompensationDecay <V1> <V2>

Sets the hardware parameter "compensation decay" from acquisition port <V1> to value <V2>.

SetConversionGain <V1> <V2>

The hardware parameter conversion gain of port <V1> is set to <V2>.

SetCursorPosition <V1> <V2>

The cursor in spectrum window <V1> is set to channel <V2>.

SetDeadTime <V1> <V2>

This command sets the dead time of spectrum <V1> to value <V2> (in seconds).

SetDetectorLimit <V1> <V2>

Sets the HV limit <V2> for the detector on acquisition port <V1>. The HV value can not be set to a value higher than this limit.

SetDLLBoolean <V1> <V2>

Assigns a value <V2> to one of the boolean memory cells <V1>=1,2... . "FALSE" is represented by 0, "TRUE" by 1.

SetDLLFloat <V1> <V2>

Assigns a value <V2> to one of the floating-point memory cells <V1>. These are numbered from 1 to 64.

SetDLLFloatFormat <V1> <V2>

The decimal place number *n* of the floating-point memory cell <V1> used by the [information window](#) can be determined. The format is given by <V2> using "%.*nf*".

SetDLLFloatMaxValue <V1> <V2>

The normalization value <V2> for the floating-point memory cell <V1> is given. <V2> is used within the [information window](#) for percentage beam display.

SetDLLFloatPercentageAlarm <V1> <V2>

<V1> refers to the floating-point memory cell and <V2> to the percentage value at which the beam display within the [information window](#) changes its color from green to red.

SetDLLString <V1> <V2>

Assigns a string <V2> to one of the 64 string memory cells <V1>.

SetEnergyCalibrationEx <N1> <V1> <V2> <N2> <N3>

An energycalibration is carried out (see also 3.3.4, Energy Calibration). If the fit is successful, the variable <N1> is set to 1. The spectrumwindow is given by <V1>, the degree of the polynomial by <V2>. Variables <N2> and <N3> have to be declared and enumerated in the variable part of the batch file. <N2> sets the channel and <N3> the corresponding energy.

Here is an example:

```
SetEnergyCalibrationEx Res 1 3 Ch E
VARIABLES
Res %d
CH1 %f 81.02
CH2 %f 162.99
CH3 %f 230.13
CH4 %f 518.62
CH5 %f 641.75
CH6 %f 734.03
CH7 %f 938.0
E1 %f 81.02
E2 %f 162.99
E3 %f 230.13
E4 %f 518.62
E5 %f 641.75
E6 %f 734.03
E7 %f 938.0
```

SetErrorWaitTime <V>

Sets the time <V> (0..60 seconds) in which a batch error message shall be displayed. If you select <V>=0 (this is the default value) the error message must be confirmed with the ENTER (↵) key.

SetExcelWorksheetValueFormat <V>

Parameter <V> gives the format which is used for inserting values into an excel file. Parameter <V> must be given using excel format. You can use this command before you insert values with batch command *InsertItemInExcelWorksheet*, to fix the format for the inserted values.

SetExclusiveFlag <V1> <V2>

Determines if other batch files having the port number <V1> shall be executed (<V2>=0) or not (<V2>=1). Using this command you avoid calling up a batch file for more than one time without having finished.

SetFineGain <V1> <V2>

The fine gain of an acquisition port <V1> is set to the given value <V2>.

SetHV <V1> <V2>

Sets the hardware parameter high-voltage of an acquisition port <V1> to the given value <V2>.

SetIPCItemData <V1> <V2>

Sets the content of item <V1> to the value given by <V2>. Please note that a connection has to be opened before (with batch command *OpenIPCCConnection*).

SetLiveTime <V1> <V2>

This command sets the dead time corrected acquisition time for spectrum <V1> to value <V2> (using seconds).

SetLLD <V1> <V2>

This command sets the lower level discriminator (LLD) of an acquisition port <V1> to value <V2>.

SetMarker <V1> <V2> <V3>

Sets a left (<V2>=0) or right (<V2>=1) marker within spectrum <V1>=1,2...64 at the desired channel <V3>.

SetMCSChannelNumber <V1> <V2>

This command sets the actual channel number of a virtual MCS-acquisition for spectrum <V1> to channel <V2>.

SetMeterMode <V1> <V2>

This command sets the meter mode of spectrum <V1> to count rate (<V2>=1), or refresh rate (<V2>=2). <V2>=0 disables meter.

SetMeterWidth <V1> <V2>

<V2> specifies meter width of spectrum <V1> in percent of spectrum window width.

SetNanoDailyMeasurementStart <V1> <V2> <V3>

This command activates a daily measurement for nanoSPEC on port <V1>. The time is given by parameter <V2> (using format hh:nn:ss), the date by parameter <V3> (dd.mm.yyyy).

SetNanoMeasurementStart <V1> <V2> <V3>

This command gives date and time for nanoSPEC measurement on port <V1>. Parameter <V2> is set to time (using format hh:nn:ss), parameter <V3> to date (format dd.mm.yyyy).

SetNanoNumberOfRuns <V1> <V2>

This command fixes the number of measurements <V2> for nanoSPEC on port <V1>. It is required to define a starting point. The runs are executed continuously.

SetNanoSystemTime <V1> <V2> <V3>

Sets the system timer of nanoSPEC connected to port <V1> to date <V2> (using format dd.mm.yyyy) respectively time <V3> (format hh:nn:ss).

SetNoiseLevel <V1> <V2>

The hardware parameter noise level of port <V1> is set to value <V2>.

SetNuclideDatabaseName <V>

Allows it to change the actual nuclide database. The nuclide database is needed to display the name of the nuclides in the spectrum window and the resulting integration window. File <V> must be located in the .NUCDATA directory.

SetNumberOfSubSpectra <V1> <V2>

This command defines the number of sub spectra <V2> for spectrum <V1>.

SetOffset <V1> <V2>

Sets the hardware parameter offset of port <V1> to value <V2>.

SetPar <N> <V>

Assigns value <V> in the temporary batch file to variable <N>.

SetPortUDPInfo <V1> <V2> <V3>

This command prepares the network connection to an external spectra UDP-server. The local spectrum <V1>=1,2...64 is assigned to spectrum <V2> to server with IP address <V3>.

SetProgramName <V1> <V2>

Selects a windows application which will be executed on port <V1> after a pre-set service has finished. Parameter <V2> contains the application name and, if required, the file path and command line parameters. If a batch file should be executed you have to call up the program winPROC with the corresponding command line parameters.

SetPulser <V1> <V2>

This command activates (<V2>=1) an internal pulser for dMCA acquisition channel <V1>. <V2>=0 disables the pulser.

SetPZExternal <V1> <V2>

The hardware parameter „PZ (pole zero) external" of acquisition port <V1> is set to value <V2>.

SetPZInternal <V1> <V2>

The hardware parameter "PZ (pole zero) internal" of acquisition port <V1> is set to value <V2>.

SetRealTime <V1> <V2>

This command sets the acquisition time of spectrum <V1> to value <V2> (in seconds).

SetRefreshrate <V>

Sets the display refresh rate to the given value in milliseconds (V). The assigned time represents the time between two display updates.

SetROIColor <V1> <V2> <V3>

Assigns a color <V3> to a ROI defined within spectrum <V1>. The ROI is selected via an energy value <V2> lying within the ROI. If no energy calibration was carried out the value is explained as channel. For the format of color definition see *GetNetLiveCPS*.

For defining ROIs see the batch commands *DefineEnergyROI* and *MkNaIROI*.

SetScreenState <V>

Sets the size of the winTMCA32 program window respectively the arrangement of the spectra windows depending on parameter <V>:

VALUE ACTION

0	The main window is minimized.
1	The main window will be set to default size. (This disables V=0,2.)
2	The main window is maximized.
3	The spectra windows will be arranged side by side.
4	The spectra windows will be arranged overlapped.
5	The active application window will be set to background while overlapping with other applications.

SetShapingTime <V1> <V2>

The hardware parameter "shaping time" of port <V1> is set to value <V2>.

SetSpecTextWindow <V1> <V2> <V3>

Displays a text (V3) within a window located in spectrum <V1>. By specifying the color value <V2>, the window color can be set to :

VALUE COLOR

0	green
1	red
2	gray
3	yellow

Combined with a text the special function "[mcsvalue]" can be used. The actual channel content which was written at last to the spectrum using *WriteMCSCchannel* is displayed in

the text window.

SetSpecTextZoom <V1> <V2>

This command maximizes (<V2>=1) text window (see *SetSpecTextWindow*) in spectrum <V1>. Setting <V2> to 0, the text window will be set to default size.

SetSpectrumBGColor <V1> <V2>

This command chooses the background color of spectrum <V1>. For color definition <V2> see *GetNetLiveCPS*.

SetSpectrumComment <V1> <V2>

Defines a comment <V2> for spectrum <V1>. Comments are displayed in the bottom left corner of the spectrum window.

SetSpectrumLeftMargin <V1> <V2>

Sets the left display margin of spectrum <V1>. The first channel <V2> that is to be displayed must be specified as margin.

SetSpectrumLength <V1> <V2>

Sets the spectrum length of spectrum <V1> to channel number <V2>.

SetSpectrumName <V1> <V2>

Assigns a name <V2> to spectrum <V1>.

SetSpectrumPath <V1> <V2>

This command sets the spectrum path of spectrum <V1> to path <V2>.

SetSpectrumRightMargin <V1> <V2>

Sets the right display margin of spectrum <V1>. The last channel that is to be displayed must be set as margin.

SetStabilisationParameter <V1> <V2> <V3> <V4>

Sets the parameters used for software stabilization on acquisition port <V1>. The parameters <V2> and <V3> specify the range (left and right channel) in which is searched for the desired peak position <V4>. To activate stabilization, the command *ActivateStabilisation* must be used. (If you use a scintiSPEC stabilization is activated automatically by the *SetStabilisationParameter* command. Please note that left and right margin are set automatically, only the centroid <V4> is evaluated.)

SetStopBatch <V>

The batch file <V> will be executed if the actual batch file is cancelled due to an error.

SetSubSpectrumNumber <V1> <V2>

A sub spectrum <V2> can be chosen and displayed in spectrum window <V1>. This is only possible if any sub spectra are defined.

SetTextFileFont <V1> <V2>

Sets the text file font to <V1>. <V2> is a factor to multiply the default size.

SetTopLength <V1> <V2>

The hardware parameter "top length" of acquisition port <V1> is set to value <V2>.

SetULD <V1> <V2>

Sets the hardware parameter ULD (upper level discriminator) of acquisition port <V1> to value <V2>.

SetWindowFunctionCoeff <V1> <V2> (<V3> <V4> <V5> <V6> <V7>)

In a spectrum window a polynome in the sixth degree can be displayed instead of or additionally to a spectrum:

$$f(x) = a \cdot x^5 + b \cdot x^4 + c \cdot x^3 + d \cdot x^2 + e \cdot x + f$$

<V1> refers to the spectrum window, <V2>=f, <V3>=e, <V4>=d, <V5>=c, <V6>=b, <V7>=a. If an energy calibration was implemented, the polynome refers to energies, otherwise to channels.

SetWindowFunctionFlag <V1> <V2>

This command activates or deactivates the polynome display (see *SetWindowFunctionCoeff*) for spectrum window <V1>. Parameter <V2> can be set the following values:

value	spectrum	polynome
0	visible	invisible
1	invisible	visible
2	visible	visible

SetWindowFunctionPoints <V1> <V2> <V3> <V4> (<V5>)

Data points for polynome display in spectrum window <V1> can be set. Using <V2>=1,2...64 the data points are selected. The x-coordinate of the point is given by <V3>, the y-coordinate by <V4>. Parameter <V5> is optional and considers a y-error which will be displayed as an error beam.

SetWinprocCancelRequest <V>

This command cancels all batches running on acquisition port <V>.

SetWinprocDebug <V>

If <V> is set to 1, all following commands in the batch file to be executed are written to the actual LOG file named LOGddmmy.TXT (d=day, m=month, y=last number of the year). The log file is located in the \CONFIG directory.

SetXLabelChannel <V>

Changes the legend of the x-cursor position in the tool bar of spectrum <V> to channels.

SetXLabelEnergy <V>

Changes the legend of the x-cursor position in the tool bar of spectrum <V> to energies, if an energy calibration was implemented.

SetXUnit <V1> <V2>

Changes the legend of the x-axis to the specified text (V2). The legend is displayed in the bottom right corner of the spectrum window <V1>.

SetYDisplay <V1> <V2>

This command changes the display mode for spectrum window <V1>. Parameter <V2> can be set to the following modes:

LIN – linear

LOG-logarithmic

SQR-square root

SetYUnit <V1> <V2>

Changes the legend of the y-axis to the specified text (V2). The legend is displayed in the bottom right corner of the spectrum window <V1>.

ShowError <V1> <V2> (<V3>)

This command opens an error window displaying a text line <V2> from text file <V1>. <V3> displays an optional text. The text file must be located in the .\CONFIG directory. If <V1> is set to 0, the parameter <V2> is ignored and only text <V3> is displayed. The error message must be confirmed by the user.

ShowFormattedPage <V1> <V2> <V3> <V4> (<V5> <V6>)

Displays a formular on the screen, analogous to the command *PrintFormattedPage*. The layout file must be given by parameter <V4>. Width <V1> and height <V2> must be given in percent of screen size. The origin of the window is the upper left screen angle. Parameter <V3> defines the window caption. If variables from the temporary batch file are used, the name of the file must be given as additional parameter <V5>. If a print layout file is specified by the optional parameter <V6>, the formular on the screen can be printed analogous to *PrintFormattedPage*.

ShowMessage <V1> <V2> <V3> (<V4>)

Displays a message window for a specified time <V3> (seconds). The message window contains a line <V2> stored in file <V1> in the .\CONFIG directory plus an optional text <V4>. If <V2> is set to 0, parameter <V1> is ignored and only the optional text <V4> is displayed. If <V3> is set to 0, the user has to confirm the message by clicking the button in the message window.

ShowMinMax <V1> <V2>

The minimum and maximum values of the MCS spectrum in spectrum window <V1> are displayed in the upper left corner of the spectrum window. This function is enabled by setting <V2>=1 and disabled by <V2>=0.

ShowQuestion <N> <V1> <V2> (<V3>)

Displays a question <V2>. The question must be stored as line in an ASCII-text file <V1>. Beneath the text three buttons can be displayed ("OK", "NO", "CANCEL"). The value of variable <N> depends upon which button was clicked: OK → 0, NO → 1, CANCEL → 2. If parameter <V2> is set to 0, <V1> will be ignored and only the optional text <V3> will be displayed.

ShowStatus <V1> <V2> (<V3>)

Analogous to command *ShowMessage* a message window is displayed. This window is visible until it is closed by the command *HideStatus* or the batch file is finished. The execution of the batch file is **not** terminated by this command.

ShowUserDialog

Opens the window for user selection if users are defined before.

ShowWindow <V>

Opens one of the 64 spectra windows (<V>=1,2,...64) or the [information window](#) (<V>=0).

SmoothSpectrum <V>

Smooths spectrum <V>.

Sprintf <N> <V1> <V2>

Allows the formatted output of parameter <V2> to variable <N>. The format is given by parameter <V1> corresponding to the c-syntax.

StartAcquisition <V1> (<V2> <V3> ...)

Starts spectrum acquisition on port <V1>. Optionally, more than one acquisition can be started by specifying <V2>, <V3>... .

Using the symbol & behind this command the batch file can be set into a sleeping mode. This is very necessary if you use preset settings for acquisition.

Example:

```
...
PresetRealtime 1 30
StartAcquisition 1 &
...
```

After the command StartAcquisition the batch file is set into a sleeping mode until the preset acquisition time has expired. After that the batch file is executed as usual.

StartChronometer <V>

Starts the internal chronometer <V>=0,1. The actual time can be displayed in the [information window](#).

StartLoopTimer <V>

Executes a batch file repeatedly after a specified time <V> (given in seconds). The batch file must be named as "LOOP.WPB" (see also *StopLoopTimer*).

StopAcquisition <V1> (<V2> <V3> ...)

Stops spectrum acquisition on port <V1>. More than one spectrum can be stopped if the optional parameters <V2>, <V3> ... are given.

StopChronometer <V>

This command stops the internal chronometer <V>. The chronometer is started with the batch command *StartChronometer*.

StopLoopTimer

Terminates the repeated execution of the loop batch LOOP.WPB which was started with the batch command *StartLoopTimer*.

StrCat <N> <V1> <V2> (<V3> <V4>...)

Joins two strings <V1> and <V2> together, the result is assigned to variable <N>. Optionally, more than two strings can be specified.

StrCopy <N> <V1> <V2> <V3>

A part of string <V1> is assigned to variable <N>. The starting position is given by parameter <V2>, the number of characters to be copied by parameter <V3>.

StrDelete <N> <V1> <V2> <V3>

Characters in string <V1> are deleted starting from position <V2>. The number of deleted characters is given by <V3>. The result is assigned to variable <N>.

StripExtension <N> <V>

The extension of file name <V> is erased, the result is assigned to variable <N>.

StrLength <N> <V>

The number of characters in string <V> is assigned to variable <N>.

StrPos <N> <V1> <V2>

This function checks if string <V1> is located within text line <V2>. The start position of the string within the line is assigned to variable <N>. If the text is not found a 0 is assigned.

SubtractSpectrum <V1> <V2>

Spectrum <V1> is subtracted from spectrum <V2> channel by channel.

SyncNano <V>

winTMCA32 waits until the measurement device connected to port <V> sends "OK:".

TerminateAllLoopTasks

Deletes all batches which were added by the command *AddLoopTask* to the list of batches to be continuously repeated.

TerminateAllTasks

Cancels all active batches.

TimeCalibration <V1> <V2> (<V3>)

Executes a time calibration for the x-axis of spectrum <V1>. The parameter <V2> gives the time per channel in seconds. When you use the optional parameter <V3> a starting date for channel 0 (format "DD.MM.YYYY HH:NN:SS") is determined if the current date shall not be used.

Try..Except..EndTry

All commands within the try-section will be executed. If none of the commands fail the except-section will be ignored. If one command fails the except-section will be executed. The exception message will be assigned to variable \$ExceptionMessage.

The syntax for this command is:

Try

...

Except

...

EndTry

Here is an example:

Variable "testvariable" is not declared in the variables section and will therefore lead to an exception. The exception message will be displayed on the screen.

```
Try
  SetPar testvariable 10
Except
  StrCat Line "Exception: " $ExceptionMessage
  ShowMessage Dummy 0 0 $Line
EndTry
VARIABLES
Line %s
```

Wait <V>

This command stops the execution of a batch file for a given time <V> (in seconds, also fractions of seconds can be given).

WaitCOMString <V1> <N> <V2> <V3>

The text line <V3> is sent via serial interface <V1>=1,2,..., whereby automatically a CR is appended to the line. The interface must have been initialized earlier using the command *ConfigCOM*. The function waits for a maximum of 30 seconds for an answer from COM port <V1>, which must correspond to the answering text <V2>. The answering text must be terminated with a CR. For <V2>="^" every text is accepted as an answer. The received answer is assigned to variable <N>.

WindowFrame <V1> <V2> <V3> <V4> <V5>

The position and size of spectrum window <V1> within the spectrum display window is defined. <V2> and <V3> give the x- respectively y-position and <V4>,<V5> the window width resp. window height in percent of the display area.

WinExec <V1> <V2> <V3>

The external program <V2> which is located in the directory <V1> (full path!) is started. <V3> must be set to SHOWNORMAL.

WinProc <V>

Starts the execution or continuation of a batch file. For the command line parameters <V> please see winPROC commanc line parameters.

Wpbt <V1> <N> <V2>

Value <V2> is assigned to variable <N> in batch file <V1> as permanent starting value. The batch file must have the extension ".WPB".

Example:

```
Wpbt STARTUP.WPB HV 800
or
Wpbt STARTUP.WPB HV $AktHV
```

WriteMCSCchannel <V1> <V2> (<V3> <V4>)

Writes a numerical value <V2> into an acquisition channel of spectrum <V1>. The first value will be written to channel number 0 or into the channel specified by the command *SetMCSCchannelNumber*. The channel number is incremented automatically with each execution of this command. If you use the optional parameter <V3> = 1,2,..., the given

value <V2> will also be written in the following channels, counted by <V3>. Setting <V4> to "M" enables the representation of the channels and their contents as histogram. For each channel a bar in the respective color is chosen.

WriteMCSToEnergy <V1> <V2> <V3>

The value <V2> is written into mcs spectrum <V1>. The x axis is time scaled, the corresponding time <V3> has to be a real number (i.e. batch command *GetActualDateTime*).

5.3 Special Characters

You can set two special characters at the end of a line:

"&": After command execution the batch is set into SLEEP mode.

With the command line **WINPROC @ -p=n** the process is continued. If you use "&" in connection to the commands *StartAcquisition* and *SetAcquisitionDate*, this command line will be entered automatically as program which will be started after the preset command is executed (see *SetProgramName*). With this option it is possible to start an acquisition and to continue executing a batch file if acquisition has finished.

"#": With this special character the command line will be delivered as "shell" command, which means that executable programs can be called up.

Example:

```
CALC.EXE #
```

This calls up the windows[®] calculator.

The batch file will be continued when the external program is finished.

ATTENTION: A "#" in front of a command line defines this line as a comment!

Example:

```
# This line is a comment.
```

5.4 Pre-defined internal variables

The following variables are predefined and need not be declared:

<i>\$WintmcaDir</i>	Gives the winTMCA32 installation directory.
<i>\$ConfigDir</i>	Gives the path of the CONFIG-directory.
<i>\$WinprocPort</i>	Gives the batch port number.

5.5 Program winproc

The program winPROC, which is located in the winTMCA32 working directory, allows batch file execution. This can be done via dialog window or command line parameters.

winPROC command line parameters

[winPROC dialog window](#)

[winPROC monitor](#)

5.5.1 winproc command line parameters

If a batch file shall be executed again, the syntax must have the following format:

WINPROC BATCHFILE -p=n (-e) (-s=STOPBATCH)

The parameters are described below:

-p=n

Defines the port number for batch file execution. This port number should be the same as the acquisition port number corresponding to the batch file, but this is not required. With the help of port numbers, daughter processes are administrated, that means batch files can be called up within another batch file. When you start a daughter process on the same port number, the other process is stopped and will be continued if this daughter process has finished. If the port numbers are not equal the processes are running parallel. The port number is also used to name the temporary file, in which a running process stores its variables. The format of the name is *PORT_nn.INF*, whereby "nn" refers to the port number 00, 01... . The value of the port number must range between 0 and 99. Please note that system batch files like STARTUP.WPB, LOOP.WPB... are running on port 0.

BATCHFILE

refers to the name of the batch file which shall be executed. The name of the batch file must be entered without the extension ".WPB".

Batch files must be located in the \CONFIG directory, because winPROC is only searching for batch files within this directory.

-e (exclusive)

This is an optional parameter which takes care that no other process can be started on the same port until the first process is finished. This feature serves to prevent the user from calling up a batch file twice.

-s=STOPBATCH

This parameter allows to determine a batch file which shall be executed if the actual running process is canceled or not finished orderly. If this batch file is executed the same port number is assigned to it.

If a batch file in the SLEEP mode shall be continued, the syntax is

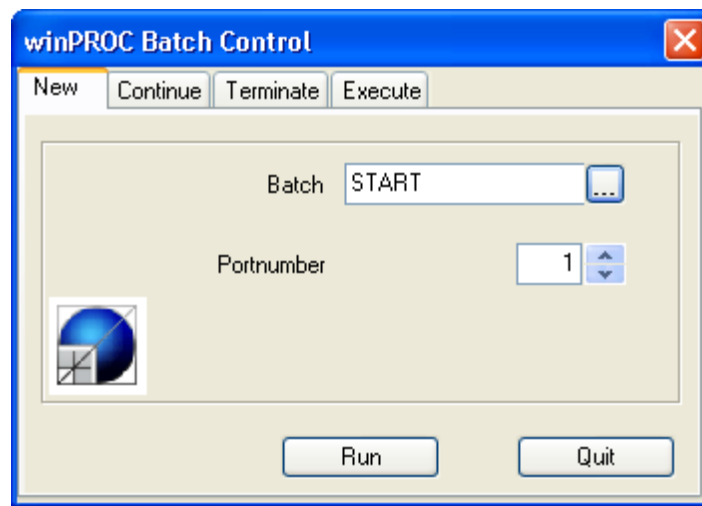
WINPROC -p=n @

winPROC can be called up via menu commands, buttons or WINDOWS[®] directly (START ⇒ EXECUTE).

5.5.2 winproc dialog window

If you call up the program winPROC without command line parameters (for example by selecting Miscellaneous menu ⇒ EXECUTE BATCH from the winTMCA32 menu header), a dialog window appears, containing the four registers NEW, CONTINUE, TERMINATE and EXECUTE.

In the register **NEW**, you enter the name of the batch file into the corresponding field or with help of the file selection dialog which pops up when you click the folder symbol on the right.

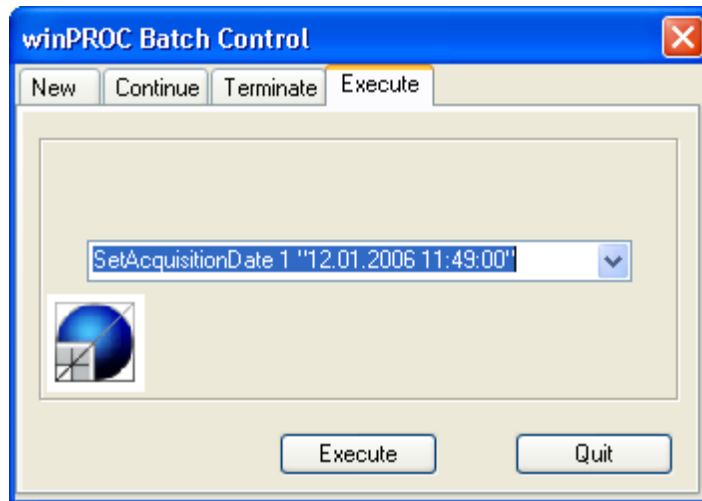


With the **PORTNUMBER** field a port number is assigned to the batch file. You start the batch execution with the START button.

With the **CONTINUE** register a batch file in SLEEP mode can be continued. Therefore you have to select the desired port number with the PORTNUMBER field. The name of the active batch file in SLEEP mode appears in the BATCH field. Click the CONTINUE button to continue the batch file execution.

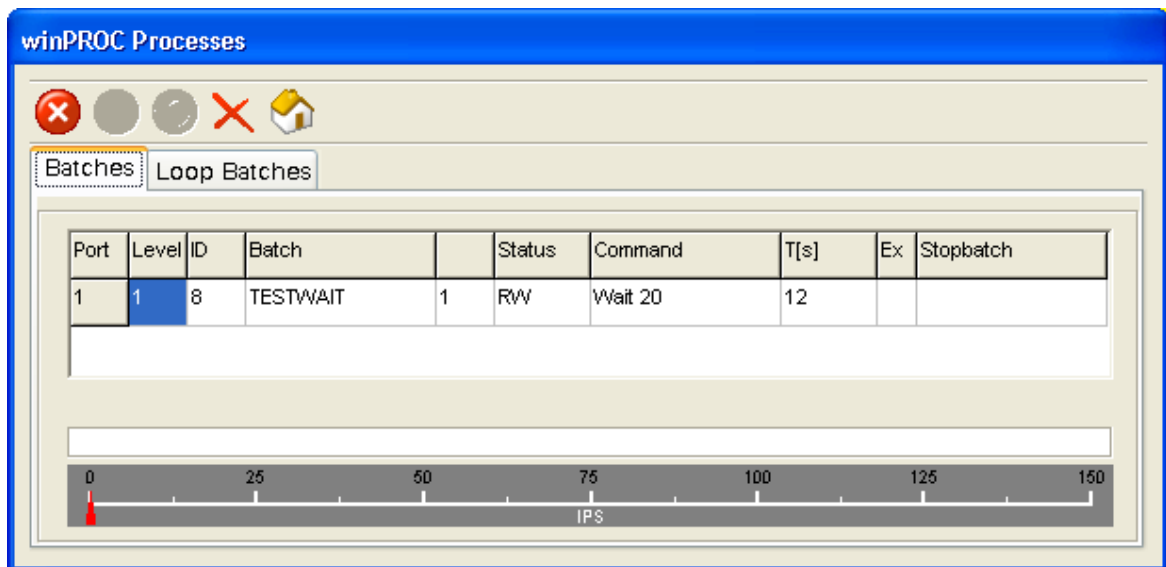
The register **TERMINATE** serves to cancel the execution of an active batch file. Select the port number in order to display the active batch file in the corresponding field.






Register **EXECUTE** allows to execute single batch file commands. You can enter the commands into the corresponding field or choose from a list containing the last 25 commands used interactively. As many variable names as you like can be chosen. The values assigned to are displayed within the output line of the winTMCA32 main form for two seconds.



5.5.3 winproc monitor

With the winPROC monitor (can be called up via Miscellaneous Menu => [winPROC monitor](#) in the winTMCA32 menu header) you can control and observe the execution of batch files stepwise for testing purposes.



Icon  stops the automatical execution of batch files. Icon  executes the batch file step by step. You cancel this mode with icon . Icon  cancels all batch files on the list. Icon  closes the window and deactivates the step-by-step mode, if it was selected before.

Register set BATCHES

In the table all active batch files will be sorted by their port numbers. If more than one batch file was started on the same port number the execution order can be read out in the LEVEL field. The batch file with the highest level number will be executed at first. If this

execution is finished, the batch file with the next highest level will be started. The ID field displays an internal assigned number, which is incremented continuously. The name of the batch file must be taken from the corresponding field. The LINE field displays the line number of the command executed at the moment. In the STATUS field the following attributes can be displayed: **R** (running), **S** (sleeping), **W** (waiting), **E** (executing), **C** (child, a daughter process using the same port number was called up) and **M** (message, message window is opened).

In the COMMAND field the command corresponding to the line number is displayed. Clicking into this field displays the command line in the bottom text field. The T(s) field shows the remaining waiting time that is left before a corresponding command waiting for a reaction times out. The EX field shows if the batch file which is running uses the exclusive mode. In the last field, STOPBATCH, it can be displayed if a stop batch was defined, which will be executed if the running batch is canceled due to an error.

Register set LOOP BATCHES

On the register set LOOP BATCHES the execution of loop batches can be observed. A loop batch is a batch that is executed continuously within a separate "windows-thread" for maximum time precision.

Port	Batch	T[s]	First hh:mm:ss:zzz	Next hh:mm:ss:zzz	Cycle
1	TESTWAIT.WPB	10.0	15:42:17:421	15:42:27:421	1

In the table all active batch files are listed with their port number (PORT) and name. T[s] gives the time intervall in seconds which lies between the executions. FIRST/NEXT gives the time of the first/next execution of the batch file. CYCLE shows the number of the executions already done before.

5.6 Information window

Using the batch file command *ShowWindow 0* an information window can be displayed. The appearance of this window is determined by the INFO.TXT file located in the \CONFIG directory. Within this INFO.TXT file all data fields that are to be displayed are fixed. The file must have the following structure:

The first line must contain the window caption given by text.

The following lines are always divided into two columns. The first one contains the description of the value to be given out as text (for example weight). If blanks are used within the title or text, quotation marks (" ") must be used.

In the second column the data source for the value given out will be determined. This can be a static text or one of the following predefined data sources, which must be set in angular brackets :

- *[DLLFloatX]* displays the contents of the floating point memory cell number X=1, 2,...64 (see also *SetDllFloat*).
- *[DLLStringX]* displays the contents of the string memory cell number X=1,2,...64. (see also *SetDllString*)
- *[DLLFloatPercentageX]* displays the contents of the floating point memory cell number X=1,2,...64 displayed as percentage beam. The 100 % reference value is the value set by the command *SetDLLFloatMaxValue* for the corresponding memory. The beam display changes by default from green to red when the value exceeds 90 %. You set this threshold with the command *SetDLLFloatPercentageAlarm*.
- *[DLLBooleanX]* shows the contents of the boolean memory cell number X=1,2,...64 as control lamp (see *SetDLLBoolean*). If the memory value is 0 (false) the control lamp is dark green, if the value is 1 (true) light red.
- *[Time]* displays the continuous time.
- *[Now]* displays date and time continuously.
- *[ChronoX]* displays the chronometer with number X=0,1 (see also *StartChronometer*, *StopChronometer*).

The information window is updated every second.












Chapter

6

Nuclide database editor DBEDIT.TXT


6 Nuclide database editor DBEDIT.TXT

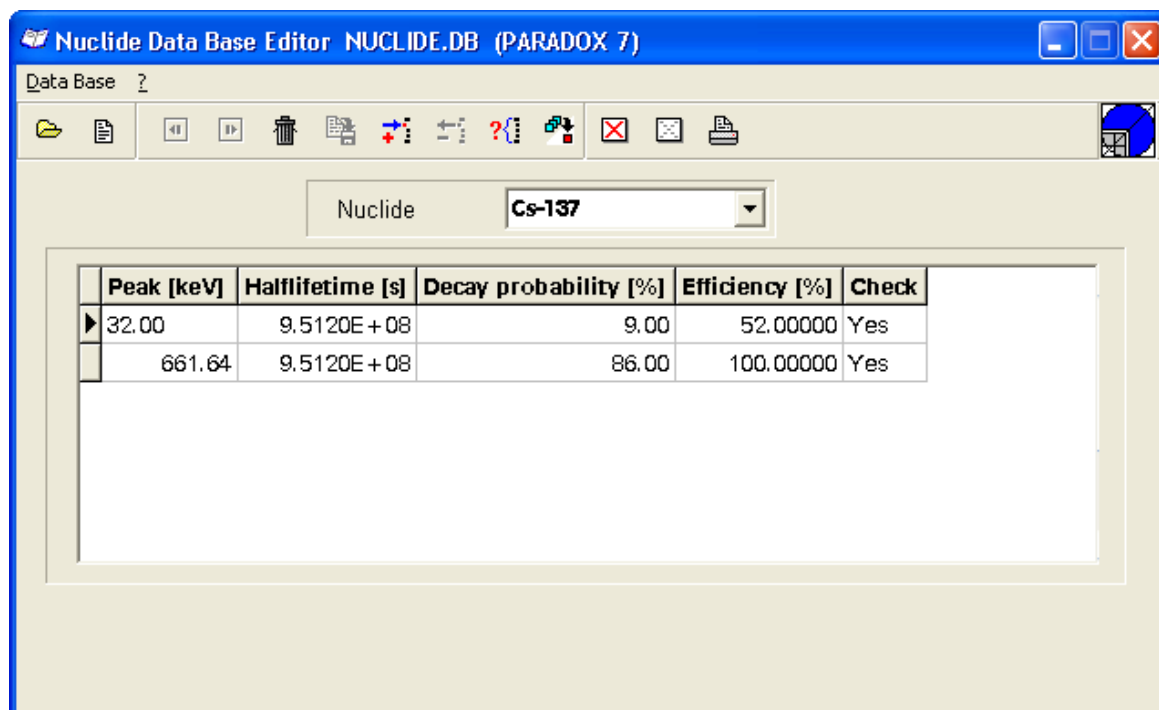
You adapt the present nuclide databases or create new ones with the nuclide database editor DBEDIT.EXE.

Icon  opens an already existing database, icon  creates a new one. With the cursor keys ($\uparrow\downarrow$) or icons   each nuclide can be listed one after the other. Icon  serves to erase the displayed nuclide from the database. Icons   append respectively erase a peak. In order to find a peak with a special energy, the energy can be entered into the search field which appears after clicking icon . Peaks located in another database (for example NUCLIDE.DB) can be appended via Icon . In order to select all peaks for evaluation, icon  activates the CHECK fields. Icon  deselects all peaks.

The decay probability at each gamma energy is given as a percentage rate. In the next field the detector efficiency is displayed which is evaluated by [efficiency calibration](#). If no calibration with this database was carried out the value is set to 100 %. If the calibration was carried out, an evaluation of the detector efficiency dependent on the gamma energy will be accomplished.

Attention: Only gamma energies which have their CHECK fields activated will be taken into consideration in the spectra display and the integration window.

In order to append new nuclides the name must be entered into the nuclide field. After that icon  serves to select the energy lines.



Chapter

7

Appendix

7 Appendix

[Configuration file TMCAINIT.TXT](#)

[Example for a layout file created with batch command PrintFormattedPage](#)

[Evaluation module NAJCALC](#)

[Spectra format](#)

[Trouble shooting](#)

[Using webMCA](#)

7.1 Configuration file TMCAINIT.TXT

The file named TMCAINIT.TXT serves for hardware configuration and is depending on software not always located in the .\CONFIG directory, but must be created there if needed. This can be done with any default ASCII editor like the winTMCA32 editor, for example. If the file already exists it will be executed automatically every time the program is started.

Within this file the setups corresponding to the acquisition ports can be adjusted, as for example the type and number of ports and the communication between PC and external acquisition hardware. The following parameters can be set:

- | | |
|-----|--|
| t=X | X states the total number of acquisition ports to be initialized. If X is not specified, all acquisition ports, which are physically present, will be initialized. If the number of the physical present hardware ports is smaller than X, as many virtual ports as necessary are added to balance the difference in number. |
| i=X | X is the number of interrupts that will be generated per second to control the acquisition of data. If this value is not specified it is set to its default value of 250/s. |
| g=X | X states the time in microseconds necessary to adjust the system clock due to the time loss caused by the IRQ-Control, when working under real time conditions (GAP). Default is 35 μ s. This value should not be changed except under special conditions. |
| r=X | X gives the number of physical acquisition ports that should be controlled by the software. This number can be either bigger than the number of ports actually present - in which case only this limited number of ports will be initialized - or smaller which means only those ports actually present will be started. Is the parameter r = x set to zero, only one virtual acquisition port will be setted up and neither the IRQ nor the I/O addresses of an acquisition card will be initialized. |

- v=X X is the number of virtual acquisition ports being initialized in addition to the physical ones. Virtual acquisition ports enhance the interpretation of values acquired with physical acquisition ports. E.g. signals acquired in a PHA-spectrum via a physical acquisition port can be interpreted as MCS-spectrum on a virtual port at the same time.
- P=X,c(p,b) This parameter assigns specific hardware (c) to an acquisition port (X). Setups for this type can be "N" for nanoSPEC and "f" for field spec. Additionally the parameters p=1,2,... for serial COM port and b for baud rate/100 must be given.

7.2 Example for a layout file created with batch command PrintFormattedPage

```

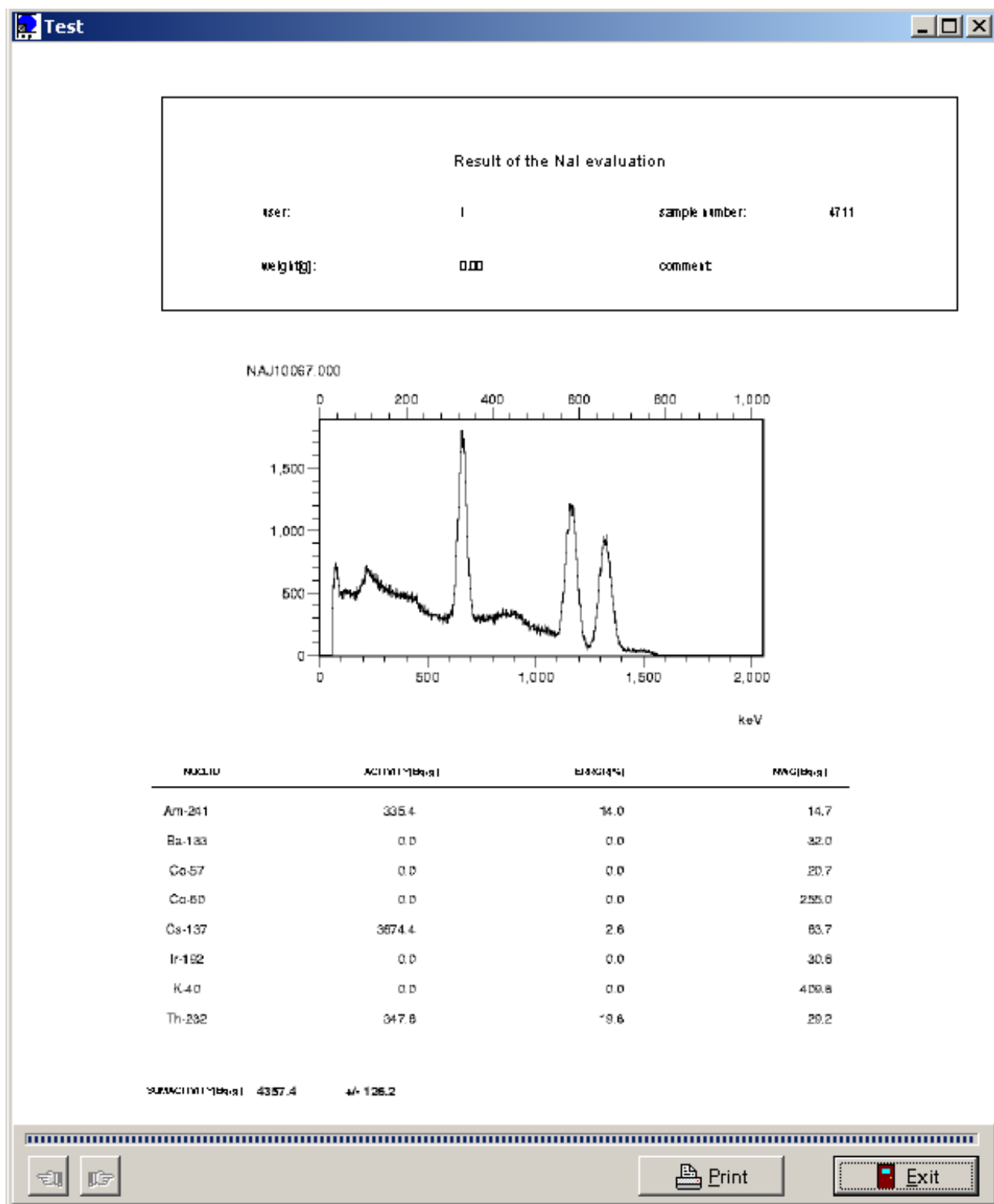
BEGINHEADER
TEXTOUT(55,10,20,0,0,C,Result of the NaI evaluation)
TEXTOUT(25,15,15,0,0,L,user:)
TEXTOUT(45,15,15,0,0,L,$user)
TEXTOUT(65,15,15,0,0,L,sample:)
TEXTOUT(82,15,15,0,0,L,$number)
TEXTOUT(25,20,15,0,0,L,weight[g]:)
TEXTOUT(45,20,15,0,0,L,$weight)
TEXTOUT(65,20,15,0,0,L,comment:)
TEXTOUT(82,20,15,0,0,L,$comment)
DRAWFRAME(15,5,95,25,1)
ENDHEADER
DRAWSPECTRUM(1,20,Y+5,50,25,1)
SAVEY
TEXTOUT(20,SAVEY+10,10,1,0,c,NUCLID)
TEXTOUT(40,SAVEY+10,10,1,0,c,ACTIVITY[Bq/g])
TEXTOUT(60,SAVEY+10,10,1,0,c,ERROR[%])
TEXTOUT(80,SAVEY+10,10,1,0,c,NWG[Bq/g])
DRAWLINE(15,Y+1,85,Y+1)
BEGINTABLE
TABLETEXTOUT(20,Y+2,2,10,0,0,c,1,*1,$NUCLID)
TABLETEXTOUT(42,Y+2,2,10,0,0,r,1,*1,$NET,%1f)
TABLETEXTOUT(62,Y+2,2,10,0,0,r,1,*1,$ERRORREL,%1f)
TABLETEXTOUT(82,Y+2,2,10,0,0,r,1,*1,$NWG,%1f)
ENDTABLE
SAVEY
TEXTOUT(15,SAVEY+5,10,1,0,l,SUMACTIVITY[Bq/g]: $NETSUM,%1f)
TEXTOUT(38,SAVEY+5,10,1,0,l,+/- $ERRORSUM,%1f)
    
```

The page header is created.
All variables must be declared in the temporary file (i.e. Suser...)

These text declarations are printed out side by side as a fact of the SAVEY command.

A table consisting of four columns is created. The variables that are to be used must be declared as \$NUCLID1, \$NUCLID2... The index is running from 1 to maximum.

The resulting page is shown below:



7.3 Evaluation module NAJCALC

The optional program module NAJCALC.EXE allows the [evaluation](#) of NaI-spectra, the [efficiency calibration](#) and the [quality control](#) of NaI acquisition ports.

In order to execute NAJCALC it must be started with the corresponding command line

parameters. This can result from menu registers within the winTMCA32, buttons and batch file commands. This program can be started for testing via START \Rightarrow EXECUTE and the specific command line parameters.

[Evaluation](#)

[Efficiency Calibration](#)

[Quality Control](#)

7.3.1 Evaluation

In order to determine the activity for a nuclide line the integration area is defined around the desired energy line. The width of this integration area is proportional to

$$\Delta E = A + B \cdot \sqrt{E_{keV}}$$

Within the area it is tried to describe the spectrum shape using a gauss function

$$\Gamma(E) = e^{-\frac{(E-E_0)^2}{2 \cdot \sigma^2}}$$

If this fit is not successful a mean background is determined at the margins of the integration range. Therefore five channels are taken into consideration in each case. These points are used to determine the straight line equation for background. The responding net area is assigned to the corresponding nuclide, if the centroid of the net area lies within a pre-fixed energy window (3 keV by default), and the FWHM (full width of half maximum) lies within margins depending on energy.

If a background spectrum is given, the channel contents are normalized by acquisition time and subtracted from the measured spectrum before the evaluation of the net area takes place.

In order to evaluate the minimum detectable activity for the corresponding energy range within the spectrum the statistical error from the spectrum and from the background spectrum is used. The [efficiency calibration](#) for the corresponding energy is taken into consideration. The default value of $1\sigma \cong \sqrt{N}$, whereby N refers to the number of total events in the integration area.

The error of the given activity results from the statistical error of the net area (default 1σ) and the [efficiency calibration](#) error.

For evaluation the following command line parameters are possible:

Command line parameter Function

- d=<[Nuclide database](#)> Determines the nuclide database that is used during spectrum evaluation. The name of the database must be entered **without** file extension and **without** specifying a file path. (The search path is the .\NUCDATA subdirectory located in the winTMCA32 directory.)
- s=<n> **n** states the number of the spectrum being evaluated.

- b=<n> **n** refers to the number of the [spectrum window](#), where the background spectrum is located (optionally).
- w=<f> The parameter **f** creates an energy window around the desired peak energy. Peaks lying within this window are identified. The window width is $\pm f$ keV (optionally; default 3.0 keV).
- f=<f> This factor can be used to normalize the results, e.g. to calculate the activities with regard to a weight (Bq/kg), etc. The results are divided through this factor (optionally; default f=1.0).
- e=<f> This factor is used to multiply the activity error and the error of the minimum detectable activity. These errors correspond then to the root mean square deviation multiplied by f (optionally; default f=1.0).
- a Evaluates for every nuclide the decay time until the value is smaller than the value given in the field for allowed activity in the nuclide database.

All nuclides selected in the chosen nuclide database are taken into consideration during evaluation. (The nuclides must be activated, by setting their CHECK fields in the [nuclide database editor DBEDIT](#).) If more than one gamma peak is activated for a nuclide, the mean for the activities of the single lines is evaluated.

The evaluation results are stored in the file NAJCRES.TXT. The file is stored in the .CONFIG subdirectory of the winTMCA directory.

Example for a NAJCRES.TXT file:

```

NUCLID=Cs-137 NET=<908.88 GROS=7383.76 ERROR=0.00 NWG=908.88 ERRORREL=0.00
NETCOUNTS=0
HLT=951200000
EFFICIENCY=0.000670
NUCLID=I-131 CENTROID=361.41 CENTROIDERROR=6.30 FWHM=32.71
NUCLID=I-131 NET=6795.19 GROS=14994.26 ERROR=1279.45 NWG=943.93
ERRORREL=18.83
NETCOUNTS=848
HLT=694656.004445798
EFFICIENCY=0.001262
NUCLID=Tc-99m NET=<1061.52 GROS=25679.50 ERROR=0.00 NWG=1061.52
ERRORREL=0.00
NETCOUNTS=0
HLT=21620
EFFICIENCY=0.001709
NUCLID=TI-201 CENTROID=70.22 CENTROIDERROR=6.01 FWHM=22.65
NUCLID=TI-201 NET=4231.32 GROS=37240.26 ERROR=1442.67 NWG=1278.71
ERRORREL=34.10 NETCOUNTS=444
HLT=262700
EFFICIENCY=0.001654
NETSUM=11026.51 ERRORSUM=1928.29

```

For each nuclide (NUCLID) the total activity (NET) in Bq, the gross activity (GROS) in Bq, the activity error of the total activity (ERROR) in Bq, the minimum detectable activity (NWG) in Bq, the relative activity error of the total activity (ERRORREL) in % and the

number of net events for all gamma peaks of the nuclide (NETCOUNTS) are given. For additional information the half life time in seconds (HLT) and the efficiency factor of the last evaluated nuclide line are given.

If a net activity was calculated, one or more lines precede the result line (depending on the gamma peaks selected in the [nuclide database](#)), where the centroid (CENTROID) in keV, the centroid error (CENTROIDERROR) in keV, as well as the full width of half maximum (FWHM) in keV are displayed.

In the last line of the NAJCRES.TXT file, the total activity of all nuclides identified (NETSUM) in Bq and the error of this total activity (ERRORSUM) in Bq are displayed.

In order to use the results in [winPROC-batch files](#) the command line `READSAMPLERESULTS NAJCRES.TXT` can be used. This command is used to assign variables of a temporal winPROC file to all data.

In order to generate a printout of the results afterwards, the command `PRINTFORMATTEDPAGE <Layout file> <temporary file>` can be used.

7.3.2 Efficiency Calibration

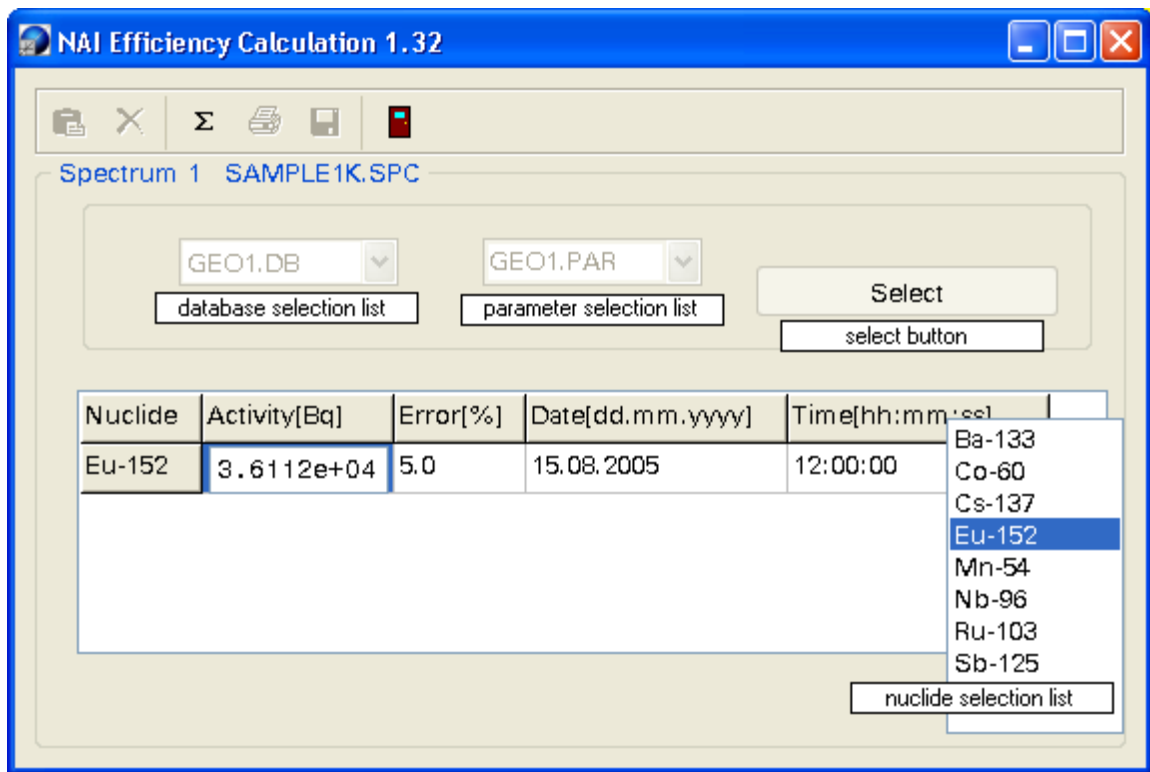
The efficiency calibration is necessary to determine the energy depending efficiency of the whole acquisition port, which depends on sample geometry, positioning in front of the detector and the detector itself. The efficiency calibration must be repeated only if the geometry or the calibration source are changed, or the [quality control](#) deviations are too large. One of the possible reasons for these deviations might be that the detector is too old. The calibration refers to a nuclide database in which the entries for the efficiency of each peak is re-evaluated after successful realization. Therefore, every geometry needs its own nuclide database.

For spectrum evaluation in the actual spectrum window of winTMCA32 the following command line parameters are recommended respectively possible:

Command line parameters	Function
-c	Starts NAJCALC in the calibration mode.
-d=<nuclide database>	Specifies the name of the nuclide database to be calibrated (optional, the database can be selected interactive).



- p=<calibration source parameter file> Specifies the name of the parameter file to be used containing the activities of the calibration source used. The file name must be given without path **but with** file extension (default "*.PAR") (optional, the file can be selected or created interactive).
- b=<n> **n** specifies the number of the background spectrum taken into consideration (optional).
- w=<f> **f** specifies the energy window around the desired peak position, peaks lying within this window will be identified. The window width is $\pm f$ keV (optional, default **f**=3.0)


After starting NAJCALC.EXE the following dialog window appears:



The spectrum number and the name of the selected spectrum are displayed within the window. The data base selection list shows the name of the actual chosen nuclide database. Only nuclide databases located in the \NUCDATA subdirectory of the winTMCA32 directory are listed. To alter existing databases or to create new ones the program DBEDIT must be used.


In the parameter selection list one of the present parameter files can be chosen, in which parameters of the calibration sources that are to be used are stored. If no parameter file exists a name based on the first displayed nuclide database is proposed. The name in this field can be changed which means that a new source parameter file is installed. The extension of this file should be ".PAR". If the selection is finished respectively the name is entered, the SELECT button must be clicked. That leads to the result that the field for entering the calibration source data is activated. If an existing parameter file was selected its saved data will be displayed.


Import a nuclide via button . Choose a nuclide out of the nuclide selection list. Use the right mouse button to stop the import. For each chosen nuclide the activity at reference date (in Bq), the error of the activity (in %) and the reference date (in dd.mm.yyyy hh:nn:ss) must be given. Delete a nuclide via button .

After having entered the nuclides, start the evaluation via button . Therefore the net areas of all peaks of the nuclides listed in the enter field (which have their CHECK fields in the nuclide database editor activated) are evaluated. The resulting count rates with corresponding nuclide activities are related to the actual date. The individual decay probability of the gamma lines is taken into consideration.

The resulting value pairs of the relation between count rate and calibration source activity depending on the gamma energy are adapted by the function

$$\log(\text{Eff}(x)) = \sum_{i=0}^2 a_i \cdot \frac{1}{x^2}$$

In the actual spectrum window the resulting function for the detector efficiency is displayed. The PRINT button serves to print out the analysis. You can adjust the given activities by activating the field for the calibration source parameters. In that way the fit can be executed again. In order to use the efficiency adaption for the database press button .

Button  allows to exit the program at any time.

7.3.3 Quality Control

The command line parameter "-q" enables the customer to perform a quality control with the NAJCALC program. Therefore, a spectrum must be acquired with the help of the calibration source and the same geometry as used in an earlier performed calibration session. When this spectrum is evaluated, the calculated activities are compared to the values stored in the nuclide database. The half-life of the nuclides is taken into consideration during the comparison.

The following command line parameters are necessary, resp. possible:

Command line parameters	Function
-q	Starts the NAJCALC program for quality control.
-s=<n>	n states the number of the spectrum being evaluated.

-p=<calibration source parameter file>	Specifies the name of the parameter file containing the activity declarations of the calibration source. The file name must be given without path but with file name extension (default ".PAR").
-b=<n>	n specifies the number of the background spectrum taken into consideration (optionally).
-w=<f>	The parameter w creates an energy window around the desired peak energy. Peaks lying within this window are identified. The window width is $\pm f$ keV (optionally; f = 3.0 by default)
-e=<f>	This factor is used to multiply the activity error and the error of the minimum detectable activity. These errors correspond then to the root mean square deviation multiplied by f. (optionally; default f =1.0)

The results are written to a file named NAJQRES.TXT, which is stored in the \CONFIG subdirectory of the winTMCA32 directory.

Example for a NAJQRES.TXT file:

```

NUCLID=Ba-133 CENTROID=356.01 CENTROID(C)=363.43 ACT=3379.19 ACT(C)=3394.02
DELTA ACT=0.1
NUCLID=Cs-137 CENTROID=661.64 CENTROID(C)=661.49 ACT=4449.31 ACT(C)=4606.31
DELTA ACT=0.6
NUCLID=Co-60 CENTROID=1173.23 CENTROID(C)=1159.44 ACT=3234.31 ACT(C)=3280.69
DELTA ACT=0.2
NUCLID=Co-60 CENTROID=1332.51 CENTROID(C)=1318.51 ACT=3234.31 ACT(C)=5235.73
DELTA ACT=6.4
AVRDELTA ACTIVITY=1.82

```

In the result file the following information is displayed for each selected nuclide from the database:

- name
- energy (CENTROID) as it is stated in the database in keV
- the energy (CENTROID(C)) determined of the peak centroid of the spectrum being evaluated in keV
- the nuclide activity at the actual date (ACT) in Bq
- the activity (ACT(C)) calculated from the spectrum with respect to the efficiency
- calibration in Bq
- the difference of these two activities as multiples of the root mean square deviation of this difference

In the last line of the file the value AVRDELTA ACTIVITY states the medium deviation of all evaluated peaks in multiples of the root mean square deviation.

The quality control feature of the NAJCALC program enables you to check whether an efficiency calibration is still valid. A new calibration session should be run, if the medium deviation is larger than three times the root mean square deviation and the system setup should be checked, too.

7.4 Batch file examples

[Inserting values into excel files](#)

[Generating spectrum names](#)

[Creating a mcs spectrum](#)

[Example for a startup batch file](#)

[Acquiring and integrating](#)

7.4.1 Generating spectrum names

```
GetsDate sDate
GenerateSPCName SpcName 1 %s%s "SPC_" $sDate
SetSpectrumName 1 $SpcName
StartAcquisition 1 &
SaveSpectrum 1 $SpcName
VARIABLES
sDate %s
SpcName %s
```

This batch file generates a spectrum name using the format "SPC_ddmmyy.nnn", where *ddmmyy* relates to the date and *nnn* is an autoincrementing number starting from 000. If this batch file is executed more than one time the extension increments by 1. An example for a spectrum name generated with this batch file is "SPC_131003.002". You can see directly from the spectrum name that the spectrum was acquired on 13.10.2003, it was the third spectrum created on the day (extension 002).

7.4.2 Creating a mcs spectrum

Using this batch file a mcs spectrum can be created:

```
SetSpectrumLength 3 16384
DeleteAllROIs 1
GetsDate sDate
GenerateSPCName MCSSpectrum 3 %s%s "MCS_" $sDate
SetSpectrumName 3 $MCSSpectrum
ClearSpectrum 3
TimeCalibration 3 30
PresetLivetime 1 30
MkNaiROI 1 662 1.2
SetMCSWindow 3 30
:LOOP
ClearSpectrum 1
StartAcquisition 1 &
Integrate 1 Centroid Fwhm Net Gros Back 662
```

```

GetActualDateTime ActDateTime
WriteMCStoEnergy 3 $Net $Actdatetime
SaveSpectrum 3 $MCSSpectrum
GetMCSSpectrumChannelNumber ChannelNumber 3
GetSpectrumLength SpectrumLength 3
if $ChannelNumber < $SpectrumLength
{
Goto LOOP
}

```

The mcs window is displayed in spectrum window 3, the integration results of the RoI in spectrum window 1 are here displayed. The values will be inserted until the end of the mcs spectrum is reached.

7.4.3 Inserting values into excel files

Using the batch command *ImportInExcelWorksheet* the contents of a textfile are written into an excel file:

```

OpenExcelWorkSheet "C:\Oktober\13102003.xls" results 1
ImportInExcelWorkSheet ExcelImport.txt
CloseExcelWorkSheet

```

This batch file opens the excel file 13102003.xls within the directory "C:\Oktober". Then the contents of the file ExcelImport.txt are transferred into the excel worksheet named "results". Then the file is closed.

The file ExcelImport.txt has the following contents:

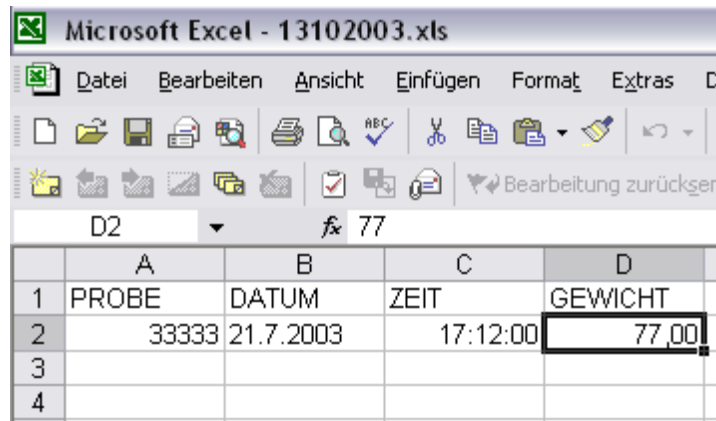
```

PROBE
33333
DATUM
21.7.2003
ZEIT
17:12:00
GEWICHT
77

```

This file contains the column names and their corresponding values, which are written into the next free row within the column.

The resulting excel file looks like this:



These values can also be transferred using the batch command *InsertItemInExcelWorksheet*:

```

OpenExcelWorkSheet "C:\Oktober\13102003.xls" results 1
Insertiteminexcelworksheet PROBE 1020
Insertiteminexcelworksheet Datum "11.10.2003"
Insertiteminexcelworksheet ZEIT "16:47:00"
IncrementExcelWorkSheetRow
Insertiteminexcelworksheet PROBE 1030
Insertiteminexcelworksheet Datum "11.10.2003"
Insertiteminexcelworksheet ZEIT "16:48:00"
IncrementExcelWorkSheetRow
Insertiteminexcelworksheet PROBE 1040
Insertiteminexcelworksheet Datum "11.10..2003"
Insertiteminexcelworksheet ZEIT "16:48:00"
CloseExcelWorkSheet
    
```

The resulting excel file looks like this:

	A	B	C	
1	PROBE	Datum	ZEIT	
2	1020	11.10.2003	16:47:00	
3	1030	11.10..2003	16:48:00	
4	1040	11.10..2003	16:48:00	
5				

7.4.4 Example for a startup batch file

Within the following batch file as comment is written in front of a command. These comment lines start with a "#".

```

#Maximize winTMCA to screen
SetScreenState 2
#Show spectra window 1
ShowWindow 1
#Set the spectra window size
WindowFrame 1 1 1 98 98
#Make energy calibration on spectra window 1: 1 channel = 1keV
    
```

```

EnergyCalibration 1 1 1
#Set X unit to keV on spectrum window 1
SetXUnit 1 "keV"
#Setup acquisition hardware: If you don't want to use this section, use # character to mark
the following lines as comment
#Set HV
SetHV 1 $HV
#Set upper level discriminator
SetULD 1 $ULD
#Set lower level discriminator
SetLLD 1 $LLD
#Set noise level
SetNoiseLevel 1 $NOISE
#winTMCA batch file needs variable section
VARIABLES
HV %d 500
ULD %d 1023
LLD %d 0
NOISE %d 15

```

7.4.5 Acquiring and integrating

In the following batch file a RoI is set around a given energy, and an acquisition is started for a preset time. If the time has expired the area of the RoI is integrated and the counts per second are calculated. The result is displayed on the screen within a message window.

```

#Clear spectrum
ClearSpectrum 1
#Clear all RoIs
DeleteAllRoIs 1
#Set a single RoI using an energy value: Energy float (keV)
MkNaIROI 1 $Energy 1
#Preset Real time: RT integer (seconds)
PresetRealtime 1 $RT
#Start Acquisition and wait for completion
StartAcquisition 1 &
#Integrate the RoI: Centroid, FWHM, net counts, gros counts, background counts
Integrate 1 Centroid FWHM Net Gros Back $Energy
#Get live (true) acquisition time
#Attention: To assign a value to a variable ommit the $ character in front of the variable
name: $ = access
# contents of variable
GetLivetime LT 1
#Calculate Net live cps
Eval $Net/$LT CPS %.2f
#Build output string
Printf OutputLine "Result %.2f" $CPS
#Print result using showmessage: Text file name, Line number in file, time message [s] is
displayed
#(0: stay on screen until OK is pressed)
#optional text (if line number is 0 only the optional text is displayed)

```

```

ShowMessage dummy 0 0 $OutputLine
#winTMCA batch file needs variable section
VARIABLES
Energy %f 661.62
RT %d 30
Centroid %f
FWHM %f
Net %f
Gros %f
Back %f
LT %f
CPS %f
OutputLine %s

```

7.5 Spectra format

The winTMCA32 spectra are stored in ASCII format, so they can easily be imported or adapted. A spectrum file contains the spectrum header followed by the channel contents.

The header contains the following informations:

- *SpectrumName*
- *XUnit* (user defined unit of the x-axis (channel-axis))
- *YUnit* (user defined unit of the y-axis (channel-content axis))
- *Length* (number of channels for the x-axis)
- *SubSpcNum* (number of sub spectra, which means the number of channels for the z-axis)
- *StartSubSpc* (defines the beginning of the sub spectra area which is saved to the file)
- *StopSubSpc* (defines the ending of the sub spectra area which is saved to the file)
- *Comment* (user defined comment)
- *Realtime* (whole acquisition time (in seconds) at saving time)
- *Livetime* (dead time corrected acquisition time (in seconds) at saving time)
- *Deadtime* (dead time)
- *Starttime* (date/time of the acquisition start, the format "dd.mm.yyyy hh:mm:ss" is used)
- *Stoptime* (date/time of acquisition end, the format "dd.mm.yyyy hh:mm:ss" is used)
- *CalibPoint1-4* (channel/energy pairs used for energy calibration)
- *CalibCoeff* (polynome coefficients for the energy calibration function (type $E=a*x^3+b*x^2+c*x+d$))
- *SpectrumText* (user defined text in the spectrum text window)

After the spectrum header the channel contents are displayed, eight channels per line separated by ",". Consecutive sub spectra are not separated by ",". Only one spectrum header is created with every saving.

7.6 Trouble Shooting

This chapter gives some assistance in locating and eliminating problems, which might occur while working with the winTMCA32-software.

[No spectrum can be acquired.](#)
[Spectra are not stored in the chosen directory.](#)
[Malfunction peak integration](#)

7.6.1 No spectrum can be acquired

Possible sources of error:

Cause	Solution
Wrong hardware parameters.	<ul style="list-style-type: none"> • Check the hardware parameter like HV, ULD, Gain, Fine gain, etc • Check the parameter for serial communication with nanoSPEC and identiFINDER like COM port, baud rate, etc.
Cable is incorrectly fitted.	<ul style="list-style-type: none"> • Check all cable connections.

7.6.2 Spectra are not stored in the chosen directory

Possible sources of error:

Cause	Solution
Wrong spectra path.	Check the path settings for the spectrum window . The path is individually selectable for each spectrum and is stored to the windows registration database.
File extension is not ".SPC".	In the spectra selection dialog only files having the extension ".SPC" are displayed by default. For spectra with other extensions, select "all files".

7.6.3 Malfunction peak integration

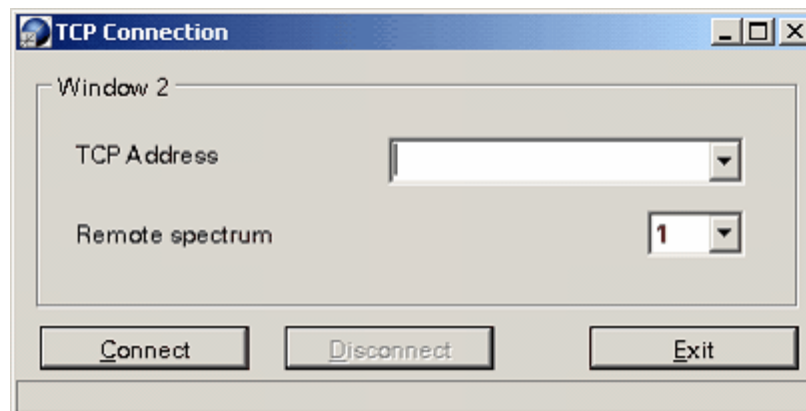
Possible sources of error:

Cause	Solution
No cursor within a ROI.	<ul style="list-style-type: none"> To select a ROI for integration the cursor must be located within the ROI.
Marker lines are set.	<ul style="list-style-type: none"> If two marker lines are defined the area within these marker lines will be integrated independent of cursor position.

7.7 Using webMCA

The connection to a webMCA acquisition port can be initiated manually while winTMCA32 is running or automatically if winTMCA32 is started.

Select SPECTRUM ⇒ SELECTTCP within the menu header to connect manually to the webMCA. The following input box appears on the screen:



If the IP address is entered the connection is activated by clicking the connect button. If the connection was successful the dialog box will disappear automatically. The IP address is stored and will be displayed within the selection list of the TCP Address field if the dialog is opened again.

If the menu header does not contain this menu item the following line has to be added to the menu definition file MENU.DEF (which can be found within the CONFIG directory):
SELECTTCP_S SELECTTCPSPECTRUM

It is also possible to connect automatically when winTMCA32 is started. Therefore the file PORTMAPPING.TXT has to be added to the CONFIG directory. For every webMCA device a new line consisting of the following format has to be added:

p=n,IP=xxx.xxx.xxx.xxx

n relates to the winTMCA32 acquisition port to which the webMCA shall be connected. Please note that it is not allowed to connect any other MCA devices like scintiSPEC etc. to this port!

Chapter

8

Credits

8 Credits

A list of additional used Delphi freeware components is given:

TColorPickerButton © 1999 from Dipl. Ing. Mike Lischke (public@lischke-online.de)

TComPort © 1998-2001 from Dejan Crnila (dejancrm@yahoo.com)

TWSocket (ICS) © 1997-2001 from François Piette (francois.piette@rtfm.be)

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