MULTIPLOT

Instruction Manual

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0.Introduction

Multiplot comes as part of the spectrometer software package working in Windows. This program enables the simultaneous presentation of up to 10 spectra for comparison and printing. Multiplot accepts data file formats created by our spectrum control programs CU1, CU2 and DS100.

1.System Reqirements

Minimum requirement is a PC equipped with a 486 microprocessor and at least with 8 MB RAM, however, execution will be more swiftly with 16 MB RAM. The selected graph mode should be either VGA with 640*480 pixels or SuperVGA with 800*600 pixels, and the font size should be chosen not too small.

2.Installation

The program Multiplot will be installed on your hard disk by inserting the installation diskette No. 2 into the appropriate drive. Then select this drive as the actual drive by typing „**<drive>:**“.
The installation program INSTALL.BAT will be started by typing „**install <destination drive>:**“ wherein <destination drive> denotes the hard disk drive with the subdirectory CU1 (which may exist from previous programm installations). If no subdirectory with the name CU1 exists at the time of installation it will be created automatically by the installation procedure. After a successful completion of the installaion you will find in the subdirectory CU1 of the chosen drive the files mplot.ico and mplot.exe.

You may use the „file/new“ option of the program manager to create another directory for Multiplot any time, or move it to any other directory you wish, it may not affect the program execution. Please consult your Windows manual.

3.Operating

3.1. Starting of Multiplot

The Multiplot application will be started by:

1. double clicking of the icon 

2. couble clicking „mplot.exe“ within the data manager or by
3. entering „mplot.exe“ preceded by the path to your Multiplot program subdirectory within the "file/execute" option either of the program manager or of the file manager

3.2. Leaving Multiplot

You may quit the Multiplot application by:

1. double clicking of the minus sign in the left upper corner of the program window or by
2. selecting the menue item "File/exit"

3.3. Toggeling between Multiplot and other windows applications

You may switch to other Windows applications simply by clicking the mouse pointer to the appropriate window and/or double clicking the icon of the other application. Before switching the Multiplot window can be reduced to ist icon size by simply clicking the triangle in the upper right corner of the window. Vice verse, Multiplot can be activated in the same way coming from other applications.

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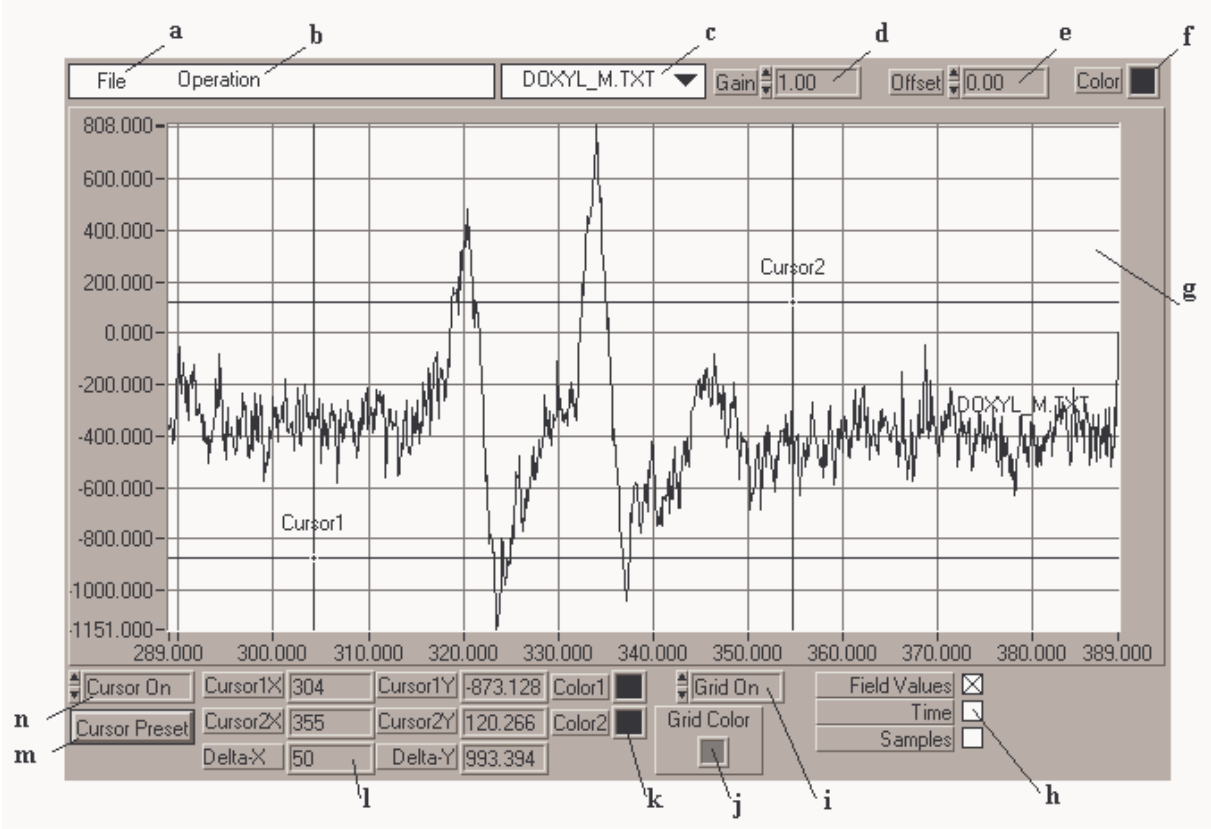
3.4. Elements of Multiplot



	screen function type	name	function
a	pull down menu	File	-load spectrum -delete spectrum -show parameter -print spectrum -quit
b	pull down menu	Operation	-change x/y-axis
c	pull down menu		-select spectrum
d	numerical input	Gain	-change signal amplitude
e	numerical input	Offset	-change signal position
f	colour palette	Color	-select drawing colour
g	graphical display	Graph	-display of spectra
h	switch	Field Values Time Samples	-select x-axis scaling dimension
i	roll up menu	Grid On/Off	-show / hide grid
j	colour palette	Grid Colour	-select colour of grid
k	colour palette	Color1 Color2	-select cursor colour
l	numerical display	Cursor1X Cursor1Y Cursor2X Cursor2Y Delta-X Delta-Y	-show cursor positions and distances
m	button	Cursor Pre-set	put cursors within graph window
n	roll up menu	Cursor On/Off	activate/deactivate cursors

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3.5. Creation of a multiple spectral display

Only the pull down menu "File"[a] is available after starting the program which entails the options "File/new" and "File/exit". The rest of the display is filled with an empty graph display.
■ *In practice a multiple spectrum display always starts with "File/new".*

Other pull down menus appear as soon as a spectrum is loaded into the program, such as the menu "Operation" [b]. The name of the spectrum is shown in the identification display [c]. The size and position of each spectrum can be influenced by the switches „gain“ [d] and „offset“ [e]. The cursors and the grid can be activated or deactivated by the switches "Cursor On/Off" [n] and "Grid On/Off" [i], respectively. Once activated the cursors can be positioned with a mouse click. Colours for the cursors and the grid can be freely chosen whenever they are active. Scaling units for the x-axis can be selected by using the switches "Field Values", "Time" und "Samples" [h].

■ *The following steps lead to a successful multiple spectrum display*

1.	load a spectrum	[File/new/append/insert]
2.	adjust amplitude, if necessary	[Name]+[gain]
3.	drag the spectrum to the desired position	[Name]+[offset]
4.	assign a colour to the spectrum curve	[Name]+[color]
5.	choose an x-axis	[FieldValue/Time/Samples]
6.	select a subrange if desired	
	6.1. switch on the cursors	[Cursor On]+[Cursor Preset]
	6.2. drag the cursors to the margins of subrange	
	6.3. zoom in	[Operation/zoomin]
	6.4. rescale y-axis if necessary	[Operation/xy-scale]
7.	select precision of y-axis if desired	[Operation/xy-scale]
8.	drag or deactivate cursors	[Cursor Off]
9.	optionally change colour of cursors	[Color1]/[Color2]
10.	optionally ad the grid to the display	[Grid On]
11.	optionally assign a different colour to the grids	[Grid Color]
12.	print, if you wish	[File/print]

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4. Funktions

4.1. File

4.1.1. new

"File/new" is always the first command in creating a multiple spectrum display with Multiplot. The actual screen display makes place for the file dialogue to allow picking a spectrum file. The name of the spectrum needs to be entered into the identification box. Predefined values for gain and offset 1.0000 and 0.0000, respectively and the predefined colour of the spectrum lines is black.

4.1.2. append

Further spectra can be added to the display with the *"File/append"* menu option. Spectrum files are selected with the file dialogue in the same way as the first one. Each new name of a further spectrum is appended to the previous ones within the identification box. Again, predefined default values for gain and offset are 1.0000 and 0.0000, respectively, and the colour of the spectrum will be black in the first place.

4.1.3. insert

The *"File/insert"* option allows to insert a new spectrum into a row of existing ones. The position within that row should be marked with the mouse pointer within the identification box. The new spectrum file will be identified with the file dialogue window. The new name will be inserted into the row before that one selected with the pointer. As before, the default values for gain, offset and colour are 1.0000, 0.0000 and black, respectively.

4.1.4. delete

The *"File/delete"* option removes a spectrum from the present display. The name of the spectrum has to be selected within the identification box. The listing within this box will be also purged from name of the removed spectrum.

4.1.5. parameter

All parameters of a spectrum selected from the listing in the identification box will displayed upon calling this menu item.

4.1.6. print

Makes a print of the multiple spectrum display.

4.1.7. exit

Quits the program Multiplot.

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4.2. Operation

4.2.1. xy-scale

Each axis can be scaled individually by this operation, optionally with and without the AutoScale function. When active the auto scale function takes care of an optimal presentation of the total range of the spectrum, otherwise the range can be selected by the user. The option Precision defines the tick density of the Y-axis. The precision of the X-axis is predefined by the selected scaling unit, and the precision of the cursor positions by the corresponding scales.

4.2.2. zoomin

The zoomin operation deactivates the AutoScale function, the present cursor positions turn into the beginning and end of the new scales.

■ *Consequently zoomin is only available when the cursors are present.*

4.2.3. zoomout

The zoomout function returns to the presentation of full range of the spectrum with active auto scaling.

5. Further Program Elements

5.1. Identifier box

The names of all spectra are listed in the pull down menu of the identifier box. The values (welche Werte???) of the selected spectrum appear also in the menu boxes for "Gain", "Offset" and "Color". Whenever the presentation of a spectrum should be changed by "Gain", "Offset" or "Color" its name must be selected within the identifier box.

5.2. Gain / Offset

The amplitude size of a spectrum on display can be changed by setting „Gain“, its vertical position relative to the other spectra by setting „Offset“.

■ *The spectrum to be changed has to be selected from the listing in the identifier box.*

Alternatively the position of a spectrum on display can be easily and comfortably changed with the help of the mouse cursor. It has to point onto the right end of the spectrum. With the left mouse button pushed the spectrum can be dragged into any position with concurrent adjustment of the offset value.

■ *Dragging a spectrum with the mouse cursor need the X-axis AutoScale option to be activated.*

■ *The displayed ordinate value of a spectrum results from the sum of its original value and the offset:*

$$Y'(x) = Y(x)*Gain+Offset$$

5.3.Field Values/Time/Samples

The scaling of the x-axis can be selected with the help of this switch. Available dimensions for abscissa values are the magnetic field range, scan time or the number of data points. The corresponding dimensions are mT with three digits after the decimal point, seconds with two and the number of points as integers, respectively.

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■ *The X-axis AutoScale function must be active when changing these settings.*

■ *If one of the spectra comes with a magnetic sweep range of zero, then the magnetic field scaling option is automatically disabled.*

■ *If in case of magnetic field scaling a spectrum with a sweep range of zero is added to the list of displayed spectra then scaling of the x-axis is automatically changed to number of data points.*

5.4. Grid

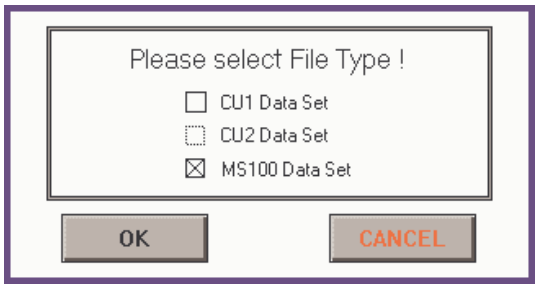
The roll up menu "Grid On/Off" adds a grid to the display of the spectra or removes it. The colour of the grid may be changed with the colour palette "Grid Color".

5.5. Cursors

The roll up menu "Cursor On/Off" shows or hides the cursors in the display. The switch „Cursor Preset“ and the colour palettes „Cursor 1“ and „Cursor 2“ are always present when the cursors are active on the screen. Pressing „Cursor Preset“ makes the cursors returning to fixed positions within the display even if the cursors are not activated with „Cursor On“. The precision of the displays of cursor positions and distances is ruled by the selected scaling of the x- and the y-axis. The colour of the cursors can be freely selected from the corresponding colour palettes.

6.File Dialogue

The execution of the functions "File/new", "File/append" und "File/insert" starts with a dialogue to select the appropriate file format. Three different file formats are available, they are created by the different control programs of our ESR instruments.



The option "Cancel" allows returning to the main program without any change, and "OK" opens the dialogue to select a file name (file-dialogue).

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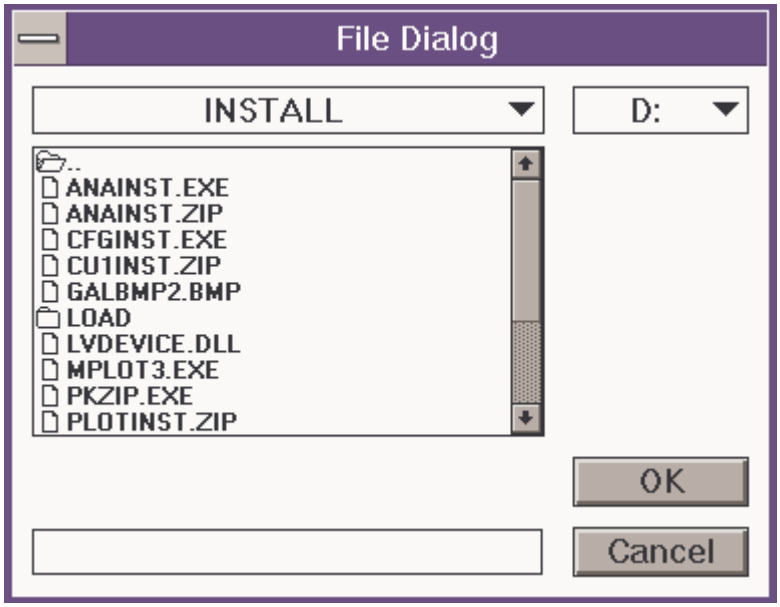
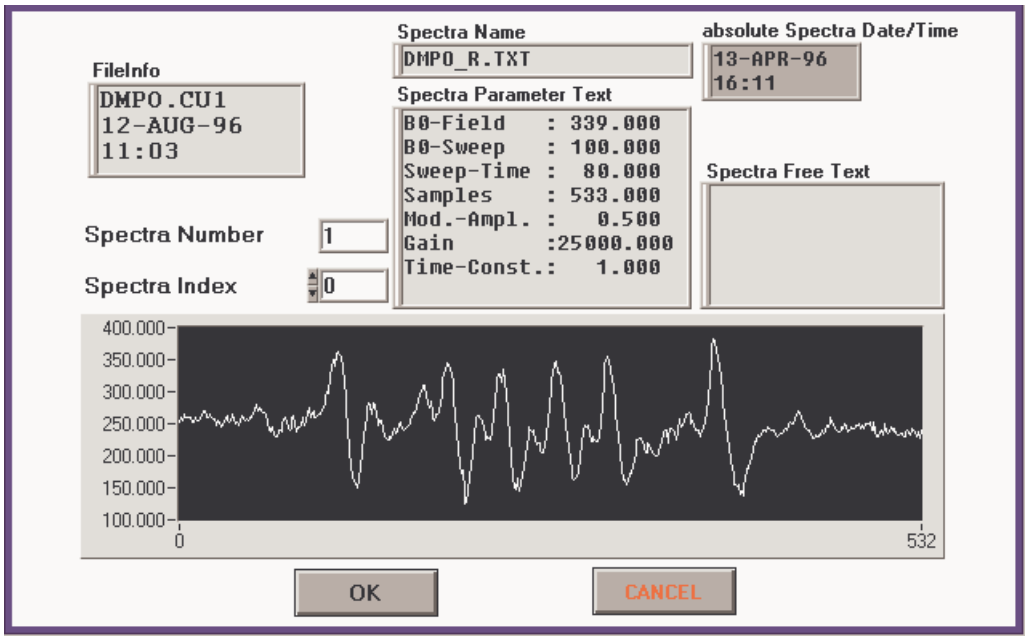


Again, "Cancel" leaves the dialogue without any change and returns to Multiplot main menu. If a selection of a file has been confirmed with "OK", then the selected file will be loaded into the program and an info-dialogue appears on the screen.

The info dialogue box also shows supplementary information about the original measurement. The amount of information depends on the file type.



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Information	Content	FILE TYPE		
		CU1	CU2	MS100
FileInfo	name, creation date and time of scan file	■	■	■
Spectra Name	name of scan	■	■	
Spectra Parameter Text	scan parameters	■	■	■
Spectra Free Text	user comments	■	■	
Spectra Number	number of recorded scans in file	■	■	
Spectra Index	identification of selected scan within the file	■	■	
absolute Spectra Date/Time	date and time of scan recording	■	■	
relative Spectra Time	time shift between spectrum(0) and selected scan		■	
Spektrum	selected spectrum	■	■	■

Leaving the info dialogue with „Cancel“ will return control to the file dialogue which allows selecting another file. Confirmation with „OK“ will add the spectrum to the multiple specta display.

■ *The way to return to the main program without adding a further spectrum to the multiple spectral display is first to quit the info dialogue and then the file dialoge with „Cancel“.*

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