

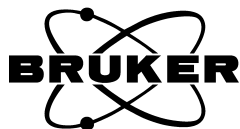


# **OPUS**

Spectroscopy Software

Version 6

## **Quick Reference Guide**



1st updated edition, April 2007

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This manual is the original documentation for the OPUS spectroscopic software.

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# 1 Starting OPUS

Before starting the OPUS installation, read the attached documentation.

To install OPUS, insert the OPUS installation CD into your CD drive. Normally, the installation starts automatically. If the Windows *Autostart* option is disabled, you have to start the installation manually by running the *Setup* program from your CD. The installation program will guide you step by step. You only need to follow the on-screen installation instructions shown in the different dialog boxes.

At the end of the installation procedure you will be asked to restart the computer. Note that you need to restart your computer in order to complete the OPUS installation. You may also be prompted to restart your computer when you install different program components. In such a case do not restart until the OPUS setup has been completed!

When the installation has been finished, an OPUS program icon is displayed in the Windows *Start* menu. Click on this icon to start OPUS.



Figure 1: Windows Start Menu

The *Login dialog* box opens. Select your *User ID* from the drop-down list. OPUS provides an independent user account system which regulates the access. If you use OPUS for the first time, the *User ID* drop-down list includes the two pre-defined user records *Default* and *Administrator*. Select either one of them.

Enter *OPUS* in the *Password* entry field. The password is case sensitive. Once you have assigned yourself a user record in OPUS, it is possible to determine your own *User ID* and *Password*.

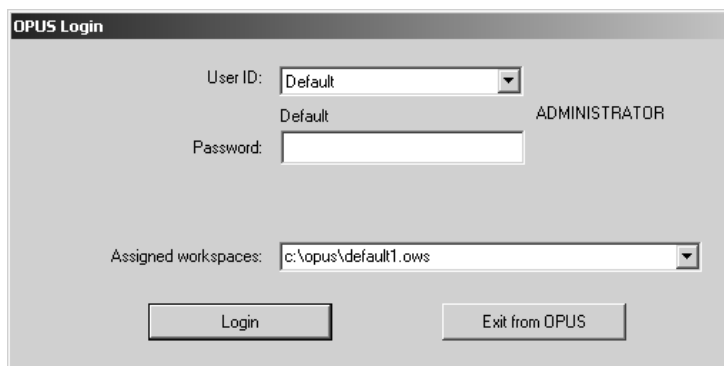


Figure 2: OPUS Login

OPUS includes different accounts for operator and administrator rights. Users defined as *Operator* have limited access rights compared to users defined as *Administrator*. The rights depend on the *User ID* selected.

The *Assigned Workspaces* identify the user interface and access right. You can always select those workspaces from the drop-down list which have been defined for your *User ID*. When you use OPUS for the first time, we recommend not to change the standard *Default.ows* workspace.

Click on the *Login* button and the *About OPUS* window opens.

This window shows the serial number of your OPUS copy and the name of the licensee. Available OPUS packages can be selected from the drop-down list. The basic OPUS package integrates these additional licensed packages as an all-in-one application.

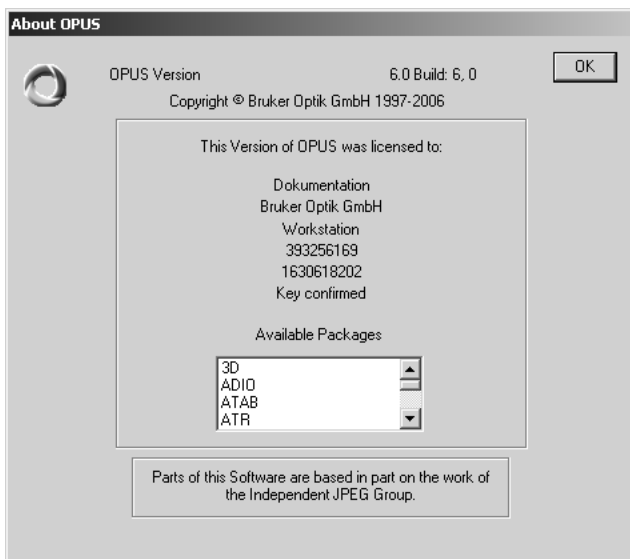


Figure 3: About OPUS

Click on *OK* to open the OPUS user interface. The interface appearance depends on the screen settings and operating system used. Thus, the screen display of the following dialog boxes may not show exactly the screen contents displayed on your screen.

BRUKER recommends a minimum graphic resolution of 800 x 600 pixel and true color.

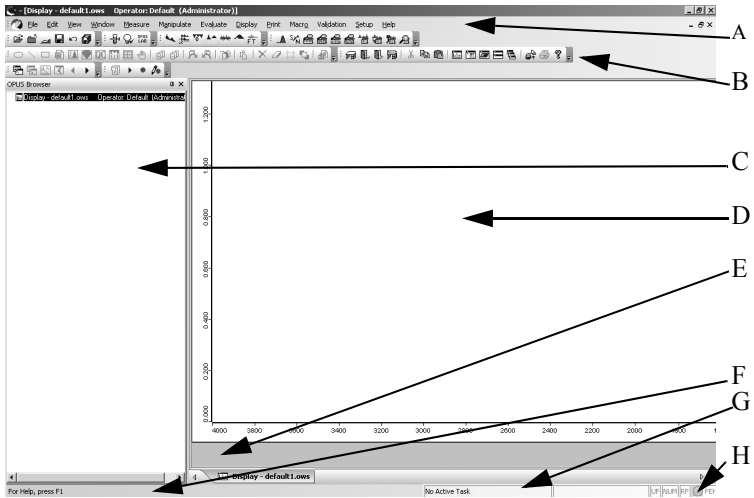


Figure 4: OPUS User Interface

The OPUS user interface header shows the type and status of the operator currently logged in.

- A) Menu bar: the pull-down menus can be used to access all OPUS commands.
- B) Icon bar: can be configured to quickly access frequently-used commands.
- C) Browser window: files are displayed similar to the Windows Explorer.
- D) Spectrum window: for full views and zoom operations.
- E) Overview window: always displays the full frequency range of the selected data files.
- F) Online help: context sensitive.
- G) Status bar: indicates tasks which performs in the background.
- H) Instrument status:
  - Gray: No spectrometer connected
  - Green: Spectrometer connected
  - Yellow: Warning
  - Red: Error

All settings (menus or icons) are individually configurable and will be reloaded when you start OPUS next time.



## 1.1 OPUS Access Control

OPUS has an access control mechanism which is shown in the graph below.

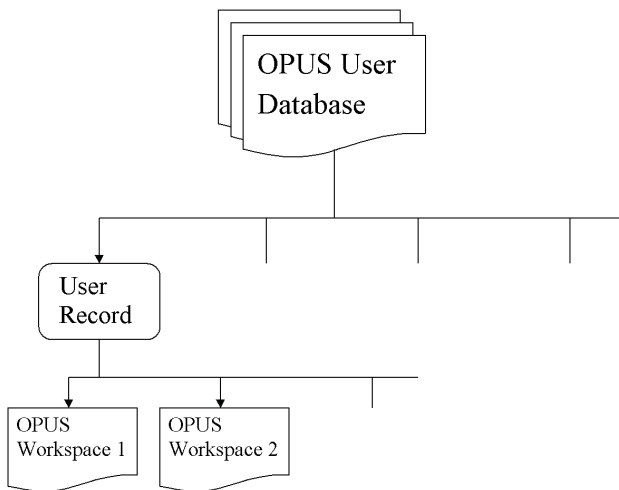


Figure 5: OPUS Access Control Diagram

The *OPUS User Database* includes all *User Records*. The *User Records* comprise:

- User ID
- Password
- Operator Name
- User Group (Administrator, Operator)
- Accessible Workspaces

The *Workspaces* comprise:

- Menu Contents
- Toolbar Contents
- Access Rights within OPUS
- Other Settings (e.g. file increment mode, display limits)

Details about the *User Management* functions to add, modify or remove users from the User Database are described in the OPUS Reference Manual.



To check whether the registration data are correct click on the *Check Registration Data* button. If they are correct, the selection field lists all available OPUS packages and libraries.

The *Select packages....* option button allows to deactivate single software packages and libraries. If you activate this option button, you can remove the check mark in front of the respective package or library. If you close the dialog, these packages or libraries will not be registered until you restart OPUS.

Click on the *OK* button to have the data permanently registered.



# 2 Working with OPUS

## 2.1 Acquiring a Spectrum


During normal daily work you may frequently measure a single-channel reference spectrum (open beam spectrum without any sample in the optical path). This spectrum is also called *background spectra*. In case of routine measurements you just have to change the samples, start measurement and evaluate the results. If you turn on the spectrometer for the first time, or if you have changed the hardware (e.g. beamsplitter or detector), you have to check the instrument settings before starting the measurement.

All settings described in this section refer to the operation of a mid-infrared spectrometer. Depending on the current configuration of your spectrometer, the following dialog boxes may be slightly different from the ones displayed on your screen.

### 2.1.1 Using OPUS-OS/2 Configuration Files

If you already have a spectrometer and this OPUS version is an update of OPUS-OS/2, you can use your OPUS-OS/2 experiment files without having to convert them. You can leave out the setup procedure and continue with section 2.1.6.

### 2.1.2 Setting up the Spectrometer Components

Open the *Measure* menu and select *Optic Setup and Service* or use the  icon in the icon bar to open the *Optic Setup and Service* dialog box. The *Optics Setup* parameters specify spectrometer components and parameters. Click on the *Optical Bench* tab and select the spectrometer connected. Define the setup of your instrument using the remaining tabs.

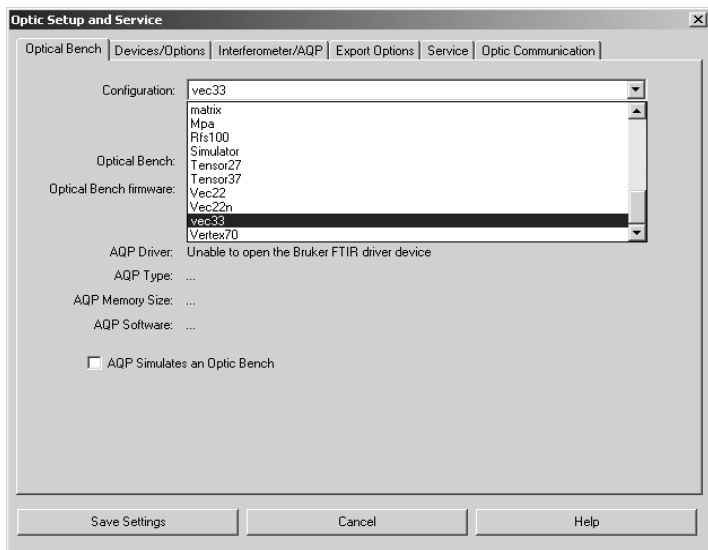



Figure 7: Optic Setup and Service - Optical Bench tab

Normally, a BRUKER service engineer specifies and saves the initial settings. As these settings very much depend on the optics installed, they will not be further discussed in this manual.

Any changes made in these settings may impede the correct use of the instrument. Do not change the default device parameters before having read the appropriate section in the OPUS Reference Manual.

### 2.1.3 Setting up the Measurement Parameters

Before starting a measurement, you have to define certain parameters. Open the *Measurement* dialog box by clicking on the *Measure* menu or the  icon. A dialog box will open, including the following tabs:

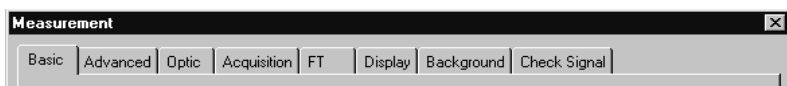



Figure 8: Measurement menu tabs

If you open the *Measure* menu for the first time, some of the tabs may have error symbols (e.g. ) attached.

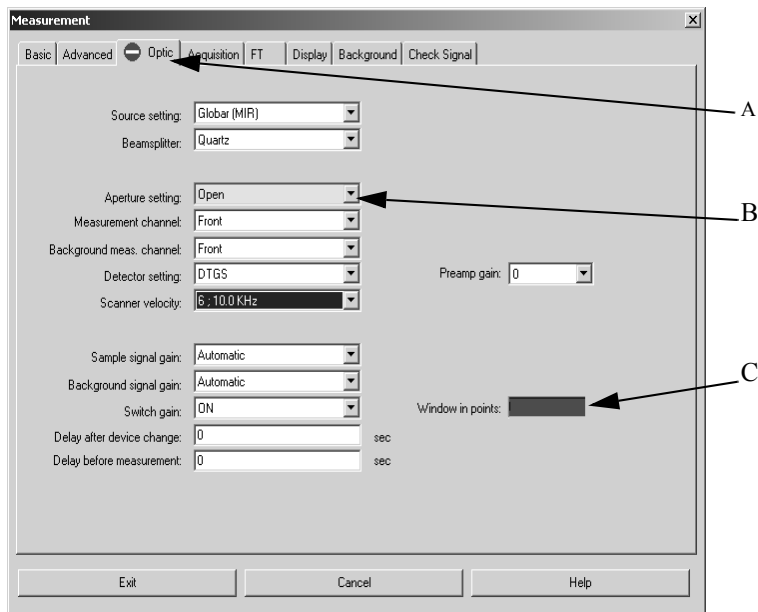


Figure 9: Measurement menu tabs with error symbol


If the error symbol (A) appears on one or more tabs or if the  symbol is displayed, you have to correct the erroneous settings first before being able to continue. In case of *General Warning* it is still possible to save the configuration. If an entry field is marked red (C), the current value for that parameter is beyond its specified range or the value is missing. If you point the cursor to a red entry field, a suggestion box opens and provides an explanation.



Figure 10: Error suggestion box

If a wrong value is selected from the drop-down list (B), the field is marked red. The requested parameter does not fit to the hardware used. For example, if an experiment requires an MCT detector, but according to the optics configuration a DTGS detector has been installed. In such a case the advice suggestion box will display the setting(s) allowed. Make sure that you correct potential errors before saving the settings.

If properly configured, the *Measurement* dialog box is displayed without any warnings:

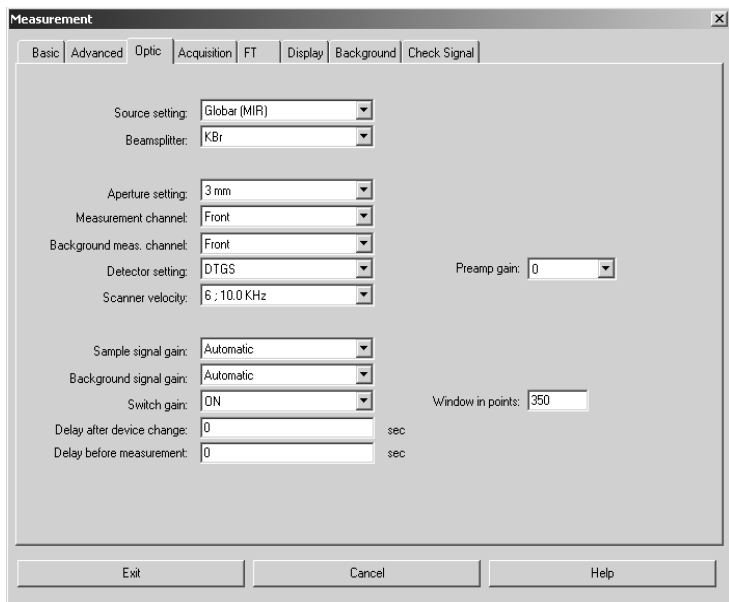


Figure 11: Measurement menu tabs without warning symbol

## 2.1.4 Calibrating the Interferogram Peak

The exact interferogram peak position **MUST** be determined and stored before the first measurement. You only have to repeat the peak position determination if there have been any changes in the hardware. Select the *Check Signal* tab in the *Measurement* dialog box. Make sure that you have checked the *Interferogram* option button.



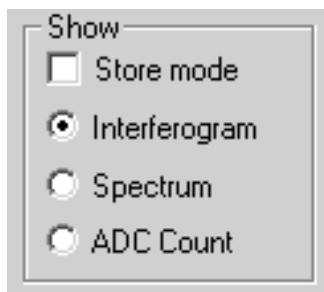


Figure 12: Check Signal tab - Select interferogram

If no interferogram peak is displayed, you can move the scan region to the left or right using the arrow buttons to find the peak.

Once the interferogram peak has been found, its position **MUST** be stored by clicking on the *Save Peak Position* button. Later the peak position will be used to perform Fourier Transformation.

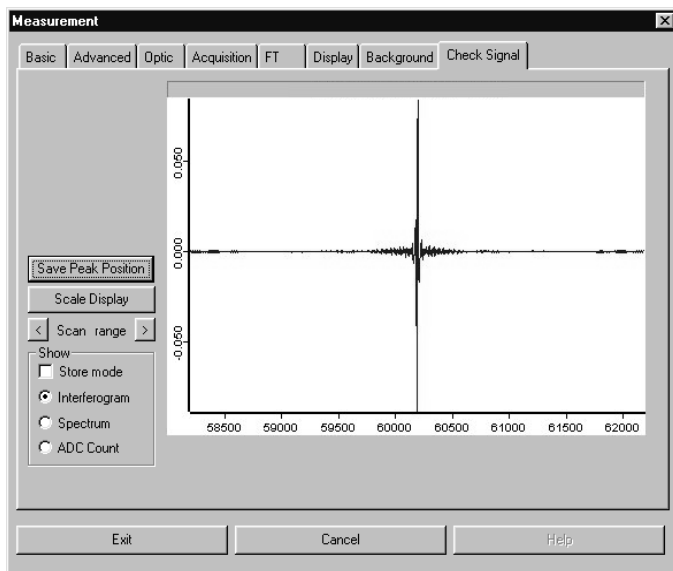



Figure 13: Measurement - Interferogram calibration

## 2.1.5 Advanced Settings

The *Advanced* option allows to store all parameter settings into an experiment file. Click on the *Advanced* tab. You can define the number of scans in the entry fields *Scan Time*.

In figure 14 the number of scans has been set to 32 for sample and background. You can also select minutes instead of scans to exactly define the duration of your experiment. It is also possible to enter the data path defined for the automatic storing of the measurement. If you change this path, make sure that it *does* exist. You can browse the desired path by clicking on the  button.

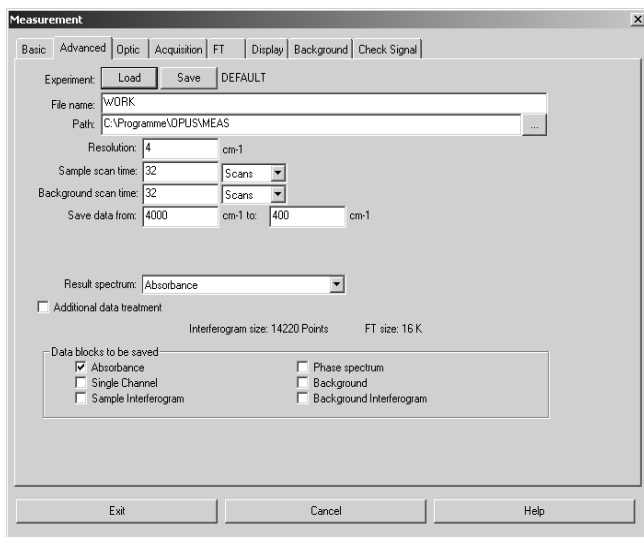


Figure 14: Measurement - Advanced tab

It is recommended to select *Absorbance* as a common result spectrum.

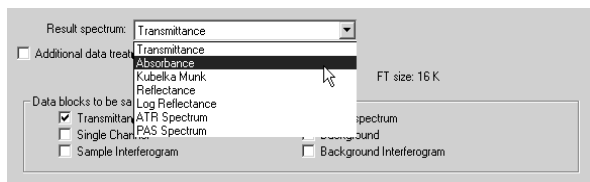


Figure 15: Measurement - Select result spectrum type

If you later want to work with a different kind of data type for the result spectrum, you can change the type of result spectrum at any time.

In the *Data blocks to be saved* group field, you can select the kind of measurement data you want to save together with the spectrum. Each option selected will produce an additional data block. If you click on the *Exit* button, all options selected will be saved.

It is highly recommended to repeatedly use the experiment files. They are indispensable if you work with macros.

Using the *Acquisition* tab you can define the data acquisition mode. The acquisition mode selected in the following window collects data on both the forward and reverse mirror movement (*Double Sided, Forward-Backward*). This acquisition mode yields the best signal-to-noise ratio. These values are normally set by default and do not have to be changed.

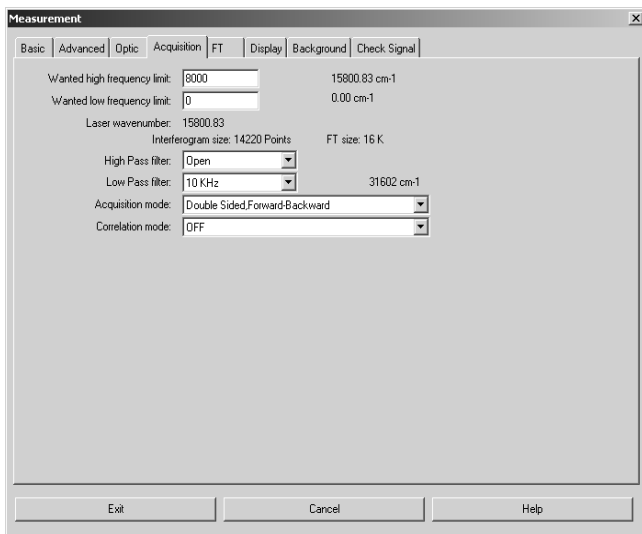


Figure 16: Measurement - Acquisition tab

Finally, you need to set the parameters for Fourier Transformation. Click on the *FT* tab. Normally, you can leave the default settings unchanged. For details on *Phase Resolution* and *Zerofilling Factor*, see the OPUS Reference Manual.

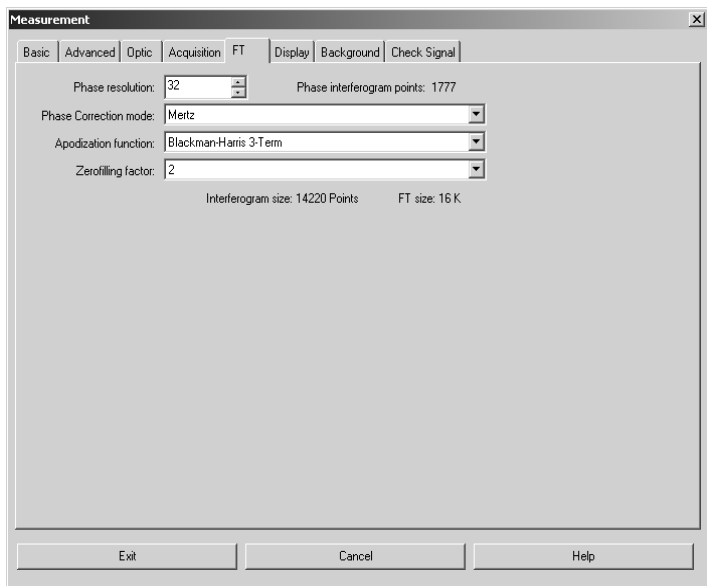


Figure 17: Measurement - FT tab

## 2.1.6 Background Measurement

Except for emission, Raman, and single-channel measurements, it is always necessary to acquire a background spectrum before measuring the sample. This spectrum allows to take into account the effects that the spectrometer itself has on measured spectra, e.g. if the power of the light source varies at some frequencies, or the optics absorbs light stronger at a certain wavelength.

To measure a background spectrum select the *Optic* tab and make sure that the aperture is set to the same value which you want to use to acquire a sample spectrum. To start the background measurement select the *Basic* tab and click on the *Background Single Channel* button.

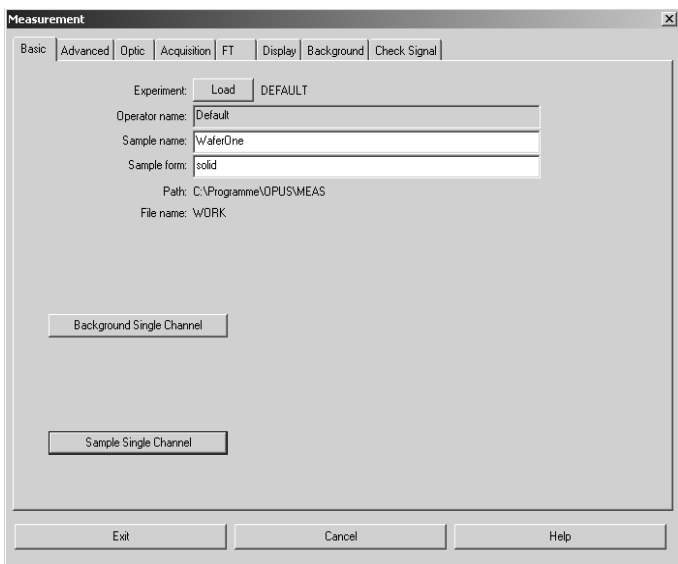


Figure 18: Measurement - Background measurement

The status bar below the OPUS spectrum window indicates the measurement progress, the number of scans performed by the optical bench and the OPUS application which is currently running:

Background : 7 scans

Right click on the status bar to interrupt measurement. If the data acquisition has been finished, the status bar indicates that *No Active Task* is performed.

Usually, the background spectrum data remains in the Acquisition Processor Unit. However, the spectrum can also be saved on hard disk. Check the appropriate data block option in the *Advanced* tab.

### 2.1.7 Sample Measurement

Having measured the background spectrum, place the sample into the optical path. This procedure depends on your specific hardware setup. Enter the *Sample Name* and define the *Sample Form* in the *Basic* tab. This information will be stored together with your spectrum. Click on the *Sample Single Channel* button to start measurement. The *Measurement Dialog Box* is closed and the spectrum window displayed.

Once again, you can monitor the progress of your measurement on the status bar at the bottom of the OPUS window. Having finished the measurement, the measured spectrum will be displayed in the spectrum window.

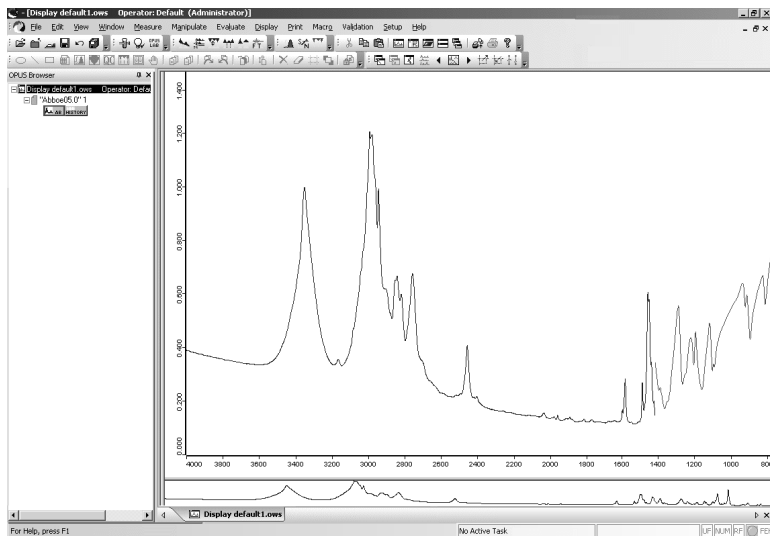


Figure 19: Spectrum Window - Showing the spectrum measured

Strictly speaking, the spectrometer measures an interferogram rather than a spectrum. Using Fourier Transformation this interferogram is transferred into a single-channel spectrum. On the basis of this single-channel spectrum and the background spectrum measured a resulting transmission spectrum will be calculated. This is done automatically and apart from short descriptions in the status line you will not notice any of these steps.

Figure 20 shows the single-channel spectrum, background spectrum and the calculated transmission spectrum. Each data block is displayed by different icons. For further details on the icons, refer to the OPUS Reference Manual.

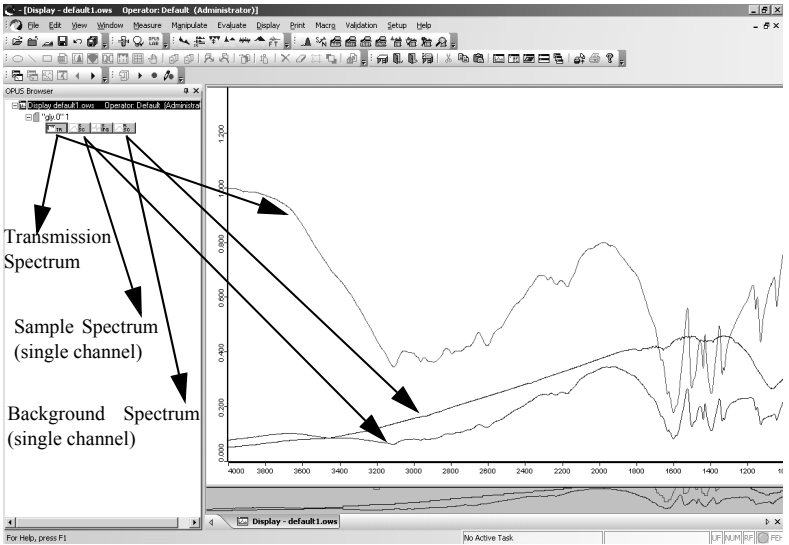



Figure 20: Spectrum Window - Showing different types of spectra

## 2.2 Baseline Correction

If the baseline of your spectrum is sloped, curved or significantly below 100% transmission, the sample preparation might have been insufficient. Instead of preparing a new sample, try to correct the baseline automatically. In many cases, this will solve the problem. The baseline correction can be started either from the *Manipulate* menu or by clicking on the  icon. The following dialog box opens:

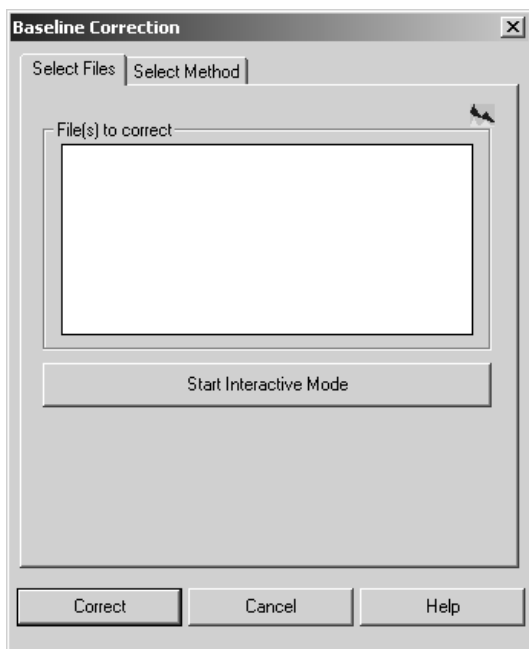


Figure 21: Baseline Correction - Select Files tab

Select the spectrum block in the browser window. Either by double clicking or dragging it from the OPUS browser to the *File(s) to correct* selection field while pressing the left mouse button. Moving files in this way is called *drag-and-drop*. If you release the left mouse button, the file selected will be displayed in the *File(s) to Correct* selection field:

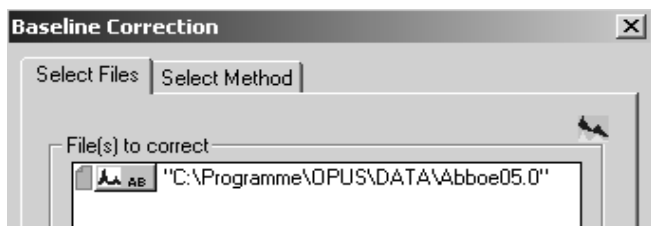


Figure 22: Baseline Correction with file selected



The blue document symbol indicates that the file has not yet been manipulated. The spectrum block is displayed as a small icon next to the name and path of the file. To start the baseline correction click on the *Correct* button. If you want to define a particular baseline correction method, click on the *Select Method* tab.

A list of commonly used settings is displayed. Any changes you make will overwrite the default settings. The *Select Method* field includes the *Scattering correction*, *Rubberband correction* and *Concave rubberband correction* option buttons. Check either one of these options which will be explained in more detail in the OPUS Reference Manual.

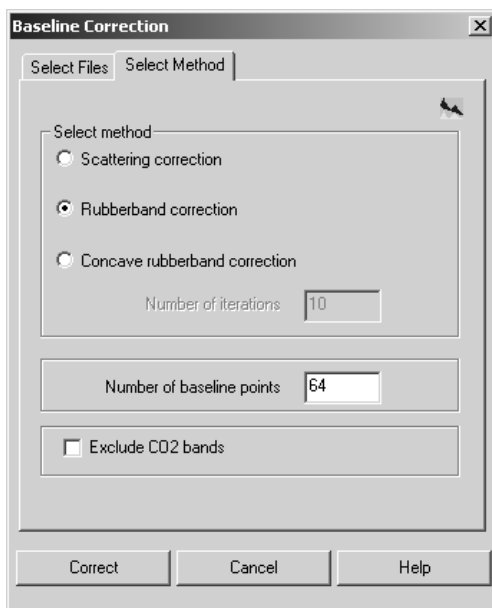


Figure 23: Baseline Correction - Select Method tab


You can also set the *Number of Baseline Points*. Click on the corresponding entry field and change the number. A value of 64 is generally recommended.

It is also possible to exclude the CO<sub>2</sub> range during baseline correction. Activate the *Exclude CO<sub>2</sub> Bands* check box.

Click on the *Correct* button to immediately start the correction. Now, the OPUS browser window shows a red document symbol which indicates that the file has been manipulated. The red symbol is on top of the blue one (raw data).



Figure 24: File processed indicator

Alternatively, double click onto the  icon to correct the baseline of the active spectrum. A baseline correction for the currently selected spectrum will be performed using the standard settings.

If you have finished the baseline correction, the spectrum has not yet been saved to disk and exists only as a temporary file. Store the file on the disk as a separate file to prevent the original from being overwritten.

To undo baseline correction, use the right mouse button and click on the red document symbol. A menu pops up.

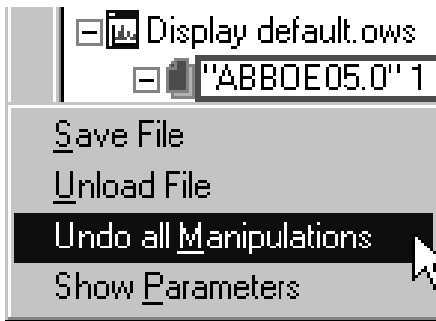


Figure 25: Pop-up menu used to undo function

Select the *Undo all Manipulations* command to open the following dialog box:



Figure 26: Undo all changes - Select Files tab

Click on the *Undo* button and the red document symbol disappears in the OPUS browser window while the original blue symbol remains.

The baseline correction is useful to manipulate spectra which could not have been measured very well due to the sample material. However, you should always try to obtain good spectra from your sample, instead of correcting them later.

Figure 27 shows an example of a baseline correction: the second spectrum is the original, whereas the first one is baseline corrected.

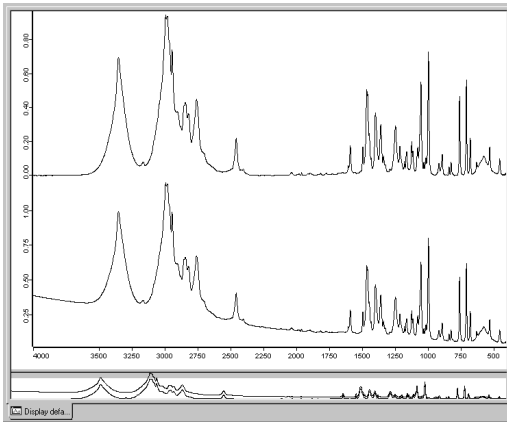


Figure 27: Spectrum Window - Baseline correction results

## 2.3 Data File History

Any spectrum manipulations and measurement parameter changes are recorded in a non-editable, non-deletable history data file. Figure 28 shows a data file history with several spectrum manipulations performed:

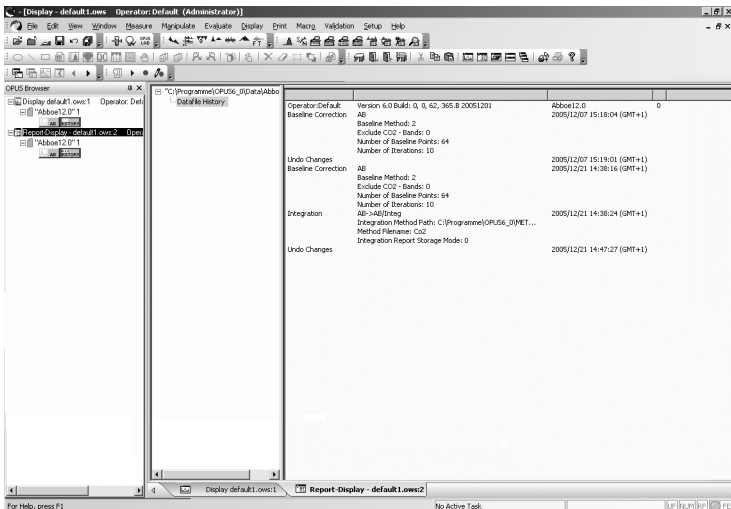


Figure 28: Report window showing the data file history

The first part of the data file history indicates the operator as well as the OPUS version and the spectrum name. All manipulations and their parameters are listed in the order of performance.

Data information is always stored in a data block (**HISTORY**) together with the processed spectrum in one single spectrum file. This ensures that all data manipulations are recorded, e.g. manipulation method, time and operator.

## 2.4 Saving Spectra



The original spectrum is automatically saved in the path which you have defined in section 2.1.5. To save any spectra modifications, right-click on the red document symbol in the OPUS browser window. Select the *Save File* command from the pop-up menu. Alternatively, click on the *Save* icon  or select *Save File* from the *File* menu.



Figure 29: Save File - Select Files tab

If you have selected a file to be stored, the spectrum will automatically be listed in the *File(s) to save* selection field. You can also drag and drop the file from the OPUS browser window to the *File(s) to save* field. If you click on the *Save* button, the original file will be replaced and cannot be restored anymore.

If you want to save a file using a different file name, or in a different directory, use the  icon or select the *Save File As* command from the *File* menu. The *Save File As* dialog pops up and OPUS automatically suggests a file name which you can modify, of course. If you want to save the file in a different directory, enter the path directly into the *Path* field. Alternatively, you can browse the directories by clicking on the *Change Path* button. If you want to overwrite a previous file, activate the *Overwrite* check box. Otherwise, an increment will be added to the file name. The *Overwrite* option is not available in validation mode. The increment extension is defined by the *User Settings* command in the *Setup* menu.

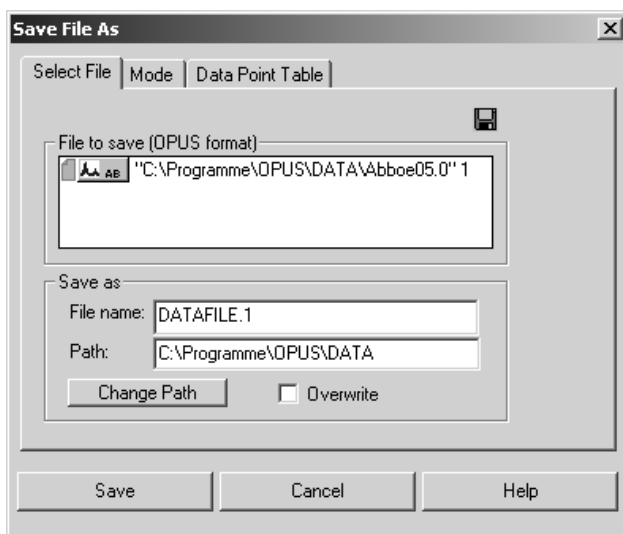


Figure 30: Save Spectrum - Select File tab

The file is normally saved in OPUS format. However, the *Mode* and *Data Point Table* tabs allow to save the file in JCAMP-DX format, as a plain X-Y data table, in Pirouette (DAT) or in GALACTIC format (SPC).

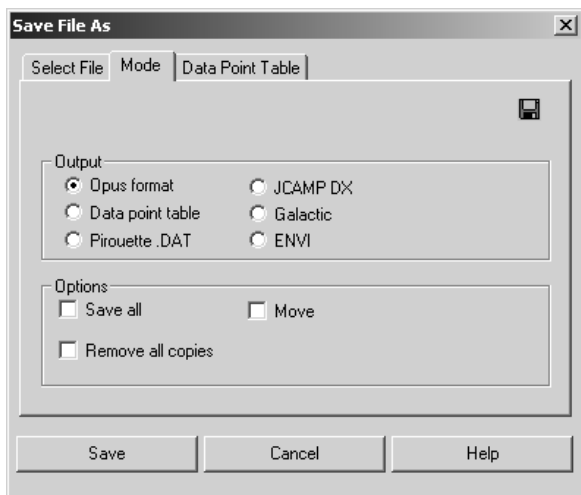



Figure 31: Save Spectrum - Mode tab

## 2.5 Loading a Spectrum

An OPUS file can be loaded by either using the *Load File* option from the *File* menu or clicking on the  icon in the icon bar. The following dialog box opens. As the appearance depends very much on the contents of each directory, your dialog box may look different.

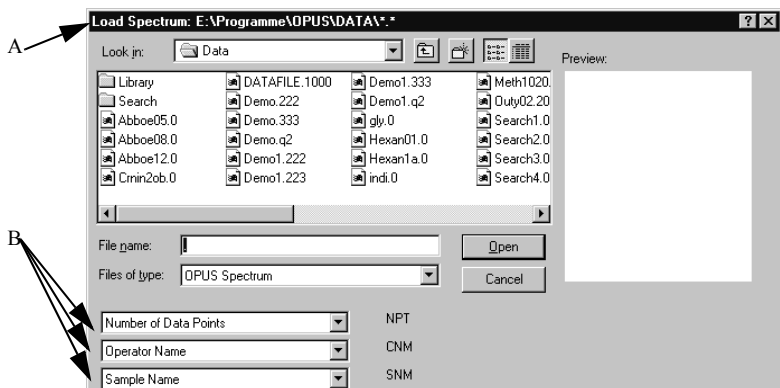


Figure 32: Load Spectrum - No file selected

The title bar (A) shows the directory in which the file is located. Three parameters (B) of the OPUS file selected are shown by default. You can select the specific parameters you want to have defined from the drop-down lists. Since no file has been selected yet in figure 32, the parameter abbreviations are shown.

If you select a file, the *Load Spectrum* dialog will change as follows:

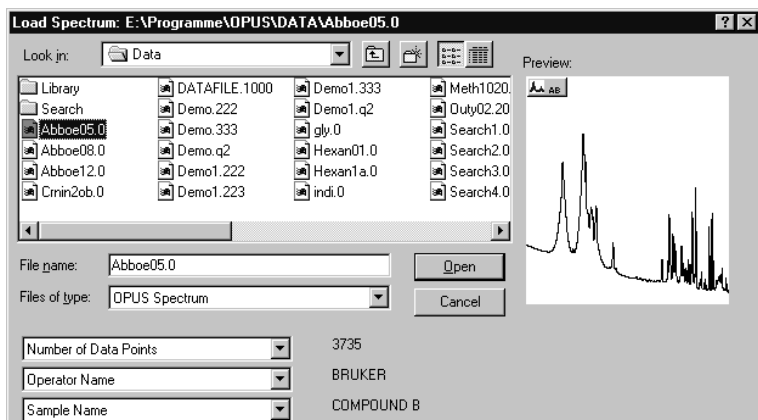



Figure 33: Load Spectrum - Active preview

A preview of the spectrum without the axes is displayed. The absorption data block (  ) on the top left corner is displayed as a small icon. The spectrum parameters are now defined. As normally not all parameters have been specified for each file some of the parameters may be missing. Click on the *Open* button to load the spectrum into the OPUS spectrum window.



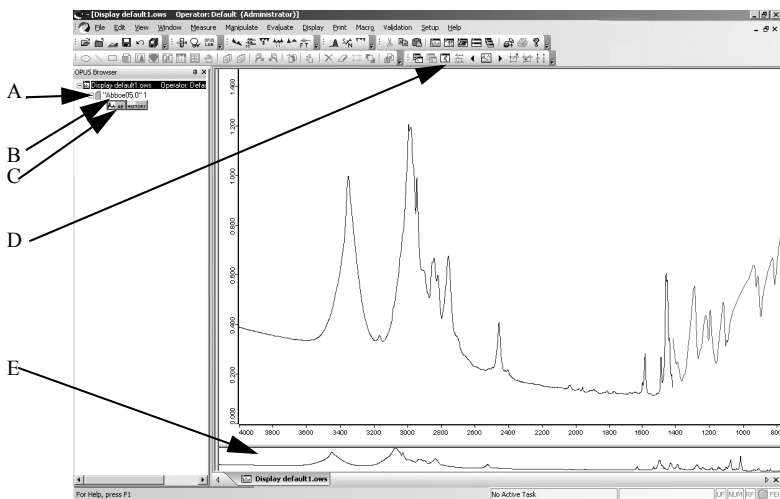


Figure 34: OPUS spectrum and browser window

The overview window (E in figure 34) shows the entire frequency range. As the spectrum is not displayed in full size within the spectrum window, you can scale the spectrum using the *Scale* icon (D).

In the OPUS browser window a blue document symbol (A) is shown in front of the file name (B), indicating that the file has not yet been manipulated. A typical example of data manipulation is the so-called baseline correction which has already been described. Spectrum data blocks (C) are displayed as small icons.

## 2.6 Printing the Spectrum

There are two options to quickly and easily print your recorded spectra. If you click on the *Quick Print* icon in the icon bar, OPUS automatically selects an appropriate layout depending on the window type you are using at the moment.

If you work in the normal display window, the spectrum will be printed within a frame. If you search a spectrum library, the results as well as a hit list, spectral information and the structure of the product will be printed. For details on default settings available, refer to the OPUS Reference Manual.

Another possibility to print spectral information is to use the *Print Spectra* command in the *Print* menu. Using this command, enables you to define further basic printout options, e.g. frames and frequency range.

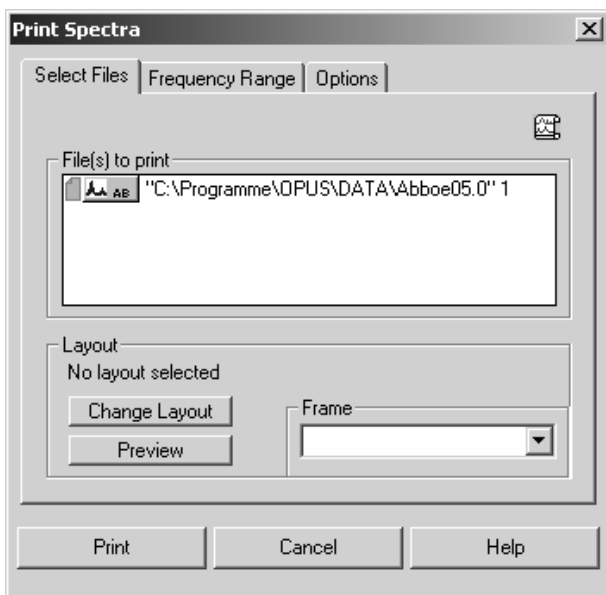


Figure 35: Print Spectra - Select Files tab

For details on printing data using the Plot Layout Editor (PLE), refer to chapter 3.

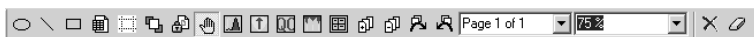
# 3 Plot Layout Editor (PLE)

The Plot Layout Editor (PLE) tool allows to print customized pages which include spectra and additional information, e.g. measurement parameters. You can add descriptions as well as simple graphic elements (e.g. logos or bitmaps) to the plots.

If you want to print a spectrum only, you can either use the *Quick Print* icon in the icon bar or the *Print Spectra* command from the *Print* menu. Using the *Quick Print* icon immediately sends data to the default printer, while the *Print Spectra* dialog allows you to define specific print parameters. For further information, see the OPUS Reference Manual.

## 3.1 Starting PLE

To start PLE, select the *New Layout* option in the *Print* menu. The pull-down menus displayed in the menu bar have changed and the following icons which have previously been hidden are now activated in the icon bar.



The PLE layout window opens within the OPUS spectrum window.

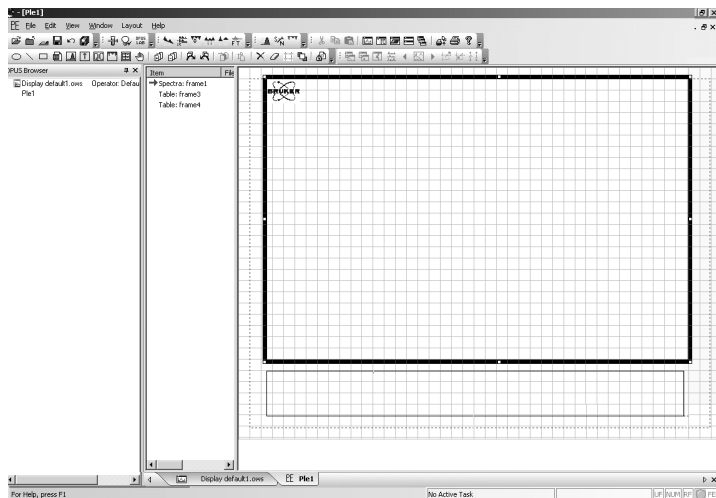


Figure 36: Plot Layout Editor (PLE) window

On the left at the bottom of the OPUS display window, a second tab appears termed *Ple1*. The PLE window includes a black grid and a red broken frame line. This frame indicates the available print area of your printer. Next to the PLE window on the left you can see the *Item* column.

As the available print area depends on your printer settings, you have to configure these particular settings first. If you have already installed a printer for Windows, you may omit the next section.

## 3.2 Installing a Printer for Windows

Click on the *Settings* command at the Windows *Start* menu and select the *Printer* command. The window which opens includes the *Add Printer* icon. Click on this icon and follow the installation instructions. For any further information, refer to the Windows manual.

## 3.3 Defining the Print Area

Each setting in the Plot Layout Editor always corresponds to a characteristic plot feature. If you want to make any changes, click on the particular feature (in this example the grid layout area) using the right mouse button. The following dialog box opens:

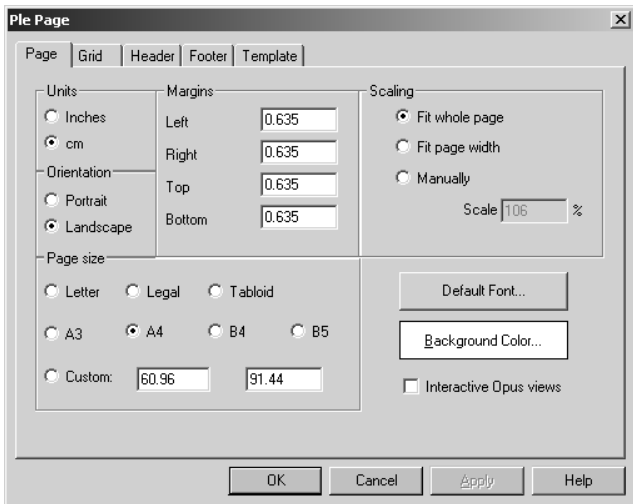


Figure 37: Ple Page - Page tab

In Europe centimeters (cm) will probably be the preferred unit to specify the margins. Usually, spectra are printed in landscape format, unless you want to print major additional information, and a smaller spectrum image would be sufficient. The most common page size for North America is *Letter*, and *A4* for Europe.

The paper advance mechanism prevents the printer from printing to the outermost edge of the paper. To specify the margins of this unprintable area, refer to the printer manual or use empirical methods. The available printing area is indicated by a broken red frame line in the layout window.


As the resolution of an image is higher when printed instead of displayed on the screen, you can scale the image on the screen. The currently hidden areas of the image can be displayed using the scroll bars on the right and at the bottom. The smaller the scaling factor, the bigger the layout window on the screen. The default scaling factor is 75. It is also possible to fit the whole page or page width.

The *Background Color* button always appears in the color which is used for the printout. White is commonly used because it provides the best contrast.

If you have activated the *Interactive OPUS View* check box, you can rotate e.g. 3D plots using PLE.

To define the grid representation and resolution, add headers and footers to the image or determine the color for graphic objects, use the remaining *Ple Page* tabs. If you want these settings to be used as a template for the *Quick Print* of spectra, select the *Template* tab in the *Ple Page* window and click on the *Save as Default* button. To apply these new settings, click on the *OK* button.

## 3.4 Loading and Displaying a Spectrum

Before being able to load a spectrum, you have to create a frame in which the spectrum can be displayed. Click on the  icon in the icon bar. To define the position and size of the frame, move the cursor into the black grid and press the left mouse button while dragging the mouse across the PLE layout window. Release the left mouse button to display the complete frame. You can modify the frame by clicking on the frame edges, and moving the cursor to the position you want.

To add a spectrum into the frame, use the right mouse button and click onto the frame. Select the *Assign* and *Spectra* command from the pop-up menu.

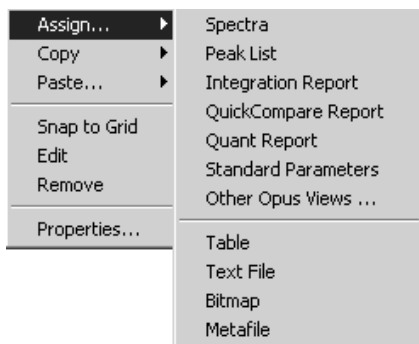


Figure 38: PLE Pop-up menu

A file selection box opens, select the spectrum you want to add. The spectrum selected will be displayed in the frame, including axes and annotations.

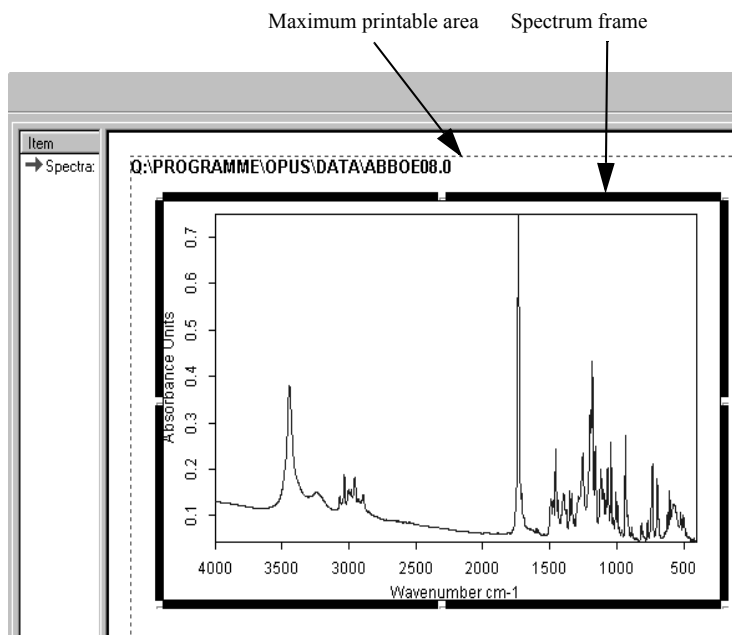


Figure 39: PLE window - Spectrum frame

As you have loaded a spectrum the newly created frame has become a spectrum frame. You can change the frame properties. Right click on the frame and select the *Properties* command from the pop-up menu. The *Spectral Frame Properties* window opens:

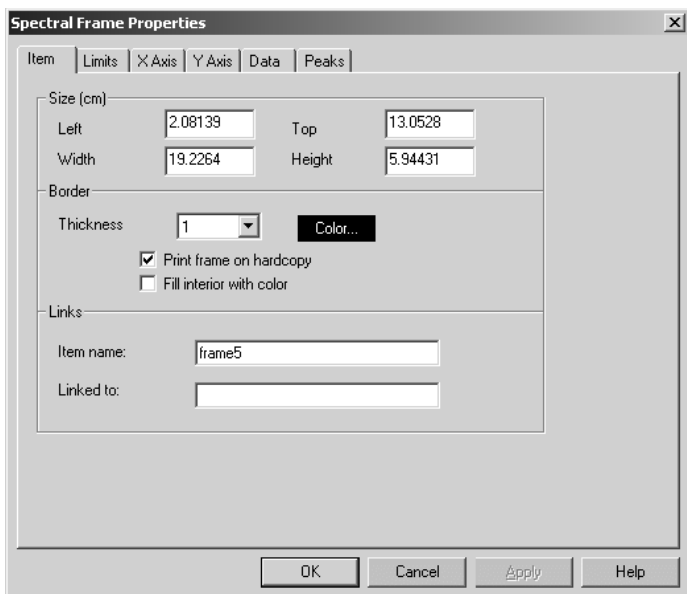



Figure 40: Spectral Frame Properties - Item

It is possible to individually set the size and border of the frame and link it to a different object. You can also define the size and font of annotations, the x and y axis display, lines and color of graphic objects, the spectrum range, as well as the peak positions.

To print the standard spectrum parameters, select the  icon from the icon bar and create a frame as already described. By default, the table has rows and columns. If you want to change the colors and thickness of the dividing lines between the cells, right click on the frame and select the *Properties* command from the pop-up menu. The *Table Properties* dialog opens.

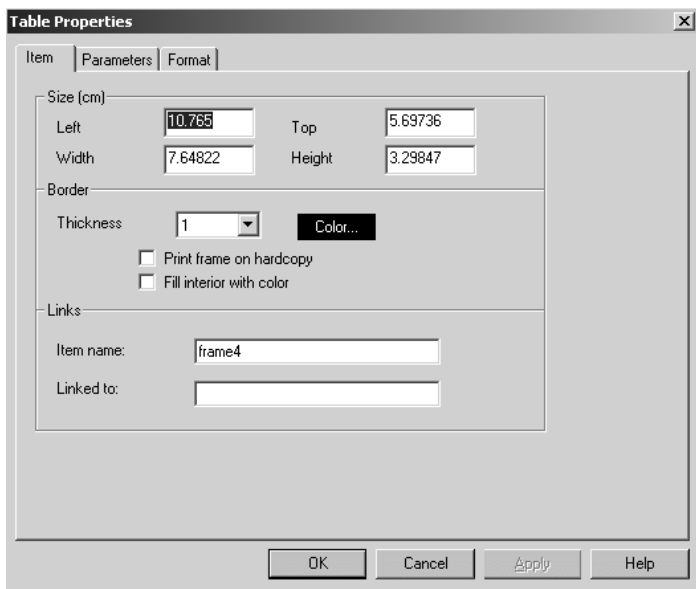


Figure 41: PLE - Table Properties

The table parameters can be changed using the *Item*, *Parameters* and *Format* tabs. To confirm your settings click on the *OK* button.

Parameters to be included in the table have to be defined by the *Parameters* tab. Click on the *Parameters* tab and select a parameter from the selection field.

Drag this parameter to the table cell you want to use to have the parameter displayed (see figure 42). The table cell includes the parameter selected and its corresponding value.



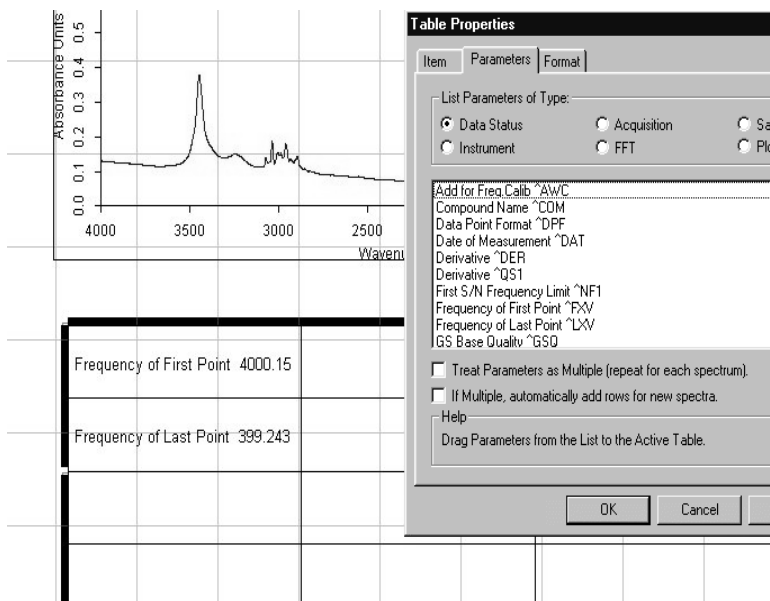



Figure 42: PLE - Page view and table properties

Different parameters can be selected if you change the type of parameter. Figure 42 shows the *Data Status* parameter type.

### 3.5 Attaching a Logo or Bitmap

To mark the origin of a printout, you can add a company logo to the plot. Draw a new frame using the  icon into the image (or even into the spectrum frame). If you use the right mouse button and click onto this frame, the pop-up menu is displayed again. Select the *Assign* and *Bitmap* commands. Using this pop-up menu, you can select different features, e.g. *Snap to Grid* or *Insert Legend* etc. Having defined the bitmap desired it will be displayed on the screen:

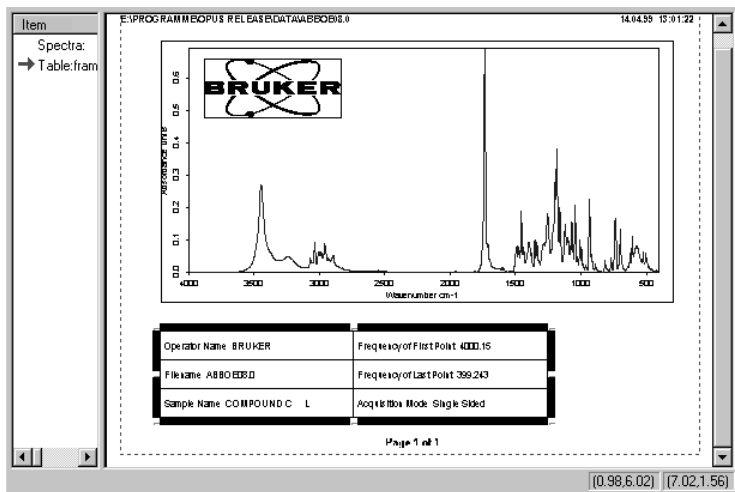



Figure 43: PLE - Showing spectrum frame with bitmap attached



Using the pop-up menu, you can select different features, e.g. *Snap to Grid* or *Insert Legend* etc.

The *Item* column in figure 43 shows the items displayed in the current plot (spectra, table). As the table is selected in the plot (active), it is marked with an arrow in the *Item* column.

You may print out the plot using the  icon.

## 3.6 Attaching Graphic Elements and Text

If you have drawn a spectrum frame and loaded a spectrum into the frame using the *Assign* and *Spectrum* option from the pop-up menu, you can highlight certain peaks, e.g. by additional graphic elements. In particular, you can use circles, arrows and callout boxes.

First, select the  icon and draw a frame on the plot. Then, select the  icon and draw a line to the selected object. If you want the line to have no arrow head, use the right mouse button and click on the line. Select the *Properties* command from the pop-up menu and uncheck the *Arrow Head* option.

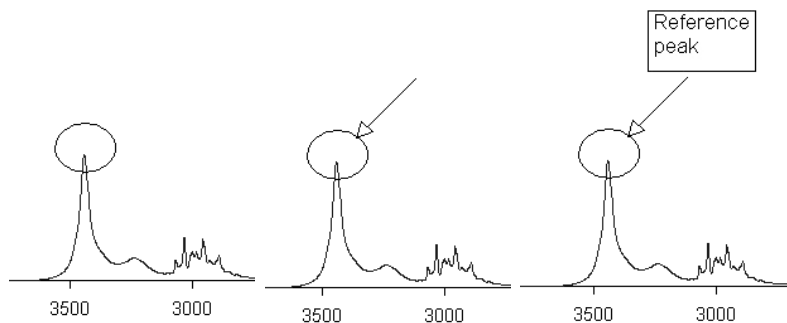


Figure 44: Attaching Graphic Elements to Spectra

To add a callout box, draw a frame again and right click on the frame to open the pop-up menu. Select *Edit*, and an edit field opens in which you can enter text. To exit this field, click somewhere outside the frame. If you open the pop-up menu again, you can define further settings.

### 3.7 Saving Plot Layouts

Select the *Save As* command from the *File* menu. Save the file as *PLE file(s) (\*.ple)*. Make sure that the name for the new layout is unambiguous, e.g. *Logo.ple*.

