OXF

Lab-X Extra-Plus
Software Package

Operator's Instructions

P/No LZ-07SWP
(for software version 2.20)

INDEX

1.0: LZ-07SWP: Installation and Setting up

The following components are required for a successful installation of the Lab-X Extra-Plus software on a PC;

a) CD with Lab-X Extra- Plus software (version 2.20)

b) Floppy disk with Lab-X keydisk

c) Two RS232 cables; P/No L154 for the 9 pin connector cable, and P/No CP4021 for the 25 to 9 pin adapter. Note: Items a, b, and c are all supplied as part of the LZ-07SWP package

d) PC configuration: Minimum 32Mb RAM, minimum processor 100MHz, fitted with a CD-ROM drive, and floppy disk drive, one spare serial port, and a screen resolution of 1024x768 pixels. Minimum of 10Mb disk space. An operating system of Microsoft Windows™ 2000, Excel and Word 97

e) One of the following Lab-X instruments

Lab-X 3500 (Blue case), fitted with a thermal printer and Lab-X software version 1.2

Lab-X 3500 (Blue case), fitted with a dot matrix printer and Lab-X software version 1.1

Lab-X 3000 (Grey case), fitted with a dot matrix printer and Lab-X software version 2.4

Note: The Lab-X software version number is displayed by having the "Main Menu" shown on the Lab-X and pressing the escape (Esc) key on the Lab-X keypad.

Instructions assume some familiarity with PCs and Lab-X's, in particular basic Windows™ navigation on the PC, and menus navigation on the Lab-X. The following procedure would normally be carried out only once when first installing LZ-07SWP. If you obtained your PC as part of this package this may already have been done for you.

1.1: Setting up the Computer

1.   The computer requires both a CD *and* a floppy disk drive for a successful installation.

2.   Ensure that the screen resolution is set to 1024x768 or higher, and the color is High Color   (16 bit) or higher.

3.   Set the windows settings for the decimal symbol etc as follows:

START->SETTINGS->CONTROL PANEL->REGIONAL OPTIONS

Decimal symbol: .

Digit group symbol: ,

4.   Insert the *Lab-X Extra-Plus* CD. If autorun is enabled the installation starts

automatically, otherwise start "setup.exe" in the main directory of the CD.

5.   Follow the on-screen instructions. The installation should proceed automatically installing all the software components required, i.e. Extra-Plus software, Labview run time engine, and Lab-X keydisk. If the message "Do you wish to reboot the system is given, then select the other option of NO, and proceed with the installation. Similarly if there should be any problems encountered when running the Lab-X Extra-Plus software program then re-inert the CD and select the option required, i.e. repair or replace software components .

6.   Start the file "Lab-XkeyDiskSetup.EXE in the main directory of the CD

7.   Follow the on-screen instructions

1.2: Setting up the Lab-X3500

The following sets up the parameters on the Lab-X to enable communication between the Lab-X and the external computer.

1.   Set the language on the Lab-X to English:
        OTHER FUNCTIONS->UTILITIES->TURN PAGE-> SELECT LANGUAGE-> ENGLISH

2.   Set the RS232 port 1
        (OTHER FUNCTIONS->UTILITIES->TURN PAGE-> SETTING RS232->PORT1) to the
                following settings
        BAUD RATE: 9600
        DATA BITS: 8
        STOP BITS: 1
        PARITY: NONE

3.   Set the CONNECTIONS
        (OTHER FUNCTIONS -> UTILITIES -> CONNECTIONS -> SPECIAL) to the following:
        KEY: PORT 1
        LCD: PORT 1
        PRINTER: ------ (no output specified)
        GRAPHS: ------(no output specified)
        EXPORT: PORT 1

        After completion the software screen MUST display the MAIN MENU screen for
        operation.

4.   Connect the Lab-X and the computer using the cables provided. The "adapter
cable" (P/No CP4021) is first connected into Port 1of the Lab-X (25 pin connector), and
the 9 way connector is plugged into the 9 way adapter on the cable (P/No L154). The
other end of this cable is connected to the serial port of the computer.

## 1.3: Starting the *Lab-X Extra-Plus* Software

To start the software double click on the *Lab-X Extra-Plus* short cut icon situated on your desktop.

To access the software for the first time, use the following identity. It is then recommended to create your own identity and use it to access the software.

USERNAME: manager (lower case)
PASSWORD: manager (lower case)

At this stage the *Lab-X Extra-Plus* software will automatically communicate with the Lab-X to obtain the hardware configuration of the Lab-X. A check is made between the configuration of the Lab-X and the data set up as part of the keydisk installation. If the match is *correct* then the *Lab-X Extra-Plus* MAIN MENU screen will be displayed.
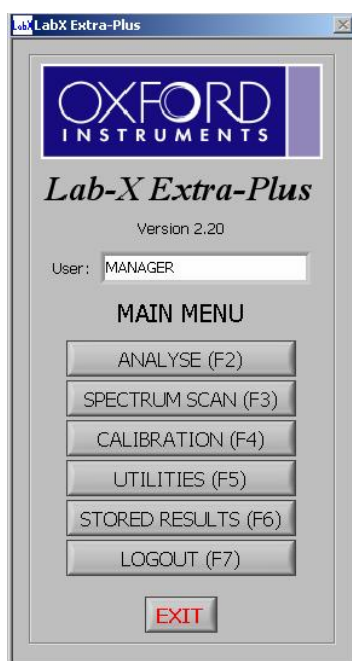
If any problems are experienced at this stage please see the troubleshooting (section 8) part of this manual.

1.4: Disconnecting and reconnecting

If for any reason the Lab-X is used without the PC, (for example, if the PC or Lab-X is removed to a different location, or the PC is switched off or the PC software is not running) then the Lab-X connections should be returned to their local settings before disconnecting, i.e. set the connections to the following:-

    Keypad: No port is specified (and therefore uses the resident keypad)
    LCD display: No port is specified (and therefore uses the resident LCD)
    Printer: Select 0=PRINTER (This selects the resident printer on the Lab-X
    Graphs: Select 0=PRINTER (This selects the resident printer on the Lab-X)

    EXPORT: Select 0=NONE

One simple way of doing all the above "automatically "is to switch off the Lab-X, press and hold down the paper feed key, switch on the Lab-X, release the paper feed key. To reconnect the Lab-X to the Extra-Plus software follow the instructions specified in section 1.2.
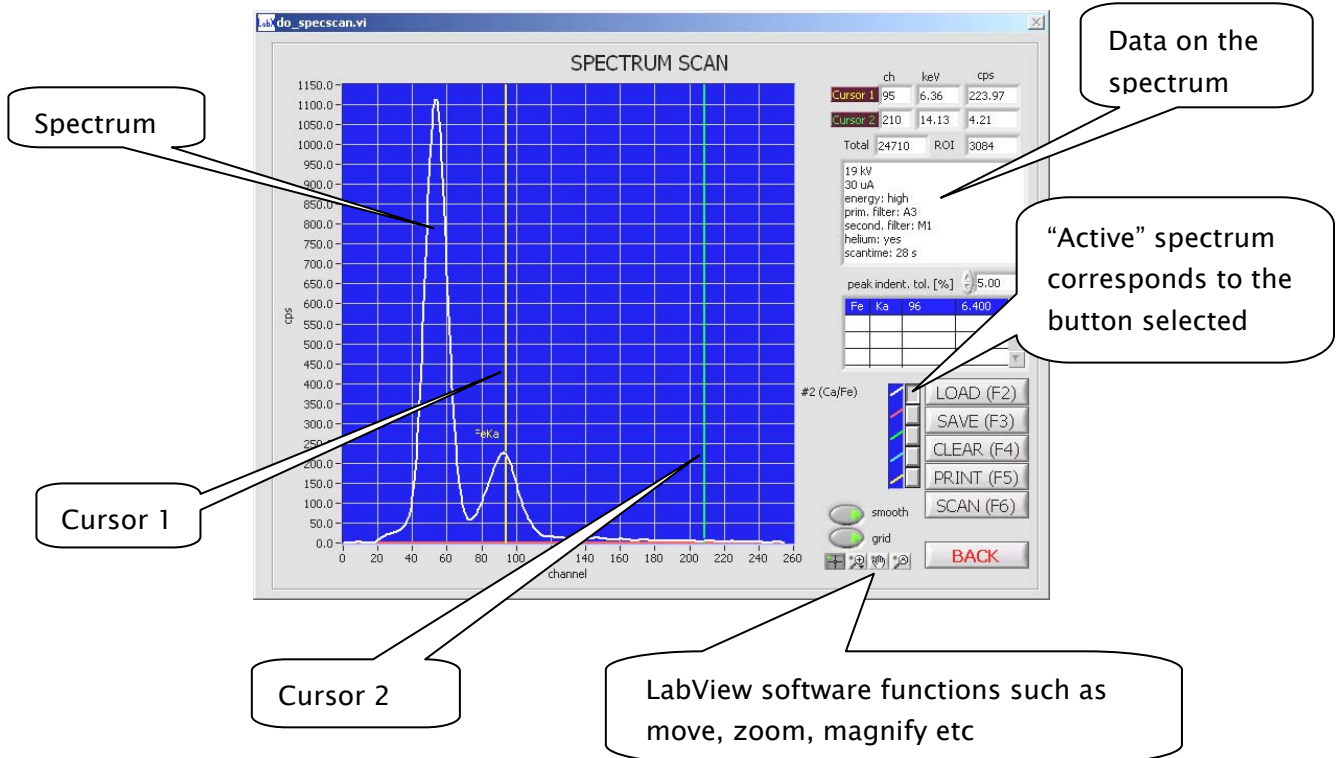
2.0: Spectrum Scan:

2.1: Overview:
The *Lab-X Extra-Plus* software package allows a Lab-X 3500 instrument to be operated using a PC.

Most of the functions in the *Lab-X Extra-Plus* software use the same format to those on the Lab-X3500 instrument giving familiarity and ease of use, and reference should be made to the Lab-X Operator's manual for most functions. This manual describes the main differences between the two software packages.

2.2: Spectrum Scan:

Spectrum

Cursor 1

Cursor 2

Data on the spectrum

"Active" spectrum corresponds to the button selected

LabView software functions such as move, zoom, magnify etc

Summary:
Using the *Lab-X Extra-Plus* software, spectra can be stored, retrieved and up to five spectra displayed, each spectra is identified by the colour of the spectra, and this corresponds to which button is selected (shown on the right hand side of the display).

Cursors:
There are two cursors and these can be moved across the spectrum. The main cursor (labelled cursor 1 in the top right hand side box and shown in yellow on the spectrum display) shows the channel position, element marker, equivalent keV X-ray energy, and the intensity, in counts per second, (cps) at that channel. Cursor 2 (shown in green) allows the region of interest (area between the two cursors) to be shown. Also displayed is the total intensity for the entire spectrum (box labelled "total") and the intensity obtained between the two cursors, (box labelled "ROI") for Region Of Interest.

Peak ident. tol (%)
Can be set to widen the channel at which a particular element is shown.

Data:

The data shows the parameters under which the spectrum (specified by which spectrum button is selected) was measured.

Function Buttons:

LOAD(F2): Allows a previously stored spectrum to be selected and subsequently displayed. Note: The spectrum label is displayed to the left hand side of the button.

SAVE(F3): Allows a spectrum to be saved.
Note: Many spectra can be saved, the number is only limited by the size of the hard disk on the computer.

CLEAR(F4): Clears the currently "selected" spectrum. Note: The "selected" spectrum corresponds to the button selected, and the colour of the spectrum signifies which button (white, red, green, blue or yellow) will be cleared.

PRINT(F5): Gives the details for the spectrum and the spectrum itself in a Word™ document

SCAN(F6): Allows the generation of a new spectrum. On selection, instrument parameters (such as X-ray tube kV and µA etc) are requested.
Note: The maximum power of a Lab-X is one watt, so if an input value is selected which is greater than one watt the software will automatically correct this value to be no more than one watt, e.g. if 25kV and 100µA is selected the setting will be automatically set to 25kV and 40µA.
Confirmation that a sample is in the analysis port is then requested and the measurement commences. At the end of this time a new spectrum is displayed.

*LabView Software Function buttons:*

There are four icons displayed, which allow the spectrum to be moved, and magnified. From left to right: The first icon (+) is the default setting and should be "selected" for normal operation where the cursors can be moved. Second icon (magnify symbol) when selected gives options allowing magnification in both the vertical and horizon mode. To activate, select the required icon (vertical or horizontal expansion and place the pointer at the starting point on the spectrum. Keeping the mouse key depressed drag to the required end position and on release the spectrum will automatically magnify that portion of the spectrum selected. To restore the default setting select the fourth icon, followed by the first icon to restore default operation The third icon (hand symbol) allows the spectrum to be moved by placing this icon onto the spectrum and moving as required, again to restore default setting select the fourth icon and then the first icon.

3.0: CALIBRATION:

All the functions such as New, Edit, Copy, Delete for a calibration are as per the standard Lab-X3500 (resident ASP3500) software. Note: The Export/Import buttons are to transfer a calibration that was derived using Lab-X Extra-Plus software to another Lab-X Extra-Plus software program (file extension .cal), NOT between the Extra-Plus and the Lab-X. If it is required to transfer a calibration from a Lab-X to the Extra-Plus software resident on the PC then the Import/Export function (with file extension .txt) in the Utilities section 5.3 **must** be used.
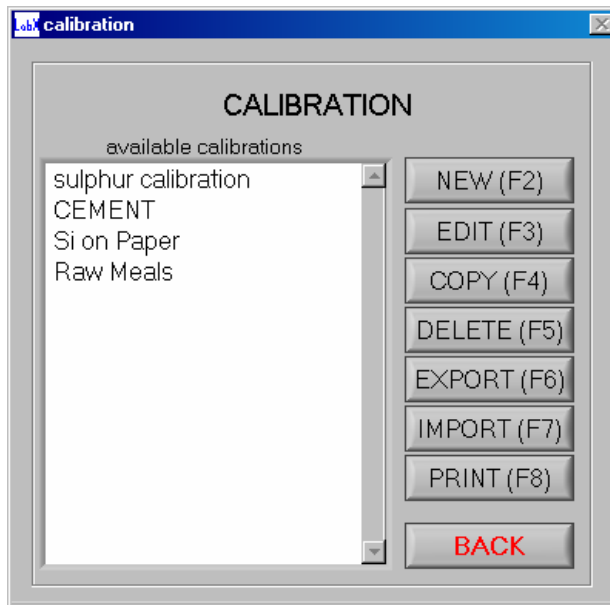
3.1: NEW CALIBRATION
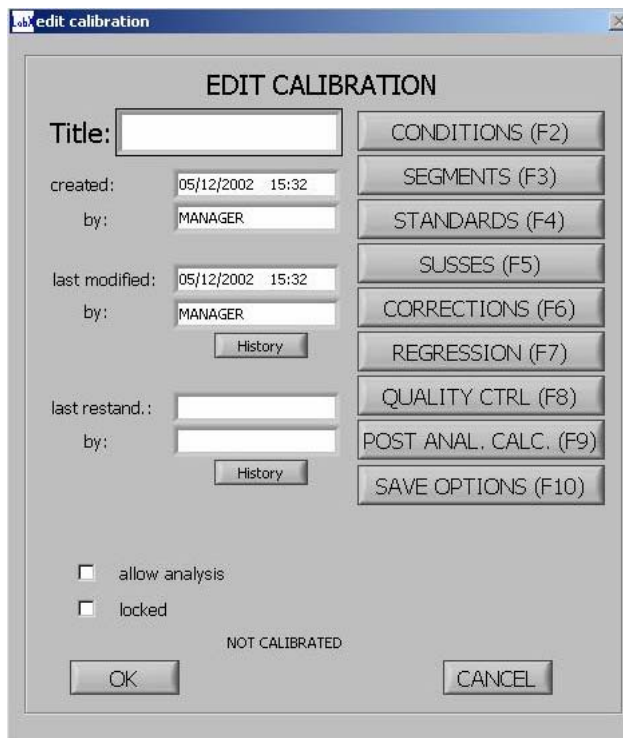
On selection the following will be displayed.

A calibration title is required and then a range of options are available to generate a calibration (as described below). On completion of the required functions the box labelled

"allow analysis" when ticked, will make this calibration available for routine analysis. The locked function prevents the calibration from been altered. The two history buttons give a summary of when changes to the calibration were made and restandandardisation history data.

3.1.1 CONDITIONS/SEGMENTS:

Selected from the New button and the same functionality as the standard Lab-X.
Note: It is very important that the **there cannot be any space in any segment name** when working on the Lab-X Extra-Plus software. If there is a space on the segment name then when transferring the data from the Lab-X to the PC or from the PC to the Lab-X, the printout of the Lab-X will be corrupted, and incorrect intensity data shown.

3.1.2: STANDARDS/SUS's:

A check box allows the use of the standard (or just one analyte in the standard) to be used in regression. For Setting Up Samples (SUS's) both the turntable position can be specified and the use of this SUS as either a high/low SUS, blank or instrument correction SUS for each analyte. Note: Once a SUS is specified for a particular function another SUS cannot be specified for the same function (it is greyed out).
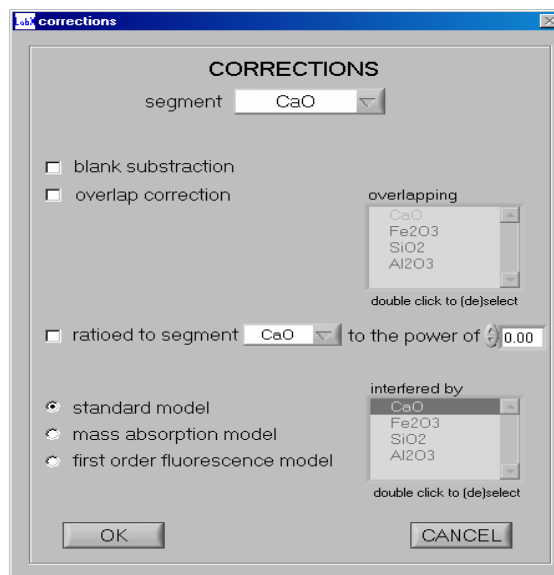
3.1.3: X-RAY CORRECTIONS:

Same functions as Lab-X3500.

If an overlap correction is required, first select the overlap correction, and then the overlapping analyte by "double clicking" to select or de-select the overlapping analyte. After the correction select a SUS (if required for this particular regression) and then select the required analyte in regression.
The "first order filter fluorescence model" is selected by highlighting the correction and selecting the interfered by analyte. Note: On the Lab-X instrument this model was selected by ratio of an analyte to itself followed by a mass absorption correction.

3.1.4: REGRESSION:

After a series of standards have been measured and the necessary X-ray corrections applied (it is advisable to start with no corrections applied), a regression can be performed. For each segment specified two graphs are displayed, one showing the intensity (measured in counts per second)

against the given concentration and the other the calculated concentration against the given concentration. Note: If a ratio or blank subtraction correction has being applied, the regression table will show the corrected intensities, which are different from the "raw data" intensities.

Under the segment name, is shown the type of regression performed (in the example shown a linear standard regression model has been selected), followed by the intercept, slope, and if a mass absorption correction has been applied the co-efficient associated with the effect
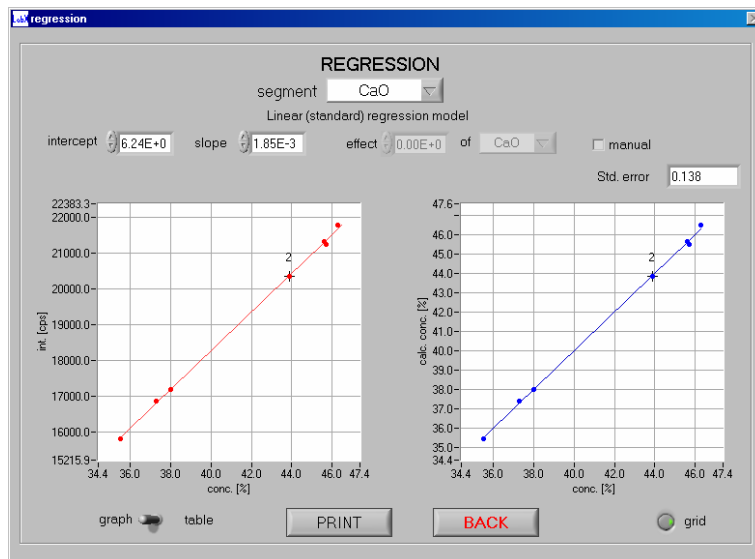
of the other segments.

Manual mode is equivalent to "direct data entry" on the Lab-X resident software. When the "Manual button" is selected a change can be noticed on the standard error. The "Manual button" allows the user to enter the slope and intercept of the calibration manually so the software will use those values to recalculate the standard error.

To identify the name of a calibration standard (on either graph) simply place the pointing device over the calibration point and click. The standard name is then displayed. By simply placing the pointing device on the "toggle switch" and clicking, the display changes from a graph to a table and vice versa.
The table shows the same data in tabular format. Selecting PRINT in either case places the information directly into a Word document.

GRID:
The grid button places a grid over the graphs, clicking on the grid button selects this feature on or off.

3.1.5: SETTING UP QUALITY CONTROL (QC) SAMPLE

This is a new function (compared to the resident software on the Lab-X3500) and allows a sample (QC check sample) to be measured routinely for checking of the instrument and/or the process to be controlled. Specification for which standard is to become the "QC check sample" is in the calibration section and routine measurement in the analysis section (see section 6.2). The specification is based on the plus/minus tolerance and can be the default values of 2 or 3 sigma (for one or more analytes) or customer specified. The QC sample to be used is either one of the calibration standards or a sample measured as a calibration standard (but no concentration specified).
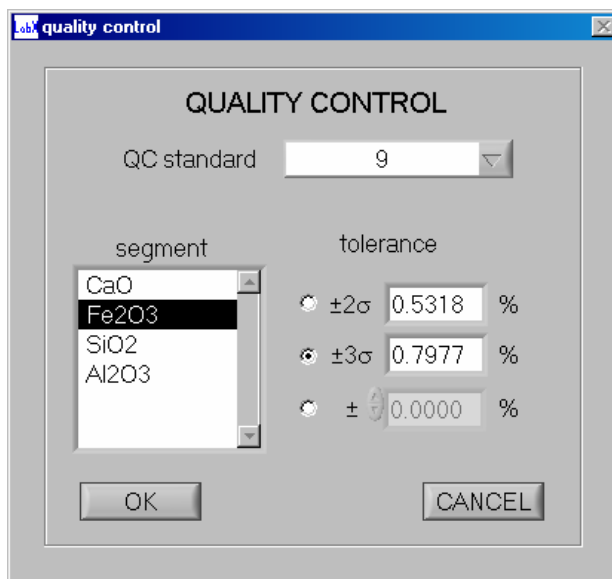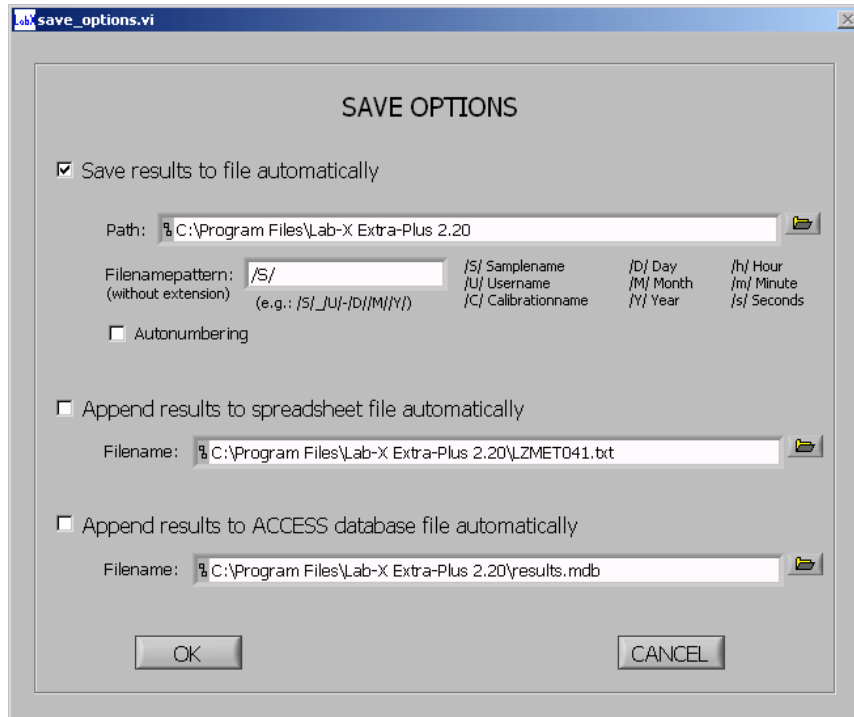

3.1.6: POST ANALYTICAL CALCULATIONS

A name is specified followed by the required calculation. The analytes specified in the method are displayed and for the resulting calculation the decimal places, units, and tolerances can be specified. Addition, subtraction, division and multiplication are allowed.
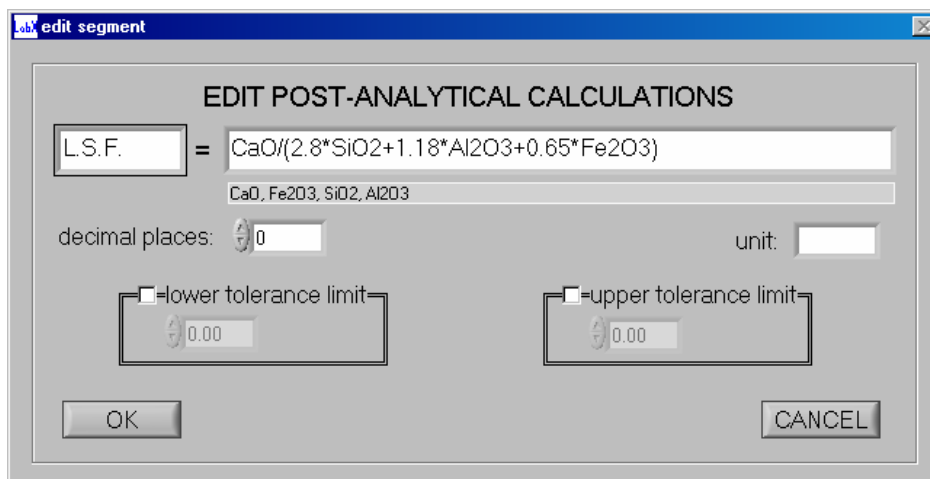
3.1.7: SAVE OPTIONS

SAVING ROUTINE ANALYSIS DATA:
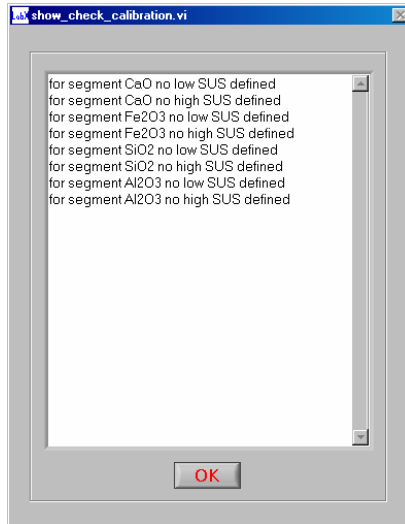
Routine analysis data can be saved in different formats:

a) To a single file

b) To a spreadsheet file (allows automatic export into Excel spreadsheet)

c) To an ACESS database

Select the format required and the file location. In routine analysis the file location will be shown.

Note: If NO format is selected, then the results during routine analysis will be saved as single files automatically but the data CANNOT be exported into an Excel spreadsheet. In the STORED RESULTS option the results can be viewed.

3.1.8: CHECKING OF CALIBRATION PARAMETERS

When the calibration is complete a basic check is performed and if certain important parameters are not specified e.g. a SUS has not been measured, or no quality control sample specified, then a warning is given followed by the message NOT CALIBRATED. The message NOT CALIBRATED does not prevent a calibration from being used for routine analysis, but it is recommended that the warning message given is corrected to ensure successful long-term operation.

```
show_check_calibration.vi

for segment CaO no low SUS defined
for segment CaO no high SUS defined
for segment Fe2O3 no low SUS defined
for segment Fe2O3 no high SUS defined
for segment SiO2 no low SUS defined
for segment SiO2 no high SUS defined
for segment Al2O3 no low SUS defined
for segment Al2O3 no high SUS defined

                  OK
```

3.2: Edit calibration

A calibration can be edited and all the options originally available when the calibration was generated are available to be edited.

3.3: Copy calibration

When selected a copy of the calibration is given. This is shown in the list as (calibration name) copy.

3.4: Delete calibration

Upon selection confirmation is required.

3.5: Export/Import calibration

The Export/Import buttons are to transfer a calibration that was derived using Lab-X Extra-Plus software to another Lab-X Extra-Plus software program (file extension .cal), NOT between the Extra-Plus and the Lab-X. If it is required to transfer a calibration from a Lab-X to the Extra-Plus software resident on the PC then the Import/Export function (with file extension .txt) in the Utilities section 5.3 **must** be used.

3.6: Print calibration

All details of a calibration will be automatically transferred into a Microsoft Word document.

4.0: STORED RESULTS
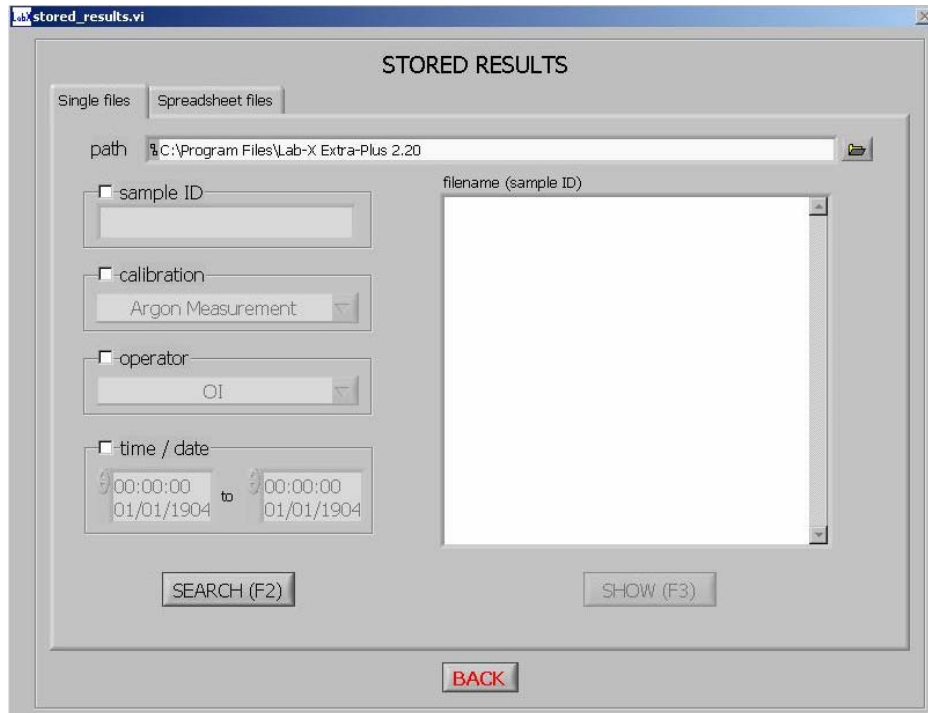
If during routine analysis any samples have been stored, then these can be retrieved using this function. Selection of the samples to display can be selected by first selecting the file where the samples are saved and then using the SEARCH button to display particular results based on sample ID, calibration name, operator or time/date. On selection of Search(F2) button the relevant samples are displayed.

If routine analysis results have been saved to a file then to retrieve the sample data carry out the following:

a) Select single file and then choose the path
b) Press the Select Cur. Dir. Button shown at the bottom right of this open window
c) Select Search (F2). The sample meeting the search criteria (calibration/date/time etc will then be displayed in the box shown on the right hand side of the screen
d) Select the sample label required (using the sample name) and press SHOW (F3)
e) The software will then display the routine analysis result data for the sample selected.

For routine analysis results saved in a spreadsheet:

a) Select the spreadsheet files and the path originally specified in the "Calibration Save options menu".
b) Select the data required to export into an Excel spreadsheet and press the Excel button

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5.0: UTILITIES

Detector test, position turntable, test scan, are all standard features as used on the Lab-X resident software. The configuration page is used to obtain the hardware configuration of the Lab-X and is automatically activated when the software is first started.
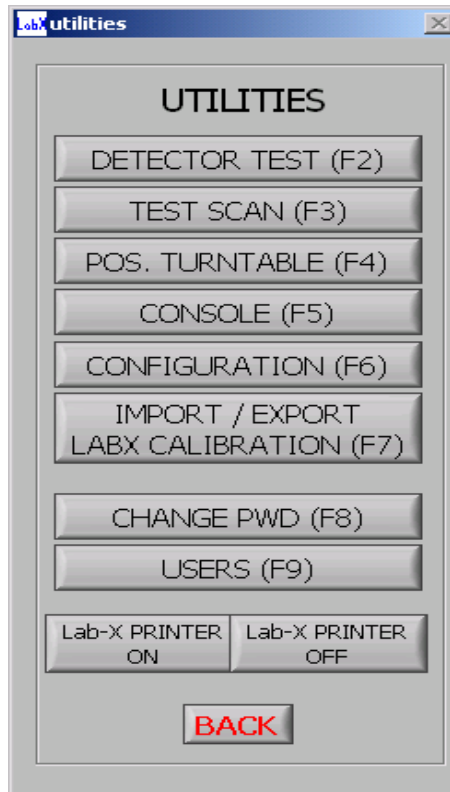
5.1: POSITION TURNTABLE
To select a turntable position, either place the hand icon directly over the number, e,g, over turntable position number 4, and "click" the mouse. The turntable will then move to this position. Alternatively place the hand icon on the red line shown on the dial, "press and hold" the mouse button and rotate the red line to the required turntable position, once the mouse button is removed the turntable will move to the position indicated by the red line.

5.2: CONSOLE:
This allows an "emulation software" to be operated. In this case the keyboard of a PC can be used and the menu of the liquid crystal display (LCD) is shown in the window of the console software. NOTE: When using the console mode it should be remembered that all the functions for operation, e.g. calibration etc. resides on the Lab-X instrument, NOT on the PC. Also that when "YES" is required to be input select the letter Y and for No the letter N.

5.3: CONFIGURATION
When this software program is first started, as part of the start up procedure the configuration of the Lab-X is automatically downloaded from the Lab-X to the Extra-Plus software resident on a PC. The configuration is checked against the keydisk software to ensure compatibility. If no compatibility is given an error message is displayed . Also if the configuration is incorrect then the calibrations shown in routine analysis will only be those that can be used with that configuration.

5.4: EXPORT/IMPORT CALIBRATION

This function allows a calibration to be transferred from a Lab-X to the Lab-X Extra-Plus software or vice versa (file extension .txt). It is good practise to either calibrate and measure routine sample on the Lab-X or the same using the Lab-X Extra-Plus software. Swapping files is NOT recommended particular with large complicated regressions as small differences in software routines could give errors. On selection the calibrations available are listed and the required calibration selected.

Note:

i) Extra-Plus software allows the use of more than one calibration using the same name. This is NOT the case with the Lab-X so it is recommended that once a calibration name is used it is not repeated. If there is more than one calibration with the same name then the Lab-X will not recognise the calibration .

ii) The Lab-X instrument allows up to 15 characters for a calibration name, if a longer name is used for a calibration using the Extra-Plus software then if this calibration is transferred to the Lab-X the name will be truncated to a maximum of 15 characters.

iii) If a calibration has been derived on the Lab-X and one (or more) of the calibration standards deleted, then if this calibration is transferred to the Extra-Plus software all the data will be transferred and the standards will need to be deleted using the Extra-Plus software again.

5.5: CHANGE PWD(Passwords)

When first switched on a username and password is required. If the name manager (in lower case) is entered for both the username and password this gives access to all the functions, e.g. setting passwords and modifications to these functions can be made.

5.6: USERS

If a manager password is used then users can be added, deleted, passwords modified, and the functions accessible to each user specified. Note: Only a manager password allows this function to be used. If other passwords are used then this function is not accessible.

5.7 LAB-X PRINTER ON/OFF

For the functions of test scan and configuration ONLY by selecting this option the printer on the Lab-X can be turned on and off.

6.0: ROUTINE ANALYSIS

6.1: OVERVIEW
After highlighting the required calibration either analysis, restandardisation or measuring a Quality Control (QC) check sample can be accomplished. Note: If no QC sample was specified in the calibration then this function will be greyed out.

6.2: MEASURING QUALITY CONTROL (QC) SAMPLE

Once the QC check sample has been measured (sample label as shown in the text box on selection of "Measure QC sample") the first result is shown graphically together with the tolerance values (specified in the calibration) as two red bars. The vertical scale is concentration and the horizontal is time. This is repeated for each analyte (segment) specified. If a result is outside the specified tolerance (for any segment) then a warning message "RESTANDARDISATION STRONGLY RECOMMENDED!" flashes at the bottom of the screen. At this stage either re-measure the QC sample to confirm the result, or re-measure the Setting Up Samples (SUS's) as defined in the method. After restandardisation the QC sample should be re-measured to confirm that the results are within tolerance.
If an incorrect sample was measured then the function "remove last measurement" can be used.
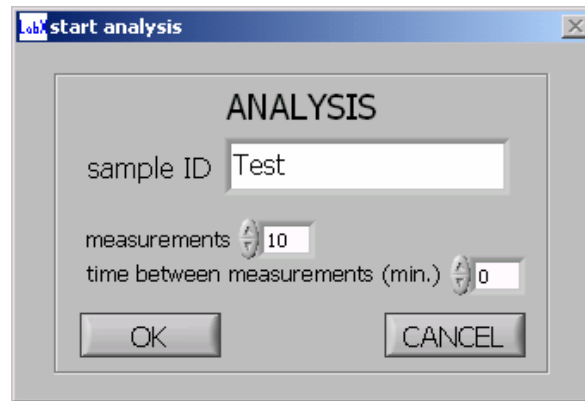Note: On "first selection" any value, which appears by default, can be removed by selecting the "Remove last measurement" button. Then the data table becomes blank and another QC
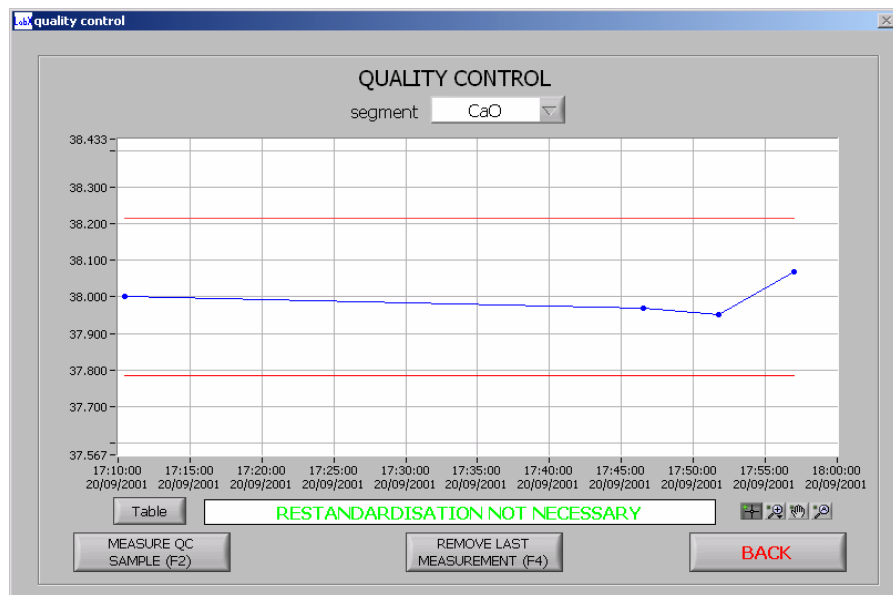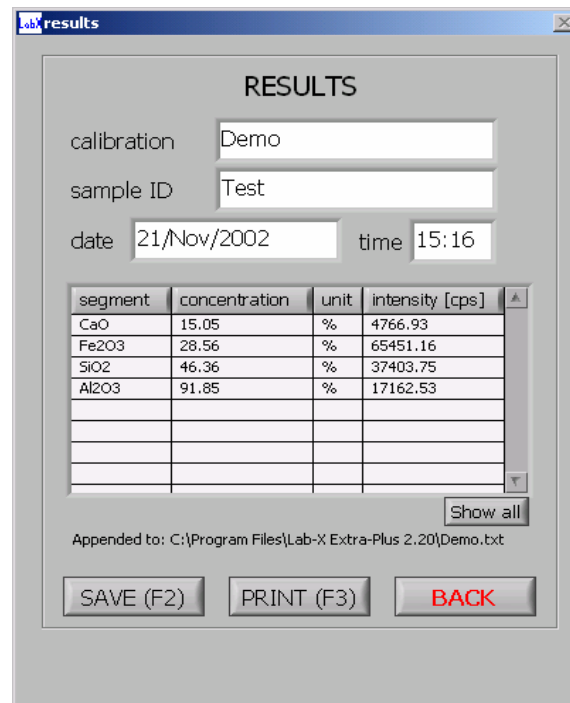

check sample can be selected.

6.3: ANALYSIS

On selection a sample identification is required.

If more than one measurement is required on a sample this can be selected under "measurements". The final result displayed will be the mean value of the measurements. For diagnostic purposes a delay time between measurements can be specified

After the sample has been measured the results are displayed. The result can be saved, printed (directly into Word format) or sent to an Excel spreadsheet for subsequent data manipulation. Note: Saving results data are specified in the "Save options" (section 3.7) of the calibration procedure

Results are sent to the same location in an Excel spreadsheet so users must have a good working knowledge of Excel if further data manipulation is required. Note: In the unlikely event that the Lab-X hardware is changed, e.g. removal of a filter, then only those calibrations whose parameters match the hardware configuration will be displayed in routine analysis.

If any of these save options have not been selected in the calibration procedure then the results are *not* saved automatically. In this case if some results are required to be saved then the "SAVE" button can be used

Retrieval of any saved data can be recalled and displayed in the STORED RESULTS menu.

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(section 4.0)

6.4: Routine Analysis: Repeat Measurements

If repeat measurements has been specified only the *mean values* will be displayed. However on selection of the "Show All" button all data will be displayed in both graphical and tabular format.
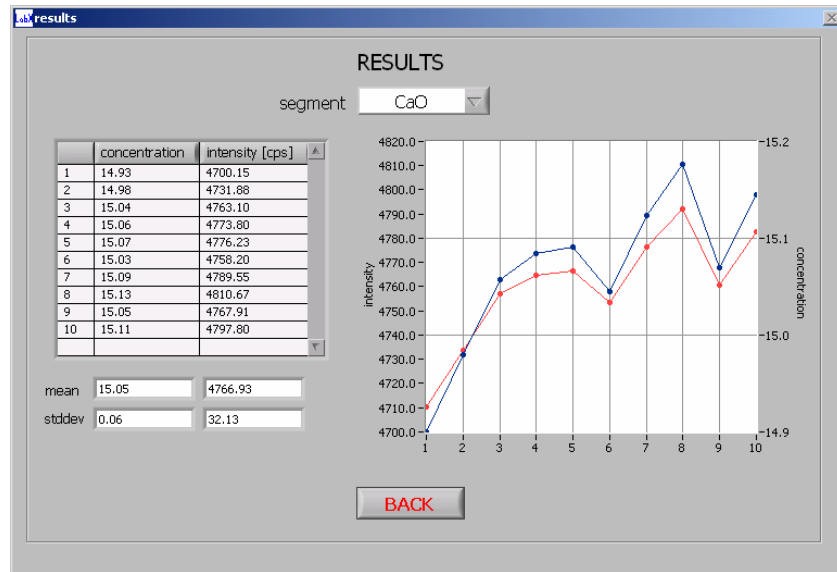

7.0: LOGOUT

This function allows the software to be left in a state ready for the next user. If LOGOUT is selected each operator will need to "log on" ensuring that for each sample measured a user identification will be known. This would make any subsequent retrieval or results by an operator easier.

8.0: TROUBLESHOOTING TIPS

General: If a function does not work, it should be closed down and tried again to confirm or clear the fault.

8.1: Error messages:

If the configuration of the Lab-X does not match the configuration specified on the keydisk then an error message will be given and by selecting OK, the *Lab-X Extra-Plus* software can be operated only in "demonstration mode".
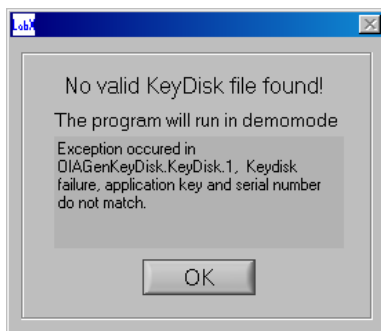
Retry the function, and if still unsuccessful contact your nearest Oxford Instrument's support centre quoting the Lab-X model, serial number, and if possible the order number for the software.

If there is no communication between the Lab-X and the PC the software error (shown below) can be seen.

Check all the cables are connected, and that the correct RS232 settings are specified on BOTH the Lab-X and the Extra-Plus software.

No helium: If it is not possible to make a measurement .e.g. helium is specified for the measurement but no helium is present then a warning message will be displayed.

8.2: Lab-X (Resident) Software loss of communication:

If the resident software on the Lab-X3500 should "lock up" or lose communication, one cause may be that the software is trying to communicate with the PC but the connection cannot be made, e.g. if the *Lab-X Extra-Plus* software was switched off. By simply running the Extra-Plus software this will free up the Lab-X software and normal communication can be remade. If this is not successful then switch off the Lab-X and try again. If not successful then switch off the Lab-X and on switch on hold down the printer feed key. This will set all the connections back to Lab-X only mode and the Lab-X will work correctly. The connections from the Lab-X to the PC need to be reset (see section 1.2).