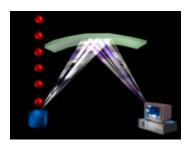
Probe for Windows 95/98/NT (32 bit) v. 4.52

User's Guide to Getting Started

By Daniel T. Kremser, Ph.D.



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Conventions Used in this Guide

The computer operating system employed here is Microsoft Windows NT (v. 4.0, service pack 4) running on a Pentium PC base. The software version of PROBE FOR WINDOWS (32 bit) is 4.52.

The following conventions are used in this document; Menu Commands and Dialog Box (Windows) Names and buttons are bold-faced whenever they occur in the text. *Dialog Box Options* are italicized and FILE NAMES are capitalized.

Several tips for saving time/steps include:

Context sensitive HELP is available in any window by pressing the F1 key.

Pressing <Enter> on the keyboard is identical to clicking the OK button.

Pressing the <Esc> key on the keyboard is identical to clicking the Cancel command.

To select a range of items in *Multi-Select* list boxes, click on the first item, move to the last and hold the <Shift> key down while clicking on the last item.

To select individual items in *Multi-Select* list boxes, hold down the <Ctrl> key down while clicking on the item. De-select items in *Multi-Select* list boxes by holding the <Ctrl> key down and clicking the item.

Creating the Default Standard Database File

PROBE FOR WINDOWS requires a database of microprobe standards for use in quantitative analysis. This standard database can store up to 1000 standards each with up to 32 elements per standard. All standard information is stored in a file designated STANDARD.MDB. MDB is an abbreviation for Microsoft DataBase and represents a Microsoft Access v. 3.5 database file. In addition to the default standard database, three other standard databases are supplied as ASCII files. These are:

DHZ.DAT	Deer, Howie and Zussman
ORE.DAT	Dana's Mineralogy (Sulfides)
SRM.DAT	NIST standard reference alloys and glasses

The DHZ.DAT file is a database of all of the analyses listed in the first edition of "Rock Forming Minerals" by Deer, Howie and Zussman. The ORE.DAT file is a database composed of sulfide minerals from Dana's Mineralogy entered in ideal formulas. The SRM.DAT file is a database of SRM (Standard Reference Materials) alloys and glasses from the NIST SRM catalog. All of these database files can be used for reference and matching purposes but must first be imported into a PROBE FOR WINDOWS standard database file (see User's Guide and Reference documentation) using the **File** | **Import** command.

The following procedure illustrates how to create a new default standard database and enter standard compositions into it. To import standard compositions from 16 bit PROBE FOR WINDOWS see the User's Guide and Reference documentation.

From the Desktop, double click on the yellow EPMA Software folder. Then double click on the **Standard** icon in the EPMA Software group.

😂 C:\WINN1	\Profiles\Adı	ninistrator\De	sktop\EPMA	Software	_ 🗆 ×
<u>File E</u> dit <u>V</u> ie	w <u>H</u> elp				
ZAF Calczaf	Edit MI Config	Edit Probewin	Grapher 2.0	Graphppr Help	
P	File	Config Files		×	
GS Scripter32	Joywin	MicroImage	Microlmage Help	Periodic Table	
Probe for Windows	Probewin Help	Stage	Standard	Startwin	
Surfer32	T C Innr Testtc	ZUSER Userwin			
1 object(s) selec	cted 8	305 bytes			

This action launches the STANDARD (Compositional Database) program and opens the **Open Old Standard Database File** dialog box. To create a new standard database, click on the **Cancel** button to close the **Open Old Standard Database File** dialog box.

Open Old Standard Database File ? 🗙	
Look jn: 🔄 Probe for Windows 💌 💼 📺	
MQData Standard.mdb	
UserData 🔊 User.mdb	
폐 jeolel.MDB 폐 Xray.mdb 폐 jeolox.MDB	
Position.mdb	
Setup.mdb	Total Oxygen
	lated Oxygen Excess Oxygen
	ic Weight Z - Bar
File <u>n</u> ame: standard.mdb Open	
	bit) v. 4.52) John J. Donovan
Files of type: X.MDB (X.MDB)	point 5. Donovan
TINIS SOLUMIC IS ICHISCICA CO .	
Dan Kremser	
Washington University	
Press the F1 key in any window for context sensitive	е петр

Select File from the menu	a bar and then click or	n New from the menu.
---------------------------	-------------------------	----------------------

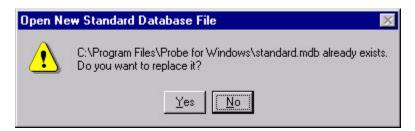
🔯 Standard (Co	mpositional Database)			
	ard Options Xray Analytical	<u>O</u> utput <u>H</u> elp		
<u>N</u> ew	e-click to see composition	on data)		
<u>O</u> pen	-			
Save <u>A</u> s				
Close	_			
Import				
Export			Total	Total Oxygen
Eile Information			Calculated Oxygen	Excess Oxygen Z - Bar
<u>Print Log</u>				
Print Set <u>u</u> p	andard (Probe for	그렇다 아이님이 아이나 이 것이 가지 않는 것이 가지 않는다.	가방에서는 이번 방법에 잘 들었다. 그는 것이 많아졌다. 것	1.5
E <u>x</u> it	n J. Donovan, Cop	yright (c) 1995-19	999 John J. Donova	n
Dan Kremser Washington N	re is registered to University L key in any window		tive heln	
filess the fi	t Key in any minuon	IOI CONCERC SCHOI	cive herp	

This opens the Open New Standard Database File dialog box.

lpen New Stand	lard Database File		? ×
Savejn: 🧲	Probe for Windows	- 🖻 <u>(</u>	*
MQData UserData jeolel.MDB jeolox.MDB Position.mdb Setup.mdb) ≫i Standard.mdb) wi User.mdb) ≫i Xray.mdb		
File <u>n</u> ame: sta	andard.mdb		Save
Save as type: 🔣	MDB (*.MDB)		Cancel

Click the Save button to open a new default standard database (STANDARD.MDB).

The Open New Standard Database File window appears.



Click the **Yes** button to confirm overwriting the existing default database. Note: the supplied demonstration files JEOLEL.MDB and JEOLOX.MDB will no longer be usable after this operation.

The File Information window opens.

File Information				
File Name	C:\Program Files\Pr	obe for Window	s\standard.mdb	
Version	4.52	Туре	STANDARD	ок
User	Dan Kremser			Cancel
Title	Default Standard Da	atabase		
Department				_
Account #		Group		
Description	Standard Composition	on (Probe for Wi	indows)	~
Insert <cr>>>></cr>				
	-			
				*
Date Created	, 9/22/99 1:09:19 PM	l Date	Modified 9/22/99	1:09:20 PM
Last Updated	9/22/99 1:09:19 PM			

Enter the relevant information into the *User, Title,* and other *Description* text boxes shown in the **File Information** dialog box displayed below. Use the <tab> key to move between text boxes. Click the **Insert <cr> >>** button to insert a carriage return in the *Description* field text.

File Information				
File Name	C:\Program Files\Pro	be for Windows	\standard.mdb	
Version	4.52	Туре	STANDARD	ок
User	Dan Kremser			Cancel
Title	Default Standard Da	tabase		
Department	Earth and Planetary	Sciences		
Account #		Group		
Description	Standard Compositio		ndows)	A.
Insert <cr>>>></cr>	Washington Universi	ity		
1 				
				Ŧ
Date Created	9/22/99 1:09:19 PM	Date I	Modified 9/22/99	0 1:09:20 PM
Last Updated	9/22/99 1:09:19 PM			

When finished, click the **OK** button.

The user now has an empty database ready to accept standard composition data.

Standard For Windows [C:\Program Files\Probe for Window	ws\standard.mdb]	_ 🗆 🗙
File Edit Standard Options Xray Analytical Output Help		
Standards (double-click to see composition data)		
	Total	Total Oxygen
	Calculated Oxygen Atomic Weight	Excess Oxygen Z - Bar

To enter standards into this database, select **Standard** from the menu bar and click on **New** from the menu.

Standa	<u>N</u> ew	mposition data)		
	<u>M</u> odify Datata			
	<u>D</u> elete D <u>e</u> lete Selected			
	List Standard Names			
	List Selected Standard	ls l		
	List <u>A</u> ll Standards		Total	Total Oxygen
			Calculated Oxygen	Excess Oxyg
		[Atomic Weight	Z - Bar

This action opens the **Standard Composition** dialog box. Type in the appropriate *Sample Number, Standard Name,* and *Standard Description* into the text boxes. The software automatically loads the next available number by default. Choose standard numbers that will allow grouping of standards into various functional sets. Standard numbers may range from 1 to 32768, however to avoid conflict with the supplied NIST SRM, DHZ, and Dana ORE sample databases select numbers below 2000.

1 Insert ∢cr	1	ndard Name ndard Desc	-			×	OK Cance
lick Elem Channel	ent Row to Element	Edit Elemen X-Ray	t Composition	n and/or Cati	ons (click en Elemental	npty row to Oxide	add) Atomic
c _1							
nter Com Oxide F	position In – Percent	100000000000000	Compositior de Standard	099334	Curr Elemental .000	ent Colum Oxide .000	n Totals Atomic

Click the *Elemental Percent* and *Elemental Standard* buttons under *Enter Composition In* and *Display Composition As* respectively, as necessary. All standard compositions are saved in the standard database as elemental concentrations. If oxygen is present in the standard then one must enter oxygen as an element and its concentration into the standard entry. See the silicate example in this manual for details.

The first example will illustrate the entry of an elemental metal standard. Click on any empty row in the spreadsheet. This opens the **Element Properties** dialog box. In the *Element* field either type in the first element in the standard or use the drop-down list box to select the element symbol. Continue by choosing the correct *X-Ray Line*, *Cations*, and *Oxygens*. The *X-Ray Line* is used for modeling purposes only. When entering properties and concentrations for elements in elemental mode, the program grays out the *Cations* and *Oxygens* text boxes, no editing of these text boxes are necessary.

529	Copper Metal	
Insert <cr>>>></cr>	pure metal standard supplied by JEOL with microprobe	× Cancel
Click F <mark>Element F</mark> Chann – Enter F		
	Iement Properties and Concentration For : ment X-Ray Line Cations Oxygens	ОК
	▼ ka ▼ 2 ▼ 1	Cancel
ni cu	on In Elemental Weight Percent	Clear
zn ga		
<pre>dege ge as se</pre>	-	<u> </u>
Enter Compositio	C Ovide Standard Elemental	nt Column Totals Oxide Atomic
	cent © Elemental Standard	.000

Enter the elemental weight percent for cu into the *Composition* text box. Finish by clicking the **OK** button of the **Element Properties** dialog box.

ement Properties Enter Element Properties and C	oncentration For :		14
Element X-Ray Line	Cations	Oxygens	ОК
cu 💌 ka 💌	2 💌	1 💌	Cancel
Enter Composition In Elementa	Weight Percent		
100.00			Clear

The program returns to the Standard Composition dialog box.

529	C	opper Metal					
Insert <c< th=""><th>51</th><th>ure metal star upplied by JE(</th><th>DL with micro</th><th></th><th></th><th>×</th><th>Cancel</th></c<>	51	ure metal star upplied by JE(DL with micro			×	Cancel
Channel	Element	o Edit Elemen X-Ray	Cations	n and/or Cat	Elemental	opty row to	Atomic
	cu	ka			100.000		100.000
							-
•							
Inter Com	position In Percent	60	Compositior de Standard		Curr Elemental 100.000	ent Colum Oxide	n Totals Atomic 100.000

If there are more elements (compound standards) in the standard, click the next empty *Element* row and repeat the data entry process. When all elements are entered, click the **OK** button on the **Standard Composition** dialog box. This concludes the entry of a standard into the standard database and results in the following log window output.

Standard For Windows [C:\Program Files\Probe for V	🖌 🖬 🖬 🖬 🖬 🖬 🖬
File Edit Standard Options Xray Analytical Output Hel Standards (double-click to see composition data) 529 Copper Metal	p St 529 Copper Metal TakeOff = 40 KiloVolts = 15 pure metal standard supplied by JEOL with microprobe
	100.000 Total .000 Total Oxygen .000 Calculated Oxygen .000 Excess Oxygen 63.546 Atomic Weight 29.000 Z - Bar
St 529 Copper Metal TakeOff = 40 KiloVolts = 15 pure metal standard supplied by JEOL with microprobe Elemental Composition Elemental Wt. % Total: 100.000 Ave:	rage Total Oxygen: .000
Average Calcu. Oxygen: .000 Aver	age Excess Oxygen: .000 age Atomic Number: 29.000
ELEM: Cu XRAY: ka ELWT: 100.000 KFAC: 1.0000 ZCOR: 1.0000 ATWT: 100.000	

Many standards contain oxygen in their compositions. Since all standard compositions are saved to the standard database as elemental concentrations, it is necessary to enter the oxygen concentration if oxygen is present in the compound. This applies to all standards, even those which are entered and/or displayed as oxide concentrations. The following example illustrates a silicate (oxygen bearing) standard entry into the database.

From the main Standard log window, select **Standard** from the menu bar and click on **New** from the menu choices. This action opens the **Standard Composition** dialog box. Type in the appropriate *Sample Number, Standard Name,* and *Standard Description* into the text boxes. Click the *Oxide Percent* and *Oxide Standard* buttons under the *Enter Composition In* and *Display Composition As* boxes.

81	Alb	te (Amelia)					
Insert <c< th=""><th>Sou</th><th>ırce: Ed Ols</th><th>en from Amel en, Univ of C</th><th>Chicago</th><th></th><th>*</th><th>Cance</th></c<>	Sou	ırce: Ed Ols	en from Amel en, Univ of C	Chicago		*	Cance
Channel	Element	X-Ray	t Composition	Oxygens	Elemental	Oxide	Atomic
<u>، ا</u>							
Oxide I	position In – ^D ercent Ital Percent	© Oxi	v Composition de Standard mental Stand		Curr Elemental .000	ent Colum Oxide .000	n Totals Atomic 000 ns 000

Click on any empty row in the spreadsheet.

This opens the **Element Properties** dialog box. In the *Element* field either type in the first element in the standard or use the drop-down list box to select the element symbol. Continue by choosing the correct *X-Ray Line, Cations,* and *Oxygens*. Finally, enter the weight percent for SiO_2 into the *Enter Composition In Oxide Weight Percent* text box.

lement Properties	
Enter Element Properties and Concentration For : Element X-Ray Line Cations Oxygens	OK
si v ka v 1 v 2 v	Cancel
Enter Composition In Oxide Weight Percent	Clear

Finish by clicking the **OK** button of the **Element Properties** dialog box. This results in the following **Standard Composition** dialog box.

81	Alb	ite (Amelia)					ОК
Insert <c< th=""><th>Sou</th><th>ırce: Éd Ols</th><th>en from Amel en, Univ of (</th><th>Chicago</th><th></th><th></th><th>Cancel</th></c<>	Sou	ırce: Éd Ols	en from Amel en, Univ of (Chicago			Cancel
Channel	Element	Edit Elemer	Cations	n and/or Cati	Elemental	Oxide	Atomic
1	si	ka	1	2	32.117	68.710	100.000
.							
	position In - ^P ercent Ital Percent	© Oxi	v Compositior de Standard mental Stand		Curr Elemental 32.117	ent Column Oxide 68.710	Totals Atomic 100.000

Note: to facilitate the data entry for the oxygen concentration of standard compositions which are entered as oxide concentrations, the program will display a running total in the text box designated *Total Oxygen From Cations*.

Continue the data entry process for the remaining elements (as oxides).

Sample Nu	umber, Name	and Descr	iption				ОК
81	Albi	te (Amelia)					
Insert ∢c			en from Amel en, Univ of (×	Cance
Click Elem Channel	Element	Edit Elemen	t Composition	n and/or Cat	ions (click en Elemental	npty row to a	add) Atomic
1	si	ka	1	2	32.117	68.710	60.006
2	al	ka	2	3	10.320	19.500	20.071
3	na	ka	2	1	8.680	11.700	19.811
4	k	ka	2	1	.083	.100	.111
•							F
Oxide F	position In – ^p ercent Ital Percent	• Oxi	Compositior de Standard mental Stand	ard	Curr Elemental 51.200 otal Oxygen	ent Column Oxide 100.010 From Cation	Atomic 100.000

To complete the standard entry into the standard database, enter oxygen as the last element in the standard. Click on any empty row in the spreadsheet. This opens the **Element Properties** dialog box. In the *Element* field type in the element symbol for oxygen. Check for the appropriate *X-Ray Line, Cations,* and *Oxygens*. Finally, enter the running total from the *Total Oxygen From Cations* text box into the *Enter Composition in Oxide Weight Percent* text box.

81	Albite (Amelia)	ОК
01		Cancel
Insert (cr> >>	Natural specimen from Amelia, VA Source: Ed Olsen, Univ of Chicago	
Click E <mark>Element </mark> Chann – Enter	Properties Element Properties and Concentration For :	
1	ement X-Ray Line Cations Oxygens	ОК
3 4 Enter (▼ ka ▼ 1 ▼ 0 ▼ Composition In Oxide Weight Percent	Cancel
	7	Clear
48.81		
	on In — Display Composition As — Current Col Flemental Oxic	le Atomic

Click the **OK** button of the **Element Properties** dialog box.

The following Standard Composition dialog box illustrates the completed five element silicate standard, Albite.

2 al ka 2 3 10.320 19.500 7.713 3 na ka 2 1 8.680 11.700 7.613 4 k ka 2 1 .083 .100 .043	Click Elem	ent Row to	Edit Elemen				~	
si ka 1 2 32.117 68.710 23.07 2 al ka 2 3 10.320 19.500 7.717 3 na ka 2 1 8.680 11.700 7.617 4 k ka 2 1 .083 .100 .043	Channel	Element						
3 na ka 2 1 8.680 11.700 7.613 4 k ka 2 1 .083 .100 .043	1	si		100000000000000000000000000000000000000		1 20.0 P. 200 P. 2 P. 200	10000000	23.072
4 k ka 2 1 .083 .100 .043	2	al	ka	2	3	10.320	19.500	7.717
	3	na	ka	-	1	8.680	11.700	7.617
5 o ka 1 0 48.810 .000 61.55	4	k	ka	2	1	.083	.100	.043
	5	0	ka	1	0	48.810	.000	61.550
Ovide Percent Ovide Standard			1000050000			Elemental	Oxide	► Totals Atomic

The compositional data of any standard entered into the standard database may be reviewed by simply doubleclicking on the standard of interest from the scrollable *Standards* list box. The following window contains two standards with the compositional data of Albite displayed in the log window in oxide form.

	bite (Amelia opper Meta	1	e compositio	n uataj	Natural spec	e (Amelia) O KiloVolts = cimen from Ar Olsen, Univ (melia, VA	
					48.810	otal Calculated Ox Stomic Weigh		Total Oxygen Excess Oxygen Z - Bar
TakeOfi Natural Source:	= 40 F specime Ed Olse	n, Univ						
			100.010	Ave	rage Total	Oxvgen:	48.810	
200 00 00 00 00	al Wt. 8							
Average	e Calcu.	0xygen:	48.810	Aver	age Excess	0xygen :	.000	
Average	- 1. State	0xygen:		Aver		0xygen :	.000 10.712	
Average Average	e Calcu.	0xygen:	48.810	Aver	age Excess	0xygen :		
Average Average ELEM:	e Calcu. e Atomic	Oxygen: Weight:	48.810 20.178	Aver Aver	age Excess age Atomic	0xygen :		
Average Average SLEM: KRAY:	e Calcu. e Atomic SiO2	Oxygen: Weight: Al203	48.810 20.178 Na20	Aver Aver K20	age Excess age Atomic O	0xygen :		
average average CLEM: CRAY: DXWT:	e Calcu. Atomic SiO2 ka	0xygen: Weight: Al203 ka	48.810 20.178 Na20 ka	Aver Aver K20 ka	age Excess age Atomic O ka	0xygen :		
Average Average ELEM: XRAY: DXWT: ELWT:	e Calcu. Atomic SiO2 ka 68.710	Oxygen: Weight: Al2O3 ka 19.500	48.810 20.178 Na20 ka 11.700	Aver Aver K20 ka .100	age Excess age Atomic 0 ka .000	0xygen :		
Average	e Calcu. Atomic SiO2 ka 68.710 32.117	0xygen: Weight: Al203 ka 19.500 10.320	48.810 20.178 Na20 ka 11.700 8.680	Aver Aver K20 ka .100 .083	age Excess age Atomic 0 ka .000 48.810	0xygen :		

To modify a particular standard, select the standard in the *Standards* list box. Click **Standard** from the menu bar and select **Modify** from the menu. Edit the appropriate fields in the **Standard Composition** window as described previously.

After entering all of the standard compositions in your standard collection, save this important file (STANDARD.MDB) to another directory on the hard disk and likewise to a floppy for archival purposes.

Note: the takeoff, kilovolt, x-ray and cation ratio parameters displayed here are used only for nominal calculations of the k-factors and ZAF corrections within the program STANDARD. The PROBE FOR WINDOWS quantitative analysis will calculate the quantitative standard k-factors based on the actual conditions.

Creating Standard Position Files

Program STAGE.EXE is used to digitize your standard mounts to create pre-digitized standard coordinate files. These files are necessary for automated acquisition and standardization. The standard coordinates are digitized in three dimensions (X, Y, and Z) as well as the W stage position (multi-position specimen stages only) and are typically referenced to three physical fiducial marks on the standard mount surface. These coordinate files should be digitized with the standard mount located in the position where it is typically found.

The following procedure illustrates how to create a new standard position file. In this example, four carbonate standards will be digitized. These standards must already be entered into the standard database using program STANDARD.

When creating digitized standard files for standard mounts containing more than 42 standards, a slightly different procedure than outlined below must be followed. Concise instructions on how to bypass the current 42 standard limit in the STAGE digitize feature are outlined in the reference documentation. To find these instructions, open the PROBEWIN.HLP program from the EPMA Software folder. Click the **Search** button and type in digitize in the text box. Highlight the topic entitled *Digitizing Standard Mounts with More Than 42 Standards* and click the **Display** button.

			ø		
Calczaf	Edit MI Config File	Edit Probewin Config Files	Grapher 2.0	Graphppr Help	
þ		J.		×	
S Scripter32	Joywin	Microlmage	MicroImage Help	Periodic Table	
			STD		
Probe for Windows	Probewin Help	Stage	Standard	Startwin	
Surfer32	Testto	Userwin			

Open STAGE (Stage Control and Automation) by double clicking on the Stage icon in the EPMA Software group.

This starts the STAGE program and brings up the **Confirm Motor and Crystal Positions** dialog box. Confirm that all of the motors (stage and spectrometer positions) and crystal designations are correctly calibrated. If there is disagreement between the mechanical positions (actual) and the software values, adjust the software values. Use the <tab> key to move between the *Target Positions* text boxes. Click the **OK** button to close the **Confirm Motor and Crystal Positions** dialog box when done.

X	Positions	Remove Faraday	OK
15.9979	36.9968	Update Positions	Positions
Z 11.0001	W Increa	nent Free/Clear	Stage
Stage Back	klash Target Positions	Jog Stage Jog Spectrometers	Cancel
1	Contraction of the second seco	3	
PET •	TAP IIF 240.005 240.0		<u>×</u>

The following display illustrates the STAGE log window.

Stage (Stage Control and Automation) - 🗆 × File Edit Standard Window Output Help Welcome to Stage (Probe for Windows 95/98/NT (32 bit) v. 4.52) Written by John J. Donovan, Copyright (c) 1995-1999 John J. Donovan This software is registered to : Dan Kremser Washington University Press the F1 key in any window for context sensitive help Initializing Advanced MicroBeam Interface Loading DCX motor controller driver for board O DCX Driver version number 2 DCX DLL version number 2 Getting DCX motor controller configuration for board O DCX initialization completed Advanced MicroBeam Interface Initialized

Select Standard from the menu bar and click on Add Standards to Run from the menu choices.

💐 Stage (Stage Control and Automation)
<u>File Edit Standard Window Output Help</u>
Welcome <u>S</u> tandard Database or Windows 95/98/NT (32 bit) v. 4.52) Written <u>Add Standards To Run</u> r, Copyright (c) 1995–1999 John J. Donovan
This software is registered to : Dan Kremser
Washington University
Press the F1 key in any window for context sensitive help
Initializing Advanced MicroBeam Interface
Loading DCX motor controller driver for board O
DCX Driver version number 2
DCX DLL version number 2 Getting DCX motor controller configuration for board O
DCX initialization completed
Advanced MicroBeam Interface Initialized

This action opens the **Add Standards to Run** dialog box. Click on the name of each of the standards in the standard block to be digitized from the *Available Standards in Database* list box.

130 Calcite 131 Dolomite 132 Siderite 163 NBS Glass 620 164 Chromium Augite 166 Strontianite 177 CaMoO4, syn Taylor 178 Magnetite (Port Henry) 179 InTe 202 Labradorite 203 Fayalite 204 Forsterite	126 Indium Metal	
131 Dolomite 132 Siderite 163 NBS Glass 620 164 Chromium Augite 166 Strontianite 177 CaMoO4, syn Taylor 178 Magnetite (Port Henry) 179 InTe 202 Labradorite 203 Fayalite 204 Forsterite OK	128 SRM470 K-411	
132 Siderite 163 NBS Glass 620 164 Chromium Augite 166 Strontianite 177 CaMoO4, syn Taylor 178 Magnetite (Port Henry) 179 InTe 202 Labradorite 203 Fayalite 204 Forsterite		
163 NBS Glass 620 164 Chromium Augite 166 Strontianite 177 CaMoO4, syn Taylor 178 Magnetite (Port Henry) 179 InTe 202 Labradorite 203 Fayalite 204 Forsterite		
164 Chromium Augite 166 Strontianite 177 CaMoO4, syn Taylor 178 Magnetite (Port Henry) 179 InTe 202 Labradorite 203 Fayalite 204 Forsterite		
166 Strontianite 177 CaMoO4, syn Taylor 178 Magnetite (Port Henry) 179 InTe 202 Labradorite 203 Fayalite 204 Forsterite		
177 CaMoO4, syn Taylor 178 Magnetite (Port Henry) 179 InTe 202 Labradorite 203 Fayalite 204 Forsterite		
178 Magnetite (Port Henry) 179 InTe 202 Labradorite 203 Fayalite 204 Forsterite		
179 InTe 202 Labradorite 203 Fayalite 204 Forsterite		
202 Labradorite 203 Fayalite 204 Forsterite	178 Magnetite (Port Henry)	
203 Fayalite 204 Forsterite IIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIII	179 InTa	
204 Forsterite	11211116	
204 Forsterite		
OK	202 Labradorite	
	202 Labradorite 203 Fayalite	
	202 Labradorite	
	202 Labradorite 203 Fayalite	ОК
	202 Labradorite 203 Fayalite	

Click the **Add to Run** >> button to add these standards to be digitized. Standards maybe added one at a time or one may multi-select standards by holding down the <Ctrl> button on the keyboard as standards are selected.

179 InTe 202 Labradorite 203 Fayalite 204 Forsterite	
Add To Run >>	ОК

Click the OK button of the Add Standards to Run dialog box when finished.

Select Window from the menu bar and choose Digitize Positions from the menu choices.

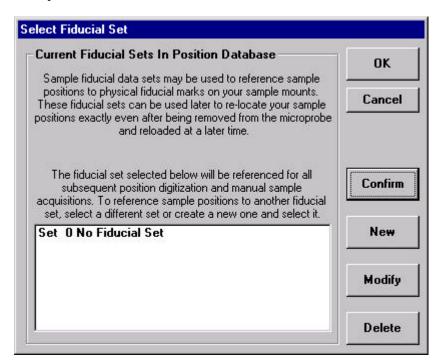
	idow <u>O</u> utput <u>H</u>	
Welcome to Sta ♪ Written by Jof _ 	love igitize Positions rid Minerals	Findows 95/98/NT (32 bit) v. 4.52) Copyright (c) 1995-1999 John J. Donovan
This software is Dan Kremser	registered	to :
Washington Unive	sity	
Press the F1 key	in any win	dow for context sensitive help
Initializing Adv		
Loading DCX motor		r driver for board O
정치가 있어? 정치 한곳들은 누가 한 것 같아요. 한 것 같		2
DCX Driver versio		
DCX Driver versio DCX DLL version n Getting DCX moto	umber 2 controlle	r configuration for board O d
DCX Driver version DCX DLL version (number 2 controlle: on complete	d
DCX Driver version DCX DLL version p Getting DCX motop DCX initializatio	number 2 controlle: on complete	d

This action opens the **Digitize!** dialog box.

O All Samples Sample Setups Select Stds Select All Delete All Confirm Delete All Auto Focus O New Sample Cevery Point Delete Selected Positions Export Selected Samples	C Unknowns C Wavescans C All Samples Select Stds Select All Delete All Delete Selected Delete Selected	2012/2011/201		om ASCII File	Plot Samp File C C Nev C Nev	Fiducials le Setups setups onfirm o Focus w Sample ery Point
Select Stds File Setups Select All Confirm Delete All Auto Focus Delete Selected Samples Import from ASCII File Delete Selected Positions Export Selected Samples	Select Stds Select All Delete All Delete Selected Delete Selected	2012/2011/201		om ASCII File	File C C Auto C Nev C Eve	onfirm oFocus w Sample ery Point
Delete All Delete All Auto Focus C New Sample Delete Selected Samples Import from ASCII File C Every Point Delete Selected Positions Export Selected Samples Digitized	Delete All Delete Selected Delete Selected	2012/2011/201		om ASCII File	C Nev	o Focus v Sample ry Point
Delete Selected Samples Import from ASCII File C New Sample Delete Selected Positions Export Selected Samples C Interval	Delete Selected	2012/2011/201		om ASCII File	C Nev	v Sample ery Point
Row X Y Z W Grain # Focus		122	L xport Se	lected Samples		
	Row X	Y	Z	W	Grain #	Focus

Click the **Fiducials** button.

This opens the **Select Fiducial Set** window.



Click the **New** button. This opens the **Modify Fiducial Positions** window. The current stage coordinates are loaded by default.

Enter Ap	proximate Fid	ucial Position:	s For Fiducial S	Set 1	ОК
Fiducial	Description	New Fiduci	al Coordinate S	Set	Cancel
Point#	х	Y	z	w	Lancer
1	15.99803	36.99683	11.00007	1	
2	15.99803	36.99683	11.00007	1	
3	15.99803	36.99683	11.00007	1	

Type in a *Fiducial Description*. Enter the nominal coordinates or move to each of the three fiducial marks on the standard mount, determining their approximate coordinates, and enter those values into the appropriate fields. On JEOL 733 microprobes, the W stage position needs to be recorded as well. The following window results.

Enter Ap	proximate Fid	lucial Positio	ns For Fiducial	Set 1	ОК
Fiducial	Description	Carbonate	Standard Blo	ck	Cancel
Point#	х	Y	z	w	Lance
1	9.5	36.0	10.9	4	
2	22.5	36.1	10.9	4	
3	15.8	49.1	10.9	4	

Click the **OK** button when done. This creates a new entry in the **Select Fiducial Set** list box as shown below.

Current Fiducial Sets In Position Database	ОК
Sample fiducial data sets may be used to reference sample positions to physical fiducial marks on your sample mounts. These fiducial sets can be used later to re-locate your sample positions exactly even after being removed from the microprobe and reloaded at a later time.	Cancel
The fiducial set selected below will be referenced for all subsequent position digitization and manual sample acquisitions. To reference sample positions to another fiducial set, select a different set or create a new one and select it.	Confirm
Set 0 No Fiducial Set	New
Set 1 Carbonate Standard Block	
	Modify
	Delete

Select (highlight) the new fiducial set and click the **Confirm** button to initiate a precise centering of the three fiducial marks.

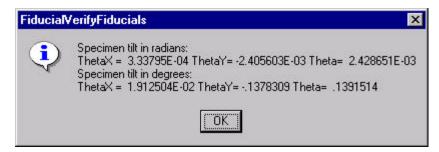
The **Modify Fiducial Positions** window opens displaying the originally entered fiducial coordinates. Click the **OK** button to confirm.

Enter Ap	proximate Fid	ucial Positio	ns For Fiducia	Set 1	OK
Fiducial	Description	Carbonate	Standard Blo	ck.	Cancel
Point#	х	Y	z	w	Lancer
1	9.5	36	10.9	4	
2	22.5	36.1	10.9	4	2
3	15.8	49.1	10.9	4	

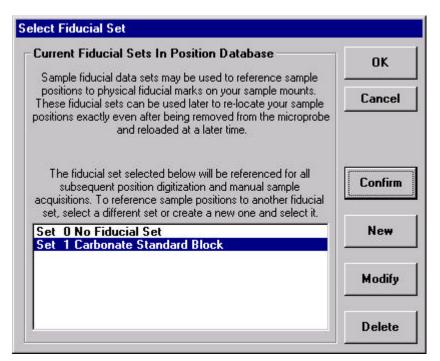
The computer then drives to each fiducial mark and displays the **FiducialVerifyFiducial** window. Adjust the stage position to center the fiducial mark and click the **OK** button.

Fiducial	/erifyFiducial
•	Please adjust the stage position for fiducial #1 to the exact center of the alignment mark. Click OK or <enter> when ready or click Cancel or <esc> to quit.</esc></enter>
	Cancel

After centering the third fiducial mark and clicking the **OK** button, the **FiducialVerifyFiducials** window opens to display the specimen tilt in radians and degrees. A warning will be given if the sample is tilted at more than 0.5 degrees. Click this **OK** button.



Closing the FiducialVerifyFiducials window returns to the Select Fiducial Set dialog box.



Finally, click the **OK** button on the **Select Fiducial Set** dialog box. This opens the **FiducialSaveSelect** window to confirm the currently selected fiducial set.

FiducialS	aveSelect	×
•	Subsequent manual and digitized sample positions will be referenced to fiducial set number	1
	ΟΚ	

Click the OK button of the FiducialSaveSelect window.

The	fiducial	coordinate	positions a	are recorded	to disk	and the	Digitize!	dialog box return	IS.

C All Samples Select Stds Select All Delete All Delete Selected Samples Import from ASCII File Delete Selected Positions Export Selected Samples C Interval	O Unknowns Plot Fiducial O Wavescans Plot Fiducial O All Samples Sample Setups File Setups Select Stds Select All Confirm Delete All Auto Focus O New Sample Delete Selected Samples Import from ASCII File C Every Point O Digitized O Digitized C State	O Unknowns Plot Fiducials O Wavescans All Samples Sample Setups Select Stds Select All Confirm Delete All Auto Focus C New Sample Delete Selected Samples Import from ASCII File C Every Point Delete Selected Positions Export Selected Samples C Interval			u-selectj	(uouble-ciic	k to see data)-		Move
Wavescans Plot Fiducia All Samples Sample Sample Setup Select Stds File Setups Confirm Delete All Auto Focus Confirm Delete Selected Samples Import from ASCII File Cevery Point Delete Selected Positions Export Selected Samples Cinterval	O Wavescans Plot Fiducial O All Samples Sample Setups Select Stds File Setups Select All Confirm Delete All Auto Focus O Delete Selected Samples Import from ASCII File Delete Selected Positions Export Selected Samples	O Wavescans Plot Fiducials O All Samples Sample Setups Select Stds File Setups Select All Confirm Delete All Auto Focus Delete Selected Samples Import from ASCII File Delete Selected Positions Export Selected Samples		***************************************				D	igitize
Select Stds File Setups Select All Confirm Delete All Auto Focus Delete Selected Samples Import from ASCII File Delete Selected Positions Export Selected Samples	Select Stds File Setups Select All Confirm Delete All Auto Focus Delete Selected Samples Import from ASCII File Delete Selected Positions Export Selected Samples	Select Stds File Setups Select All Confirm Delete All Auto Focus Delete Selected Samples Import from ASCII File Delete Selected Positions Export Selected Samples	O Wa	vescans				Plot	Fiducial
Select All Confirm Delete All Auto Focus New Sample New Sample C Every Point D Digitized C Interval 	Select All Confirm Delete All Auto Focus Delete Selected Samples Import from ASCII File Delete Selected Positions Export Selected Samples	Select All Confirm Delete All Auto Focus New Sample New Sample Export from ASCII File Delete Selected Positions Export Selected Samples Interval 	C All	Samples				Samp	ole Setups
Delete All Import from ASCII File Delete Selected Samples Import from ASCII File Delete Selected Positions Export Selected Samples	Delete All Delete Selected Samples Import from ASCII File Delete Selected Positions Export Selected Samples C Interval	Delete All Auto Focus New Sample New Sample Export from ASCII File Delete Selected Positions Export Selected Samples Interval 	Sele	ct Stds				File	Setups
Delete Selected Samples Import from ASCII File C New Sample Delete Selected Positions Export Selected Samples C Interval	Delete Selected Samples Import from ASCII File C New Sample Delete Selected Positions Export Selected Samples C Digitized	Delete Selected Samples Import from ASCII File C New Sample Delete Selected Positions Export Selected Samples C Digitized C Interval C	Sel	ect All				C	onfirm
Delete Selected Samples Import from ASCII File C Every Point Delete Selected Positions Export Selected Samples C Digitized C Interval C	Delete Selected Samples Import from ASCII File C Every Point Delete Selected Positions Export Selected Samples C Digitized	Delete Selected Samples Import from ASCII File C Every Point Delete Selected Positions Export Selected Samples C Digitized	Del	ete All				100000000000000000000000000000000000000	
			204070233	M.997C7 552 557	052010500		07 305 NAME NO	C Eve C Dig	ery Point itized
fow X Y Z W Grain # Focus			2003	×	Y	Z	w		
			łow						
			<u>tow</u>						
			10 W						
			10 w						

The position of each of the standards in this standard mount must now be digitized. Move to the first standard; either by turning the motor controls manually or using the joystick via the JOYWIN (Joystick Control for Stage and Spectrometers) program or use the **Move** button in the **Digitize!** window. Clicking the **Move** button opens the **Move Motors and Change Crystals** dialog box.

Type in the appropriate target coordinates in the *Stage Target Positions* boxes for the first standard. Use the <tab> key to move between entries.

×	et Positions Y [Remove Faraday	Go
8.5	40.9		Update Positions	Positions
Z	- W	Increment	Free/Clear	Stage
10.7 Stage B	acklash	.01540	Jog Stage Jog Spectrometers	Close
Spectromet	er Target Positior	18		
1	2	3		
PET	TAP T	LIF	Y	Y
000 000	240.005	240.000		
239.998		22.00 PA		

Click **Go** or press <Enter> on the keyboard, this will drive the stage to the target positions. Check the position and optical focus.

Click the **Digitize** button of the **Digitize!** dialog box. This activates the **Digitize Sample Positions** dialog box. The *Standard Position Samples* list box contains the standards already added to the run.

Digitize Sample	Positions		L
Sample Type © Standard © Unknown © Wavescan	Sample Type o Create New Ur a new standa	w unknown position, click the Unkno ption, enter a sample name and click nknown or Wavescan button. To cre- ard position, click the Standard Sampl and select a standard from the Standa List.	th ate
Unknown or Wa		n Samples own or Wayescan	
	-		
Standard Positio 130 Calcite 131 Dolomite 132 Siderite 166 Strontianit	•		
130 Calcite 131 Dolomite 132 Siderite 166 Strontianit	•	AutoFocus On	
130 Calcite 131 Dolomite 132 Siderite 166 Strontianit	ie ment Grain	AutoFocus On Rectangular Grid	

Select (highlight) the first standard to digitize from the *Standard Position Samples* list box. The standard will be added automatically to the **Digitize!** *Position List*.

	Positions		
Sample Type — © Standard © Unknown © Wavescan	Sample Type o Create New Ur a new standa	w unknown position, click the ption, enter a sample name an nknown or Wavescan button. ard position, click the Standard nd select a standard from the List.	nd click th To create Sample
leferenced To F		Setup Number: O and File)NE	e Setup
Unknown or Wa	avescan Positio	n Samples	
Calcite			_
	eate New Unkn	ann as Itlanaann	
10.25		INNET TO WHY PSIGHT	
Lī	eate new onki	own or wavescan	
Standard Positi		own or wavescan	
		own or wavescan	
Standard Positi 130 Calcite 131 Dolomite		UWIN UI WAVESCAIN	
Standard Positi	on Samples —	UWIN UI WAVESDAM	
Standard Positi 130 Calcite 131 Dolomite 132 Siderite	on Samples —	UWIN DI WAYESDAN	
Standard Positi 130 Calcite 131 Dolomite 132 Siderite	on Samples —	UWN UI W dvestan	
Standard Positi 130 Calcite 131 Dolomite 132 Siderite	on Samples —	UWIN DI WAYESDAM	
Standard Positi 130 Calcite 131 Dolomite 132 Siderite	on Samples —	UWIN DI WAYESDAN	
Standard Positi 130 Calcite 131 Dolomite 132 Siderite 166 Strontiani	on Samples —	AutoFocus On	
Standard Positi 130 Calcite 131 Dolomite 132 Siderite 166 Strontiani	on Samples te ment Grain		id

To digitize a random point on this standard, click the **Random Point** button of the **Digitize Sample Positions** dialog box to record the current coordinates (X, Y, Z, and W) for this grain.

• Standards St 130 Fid 1 Calcite • Unknowns Plot • Wavescans All Samples • Select Stds Select All • Delete All • File Setups • Delete Selected Samples Import from ASCII File • Delete Selected Positions Export Selected Samples • Row X Y Z W Grain # • Focus • New Sample • New Sample • Delete Selected Positions • Export Selected Samples • O Interval			2	8		see data)-	1	Move
O All Samples Sample Setup: Select Stds File Setup: Select All Confirm Delete All Auto Focus Delete Selected Samples Import from ASCII File Delete Selected Positions Export Selected Samples Row X Y Z W Grain #			5t 130 F	I DI	Calcite		-	-
Select Stds File Setups Select All Confirm Delete All Auto Focus Delete Selected Samples Import from ASCII File Delete Selected Positions Export Selected Samples Row X Y Z W Grain #								
Select All Confirm Delete All		- 1					Samp	ole Setups
Delete All Auto Focus New Sample New Sample C Every Point C Digitized C Interval Row X Y Z W Grain # Focus	Sele	ct Stds					File	Setups
Delete Selected Samples Import from ASCII File C New Sample Delete Selected Positions Export Selected Samples C Digitized Row X Y Z W Grain # Focus	Sele	ect All					C	onfirm
Delete Selected Samples Import from ASCII File C Every Point Delete Selected Positions Export Selected Samples Digitized Row X Y Z W Grain # Focus	Dele	ete All						
Row X Y Z W Grain # Focus							C Eve	ry Point
	Delete			Exp	2			
1 8.50232 40.9534 10.7065 4 1 U					Z	W	Grain #	Focus
		10000		534	10.7065	4	1	0
		10000		534	10.7065	4	1	0
		10000		534	10.7065	4	1	0
		10000		534	10.7065	4	1	0
		10000		534	10.7065	4	1	0
		10000		534	10.7065	4	1	0

The coordinates of this standard in the **Digitize!** dialog box, are seen below.

Note, that although only one position per standard need be digitized, if additional points are digitized, PROBE FOR WINDOWS will automatically utilize them. Otherwise, PROBE FOR WINDOWS will simply increment the stage X position for each additional acquisition required.

Move to the next standard, select the standard from the list box in the **Digitize Sample Position** window and click the **Random Point** button again. The standard position will be digitized. Continue until all of the remaining standards in the standard block are digitized. In this example the **Digitize!** and **Digitize Sample Positions** dialog boxes would appear as follows.

🚔 Digiti:	ze!					_ 🗆 ×	📕 🚟 Digitize Sample Po	ositions	
 G Sta C Un C Wa C All Sele Sel Del 	on List (mu andards knowns avescans Samples ect Stds lect All lete All s Selected		Calcite Dolomite Siderite Strontianit	e	D Plot Samp File C. C. New C. New C. New C. Digi	Statement of the second se	© Standard © Unknown © Wavescan Referenced To Fidu Unknown or Wave Strontianite	Sample Type o Create New U a new stand Type option a ucial Set: 1, Nt sscan Positio	w unknown position, click the Unknown ption, enter a sample name and click the nknown or Wavescan button. To create and position, click the Standard Sample and select a standard from the Standard List. Setup Number: 0 and File Setup: DNE n Samples own or Wavescan
Row 1	× 22.79	Y	Z 10.6937	W 4	C Inte Grain # 1	Focus 0	Standard Position 130 Calcite 131 Dolomite 132 Siderite 166 Strontianite	Samples —	
KeV = File Se	and the second sec	Current = 30 E	3eam Size	= 2 S	etup Nurr	nber = 0	1 Increment Random Po Linear Trave	oint	AutoFocus On Rectangular Grid Polygon Grid

Close the **Digitize Sample Positions** dialog box by clicking the **Close** button in the upper right corner.

Finally, store the new pre-digitized standard coordinates to disk as an ASCII position file (.POS). Select all of the standards using the **Select Stds** button of the **Digitize!** dialog box.

All Sa Select Select	mples	166 Fid 1	Strontianit	e	Samp	la Catura
C -11					10000	Setups
Delete						onfirm o Focus
	elected Sa elected Pos		nport from / port Selecte	ASCII File ed Samples	C Eve	v Sample ry Point tized rval
łow	×	Y	z	W	Grain #	Focus
1	22.7921	40.8333	10.6937	4	1	0
5.5.9.C	X 22.7921		S DECL	A 200 C	and the second second	

Click the **Export Selected Samples** button.

This action opens both the **Standard Position File Name Strings** and the **Open File To Export Position Data To** windows. The **Standard Position File Name Strings** listing is from the PROBEWIN.INI file. In this example the Carbonate Standard Block is designated as STDPOS4.POS.

STDPOS1.PC STDPOS2.PC STDPOS3.PC STDPOS4.PC STDPOS5.PC STDPOS6.PC	ition File Name Strings DS = Rectangular A DS = Taylor with JEOL std DS = Rectangular B DS = Carbonates DS = Sulfides DS = User Defined DS = User Defined					
Open File To	Export Position Data To				?	×
Save in:	Probe Operators	-	£	ď	8-0- 8-0- 8-0-	
Images Manual Fil UNIVERS	les ITY_CLIENTS					
File <u>n</u> ame: Save as <u>t</u> ype:	untitled.pos ASCII Position Files (*.POS)		•		<u>S</u> ave Cancel	

The default directory (set by Advanced MicroBeam Inc.) for the *Save in:* location is C:\Program Files\Probe for Windows\UserData. This is the normal location for *.POS files. The default *Save in:* location is specified by the UserDataDirectory keyword in the PROBEWIN.INI file.

At Washington University the default directory path was changed for convenience. For the export of position data files, edit the path to C:\Program Files\Probe for Windows\UserData.

Type in the appropriate *File name:* as designated in the **Standard Position File Name Strings** (from the **PROBEWIN.INI file)**. Click the **Save** button of the **Open File To Export Position Data To** window.

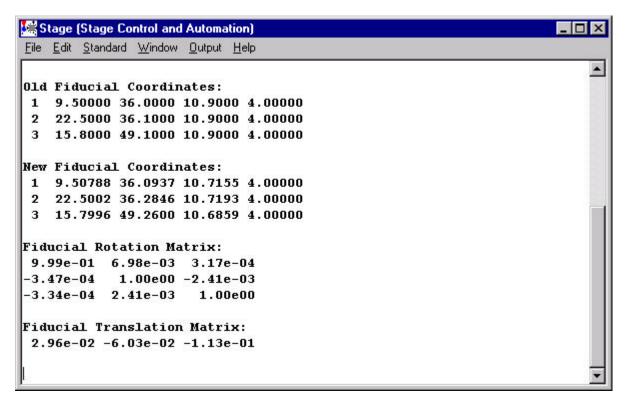
Open File To	Export Position Data To				? ×
Save jn:	🔁 UserData	•		e *	8-8- 8-8- 8-8-
Stdpos1.pd	20				
Stdpos2.pd					
Stdpos3.pd	20				
File <u>n</u> ame:	Stdpos4.pos				<u>S</u> ave
Save as type:	ASCII Position Files (*.POS)		-		Canad
outo do gipo.				-	Cancel

After the positions are written to disk, click the **OK** button to confirm the exported position coordinate data to disk in the **AutomateExportPositions** window.

Automate	eExportPositions
•	Position coordinate data exported to C:\Program Files\Probe for Windows\UserData\Stdpos4.pos
	[OK]

Close the **Digitize!** dialog box by clicking the **Close** button.

Close STAGE by clicking the **File** | **Exit** menu.



After digitizing all of the standards on the standard mounts and creating various STDPOSx.POS files, save these files to another directory and to a backup floppy.

Beam and Detector Stability

Testing beam (drift) stability is an important step prior to acquiring any quantitative data. The following step-bystep procedure illustrates how to monitor and plot beam current with time.

From the Desktop, double click on the yellow EPMA Software folder. Then, double click on the **Startwin** icon in the EPMA Software group.

		ninistrator\De	sktop\EPMA	Software	_ 🗆 ×
<u>File E</u> dit ⊻ie	ew <u>H</u> elp				
			٩	ø	
Calczaf	Edit MI Config File	Edit Probewin Config Files	Grapher 2.0	Graphppr Help	
ļ			2	×	
GS Scripter32	Joywin	Microlmage	Microlmage Help	Periodic Table	
		,	STD S	7	
Probe for Windows	Probewin Help	Stage	Standard	Startwin	
		JSER			
Surfer32	Testtc	Userwin			
1 object(s) selec	cted 8	305 bytes			11

This action launches the STARTWIN (Motion and Counter Control) program and brings up the **Confirm Motor and Crystal Positions** dialog box. Confirm that all of the motors (stage and spectrometer positions) and crystal designations are correctly calibrated. If there is disagreement between the mechanical positions (actual) and the software values, adjust the software values. Use the <tab> key to move between the various *Target Positions* boxes.

Startwin (Motion and Counter Control)			- 🗆 ×
<u>File Edit M</u> odes <u>X</u> ray <u>O</u> utput <u>W</u> indow <u>H</u> elp			31 21
This software is registered to : Dan Kremser Washington University			
Press the F1 key in any window for cont	ext sensitive help	2	
Initializing Advanced MicroBeam Interfa Loading DCX motor controller driver for DCX Driver version number 2 DCX Confirm Motor and Crystal Positions Get			×
DCX Stage Target Positions	Remove Faraday	OK	
Adv. X Y 19.0009 37.5251 Z W Increment	Update Positions Free/Clear	Positions Stage	
10.9710 1 Stage Backlash	Jog Stage Jog Spectrometers	Cancel	
Spectrometer Target Positions			
1 2 3 PET ▼ TAP ▼ LIF ▼ 240.003 240.004 240.000 Ca ▼ ka ▼ Si ▼ ka ▼ Fe ▼ ka ▼ ▼ Spectrometer Backlash			

Click the OK button to close the Confirm Motor and Crystal Positions dialog box when done.

The Count Acquisition window opens.

1	2		3	x	Y	z	W	
240.002 240	.004	240.	000	19.0009	37.5251	10.9710	1.00000	
Faraday		1		2	3			
. 00		00		. 00	.00			
.000000		•		•	•	xun.		50e10.
PHA				Count Ti	mes	Sta	art Count	Start Wavescan
Analytical Co	nditio	ns	Pe	ak/Scan	Ontions		Move	Start Peak Center

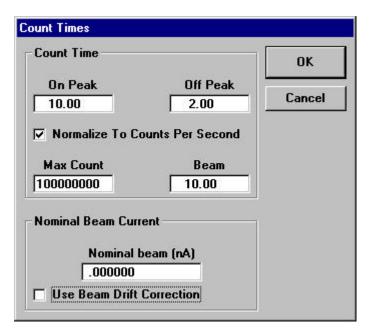
From the STARTWIN log window, select **Modes** from the menu bar and click on **Cycle Counters** from the menu choices. The **Measure Faraday** menu should also be selected.

🖾 Startwin (Motion and Counter Control)	
<u>File Edit Modes</u> Xray <u>O</u> utput <u>W</u> indow <u>H</u> elp	
Cycle Counters	
This so MoveloOffPeaks ered to :	
Dan Kre Measure Off Peaks	
₩ashing ✓ Measure Earaday	
Measure <u>A</u> bsorbed	
Press t he F1 key in any window for context sensitive help	
Initializing Advanced MicroBeam Interface	
Loading DCX motor controller driver for board O	
DCX Driver version number 2	
DCX DLL version number 2	
Getting DCX motor controller configuration for board O	
DCX initialization completed	
Advanced MicroBeam Interface Initialized	
ana na manana manana na manana ka ana na pana ka ana na pana na	
	T

Next. c	lick the	Count Time	es button in th	e Count Ac	quisition window.
		000000			quebelon a mao a l

1	2	3	x	Y	Z	W	
240.002 240	.004	240.000	19.0009	37.5251	10.9710	1.00000	
Faraday		1	2	3			
.00	. 0	0	.00	.00			
.000000		-	•	•	80.		50011.
PHA			Count Ti	mes	Sta	art Count	Start Wavescan
Analytical Co	ndition	。 Pa	ak/Scan	Ontione	<u> </u>	Move	Start Peak Center

This opens the **Count Times** dialog box. Choose an *On Peak* count time, this will be the interval of time between successive beam measurements. Finally, disable the beam drift correction, confirm that the *Use Beam Drift Correction* box is unchecked.



Click the **OK** button returning to the **Count Acquisition** window.

Click the **Start Count** button to initiate a continuous cycle of beam current measurements. In this example, a ten second scalar count will be done followed by a Faraday current measurement. This process repeats until the user cancels the loop.

1	2	3	x	Y	z	W	
240.002 240	.004	240.000	19.0009	37.5251	10.9710	1.00000	
araday		1	2	3			
.00	. 0	0	.00	.00			
. 000000				•	2015		427.07
PHA			Count Ti	mes	Sta	art Count	Start Wavescan
Analytical Co	ndition	• Po	ak/Scan	Ontione	8v.	Move	Start Peak Center

When the user has acquired a suitable number of beam current measurements, click the **Cancel** button in the **Automation Status** window to stop the acquisition cycle.

The STARTWIN log window will contain the beam current data acquired so far (in this example, reported in nanoamps). The other three columns represent counts in counts per second acquired by each spectrometer with the beam blanked (essentially detector/electronics noise).

🚺 Sta	artwin (Motic	on and	l Counte	er Control]		
<u>F</u> ile <u>E</u>	<u>E</u> dit <u>M</u> odes	⊠ray	<u>O</u> utput	<u>W</u> indow	<u>H</u> elp		
30.	4450		1	.7		.6	
30.	4460		2	.1		.7	
30.	4430		6	.4		. 5	
30.	4420		6	.6		.8	
30.	4370		6	.4		.4	
30.	4380	. 4	1	.1		.3	
30.	4300		2	.2		. 2	
30.	4250	2	5	.3		.7	
30.	4210		5	.4		.3	
	4200	.:		. 5		. 2	
	4190	0	6	. 5		. 8	
30.	4090		2	.8		.6	
	4090			. 5		.6	
	4090		6	.4		.3	
	4050			. 2		.4	
	3990			.3		. 5	
	3980			.6		.4	
	4000			.4		.7	
	3900			.3		.6	
	3800	. :		. 5		.6	
	3870	. :		.1		.6	
	3810	0		. 2		.3	
	3830	0		. 2		. 2	
	3890			. 5		.3	
	3810	. 1		.6		.4	
	3880			.6		. 2	
	3820			. 4		.3	
	3740			.9		.3	
	3740			.1		.3	
30.3	3730	-	7	.2		. 5	
							•
<u></u>							

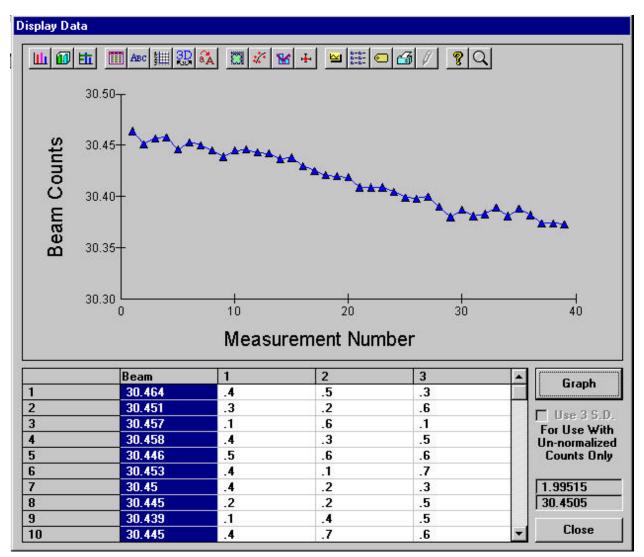
Startwin (Mot					
le <u>E</u> dit <u>M</u> odes	s <u>X</u> ray <mark>Outp</mark> u	ut <u>W</u> indow <u>I</u>	<u>H</u> elp		
	and the second se	g Window Font			
30.4640	<u>D</u> e	bug Mode			
30.4510	<u>E</u> xt	ended Format			
30.4570	<u>S</u> av	ve To Disk Log	1		
30.4580	ie <u>V</u> ie	w Disk Log			
30.4460					
30.4530		t Count Data			
30.4500	List	Spectrometer 9	setup		
30.4450	00	en Link To Exc	el		
30.4390		se Link To Exc	1250		
30.4450	- Construction				
30.4460	.2	71	.7		
30.4430	.6	.4	.5		
30.4420	.6	.6	.8		
30.4370	.6	.4	. 4		
30.4380	. 4	.1	.3		
30.4300	.2	.2	. 2		
30.4250	. 5	.3	.7		
30.4210	.5	.4	.3		
30.4200	.3	.5	. 2		
30.4190	. 6	. 5	. 8		
30.4090	.2	.8	.6		
30.4090	.9	. 5	.6		
30.4090	.6	. 4	.3		
30.4050	.5	. 2	. 4		
30.3990	. 2	.3	. 5		
30.3980	.3	.6	. 4		
30.4000	.0	. 4	.7		
30.3900	.2	.3	.6		
30.3800	.2	. 5	.6		
30.3870	.2	.1	.6		
30.3810	. 0	.2	.3		

Evaluating the trend between beam current and time may best be viewed in graphical format rather than in looking at a long series of numbers. Use the mouse to select the data set to graph. Then, select **Output** from the menu bar and click **Plot Count Data** from the drop-down menu choices.

This opens the **Display Data** window.

Display Data	ABC # 20	ñ 🕅 🦑	8 +	□ <u>6</u> // <u></u> ?	ما	
	Beam	1	2	3		
1	30,464	.4	.5	.3	-	Graph
2	30.451	.3	.2	.6		E 10 - 2 2 0
3	30.457	.1	.6	.1		For Use 3 S.D.
4	30.458	.4	.3	.5		Un-normalized
5	30.446	.5	.6	.6		Counts Only
6	30.453	.4	.1	.7		
7	30.45	.4	.2	.3		
8		.4 .2				
	30.45		.2	.3		Close

While all data columns were selected by the mouse operation previously, the user may plot a single column of data by clicking the column label of the desired data and then clicking the **Graph** button.



Below, Beam Counts versus Measurement Number (time) are graphed and the overall beam stability with time may be judged.

Click the **Close** button to return to the STARTWIN log window.

Brass Alloy Run

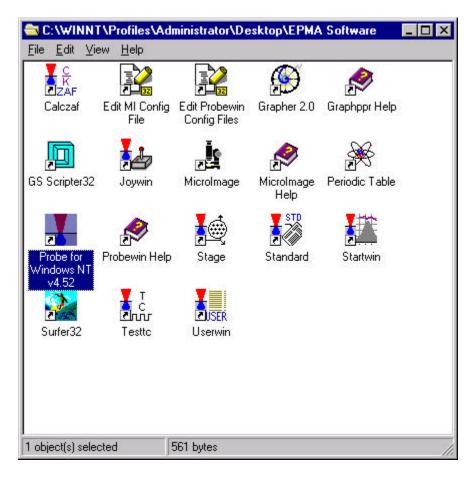
Introduction

This document illustrates step by step how to set up a new PROBE FOR WINDOWS quantitative run and how to analyze an unknown two element alloy sample. This documentation was produced on a three spectrometer JEOL 733 electron microprobe. Your particular run may look very different depending on the specific configuration of your microprobe. This document should be used in conjunction with the User's Guide and Reference documentation and on-line help.

This run will demonstrate some of the basic features of the PROBE FOR WINDOWS program. These include the use of manual and automated spectrometer peaking, manual and automated standard count acquisition and manual unknown sample acquisition. The use of pre-digitized standard positions, the unique wavescan option, off-peak adjustment capabilities and data output methods will be illustrated.

Opening Probe for Windows

From the Desktop, double-click on the yellow EPMA Software folder opening the EPMA Software group. Double click on the **Probe for Windows ...** icon.



Upon launching PROBEWIN (PROBE FOR WINDOWS), the main log window appears along with the **RealTimeInitInterface** window as illustrated below. To collect real time data click the **Yes** button. The program can also be run off-line without the microprobe interface to re-process previously acquired data or on another computer.

Probewin (Probe For Wind	lows)		_ 🗆 ×
<u>File E</u> dit <u>S</u> tandard <u>X</u> ray <u>A</u> n	alytical <u>R</u> un <u>O</u> utput <u>H</u> elp		
Acquire!	Analyze!	Automate!	Plot!
	novan, Copyright (c) RealTimeInitInterface Do you want to interface	/98/NT (32 bit) v. 4. 1995-1999 John J. Don	20.65 Sec.

This action causes the **Confirm Motor and Crystal Positions** dialog box to open. Confirm that all of the motors (stage and spectrometer positions) and crystal designations are correctly calibrated. If there is disagreement between the mechanical positions (actual) and the software values, adjust the software values. Use the <tab> key to move between the *Target Positions* text boxes. Click the **OK** button after you have finished to close the **Confirm Motor and Crystal Positions** dialog box.

Stage Target Positions	Remove Faraday	ОК
19.3958 35.6862	Update Positions	Positions
Z W Increment	Free/Clear	Stage
11.0071 1 □ Stage Backlash .01540	Jog Stage Jog Spectrometers	Cancel
Spectrometer Target Positions		
1 2 3 PET ▼ LiF ▼ 240.004 240.006 239.999		
Ca y ka y Fe y ka y Fe y ka y		

The main PROBE FOR WINDOWS log window is now visible as seen below.

Probewin (Probe For Wind	ows)		_ 🗆 ×
<u>File E</u> dit <u>S</u> tandard <u>X</u> ray <u>A</u> n	alytical <u>R</u> un <u>O</u> utput <u>H</u> elp		
Acquire!	Analyzel	Automate!	Plot
Written by John J. D	onovan, Copyright (c)	1995-1999 John J. Do	novan 🔺
This software is reg Dan Kremser Washington University Press the F1 key in -	K Construction of the second se	kt sensitive help	
Initializing Advance Loading DCX motor com	ntroller driver for B		
DCX Driver version numb DCX DLL version numb Getting DCX motor co DCX initialization co	er 2 ntroller configuratio	on for board O	
Advanced MicroBeam I	2 : 2 - 2 : 2 : 2 : 2 : 2 : 2 : 2 : 2 :		-

Creating a New Run

To create a new sample run, select **File** from the menu bar and click **New** from the menu.

💾 Probewin (Probe For Windows)		_ 🗆 ×
<u>File E</u> dit <u>Standard Xray Analytical Run Output H</u> elp		
New	Automate!	Plot!
Open Save <u>A</u> s <u>C</u> lose	-1999 John J. Dor	novan 🔺
<u>F</u> ind File		
File Information Compact_	sitive help	
<u>P</u> rint Log Print Set <u>u</u> p	0	
E <u>x</u> it		
E:\Probe Operators\UNIVERSITY_CLIENTS\Plank\tpglas01.MDB E:\Probe Operators\UNIVERSITY_CLIENTS\Plank\tpfeld01.MDB E:\Probe Operators\UNIVERSITY_CLIENTS\Kuebler\kkamph01.MDB E:\Probe Operators\UNIVERSITY_CLIENTS\Pogue\epfeld01.MDB	board O	<u> </u>

The **Open New Probe Database File** dialog box opens.

Open New P	robe Database File				? ×
Save jn:	🔁 Probe Operators	•	E	<u>r</u>	\$-6- 6-6-
COMMER	CIAL_CLIENTS				
Images					
Manual Fi	es ITY_CLIENTS				
	TIT_CLIENTS				
1				(i)	
File <u>n</u> ame:	<mark>*.mdb</mark>				<u>S</u> ave
Save as type:	*.MDB (*.MDB)		-		Cancel
N				-	

Change the *Save in:* location (directory) if desired and type an appropriate run name into the *File name* text box.

The initial *Save in:* location is specified by the UserDataDirectory keyword in the PROBEWIN.INI file. File names longer than 8 characters are now supported.

The screen capture of the first window in this section indicates that other probe runs (previous four listed) are already established. Any of the existing old runs maybe re-opened to acquire additional data or used as a "setup" file for starting a new run. In this example, a new file designated BRASS01.MDB will be created in the Manual Files directory.

pen new r	robe Database File			?
Savejn:	🔄 Manual Files	•		8-0- 5-0- 0-0-
ile <u>n</u> ame:	brass01		-	Save

Close the **Open New Probe Database File** window by clicking the **Save** button. This action opens the **File Information** dialog box.

Enter the relevant information for the new run into the *User, Title*, and other *Description* text boxes. Use the <tab> key to move between text boxes. When finished, click the **OK** button.

File Name	E:\Probe Operators\M	anual Files\br	ass01.MDB	
Version	4.52	Туре	PROBE	ок
User	Dan Kremser			Cancel
Title	Brass Analysis Routin	e		
Department	Earth and Planetary S	cience		
Account #		Group		
Description Insert <cr> >></cr>	Probe for Windows N Brass schedule for Cu		. Hardware	
Date Created	9/27/99 1:10:49 PM	Date	Modified 9/27/99	1:10:49 PM
Last Updated	9/27/99 1:10:49 PM			

This returns the program to the main PROBE FOR WINDOWS log window. Now the four main Probe buttons: Acquire!, Analyze!, Automate!, and Plot! become active.

<u>File E</u> dit <u>S</u> tandard <u>X</u> ray <u>A</u> nalytical <u>R</u> un <u>O</u> utput <u>H</u> elp	
Acquire! Analyze! Automate! Plot!	
Written by John J. Donovan, Copyright (c) 1995-1999 John J. Donovan	
This software is registered to : Dan Kremser Washington University Press the F1 key in any window for context sensitive help	
Initializing Advanced MicroBeam Interface	
Loading DCX motor controller driver for board O DCX Driver version number 2 DCX DLL version number 2 Getting DCX motor controller configuration for board O DCX initialization completed Advanced MicroBeam Interface Initialized	

Parameter Initialization

Analytical Standard Selection

Select the analytical standards to be used in the new probe run. From the main PROBE FOR WINDOWS log window, click **Standard** from the menu bar and select **Add Standards to Run** from the menu.

Probe For Windows [E:\Probe C	perators\Manual Files\	brass01.MDB]	
Eile Edit Standard Xray Analytical	<u>R</u> un <u>O</u> utput <u>H</u> elp		
<u>S</u> tandard Database	Analyze!	Automate!	Plot!
Written 2 Control of Control	n, Copyright (c)	1995–1999 John J. Dor	novan 🔺
This software is register Dan Kremser Washington University Press the F1 key in any w		t sensitive help	
Initializing Advanced Mic Loading DCX motor control DCX Driver version number	Ller driver for b r 2		
DCX DLL version number 3 Getting DCX motor control DCX initialization comple Advanced MicroBeam Inters	- Ller configuratio eted	n for board O	-

This opens the **Add Standards to Run** dialog box.

0 REE1 glass 🔺 🔺	
2 REE3 glass	
5 CoDi glass	
26 Rhodonite	
27 Jadeite	
2 Olivine	
3 Olivine	
0 Garnet	
1 Ilmenite	
is CPX	
6 CPX Hedenbergite	
O Glass CAM-112	
'3 Chromite 💌	

All previously entered standards in the default standard database are accessible. Scroll through the *Available Standards in Database* list box to find the copper and zinc metal standards to be used in this run. Select each and click the **Add To Run** >> button to add each to the *Current Standards in Run* list box.

523 Vanadium Taylor 524 JEOL Chromium 525 Manganese metal Taylor 526 JEOL Iron 527 Cobalt metal Taylor 528 JEOL Nickel 529 JEOL Copper 530 Zinc Taylor 532 Germanium taylor 540 JEOL Zirconium 541 Niobium Taylor		529 JEOL Copper 530 Zinc Taylor	
542 JEOL Molybdenum 545 Rhodium Taylor 547 Silver Taylor	Add To R		OK
<u> </u>			Cancel

Click the **OK** button of the **Add Standards to Run** window when finished selecting standards. This returns the program to the main log window.

Nominal Beam Current Measurement

Click the **Acquire!** button. This action opens both the **Acquire!** dialog box and the **AcquireCheckNominal** window for the determination of the nominal beam current.

Acquire!				_			_	_		_
1 2	3	х	Y	:	z	W				
240.003 240.007 2	40.000	19.3957	35.686	2 11.00	71 1.	00000				
Faraday 1		2	3							
AcquireChecl	k Nomina	il.							×	-
.0000		n current is	zero. Do yo	ou want to	acquire	the nor	ninal be	am currer		isitio
.0000			zero. Do yo Yes		acquire Cancel	the nor	minal be	am currer		
. 0000					ancel	the nor				isitio ption

Click the **Yes** button of the **AcquireCheckNominal** window to establish a reference beam current reading. The beam (Faraday Cup counts on a JEOL 733 microprobe) is then measured. In this example the Faraday reading was taken for 10 seconds and recorded 30488 counts or 30.488 nA of beam current.

Acquire!								
1	2	3	х	Y	z	w w		
240.003 240	006 239	.999 19.	3958 3	35.6862	11.007	L .999987		
Faraday	1	2		3				
10.00	.00	.00		. 00				
30488.0				•				
	Cur	rent Samp	e			Start Standar	d or Unki	nown Acquisition
					<u> </u>	Start Waves	scan	Special Options
New Sam	ple		locate			Move	Ace	quisition Options
Elements/Ca	tions		PHA		Peak/	Scan Options	St	art Peak Center
Analytical Cor	ditions	Co	unt Tim	2.8	R	ate Meter		Peaking

Creating a New Sample

Click the **New Sample** button of the **Acquire!** dialog box. This opens the **New Sample** dialog box.

ОК	Cancel		
	Lancei		
Load Element Setup			
Load Sample Setup			
Load Fi	ile Setup		
es to the elem	ent setup.		
n	100		
	- -		
	t below, cancel Add Standards ain menu		
	Load Sar Load F ard sample ela ast unknown alyzed elemen wn sample ar es to the elem n n		

Select *Unknown* from the *New Sample Type* buttons. Type an appropriate sample name and description into the *New Sample Name* and *New Sample Description* text boxes. This first sample will be used as a "template", only to establish the analysis parameters.

New Sample Ty	pe OK Cancel
Unknown	Load Element Setup
C Wavescan	Load Sample Setup
	Load File Setup
create a new	he analyzed elements in a run, fir unknown sample and make any hanges to the element setup.
create a new necessary c New Sample Nam setup	unknown sample and make any hanges to the element setup. e
create a new necessary c New Sample Nam setup New Sample Des Insert <cr> >></cr>	unknown sample and make any hanges to the element setup. e

Click the **OK** button of the **New Sample** dialog box.

The program returns to the **Acquire!** window. Notice that the first sample designated $Un \ 1 \ *$ *setup* is now listed in the *Current Sample* text box. The * symbol indicating that no data has been collected for this sample yet.

Acquire!								
1	2	3	x	Y	z	W		
240.003 240.0	06 239	999 19	. 3958	35.6862	11.0071	.999987		
Faraday	1	2		3				
10.00	.00	. 00)	.00				
30488.0								
	Curre	ent Samp	ole			Start Standard	l or Uni	nown Acquisition
Jn 1 * setup								
)ata Ro w s: O		Good Da	ata Ro	ws: O		Start Waves	can	Special Options
Ne w Sample		Locate				Move	Ac	quisition Options
Elements/Catio	ents/Cations PHA		Peak/Scan Options		S	Start Peak Center		
Analytical Condit	tions	Count Times		Ra	ate Meter		Peaking	

Setting Analytical Conditions

Click the **Analytical Conditions** button to open the **Analytical Conditions** dialog box. Enter the appropriate numbers into the *Kilovolts, Beam Current*, and *Beam Size* text boxes for the currently *Selected Sample*. The *Kilovolts, Beam Current*, and *Beam Size* will need to be manually adjusted if a column digital interface is not present.

elected Samples -			OK
Jn 1 * setup			Cance
nter New Condition	nsForUn 1≛s	etup	

Click the **OK** button when done, returning to the **Acquire!** window.

Element, X-Ray Line and Spectrometer Parameters Selection

Next, the user specifies the elements to be analyzed. Click the **Elements/Cations** button.

Acquire!								
1 2	3	x	Y	z	W			
240.003 240.006	5 239.999	19.3958	35.6862	11.0071	.999987			
Faraday	1	2	3					
10.00 .	00	.00	.00					
30488.0	•	•	•					
	Current 9	ample			Start Standard	or Unk	nown Acquisition	
Jn 1 * setup							4	
)ata Rows: 0	Goo	d Data Ro	ws: O		Start Wavesc	an	Special Options	
Ne w Sample		Locate			Move	Acc	uisition Options	
Elements/Cation	ons PHA			Peak/	Scan Options	Sta	Start Peak Center	
Analytical Condition	ons	Count Ti	nes	Ra	ite Meter		Peaking	

This action opens the **Analyzed and Specified Elements** dialog box. Click on any empty row in the spreadsheet to enter the first element to analyze. The user may enter the analyzed elements in any order however, the analysis output will follow this order.

Selected : Un 1 *	setup				ОК	Cancel		
					Load Element Setup			
					Load Sample Setup			
Channel	Element	X-Ray	Analyzed	Motor	Crystal	On-Peak 4		

This opens the **Element Properties** dialog box.

Element	roperties For: X-Ray Li				Dxygens	ок
				• 0	oxygens ▼	Cancel
Leave the X Element (ED	Delete					
Off Peak Correc	tion Type					
🕑 Linear	C Averag	je	C High Only	0	Low Only	C Exponentia
C MAN		Relative Offset			Low Off-Peak Interfere	
						2
Spectrometer	Crysta	2	On-Peak		h Off-Peak 0000	Low Off-Peak

In the *Element* field either type in the first element to analyze or use the drop-down menu to select the element symbol. Certain default values listed in this window are based on parameters entered into the previously established configuration files.

Element	Properties Fo X-Ray		ations	Oxygens	OK		
CU	▼ ka	Image: Control of the second seco	- 1		Cancel		
mn fe co ni	 -ray Line Blank to Indicate an Un-Analyzed S, Specified, by Difference or Stoichiometry) 						
cu zn ga ge	ion Type — C Aver	age OH	igh Only	🔿 Low Only	C Exponentia		
Parameters (no -Background		ground Type ca Off-Peak Er		andards and Unk	(nowns)		
 Off Peak ○ MAN 		 Absolute Relative 	1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 -	Low Off-Peak Interferences			
					2		
Crackerste			Desk	Ulah Off Deale	Law Off Paak		
Spectromete	r Crys	tal Or 0000		High Off-Peak .000000	Low Off-Peak		

Under the *Enter Element Properties For* section (top of the **Element Properties** dialog box) choose the correct *X-Ray Line, Cations,* and *Oxygens* for the first element.

Elemer		operties Fo X-Ray		Cation	2	Oxygei	ns	OK
cu	-	ka		1	-		•	Cancel
				o Indicate Difference				Delete
Dff Peak C € Linear	orrecti	on Type – O Aver	age	O High O	nly	O Low O	nly (C Exponential
Parameters Backgrou ⓒ Off Pe ⓒ MAN	nd Typ		Off-Pe	pe can diff ak Entry – solute Posi lative Offso	tion	HiO	lff-Peak li	owns) nterferences Interferences
	eter	Crys LiF	tal	On-Pea 107.220		High Off-I 110.410		.ow Off-Peak 04.030

Continue by selecting the *Off Peak Correction Type* and *Background Type*. Two background correction methods are available to the user; off-peak and the MAN (mean atomic number) method (see the User's Guide and Reference documentation for a complete discussion of both types). Next, click the text box under *Spectrometer* and enter the appropriate spectrometer number that will be used to analyze the first element. The drop-down menu may also be used to select the spectrometer number. Choosing a spectrometer number loads various parameters from the configuration files. Each of these parameters in this window should be inspected and edited as needed (use the <tab> key to move between boxes). Accept the nominal *On-* and *Off-Peak* positions listed here. They can be changed later, if necessary.

The next screen shows the edited **Element Properties** dialog box for copper metal.

Enter Element Propertie	es For:		ОК
	Ray Line Cations	Oxygens	
cu 💌 ka	<u> </u>		Cancel
	Line Blank to Indicate an Un ecified, by Difference or Sto		Delete
Off Peak Correction Ty	pe		
● Linear O	Average C High Only	C Low Only (C Exponentia
Parameters (note that F	Background Type can differ for St	andards and Unkno	nimute)
-			ins)
Background Type	Off-Peak Entry	Hi Off-Peak II	nterferences
Off Peak MAN	 Absolute Position Relative Offset 		
C MAN	C Heldure Offset	Low Off-Peak	Interferences
Spectrometer	Crystal On-Peak	High Off-Peak I	_ow Off-Peak
Spectrometer 2 v LiF			_ow Off-Peak 04.030

Click the **OK** button of the **Element Properties** dialog box to accept these element parameters for copper.

The program returns to the **Analyzed and Specified Elements** window with copper now entered into the *Element/Cations Parameters* table.

Selected Un 1 *	setup			— L	ОК	Cance
					Load El	ement Setup
					Load S	ample Setup
010000000000000000						pty row to ad
Channel	Element	X-Ray	Analyzed	Motor	Crystal	On-Peak
Channel I	Element cu	X-Hay ka	Analyzed Yes	Motor 2	LiF	0n-Peak 107.220
Channel 1	and the second se			and a second second second	and the second second second	
Channel 1	and the second se			and a second second second	and the second second second	
Channel 1	and the second se			and a second second second	and the second second second	

Enter the next element in the run by clicking on any empty row of the **Analyzed and Specified Elements** window. This opens the **Element Properties** dialog box again. Enter the appropriate *Element, Spectrometer* and adjust all other text boxes and buttons. The completed **Element Properties** window for zinc is shown below.

Element	roperties For: X-Ray L		Cations		Oxygens	ОК
zn 💌	ka	• 1	Cations	• 0		Cancel
Leave the 2 Element (ED						Delete
Off Peak Correc ⊙ Linear	tion Type — O Avera	ge C	High Only	• •	Lo w Only	C Exponenti
Parameters (not -Background Ty © Off Peak		Off-Peak				nknowns) ak Interferences
C MAN			ive Offset	•	Low Off-Pe	eak Interferences
						<u>-</u>
Spectrometer	Crusta	al	On-Peak	Hi	ah Off-Peak	Low Off-Peak
Spectrometer 3	Crysta] [LIF		On-Peak 3.8904		gh Off-Peak 3.195	Low Off-Peak

Click the **OK** button of the **Element Properties** to enter zinc into the *Element/Cations Parameters* table of the **Analyzed and Specified Elements** window.

Click the **OK** button of the **Analyzed and Specified Elements** window when done entering elements in the run.

	Samples setup			_	ОК	Cance	el
					Load El	ement Setup	,
					Load S	ample Setup	
Click Eler Channel	Element	X-Ray	Analyzed	Motor	Crystal	On-Peak	dc
1	CU	ka	Yes	2	LiF	107.220	
2	zn	ka	Yes	3	LIF	99.8904	

The **GetElmLoadDefaultStds** window opens to inform the user that standard assignments have been made based on elemental concentrations. Standard assignments may be edited via the **Analyze!** window (see User's Guide and Reference documentation).

GetElmL	oadDefaultStds
٩	Default standard assignments were loaded for the sample(s) based on the highest concentration of the element in the standards. It may be necessary to modify these default standard assignments for best results.
	<u>OK</u>

Click **OK** to return to the main **Acquire!** window.

Setting Count Times

Click the **Count Times** button of the **Acquire!** window. This opens the **Count Times** dialog box. Here various parameters relating to counting times can be adjusted. Initially *On-Peak* count time is set for 10 seconds and both *Hi-Peak* and *Lo-Peak* times are set for 2 seconds based on the configuration file defaults.

Channel	Element	Motor	Crystal	On-Peak	Hi-Peak	Lo-Peak	MaxCou Factor	Wave	Peak	Quic
1	cu ka	2	LiF	10.00	2.00	2.00	100000(1	6.00	8.00	.50
2	zn ka	3	LIF	10.00	2.00	2.00	100000(1	6.00	8.00	.50

Click the **OK** button of the **Count Times** dialog box to accept these count times and return to the **Acquire!** window.

This completes the initial parameter setup phase for this new run.

Manual Peaking using the Acquire! Window

The user may now manually peak center the copper and zinc peak positions from the **Acquire!** window.

Move to the copper standard by clicking the **Move** button. This opens the **Move Motors and Change Crystals** dialog box. Enter the coordinates of copper metal standard into the *Stage Target Positions* text boxes. Inspect the spectrometer crystal type and position text boxes, edit if required. Alternatively, the user may select the element and x-ray line from the drop-down lists and send the spectrometer directly to the theoretical position. Finally, click the **Go** button.

X	t Positions		Remove Faraday	Go
13.8	22.2		Update Positions	Positions
Z	W	Increment	Free/Clear	Stage
11 🗖 Stage Ba	2 cklash	.01540	Jog Stage Jog Spectrometers	Close
Spectromete	r Target Positions	1		
1	2	3		
PET	LiF 💌	LIF 💌	7	7
240.003	107.2199	239.999		
	. 🚺 🕶 🗛 🕶	Fe ▼ ka ▼		
Ca 💌 ka 🕚				And St. And St. And
	ete Fe 🔺 ash			
	ete Fe 🔺 ash Co			

The stage motors will move the stage to the expected position of the copper metal standard. Inspect the final X, Y location of the standard, adjust if necessary and check the focus.

Acquire!							
1 2	3	x	Y 2	x w			
240.003 107.220 23	9.999 13.	7599 22.19	91 10.907	1 1.99999			
Faraday 1	2	3					
10.00 .00	.00	.00					
30488.0 .		•					
Lur Un 1 * setup	rent Sampl	e		Start Standard	or Unk	nown Acquisition	
Data Rows: 0					an	Special Option	
New Sample	The Contract Contract Contract Contract	.ocate		Move	Ac	quisition Options	
Elements/Cations	РНА		Peak.	Peak/Scan Options		Start Peak Center	
Analytical Conditions	Cou	int Times	- - R	Rate Meter		Peaking	
eak Center -Elements to Peak (mul cu ka Motor 2 LiF zn ka Motor 3 LIF	ti-select) -	Peak Cent Interva Parabo ROM B	l Halving lic Fit			OK Cancel	
Plot Selected Peak	Center	And a second	Spectrome	ter Pre-Scan for s If Selected	Confi	mation	

Click the **Peaking** button of the **Acquire!** window.

From the *Peak Center Method* group, choose *Interval Halving* (see User's Guide and Reference documentation for discussion of various Peak Center methods) and click *Display Spectrometer Pre-Scan for Confirmation* from the *Peak Center Options* choices. Finally, select the *cu ka Motor 2 LiF* selection under the *Elements to Peak* list box. The **Peak Center** window should appear as follows.

Elements to Peak (multi-select) -	Peak Center Method	ОК
cu ka Motor 2 LiF zn ka Motor 3 LIF	 Interval Halving Parabolic Fit 	
	C ROM Based	Cancel
	Peak Center Options ✓ Display Spectrometer Pre-So ✓ Move To On Peaks If Select	

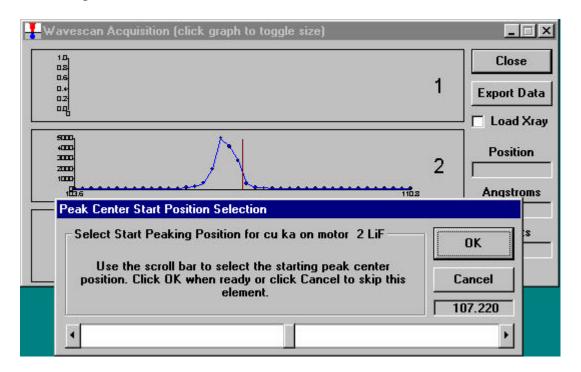
Click the **OK** button to close the **Peak Center** dialog box.

Acquire!							
1 2	3	x	Y	z	W		
240.003 107.220 23	39.999 13.	7599 22.	1991 1	0.9071	1.99999		
Faraday 1	2	3	F				
10.00 .00	.00	. 01)				
30488.0 .							
	rrent Sampl	e		[Start Standard	or Unk	nown Acquisition
Un 1 * setup Data Rows: 0	Good Da	ta Rows:	0	=	Start Wavesca	an	Special Options
New Sample		.ocate		2.55	Move	Ac	quisition Options
Elements/Cations		PHA		Peak/S	ican Options	St	art Peak Center
Analytical Conditions	Cou	unt Times		Ba	te Meter		Peaking

Click the **Start Peak Center** button in the **Acquire!** window.

spectrometer peak pre-scan (40 step, user defined parameter) on spectrometer 2 in the copper K α region.

Upon completion of the spectrometer pre-scan the **Peak Center Start Position Selection** window opens.



Slide the scroll bar to move the vertical (red) peak line to match the actual x-ray maximum position. This selects a starting peak center position for the peaking routine.

<pre>/avescan Acquisition (click graph to toggle size)</pre>		
1D D2		Close
os o.↓ o2 og	1	Export D
	2	Coad≯ Positio Angstro
Peak Center Start Position Selection		
- Select Start Peaking Position for cu ka on motor 2 LiF Use the scroll bar to select the starting peak center		ок
 position. Click OK when ready or click Cancel to skip this element. 	C	ancel
element		223

Click the **OK** button when manually centered. This initiates a peak center routine to locate the precise peak center for copper K α x-rays. The results for copper appear in the main log window, displayed below.

		1		•			1		
	Acquire!		Analy	ze!		Automate!		Plo	d!
		0.494			10		/5/		
Մո 1	setup								Ī
TakeOff	= 40 Kild	Volts	= 20 Be-	am Curren	t = 30	Beam Size	e = 2		
Off-Pea	k Corrected	l or MA	N On-Peal	k X-ray C	ounts:				
ELEM:	cu ka z	zn ka 🗄	BEAM						
BGD :	OFF	OFF							
MOT:	2	3							
CRYS:	LiF	LIF							
ORDR :	1	1							
Start p	os, cps and	l P/B f	or cu ka	on motor	2 are	106.793	5206.6	63.6	58.8
Stop p	os, cps and	l P/B f	or cu ka	on motor	2 are	106.839	5414.0	63.6	58.8
Interva	L Peak Cent	ter Res	ults:						
	t Spectr	Peaked	OnPeak	StartI	StopI	StartPB	StopPB		
Elemen	a 2 LiF	Yes	106.839	5206.6	5414.0	85.09	88.48		
Elemen cu k	a z LIF								

Zinc K α may also be peaked in this manner. First click the **Move** button of the **Acquire!** window to access the **Move Motors and Change Crystals** dialog box. Enter the appropriate stage target positions for the zinc metal standard and click the **Go** button. When the stage motors stop moving, inspect the location, and adjust the optical focus if necessary. Close the **Move Motors and Change Crystals** window. Then click the **Peaking** button as in the copper example. **Remember** to highlight only *zn ka Motor 3 LIF* this time. Close the **Peak Center** window and finally click the **Start Peak Center** button of the **Acquire!** window.

The results for zinc $K\!\alpha$ appear below.

<u>F</u> ile <u>E</u> dit <u>S</u> t	All the result	- 10 Mar 1		anual Files\I ut <u>H</u> elp					
Ac	quire!		Analyz	e!		Automate!		Plot!	
	Spectr 2 LiF 3 LIF 5, cps an	Peaked Yes No d P/B fo	OnPeak 106.839 99.8904 or zn ka	StartI 5206.6 .0 on motor on motor	5414.0 .0 3 are	.00 99.7089		51.9 51.9	42. 42.
Interval Element cu ka zn ka	- Gran (8, 200	이 같은 것이 많이	ults: OnPeak 106.839 99.7084	5206.6	5414.1	StartPB 85.09 192.04	StopPB 88.48 190.72		
4									•

Manual Count Acquisition using the Acquire! Window

To acquire a single point of x-ray count data for a standard proceed as follows. From the **Acquire!** dialog box click the **New Sample** button. This opens the familiar **New Sample** window. Click on *Standard* from the *New Sample Type* buttons. This allows the user to specify a standard from the list now active at the bottom of the *New Sample* dialog box. Click *530 Zinc Taylor*, its name now appears under *New Sample Name*. Enter any relevant text under *New Sample Description*. Click the **OK** button when done.

New Sample Type -	ок	Cancel	
Standard Unknown	Load Element Setup		
C Wavescan	Load Sa	nple Setup	
	Load F	ile Setup	
necessary change lew Sample Name Zinc Taylor lew Sample Descriptio	n		
1	s on zinc met	al standard 📕	
		1000	

Check the optical focus on the zinc standard and click the **Start Standard or Unknown Acquisition** button of the **Acquire!** window. Notice that the current sample is displayed in the **Acquire!** window. The progress of all data acquisition may be viewed in the **Acquire!** window. Clicking the **Start Standard or Unknown Acquisition** button initiates the data acquisition. The spectrometers for copper and zinc move to their respective peak positions and count on peak and off peak (both sides in this example) for times specified earlier in the **Count Times** window. The Faraday cup is also measured.

The **Acquire!** window and the main PROBE FOR WINDOWS log window appear as follows upon completion. Faraday cup counts (BEAM) are reported in total counts in the **Acquire!** window and in nanoamps in the main log window.

								_ 🗆 🗵	
1		2	3	x	Y	z w			
240.003	106.83	9 99.708	4 25.90	10 40.99	85 10.879	5 1.99999			
Farada	y	1	2	3					
10.0	~~~	.00	2.00	2.00					
30458.			142.	86.					90 - 10 9
		Current	Sample			Charl Chan	dard or Uni	known Acquisition	
St 530 S	et 1 Zin							Known Acquisition	2
Data Row	vs: 1	Go	od Data	Rows: 1		Start Way	vescan	Special Options	
New	/ Sample			ate:		Move	A	equisition Options	
Elemer	nts/Catio	ns	Pł	łA	Peak	Peak/Scan Options S		Start Peak Center	
Analytica	al Conditi	ons	Count	Times	F	late Meter		Peaking	
<u></u>	nannan z								1
THO FOR 2		and Dungka	icai <u>m</u> un		eih 1			Υ.	
	.cquire!			nalyze!		Automal	te!	Plot!	
A St 530 TakeOff =	cquire! Set 1 = 40 K	Zinc Ta iloVolt:	A aylor s = 20	nalyze! Beam Cu		30 Beam			
A St 530 TakeOff Off-Peak	cquire! Set 1 = 40 K Correc	Zinc Ta iloVolt: ted or J	A aylor s = 20 MAN On-	nalyze! Beam Cu	ırrent =	30 Beam			4
A St 530 : TakeOff : Off-Peak ELEM:	cquire! Set 1 = 40 K	Zinc Ta iloVolt:	A aylor s = 20	nalyze! Beam Cu	ırrent =	30 Beam			ł
A St 530 : TakeOff : Off-Peak ELEM: BGD:	cquire! Set 1 = 40 K Correc cu ka	Zinc Ta iloVolt: ted or J zn ka	A aylor s = 20 MAN On-	nalyze! Beam Cu	ırrent =	30 Beam			ł
A St 530 TakeOff Off-Peak ELEM: BGD: MOT:	cquire! Set 1 = 40 K Correc cu ka OFF	Zinc T iloVolt ted or J zn ka OFF	A aylor s = 20 MAN On-	nalyze! Beam Cu	ırrent =	30 Beam			
A St 530 TakeOff Off-Peak ELEM: BGD: MOT: CRYS:	cquire! Set 1 = 40 K Correc cu ka OFF 2	Zinc T iloVolt ted or l zn ka OFF 3	A aylor s = 20 MAN On-	nalyze! Beam Cu	ırrent =	30 Beam			
A St 530 TakeOff Off-Peak ELEM: BGD: MOT: CRYS:	cquire! Set 1 = 40 K Correc cu ka OFF 2 LiF	Zinc T iloVolt ted or l Zn ka OFF 3 LIF	A aylor s = 20 MAN On-	nalyze! Beam Cu Peak X-1	ırrent =	30 Beam			
A St 530 TakeOff Off-Peak ELEM: BGD: MOT: CRYS: ORDR: 81G	cquire! Set 1 = 40 K Correc cu ka OFF 2 LiF 1	Zinc T iloVolt ted or J Zn ka OFF 3 LIF 1	A aylor s = 20 MAN On- BEAM	nalyze! Beam Cu Peak X-1	ırrent =	30 Beam			
A St 530 TakeOff Off-Peak ELEM: BGD: MOT: CRYS: ORDR: 81G AVER:	cquire! Set 1 = 40 K Correc cu ka OFF 2 LiF 1 -4.6	Zinc Ta iloVolt: ted or l Zn ka OFF 3 LIF 1 9054.3	A aylor s = 20 MAN On- BEAM 30.45	nalyze! Beam Cu Peak X-1 8	ırrent =	30 Beam			
A St 530 TakeOff Off-Peak ELEM: BGD: MOT: CRYS: ORDR: 81G AVER: SDEV:	cquire! Set 1 = 40 K Correc cu ka OFF 2 LiF 1 -4.6 -4.6	Zinc Ta iloVolt: ted or J Zn ka OFF 3 LIF 1 9054.3	A aylor s = 20 MAN On- BEAM 30.45 30.45	nalyze! Beam Cu Peak X-1 8	ırrent =	30 Beam			
A St 530 TakeOff Off-Peak ELEM: BGD: MOT: CRYS: ORDR:	cquire! Set 1 = 40 K Correc cu ka OFF 2 LiF 1 -4.6 .0	Zinc Ta iloVolt: ted or J Zn ka OFF 3 LIF 1 9054.3 9054.3 .0	A aylor s = 20 MAN On- BEAM 30.45 30.45	nalyze! Beam Cu Peak X-1 8	ırrent =	30 Beam			
A St 530 TakeOff Off-Peak ELEM: BGD: MOT: CRYS: ORDR: 81G AVER: SDEV: 1SIG:	cquire! Set 1 = 40 K Correc cu ka OFF 2 LiF 1 -4.6 .0 .7	Zinc T iloVolt: ted or J Zn ka OFF 3 LIF 1 9054.3 9054.3 .0 30.1	A aylor s = 20 MAN On- BEAM 30.45 30.45	nalyze! Beam Cu Peak X-1 8	ırrent =	30 Beam			

Repeated clicking of the **Start Standard or Unknown Acquisition** button acquires additional intensity data. The following log window illustrates the acquisition of five data points on the zinc metal standard.

		1	cal <u>R</u> un <u>O</u> utput <u>H</u> elp	T T	
	Acquire!		Analyze!	Automate!	Plot!
		Zinc Ta iloVolts		nt = 30 Beam Size = 2	
Off-Pea	k Correc	ted or M	AN On-Peak X-ray (Counts:	
ELEM :	cu ka	zn ka	BEAM		
BGD :	OFF	OFF			
40T :	2	3			
CRYS:	LiF	LIF			
DRDR:	1	1			
81G	-4.6	9054.3	30.458		
82G	3.2	9053.9	30.467		
83G	-4.6	9003.6	30.452		
84G	-8.1	8980.8	30.442		
85G	1	9189.8	30.448		
AVER :	-2.8	9056.5	30.453		
SDEV :	4.4	81.1	.010		
ISIG:	. 5	30.1			
SERR :	2.0	36.3			
RSD :	-154.2	. 9			

Similarly, x-ray counts can be acquired on the copper metal standard. Move back to the copper standard position via the **Move** button and inspect the location and focus. Click the **New Sample** button, select the copper standard from the standard list, click the **OK** button when done.

Start collecting counts by clicking the **Start Standard or Unknown Acquisition** button. Repeating five times as with the zinc standard gives the following main log window output.

<u>File E</u> dit	<u>Standard</u> \geq	Kray <u>A</u> nalytic	al <u>R</u> un <u>O</u> utput <u>H</u> elp		
	Acquire!		Analyze!	Automate!	Plot!
TakeOff	= 40 K		The second	nt = 30 Beam Size = 2 Counts:	
ELEM: BGD:	cu ka OFF	zn ka OFF	BEAM		
MOT: CRYS:	2 LiF	3 LIF			
ORDR : 86G 87G	1 5359.0 5416 9	1 -322.1 -334.7	30.467 30.473		
88G 89G		-311.8	30.476 30.480		
90G	5416.8	-321.1	30.486		
AVER : SDEV :	5394.2 26.6	-320.2 9.6	30.476 .007		
1SIG: SERR: %RSD:	23.2 11.9 .5	5.7 4.3 -3.0			
•		5.0			

Inspection of the copper data reveals an interesting feature. All of the zinc off-peak corrected counts on the pure copper standard are very negative suggesting that a background position may be incorrectly set. This can be easily checked by moving to an alloy sample containing both elements of interest and performing a wavescan. A Cartridge Brass standard (NIST SRM 478) containing both elements may be used.

Wavescan Acquisitions

To perform a wavescan acquisition on the Cartridge Brass standard click the **Move** button in the **Acquire!** window to move to this standard.

Click the **New Sample** button. Select *Wavescan* under *New Sample Type*, edit the *New Sample Name* and *New Sample Description* text boxes.

New Sample Type -	ОК	Cancel
C Unknown	Load Elem	ent Setup
Wavescan	Load Sam	ple Setup
	Load Fil	e Setup
New Sample Name NIST 478 New Sample Descriptic	10	
NIST 478 New Sample Description Insert <cr>>> Cartri</cr>	on idge brass stan ground positior	
NIST 478 New Sample Description Insert <cr>>> Cartri</cr>	idge brass stan ground position e standard list the Standard J	h check below, cance Add Standard

Click **OK** when done.

1 2	3 X	Y Y	Z	W	
240.003 106.839 99	.7084 13.9785	i 21.9852 1	LO.9068	1.99999	
Faraday 1	2	3			
10.00 .00	2.00	2.00			
30486.0 .	114. 1	1396.			
Cu	rrent Sample		S	tart Standard (or Unknown Acquisition
₩a 1 *NIST 478					
Data Rows: O	Good Data Ro	ows: O		Start Wavesca	an Special Options
New Sample	Locat	e	h	love	Acquisition Options
Elements/Cations	PHA		Peak/S	can Options	Start Peak Center
	10 10 10 10 10 10 10 10 10 10 10 10 10 1			and a second state of the	10 10 10 10 10 10 10 10 10 10 10 10 10 1

Click the **Start Wavescan** button of the **Acquire!** window.

example, simply copper and zinc. Graphical output of the completed scan via the **Wavescan** Acquisition window can be seen below.

1D. DS			Close
0.6 0.4 0.2 0.4		1	Export Da
500, 400 300 300	Λ	2	Load Xr Position 7.38042
1000 102.1 2500		111.6	Angstrom
	\mathcal{A}	3	Counts .968933

The wavescan labels appear in the main PROBE FOR WINDOWS log window.

	∐ray <u>A</u> nalytical <u>R</u> un	alither and a second	1	1
Acquire!	4	nalyze!	Automate!	Plot!
an 100 anos 100 100	90.42			
Wa 1 NIST 4	100 KONAR - KON - 1608 -			
TakeOff = 40	KiloVolts = 20	Beam Current	z = 30 Beam Size = 2	
Cartridge bras	s standard for	background po	sition check	
Corrected Wave	scan Positions	and Counts:		
ELEM: Spectro	cu ka Specti	co znka BH	CAM	
MOT:	2	3		
CRYS:	LiF	LIF		
ORDR :	1	1		
la la cos	2			
Wa 2 contin	100.0 States - State - 100.0	S 3 3		
			:= 30 Beam Size = 2	
Cartridge bras	s standard for	background po	sition check	
	2			
Corrected Wave	scan Positions	and Counts:		
	cu ka Specti	o znka BI	20M	
ELEM: Snectro	8 5	3		
(RG2030)	2			
ELEM: Spectro MOT: CRYS:	2 LiF	LIF		

The wavescan positions and counts may be displayed in the main log window by clicking the **Analyze!** button opening the **Analyze!** window. Select the *Wavescans* button, then click the **Select All** button and finally clicking the **Data** button.

<u>F</u> ile <u>E</u> dit	<u>S</u> tandard <u>X</u> r	ay <u>A</u> nalyti	cal <u>R</u> un <u>O</u> u	tput <u>H</u> elp		·	
	Acquire!		Analy	vze!		Automate!	Plot!
a t	NIST 478	3					
[ake0f1	S (70,5) 707					Beam Size = 2	
Cartrio	lge brass	standa	d for bac	ckground	position	h check	
		_					
Correct	ed Waveso	an Posi	itions and	i Counts			
ELEM:	Spectro	cu ka	Spectro	zn ka	BEAM		
FIME :	Speccro	6.00	Spectro	6.00	DIF		
MOT:		2		3			
CRYS:		LiF		LIF			
ORDR :		1		1			
91G	111.624	56.7	104.665	67.2	.0		
92G	111.525	56.0	104.565	64.8	.0		
93G	111.429	55.3	104.466	58.8	. 0		
94G	111.332	55.7	104.365	59.0	. 0		
95G	111.235	56.7	104.265	63.5	. 0		
96G	111.138	61.5	104.164	62.5	. 0		
97G	111.041	58.8	104.065	59.5	. 0		
98G	110.946	57.0	103.965	58.8	. 0		
99G	110.849	63.2	103.864	57.3	. 0		
100G	110.753	56.5	103.764	57.2	. 0		
	110.656		103.663	63.3	. 0		
	110.558	61.8	103.564	53.2	. 0		
	110.463		103.464	53.7	.0		
	110.366		103.363	59.0	.0		
	110.270		103.264	57.8	. 0		
	110.172	8.8.8.8	103.163	52.2	.0		
	110.075		103.063	60.3	.0		
	109.979		102.963	57.3	.0		
	109.884		102.862	51.5	.0		
	109.785 109.689		102.763 102.663	53.5 49.2	.0		
	109.689		102.663	49.2	.0 .0		
	109.393	27.97	102.362	55.8	.0		
777 F F	109.399		102.362	45.3	.0		
	109.399	8-84843	102.302	4J.J 56.0	.0		
	109.302		102.162	56.5	.0		
	109.108		102.102	56.0	.0		
100							

A portion of a very long list of data is illustrated below.

A more complete graphical display of these wavescans may be accomplished using the **Plot!** window.

Off-Peak Adjustments from the Plot! Window

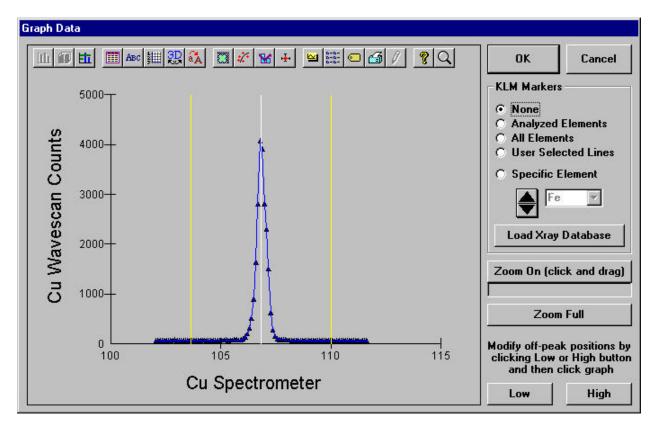
Click on the **Plot!** button under the main PROBE FOR WINDOWS log window. The **Plot!** dialog box opens.

Sample List (multi-select) -		Output Target		
C Unknowns Wa 2	NIST 478 continued	 Send Data to Plot Window Send Data to ASCII File (X, Y, (Z)) 		
Wavescans Digitized Select All		☐ Include Deleted Points ☐ ☐ Data Point Labels ☐ ☐ ASCII File Column Labels ☐	Run Info Sample Names SURFER_BAS File	
X-Axis Line Numbers On Beam Current Ab Beam Current DateTime	Line Numbers On Beam Current Ab Beam Current DateTime	Y-Axis (multi-select) Line Numbers On Beam Current Ab Beam Current DateTime	Graph Type C Scatter C Line C Lin-Log	
Elapsed Hours X Stage Coordinates Y Stage Coordinates Z Stage Coordinates ₩ Stage Coordinates	Elapsed Hours X Stage Coordinates Y Stage Coordinates Z Stage Coordinates W Stage Coordinates	Elapsed Hours X Stage Coordinates Y Stage Coordinates Z Stage Coordinates W Stage Coordinates	O 3-D I Analyzed Onl	
Relative Microns Cu Wavescan Counts Zn Wavescan Counts Cu Spectrometer Zn Spectrometer Cu Angstroms	Relative Microns Cu Wavescan Counts Zn Wavescan Counts Cu Spectrometer Zn Spectrometer Cu Angstroms	Relative Microns Cu Wavescan Counts Zn Wavescan Counts Cu Spectrometer Zn Spectrometer Cu Angstroms	Average Only Minimum Tota Skip If Total Is Less Than	
Zn Angstroms	Zn Angstroms	Zn Angstroms	Output	

Under *Sample List* the *Wavescans* button should be clicked. Use the mouse to select both wavescan data samples. Since each sample can only accommodate 50 data points, a complete wavescan of 100 points is continued in two sample numbers.

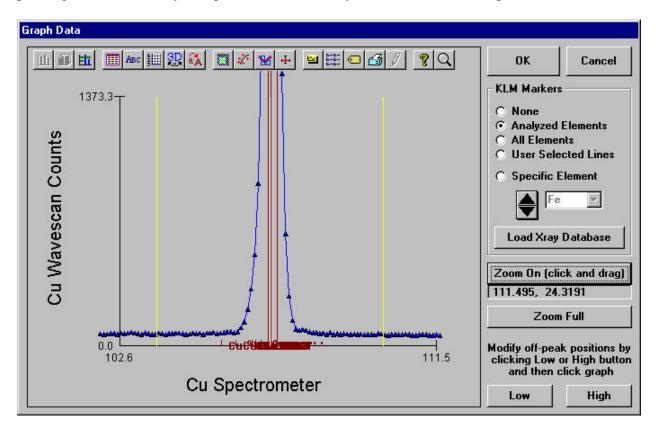
Click on *Cu Spectrometer* from the *X-Axis* list and *Cu Wavescan Counts* from the *Y-Axis* list selections. Choose a *Graph Type*, click the *Line* button and an *Output Target* of *Send Data to Plot Window*. Finally, click the **Output** button to view the graph.

Plot!			
Sample List (multi-select) C Standards C Unknowns C Wavescans C Digitized Select All X-Axis	Output Target Send Data to Plot Window Send Data to ASCII File (X, Y, (Z)) Include Deleted Points Data Point Labels ASCII File Column Labels Y-Axis (multi-select)		
Line Numbers On Beam Current Ab Beam Current DateTime Elapsed Hours X Stage Coordinates Y Stage Coordinates Y Stage Coordinates W Stage Coordinates W Stage Coordinates Relative Microns Cu Wavescan Counts Zn Wavescan Counts Cu Spectrometer Cu Angstroms Zn Angstroms	Line Numbers Graph Type Dn Beam Current Ab Beam Current DateTime Elapsed Hours Elapsed Hours C Line X Stage Coordinates 3-D Y Stage Coordinates ✓ Analyzed Only W Stage Coordinates ✓ Analyzed Only W Stage Coordinates ✓ Minimum Total Zn Wavescan Counts ✓ Minimum Total Supectrometer Skip If Total Is Less Than 98 Output Close		



The program then loads the selected data into the **Graph Data** window.

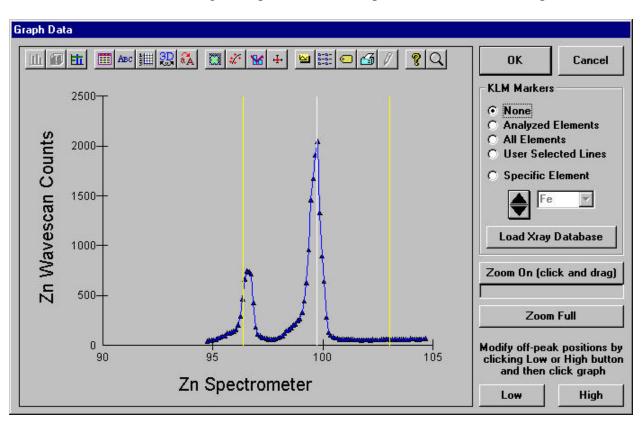
The **Graph Data** module allows a more robust treatment of the wavescan data. The plot of Cu Spectrometer position versus Cu Wavescan Counts is graphed as well as the locations of the onpeak and both off-peaks (vertical lines). Various options are available for evaluation of the data. Besides click and drag *Zoom* capabilities, a large selection of *KLM Markers* options may be enabled. With the **Zoom On** button active, simply click and drag the mouse over the region the user wishes to magnify. The *Analyzed Elements* button of the *KLM Markers* may be selected, painting the various x-ray line positions for all analyzed elements into this plot.



The default choices for both copper background positions (yellow vertical lines) appear sound as no analyzed element lies nearby and the background counts near these peaks are low. Click the **OK** button of the **Graph Data** window to return to the **Plot!** dialog box.

Next, the user evaluates the same data set for zinc. From the **Plot!** dialog box, select *Zn Spectrometer* from the *X*-*Axis* list and *Zn Wavescan Counts* from the *Y*-*Axis* list selections. Click the **Output** button.

🕌 Plot!			
Sample List (multi-select) C Standards C Unknowns C Wavescans D jgitized Select All X-Axis	Output Target Send Data to Plot Window Send Data to ASCII File (X, Y, (Z)) Include Deleted Points Run Info Data Point Labels Sample Names ASCII File Column Labels SUBFER .BAS File Y-Axis (multi-select) Graph Type —		
Line Numbers On Beam Current Ab Beam Current DateTime Elapsed Hours X Stage Coordinates Y Stage Coordinates Y Stage Coordinates W Stage Coordinates W Stage Coordinates Relative Microns Cu Wavescan Counts Zn Wavescan Counts Cu Spectrometer Cu Angstroms Zn Angstroms	Line Numbers On Beam Current Ab Beam Current DateTime Elapsed Hours X Stage Coordinates Y Stage Coordinates Z Stage Coordinates W Stage Coordinates Relative Microns Cu Wavescan Counts Cu Spectrometer Zn Spectrometer Cu Angstroms Zn Angstroms Zn Angstroms Cu Spectometer Cu Angstroms Cu Spectrometer Cu Spectrometer Cu Angstroms Cu Spectrometer Cu S		



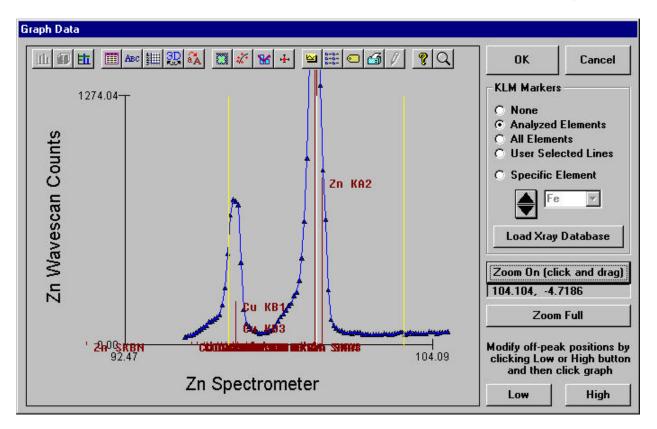
The **Graph Data** window for the zinc data set is shown below. Two peaks are visible and the user observes that the low background position lies on top of the smaller unknown peak.

Use either the *KLM Markers* or the NIST x-ray database via the **Load Xray Database** button to evaluate the unknown peak. To open the NIST x-ray database, first click the *User Selected Lines* button, then click the **Load Xray Database** button opening the NIST x-ray line catalog.

The **Xray Database** window opens and the user may select or multi-select any x-ray line to plot on the **Graph Data** window, simply highlight a line(s) and click the **Graph Selected** button.

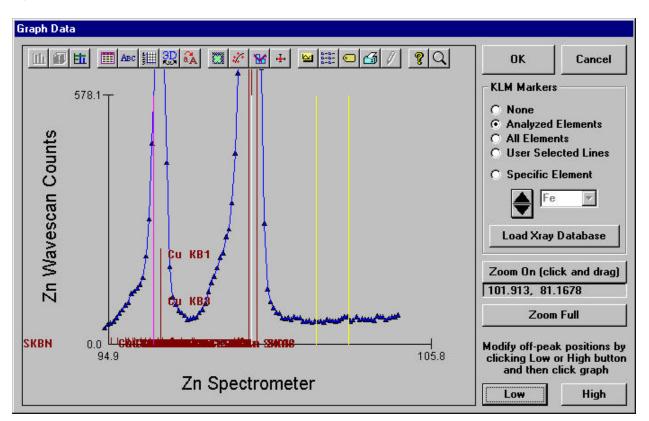
Xray Line	Angstroms	Energy	Intensity	Reference		Graph Selected
Cu SKB"	1.38499	8.95207	1.00000	1		Close
TILI	1.38500	8.95201	5.78000	C	_	
Os SLA^X	1.38589	8.94624	1.00000	li seco		
Yb LB9	1.38710	8.93846	610000	C		
Cu SKB7	1.38730	8.93719	1.00000			
Ra LG1 II	1.38920	17.8499	2.50000	1		Highlight Elemen
Cu SKB10	1.39130	8.91145	1.00000	li and		
Os LA1	1.39150	8.91020	100.000	I C		CU 💌
Hf LB4	1.39240	8.90444	10.1900			
Cu KB1	1.39240	8.90444	13.4100	C		
Cu KB3	1.39240	8.90444	6.84000	C		
Cu SKB'	1.39351	8.89735	1.00000			Load New Range
Np LB1 II	1.39581	17.7653	12.5000	Ú.		
Cu SKB	1.39842	8.86611	1.00000			Minimum Intensity
Lu LB3	1.40170	8.84536	5 13.1000	I C		
Cu SKB1^4	1.40243	8.84077	1.00000			.5
Os LA2	1.40250	8.84031	11.3700	C C		Charl Angelrome
Zr KB1 II	1.40343	17.6689	3.75000	B		Start Angstroms
Zr KB3 II	1.40443	17.6563	3.75000	Ē.		1.29683
Cu SKBN	1.40774	8.80742	1.00000	l de la companya de la		Chan Annahama
Cu SKBN	1.40854	8.80241	1.00000	8	-	Stop Angstroms
						1.512533

Examination of the data suggests that the second peak is due to the copper K β line. It is apparent that the low background position for zinc needs to be adjusted away from the copper K β line.



The user adjusts the low off-peak position by clicking the **Low** button, creating a crosshair on the **Graph Data** window. At any place on the plot the Zn Spectrometer position and Zn Wavescan Counts may be read, the values appear in the box below the two-way **Zoom On/ Hot Hit On** button. Move the crosshair to a new low background position and click the mouse. A new vertical line appears.

In the screen capture below both background positions are now on the same side (high side) of the peak avoiding all of the complicated x-ray structure around the low side of the zinc K α line. Alternatively, if the user scanned further out on the low side (to lower L number) of the copper K β line, a suitable position for the low background may also be found.



Click the **OK** button to update this background position in the run and close the **Graph Data** window. The **GetPeakSave** window appears and the user is notified that new parameters (off-peak position) will take effect on the next new sample.

GetPeak	Save 🔀
•	New parameters will take effect on the next new sample that is started

Click this **OK** button, returning to the **Plot!** window.

Finally, click the **Close** button to exit the **Plot!** window returning to the main PROBE FOR WINDOW log window.

Loading Standard Position Files

To run analytical standards using automation, requires that the computer know the physical location of all the standards for this run. Click the **Automate!** button from the main PROBE FOR WINDOWS log window.

Acquire!	Ani	alyze!	Automate!	Plot!
1736 103.696	58.7 96.4535	616.5	.0	
174G 103.600	60.3 96.3539	425.7	.0	
175G 103.503	58.7 96.2542	289.3	.0	
176G 103.406	56.7 96.1533	189.7	.0	
1776 103.309	63.8 96.0537	137.0	.0	
1786 103.212	59.2 95.9527	130.4	.0	
179G 103.117	52.5 95.8531	121.2	.0	
180G 103.021	63.0 95.7535	126.0	.0	
181G 102.923	64.8 95.6525	111.0	.0	
182G 102.826	62.3 95.5529	108.8	.0	
183G 102.730	64.2 95.4520	90.8	.0	
184G 102.635	63.3 95.3523	76.8	.0	
185G 102.536	63.2 95.2527	66.3	.0	
186G 102.441	56.7 95.1518	61.5	.0	
187G 102.344	57.5 95.0521	53.7	.0	
188G 102.246	59.7 94.9512	48.5	.0	
189G 102.150	59.8 94.8516	44.2	.0	
1906 102.053	60.8 94.7520	38.8	.0	

Position List (nulti-select) (double-cl	ick to see data) —	11	Automation Actions
Standards St 130 Fid 1 Calcite		Move	Confirm Standard Positions	
Unknowns	St 131 Fid 1 Dolo St 132 Fid 1 Sider		Digitize	Confirm Unknown Positions
C Wavescan C All Sample	St. 166 Eid 1 Strop		Plot	Confirm Wavescan Positions
			Fiducials	Calibrate Peak Positions Acquire Standard Samples
	1		Peaking	Acquire Unknown Samples
Select Stds	_			 Acquire Wavescan Samples Acquire Standard Samples (again)
Select All			Conditions	
	1		Sample Setups	Automation Options
Delete All]	File Setups	Calibrate on Assigned Standards
Delete S	elected Samples	Import from	ASCII File	🗖 Use Filament Standby After
Delete Se	elected Positions	Export Selec	ted Samples	Use Confirm During Acquisition
w X	Y Z	W 16	irain # Focus	C New Sample C Every Point
	1771 40.9709 11.	0782 3.999985		C Digitized C Interval
				Standard Points To Acquire
				Automate Confirm Delay (sec) 10
				Standard X Increment (um) 10
				Re-Standard Y Increment lum 1 to
				Re-Standard Y Increment (um) 10
				Use Last Unknown (or Standard)
				 Use Last Unknown (or Standard) Use Digitized Sample Conditions
				Use Last Unknown (or Standard)

This opens the **Automate!** dialog box shown below.

The last set of digitized standards used is visible in the *Position List* list box of the **Automate!** window. Currently, the four carbonate standards digitized for an earlier section of this manual are listed. These will be deleted and replaced by the appropriate standard position file(s). Normally, after initial setup, several sets of digitized standard positions would be visible in this list. Typically, the user would not delete these but rather append other position files to the list.

Click the **Delete All** button. This opens the **AutomateDeleteAll** window, seen below. Click the **Yes** button of the **AutomateDeleteAll** window to clear the *Position List* list box of all displayed position samples.

Position List (m	ulti-select) (double-click to see data) —	1	Automation Actions
Standards	St 130 Fid 1 Calcite	Move	Confirm Standard Positions
Unknowns	St 131 Fid 1 Dolomite St 132 Fid 1 Siderite	Digitize	Confirm Unknown Positions
Wavescans All Samples	St 166 Fid 1 Strontianite	Plot	Confirm Wavescan Positions Calibrate Peak Positions
		Fiducials	Acquire Standard Samples
Select Stds		Peaking	Acquire Unknown Samples
Select All		Conditions	Acquire Standard Samples (agair
JUCCEAI		Sample Setups	Automation Options
Delete Sel Delete Sel			p Acquisition pus
Delete Sel	n Ye		rom the position database?
Delete Sel	n Ye		rom the position database? J Acquisition pus Every Point
Delete Sel	n Ye		rom the position database? Acquisition Sus Every Point Interval
Delete Sel	n Ye		tom the position database? Acquisition Standard Points To Acquire 5
Delete Sel	n Ye		tom the position database? Acquisition bus Every Point Interval Standard Points To Acquire 5 Automate Confirm Delay (sec) 10
Delete Sel	n Ye		tom the position database? How After Acquisition Standard Points To Acquire 5 Automate Confirm Delay (sec) 10 Standard X Increment (um) 10

The FiducialDeleteUnreferenced window opens.

FiducialDeleteUnreferenced	×
Fiducial set 1 is not referenced by any position samples in the p	position database. Do you want to delete this fiducial set?
Yes No C	ancel

Click the **Yes** button to clear the fiducial coordinate set from the position database.

Click the **Import from ASCII File** button of the **Automate!** dialog box to import position samples from a previously saved ASCII file.

Automate!					
Position List (multi-select) (double-c	lick to see data)	Move	Automation Actions		
 Standards Unknowns 		Digitize	Confirm Standard Positions		
○ Wavescans ○ All Samples		Plot	Confirm Wavescan Positions		
•		Fiducials	Calibrate Peak Positions		
Select Stds		Peaking	Acquire Standard Samples Acquire Unknown Samples		
Select All		Conditions	 Acquire Wavescan Samples Acquire Standard Samples (again) 		
Select All		Sample Setups	Automation Options		
Delete All		File Setups	Calibrate on Assigned Standards		
Delete Selected Samples	Import from	ASCII File	Use "Quick" Standards Use Filament Standby After		
Delete Selected Positions	Export Select	5 1326 (D	Use Confirm During Acquisition		
w <mark>X Y</mark> Z	₩ G	rain # Focus	C New Sample C Every Point C Digitized C Interval		
			Standard Points To Acquire 5		
			Automate Confirm Delay (sec) 10		
			Standard X Increment (um) 10		
			Standard X Increment (um) 10 Re-Standard Y Increment (um) 10		
			Re-Standard Y Increment (um) 10		
			Re-Standard Y Increment (um) 10		

This action opens both the **Standard Position File Name Strings** and the **Open File To Import Position Data From** windows. The former window is based on the name strings in the PROBEWIN.INI file. It is assumed that the user has previously digitized all standard blocks and created STDPOSx.POS files. The metal standards to be used in the brass analysis are digitized in STDPOS2.POS.

STDPOS1.PC STDPOS2.PC STDPOS3.PC STDPOS4.PC STDPOS5.PC STDPOS6.PC	ition File Name Strings DS = Rectangular A DS = Taylor with JEOL std DS = Rectangular B DS = Carbonates DS = Sulfides DS = User Defined DS = User Defined		
Open File To	Import Position Data From		? ×
Look jn:	🔁 Probe Operators	•	k 📰 🏢
📄 Images 📄 Manual Fil	CIAL_CLIENTS es ITY_CLIENTS		
File <u>n</u> ame: Files of <u>t</u> ype:	untitled.pos ASCII Position Files (*.POS)		<u>O</u> pen Cancel

The *.POS files are located in C:\Program Files\Probe for Windows\UserData directory. Edit the *Look in:* location.

Type in the appropriate file name in the *File name* text box or simply highlight the file in the list and click the **Open** button.

Open File Ta	Import Position Data From				? >
Look jn:	🔄 UserData	•	£	<u>e</u> *	8-8- 8-8- 8-8- 8-8-
Stdpos1.p Stdpos2.p					
Stdpos3.p					
Stdpos4.p	05				
File <u>n</u> ame:	Stdpos2.pos				<u>O</u> pen

This action opens the **FiducialLoad** window. Click the **Yes** button to do a fiducial transformation on this pre-digitized standard block to obtain an accurate set of standard positions.

FiducialL	_oad 🔀
?	Do you want to transform the sample positions using sample fiducials for position matrix transformation?
	Yes Cancel

The **Modify Fiducial Positions** window opens. Normally the user would simply accept the defaults or edit the position text boxes for each point, including the appropriate stage location number (JEOL 733 use appropriate W stage position). When done, click the **OK** button.

Enter Ap	proximate Fid	ucial Position	s For Fiducial	Set 1	OK		
Fiducial	Description	be for Wine	be for Windows\UserData\Stdpos2.pos				
Point#	х	Y	z	w	Cancel		
1	8.2001	34.0922	11.0397	2			
2	23.7448	34.1782	10.908	2			
3	15.8743	46.7415	11.0707	2			

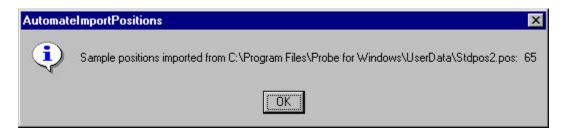
This action causes the stage motors to drive to the first fiducial coordinate in its lookup table. The **FiducialVerifyFiducial** window appears. Adjust the stage motors to center the first fiducial mark, click the **OK** button.

Fiducia	/erifyFiducial
٩	Please adjust the stage position for fiducial #1 to the exact center of the alignment mark. Click OK or <enter> when ready or click Cancel or <esc> to quit.</esc></enter>
14	Cancel

The computer will drive to each of the three fiducial marks for centering. Clicking the **OK** button after the third fiducial mark opens the **FiducialsVerifyFiducials** window. Click this **OK** button.

Fiducia	/erifyFiducials
٩	Specimen tilt in radians: ThetaX = 2.200654E-03 ThetaY= 1.079723E-02 Theta= 1.101922E-02 Specimen tilt in degrees: ThetaX = .1260882 ThetaY= .6186359 Theta= .6313546 WARNING: Specimen tilt exceeds 0.5 degree
	<u>OK</u>

The program then imports and updates the position coordinates of all of the standards in the predigitized standard position file. The **AutomateImportPositions** window opens. Click the **OK** button returning to the **Automate!** window.



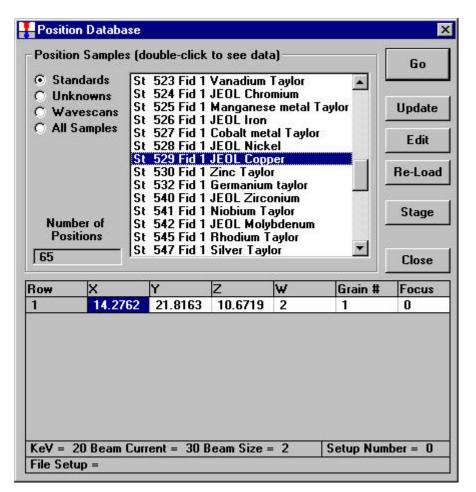
The **Automate!** window would appear as below. The currently transformed standard position file is listed in the *Position List* list box. In this example, the copper standard, number 529, has been highlighted and its coordinates are visible. If an additional standard position file (standard block) is required for use in the automation, the same procedure would be followed.

Position List (m	ulti-select) (double-cli St 521 Fid 1 Scand		Move	Automation Actions	
C Unknowns St 522 Fid 1 JEOL Titanium			Digitize	Confirm Unknown Positions	
C Wavescans C All Samples	St 524 Fid 1 JEOL Chromium		Plot	Confirm Wavescan Positions	
			Fiducials		
Select Stds St 528 Fid 1 JEOL Nickel			Peaking		
Select All	St 530 Fid 1 Zinc 1 St 532 Fid 1 Germa St 540 Fid 1 JEOL	anium taylor	Conditions		
	St 541 Fid 1 Niobiu	um Taylor	Sample Setup:	S Automation Options	
Delete All St 542 Fid 1 JEOL Molybdenum St 545 Fid 1 Rhodium Taylor		File Setups	☐ ☑ Calibrate on Assigned Standards □ Use "Quick" Standards		
100501001000	ected Samples ected Positions		om ASCII File ected Samples Grain # Focus	Use Filament Standby After Use Confirm During Acquisition Use ROM Auto Focus O New Sample O Every Point O Digitized O Interval	
1 14.2	762 21.8163 10.6	5719 2	1 0	Standard Points To Acquire 5	
				Automate Confirm Delay (sec) 10	
				Standard X Increment (um) 10	
				Do Chandred V Incompati (um)	
				Re-Standard Y Increment (um) 10	
				 Use Last Unknown (or Standard) Use Digitized Sample Conditions 	
				Use Last Unknown (or Standard)	

All of the standards listed in the *Position List* list box may now be accessed by the program during any automation action. For instance, it is now possible to have the computer drive to any standard on this block. The user may click the **Move** button of the **Automate!** window opening the **Move Motors and Change Crystals** dialog box. Then, click the **Positions** button.

Automate!			
osition Lis	t (multi-select) (double-click to see data) ds St 525 Fid 1 Manganese metal Ta 🛋	Move	nation Actions
Unknow Wavesc	ns St 526 Fid 1 JEOL Iron St 527 Fid 1 Cobalt metal Taylor	Digitize Co	onfirm Unknown Positions onfirm Wayescan Positions
All Samp	oles St 528 Fid 1 JEOL Nickel St 529 Fid 1 JEOL Copper	Plot	librate Peak Positions
	St 530 Fid 1 Zinc Taylor St 532 Fid 1 Germanium taylor St 540 Fid 1 JEOL Zirconium		quire Standard Samples
Select 📺	. I PA DAS PLAS MULLING TANKS	Peaking 🗆 Ac	quire Unknown Samples
	Move Motors and Change Crystals		× es t (agair
Selec	Stage Target Positions	Remove Faraday	Go
Delete	16.1102 46.6359	Update Positions	Positions ndards
Del	Z W Increment	Free/Clear	Stage
Dek	☐ Stage Backlash	Jog Stage Jog Spectrometers	Close Sition
DW F	Spectrometer Target Positions		al
	1 2 3		
	PET T LIF T LIF T		
	240.003 106.839 99.7084	<u> </u>	
	Ca • ka • Fe • ka • Fe • ka •		
	Spectrometer Backlash		
			indard)
-		O Us	e Digitized Sample Conditions e Digitized Sample Setups e Digitized File Setups
	eam Current = 30 Beam Size = 2 Setup	Number = 0	

This opens the **Position Database** dialog box. From here any sample that has been digitized can be located by simply selecting it and clicking the **Go** button.



Once the stage motors drive the stage to the chosen standard, exit the **Position Database** by clicking the **Close** button. Likewise, the user may close the **Move Motors and Change Crystals** window by clicking its **Close** button, returning to the **Automate!** window.

Automation Actions

Confirm Standard Positions

All of the basic peak centering and x-ray count acquisition procedures may be automated. This is accomplished via the **Automate!** window.

Click the **Select Stds** button of the **Automate!** dialog box. All standards that have been added to the current run will be highlighted in the *Position List* list box. In this example, the two standards copper (529) and zinc (530) metal are highlighted.

Automate!				
Position List (mu • Standards	lti-select) (double-cl St 529 Fid 1 JEOL		Move	Automation Actions
C Unknowns C Wavescans C All Samples	St 530 Fid 1 Zinc St 532 Fid 1 Germ St 540 Fid 1 JEOL St 541 Fid 1 Niobi	Taylor anium taylor Zirconium	Digitize Plot	Confirm Unknown Positions Confirm Wavescan Positions Calibrate Peak Positions
Select Stds	St 542 Fid 1 JEOL St 545 Fid 1 Rhod St 547 Fid 1 Silve St 548 Fid 1 JEOL	. Molybdenum lium Taylor r Taylor	Fiducials Peaking	 Acquire Standard Samples Acquire Unknown Samples
Select All	St 550 Fid 1 Tin T St 573 Fid 1 Tanta St 574 Fid 1 JEOL St 578 Fid 1 Platir	aylor alum Taylor . Tungsten	Conditions Sample Setups	Acquire Wavescan Samples Acquire Standard Samples (again) Automation Options
Delete All	St 579 Fid 1 JEOL St 592 Fid 1 Urani	. Gold,	File Setups	Calibrate on Assigned Standards
Delete Sele	ected Samples	Export Sele	m ASCII File cted Samples	 □ Use Filament Standby After □ Use Confirm During Acquisition □ Use ROM Auto Focus ○ New Sample ○ Every Point
₩ X 14.27	Y Z 62 21.8163 10.	W 6719 2	Grain # Focus 1 0	C Digitized C Interval Standard Points To Acquire 5 Automate Confirm Delay (sec) 10 Standard X Increment (um) 10
				Re-Standard Y Increment (um) 10 Use Last Unknown (or Standard) Use Digitized Sample Conditions Use Digitized Sample Setups
				C Use Digitized File Setups

The user might start by checking the location and focus of each standard selected for the automated analysis. Click the box for *Confirm Standard Positions* under *Automation Actions*. Click the **Run Selected Samples** button.

Desilien	Link for	ılti-select) (dou	bla oliak ta	ana dati				- Automation Actions
	i List (mu idards	St 529 Fid 1			a) 		Move	Confirm Standard Positions
🕆 Unki	nowns	St 530 Fid 1 St 532 Fid 1	Zinc Taylo	ſ		D	igitize	Confirm Unknown Positions
100 C 100 C 100 C	amples	St 540 Fid 1 St 541 Fid 1	JEOL Zirco	onium			Plot	Calibrate Peak Positions
			Rhodium T	aylor		Fi	ducials	Acquire Standard Samples
Select	t Stds	St 547 Fid 1 St 548 Fid 1	JEOL Cadr			P	eaking	 Acquire Unknown Samples Acquire Wavescan Samples
Sele	ct All	St 550 Fid 1 St 573 Fid 1 St 574 Fid 1	Tantalum 1			Co	nditions	C Acquire Standard Samples (again
		St 578 Fid 1 St 579 Fid 1	Platinum T	aylor		Samp	ole Setups	Automation Options
Delet	te All	St 592 Fid 1			-	File	Setups	Calibrate on Assigned Standards
De	lete Sele	ected Samples		Import	t from <i>i</i>	ASCII F	ile	🔲 Use Filament Standby After
Del	lete Sele	cted Positions		Export	Select	ed Sam	ples	Use Confirm During Acquisition
w	×	Y	Z	W	Gr	ain #	Focus	C New Sample C Every Point C Digitized C Interval
	14.27	62 21.8163	10.6719	2	1		0	Standard Points To Acquire 5
								Automate Confirm Delay (sec) 10
								Standard X Increment (um) 10
								Re-Standard Y Increment (um) 10
								O Use Last Unknown (or Standard)
								 Use Digitized Sample Conditions Use Digitized Sample Setups Use Digitized File Setups
			eam Size =		-		er = 0	

The **AutomateConfirmSelected** window opens informing the user that two standards were chosen and asks if the user wants to run these automated samples, click **Yes**.

Automat	eConfirmSelected 🛛 🕅
?	Number of Standard Position Samples: 2 Number of Unknown Position Samples: 0 Number of Wavescan Position Samples: 0 Elapsed Time for Last Analysis: 35 seconds Are you sure you want to run these automated samples?

The program then sends the stage motors to the fiducial transformed coordinates for the first selected standard and opens the **Confirm Positions** window. Clicking the two-way **Pause/Continue** button suspends the 10 second countdown (user defined in the PROBEWIN.INI file). Adjust the stage motors (X, Y, and Z) to a new, clean analysis position. Click the **OK** button of the **Confirm Positions** window when done, sending the stage to the next standard to confirm its position. Again, the **Confirm Positions** window opens, allowing the user to pause the countdown and adjust the sample position.

If more than one position is digitized, the software moves to the first position and updates all positions for that sample by the same X, Y, and Z offset.

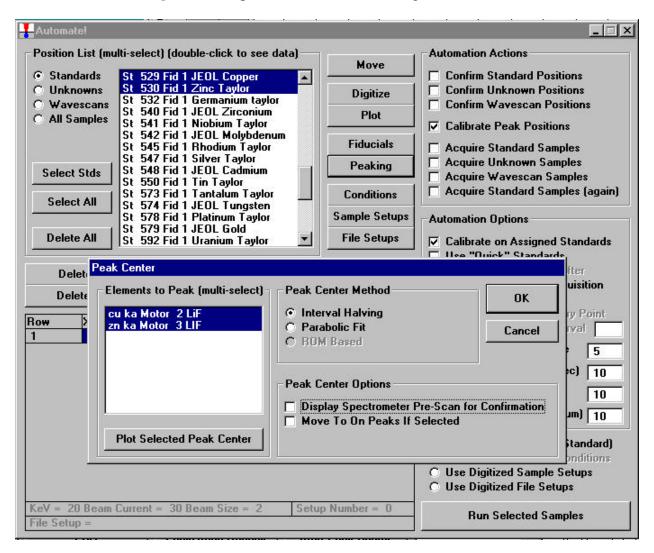
Confirm Position	s		
St 529 JEOL C	Copper		
click OK when	the sample stage ready. If you nee k the Pause butto	ed more time	Time remaining 7.30
Remove Faraday	Continue	Cancel	ок

After the final standard is confirmed, the **AcquireStop** window appears. Click this **OK** button returns to the **Automate!** dialog box.

AcquireS	itop 🗙
•	Automation Completed
	<u>OK</u>

Calibrate Peak Positions

X-ray peaking may be automated from the **Automate!** window as follows. Under *Automation Actions* click only the *Calibrate Peak Positions* box. Under *Automation Options* click the *Calibrate on Assigned Standards* box. This option causes the program to attempt a peak center on a standard position sample if the standard is assigned as the primary standard for that element. If the element has no assigned standard, then the program will attempt to assign one automatically based on the highest concentration of the elements present among the standards in the run.



Next, click the **Peaking** button to open the **Peak Center** dialog box.

In the **Peak Center** dialog box, highlight (select) all of the elements in the *Elements to Peak* list box, and click on a *Peak Center Method*. A spectrometer pre-scan is useful if that element has not been run recently or if maintenance has occurred on the spectrometer. Click the **OK** button of the **Peak Center** window.

Click the **Run Selected Samples** button from the **Automate!** window.

This opens the **AutomateConfirmSelected** window. To run these automated samples, click **Yes**.

Automat	eConfirmSelected 🛛 🕅
?	Number of Standard Position Samples: 2 Number of Unknown Position Samples: 0 Number of Wavescan Position Samples: 0
	Are you sure you want to run these automated samples?
	Yes No

The stage motors move to the position coordinates of the first standard in the *Position List* list box. If the *Use Confirm During Acquisition* box under *Automation Options* is checked then the computer automation will pause at each standard (**Confirm Positions** window will open) for some user defined amount of time to allow the operator to adjust the stage position and focus. The spectrometers go through the peaking routine to peak center the spectrometer position to the intensity maximum for all the elements assigned to that standard. After finding a new peak position and reporting the results to the main log window, the stage motors move on to the coordinates of the next standard highlighted in the *Position List* list box. Once situated on this standard, the spectrometers peak center those elements assigned to it. This procedure continues until all standards are done. When all automation action is complete, the **AcquireStop** window appears and requests the user to click the **OK** button. The following summary of the peak automation for the two standards is found in the main log window.

Acquire!	Analyze!	Au	tomate!	PI	lot!
Confirm Standard Posi	tione Automation A	ction is Comm	lotod		
Warning: Large same s		영제 정상하여 가장 구성		3	
Start pos, cps and P	영상 것을 구성할 것을 받았다.		6.839 5428.0	59.4	59.3
Stop pos, cps and P			6.824 5424.5	59.4	59.3
Interval Peak Center	Results:				
Element Spectr Pea	aked OnPeak Start	I StopI Sta	rtPB StopPB		
cu ka 2 LiF Ye	s 106.824 5428.	0 5424.5 9	1.52 91.46		
znka 3 LIF No	99.7084 .	0.0	.00 .00		
Warning: Large same s	side off-peak extra	polation for	zn ka on motor	3	
Start pos, cps and P,	'B for zn ka on mot	or 3 are 99	.7084 9035.8	58.3	56.9
Stop pos, cps and P,	'B for zn ka on mot	or 3 are 99	.6923 9164.6	58.3	56.9
	- 				
Interval Peak Center					
이 가지 않는 것은 것이 있었다. 이 같은 것은 것이 있다. 것은 것을 못했다. 것은 것은 것은 것은 것은 것을 못했다. 것은 것은 것은 것은 것은 것을 못했다. 것은 것은 것을 못했다. 것은 것은 것은 것을 못했다. 것은 것은 것은 것을 못했다. 것은 것은 것은 것은 것을 못했다. 것은 것은 것을 못했다. 것은 것은 것은 것을 못했다. 것은 것은 것은 것을 못했다. 것은 것은 것은 것은 것은 것을 못했다. 것은 것은 것은 것은 것을 못했다. 것은 것은 것은 것은 것은 것을 못했다. 것은 것은 것은 것은 것을 못했다. 것은 것은 것은 것은 것은 것은 것을 못했다. 것은 것은 것은 것은 것은 것은 것은 것을 못했다. 것은 것은 것은 것은 것은 것은 것을 못했다. 것은 것은 것은 것은 것은 것은 것은 것은 것은 것을 못했다. 것은 것을 못했다. 것은 것은 것은 것은 것은 것은 것은 것을 것을 못했다. 것은 것은 것은 것은 것은 것을 못했다. 것은 것은 것은 것을	aked OnPeak Start				
cu ka 2 LiF Ye			1.52 91.46		
zn ka 3 LIF Ye	s 99.6923 9035.	8 9164.6 15	6.97 159.21		
0-141					
Calibrate Peak Positi	lons Automation Act	ion is comple	τεα		

Acquire Standard Samples

The next step is to calibrate the analytical standards in preparation for unknown samples. The user may automate the entire acquisition of x-ray counts on all standards as follows.

From the **Automate!** dialog box and under *Automation Actions*, click only on the *Acquire Standard Samples* box. Under *Automation Options*, select the number of *Standard Points To Acquire* and whether to use the *Confirm During Acquisition* feature. In this example, five standard points are entered along with a *Standard X Increment* of 10 um. as well as the *Confirm During Acquisition* option. Click the **Run Selected Samples** button.

Position List (mu • Standards	ulti-select) (double-o		Move	Automation Actions
Unknowns	St 523 Fid 1 Zind St 530 Fid 1 Zind St 532 Fid 1 Gen	: Taylor 👘	Digitize	Confirm Unknown Positions
Wavescans All Samples	St 540 Fid 1 JEO St 541 Fid 1 Niol	L Zirconium Dium Taylor	Plot	Confirm Wavescan Positions
	St 545 Fid 1 Rho		Fiducials	Acquire Standard Samples
Select Stds	St 547 Fid 1 Silv St 548 Fid 1 JEO St 550 Fid 1 Tin	L Cadmium 👘	Peaking	 Acquire Unknown Samples Acquire Wavescan Samples
Select All	St 573 Fid 1 Tan St 574 Fid 1 JEO	talum Taylor L Tungsten	Conditions	C Acquire Standard Samples (again
Delete All	St 578 Fid 1 Plat St 579 Fid 1 JEO	L Gold	Sample Setups File Setups	Automation Options
	St 592 Fid 1 Ura			Calibrate on Assigned Standards Use "Quick" Standards
	ected Samples	Import from	n ASCII File	Use Filament Standby After Use Confirm During Acquisition
Delete Sele	ected Positions		cted Samples Grain # Focus	Use RDM Auto Focus C New Sample C Every Point
25.97			1 0	C Digitized C Interval
				Standard Points To Acquire 5
				Automate CarGan Dalay (ana)
				Automate Confirm Delay (sec) 10 Standard X Increment (um) 10
				Automate Confirm Delay (sec) 10 Standard X Increment (um) 10 Re-Standard Y Increment (um) 10
				Standard X Increment (um) 10 Re-Standard Y Increment (um) 10 © Use Last Unknown (or Standard) © Use Digitized Sample Conditions
				Standard X Increment (um) 10 Re-Standard Y Increment (um) 10 © Use Last Unknown (or Standard)

The **AutomateConfirmSelected** window opens again, informing the user that two standards are chosen and asks if you want to run these automated samples, click **Yes**.

The stage moves to the coordinates of the first standard in the *Position List* list box, the **Confirm Positions** window opens, allowing a readjustment of the stage position and optical focus. A complete analysis (all elements in the current sample) are measured, x-rays are counted on peak and at both background positions for times specified in the **Count Times** window. Finally, the Faraday cup is measured. The stage jogs 10 um in the X direction and this procedure is repeated for the number of points specified in the *Automation Options* section of the **Automate!** dialog box. After completing data collection on the first standard, the stage travels to the next standard in the list and acquires five complete analyses on that standard. After finishing the automation schedule the familiar **AcquireStop** window opens and requires the user to click the **OK** button thereby returning to the **Automate!** window.

Probe For Windows [E:\Probe Operators\Manual Files\brass01.MDB] _ 🗆 × File Edit Standard Xray Analytical Run Output Help Analyze! Automate! Plot Acquire! . 529 Set 2 JEOL Copper St TakeOff = 40KiloVolts = 20 Beam Current = 30Beam Size = 2Off-Peak Corrected or MAN On-Peak X-ray Counts: ELEM: cu ka BEAM zn ka BGD : OFF OFF MOT: 2 з CRYS: LIF LiF ORDR: 1 1 191G 5378.5 -33.530.470 192G 5320.5 28.9 30.506 193G 5347.1 -15.530.533 5344.9 30.548 194G -3.95311.0 195G 8.9 30.545 AVER: 5340.4 -3.0 30.520 SDEV: 26.4 23.7 .033 1SIG: 23.1 . 5 SERR: 11.8 10.6 **%RSD**: -789.6 . 5

The log window results for the copper standard x-ray count acquisition is seen below.

The log window results for the zinc standard x-ray count acquisition is displayed below.

<u>F</u> ile <u>E</u> dit	<u>s</u> tanuaru <u>2</u>	yay <u>A</u> nalyoc	al <u>R</u> un <u>O</u> utput <u>H</u> elp		
	Acquire!		Analyze!	Automate!	Plot!
St 530	Set 2	Zinc Ta	ylor		
TakeOff	= 40 K	iloVolts	= 20 Beam Curre	nt = 30 Beam Size = 2	
Off Doal	Correc	tod on W	AN On-Peak X-ray	Countar	
JTT-Lea	k CUFFEC	teu or m	AN UN-PEAK X-LAA	counts:	
ELEM :	cu ka	zn ka	BEAM		
BGD :	OFF	OFF			
MOT:	2	3			
CRYS:	LiF	LIF			
ORDR:	1	1			
196G	.6	9197.2	30.515		
1976	-1.9	9122.4	30.515		
1986	-2.2				
1996		9241.6			
200G	-5.6	9204.0	30.501		
AVER :	-2.1	9223.7	30.511		
SDEV :	2.3	84.5	.006		
ISIG:	. 5	30.4			
SERR :	1.0	37.8			
RSD :	-108.6	. 9			-
Acquire	Initial	Standar	d Samples Automat	ion Action is Completed	

Analyze Standard Data

After standard data is acquired it is useful to analyze the data to check for agreement among standards and for possible interferences. Click the **Analyze!** button in the main PROBE FOR WINDOWS log window.

<u>F</u> ile <u>E</u> dit	<u>Standard</u> \geq	(ray <u>A</u> nalytic	al <u>R</u> un <u>O</u> utput <u>H</u> elp		
	Acquire!		Analyze!	Automate!	Plot!
St 530 TakeOff		Zinc Ta iloVolts		nt = 30 Beam Size = 2	<u> </u>
UII-Pea	k Correc	tea or m	AN On-Peak X-ray (counts:	
ELEM:	cu ka	zn ka	BEAM		
BGD :	OFF	OFF			
MOT:	2	3			
CRYS:	LiF	LIF			
ORDR :	1	1			
196G	.6	9197.2	30.515		
197G	-1.9	9122.4	30.515		
198G	-2.2	9353.5	30.515		
199G	-1.3	9241.6	30.507		
200G	-5.6	9204.0	30.501		
AVER :	-2.1	9223.7	30.511		
SDEV:	2.3	84.5	.006		
1SIG:	. 5	30.4			
SERR:	1.0	37.8			
%RSD:	-108.6	. 9			
	Taitial	Ctandan	d Complea Automati	ion Action is Completed	

This opens the **Analyze!** dialog box.

	1 11 F 1			7	
Sample List (multi-select) (double-click to see intens	sity dataj	Analyze	Data	KRaws
Standards St 530 9 Unknowns St 529 9		An	alyze Selecte	d Line(s)	>>Exce
St 529 St	et 2 JEOL Copper		ause Between	Samples	
C All Samples	iet 2 Zinc Taylor		Delete Selec	ted Samp	le(s)
Select All			Undelete Sele	ected Sam	ple(s)
pecified Concentrations	Standard Assignments	Name/Description	Conditions	Element	s/Cations
		Total Weight			l Oxygen
		Calculated 0x Atomic Weigh	2022 N	Exce	ess Oxyge
		Atomic weigh	<u> </u>	2-0	
ру			66		
Delate Selected Line(a)	Undelate Colosted Lin	a(a)		algulation	Ontines
Delete Selected Line(s)	Undelete Selected Lin	e(s) List Rep	ort	alculation	Options
Delete Selected Line(s)	Undelete Selected Lin	e(s) List Rep	ort	alculation	Options
2	Undelete Selected Lin	e(s) List Rep	ort C	Calculation	Options
2	Undelete Selected Lin	e(s) List Rep	ort C	alculation	Options
2	Undelete Selected Lin	e(s) List Rep	ort C	Calculation	Options

The *Sample List* list box contains the standards acquired so far. To examine the data acquired on the two standards run under automation, first choose the copper metal, selecting *St* 529 *Set* 2 *JEOL Copper* and click the **Analyze!** button.

The results for the five automated standard analyses of the copper metal are shown below. Each individual line (191G to 195G) is illustrated along with the *Average*, *Std Dev* and a variety of other statistical parameters for the acquired points (see User's Guide and Reference documentation for additional details).

Then S in			6.0760 S	SS 70 1				2		
-Sample L	ist (multi-selo	ect) (double-	click to see inten	sity data	1	Analy	ze	Data	KRaws	
	Standards St 530 Set 1 Zinc Taylor Unknowns St 529 Set 1 JEOL Copper						Selected	l Line(s)	>>Excel	
C Wave	seame St .	529 Set 2 J	EOL Copper			Pause E	etween?	Samples		
C All Samples St 530 Set 2 Zinc Taylor						Delete Selected Sample(s)				
Select						Undel	ete Sele	cted Sam	ple(s)	
Specified	Concentratio	ons Standa	ard Assignments	Name	Description	Con	ditions	Element	s/Cations	
30 Beam : Results in	Elemental W	eight Percer	nt 6		Calculated (Atomic Weig	032 5 .55	.00 29.0		ss Oxyger ar	
		Zn	Total					- 10	-	
Сору	Cu	100 C 10 C			10					
verage:	99.994	.082	100.076							
verage: td Dev:	99.994 .488	.082 .136	100.076 .414							
verage: td Dev: ublished:	99.994 .488 100.000	.082 .136 n.a.	100.076 .414 100.000							
verage: td Dev: ublished: td Err:	99.994 .488 100.000 .218	.082 .136 n.a. .061	100.076 .414 100.000 .185							
verage: td Dev: ublished: td Err: Rel SD:	99.994 .488 100.000 .218 .5	.082 .136 n.a. .061 165.9	100.076 .414 100.000 .185 .4							
verage: td Dev: ublished: td Err: :Rel SD: linimum:	99.994 .488 100.000 .218 .5 99.450	.082 .136 n.a. .061 165.9 .000	100.076 .414 100.000 .185 .4 99.547							
	99.994 .488 100.000 .218 .5	.082 .136 n.a. .061 165.9	100.076 .414 100.000 .185 .4							
verage: td Dev: ublished: td Err: Rel SD: inimum: aximum:	99.994 .488 100.000 .218 .5 99.450	.082 .136 n.a. .061 165.9 .000 .314	100.076 .414 100.000 .185 .4 99.547	ne(s)	List Re	port		alculation	Options	
verage: td Dev: ublished: td Err: Rel SD: inimum: aximum: Delete S	99.994 .488 100.000 .218 .5 99.450 100.693	.082 .136 n.a. .061 165.9 .000 .314	100.076 .414 100.000 .185 .4 99.547 100.693	ne(s)	List Re	port	C	alculation) Options	
verage: td Dev: ublished: td Err: Rel SD: inimum: aximum: Delete S	99.994 .488 100.000 .218 .5 99.450 100.693	.082 .136 n.a. .061 165.9 .000 .314	100.076 .414 100.000 .185 .4 99.547 100.693	1e[s]	List Re	port		alculation	Options	
verage: td Dev: ublished: td Err: Rel SD: inimum: aximum: Delete S Copy 91 G	99.994 .488 100.000 .218 .5 99.450 100.693 Selected Line	.082 .136 n.a. .061 165.9 .000 .314 e(s) Unde	100.076 .414 100.000 .185 .4 99.547 100.693	ne(s)	List Re	port	C	alculation	Options	
verage: td Dev: ublished: td Err: Rel SD: inimum: aximum: aximum: Delete S Copy 91 G 92 G	99.994 .488 100.000 .218 .5 99.450 100.693 ielected Line Cu 100.693	.082 .136 n.a. .061 165.9 .000 .314 e(s) Unde	100.076 .414 100.000 .185 .4 99.547 100.693 elete Selected Lin Total 100.693	ne(s)	List Re	port		alculation	Options	
verage: td Dev: ublished: td Err: Rel SD: linimum: laximum:	99.994 .488 100.000 .218 .5 99.450 100.693 selected Line Cu 100.693 99.617	.082 .136 n.a. .061 165.9 .000 .314 e(s) Unde Zn .000 .314	100.076 .414 100.000 .185 .4 99.547 100.693 elete Selected Lin Total 100.693 99.931	ne[s]	List Re	port	C	alculation	Options	
verage: td Dev: ublished: td Err: Rel SD: inimum: aximum: delete S Copy 91 G 92 G 93 G	99.994 .488 100.000 .218 .5 99.450 100.693 selected Line Cu 100.693 99.617 100.126	.082 .136 n.a. .061 165.9 .000 .314 e(s) Unde Zn .000 .314 .000	100.076 .414 100.000 .185 .4 99.547 100.693 elete Selected Lin Total 100.693 99.931 100.126	1e[s]	List Re	port	C	alculation	Options	

If the sample that has been run is a standard, the program will show a *Published* line as well in the analysis output. This is the weight percent value for the element as entered in the standard database. If an element is not found in the standard database it is shown as n.a. or not analyzed.

Selecting *St* 530 *Set* 2 *Zinc Taylor* and clicking the **Analyze** button exports the following data (zinc metal standard numbers) to the main PROBE FOR WINDOWS log window.

		COLOR DE LA COL	ical <u>R</u> un <u>O</u> utpu	a <mark>nual Files\brass</mark> .t <u>H</u> elp				
	Acquire!		Analy	ze!	Automate!	1	Plot!	
		2 Zinc Ta	the second s					
TakeOff				m Current =	30 Beam Size	= 2		
Number			nber of 'Go		5			
Current	Date a	nd Time:	2/26/99 4:	59:23 PM				
Element	al Wt. 4	& Total:	100.013	Average 1	otal Oxygen:	.000		
Average	Calcu.	Oxygen:	.000	Average Ex	cess Oxygen:	.000		
Average	Atomic	Weight:	65.370	Average At	omic Number:	30.000		
Average	ZAF Ite	eration:	1.20	Average MA	N Iteration:	2.00		
Results	in Eler	nental Wo	eight Perce	nts				
ELEM:	Cu	Zn						
BGDS:	LIN	LIN						
TIME :	10.00	10.00						
ELEM:	Cu	Zn	SUM					
196	.011	10000 No 52.87						
197	.000	98.918	98.918					
198	.000	101.407	101.407					
199	.000	100.194	100.194					
200	.000	99.786	99.786					
AVER :	.002	100.010	100.013					
SDEV:	.005	. 908						
SERR :	.002	.406						
%RSD:	223.6	. 9						
PUBL :	n.a.	100.000	100.000					
%VAR:	.00	.01	001808001000303030					
DIFF:	.000	.010						
STDS:	529	530						

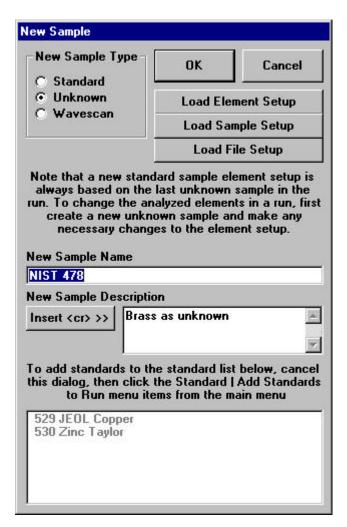
Both standards look ok, the user may move on to analyze unknowns.

Unknown Sample Data Collection and Analysis

To collect x-ray data on an unknown sample, minimize the **Analyze!** window and/or bring forward the **Acquire!** dialog box to start a new sample.

Click the **Move** button on the **Acquire!** window to drive the stage to the coordinates of the first unknown sample.

Click the **New Sample** button to activate the **New Sample** dialog box. Enter an appropriate sample name and description into the *New Sample Name* and *New Sample Description* text boxes. Check that the *Unknown* button under *New Sample Type* is checked and then click the **OK** button.



To start acquiring x-ray counts on the first unknown sample (NIST 478), simply click the **Start Standard or Unknown Acquisition** button of the **Acquire!** window.

1 2	3	x	Y 2	z w		
240.003 106.824 9	9.6923 22.00	517 43.959	7 10.904	2 1.99999		
Faraday 1	2	3				
10.00 .00	2.00	2.00				
30498.0 .	121.	128.				
303	irrent Sample			Start Standa	rd or Unk	nown Acquisition
Un 2 * NIST 478					1	
Data Rows: O	Good Data	Rows: 0		Start Wave	scan	Special Options
New Sample	Lo	cate		Move	Ac	quisition Options
Elements/Cations	P	НА	Peak	Scan Options	St	art Peak Center

Next, the **Analyze!** dialog box is reopened or simply brought forward. Click the *Unknowns* button under the *Sample List* buttons and highlight (select) *Un* 2 *NIST* 478.

Analyze!					_ 🗆 :
Sample List (multi-select) (© Standards <u>Un 1 *</u>	double-click to see intens setup IIST 478 Standard Assignments	Ar	Analyze halyze Selecte 'ause Between Delete Selec Undelete Selec Conditions	Samples cted Samp ected Sam	
Copy		Total Weight Calculated O Atomic Weigl	xygen		l Oxygen ss Oxygen ar
Delete Selected Line(s)	Undelete Selected Line	e(s) List Rep	port C	Calculation	Options

Clicking the **Analyze** button calculated the results for these five points and those values are viewed below, as displayed in the main log window.

	Acquire!		Analy	zel	Automate	P	ot!
	Acquire		Analy	26:	Automate		
	NIST 47						
8			s=20 Bea	m Current =	30 Beam Siz	e = 2	
251 Th 100 Th 100 Th	s unknow	07 25		1212 230	2		
	of Lines		nber of 'Go		5		
Current	Date an	d Time:	2/26/99 5:	09:25 PM			
Floment	al Wt. %	Total	100.099	A	Total Oxygen:	.000	
	ar wt. v Calcu.		.000	83	xcess Oxygen:		
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	Atomic				tomic Number:		
191	ZAF Ite	30.5	1.00	SR 2223	AN Iteration:	2.00	
				20.57 BB		the Matrix Correc	tion
Results	in Elem	ental We	eight Perce	nts			
			_				
SPEC:	0						
TYPE :	CALC						
AVER :	.000						
SDEV:	.000						
1003007	2	2					
ELEM:	Cu	Zn					
BGDS:	LIN	LIN					
TIME:	20.00	30.00					
ELEM :	Cu	Zn	SUM				
201	73.080		30m 100.047				
202		26.620					
203		27.106					
204		27.477					
205	73.020		100.472				
AVER :	72.975	27.124	100.099				
SDEV :	.195	.357					
	.087	.160					
SERR:		4 0					1
SERR: %RSD: STDS:	.3 529	1.3 530					

The certified values for NIST 478 are 72.85 wt% copper and 27.10 wt% zinc. This sample can also be used as a secondary standard to check the quality of the standardization. If the sample is a standard sample, the analysis printout will list several other output lines (see page 120, zinc metal). The published, "PUBL" weight percent value for the element as entered in the default standard database and the percent variance, "% VAR" from the published value for each element compared to the actual measured average for the standard are listed. After this is a line labeled "DIFF" which is the difference between the "AVER" and "PUBL" values. These parameters give the user an easy way to evaluate the quality of the standardization.

Output of Analyzed Data

Before closing the run, the user decides to output the data to an ASCII file for importing to another application such as Excel and to the laser printer for a hardcopy. From the main PROBE FOR WINDOWS log window, select **Output** from the menu bar and click **Save to Disk Log** from the menu.

	robe Operators\Manual Files\brass01.M	DB]	_ 🗆 ×
<u>File Edit Standard Xray A</u> r	alytical <u>R</u> un <u>Output</u> <u>H</u> elp		
Acquire!	, Log Window Font Debug Mode Extended Format Save To Disk Log View Disk Log	mate!	Plot!
	Load Custom Position Forma Save Custom Analysis Forma		
	<u>O</u> pen Link To Excel <u>C</u> lose Link To Excel		
•			

This opens the **Open File To Output Probe Data To** dialog box. Type in a *File name*. This output file has the extension .OUT. Note that all raw data is always automatically saved in the .MDB run file for future re-calculation and /or output. Click **OK** when finished.

Open File To	Output Probe Data To				? ×
Save jn:	Probe Operators	-		<u>e</u>	0-0- 0-0- 0-0-
COMMER	CIAL_CLIENTS				
🚞 Images					
🚞 Manual Fil	es				
🗀 UNIVERS	ITY_CLIENTS				
1	-				
File <u>n</u> ame:	E:\Probe Operators\Manual F	iles\brass01.	out		<u>S</u> ave
Save as type:	Probe Output Files (*.OUT)		-		Cancel
State Property	1				Cancel

Select the **Analyze!** button in the main PROBE FOR WINDOWS log window, to bring forward the **Analyze!** dialog box.

Sample List (multi-select) (double-click to see intens	sity data) — 🗌	Analyze	Data	KBaws
🔿 Standards 🛛 Un 1 *	' setup		Analyze Select		>>Exce
Unknowns Un 2 M	NIST 478		Pause Betwee		//LAGE
O Wavescans O All Samples					
			Delete Sele		
Select All		'	Undelete Se	lected Sam	ple(s)
pecified Concentrations	Standard Assignments	Name/Description	n Conditions	Element	ts/Cations
		Total Weig	Oxygen 🗍	Exce	l Oxygen sss Oxyge
		Atomic We	gnt j	Z - B	iar
ру					
					-
Delete Selected Line(s)	Undelete Selected Lin	e(s) List R	eport	Calculation) Options
12 A. A. A.	Undelete Selected Lin	e(s) List R	eport	Calculation	1 Options
2 <u>00</u> 400 400	Undelete Selected Lin	e(s) List R	eport	Calculation	Options
2 <u>00</u> 400 400	Undelete Selected Lin	e(s) List R	eport	Calculation	1 Options
Delete Selected Line(s)	Undelete Selected Lin	e(s) List R	eport	Calculation	1 Options
1 <u>11</u> 101 111	Undelete Selected Lin	e(s) List R	eport	Calculation	1 Options

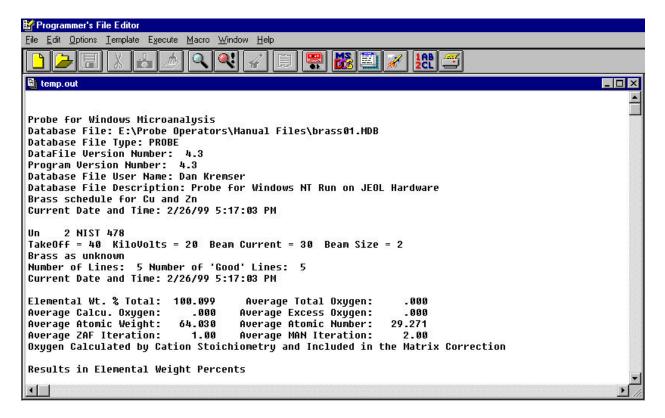
Select from the Sample List of the Analyze! window the samples to be output to this file.

Click the **Analyze** button to reanalyze the samples.

When the program finishes recalculating data to the file, return to the main PROBE FOR WINDOWS log window. Select **Output** from the menu bar again and click **View Disk Log** from the menu.

Acquire!	, Log Window Font	mate!	Plot!
	<u>Debug</u> Mode <u>Extended Format</u>		
	✓ Save To Disk Log		
	<u>V</u> iew Disk Log		
	Load Custom Position Format #1 Save Custom Analysis Format #1		
	Open Link To Excel Close Link To Excel		

This opens the file editor. This example utilizes the **Programmer's File Editor**, seen below. A number of text file editors may be used. To utilize a specific editor such as Notepad or Textpad, edit the FileViewer keyword in the PROBEWIN.INI file.



The user might note that the output file is designated TEMP.OUT rather than the BRASS01.OUT specified earlier in the **Open File To Output Probe Data To** window. When the user wishes to view the disk log, the program closes the active log, creates a copy called TEMP.OUT, reopening the original (BRASS01.OUT) for further log writing, and allows the user to view the copy. Each time the user reopens the disk log and assuming new information has been appended, the editor will prompt that the TEMP.OUT file has been altered on disk by another application. Do you want to load this new version? Select the **Yes** button to view the additional material.

Also, if the user types a comment (to annotate output) into the main PROBE FOR WINDOWS log window, this comment string is echoed into the active disk log. Be aware that the comments entered will be placed at the current end position of the active log window.

The user may now direct the log data to a laser printer for hard copy viewing by selecting **File** from the **Programmer's File Editor** menu bar and clicking on **Print** in the drop-down menu.

Exit the file editor and return to the main PROBE FOR WINDOWS log window.

Closing the Current Run and Probe for Windows

The user ends the analysis session from the main PROBE FOR WINDOWS log window. Select **File** from the menu bar and click **Close** from the menu selections.

Probe For Windows [E:\Probe Operators\Manual Files\br	ass01.MDB]	
<u>File</u> Edit <u>S</u> tandard <u>X</u> ray <u>Analytical</u> <u>B</u> un <u>D</u> utput <u>H</u> elp	22.0 22.0	
New	Automate!	Plot!
Open		
Save <u>A</u> s		
Eind File		
File Information		
Compact		
Print Log		
Print Setup		
Exit		
E:\Probe Operators\Manual Files\brass01.MDB		
E:\Probe Operators\UNIVERSITY\Plank\tpglas01.MDB		_
E:\Probe Operators\UNIVERSITY\Plank\tpfeld01.MDB		
E:\Probe Operators\UNIVERSITY\Kuebler\kkamph01.MDB		

This opens the **ProbFormCloseFile** window, click **Yes** to close this file.

ProbForm	nCloseFile 🔀
?	Are you sure you want to close the current Probe for Windows file E:\Probe Operators\Manual Files\brass01.MDB?

Close PROBE FOR WINDOWS by selecting File from the menu bar and clicking Exit.

Probe For Windows		_ 🗆 🗙
<u>File</u> Edit <u>S</u> tandard <u>Xray</u> <u>A</u> nalytical <u>R</u> un <u>D</u> utput <u>H</u> elp		
New	Automatel	Plot
<u>O</u> pen	-	
Save <u>A</u> s		
Close		
<u>F</u> ind File		
File Information		
Compact		
Print Log		
Print Setup		
E <u>v</u> it		
E:\Probe Operators\Manual Files\brass01.MDB		
E:\Probe Operators\UNIVERSITY\Plank\tpglas01.MDB		
E:\Probe Operators\UNIVERSITY\Plank\tpfeld01.MDB		
E:\Probe Operators\UNIVERSITY\Kuebler\kkamph01.MDB		

Silicate Sample Run

Introduction

This document illustrates step by step how to set up a new PROBE FOR WINDOWS quantitative run and how to analyze an unknown ten element silicate sample. This documentation was produced on a three spectrometer JEOL 733 electron microprobe. Your particular run may look very different depending on the specific configuration of your microprobe. This document should be used in conjunction with the User's Guide and Reference documentation and on-line help.

This run will demonstrate some of the powerful features of the PROBE FOR WINDOWS program. These include the use of pre-digitized standard mounts, automated spectrometer peaking, non-linear MAN (mean atomic number) background corrections, automated spectral interference corrections, automated standard acquisitions and digitizing unknown sample acquisitions.

Opening Probe For Windows

From the Desktop, double-click on the yellow EPMA Software folder opening the EPMA Software group. Double click on the **Probe for Windows ...** icon.



Upon launching PROBEWIN (PROBE FOR WINDOWS), the main log window appears along with the **RealTimeInitInterface** window as illustrated below. To collect real time data click the **Yes** button. The program can also be run off-line without the microprobe interface to re-process previously acquired data or on another computer.

📕 Probewin (Probe For Win	tows)		
<u>File E</u> dit <u>S</u> tandard <u>X</u> ray <u>A</u> r	alytical <u>R</u> un <u>O</u> utput <u>H</u> elp		
Acquire!	Analyze!	Automate!	Plot
- 1.7.11.21명에 실망했다. 그러면 전 - 22.22명에 관심하는 1.7.22명이 있다.	y 🕐 Do you want to interfa	그가 같은 맛있었는 것이에서 말했던 것이 많다는 것이 좋다.	

This action causes the **Confirm Motor and Crystal Positions** dialog box to open. Confirm that all of the motors (stage and spectrometer positions) and crystal designations are correctly calibrated. If there is disagreement between the mechanical positions (actual) and the software values, adjust the software values. Use the <tab> key to move between the *Target Positions* text boxes.

x	t Positions	Remo	ive Faraday	ОК
<u>-</u> 9.3720	35.7016	Upda	te Positions	Positions
Z	w Incr	ement Fr	ee/Clear	Stage
0.9966 Stage Ba	cklash 🛄		og Stage Dectrometers	Cancel
1	r Target Positions	3		
ET 🔄	TAP 🗾 LIF	•	V	×
	240.010 240	.001		
40.003				

Click the **OK** button after you have finished to close the **Confirm Motor and Crystal Positions** dialog box.

The main PROBE FOR WINDOWS log window is now visible as seen below.

🕌 Probewin (Probe For Window	\$]						
<u>File Edit Standard Xray Analytical Run Output Help</u>							
Acquire!	Analyze!	Automate!	Plot!				
Written by John J. Dong	ovan, Copyright (c)	1995-1999 John J. Do	onovan 🔺				
This software is regist Dan Kremser Washington University Press the F1 key in any		: sensitive help					
Initializing Advanced M	licroBeam Interface						
Loading DCX motor cont DCX Driver version numb DCX DLL version number	er 2	oard O					
Getting DCX motor cont DCX initialization comp	oller configuration	ı for board O					
Advanced MicroBeam Inte	erface Initialized		•				

Creating a New Run

To create a new sample run, select **File** from the menu bar and click **New** from the menu.

Probewin (Probe For Windows)		
<u>File E</u> dit <u>S</u> tandard <u>X</u> ray <u>Analytical</u> <u>B</u> un <u>O</u> utput <u>H</u> elp		
New	Automate!	Plot!
<u>O</u> pen	(32 bit) v. 4.52)	
Save <u>A</u> s	-1999 John J. Donovan	
Close		
<u>F</u> ind File		
File Information		
Compact		
Print Log	sitive help	
Print Setup		
E <u>x</u> it	0	
E:\Probe Operators\Manual Files\brass01.MDB		
E:\Probe Operators\UNIVERSITY_CLIENTS\Plank\tpglas01.MDB	board O	
E:\Probe Operators\UNIVERSITY_CLIENTS\Plank\tpfeld01.MDB	ada de atrada en actival de la	
E:\Probe Operators\UNIVERSITY_CLIENTS\Kuebler\kkamph01.MDB		

The Open New Probe Database File dialog box opens.

Open New F	Probe Database File			? ×
Save jn:	Probe Operators	-		k 🔛 🏢
COMMER	RCIAL_CLIENTS			
🚞 Images				
📄 Manual F	ïles			
	SITY_CLIENTS			
File <u>n</u> ame:	*.mdb			<u>S</u> ave
Save as <u>t</u> ype	: .MDB (*.MDB)		•	Cancel

Change the Save in: location (directory) and type in an appropriate run name into the File name text box.

The initial *Save in:* location is specified by the UserDataDirectory keyword in the PROBEWIN.INI file. File names longer than 8 characters are now supported.

The screen capture of the first window in this section indicates that other probe runs (previous four listed) are already established. Any of the existing old runs maybe re-opened to acquire additional data or used as a "setup" file for starting a new run. In this example, a new file designated PYROXENE01.MDB will be created in the Manual Files directory.

Open New I	Probe Database File		? ×
Save in:	🔁 Manual Files	- 🖬 🖻	
brass01.1	MDB		
[01504		
File <u>n</u> ame:	pyroxene01.mdb		<u>S</u> ave
Save as <u>t</u> ype	: .MDB (*.MDB)		Cancel

Close the **Open New Probe Database File** window by clicking the **Save** button. This action opens the **File Information** dialog box.

Enter the relevant information for the new run into the *User, Title*, and other *Description* text boxes. Use the <tab> key to move between text boxes. When finished, click the **OK** button.

File Information File Name	E:\Probe Operator	s\Manual Files\nu	uoxene01 mdb	
Version	4.52	Туре	PROBE	ок
User	Dan Kremser			Cancel
Title	Pyroxene Run			
Department	Earth and Planeta	y Sciences		
Account #		Group		_
Description Insert <cr> >></cr>	Probe for Windows		_ Hard w are	×
				¥
Date Created	9/27/99 6:36:11 P	M Date	Modified 9/27/99	6:36:11 PM
Last Updated	9/27/99 6:36:11 P	M		

This returns the program to the main PROBE FOR WINDOWS log window. Now the four main Probe buttons: Acquire!, Analyze!, Automate!, and Plot! become active.

<u>File E</u> dit <u>S</u> tandard <u>X</u> ray <u>A</u> n	r <mark>obe Operators\Manual Files\p</mark> alytical <u>R</u> un <u>O</u> utput <u>H</u> elp		
Acquire!	Analyze!	Automate!	Plot!
상태가 관계 집에 넣는 그 것이다. 그 귀엽 것이라 한 것이라 하는 것	(Probe for Windows 95/ onovan, Copyright (c)	생활하게 많아야지, 아이들이 물건을 많은 것이 많다. 것이 같아요.	177.757 S
This software is reg Dan Kremser	istered to :		
Washington Universit Press the F1 key in	Y any window for context	sensitive help	
	d MicroBeam Interface		
Loading DCX motor co DCX Driver version n DCX DLL version numb		oard O	
	ntroller configuration	for board O	
Advanced MicroBeam I	있는 것 		1 March

Parameter Initialization

Analytical Standard Selection

Select the analytical standards to be used in the new probe run. From the main PROBE FOR WINDOWS log window click **Standard** from the menu bar and select **Add Standards to Run** from the menu.

File Edit Standard Xray Analytical		pyroxene01.mdb]	
<u>S</u> tandard Database	Analyze!	Automate!	Plot!
Welcome Correspondent to Run Written by John J. Donova		~ 그는 것이 잘 많은 것이 잘 많이 잘 잘 안 했다. 이 것이 가지 않는 것이 같이 나라. 것이 없는 것이 같이 나라. 것이 없는 것이 없다. 것이 없는 것이 없이 않이	553 (55) (55) (55) (55)
This software is register Dan Kremser	ed to :		
Washington University			
Press the F1 key in any w	indow for contex	t sensitive help	
Initializing Advanced Mic	roBeam Interface		
Loading DCX motor control		oard O	
DCX Driver version number DCX DLL version number 2			
Getting DCX motor control		n for board O	
DCX initialization comple		ICI FARMAREN EFERT	<u>.</u>
Advanced MicroBeam Interf	ace Initialized		

This opens the Add Standards to Run dialog box.

Available Standards in Database (multi-select) 0 REE1 glass	Current Standards in Run
1 REE2 glass	
2 REE3 glass	
5 CoDi glass	
26 Rhodonite	
27 Jadeite 32 Olivine	
33 Olivine	
lo Garnet	
1 Ilmenite	
is CPX	
6 CPX Hedenbergite	
O Glass CAM-112	
73 Chromite	
	ОК
Add To F	

All previously entered standards in the default standard database are accessible. Scroll through the *Available Standards in Database* list box to find the standards to be used in this run. Select both primary analytical standards and the MAN background standards. Some standards may be run as both. Select each and click the **Add To Run** >> button to add each to the *Current Standards in Run* list box.

308 Hematite #2 Taylor 🛛 🗖	81 Albite
309 Olivine #1 Taylor	203 Fayalite
310 Barite #4 Taylor	205 Tephroite
311 YAG Garnet Taylor	206 Orthopyroxene
312 Spinel Taylor	207 Kyanite
313 Benitoite Taylor	210 Wollastonite
314 Anhydrite #4 Taylor	211 V205
315 Wollastonite #2 Taylor	212 Rutile
316 SrTiO3 Taylor 👘 👘 👘	222 Ni-Olivine
317 MgO Taylor	224 Cr2O3
318 Al2O3 Taylor	317 MgO Taylor
319 SiO2 Quartz Taylor	318 Al2O3 Taylor
320 CaCO3 Taylor	319 SiO2 Quartz Taylor
321 TiO2 Rutile Taylor 📃 💌	N 82
(OK
Add To	Run >>
	Cancel

Click the **OK** button of the **Add Standards to Run** window when finished selecting standards. This returns the program to the main log window.

Nominal Beam Current Measurement

Click the **Acquire!** button. This action opens both the **Acquire!** dialog box and the **AcquireCheckNominal** window for the determination of the nominal beam count.

Acquire!							
1	2	3	x	Y	z	W	
240.002 24	0.007	240.000	19.3719	35.7002	10.9966	1.00000	
Faraday		1	2	3			
(• •	lominal bea	_		u want to ac		beam current now? isition ptions
Elements/I	Cations	:	PHA	6	Peak/9	ican Options	Start Peak Center

Click the **Yes** button on the **AcquireCheckNominal** window to establish a reference beam current reading. The beam (Faraday Cup counts on a JEOL 733 microprobe) is then measured. In this example the Faraday reading was taken for 10 seconds and recorded 40552 counts or 40.552 nA of beam current.

Acquire!										
1	2		3	x		Y	z	W		
240.002 240.	006	240.0	01 1	9.3720	35.700)1	10.9966	.999987		
Faraday		1		2	3					
10.00	. ()0	. 0	0	.00					
40552.0				•	•					
Current Sample							Start Standard or Unknown Acquisition			
								Start ₩av	/escan	Special Option
Ne w Samp				Locate	e.			Move	Ac	quisition Options
Elements/Ca	tions			PHA		Ţ	Peak/9	ican Optio	ns S	art Peak Center
Analytical Con	ditior	78	C	iount Ti	mes		Ra	te Meter		Peaking

Creating a New Sample

Click the New Sample button of the Acquire! dialog box. This opens the New Sample dialog box.

New Sample					
New Sample Type -	ОК	Cancel			
Unknown	Load Element Setup Load Sample Setup				
C Wavescan					
	Load File Setup				
necessary change New Sample Name unknown sample	es to the elem	ent setup.			
New Sample Descriptio	n				
Insert <cr>>>></cr>		X			
To add standards to th this dialog, then click t to Run menu ite	he Standard	Add Standards			
81 Albite 203 Fayalite					
205 Tephroite					
206 Orthopyroxene 207 Kyanite					
210 Wollastonite					
211 V205					

Select *Unknown* from the *New Sample Type* buttons. Type an appropriate sample name and description into the *New Sample Name* and *New Sample Description* text boxes. This first sample will be used only to establish the analysis parameters.

New Sample Type –	ок	Cancel
Unknown	Load Ele	ment Setup
C Wavescan	Load Sa	mple Setup
	Load F	ile Setup
New Sample Name		
setup		
setup	on	
setup New Sample Descriptio Insert <cr> >> parar</cr>	on neter initializa ent pyroxenes	
setup New Sample Description Insert <cr>>>> Parar element Fo add standards to th</cr>	neter initializa ent pyroxenes ie standard lis the Standard	t below, cance Add Standard
setup New Sample Description Insert <cr>>>> o add standards to the this dialog, then click to Run menu ite 81 Albite 203 Fayalite 205 Tephroite</cr>	neter initializa ent pyroxenes ie standard lis the Standard	t below, cance Add Standard
setup New Sample Description Insert <cr>>>> Fo add standards to the this dialog, then click to Run menu ite 81 Albite 203 Fayalite</cr>	neter initializa ent pyroxenes ie standard lis the Standard	t below, cance Add Standard

Click the **OK** button of the **New Sample** dialog box.

The program returns to the **Acquire!** window. Notice that the first sample designated $Un \ 1 \ * setup$ is now listed in the *Current Sample* text box. The * symbol indicating that no data has been collected for this sample yet.

Acquire!							
1 2	3	x	Y	z	W		
240.002 240.006 24	0.001 19	. 3720 3	5.7001	10.9966	. 999987		
Faraday 1	2	È	3				
10.00 .00	. 00		00				
40552.0 .							
	rrent Samp	le			Start Standard	or Unk	nown Acquisition
In 1 * setup						ŕ	
)ata Rows: 0	Good Da	ata Rows	s: O		Start Wavesc	an	Special Options
New Sample		Locate			Move	Ac	quisition Options
Elements/Cations		PHA		Peak/	Scan Options	SI	art Peak Center
Analytical Conditions	Co	unt Time	s	Ra	ite Meter		Peaking

Setting Analytical Conditions

Click the **Analytical Conditions** button to open the **Analytical Conditions** dialog box. Enter the appropriate numbers into the *Kilovolts, Beam Current*, and *Beam Size* text boxes for the currently *Selected Sample*. The *Kilovolts, Beam Current*, and *Beam Size* will need to be manually adjusted if a column digital interface is not present.

elected Samples			OK
Jn 1 * setup			Cance
nter Ne w Conditi	ons For Un 1*s	etup	

Click the **OK** button when done, returning to the **Acquire!** window.

Element, X-Ray Line, and Spectrometer Parameters Selection

Next, the user specifies the elements to be analyzed. Click the **Elements/Cations** button.

Acquire!							
1 2	3	x	Y	z	W		
240.002 240.006	240.001 19	. 3720 35	i.7001	10.9966	. 999987		
Faraday	1 2	5	3				
10.00 .0	0.00)(00				
40552.0	•	<u>.</u>	•				
	Current Samp	ole			Start Standard	or Unk	nown Acquisition
Jn 1 * setup						ſ	Ť.
)ata Rows: 0	Good D	ata Rows:	0		Start Wavesc	an	Special Options
New Sample		Locate			Move	Ac	quisition Options
Elements/Cations		PHA		Peak/	Scan Options	SI	art Peak Center
Analytical Condition	s Co	unt Times	5	Ra	nte Meter		Peaking

This action opens the **Analyzed and Specified Elements** dialog box. Click on the first empty row under the *Element* column to enter the first element to analyze. The user may enter the analyzed elements in any order however, the analysis output will follow this order.

Load Eleme Load Samp	
Click Element Row to Edit Element/Cations Parameters (click empty	row to add
Channel Element X-Ray Analyzed Motor Crystal O	In-Peak

This opens the **Element Properties** dialog box. In the *Element* field either type in the first element to analyze or use the drop-down menu to select the element symbol. Certain default values listed in this window are based on parameters entered into the previously established configuration files.

Element	X-Ray	Line Cations	Oxygens	OK
si	▼ ka	• 1 •	2 🔹	Cancel
f ne na mg	_6, Špecifi	Blank to Indicate an ied, by Difference or \$		Delete
al si p s	ion Type O Aver	age 🔿 High Only	🔿 Low Only	C Exponentia
Parameters (n Background © Off Peak		ground Type can differ for Off-Peak Entry	r Standards and Unkn Hi Off-Peak I	
• Un Peak • MAN		Absolute Position Relative Offset	Low Off-Peak	Interferences
				<u>.</u>

Under the *Enter Element Properties For* section (top of the **Element Properties** dialog box) choose the correct *X*-*Ray Line, Cations*, and *Oxygens* for the first element.

Element	perties For: X-Ray Li	ine Ca	tions	Oxygens	OK
si 💌	ka		▼ 2	oxygens ▼	Cancel
Leave the X- Element (EDS					Delete
Off Peak Correction	on Type				-
Linear	C Averag	je 🔿 Hig	jh Only 📿	Low Only	C Exponential
Background Typ © Off Peak © MAN		Off-Peak Entr Off-Absolute F ORelative C	Position		Interferences
					×
					×
Spectrometer	Crysta	l On-		igh Off-Peak	Low Off-Peak .000000

There are two common methods for performing a background correction on wavelength dispersive x-ray data; offpeak backgrounds and MAN (mean atomic number) background corrections. The off-peak method entails measuring the background on each element in the sample of interest with the spectrometer adjusted to a position, typically on each side of the analytical peak. This method while somewhat time-consuming can accurately determine the background contribution for major, minor and trace element concentrations.

The MAN method relies on the fact that most of the background (continuum) production in the sample is directly proportional to the average atomic number of the sample. The MAN correction is an empirical calibration curve method involving the measurement of standards of known composition (hence average atomic number). If many samples are to be analyzed for their major and minor element concentrations then substantial time may be saved using the MAN method. However, if the user is required to measure high atomic number samples and/or trace concentrations, more accurate data may be obtained with off-peak background corrections.

Continue by selecting *MAN* for the *Background Type*. Selecting *MAN* deactivates the *Off Peak Correction Type* buttons as well as the *High* and *Low Off-Peak* boxes. Next, click the text box under *Spectrometer* and enter the appropriate spectrometer number that will be used to analyze the first element. The drop-down menu may also be used to select the spectrometer number. Choosing a *Spectrometer* and *Crystal* loads various parameters from the configuration files. Each of these parameters in this window should be inspected and edited as needed (use the <tab> key to move between boxes).

Element	operties For X-Ray I		ons	Oxygens	OK
si 💌	ka	▼ 1	• 2	▼	Cancel
		Blank to Indica ed, by Differen			Delete
Off Peak Correct	ion Type —				
🖲 Linear	C Avera	ige C High	Only C	C Low Only	C Exponentia
Background Ty		round Type can o Off-Peak Entry		- 1	c Interferences
• MAN		C Relative Of	56761761 <u>5</u> 7642	Low Off-Pea	ak Interferences
					2
Spectrometer	Crust	al On-P	eak H	liah Off-Peak	Low Off-Peak
Spectrometer	Cryst.	al On-P		ligh Off-Peak 30.906	Low Off-Peak

The next screen shows the edited **Element Properties** dialog box for silicon.

Click the **OK** button of the **Element Properties** dialog box to accept these element parameters for silicon.

The program returns to the **Analyzed and Specified Elements** window with silicon now entered into the *Element/Cations Parameters* table.

Selected Un 1 *	setup				ОК	Cancel
					Load El	ement Setup
					Load S	ample Setup
Click Eler	nent Row to	o Edit Elen	nent/Cations	Paramete	rs (click em	pty row to add
Channel	Element	X-Ray	Analyzed	Motor	Crystal	On-Peak
1	si	ka	Yes	1	PET	228.074

Enter the next element in the run by clicking on the next empty *Element* row of the **Analyzed and Specified Elements** window. This opens the **Element Properties** dialog box again. Enter the appropriate *Element*, *Spectrometer*, *Crystal* and adjust all other text boxes and buttons. Repeat the element entry process until all of the elements are listed in the **Analyzed and Specified Elements** window. The remaining nine element entries are not shown here to save space. Finally, oxygen is added to the element list as a not analyzed element for subsequent formula calculations. This is done by entering o (for oxygen) in the *Element* text box and leaving the *X-Ray Line* text box empty. See User's Guide and Reference documentation for more details.

Un 1 ×	Samples				OK	Cance	el
	27-27 - 22				Load El	ement Setup	
					Load S	ample Setup	
Channel	Element	X-Ray	Analyzed	Motor	Crystal	On-Peak	
1 2	si al	ka ka	Yes Yes	1	PET TAP	228.074 90.9050	
	ai		Yes	3			-
	ti	ka	res	э	LIF	191.217	
3	ti V	ka ka	Yes	3	LIF	191.217 174.186	
3 4 5	- 69						
3 4 5	v	ka	Yes	3	LIF	174.186	
3 4 5 6	v cı	ka ka	Yes Yes	3 3	LIF LIF	174.186 159.317	
3 4 5 6 7 8	v cr fe	ka ka ka	Yes Yes Yes	3 3 3	LIF LIF LIF	174.186 159.317 134.724	
3 4 5 6 7 8	v cr fe mn	ka ka ka ka	Yes Yes Yes Yes	3 3 3 3 3	LIF LIF LIF LIF	174.186 159.317 134.724 146.253	
3 4 5 6 7	v cr fe mn mg	ka ka ka ka ka	Yes Yes Yes Yes Yes Yes	3 3 3 3 2	LIF LIF LIF LIF TAP	174.186 159.317 134.724 146.253 107.798	

Click the **OK** button of the **Analyzed and Specified Elements** window when done entering elements in the run.

The **GetElmLoadDefaultStds** window opens to inform the user that standard assignments have been made based on the highest concentration of the element in the standard. The user will edit these choices shortly. Click **OK** to return to the main **Acquire!** window.

GetElmL	oadDefaultStds
•	Default standard assignments were loaded for the sample(s) based on the highest concentration of the element in the standards. It may be necessary to modify these default standard assignments for best results.
	ΟΚ

Editing Acquisition Options

The user may change the element acquisition order of the spectrometers by clicking the **Acquisition Options** button in the **Acquire!** dialog box.

Acquire!												
1		2		3		x	Y	1	z	W	r	
240.002	240.	006	240.	001	19.	3720	35.700	L 10	. 9966	. 99998	2	
Faraday	r		1		2		3					
10.00	n .	1	20		00	5	00					

Channel	Element	Motor	Crystal	Order	Std Bgd	Unk Bgd	EDS	
1	si ka	1	PET	1	Off Peak	MAN		
2	al ka	2	TAP	1	Off Peak	MAN		
3	ti ka	3	LIF	1	Off Peak	MAN		
4	v ka	3	LIF	2	Off Peak	MAN		
5	cr ka	3	LIF	3	Off Peak	MAN		
6	fe ka	3	LIF	4	Off Peak	MAN		
7	mn ka	3	LIF	5	Off Peak	MAN		
8	mg ka	2	TAP	2	Off Peak	MAN		
9	ca ka	1	PET	2	Off Peak	MAN		
10	na ka	2	TAP	3	Off Peak	MAN		
• • Chann	el Number			Asyr	tion Motion — nchronous		OK	8. 010
• Chann	el Number	ms		Asyr	nchronous			8. 010
• Chann • Chann • Ascen • Desce	el Number ding Angstro nding Angst	roms		© Asyı © Syn	nchronous chronous		OK Canc	8. 010
• Chann • Chann • Ascen • Desce	el Number ding Angstro	roms		⊙ Asyı ⊖ Syn Miscell	nchronous chronous aneous Optio		Canc	el
Chann CAscen CDesce CUser D	el Number ding Angstro nding Angst	roms r Number		⊙ Asyı ○ Syn Miscell	nchronous chronous	iks After Ac	Canc quisitior	el
Chann CAscen CDesce CUserD Spectrom	el Number ding Angstro nding Angst efined Orde	roms r Number sh	ctrometers	⊙ Asyn ⊙ Syn Miscell ☑ Reto ☑ Blar	nchronous chronous aneous Optio urn to On Pea	ks After Ac Acquisition	Canc quisitior	el n
 Chann Asceni Desce User D Spectrom BackL 	el Number ding Angstro nding Angst efined Orde eter BackLa	roms r Number sh on on Spe		 ○ Asyn ○ Syn Miscell ☑ Retu ☑ Blar ☑ Mea ☑ Mea 	nchronous chronous aneous Optio urn to On Pea ik Beam After	ks After Ac Acquisition n Sample Ac n Wavescar	Canc quisitior cquisitio	el n
 Chann Asceni Desce User D Spectrom BackL Stage Bac 	el Number ding Angstro nding Angst efined Orde eter BackLa ash Correcti	roms r Number sh on on Spe v with auto	mation)	 ○ Asyn ○ Syn Miscell ☑ Reto ☑ Blar ☑ Mea □ Mea □ Mea 	nchronous chronous aneous Optio urn to On Pea ik Beam After isure Beam O isure Beam O isure Absorbe	ks After Ac Acquisition n Sample Ac n Wayescar d Current	Canc quisitior cquisitio	el n
 Chann Asceni Desce User D Spectrom BackL Stage Bac BackL 	el Number ding Angstro nding Angst efined Orde eter BackLa ash Correcti ckLash (only	roms r Number sh on on Spe with auto on on Star	mation) ndards	 ⊙ Asyn ⊂ Syn Miscell ☑ Retu ☑ Blar ☑ Mea ☑ Mea ☑ Mea ☑ Mea ☑ Mea ☑ Use 	nchronous chronous aneous Optio urn to On Pea ak Beam After sure Beam O isure Beam O isure Absorbe Automatic Ar	iks After Act Acquisition n Sample Act n Wayescar d Current nalysis	Canc quisitior cquisitio	el n
 Chann Ascen Desce User D Spectrom BackL BackL BackL BackL 	el Number ding Angstro nding Angst efined Orde eter BackLa ash Correcti ckLash (only ash Correcti	roms Fr Number sh on on Spe with auto on on Star on on Unk	mation) ndards nowns	 ⊙ Asyn ⊂ Syn Miscell ✓ Reto ✓ Blar ✓ Mea ✓ Mea ⊂ Mea ⊂ Use ⊂ Bea 	nchronous chronous aneous Optio urn to On Pea ik Beam After isure Beam O isure Beam O isure Absorbe	ks After Ac Acquisition n Sample Ac n Wavescar d Current nalysis Spectromete	Canc quisition cquisitio ns er Motio	rel n
 Ascen Desce User D Spectrom BackL Stage BackL BackL BackL BackL 	el Number ding Angstro nding Angst efined Orde eter BackLa ash Correcti ckLash (only ash Correcti ash Correcti	roms Fr Number sh on on Spe with auto on on Star on on Unk on on Way	mation) ndards nowns	 C Asyn C Syn Miscell ✓ Reto ✓ Blar ✓ Mea ✓ Mea ✓ Mea ✓ Mea ✓ Esea ✓ Acq 	nchronous chronous aneous Optio urn to On Pea ak Beam After sure Beam O isure Beam O isure Absorbe Automatic Ar m Off During	ks After Ac Acquisition n Sample Ac n Wayescar d Current nalysis Spectrometri ight Percent	Canc quisition cquisitio ns er Motio	el n

This opens the Acquisition Options dialog box.

To change the order that the spectrometer measures an element, select the *User Defined Order Number* button under *Acquisition Order* and click the row of the element to edit.

This opens the **Acquisition Properties** dialog box, seen below. Here, the user will re-define na to be counted on the first spectrometer pass due to its susceptibility to being volatilized by long exposure to the electron beam. In samples containing volatile elements the user may wish to consider running the volatile element calibration routine (see User's Guide and Reference documentation and/or Advanced Topics manual).

Channel	Element	Motor	Crystal	Order	Std Bgd	Unk Bgd	EDS	
2	al ka	2	TAP	1	Off Peak	MAN		
3	ti ka	3	LIF	1	Off Peak	MAN		1
4	v ka	3	LIF	2	Off Peak	MAN		1
5	cr ka	3	LIF	3	Off Peak	MAN		1
6	fe ka	3	LIF	4	Off Peak	MAN		1
7	mn ka	3	LIF	5	Off Peak	MAN		1
8	mg ka	2	TAP	2	Off Peak	MAN		
9	ca ka	1	PET	2	Off Peak	MAN		
10	na ka	2	TAP	3	Off Peak	MAN		1
11	0	Acquisiti	on Propertie:	8			No	
○ Descer ○ User D Spectrome ▼ BackL Stage BackL ■ BackL ■ BackL Automatio		To ch user d acqui	ground Type ff Peak AN (mean al ground Type ff Peak AN (mean al	quisition or , enter the for all eleme ctrometer e for Standa tomic numb e for Unkno tomic numb	desired ents on ards er) wwns	Cancel	OK Cance uisition quisition s r Motio	ns

Edit the *Spectrometer Order Number* for all elements to change the acquisition order. Further, the user wishes to use the same background correction method for both standards and unknowns, edit the *Background Type for Standards* to *MAN* for each element. Click the **OK** button returning to the **Acquisition Options** window. For spectrometer efficiency and element volatilization issues the user redefines the acquisition order as seen below.

Channel	Element	Motor	Crystal	Order	Std Bgd	Unk Bgd	EDS	
1	si ka	1	PET	1	MAN	MAN		1
2	al ka	2	TAP	3	MAN	MAN		
3	ti ka	3	LIF	1	MAN	MAN		
4	v ka	3	LIF	2	MAN	MAN		
5	cr ka	3	LIF	3	MAN	MAN		
6	fe ka	3	LIF	5	MAN	MAN		
7	mn ka	3	LIF	4	MAN	MAN		
8	mg ka	2	TAP	2	MAN	MAN		
9	ca ka	1	PET	2	MAN	MAN		
10	na ka	2	TAP	1	MAN	MAN		
C Chann	el Number	ms		Asyr	tion Motion – nchronous chronous		OK	8) 190
O Chann		oms		Asyr				8. 194
C Chann C Ascen C Desce	el Number ding Angstro nding Angst	roms		© Asy © Syn	nchronous chronous		OK Canc	8. 194
C Chann C Ascen C Desce	el Number ding Angstro	roms		⊙ Asyı ⊖ Syn Miscell	nchronous chronous aneous Optio		Canc	el
C Chann C Ascen C Desce C User D	el Number ding Angstro nding Angst	roms r Number		 Asyn Syn Miscell ☑ Reto 	nchronous chronous aneous Optio urn to On Pea	aks After Ac	Canc quisitior	el
C Chann C Ascen C Desce Spectrom	el Number ding Angstro nding Angst efined Orde eter BackLa	roms r Number sh	ctrometers	 Asyn Syn Miscell ☑ Reto 	nchronous chronous aneous Optio	aks After Ac	Canc quisitior	el
C Chann C Ascen C Desce Spectrom	el Number ding Angstro nding Angst efined Orde	roms r Number sh	ctrometers	C Asyn C Syn Miscell ☑ Retu ☑ Blar	nchronous chronous aneous Optio urn to On Pea nk Beam Afte usure Beam O	aks After Ac r Acquisition n Sample Ac	Canc quisitior cquisitio	el n
C Chann C Asceni C Descei ⊙ User D Spectromi ⊽ BackL	el Number ding Angstro nding Angst efined Orde eter BackLa ash Correcti	roms r Number sh on on Spe		 ○ Asyn ○ Syn Miscell ☑ Retu ☑ Blar ☑ Mea ☑ Mea 	nchronous chronous aneous Optio urn to On Pea nk Beam Aften isure Beam O isure Beam O	aks After Ac r Acquisition n Sample Ac n Wavescar	Canc quisitior cquisitio	el n
C Chann C Asceni C Desce © User D Spectrome ▼ BackL Stage Bac	el Number ding Angstro nding Angst efined Orde eter BackLa ash Correcti ckLash (only	roms r Number sh on on Spe v with autor	mation)	 ○ Asyn ○ Syn Miscell ☑ Retu ☑ Blar ☑ Mea ☑ Mea 	nchronous chronous aneous Optio urn to On Pea nk Beam Afte usure Beam O	aks After Act r Acquisition n Sample Act n Wavescar	Canc quisitior cquisitio	el n
C Chann C Asceni C Descei I User D Spectromi I BackL Stage Bac BackL	el Number ding Angstro nding Angst efined Orde eter BackLa ash Correcti ckLash (only ash Correcti	roms r Number sh on on Spea with autor on on Star	mation) ndards	 ○ Asyn ○ Syn Miscell ☑ Reto ☑ Blar ☑ Mea □ Mea □ Mea 	nchronous chronous aneous Optio urn to On Pea nk Beam Aften isure Beam O isure Beam O	aks After Ac r Acquisition n Sample Ac n Wavescar ed Current	Canc quisitior cquisitio	el n
C Chann C Ascen C Desce O User D Spectrom Z BackL Stage Bac BackL BackL BackL	el Number ding Angstro nding Angst efined Orde eter BackLa ash Correcti ckLash (only ash Correcti ash Correcti	roms Fr Number sh on on Spe with autor on on Star on on Unk	mation) ndards nowns	 G Asyn C Syn Miscell ₩ Retu ₩ Blar ₩ Mea ₩ Mea<	nchronous chronous aneous Optio urn to On Pea nk Beam After sure Beam O isure Beam O isure Absorbe	aks After Act r Acquisition n Sample Act n Wavescar ed Current nalysis	Canc quisitior cquisitio	el n
C Chann C Ascen C Desce O User D Spectrom Z BackL Stage Bac BackL BackL BackL	el Number ding Angstro nding Angst efined Orde eter BackLa ash Correcti ckLash (only ash Correcti	roms Fr Number sh on on Spe with autor on on Star on on Unk	mation) ndards nowns	 ○ Asyn ○ Syn Miscell ✓ Retu ✓ Blar ✓ Mea ✓ Mea ⊂ Mea ⊂ Use ⊂ Bea 	nchronous chronous aneous Optio urn to On Pea nk Beam After isure Beam O isure Beam O isure Absorbe Automatic A	aks After Ac r Acquisition n Sample Ac n Wavescar ed Current nalysis Spectromete	Canc quisitior cquisitio ns er Motio	n n
C Ascen C Desce C Desce C User D Spectrom F BackL Stage BackL BackL BackL BackL	el Number ding Angstro nding Angst efined Orde eter BackLa ash Correcti ckLash (only ash Correcti ash Correcti	roms sh on on Spe with auto on on Star on on Unk on on Way	mation) ndards nowns	 ○ Asyn ○ Syn Miscell ☑ Retu ☑ Blar ☑ Mea □ Mea □ Use □ Bea □ Acq 	nchronous chronous aneous Optio urn to On Pea ik Beam After sure Beam O isure Beam O isure Absorbe Automatic Ai m Off During	aks After Act r Acquisition n Sample Act n Wavescar ed Current nalysis Spectrometr ight Percent	Canc quisitior cquisitio ns er Motio	el n

Click the **OK** button of the **Acquisition Options** window to return to the **Acquire!** dialog box.

Modifying Standard Assignments

The standard assignments chosen by PROBE FOR WINDOWS may be inspected and edited by clicking the **Analyze!** button from the main log window.

<u>F</u> ile <u>E</u> dit	Standard A	ray <u>A</u> nalytic	al <u>R</u> un <u>O</u> ut	put <u>H</u> eip						
	Acquire!		Analy	zel		Automate	I I		Plot!	
TakeOff paramet	er initia	alizatio	= 15 Be n for 10 AN On-Pea	element	pyroxen		ize = 2			
ELEM: BGD: MOT: CRYS: ORDR:	si ka MAN 1 PET 1	al ka MAN 2 TAP 3	ti ka MAN 3 LIF 1	v ka MAN 3 LIF 2	cr ka MAN 3 LIF 3	fe ka MAN 3 LIF 5	mn ka MAN 3 LIF 4	mg ka MAN 2 TAP 2	BEAM	
ELEM: BGD: MOT: CRYS: ORDR:	ca ka MAN 1 PET 2	na ka MAN 2 TAP 1	BEAM							

The program automatically wraps element data output to eight elements per line. If the extended format menu is checked (activated from the **Output** menu) then the data is written out (in log window and to disk file, if enabled) as far as necessary to the right.

This opens the Analyze! dialog box.

Analyze!			100			
Sample List (multi-select) ((double-click to see intens	sity data) ——		Analyze	Data	KRaw
	* setup		An	alyze Seleci	ted Line(s)	>>Exc
Unknowns Wavescans			1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		en Samples	
C All Samples				Delete Se	lected Samp	le(s)
Select All					elected Sam	
				Undelete 5	electeu sam	pie(s)
pecified Concentrations	Standard Assignments	Name/Descri	ption	Conditions	Element	s/Cation
		Total V	veight ∶	%	Tota	l Oxygen
			ated Ox	5175 M		ess Oxyg
		Atomic	Weigh	t	Z - B	ar
ру						
						-
Delete Selected Line(s)	Undelete Selected Lin	e(s) Li	ist Repo	nt	Calculation	Options
	Undelete Selected Lin	e(s)	st Repo	ort	Calculation	Options
Delete Selected Line(s)	Undelete Selected Lin	e(s)	ist Repo	ort	Calculation	Options
	Undelete Selected Lin	e(s)	st Repo	ort	Calculation	Options
	Undelete Selected Lin	e(s)	ist Repo	ort	Calculation	Options
	Undelete Selected Lin	e(s)	ist Repo		Calculation	Options

Click the **Standard Assignments** button.

The Standard and Interference Assignments dialog box opens.

Selected :					ОК	Cancel
UN I	setup				Save Eleme	nt Setup
-					Save Sampl	
Click Elen Channel	Element	Edit Stand	lard/Interfere	nce/Volatile	Assignmen	ts Interf-Sta
1	si	ka	Yes	319		0,0,0,0
				04.0		
2	al	ka	Yes	318		0,0,0,0
5275	al ti	ka ka	Yes Yes	212		0,0,0,0 0,0,0,0
3		2255				
3 4 5	ti	ka	Yes	212		0,0,0,0
3 4 5 6	ti V	ka ka	Yes Yes	212 211		0,0,0,0 0,0,0,0
3 4 5 6	ti v cr	ka ka ka	Yes Yes Yes	212 211 211 224	 	0,0,0,0 0,0,0,0 0,0,0,0
3 4 5 6 7 8	ti v cr fe	ka ka ka ka	Yes Yes Yes Yes	212 211 224 203	 	0,0,0,0 0,0,0,0 0,0,0,0 0,0,0,0
3 4 5 6 7 8	ti v cr fe mn	ka ka ka ka ka	Yes Yes Yes Yes Yes	212 211 224 203 205	 	0,0,0,0 0,0,0,0 0,0,0,0 0,0,0,0 0,0,0,0
2 3 4 5 6 7 8 9 9	ti v cr fe mn mg	ka ka ka ka ka ka	Yes Yes Yes Yes Yes Yes Yes	212 211 224 203 205 317	 	0,0,0,0 0,0,0,0 0,0,0,0 0,0,0,0 0,0,0,0 0,0,0,0

Click the row of the element that the user wishes to change the standard assignment for.

This opens the **Assignment Properties** dialog box. The default standard assignments are based on the highest concentration of the element in the standards currently in the run. In addition to standard assignments, the user may assign spectral interference corrections and volatile element calibrations from this window.

Element	X-Ray	nts For: si ka Assigned Standard	OK
si 🔻	ka 🔻	319 SiO2 Quartz Taylor	Cancel
nterference	Standard As	signments	
st			- Remove
nd		, 	→ Remove
ird		, 	→ Remove
th			✓ Remove
		interfered element, nor any other interf	ent and none of the fering elements.
		interfered element, nor any other interf	
/olatile Elen	ient Calibrati	on Sample Assignment (select an unknown sample fo	fering elements.
			fering elements. or calibration fit) on calibration sample g the "Volatile" buttor
		on Sample Assignment (select an unknown sample fo Volatile element correction should be acquired using	fering elements. or calibration fit) on calibration sample g the "Volatile" buttor re window. ons using an assigne pecified here. Volatile ons are assigned to
		on Sample Assignment (select an unknown sample fo Volatile element correction should be acquired using in the Acquired Volatile element calibration calibration sample are sp element self calibration	fering elements. or calibration fit) on calibration sample g the "Volatile" buttor re window. ons using an assigne pecified here. Volatile ons are assigned to

Click the *Assigned Standard* menu box. A scrollable list of all standards added to the current run are displayed. Select a new standard for element si.

Inter Stand			OK
Element	X-Ray	Assigned Standard	
si 🔻	ka 🔻	206 Orthopyroxene	▼ Cancel
nterference	Standard As	205 Lephroite	
st		206 Orthopyroxene 207 Kyanite 210 Wollastonite	Remove
nd	•	211 V205	Remove
hd	T	212 Rutile	Remove
th		, [→ Remove
Calculate	Interference	The standard used for the interference correction known concentration of the interfering element interfered element, nor any other interferin	and none of the
Calculate	Interference	known concentration of the interfering element	and none of the
	nent Calibrat	known concentration of the interfering element interfered element, nor any other interferin ion Sample Assignment (select an unknown sample for o Volatile element correction should be acquired using th in the Acquire v Volatile element calibrations calibration sample are spec element self calibrations themselve	t and none of the ng elements. calibration fit) calibration sample ne "Volatile" button window. s using an assigne cified here. Volatile are assigned to

Click the **OK** button returning to the **Standard and Interference Assignments** dialog box.

Repeat these editing steps until all necessary element standard assignments have been modified. In this example, the standard assignments for si, al, and mg are edited, resulting in the following window.

	Samples				OK	Cancel
Un 1 *	setup				Save Eleme	et Colue
-					Save Samp	
Click Elen Channel	ent Row to Element	Edit Stand	lard/Interfere Analyzed	nce/Volatile	Assignmen	ts Interf-Std
1	si	ka	Yes	206		0,0,0,0
2	al	ka	Yes	207		0,0,0,0
	ti	ka	Yes	212		0.0.0.0
3			- C. (7) (7)			
	v	ka	Yes	211		0,0,0,0
4 5		ka ka	Yes Yes	211 224		0,0,0,0 0,0,0,0
4 5	v		2.77			
4 5 6	v cr	ka	Yes	224		0,0,0,0
4 5 6 7	v cr fe	ka ka	Yes Yes	224 203		0,0,0,0 0,0,0,0
4 5 6 7 8	v cr fe mn	ka ka ka	Yes Yes Yes	224 203 205		0,0,0,0 0,0,0,0 0,0,0,0
3 4 5 6 7 8 9 10	v cr fe mn mg	ka ka ka ka ka	Yes Yes Yes Yes	224 203 205 206		0,0,0,0 0,0,0,0 0,0,0,0 0,0,0,0

Click the **OK** button of the **Standard and Interference Assignments** dialog box returning to the **Analyze!** window.

Setting Count Times

Click the **Count Times** button of the **Acquire!** window.

Acquire!							
1 2	3	x	¥	z	W		
240.002 240.006 24	0.001 19.3	720 35.7	7001 10.	9966 .9	99987		
Faraday 1	2	3					
10.00 .00	.00	. 00					
40552.0 .	•						
Cur Un 1 * setup	rent Sample			Star	t Standard	or Unk	nown Acquisition
Data Rows: 0	Good Data	Rows: ()	- Sta	art Wavesca	an	Special Options
New Sample	Lo	cate		Mo	ve	Ac	quisition Options
Elements/Cations	P	НА	P	'eak/Scai	n Options	St	art Peak Center
Analytical Conditions	Cour	t Times		Rate M	latar		Peaking

Count Times

Channel	Element	Motor	Crystal	On-Peak	Hi-Peak	Lo-Peak	MaxCou Factor	Wave	Peak	Quick
1	si ka	1	PET	10.00	2.00	2.00	100000(1	6.00	8.00	.50
2	al ka	2	TAP	10.00	2.00	2.00	100000(1	6.00	8.00	.50
3	ti ka	3	LIF	10.00	2.00	2.00	100000(1	6.00	8.00	.50
4	v ka	3	LIF	10.00	2.00	2.00	100000(1	6.00	8.00	.50
5	cr ka	3	LIF	10.00	2.00	2.00	100000(1	6.00	8.00	.50
6	fe ka	3	LIF	10.00	2.00	2.00	100000(1	6.00	8.00	.50
7	mn ka	3	LIF	10.00	2.00	2.00	100000(1	6.00	8.00	.50
8	mg ka	2	TAP	10.00	2.00	2.00	100000(1	6.00	8.00	.50
9	ca ka	1	PET	10.00	2.00	2.00	100000(1	6.00	8.00	.50
10	na ka	2	TAP	10.00	2.00	2.00	100000(1	6.00	8.00	.50
∢ araday C	ount Tim	ie <u>10</u>	00	U	pdate Se	elected E	lements [OK		<u>▶</u> Cancel

To edit the count times for any element click that row in the spreadsheet. This opens the **Count Time Properties** dialog box.

	Properties For: si ka		OK
On-Peak Time	Hi-Peak Time	Lo-Peak Time	
10.00	2.00	2.00	Cancel
Wave Scan Time	Peaking Time	Quick Scan Time	
6.00	8.00	.50	
Unknown Maximum	Count :	10000000	
Use the Unknown	n Maximum Count to	specify a desired	
statistical signific the total counts ac	uisition will be cons	ixed count time. If Unknown Maximum	

Edit the *Count Time* text boxes with new times. To adjust the count times on unknowns, change the *Unknown Count Time Factor*. This is the multiplicity factor for acquiring unknown sample elements relative to the count times specified for the standards.

The *Unknown Maximum Count* text box is used to specify a statistics based count time. This feature is most useful if the user wishes to count for 30 seconds or 40000 counts whichever comes first. For samples with high count rate elements, the actual analysis time would be shorter.

Click the **OK** button of the **Count Time Properties** window.

Finally, click the **OK** button of the **Count Times** dialog box to accept any modified count times and return to the **Acquire!** window.

Loading Standard Position Files

To run analytical standards using automation, requires that the computer know the physical location of all the standards for this run. Click the **Automate!** button from the main PROBE FOR WINDOWS log window.

Probe For Windows (E:\Probe Operators\Manual Files\pyroxene01.mdb)									
<u>F</u> ile <u>E</u> dit	<u>S</u> tandard <u>X</u> r	ray <u>A</u> nalytic	al <u>R</u> un <u>O</u> ut	put <u>H</u> elp					
Acquire! Analyze! Automate! Plot!								Plot!	
TakeOff paramete	er initia	alizatio	= 15 Be n for 10 AN On-Pea	element	pyroxene		ize = 2		•
ELEM: BGD: MOT: CRYS: ORDR:	si ka MAN 1 PET 1	al ka MAN 2 TAP 3	ti ka MAN 3 LIF 1	v ka MAN 3 LIF 2	cr ka MAN 3 LIF 3	fe ka MAN 3 LIF 5	mn ka MAN 3 LIF 4	mg ka MAN 2 TAP 2	BEAM
ELEM: BGD: MOT: CRYS: ORDR:	ca ka MAN 1 PET 2	na ka MAN 2 TAP 1	BEAM						

This opens the Automate	dialog box shown below.
-------------------------	-------------------------

Automate!				
Position List (m Standards	ulti-select) (double-o St 592 Fid 1 Ura	nium Taylor	a) Mov	e Automation Actions
C Unknowns St 601 Fid 1 NaCl Taylor St 602 Fid 1 BN Taylor			Digiti	ze Confirm Unknown Positions
C All Samples	St 603 Fid 1 KBr St 604 Fid 1 CaF	2 Taylor	Plo	
	St 605 Fid 1 ZnS St 606 Fid 1 GaA	s Taylor	Fiduci	ials 🛛 🗖 Acquire Standard Samples
Select Stds	St 607 Fid 1 Sb2 St 608 Fid 1 Csl	Taylor	Peak	ing Acquire Unknown Samples
Select All	St 609 Fid 1 HgS St 610 Fid 1 TICI	l Taylor	Conditi	
0000000	St 611 Fid 1 PbS St 612 Fid 1 NBS St 613 Fid 1 NBS	6160a	Sample 9	Setups Automation Options
Delete All	St 715 Fid 1 Pyri		File Se	
Delete Sel	ected Samples	Impor	t from ASCII File	Use Filament Standards
0.050.000	ected Positions	-	Selected Samples	Use ROM Auto Focus
ow X	Y Z	W	Grain # Fo	C New Sample C Every Point
14.99	950 36.4474 10	0.7961 2	1 0	L Uninzen L Inferval
				Automate Confirm Delay (sec)
				Standard X Increment (um) 10
				Re-Standard Y Increment (um) 10
				Use Last Unknown (or Standard)
				C Use Digitized Sample Conditions
				C Use Digitized Sample Setups
				 Use Digitized Sample Setups Use Digitized File Setups

The last set of digitized standards used is visible in the *Position List* list box of the **Automate!** window. Currently, the standard block for the brass alloy run digitized previously are listed. These will be deleted and replaced by the appropriate standard position file(s).

Click the **Delete All** button. This opens the **AutomateDeleteAll** window. Click the **Yes** button of the **AutomateDeleteAll** window to clear the *Position List* list box of all displayed position samples.

Automate!			
Position List (m Standards	ulti-select) (double-click to see data) — St 592 Fid 1 Uranium Taylor	Move	Automation Actions
C Unknowns C Wavescans	St 601 Fid 1 NaCl Taylor St 602 Fid 1 BN Taylor St 603 Fid 1 KBr Taylor	Digitize	Confirm Unknown Positions
O All Samples	St 604 Fid 1 CaF2 Taylor St 605 Fid 1 ZnSe	Plot Fiducials	Calibrate Peak Positions
Select Stds	St 606 Fid 1 GaAs Taylor St 607 Fid 1 Sb2Te3 Taylor ? St 608 Fid 1 Csl Taylor	Peaking	Acquire Standard Samples Acquire Unknown Samples Acquire Unknown Samples
Select All	St 609 Fid 1 HgS Taylor St 610 Fid 1 TICI Taylor St 611 Fid 1 PbS Taylor	Conditions	C Acquire Wavescan Samples Acquire Standard Samples (again)
Delete All	St 612 Fid 1 NBS160a St 613 Fid 1 NBS 478 Tavlor	Sample Setups	Automation Options
Delete Sel	- Velete al position samples cure	ently listed in position list f	p Acquisition
Delete Sel Delete Sel	e ? Delete all position samples curre		rom the position database? Jards dby After JAcquisition cus Every Point
Delete Sel Delete Sel	e ? Delete all position samples curre	 	rom the position database? Acquisition pus
Delete Sel Delete Sel	e ? Delete all position samples curre	 	rom the position database? Acquisition Cus Every Point Interval Standard Points To Acquire Standard Confirm Delay (sec) 10
Delete Sel Delete Sel	e ? Delete all position samples curre	 	rom the position database? datas dby After g Acquisition Pus Every Point Interval Standard Points To Acquire 5
Delete Sel Delete Sel	e ? Delete all position samples curre	 	ards the position database? Acquisition us Every Point Interval Standard Points To Acquire 5 Automate Confirm Delay (sec) 10 Standard X Increment (um) 10 Re-Standard Y Increment (um) 10 © Use Last Unknown (or Standard)
Delete Sel Delete Sel ow X	e ? Delete all position samples curre	 	ards dards dby After Acquisition us Every Point Interval Standard Points To Acquire 5 Automate Confirm Delay (sec) 10 Standard X Increment (um) 10 Re-Standard Y Increment (um) 10

The **FiducialDeleteUnreferenced** window opens. Click the **Yes** button to clear the fiducial coordinate set from the position database.

Fiducial	DeleteUnreferenced	×
?	Fiducial set 1 is not referenced by any position samples in the position database. Do you want to dele	te this fiducial set?
	Yes No Cancel	

Click the **Import from ASCII File** button of the **Automate!** dialog box to import position samples from a previously saved ASCII file.

Position List (multi-select) (d Standards	ouble-click to see data)	Move	Automation Actions	
Standards Unknowns Wavescans		Digitize	Confirm Standard Positions Confirm Unknown Positions Confirm Wayescan Positions	
All Samples		Plot	Calibrate Peak Positions	
		Fiducials	Acquire Standard Samples	
Select Stds		Peaking	Acquire Unknown Samples Acquire Wavescan Samples	
Select All		Conditions Sample Setups	Acquire Standard Samples (again	
Delete All		File Setups	Automation Options	
Delete Selected Samples Import from ASCII File			Use "Quick" Standards	
Delete Selected Positio	ns Export S	elected Samples	Use Confirm During Acquisition	
w <mark>X Y</mark>	Z W	Grain # Focus	C New Sample C Every Point C Digitized C Interval	
			Standard Points To Acquire	
			Automate Confirm Delay (sec) 10 Standard X Increment (um) 10	
			Standard X Increment (um) 10 Re-Standard Y Increment (um) 10	
			Use Last Unknown (or Standard)	
			 Use Digitized Sample Conditions Use Digitized Sample Setups Use Digitized File Setups 	
	T			

This action opens both the **Standard Position File Name Strings** and the **Open File To Import Position Data From** windows. The former window is based on the name strings in the PROBEWIN.INI file. The user has previously digitized all standard blocks and created STDPOSx.POS files. Three STDPOSx.POS files are typically loaded for silicate runs; STDPOS1.POS, STDPOS2.POS, and STDPOS3.POS. The default location for *.POS files is at C:\Program Files\Probe for Windows\UserData.

STDPOS1.P STDPOS2.P STDPOS3.P STDPOS4.P STDPOS5.P STDPOS6.P STDPOS7.P	sition File Name Strings OS = Rectangular A OS = Taylor with JEOL std OS = Rectangular B OS = Carbonates OS = Sulfides OS = User Defined OS = User Defined		-click to se CI Taylor Taylor r Taylor
Look jn: Stdpos1.p Stdpos2.p Stdpos3.p Stdpos4.p	os os	<u> </u>	*
File <u>n</u> ame: Files of <u>type</u> :	untitled.pos ASCII Position Files (*.POS)		<u>O</u> pen Cancel

Type in the appropriate file name in the *File name* text box or simply highlight the file in the list and click the **Open** button.

Open File To	Import Position Data From				? ×
Look jn:	🔄 UserData	•	Ē	<u>e</u> *	8-0- 5-5- 5-5-
Stdpos1.p	os				
Stdpos2.p					
Stdpos3.p					
File <u>n</u> ame:	Stdpos1.pos				<u>O</u> pen
Files of type:	ACCIL Devision Films (* POC)			_	
riles of type.	ASCII Position Files (*.POS)		<u> </u>	-	Cancel

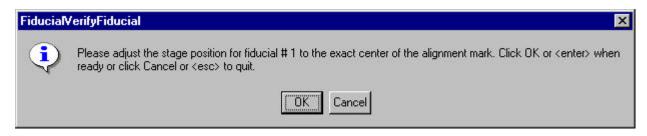
This action opens the **FiducialLoad** window. Click the **Yes** button to do a fiducial transformation on this predigitized standard block to obtain an accurate set of standard positions.

Fiducial	.oad 🗙
?	Do you want to transform the sample positions using sample fiducials for position matrix transformation?
	Yes Cancel

The **Modify Fiducial Positions** window opens. Normally the user would simply accept the defaults or edit the position text boxes for each point, including the appropriate stage location number (JEOL 733 use appropriate W stage position). When done, click the **OK** button.

Enter Ap	proximate Fid	ucial Position	s For Fiducial	Set 4	OK
Fiducial	Description	be for Wind	dows\UserDat	a\Stdpos1.pos	Cancel
Point#	х	Y	z	w	Lance
1	4.4807	15.3985	10.9992	1	
2	27.4548	15.5285	11.0263	1	
3	15.7421	46.354	10.9422	1	

This action causes the stage motors to drive to the first fiducial coordinate in its lookup table. The **FiducialVerifyFiducial** window appears. Adjust the stage motors to center the first fiducial mark, click the **OK** button.



The computer will drive to each of the three fiducial marks for centering. Clicking the **OK** button after the third fiducial mark opens the **FiducialsVerifyFiducials** window. Click this **OK** button.

Fiducial	/erifyFiducials
٩	Specimen tilt in radians: ThetaX = -1.971077E-04 ThetaY= -2.678065E-03 Theta= -2.685309E-03 Specimen tilt in degrees: ThetaX = -1.129344E-02 ThetaY=1534418 Theta=1538569
	[OK]

The program then imports and updates the position coordinates of all of the standards in the pre-digitized standard position file. The **AutomateImportPositions** window opens. Click the **OK** button returning to the **Automate!** window.

Automate	eImportPositions	х
•	Sample positions imported from C:\Program Files\Probe for Windows\UserData\Stdpos1.pos:	32
	[OK]	

The **Automate!** window would appear as below. The currently transformed standard position file is listed in the *Position List* list box.

	ulti-select) (double-click to see data) —	Move	Automation Actions
Standards	St 211 Fid 1 V205		Confirm Standard Positions
Unknowns	St 212 Fid 1 Rutile	Digitize	Confirm Unknown Positions
Wavescans	St 217 Fid 1 Sr-Feldspar St 218 Fid 1 Celsian		Confirm Wavescan Positions
All Samples	St 219 Fid 1 Gabnite	Plot	Calibrate Peak Positions
	St 220 Fid 1 Rhodonite St 222 Fid 1 Ni-Olivine	Fiducials	Acquire Standard Samples
Select Stds	St 223 Fid 1 Nb0 St 224 Fid 1 Cr2O3	Peaking	Acquire Unknown Samples Acquire Wavescan Samples
Select All	St 230 Fid 1 Sodalite St 231 Fid 1 Fluorophlogopite St 234 Fid 1 Th02	Conditions	C Acquire Standard Samples (again
	St 235 Fid 1 U02	Sample Setups	Automation Options
Delete All	St 238 Fid 1 An100-12 St 254 Fid 1 Anhydrite	File Setups	
Delotorial	St 234 Flu T Annyulite		Calibrate on Assigned Standards
		1000 57	Use Filament Standby After
Delete Sel	ected Samples Import fro	Use Confirm During Acquisition	
Delete Sele	ected Positions Export Sele	cted Samples	Use ROM Auto Focus
		-	
	in the second	1	C New Sample C Every Point
		Grain # Focus	C New Sample C Every Point C Digitized C Interval
w X 10.50		Grain # Focus 1 0	
Contra-			C Digitized C Interval
			C Digitized C Interval Standard Points To Acquire
			C Digitized C Interval Standard Points To Acquire 5 Automate Confirm Delay (sec) 10
			C Digitized C Interval Standard Points To Acquire Automate Confirm Delay (sec) 10 Standard X Increment (um) 10 Re-Standard Y Increment (um) 10 © Use Last Unknown (or Standard)
			C Digitized C Interval Standard Points To Acquire Automate Confirm Delay (sec) 10 Standard X Increment (um) 10 Re-Standard Y Increment (um) 10

Repeat the same loading procedure for the other two standard position files required for use in the automation. After clicking the **Import from ASCII File** button, the **AutomateImportFile** window opens.

Automate	elmportFile
?	The Automate list already contains position samples. Do you want to delete all positions in the Automate list first?
	Yes Cancel

Typically, when using more than one standard mount, the user would not delete all positions in the *Position List*, instead appending the additional position files to the first file.

All of the standards loaded are listed in the *Position List* list box of the **Automate!** window. These may now be accessed by the program during any automation action. For instance, it is now possible to have the computer drive to any standard located on the three blocks. The user may click the **Move** button of the **Automate!** window opening the **Move Motors and Change Crystals** dialog box. Then, click the **Positions** button.

osition Li	ist (multi-select) (double-click to see data) –		omation Actions
Standa	rde Ch C01 Eid 2 NoCl Taylor	Move	Confirm Standard Positions
Unknow	wns St 602 Fid 2 BN Taylor	Digitize	Confirm Unknown Positions
Waves All Sam	St 604 Fid 2 CaF2 Taylor	Plot	Confirm Wavescan Positions
All Jall	IPIES St 605 Fid 2 ZnSe St 606 Fid 2 GaAs Taylor		Calibrate Peak Positions
	Move Motors and Change Crystals	• 1	×
Select	Stage Target Positions	Remove Faraday	Go s (agair
Selec	X Y 15.7771 46.7250	Update Positions	Positions
Deleti	Z W Increment	Free/Clear	Stage ndards
	Stage Backlash	Jog Stage	
Del	Stage Backlash —	Jog Spectrometers	Close sition
Deli	Spectrometer Target Positions		siton
w	1 2 3		Point
	PET TAP LIF	▼ <u>▼</u>	
	240.002 240.003 240.001		5
	Ca ▼ ka ▼ Si ▼ ka ▼ Fe ▼ ka		
	Spectrometer Backlash		10
		C C	Use Last Unknown (or Standard) Use Digitized Sample Conditions Use Digitized Sample Setups Use Digitized File Setups

This opens the **Position Database** dialog box. From here any sample that has been digitized can be located by simply selecting it and clicking the **Go** button.

pdate Edit
Edit
e-Load
itage
Close
ocus
0

Once the stage motors drive the stage to the chosen standard, exit the **Position Database** by clicking the **Close** button. Likewise, the user may close the **Move Motors and Change Crystals** window by clicking its **Close** button, returning to the **Automate!** window.

This concludes the initial parameter setup portion of PROBE FOR WINDOWS.

Automation Actions

Confirm Standard Positions

All of the basic peak centering and x-ray count acquisition procedures may be automated. This is accomplished via the **Automate!** window.

Click the **Select Stds** button of the **Automate!** dialog box. All standards that have been added to the current run will now be highlighted in the *Position List* list box.

Automate!					2
- Position List (mu © Standards	lti-select) (double- St 305 Fid 2 Zird		ta)	Move	Automation Actions
C Unknowns C Wavescans	St 306 Fid 2 Chi St 307 Fid 2 Spl	romite #5 Taylor hene #1a Taylor		Digitize	Confirm Unknown Positions
 All Samples 	St 310 Fid 2 Barite #4 Taylor		Plot	Calibrate Peak Positions	
[<u>************************************</u>	St 311 Fid 2 YA St 312 Fid 2 Spi	G Garnet Taylor inel Taylor		Fiducials Peaking	 Acquire Standard Samples Acquire Unknown Samples
	Select Stds St 313 Fid 2 Benitoite Taylor St 314 Fid 2 Anhydrite #4 Taylor St 315 Fid 2 Wollastonite #2 Tayl		Conditions	┘ ┌─ Acquire ₩avescan Samples │ ┌─ Acquire Standard Samples (again)	
Select All	St 316 Fid 2 SrT St 317 Fid 2 Mg St 318 Fid 2 Al2	O Taylor		Sample Setups	Automation Options
Delete All	St 319 Fid 2 SiO			File Setups	Calibrate on Assigned Standards
1.00.01.00.000	Delete Selected Samples Import from ASCII File			- 1324 - US	 Use Filament Standby After Use Confirm During Acquisition
Row X	Delete Selected Positions Export Select			ain # Focus	Use ROM Auto Focus O New Sample O Every Point
1 14.98	62 36.4523 1	0.7984 2	1	0	C Digitized C Interval Standard Points To Acquire 5
					Automate Confirm Delay (sec)
					Standard X Increment (um) 10 Re-Standard Y Increment (um) 10
					 Use Last Unknown (or Standard) Use Digitized Sample Conditions
					 Use Digitized Sample Setups Use Digitized File Setups
KeV = 15 Beam File Setup =	Current = 40 Bear	m Size = 2	Setu	p Number = 0	Run Selected Samples

The user might start by checking the location and focus of each standard selected for the automated analysis. Click the box for *Confirm Standard Positions* under *Automation Actions*. Click the **Run Selected Samples** button.

Unknowns Wavescans All Samples	St 305 Fid 2 Zircor St 306 Fid 2 Chrom St 307 Fid 2 Spher	ite #5 Ťaylor 🦷		Confirm Standard Positions	
All Samples		ne #1a Taylor	Digitize	Confirm Unknown Positions	
	St 308 Fid 2 Hematite #2 Taulor		Plot	Calibrate Peak Positions	
	St 310 Fid 2 Barite St 311 Fid 2 YAG 0 St 312 Fid 2 Spinel	arnet Taylor	Fiducials	C Acquire Standard Samples	
Select Stds St 313 Fid 2 Benitoite Taylor Select All St 314 Fid 2 Anhydrite #4 Taylor Select All St 315 Fid 2 Wollastonite #2 Taylor St 316 Fid 2 Srii03 Taylor St 317 Fid 2 Mg0 Taylor		nite Taylor Irite #4 Taylor	Peaking	Acquire Unknown Samples Acquire Wavescan Samples Acquire Standard Samples (again Automation Options	
		3 Taylor	Conditions Sample Setups		
	St 318 Fid 2 Al203 St 319 Fid 2 Si02 (Taylor	File Setups	Calibrate on Assigned Standards	
			om ASCII File ected Samples	Use "Quick" Standards Use Filament Standby After Use Confirm During Acquisition Use ROM Auto Focus	
w X	Y Z 36.4523 10.7	W 984 2	Grain # Focus 1 0	C New Sample C Every Point C Digitized C Interval	
				Standard Points To Acquire 5	
				Automate Confirm Delay (sec) 10 Standard X Increment (um) 10	
				Re-Standard Y Increment (um) 10	
				© Use Last Unknown (or Standard) © Use Digitized Sample Conditions	
				 Use Digitized Sample Setups Use Digitized File Setups 	

The **AutomateConfirmSelected** window opens informing the user that thirteen standards were chosen and asks if you want to run these automated samples, click **Yes**.

Automat	eConfirmSelected 🛛 🕅
?	Number of Standard Position Samples: 13 Number of Unknown Position Samples: 0 Number of Wavescan Position Samples: 0
	Are you sure you want to run these automated samples?
	Yes No

The program then sends the stage motors to the fiducial transformed coordinates for the first selected standard and opens the **Confirm Positions** window. Clicking the two-way **Pause/Continue** button suspends the 10 second countdown (user defined in the PROBEWIN.INI file). Adjust the stage motors (X, Y, and Z) to a new, clean analysis position. Click the **OK** button of the **Confirm Positions** window when done, sending the stage to the next standard to confirm its position. Again, the **Confirm Positions** window opens, allowing the user to pause the countdown and adjust the sample position.

St 81 Albite		
click OK whe	the sample stage position and n ready. If you need more time sk the Pause button.	Time remaining 7.50
CIIC	A the I due button.	

After the final standard is confirmed, the **AcquireStop** window appears. In this example standards on several standard blocks are located and confirmed. Click this **OK** button returning to the **Automate!** dialog box.



Calibrate Peak Positions

X-ray peaking may be automated from the Automate! window as follows.

The **Select Stds** button from the previous step highlighted all of the standards added to the current run. Presently the *Position List* list box in the **Automate!** window contains both the analytical and MAN background standards for the current run. Since x-ray peak centering is only done on the primary analytical standards, either re-select the primary analytical standards or de-select the additional MAN background standards from the *Position List* list box. Under *Automation Actions* click only the *Calibrate Peak Positions* box. Under *Automation Options* click the *Calibrate on Assigned Standards* and *Use Confirm During Acquisition* boxes. Finally, click the **Peaking** button to open the **Peak Center** dialog box.

Automate!					_ I ×
	ulti-select) (double-click to St 206 Fid 1 Orthopyroxe St 207 Fid 1 Kyanite St 208 Fid 1 Benitoite St 209 Fid 3 Cuprite St 210 Fid 1 Wollastonit St 211 Fid 1 Wollastonit St 212 Fid 1 Rutile St 213 Fid 3 Hematite	ene	Move Digitize Plot Fiducials	Automation Actions Confirm Standard Posit Confirm Unknown Posi Confirm Wavescan Position Calibrate Peak Position Acquire Standard Sam Acquire Unknown Sam	tions tions sitions ns ples
Select Stds Select All Delete All	St 217 Fid 1 Sr-Feldspar St 218 Fid 1 Celsian St 219 Fid 1 Gahnite St 220 Fid 1 Rhodonite St 222 Fid 1 NhO St 223 Fid 1 NbO St 224 Fid 1 Cr203		Peaking Conditions Sample Setups File Setups	Acquire Onknown Sam Acquire Wavescan Sam Acquire Standard Sam Automation Options Calibrate on Assigned	mples ples (again)
Delete Sele Pea Row X 1 1	ected Samples acted Positions ak Center Elements to Peak (multi-sel si ka Motor 1 PET		2010/02/02/02	Use "Quick" Standards	After
	al ka Motor 2 TAP ti ka Motor 3 LIF v ka Motor 3 LIF cr ka Motor 3 LIF fe ka Motor 3 LIF mn ka Motor 3 LIF mg ka Motor 3 LIF ca ka Motor 1 PET Plot Selected Peak Centor	○ Pa ○ Ri - Peak	rabolic Fit IM Based Center Options —	Cancel Pre-Scan for Confirmation Selected	5) 10 10 m) 10 andard) nditions tups
KeV = 15 Beam File Setup =	Current = 40 Beam Size =	2 Setu	p Number = 0	Run Selected Sam	nples

In the **Peak Center** dialog box, select all the elements from the *Elements to Peak* list box, next click on a *Peak Center Method.* A spectrometer pre-scan is useful if that element has not been run recently or if maintenance has occurred on the spectrometer. Click the **OK** button of the **Peak Center** window.

Click the Run Selected Samples button from the Automate! window.

This opens the AutomateConfirmSelected window. To run these automated samples, click Yes.

Automat	eConfirmSelected 🛛 🕅
?	Number of Standard Position Samples: 9 Number of Unknown Position Samples: 0 Number of Wavescan Position Samples: 0
	Are you sure you want to run these automated samples?

The stage motors move to the position coordinates of the first standard highlighted in the *Position List* list box and the **Confirm Positions** window opens. This window allows the user to readjust if necessary the stage motors (X, Y, and Z) to a new, clean analysis position. Click the **OK** button of the **Confirm Positions** window when done and the spectrometers go through the peaking routine to peak center the spectrometer position to the x-ray maximum for all the elements assigned to that standard. After finding a new peak position and reporting the results to the main log window, the stage motors move on to the coordinates of the next standard highlighted in the *Position List* list box. Once situated on this standard, the spectrometers peak center those elements assigned to it. This procedure continues until all standards are done. When all automation action is complete, the **AcquireStop** window appears and requests the user to click the **OK** button.

	Ac	quire	!		Analyz	el		Automate!		Plot!
	1978	202022	0.2.7.7	ter Resu	<u> - 2 2 2 2 </u>					
Eleme		10.000	ectr	Peaked	OnPeak	2012/07/2012	10 - 20 - T raining	StartPB	StopPB	
si	ka	1	PET	Yes	228.117	4225.4	4865.8	334.68	385.41	
al	ka	2	TAP	Yes	90.3930	2702.3	22623.9	26.19	219.25	
ti	ka	3	LIF	Yes	191.136	1413.3	1969.5	185.34	258.30	
v	ka	3	LIF	Yes	174.110	1882.5	2519.9	212.11	283.93	
cr	ka	3	LIF	Yes	159.153	2912.3	4182.9	194.15	278.86	
fe	ka	3	LIF	Yes	134.537	2869.4	4393.0	127.53	195.24	
mn	ka	3	LIF	Yes	146.078	2610.1	3786.4	147.57	214.07	
mq	ka	2	TAP	Yes	107.490	3120.5	12125.9	67.02	260.42	
ca	ka	1	PET	Yes	107.476	10986.9	11071.5	254.77	256.73	
na	ka	2	TAP	Yes	129.703	1546.3	2160.4	79.81	111.50	
alib	rate	Pea	ak Po	sitions	Automat	ion Acti	on is Con	mpleted		
								171 - WELLER		

All elements were peak centered using the Interval Halving method. The new peak locations (OnPeak) along with the start and stop intensities in counts per second and peak-to-backgrounds are listed. The final on-peak intensities (StopI) are valuable for adjusting count time parameters for your standardizations to improve statistics.

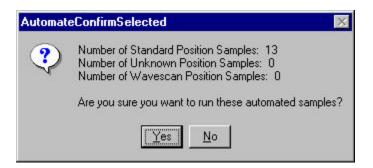
Acquire Standard Samples

The next step is to calibrate the analytical and MAN background standards in preparation for unknown samples. The user may choose to run both types of standards together or separate them. In the latter case, the MAN background standards would normally be acquired first since backgrounds drift less than peak intensities.

Here, the user will automate the entire acquisition of x-ray counts on all standards. Click the **Select Stds** button in the **Automate!** dialog box. This selects all current standards in the run, highlighting them in the *Position List* list box. Next, under *Automation Actions*, click only on the *Acquire Standard Samples* box. From the *Automation Options* choices select the number of *Standard Points To Acquire* and whether to *Use Confirm During Acquisition*. In this example, four standard points are chosen along with a *Standard X Increment* of 10 um. Finally, click the **Run Selected Samples** button.

Automate!				
Position List (mu Standards Unknowns Wavescans All Samples Select Stds Select All Delete All	Ilti-select) (double-c St 305 Fid 2 Zircc St 306 Fid 2 Chro St 307 Fid 2 Sphe St 308 Fid 2 Hem St 309 Fid 2 Olivi St 310 Fid 2 Barit St 311 Fid 2 Spin St 312 Fid 2 Spin St 313 Fid 2 Beni St 314 Fid 2 Anhy St 315 Fid 2 Woll St 316 Fid 2 SrTif St 317 Fid 2 MgD St 318 Fid 2 Al20 St 319 Fid 2 Si02	n #1 Taylor mite #5 Taylor rne #1a Taylor atite #2 Taylor ne #1 Taylor e #4 Taylor Garnet Taylor el Taylor toite Taylor drite #4 Taylor astonite #2 Taylor 3 Taylor 3 Taylor	Move Digitize Plot Fiducials Peaking Conditions Sample Setups File Setups	Automation Actions Confirm Standard Positions Confirm Unknown Positions Confirm Wavescan Positions Calibrate Peak Positions Acquire Standard Samples Acquire Unknown Samples Acquire Wavescan Samples Acquire Standard Samples (again) Automation Options Calibrate on Assigned Standards Use "Quick" Standards
1.4.91.8.123	ected Samples ected Positions		m ASCII File cted Samples	Use Filament Standby After Use Confirm During Acquisition Use ROM Auto Focus
Row X 1 14.98	Y Z 362 36.4523 10.	W 7984 2	Grain # Focus 1 0	C New Sample C Every Point C Digitized C Interval Standard Points To Acquire Automate Confirm Delay (sec) 10 Standard X Increment (um) 10 Re-Standard Y Increment (um) 10 © Use Last Unknown (or Standard) C Use Digitized Sample Conditions C Use Digitized Sample Setups C Use Digitized File Setups
KeV = 15 Beam File Setup =	Current = 40 Beam	Size = 2 Set	tup Number = 0	Run Selected Samples

The familiar **AutomateConfirmSelected** window opens again, informing the user that thirteen standards are chosen and asks if you want to run these automated samples, click **Yes**.



The stage moves to the coordinates of the first highlighted standard in the *Position List* list box. If the *Use Confirm During Acquisition* box is checked then the **Confirm Positions** window will open. A complete analysis is acquired on all elements in the current sample, x-rays are counted on peak only for times specified in the **Count Times** window. Finally, the Faraday cup is measured. The stage jogs 10 um in the X direction and this procedure is repeated for the number of points specified in the *Standard Points To Acquire* text box of the **Automate!** dialog box. After completing data collection on the first standard, the stage travels to the next highlighted standard in the list box and acquires four complete analyses on that standard. This procedure is repeated for all selected standards. After finishing the automation schedule the **AcquireStop** window opens and requires the user to click the **OK** button thereby returning to the **Automate!** window.

The following log window ill	lustrates typical on-peak	x-ray count data (in cps)	for the Taylor Quartz standard.

<u>File E</u> dit	<u>S</u> tandard X	ray <u>A</u> nalytic	al <u>R</u> un <u>O</u> ut	put <u>H</u> elp						
	Acquire!		Analy	ze!		Automate	!		Plot!	
St 319 TakeOff			artz Tayl = 15 Be		ent = 40	Beam S:	ize = 2			-
Off-Pea	k Correct	ted or M	AN On-Pea	k X-ray	Counts:					
ELEM: BGD:	si ka MAN	al ka MAN	ti ka MAN	v ka MAN	cr ka MAN	fe ka MAN	mn ka MAN	mg ka MAN	BEAM	
MOT:	1	2	3	3	3	3	3	2		
CRYS:	PET	TAP	LIF	LIF	LIF	LIF	LIF	TAP		
ORDR :	1	3	1	2	3	5	4	2		
49G	9374.5	70.7	2.7	3.7	5.9	10.8	6.6	35.1	40.463	
50G	9309.0	72.1	2.5	4.4	4.4	10.6	7.5	32.2	40.468	
516	9342.3	72.8	1.7	4.0	5.7	8.9	9.5	33.8	40.497	
526	9365.9	77.6	2.0	3.0	4.7	11.6	7.2	35.8	40.471	
AVER :	9347.9	73.3	2.2	3.8	5.2	10.5	7.7	34.2	40.475	
SDEV:	29.3	3.0	.5	.6	.7	1.1	1.3	1.6	.015	
1SIG:	30.6	2.7	.5	.6	.7	1.0	.9	1.8		
SERR:	14.6	1.5	.2	.3	.4	.6	.6	.8		
%RSD:	.3	4.1	20.6	15.6	14.2	10.9	16.3	4.6		
ELEM:	ca ka	na ka	BEAM							
BGD :	MAN	MAN								
MOT:	1	2								
CRYS:	PET	TAP								
ORDR:	2	1								
49G	34.3	17.0	40.463							
50G	31.6	16.9	40.468							
516	30.1	19.0	40.497							
526	33.3	18.1	40.471							
AVER :	32.3	17.8	40.475							
SDEV :	1.8	1.0	.015							
1SIG:	1.8	1.3								
SERR :	.9	.5								
%RSD:	5.7	5.6								
Acmire	Initial	Standar	d Samples	Automat	tion Acti	ion is Co	muleted			

In addition to the four individual lines of count data, the *AVER*, *SDEV*, *ISIG*, *SERR*, and *%RSD* are calculated. The *AVER* (average) is the average intensity reading of each element column. The *SDEV* (standard deviation) is the range of these results, *ISIG* (one sigma) is the predicted standard deviation, and the *SERR* (standard error) is essentially the precision of the average. The *%RSD* number is the *SDEV* divided by the *AVER* times 100. See the User's Guide and Reference documentation for exact equations. The output of the raw data counts for the remaining twelve standards are not shown here to save space.

Evaluate Standard Count Data

After all the standard data is acquired it is useful to examine the raw on-peak counts to check for and delete any obviously bad data points. Click the **Analyze!** button in the main PROBE FOR WINDOWS log window.

Probe For Windows [E:\P	robe Operators\Manual Files\p	oyroxene01.mdb]	
<u>File Edit Standard Xray An</u>	alytical <u>R</u> un <u>O</u> utput <u>H</u> elp		
Acquire!	Analyze!	Automate!	Plot!
Acquire Initial Stan	dard Samples Automatio	on Action is Completed	

This opens the Analyze! dialog box.

Analyze!					
	(double-click to see intens		Analyze	Data	KRaws
 Standards St 212 9 Unknowns St 222 9 St 224 9 	Set 1 Ni-Olivine	-	Analyze Sele	cted Line(s) een Samples	>>Exce
All Samples St 317 St 318	Set 1 MgO Taylor Set 1 Al2O3 Taylor		Delete S	elected Samp	le(s)
Select All	Set 1 SiO2 Quartz Taylor		Undelete 9	Selected Sam	ple(s)
pecified Concentrations	Standard Assignments	Name/Descript	tion Condition	ns Element	ts/Cation:
		Total We Calculate Atomic V	ed Oxygen 🗍		l Oxygen ess Oxyge tar
ру 🛛					
Delete Selected Line(s)	Undelete Selected Lin	ie(s) Lisi	t Report	Calculation) Options
ру					

The *Sample List* list box contains the list of the standards that data has been acquired on. To examine the raw count data acquired on any standard run under automation, first select the standard of interest and click the **Data** button.

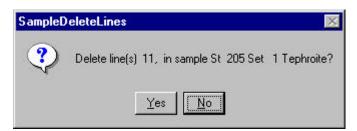
The raw count data for the four automated standard analyses of the Tephroite standard are shown below. Each individual line (9G to 12G) is illustrated along with the *Average*, *Std Dev*, *OneSigma*, *Std Err*, *%Rel SD*, *Minimum* and *Maximum* of the acquired points. This count data is also printed to the log window.

- Sample L	ist (multi-sele	ectj (double-c	lick to see in	tensity dataj		Analyze	Data KF	aws				
• Stand	ards St	81 Set 1 Alt	oite			lyze Selecte		Excel				
C Unkno		203 Set 1 Fa				ise Between	• •	LINGER				
O Wave		205 Set 1 Te 206 Set 1 Or				ise permeen	1 2 amples	-				
C All Sa	mples St 2	207 Set 1 Ky	vanite			Delete Selec	cted Sample(s)					
Select	All St 2	210 Set 1 W	ollastonite		- U	ndelete Sele	ected Sample(s	:)				
Specified	Concentratio	ns Standa	rd Assignmen	ts Name/D	escription	Conditions	Elements/Ca	tions				
TakeOff = 40 Beam		= 15 Beam	Current =	.000 C	otal Weight % alculated Oxy tomic Weight	1 .00	0 Excess 0	777.00				
Casa		The second second second	L	I LAADI	cr ka MAN	fe ka MAN	mn ka MAN	mg ka MAN	ca ka MAN	na ka MAN	Beam	-
-opy	si ka MAN	al ka MAN	ti ka MAN	v ka MAN	CI KA MAN	ILE KA MAN	IIIII Ka MAN	INY NO MAIN	Ca Ka MAN	Ind Ku Picin	Deam	
	si ka MAN 2496.0	al ka MAN 89.4	ti ka MAN 3.6	<u>у ка ман</u> 5.8	10.3	26.6	3821.9	101.9	53.9	22.9	40.5	
verage:		Contract International Periods			the second se			and the second se	A REAL PROPERTY OF THE REAL PR			
verage: td Dev:	2496.0	89.4	3.6	5.8	10.3	26.6	3821.9	101.9	53.9	22.9	40.5	
verage: td Dev: neSigma:	2496.0 15.9	89.4 1.6	3.6 .7	5.8 .4	10.3 .6	26.6 .7	3821.9 39.7	101.9 3.1	53.9 3.2	22.9 1.7	40.5	
verage: td Dev: neSigma: td Err:	2496.0 15.9 15.8	89.4 1.6 3.0	3.6 .7 .6	5.8 .4 .8	10.3 .6 1.0	26.6 .7 1.6	3821.9 39.7 19.5	101.9 3.1 3.2	53.9 3.2 2.3	22.9 1.7 1.5	40.5	
verage: td Dev: IneSigma: td Err: :Rel SD:	2496.0 15.9 15.8 7.9	89.4 1.6 3.0 .8	3.6 .7 .6 .3	5.8 .4 .8 .2	10.3 .6 1.0 .3	26.6 .7 1.6 .4	3821.9 39.7 19.5 19.8	101.9 3.1 3.2 1.6	53.9 3.2 2.3 1.6	22.9 1.7 1.5 .8	40.5	
verage: td Dev: IneSigma: td Err: :Rel SD: linimum:	2496.0 15.9 15.8 7.9 .6	89.4 1.6 3.0 .8 1.8	3.6 .7 .6 .3 19.1	5.8 .4 .8 .2 6.4	10.3 .6 1.0 .3 6.2	26.6 .7 1.6 .4 2.8	3821.9 39.7 19.5 19.8 1.0	101.9 3.1 3.2 1.6 3.1	53.9 3.2 2.3 1.6 6.0	22.9 1.7 1.5 .8 7.4	40.5 .0	
Copy verage: td Dev: IneSigma: td Err: Rel SD: linimum: laximum:	2496.0 15.9 15.8 7.9 .6 2474.2	89.4 1.6 3.0 .8 1.8 87.7	3.6 .7 .6 .3 19.1 2.7	5.8 .4 .8 .2 6.4 5.3	10.3 .6 1.0 .3 6.2 9.8	26.6 .7 1.6 .4 2.8 25.9	3821.9 39.7 19.5 19.8 1.0 3763.2	101.9 3.1 3.2 1.6 3.1 97.5	53.9 3.2 2.3 1.6 6.0 51.0	22.9 1.7 1.5 .8 7.4 20.7	40.5 .0 40.4	
verage: td Dev: IneSigma: td Err: Rel SD: linimum: laximum:	2496.0 15.9 15.8 7.9 .6 2474.2	89.4 1.6 3.0 .8 1.8 87.7 91.3	3.6 .7 .6 .3 19.1 2.7	5.8 .4 .8 .2 6.4 5.3 6.1	10.3 .6 1.0 .3 6.2 9.8	26.6 .7 1.6 .4 2.8 25.9 27.5	3821.9 39.7 19.5 19.8 1.0 3763.2	101.9 3.1 3.2 1.6 3.1 97.5 104.2	53.9 3.2 2.3 1.6 6.0 51.0	22.9 1.7 1.5 .8 7.4 20.7	40.5 .0 40.4	
verage: td Dev: neSigma: td Err: Rel SD: linimum: laximum: Delete S	2496.0 15.9 15.8 7.9 .6 2474.2 2512.0	89.4 1.6 3.0 .8 1.8 87.7 91.3	3.6 .7 .6 .3 19.1 2.7 4.1	5.8 .4 .8 .2 6.4 5.3 6.1	10.3 .6 1.0 .3 6.2 9.8 11.1	26.6 .7 1.6 .4 2.8 25.9 27.5	3821.9 39.7 19.5 19.8 1.0 3763.2 3849.4	101.9 3.1 3.2 1.6 3.1 97.5 104.2	53.9 3.2 2.3 1.6 6.0 51.0	22.9 1.7 1.5 .8 7.4 20.7 24.4	40.5 .0 40.4	
verage: td Dev: neSigma: td Err: Rel SD: inimum: aximum: Delete S Copy	2496.0 15.9 15.8 7.9 .6 2474.2 2512.0	89.4 1.6 3.0 .8 1.8 87.7 91.3 (s) Undel	3.6 .7 .6 .3 19.1 2.7 4.1 ete Selected	5.8 .4 .8 .2 6.4 5.3 6.1 Line(s)	10.3 .6 1.0 .3 6.2 9.8 11.1 List Repo	26.6 .7 1.6 .4 2.8 25.9 27.5	3821.9 39.7 19.5 19.8 1.0 3763.2 3849.4	101.9 3.1 3.2 1.6 3.1 97.5 104.2	53.9 3.2 2.3 1.6 6.0 51.0 58.5	22.9 1.7 1.5 .8 7.4 20.7 24.4	40.5 .0 40.4 40.5	
verage: td Dev: neSigma: td Err: Rel SD: linimum: laximum:	2496.0 15.9 15.8 7.9 .6 2474.2 2512.0 elected Line	89.4 1.6 3.0 .8 1.8 87.7 91.3 (s) Undel al ka MAN	3.6 .7 .6 .3 19.1 2.7 4.1 ete Selected ti ka MAN	5.8 .4 .8 .2 6.4 5.3 6.1 Line(s)	10.3 .6 1.0 .3 6.2 9.8 11.1 List Repo	26.6 .7 1.6 .4 2.8 25.9 27.5 t C	3821.9 39.7 19.5 19.8 1.0 3763.2 3849.4 Calculation Opt	101.9 3.1 3.2 1.6 3.1 97.5 104.2 ions	53.9 3.2 2.3 1.6 6.0 51.0 58.5 ca ka MAN	22.9 1.7 1.5 .8 7.4 20.7 24.4	40.5 .0 40.4 40.5 Beam	
verage: td Dev: neSigma: td Err: Rel SD: inimum: aximum: Delete S Copy G 0 G	2496.0 15.9 15.8 7.9 .6 2474.2 2512.0 si ka MAN 2497.3	89.4 1.6 3.0 .8 1.8 87.7 91.3 (s) Undel al ka MAN 91.3	3.6 .7 .6 .3 19.1 2.7 4.1 lete Selected ti ka MAN 4.1	5.8 .4 .8 .2 6.4 5.3 6.1 Line(s)	10.3 .6 1.0 .3 6.2 9.8 11.1 List Repo cr ka MAN 9.8	26.6 .7 1.6 .4 2.8 25.9 27.5 t t C fe ka MAN 25.9	3821.9 39.7 19.5 19.8 1.0 3763.2 3849.4 Calculation Opt mn ka MAN 3841.6	101.9 3.1 3.2 1.6 3.1 97.5 104.2 ions mg ka MAN 102.1	53.9 3.2 2.3 1.6 6.0 51.0 58.5 ca ka MAN 58.5	22.9 1.7 1.5 .8 7.4 20.7 24.4 na ka MAN 24.4	40.5 .0 40.4 40.5 Beam 40.5	
verage: td Dev: neSigma: td Err: Rel SD: linimum: laximum: Delete S Copy	2496.0 15.9 15.8 7.9 .6 2474.2 2512.0 elected Line si ka MAN 2497.3 2474.2	89.4 1.6 3.0 .8 1.8 87.7 91.3 (s) Undel al ka MAN 91.3 88.6	3.6 .7 .6 .3 19.1 2.7 4.1 lete Selected ti ka MAN 4.1 4.1	5.8 .4 .8 .2 6.4 5.3 6.1 Line(s) v ka MAN 6.1 5.6	10.3 .6 1.0 .3 6.2 9.8 11.1 List Repo cr ka MAN 9.8 11.1	26.6 .7 1.6 .4 2.8 25.9 27.5 t t C fe ka MAN 25.9 26.1	3821.9 39.7 19.5 19.8 1.0 3763.2 3849.4 Calculation Opt mn ka MAN 3841.6 3833.5	101.9 3.1 3.2 1.6 3.1 97.5 104.2 mg ka MAN 102.1 97.5	53.9 3.2 2.3 1.6 6.0 51.0 58.5 ca ka MAN 58.5 53.3	22.9 1.7 1.5 .8 7.4 20.7 24.4 <u>na ka MAN</u> 24.4 22.5	40.5 .0 40.4 40.5 Beam 40.5 40.4	

Examine the raw count data for each standard. If more than one sample/standard is selected for analysis, select the *Pause Between Samples* check box. When this box is checked, the program will automatically pause after displaying each analysis until the user clicks the **Cancel** or **Next** buttons on the **Analysis Status** window. If there are any bad data points, use the **Delete Selected Line(s)** button to flag a line of data as bad. In the Tephroite standard, seen below, line 11G (good) is deemed a bad data point since its cps value is very low compared to the other three lines. Click on the line number, highlighting the line. Next click the **Delete Selected Line(s)** button.

Analyze!											_ 🗆
Sample L	ist (multi-sele	ct) (double-c	lick to see in	tensity data)		Analyze	Data K	Raws			
• Stand		203 Set 1 Fa			Ana	lyze Selecte	d Line(s) >>	Excel			
C Unkno		05 Set 1 Te				use Between	• •				
C Wave		206 Set 1 Or 207 Set 1 Ky				use between	samples				
C All Sa		10 Set 1 W				Delete Sele	cted Sample(s				
Select		11 Set 1 V2			▼						
						Indelete Sel	ected Sample(s]			
Specified	Concentratio	ns Standa	d Assignmen	ts Name/D	escription	Conditions	Elements/C	ations			
TakeOff = 40 Beam S		= 15 Beam	Current =	.000 C	otal Weight % alculated Oxy tomic Weight	1	0 Excess (52650 C			
Сору	si ka MAN	al ka MAN	ti ka MAN	v ka MAN	cr ka MAN	fe ka MAN	mn ka MAN	mg ka MAN	ca ka MAN	na ka MAN	Beam
verage:	2496.0	89.4	3.6	5.8	10.3	26.6	3821.9	101.9	53.9	22.9	40.5
td Dev:	15.9	1.6	.7	.4	.6	.7	39.7	3.1	3.2	1.7	.0
neSigma:	15.8	3.0	.6	.8	1.0	1.6	19.5	3.2	2.3	1.5	
td Err:	7.9	.8	.3	.2	.3	.4	19.8	1.6	1.6	.8	
Rel SD:	.6	1.8	19.1	6.4	6.2	2.8	1.0	3.1	6.0	7.4	
inimum:	2474.2	87.7	2.7	5.3	9.8	25.9	3763.2	97.5	51.0	20.7	40.4
aximum:	2512.0	91.3	4.1	6.1	11.1	27.5	3849.4	104.2	58.5	24.4	40.5
Delete S	elected Line	(s) Undel	ete Selected	Line(s)	List Repo	rt C	Calculation Op	tions			
Сору	si ka MAN	al ka MAN	ti ka MAN	v ka MAN	cr ka MAN	fe ka MAN	mn ka MAN	mg ka MAN	ca ka MAN	na ka MAN	Beam
G	2497.3	91.3	4.1	6.1	9.8	25.9	3841.6	102.1	58.5	24.4	40.5
0 G	2474.2	88.6	4.1	5.6	11.1	26.1	3833.5	97.5	53.3	22.5	40.4
1 G	2500.5	87.7	2.7	6.0	10.5	27.5	3763.2	104.2	52.7	24.1	40.4
2 G	2512.0	89.9	3.3	5.3	9.8	27.0	3849.4	103.9	51.0	20.7	40.5
1-1											•

This opens the **SampleDeleteLines** window.



Click the **Yes** button. The computer will flag this line with a B (bad) and ignore this data for any subsequent calculations.

Click the **Data** button again to re-analyze the remaining data lines for statistical parameters. Remember one can always undelete data lines with the **Undelete Selected Line(s)** button.

At this point, the user has collected all standardization data and is ready to make MAN background assignments.

Assign MAN Background Calibrations

From the main PROBE FOR WINDOWS log window, select **Analytical** from the menu bar and click **MAN Fits** from the menu choices.

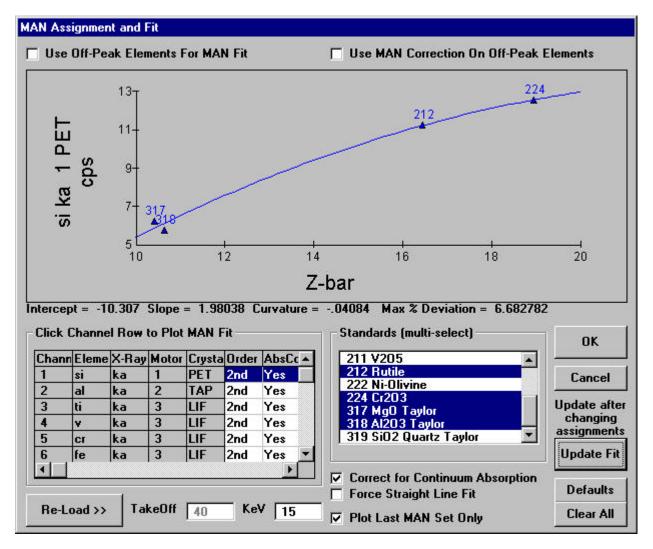
A	cquire!		sis Options	Automate!	Plot!
MOT: CRYS: ORDR: 49G 50G	1 PET 2 34.3 31.6	Empi ZAF	<u>Fits</u> rical <u>M</u> ACs rical <u>A</u> PFs Selections ent's "t" Table		
51G 52G	30.1 33.3	19.0 18.1	40.497 40.471		
AVER: SDEV: 1SIG:	32.3 1.8 1.8	17.8 1.0 1.3	40.475 .015		
SERR : %RSD :	.9 5.7	.5 5.6			

This opens the MANLoadNewElements window.

MANLoa	dNewElements
٩	Default MAN background assignments were loaded. Check each element MAN fit and modify if necessary by holding down the <cntrl> key while clicking the mouse to select or deselect standards in the Standards list. Click the Update Fit button to re-fit the selected standards.</cntrl>
	OK

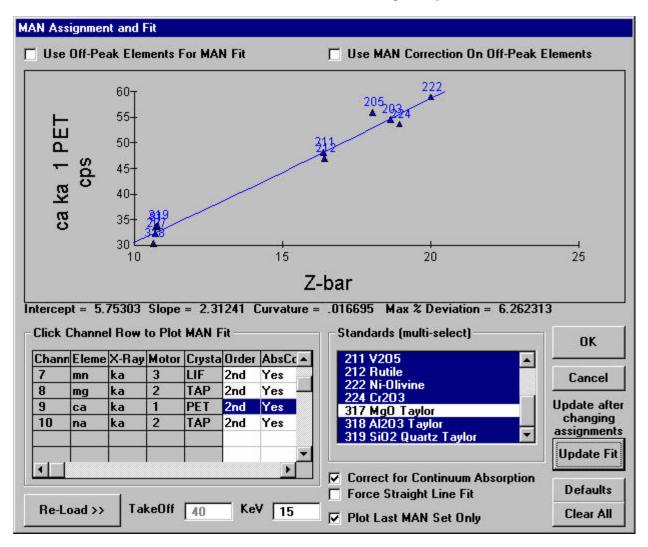
Click the **OK** button.

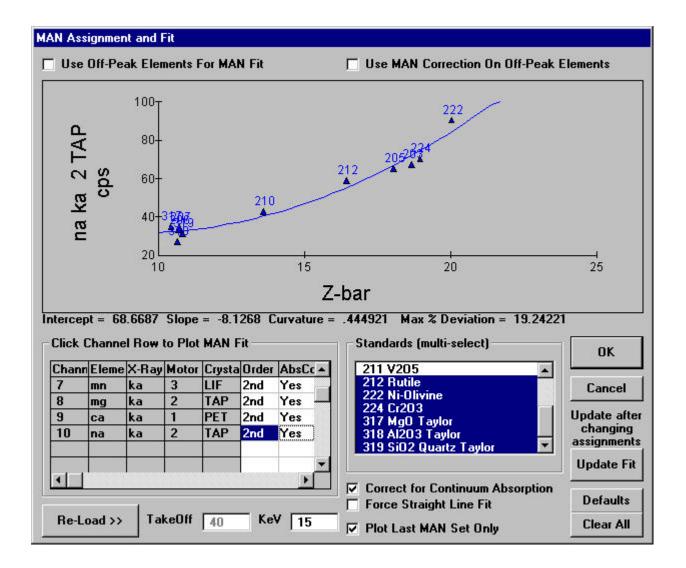
This opens the MAN Assignment and Fit dialog box.

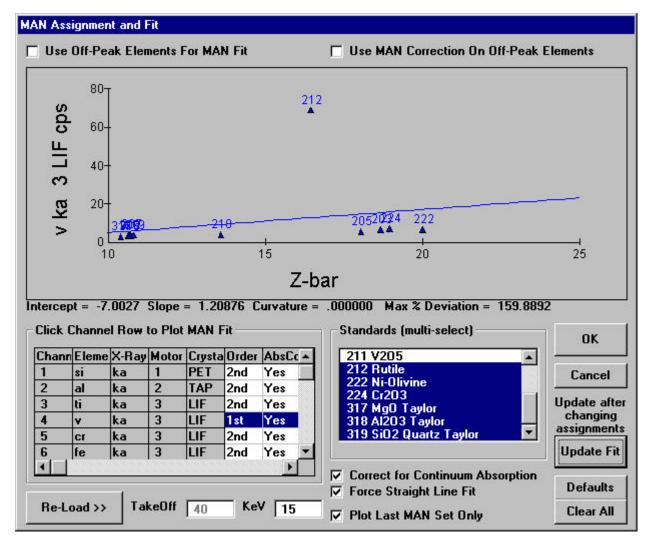


From this dialog box, the user may display and modify the MAN background assignments and fits used for the background correction of all elements in the current run. The advantage of this method is that it requires only a simple calibration of the analyzing channel over a range of atomic number. Substantial time may be saved when many samples are to be analyzed. However, if measuring high atomic number samples and/or trace concentrations, the off-peak background correction technique is usually superior.

For each element, select standards from the *Standards* list box that do not contain the element itself. In this way the measured background counts can be plotted as a function of the average atomic number (Z-bar). Choose at least five standards per element and compute a second-order polynomial or force a straight line fit (if deemed appropriate) between background counts and MAN for each. For further details and suggestions, see the User's Guide and Reference documentation. Several fits (ca, na, and v) are illustrated respectively, below.







The V plot above illustrates another effect in WDS analysis; spectral interferences. The well-known transition metal interferences are easily visible in these types of plots. The K β x-ray line for the element of atomic number x interfers with the K α x-ray line of element x+1 (Ti with V, V with Cr, Cr with Mn and Mn with Fe). Above, standard 212 is pure TiO₂ with no V₂O₃ but an apparent V x-ray signal is seen. The 212 standard is removed and the MAN background fit updated by clicking the **Update Fit** button. All of these interferences will be examined shortly.

When done adjusting individual elements, click the **OK** button to store the updated MAN background corrections.

Analyze Standard Samples

The user will now analyze all of the standard data re-calculating the x-ray counts to compositions in oxide weight percent. Since the program treats all samples as unknowns, the results of the standards provides a valuable check on the quality of the analysis.

Click the Analyze button in the main PROBE FOR WINDOWS log window. This opens the Analyze! dialog box.

Analyze!		
Sample List (multi-select) (double-click to see intensity data) Standards St 212 Set 1 Rutile Unknowns Wavescans All Samples Select All Specified Concentrations Standard Standard Assignments Name/Dest	Delete Select	
Calc	ulated Oxygen	Excess Oxyger Z - Bar
Delete Selected Line(s) Undelete Selected Line(s)	List Report C	Calculation Options
Copy Image: Copy (Copy (Co		

Under Sample List select the All Samples button	Click the Select All button highlighting all standards.
Under Sample List select the All Samples button.	Check the Select An button inghinghting an standards.

Analyze!						
-Sample List (multi-select) (double-click to see inten:	sity data) -		Analyze	Data	KRaws
C Standards St 211 S			An An	alyze Selec	ted Line(s)	>>Excel
 ○ Wavescans ○ Mal Samples St 222 9 St 224 9 St 317 9 	Set 1 Ni-Olivine Set 1 Cr2O3 Set 1 MgO Taylor			Delete Se	en Samples lected Samp	
Select All				Undelete S	elected Sam	ple(s)
Specified Concentrations	Standard Assignments	Name/D	escription	Condition	s Element	s/Cations
		Ca	otal Weight Iculated Ox omic Weigh	ygen 🗍		l Oxygen ess Oxyger lar
Delete Selected Line(s)	Undelete Selected Line	e(s)	List Rep	ort	Calculation	Options
ору						1
			1			•

Click the Calculation Options button in the Analyze! window.

This action opens the **Calculation Options** dialog box.

Selected Samples	OK Cancel
St 81 Set 1 Albite St 203 Set 1 Fayalite St 205 Set 1 Tephroite St 206 Set 1 Orthopyroxene St 207 Set 1 Kyanite St 210 Set 1 Wollastonite	EDS Data Options C Do Not Use EDS Element Data C Use EDS Element Data
Calculations Options Display Results As Oxides Calculate Atomic Percents Calculate Detection Limits and Homogeneit	 Calculate with Stoichiometric Oxygen Calculate as Elemental
Element By Difference	•
Stoichiometry To Calculated Oxygen	Atoms Of To Oxygen Atoms Of To To Oxygen

Under *Calculations Options* click the *Display Results As Oxides* box. Elemental results are always calculated and output to the log window. Click the **OK** button to output data in oxide form.

Analyzing all of the data on the standards will create a large amount of output, possibly overflowing the log window buffer, depending on the value specified in the LogWindowBufferSize parameter in the PROBEWIN.INI file. The size of the log window buffer is limited only by the amount of memory available. Setting this parameter to 512000 bytes is roughly equivalent to 300 pages of average density text. In some cases saving all log window output to a user specified text file for viewing with a text editor or printing to a laser printer may be best.

Acquire!	A	Log Window Font	ate!	Plot!
Standard 203 Fayal Standard 205 Teph Standard 206 Ortho Standard 207 Kyani Standard 210 Wolla Standard 211 V205 Standard 212 Rutil Standard 222 Ni-OJ	oite pyroxene te stonite e ivine	Debug Mode Extended Format Save To Disk Log View Disk Log Load Custom Position Format #1 Save Custom Analysis Format #1 Open Link To Excel		<u>-</u>
Standard 224 Cr203 Standard 317 MgO T Standard 318 Al203 Standard 319 SiO2 Standard K-factors	aylor Taylor Quartz Tayl		j keV	3

Select Output from the menu bar in the main log window and click Save to Disk Log.

This opens the **Open File To Output Probe Data To** dialog box. The *Save in:* location will be the directory specified for the original file name (PYROXENE01.MDB). All subsequent files created by the user will use this location. Edit the *File name* if desired. The default output file has the extension .OUT. Note that the raw data is always saved in the .MDB run file for future re-calculation and /or output. Click **Save** when finished.

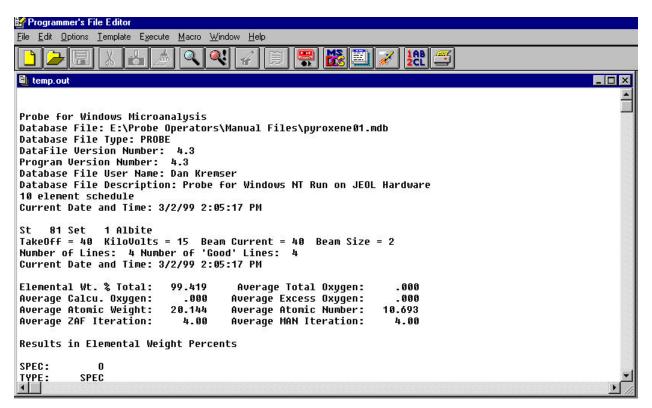
Open File T	o Output Probe Data To		? ×
Save jn:	🔄 Manual Files	- 🖻 🖻	k 📰 🏢
🔊 brass01.c	put		
File <u>n</u> ame:	:\Probe Operators\Manual File	s\pyroxene01.out	<u>S</u> ave
Save as type	Probe Output Files (*.OUT)	_	Cancel

Select the **Analyze!** button in the main PROBE FOR WINDOWS log window, to bring forward the **Analyze!** dialog box. Click the **Select All** button highlighting all standards again. Then click the **Analyze** button. This will analyze all selected standard data into the specified text file.

	<u>S</u> tandard ≚ Acquire!	nay <u>A</u> nalyac	a <u>n</u> un <u>.</u> A	<u>Jutput</u> <u>H</u> elp Log Window F	Font	ate	6		Plot!	
ELEM: 49 50 51 52	Si02 98.670 98.019 98.352 98.585	A1203 .000 .000 .000 .002	Ti0 04	Debug Mode Extended Forr Save To Disk View Disk Log Load Custom	Log	D D D D	Mn0 .000 .000 .040 .000	Mg0 .000 .000 .000 .000	SUM 99.421 99.111 99.275 99.353	*
AVER : SDEV : SERR : %RSD :	98.406 .291 .146 .3	.000 .001 .000 200.0	.01 .02 .01 119.0	Save Custom Open Link To Close Link To 105.6	Excel	at #1 6 3 200 . 0	.010 .020 .010 200.0	.000 .000 .000 .000	99.290	
ELEM: 49 50 51 52	CaO .013 .002 .000 .009	Na20 .000 .000 .002 .000	SUM 99.421 99.111 99.275 99.353							
AVER : SDEV : SERR : %RSD :	.006 .006 .003 105.3	.001 .001 .001 200.0	99.290							•

To view this data return to the main PROBE FOR WINDOWS log window and select **Output** from the menu bar again and click **View Disk Log** from the menu.

This opens the file editor. This example utilizes the **Programmer's File Editor**, seen below. A number of text file viewers may be used. To utilize a specific editor such as Textpad or Word, edit the FileViewer keyword in the PROBEWIN.INI file.



The user may now scroll through the analyzed standards using the text editor or may direct the file data to a laser printer by selecting **File** from the **Programmer's File Editor** menu bar and clicking on **Print** in the drop-down menu.

Since all elements were acquired on all standards, examination of the oxide weight percents will provide a check on the quality of the calibration. Several of the standard compositions will be displayed. The first example is the Orthopyroxene standard displayed in the **Analyze!** window below. This is the primary standard for magnesium and silicon. Both elements show excellent agreement with the published standard database values.

Sample I	List (multi-select	double -	click to see i	ntensity data		Analyze	Data	KBawa				
· Stand	darde 51 81	Set 1A	hite			aluze Selecte		o Fand				
C Unka	OWER 51 203	3 Set 1 F	ayalite		The second second	ayze Selveer		OCRUSE.				
C Wave		5 Set 1 T	ephroite http://www.ene		P3	MIC BENNECT	a samples					
C All Si		7 Set 1 K				Delete Sele	cted Sample	F]				
Selec	All St 21	0 Set 1 V	Vollastonite		-	Undelete Sel	ected Sample	e(x)				
Specified	Concentrations	Standa	ud Assignme	nts Name/	Description	Conditions	ElementsA	Cations				
TakeOff - 40 Beam	et 1 Orthopyro 40 KiloVolts - Size = 2 Onide Weight F	15 Beam	Current -	.000	Total Weight 1 Calculated Ox Atomic Weigh	ygen _0	00 Excess	Oxygen				
Copy	5/02	AI203	1:02	V203	Ci203	Fe0	MnO	MgD	Call	No20	0	Total
				24.0	600	04.7	005	39.945	0.04	.009	0.30	99.879
	59.731	.123	.000	.010	.003	.017	.005	33.840	.061	.003	.073	39.843
rerage:	59.731 .200	.123	.000	.010	.003	.017	.005	.244	.009	.005	.170	.186
d Dev:												
d Dev: M Con:	.200	.068	.000	.009	.005	.019	.004	.244	.009	.005		
d Dev: d Dev: MF Con: d En:	.200 1.3216	.058 1.5449	.000 1.1972	.009 1.2189	.006 1.1990	.019 1.2033	.004 1.2219	.244 1.3555	.009 1.1139	.005 1.7092	.170	.186
d Dev: d Dev: MF Con: d En: Rel SD:	.200 1.3216 .116	.068 1.5449 .039	.000 1.1972 .000	.009 1.2189 .005	.006 1.1960 .003	.019 1.2033 .011	.004 1.2219 .002	.244 1.3555 .141	.009 1.1139 .005	.005 1.7092 .003	.170	.186
verage: tel Dev: AF Con: tel En: Rel SD: inimum: aximum:	.200 1.3216 .116 .3	.068 1.5449 .039 55.4	.000 1.1972 .000 \$7.4	.009 1.2189 .005 89.5	.006 1.1980 .003 173.2	.019 1.2033 .011 109.0	.004 1.2219 .002 96.6	.244 1.3555 .141 .6	.009 1.1139 .005 13.9	.005 1.7092 .003 62.1	.170 .038 231.9	.186
verage: td Dev: AF Con: td En: Rel SD: inimum:	.200 1.3216 .116 .3 59.578	.068 1.5449 .039 55.4 .080	.000 1.1972 .000 97.4 .000	.009 1.2199 .005 88.5 .000	.006 1.1960 .003 173.2 .000	.019 1.2033 .011 109.0 .000	.004 1.2219 .002 86.6 .000	.244 1.3555 .141 .6 39.615	.009 1.1139 .005 13.9 .055	.005 1.7092 .003 62.1 .003	.170 .098 231.9 122	.186 .107 .2 99.768
verage: td Dev: MF Con: td Exr: Rel SD: inimum: aximum:	.200 1.3216 .116 .3 59.578	.068 1.5449 .039 55.4 .080 .202	.000 1.1972 .000 97.4 .000	.009 1.2189 .005 89.5 .000 .017	.006 1.1960 .003 173.2 .000	.019 1.2033 .011 109.0 .000 .037	.004 1.2219 .002 86.6 .000	.244 1.3555 141 .6 39.615 40.102	.009 1.1139 .005 13.9 .055	.005 1.7092 .003 62.1 .003	.170 .098 231.9 122	.186 .107 .2 99.768
d Dev AF Con: d En: d En: del SD: nimum: saimum:	.200 1.3216 1.16 .3 59.578 59.958 Selected Line(a	.068 1.5449 .039 55.4 .080 .202	.000 1.1972 .000 97.4 .000 .000	.009 1.2189 .005 89.5 .000 .017	.005 1.1960 .003 173.2 .000 .010	.019 1.2033 .011 109.0 .000 .037	.004 1.2219 .002 86.6 .000 .008	.244 1.3555 141 .6 39.615 40.102	.009 1.1139 .005 13.9 .055	.005 1.7092 .003 62.1 .003	.170 .098 231.9 122	.186 .107 .2 99.768
d Dev: d Dev: d En: d En: Rel SD: nimum: saimum: Delete \$.200 1.3216 1.16 .3 59.578 59.958 Selected Line(a	058 1.5449 039 95.4 080 .202	.000 1.1972 .000 97.4 .000 .000	.009 1.2189 .005 89.5 .000 .017	.005 1.1960 .003 173.2 .000 .010 List Repo	.019 1.2033 .011 109.0 .000 .037	.004 1.2219 .002 96.6 .000 .009 Colculation 0	.244 1.3555 .141 .6 39.615 40.102	.009 1.1139 .005 13.9 .055 .071	.005 1.7092 .003 62.1 .003 .014	.170 .098 231.9 .122 .195	.185 .107 .2 .99.758 100.093
erage: d Dev F Con: d Er: Rel SD: nimum: winum: Delete \$ aoy 3 3 G	.200 1.3216 .116 .3 59.578 59.958 Selected Line(s) \$102	058 1.5449 039 95.4 080 .202 Unde MI20 3	.000 1.1972 .000 97.4 .000 .000 .000	.009 1.2189 .005 89.5 .000 .017 f Line(s)	.005 1.1960 .003 173.2 .000 .010 List Repr	.019 1.2033 .011 109.0 .000 .037 ont Fe0	.004 1.2219 .002 96.6 .000 .008 Colculation 0	.244 1.3555 .141 .6 39.615 40.102 ptoess	.009 1.1139 .005 13.9 .055 .071	.005 1.7092 .003 62.1 .003 .014	.170 .038 231.9 .122 .195	.186 .107 .2 59.768 100.093
erage: d Dev F Con: d Er: kel SD: nimum: ainum: ainum: Delete \$.200 1.3216 .116 .3 59.578 59.958 Selected Line(a) 502 99.978	068 1.5449 039 55.4 .080 .202 Unde MI203 080	.000 1.1972 .000 97.4 .000 .000 dets Selector Tri02 .000		.005 1.1960 .003 173.2 .000 .010 List Repr Cr203 .010	.019 1.2033 .011 109.0 .000 .037 ort1 Fe0 .014	.004 1.2219 .002 96.6 .000 .009 Colculation 0 Mn0 .009	.244 1.3555 .141 .6 39.615 40.102 ptrons Mg0 39.819	.009 1.1139 .005 13.9 .055 .071 CeO .095	.005 1.7092 .003 62.1 .003 .014 Na20 .008	.170 .038 231.9 .122 .195	.186 .107 .2 99.768 100.093 Total 99.768

The analysis of the Rutile standard reveals several interesting points; 1) the TiO₂ concentration is very close to the published value of 99.26 and 2) an apparent 2.1 weight percent concentration of V_2O_3 is found! This sample has no vanadium, here the user sees the notorious Ti-V spectral interference. This interference overestimates the amount of V_2O_3 in the sample resulting in the total exceeding 100%. This will be corrected for (shortly) using the automatic interference correction routine.

sample	List (multi-selec	t) (double-	olick to see i	ntensity data)		Analyze	Data I	KRaws				
@ Stan		0 Set 1 W 1 Set 1 V	/ollastonite		A An	alyze Selecte	sd Line(s) 🔿	shaari				
C Unkr		2 Set 1 B			, E Pa	ause Between	n Samples					
C All S.	. St 22	2 Set 1 N 4 Set 1 C				Dalata Cala	cted Samplel:	at 1				
Selec	01 22	7 Set 1 M			1		lected Sample	376				
Specified	Concentration	2 Standa	ard Assignme	nte Name/	Description	Conditions	Elements/0	Cations				
40 Beam Results in	Oxide Weight	Percent		26.840 A	alculated Ox tomic Weigh	it 16.1						
Сору		AI203	1:02	V203	Cr203	Fe0	MnD	MgO	CaU	Na20	0	Nb205
verage:	_011 _012	.100	99.317	2.108	.230	.166	.002	.000	.000	.007	692	.170
		.003	.377	.022	.030	.033	.004	.000	.000	.004	.167	.000
		1 40.00	1 0700	1 1024	1 100.4	1 1 2 2 2 2	1 1 7 10	1 7766	0110			
AF Corr:	1.2238	1.4625	1.0789	1.1024	1.1654	1.1423	1.1725	1.7756	.8418	2.5295	097	000
AF Corr: td Err:	1.2238	.002	.218	.013	.017	.019	.002	.000	.000	.002	.097	.000
AF Corr: td Err: Bel SD:	1.2238 .007 112.0	.002 3.2	.218 .4	.013 1.0	.017 12.9	.019 20.0	.002 173.2	.000. 0.	.000 173.2	.002 56.9	-24.2	.0
AF Corr: AF Corr: Ad Err: Bel SD: finimum: faximum:	1.2238	.002	.218	.013	.017	.019	.002	.000	.000	.002	10.00	
AF Corr: Itd Err: Bel SD: finimum: facimum:	1.2238 .007 112.0 .000	.002 3.2 .097 .103	.218 .4 98.890	.013 1.0 2.083 2.125	.017 12.9 .206	.019 20.0 .128 .191	.002 173.2 .000	.000 .0 .000 .000	.000 173.2 .000	.002 56.9 .003	-24.2 833	.0 .170
AF Corr: td Err: Bel SD: inimum: aximum:	1.2238 .007 112.0 .000 .025 Selected Line(s	.002 3.2 .097 .103	.218 .4 98.890 99.602	.013 1.0 2.083 2.125	.017 12.9 .206 .253	.019 20.0 .128 .191	.002 173.2 .000 .006	.000 .0 .000 .000	.000 173.2 .000	.002 56.9 .003	-24.2 833	.0 .170
AF Corr: td Err: Rel SD: inimum: actimum: Delete	1.2238 .007 112.0 .000 .025 Selected Line(s	.002 3.2 .097 .103	.218 .4 98.890 99.602 dete Selecte	.013 1.0 2.083 2.125	.017 12.9 .206 .253	.019 20.0 .128 .191	.002 173.2 .000 .006 Calculation O	.000 .0 .000 .000	.000 173.2 .000 .000	.002 56.9 .003 .011	-24.2 833 507	.0 .170 .170
AF Corr: d Err: Rel SD: inimum: actimum: Delete Opy 9 B 0 G	1.2238 .007 112.0 .000 .025 Selected Line(s AI2D3 .097	.002 3.2 .097 .103	.218 .4 98.890 99.602 dete Selecte V2D3 2.126	.013 1.0 2.083 2.125 d Line(s) Cr203 .221	.017 12.9 .206 .253 List Rep Fe0 .128	.019 20.0 .128 191 ort 1 MnO	.002 173.2 .000 .006 Calculation 0 Mg0 .000	.000 .0 .000 .000 ptions CaO .000	.000 173.2 .000 .000 .000 Na20 .008	.002 56.9 .003 .011	-24.2 833 507 Nb205 .170	.0 .170 .170 .170 Totel 101.132
AF Corr: td Err: Rel SD: inimum: aximum: Delete	1.2238 .007 112.0 .000 .025 Selected Line(s	.002 3.2 .097 .103	.218 .4 98.890 99.602 dete Selecte	.013 1.0 2.083 2.126 d Line(s)	.017 12.9 .206 .263 List Rep	.019 20.0 .128 .191 ort 1 MnO	.002 173.2 .000 .006 Calculation 0	.000 .0 .000 .000 ptions CaO	.000 173.2 .000 .000 .000	.002 56.9 .003 .011	-24.2 833 507 Nb205	0 .170 .170

All of the data lines gathered on the standards are examined and appear close to their standard database values. To save space they will not be reproduced here.

Spectral Interference Assignments

PROBE FOR WINDOWS allows the user to select a fully quantitative correction for spectral interferences. The program can only correct for interferences if both the interfered and interfering elements are analyzed for. Further, data for an interference calibration standard must be acquired that contains a major concentration of the interfering element and none of the interfered element or any other elements that interfere with the interfered element.

Select the All Samples button in the Sample List and click the Select All button in the Analyze! window.

Analyze!					
Sample List (multi-select) (double-click to see inten	sity data) ——	Analyze	Data	KRaws
C Standards St 211 9			Analyze Sel	ected Line(s)	>>Excel
C Unknowns St 212 S C Wavescans St 222 S	et 1 Ni-Olivine		Pause Betw	veen Samples	-
All Samples St 224 S St 317 S			Delete S	Selected Samp	le(s)
Select All St 318 9			Undelete	Selected Sam	ple(s)
Specified Concentrations	Standard Assignments	Name/Descri	ption Conditio	ons Element	s/Cations
		Calcula	Veight % nted Oxygen Weight		l Oxygen ss Oxyger ar
Delete Selected Line(s)	Undelete Selected Lin	e(s) Li	st Report	Calculation	Options
opy					
					•

Next, click the Standard Assignments button.

Clicking this button opens the **Standard and Interference Assignments** dialog box.

Selected S	Samples				ОК	Cancel
St 81 Se St 203 S St 205 S	socup	oite			Save Eleme	nt Setup
St 207 S	et 1 Kyani	te			Save Sampl	le Setup
Click Elen	nent Row to	Edit Stand	lard/Interfere	nce/Volatile	e Assignmen	ts
Channel	Element	X-Ray	Analyzed	Standard	Interf-Ele	Interf-Std
	si	ka	Yes	206		0.0.0.0
1	91					
2	al	ka	Yes	207		0,0,0,0
		ka ka	Yes Yes			
3	al	2255		207		0,0,0,0
3 4 5	al ti	ka	Yes	207 212		0,0,0,0 0,0,0,0
3 4 5	al ti v	ka ka	Yes Yes	207 212 211	···· ···	0,0,0,0 0,0,0,0 0,0,0,0
3 4 5 6	al ti v cr	ka ka ka	Yes Yes Yes	207 212 211 224		0,0,0,0 0,0,0,0 0,0,0,0 0,0,0,0
3 4 5 6 7	al ti v cr fe	ka ka ka ka	Yes Yes Yes Yes	207 212 211 224 203	···· ···· ····	0,0,0,0 0,0,0,0 0,0,0,0 0,0,0,0 0,0,0,0
3 4 5 6 7 8	al ti v cr fe mn	ka ka ka ka ka	Yes Yes Yes Yes Yes	207 212 211 224 203 205	···· ···· ····	0,0,0,0 0,0,0,0 0,0,0,0 0,0,0,0 0,0,0,0 0,0,0,0
1 2 3 4 5 6 7 7 8 9 10	al ti v cr fe mn mg	ka ka ka ka ka ka	Yes Yes Yes Yes Yes Yes	207 212 211 224 203 205 206	···· ···· ···· ····	0,0,0,0 0,0,0,0 0,0,0,0 0,0,0,0 0,0,0,0 0,0,0,0 0,0,0,0

Click on the element row to edit the *Interference Assignments*.

The **Assignment Properties** dialog box opens. Select the first *interference element* for this element and the corresponding *standard* that contains a known amount of the interfering element but none of the interfered element.

inter Stand	a su su su su a se su		OK
Element	X-Ray ka	Assigned Standard 211 V205	
· •	Kd 🔨	211 ¥205	Cancel
nterference	e Standard A	ssignments	
st			Remove
55	ti 💌	212 Rutile	
nd	<u> </u>	_	Remove
rd	_		Remove
th	-	•	Remove
	e Interferenc	known concentration of the interfering element an interfered element, nor any other interfering e	
folatile Ele	ment Calibra	tion Sample Assignment (select an unknown sample for calit	elements.
folatile Ele	ment Calibra	known concentration of the interfering element an interfered element, nor any other interfering e tion Sample Assignment (select an unknown sample for calit	elements.
folatile Ele	ment Calibra	tion Sample Assignment (select an unknown sample for calit Volatile element correction cali	elements. pration fit) bration sample: Volatile" buttor low. ing an assigned d here. Volatile
folatile Ele	ment Calibra	tion Sample Assignment (select an unknown sample for calit should be acquired using the " in the Acquire wind Volatile element correction cali should be acquired using the " in the Acquire wind Volatile element calibrations us calibration sample are specifie element self calibrations are themselves.	elements. pration fit) bration sample: Volatile" buttor low. ing an assigned d here. Volatile

Click the **OK** button when finished.

The Standard and Interference Assignments window will appear as below.

Selected S	Samples				ОК	Cancel
St 81 Se St 203 S St 205 S	setup et 1 Albite et 1 Fayali et 1 Tephi et 1 Ortho	roite			Save Eleme	nt Setup
St 207 S	et 1 Kyani	te			Save Samp	le Setup
Click Elen	nent Row to	Edit Stand	lard/Interfere	nce/Volatile	e Assignmen	lts
Channel	Element	X-Ray	Analyzed	Standard	Interf-Ele	Interf-Std
1	si	ka	Yes	206		0,0,0,0
1 2	si al	ka ka	Yes Yes	206 207		0,0,0,0 0,0,0,0
		C1 52.77				
3	al	ka	Yes	207		0,0,0,0 0,0,0,0
3 4 5	al ti	ka ka	Yes Yes	207 212		0,0,0,0 0,0,0,0
3 4 5	al ti v	ka ka ka	Yes Yes Yes	207 212 211	 ti	0,0,0,0 0,0,0,0 212,0,0,0
3 4 5 6	al ti v cr	ka ka ka ka	Yes Yes Yes Yes	207 212 211 224	 ti	0,0,0,0 0,0,0,0 212,0,0,0 0,0,0,0
3 4 5 6 7	al ti v cr fe	ka ka ka ka ka	Yes Yes Yes Yes Yes	207 212 211 224 203	 ti	0,0,0,0 0,0,0,0 212,0,0,0 0,0,0,0 0,0,0,0
3 4 5 6 7 8	al ti v cr fe mn	ka ka ka ka ka ka	Yes Yes Yes Yes Yes Yes Yes	207 212 211 224 203 205	 ti ti	0,0,0,0 0,0,0,0 212,0,0,0 0,0,0,0 0,0,0,0 0,0,0,0
1 2 3 4 5 6 7 8 9 9 10	al ti v cr fe mn mg	ka ka ka ka ka ka ka	Yes Yes Yes Yes Yes Yes Yes	207 212 211 224 203 205 206	 Vi Vi 	0,0,0,0 0,0,0,0 212,0,0,0 0,0,0,0 0,0,0,0 0,0,0,0 0,0,0,0

Repeat these editing steps for all of the other element interferences, resulting in the following **Standard and Interference Assignments** window.

Selected S	6 amples				ОК	Cancel
10 M	owenp					110000000
St 81 Se						
	et 1 Fayali et 1 Tephi				e	100
	et 1 Ortho				Save Eleme	nt Setup
	et 1 Kyani				C C	P. denter
-				130	Save Samp	le Setup
Click Elen	ent Bow to	Edit Stand	lard/Interfere	nce/Volatile	Assianmen	ts
					, invergination	
Channel	Element	X-Ray	Analyzed	Standard	Interf-Ele	Interf-Std
and do to have been appendix	and the second se		and the second sec	and the second se		
1	si	ka	Yes	206		0,0,0,0
1 2	si al	ka ka	Yes Yes	206 207		
5275		C1 52.77	10.00			0,0,0,0
3	al	ka	Yes	207		0,0,0,0 0,0,0,0 0,0,0,0
3 4 5	al ti	ka ka	Yes Yes	207 212		0,0,0,0 0,0,0,0 0,0,0,0 212,0,0,0
3 4 5	al ti v	ka ka ka	Yes Yes Yes	207 212 211	 ti	0,0,0,0 0,0,0,0 0,0,0,0 212,0,0,0 211,0,0,0
3 4 5 6	al ti v cr	ka ka ka ka	Yes Yes Yes Yes	207 212 211 224	 ti Y	0,0,0,0 0,0,0,0 0,0,0,0 212,0,0,0 211,0,0,0 205,0,0,0
3 4 5 6 7	al ti v cr fe	ka ka ka ka ka	Yes Yes Yes Yes Yes Yes	207 212 211 224 203	 ti v mn	0,0,0,0 0,0,0,0 0,0,0,0 212,0,0,0 211,0,0,0 205,0,0,0
3 4 5 6 7 8	al ti v cr fe mn	ka ka ka ka ka ka	Yes Yes Yes Yes Yes Yes	207 212 211 224 203 205	 ti, v cr,	0,0,0,0 0,0,0,0 2,0,0,0 212,0,0,0 211,0,0,0 205,0,0,0 224,0,0,0
1 2 3 4 5 6 7 8 9 9 10	al ti v cr fe mn mg	ka ka ka ka ka ka ka	Yes Yes Yes Yes Yes Yes Yes Yes	207 212 211 224 203 205 206	 ti, v mn, cr,	0,0,0,0 0,0,0,0 2,0,0,0 2,12,0,0,0 2,11,0,0,0 2,05,0,0,0 2,24,0,0,0 0,0,0,0

Click the **OK** button when finished returning to the **Analyze!** window.

Next, the user might check the analysis options that are currently assigned. From the main PROBE FOR WINDOWS log window, select **Analytical** from the menu bar and click **Analysis Options** from the menu choices.

Probe For Windows [E	:\Probe Operators\Man	ual Files\pyroxene01.mdb]	
<u>File E</u> dit <u>S</u> tandard <u>X</u> ray	Analytical Run Output	Help	
Acquire!	Analysis Options	Automate!	Plot!
	- MAN <u>F</u> its Empirical <u>M</u> ACs Empirical <u>A</u> PFs <u>Z</u> AF Selections <u>S</u> tudent's "t" Table	1	
•			

This opens the Analysis Calculation Options window. Check that the appropriate boxes are marked.

nalysis Calculation Options	12
Analysis Options	ОК
▼ Use Deadtime Correction	
Use Normal Deadtime Correction	Cancel
O Use Precision Deadtime Correction (> 50K cps)	
✓ Use Beam Drift Correction	
Use Automatic Drift Correction on Standard Intensities	
▼ Use Assigned Interference Corrections on Standards and Unknowns	
Use Assigned Volatile Element Corrections on Unknowns	
Use Absorption Corrected MAN Continuum Intensities	
Use Empirical MAC Values	
Use Empirical APF Values	
Use Detailed Printout For Data and Analytical Results	
Use Automatic Format For Results	
Print Analyzed And Specified On Same Line	

Click the **OK** button returning to the main log window.

The user then reanalyzes the standards (**Analyze** button in the **Analyze!** window), utilizing the spectral interference correction routine. The results for the Rutile standard are dramatic; the apparent 2.1 wt% V_2O_3 concentration has been replaced with an average 0.01 wt% content (which is below the detection limit).

Analyze													11.5
Sample I	Sample List (multi-select) (double-click to see intensity data)		8 8	Analyze	Data	KRaws							
G Stand	dardz St 211 Set 1 V205		▲ An	alyze Select	ed Line(s)	>>Excel							
NUMBER OF TAXABLE PARTY.		2 Set 1 N			E P.	ause Betwee	n Samples						
C All Sa	. 51 22	4 Set 10	a203 Aq0 Taylor			Dalata Cal	ected Sample						
Selec	51 31		1203 Taylor				ected Samp						
Specified	Concentration	s Standa	ard Assignment	s Name/	Description	Conditions	Elements	:/Cations					
TakeOff = 40 Beam	et 1 Rutile = 40 KiloVolts = Size = 2 Oxide Weight I			.000 (lotal Weight Salculated Ox Momic Weigh	ygen	ewie	Oxygen 38 Oxygen 31					
Copy	AI203	TIOZ	V203	Ci203	FeO	MnD	MgD	CaO	Na2D	0	Nb205	Total	_
verage:	.102	99.440	.009	.232	.168	.002	.000	.000	.009	071	.170	100.07	2
itd Dev:	.003	.377	.015	.030	.033	.004	.000	.001	.004	.166	.000	.260	1
AF Con:	1.4619	1.0802	1.1038	1.1681	1.1433	1.1734	1.7740	.8423	2.5261	1022626		2000	
itd Em:	.002	.218	.009	.017	.019	.002	.000	.000	.002	.096	.000	.150	6
Rel SD:	3.2	.4	164.0	12.9	19.8	173.2	.0	173.2	48.5	-233.2	.0	.3	
lininum:	.098	99.013	000		.130	.000	.000	.000	.004	208	.170	99.78	3
aximum:	.104	99.726	.027	.265	.193	.007	.000	.001	.013	.114	.170	100.28	B
													21
Delete S	Selected Line(:	Unde	slete Selected	Line(s)	List Rep	tho	Calculation	Options					
Сору	Si02	AJ203	Ti02	V203	Cr203	Fe0	MnO	MgO	CaO	Na2D	0	Nb205	1
29 8				and the second s									1
30 6	.000	.098	99.013	.027	.222	.130	.000	.000	.000	.009	.114	.170	
1 6	.025	.104	99.726	.001	.265	.193	.000	.000	.000	.013	208	.170	
32.6	.009	.103	99.582	.000	.208	.180	.007	.000	.001	.004	120	.170	1
							200000000000					Cold Cold Cold Cold Cold Cold Cold Cold	-

The user is ready to move on to unknown samples.

Unknown Sample Data Collection and Analysis

To collect x-ray data on an unknown sample, minimize the **Analyze!** window and/or bring forward the **Acquire!** dialog box to start a new sample.

Click the Move button on the Acquire! window to drive the stage to the coordinates of the first unknown sample.

Click the **New Sample** button to activate the **New Sample** dialog box. Check that the *Unknown* button under *New Sample Type* is marked. Enter an appropriate sample name and description into the *New Sample Name* and *New Sample Description* text boxes. Finally, click the **OK** button.

ew Sample					
New Sample Type	OK	Cancel			
C Unknown	Load Element Setup				
C Wavescan	Load Sample Setup				
	Load F	ile Setup			
New Sample Name Pyroxene #164 New Sample Descriptio	n				
Insert (cr> >> Count	time check	1			
To add standards to th this dialog, then click to to Run menu ite 81 Albite 203 Fayalite 205 Tephroite 206 Orthopyroxene 207 Kyanite 210 Wollastonite	he Standard	Add Standard			

To start acquiring x-ray counts on the first unknown sample, simply click the **Start Standard or Unknown Acquisition** button of the **Acquire!** window.

Acquire!							
1 2	3	x	Y	z	W		
240.002 240.006 24	10.001 10. 0	5934 35.5	725 11.	1046 2.	99999		
Faraday 1	2	3					
10.00 10.00	10.00	10.00					
40471.0 332.	774.	116.					
Cu Jn 2 * Pyroxene #1	irrent Sample 64			Sta	rt Standard	or Unk	nown Acquisition
Data Rows: 0 Good Data Rows: 0				St	art Wavesc	an	Special Options
New Sample Locate		ocate		Mo	ve	Ac	quisition Options
Elements/Cations PHA		P	Peak/Scan Options		Start Peak Center		
Analytical Conditions	Cou	nt Times		Rate Meter Peakin			Peaking

Pyroxene #164, a chromium augite, is run once to obtain representative count rate information for the adjustment of element count times using the **Count Times** button to improve statistics and lower detection limits. Four random spots are then acquired (a **New Sample** is started) on the same pyroxene.

New Sample Type -	ок	Cancel				
Unknown	Load Element Setup					
C Wavescan	Load Sample Setup					
	Load F	ile Setup				
New Sample Name Pyroxene #164						
New Sample Descriptio	n					
L	random spots	1				
Insert <cr>>>> Four</cr>						
To add standards to th this dialog, then click to to Run menu ite	e standard lis he Standard	Add Standards				

The **Start Standard or Unknown Acquisition** button in the **Acquire!** window is clicked four times, to acquire four data points.

Next, the **Analyze!** dialog box is reopened or simply brought forward. Click the *Unknowns* button and select Un = 3 *Pyroxene #164*.

Analyze!						_ 0
Sample List (multi-select) ((double-click to see intens	sity data) ——		Analyze	Data	KRaws
	* setup		An	alyze Selecte	d Line(s)	>>Exce
 Unknowns Unknowns Un 2 Un 3 	Pyroxene #164 Pyroxene #164		Pa	ause Betweer	n Samples	
C All Samples				Delete Sele	cted Samp	le(s)
Select All			-	Undelete Sel		
pecified Concentrations	Standard Assignments	Name/Descri	ption	Conditions	Element	s/Cation
		Total W Calcula Atomic	ated Ox	ygen 🗍		l Oxygen sss Oxyge ar
ру			10.5			
	I I I I I I I_					
Delete Selected Line(s)	Undelete Selected Line	e(s)	st Repo	ort 1	Calculation	Options
ру						

Click the **Calculation Options** button.

This opens the Calculation Options dialog box.

Make the following changes; under Calculations Options check Display Results as Oxides, Calculate Detection Limits and Homogeneity, and Calculate with Stoichiometric Oxygen. Under Formula and Mineral Calculations check the Calculate Formula Based On box. Select Pyroxene and enter 6 Atoms of Oxygen in the other two text boxes.

Selected Samples	OK Cancel
Un 3 Pyroxene #164	EDS Data Options C Do Not Use EDS Element Data C Use EDS Element Data
Calculations Options Display Results As Oxides Calculate Atomic Percents Calculate Detection Limits and Homogenei Element By Difference 	 Calculate with Stoichiometric Oxygen Calculate as Elemental ity
Stoichiometry To Calculated Oxygen	Atoms Of To Oxygen

Click the OK button closing the Calculation Options window, returning to the Analyze! dialog box.

Clicking the **Analyze** button calculated the results for these four points and those values are viewed below, as copied from the text editor.

TakeOff Four ra Number	ndom spo of Line:	KiloVolts	ber of '	Good' Li	nes: 4	Beam S	ize = 2		
Average Average Average Oxygen	Calcu. Atomic ZAF Ite Calcula	<pre>% Total: Oxygen: Weight: eration: ted by Ca mental We</pre>	43.832 21.746 3.00 tion Sto	Aver Aver Aver ichiomet	age Exce age Atom age MAN	ic Numbe Iteratio	n: r: 12 n: 4	.832 .000 .383 4.00 Matrix Cc	prrection
SPEC:	0		-						
TYPE:	CALC								
AVER:	43.832								
SDEV:	.141								
ELEM:	Si	Al	Ti	v	Cr	Fe	Mn	Mq	
BGDS:	MAN			MAN	MAN		MAN	5	
		-28.32		-2.06		53		-32.30	
TIME:	10.00	20.00		30.00	30.00		30.00		
	- 1				_	_			
ELEM:	Si 23.345		Ti	V 016	Cr		Mn	5	
54 55	23.345		.332 .306	.016 .046		3.684 3.626	.087		99.414 99.776
56		4.026	.276	.040			.110		
57	23.352		.314	.018			.097		
AVER:	23.364		.307	.028			.094		99.452
SDEV:	.123		.023	.014		.036	.012		
SERR: %RSD:	.061		.012 7.5	.007 49.3	.007 2.1		.006 12.5		
STDS:	206		212	211			205		
0120	200	207				200	200	200	
STKF:		.2706				.4982			
STCT:	4872.5	23252.8	1851.9	2467.5	4164.4	4400.5	3826.7	12205.5	
UNKF:	.1823	.0282	.0026	.0002	.0053	.0309	0008	.0701	
UNCT:	4206.0			1.1			6.1		
UNBG:	7.1		2.2	4.1			9.0		
ZCOR:		1.4345							
KRAW: PKBG:	.8632 595.82			.0005			.0016 1.67		
INT%:	.00	.00		1.28 -23.19	- 14	.00	-1.30	.00	
1111 0				23.19	• = =		1.50		
ELEM:	Ca	Na							
BGDS:	MAN								
ABS%:	-3.20								
TIME:	40.00	30.00							
ELEM:	Ca	Na	SUM						
54	12.482		99.414						
55	12.466	.656	99.776						
56	12.503	.625	99.185						
57	12.469	.632	99.432						
AVER:	12.480	.636	99.452						
SDEV:	.017	.030	<i>,</i> ,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,						
SERR:	.008	.007							
%RSD:	.1	2.1							

STDS:	210	81							
STKF: STCT:	.3205 11337.2	.0500 2170.0							
UNKF: UNCT: UNBG:	.1149 4063.9 35.6	.0033 143.0 19.2							
ZCOR: KRAW: PKBG: INT%:	1.0863 .3585 115.28 .00	1.9327 .0659 8.44 .00							
Results	in Oxid	le Weight	Percents						
SPEC: TYPE:	0 CALC								
AVER: SDEV:	.000								
ELEM: 54 55 56 57	SiO2 49.943 50.334 49.698 49.959	Al2O3 7.652 7.653 7.607 7.623	TiO2 .553 .510 .461 .524	V2O3 .024 .067 .049 .027	Cr2O3 .889 .889 .916 .927	FeO 4.739 4.665 4.732 4.775	MnO .112 .108 .142 .125	MgO 17.186 17.223 17.245 17.173	SUM 99.414 99.776 99.185 99.432
AVER: SDEV: SERR: %RSD:	49.983 .263 .131 .5	7.634 .023 .011 .3	.512 .039 .019 7.5	.042 .021 .010 49.3	.905 .019 .010 2.1	4.728 .046 .023 1.0	.122 .015 .008 12.5	17.207 .033 .016 .2	99.452
ELEM: 54 55 56 57	CaO 17.465 17.443 17.495 17.446	Na2O .851 .884 .842 .852	SUM 99.414 99.776 99.185 99.432						
AVER: SDEV: SERR: %RSD:	17.462 .024 .012 .1	.857 .018 .009 2.1	99.452						
Results	Based c	on 6 Atom	s of o						
SPEC: TYPE:	0 CALC								
AVER: SDEV:	6.000 .000								
ELEM: 54 55 56 57	Si 1.821 1.827 1.818 1.822	Al .329 .327 .328 .328	Ti .015 .014 .013 .014	V .001 .002 .001 .001	Cr .026 .026 .026 .027	Fe .145 .142 .145 .146	Mn .003 .003 .004 .004	Mg .934 .932 .940 .934	SUM 10.016 10.013 10.021 10.016
AVER: SDEV: SERR: %RSD:	1.822 .004 .002 .2	.328 .001 .000 .2	.014 .001 .001 7.4	.001 .001 .000 49.1	.026 .001 .000 2.3	.144 .002 .001 1.2	.004 .000 .000 12.8	.935 .004 .002 .4	10.017

ELEM: 54 55 56 57	Ca .682 .678 .686 .682	Na .060 .062 .060 .060	SUM 10.016 10.013 10.021 10.016						
AVER: SDEV: SERR: %RSD:	.682 .003 .002 .4	.061 .001 .001 1.8	10.017						
Pyroxene	Mineral	End-Me	mber Calc	ulations					
54 55 56 57	Wo 38.7 38.7 38.7 38.7 38.7	En 53.0 53.2 53.1 53.0	Fs 8.2 8.1 8.2 8.3						
AVER: SDEV:	38.7 .0	53.1 .1	8.2 .1						
Detection	n limit	at 99 %	Confiden	ce in El	emental	Weight	Percent	(Single	Line):
ELEM: 54 55 56 57	Si 	Al 	Ti .029 .029 .029 .029	V .028 .028 .028 .028	Cr .025 .025 .025 .025	Fe 	Mn .026 .026 .026 .026	Mg 	
AVER: SDEV: SERR:	 	 	.029 .000 .000	.028 .000 .000	.025 .000 .000	 	.026 .000 .000	 	
ELEM: 54 55 56 57	Ca 	Na .011 .011 .011 .011							
AVER: SDEV: SERR:	 	.011 .000 .000							
Percent .	Analytic	al Erro	r (Single	Line):					
ELEM: 54 55 56 57	Si .5 .5 .5	Al .5 .5 .5	Ti 7.3 7.7 8.2 7.5	V 57.4 27.5 35.8 53.7	Cr 3.7 3.7 3.6 3.6	Fe 1.2 1.2 1.2 1.2		Mg .2 .2 .2 .2	
AVER: SDEV: SERR:	.5 .0 .0	.5 .0 .0	7.7 .4 .2	43.6 14.3 7.2	3.7 .0 .0	1.2 .0 .0	14.7 1.5 .8	.2 .0 .0	
ELEM: 54 55 56 57	Ca .3 .2 .3	Na 1.7 1.7 1.7 1.7							
AVER:	.3	1.7							

SDEV:	.0	.0
SERR:	.0	.0

ELEM: Si Al Ti V Cr Fe Mn Mg 60ci .063 .007 .009 .001 .005 .017 .002 .010 80ci .106 .011 .015 .002 .009 .028 .004 .017 90ci .152 .016 .022 .003 .013 .041 .006 .025 95ci .205 .021 .029 .004 .018 .055 .008 .034 99ci .377 .039 .054 .008 .032 .101 .014 .062 ELEM: Ca Na Ka Ka
60ci .063 .007 .009 .001 .005 .017 .002 .010 80ci .106 .011 .015 .002 .009 .028 .004 .017 90ci .152 .016 .022 .003 .013 .041 .006 .025 95ci .205 .021 .029 .004 .018 .055 .008 .034 99ci .377 .039 .054 .008 .032 .101 .014 .062 ELEM: Ca Na 60ci .009 .006 80ci .015 .010 90ci .021 .014 95ci .028 .019 99ci .052 .036 Test of Homogeneity at 1.0 % Precision (Average of Sample): ELEM: Si Al Ti V Cr Fe Mn Mg
80ci .106 .011 .015 .002 .009 .028 .004 .017 90ci .152 .016 .022 .003 .013 .041 .006 .025 95ci .205 .021 .029 .004 .018 .055 .008 .034 99ci .377 .039 .054 .008 .032 .101 .014 .062 ELEM: Ca Na .001 .001 .001 .001 .002 90ci .015 .010 .006 .0021 .014 .062 90ci .021 .014 .052 .036 .028 .019 .052 .036 Test of Homogeneity at 1.0 % Precision (Average of Sample): ELEM: Si Al Ti V Cr Fe Mn Mg
90ci .152 .016 .022 .003 .013 .041 .006 .025 95ci .205 .021 .029 .004 .018 .055 .008 .034 99ci .377 .039 .054 .008 .032 .101 .014 .062 ELEM: Ca Na 60ci .009 .006 80ci .015 .010 90ci .021 .014 95ci .028 .019 99ci .052 .036 Test of Homogeneity at 1.0 % Precision (Average of Sample): ELEM: Si Al Ti V Cr Fe Mn Mg
95ci .205 .021 .029 .004 .018 .055 .008 .034 99ci .377 .039 .054 .008 .032 .101 .014 .062 ELEM: Ca Na .001 .014 .062 60ci .009 .006 .001 .014 .062 90ci .015 .010 .015 .010 90ci .021 .014 .052 .036 Test of Homogeneity at 1.0 % Precision (Average of Sample): ELEM: Si Al Ti V Cr Fe Mn Mg
99ci .377 .039 .054 .008 .032 .101 .014 .062 ELEM: Ca Na .009 .006 .009 .006 80ci .015 .010 .021 .014 .052 .028 .019 90ci .028 .019 .052 .036 .052 .036 Test of Homogeneity at 1.0 % Precision (Average of Sample): ELEM: Si Al Ti V Cr Fe Mn Mg
ELEM: Ca Na 60ci .009 .006 80ci .015 .010 90ci .021 .014 95ci .028 .019 99ci .052 .036 Test of Homogeneity at 1.0 % Precision (Average of Sample): ELEM: Si Al Ti V Cr Fe Mn Mg
60ci .009 .006 80ci .015 .010 90ci .021 .014 95ci .028 .019 99ci .052 .036 Test of Homogeneity at 1.0 % Precision (Average of Sample): ELEM: Si Al Ti V Cr Fe Mn Mg
80ci .015 .010 90ci .021 .014 95ci .028 .019 99ci .052 .036 Test of Homogeneity at 1.0 % Precision (Average of Sample): ELEM: Si Al Ti V Cr Fe Mn Mg
90ci .021 .014 95ci .028 .019 99ci .052 .036 Test of Homogeneity at 1.0 % Precision (Average of Sample): ELEM: Si Al Ti V Cr Fe Mn Mg
95ci .028 .019 99ci .052 .036 Test of Homogeneity at 1.0 % Precision (Average of Sample): ELEM: Si Al Ti V Cr Fe Mn Mg
99ci .052 .036 Test of Homogeneity at 1.0 % Precision (Average of Sample): ELEM: Si Al Ti V Cr Fe Mn Mg
Test of Homogeneity at 1.0 % Precision (Average of Sample): ELEM: Si Al Ti V Cr Fe Mn Mg
ELEM: Si Al Ti V Cr Fe Mn Mg
-
60 ci ves ves no no ves ves no ves
80ci yes yes no no no yes no yes
90ci yes yes no no no no no yes
95ci yes yes no no no no no yes
99ci no yes no no no no yes
ELEM: Ca Na
60ci yes yes
80ci yes no
90ci yes no
95ci yes no
99ci yes no
-
Level of Homogeneity in +/- Percent (Average of Sample):
ELEM: Si Al Ti V Cr Fe Mn Mg
60ci .3 .2 2.9 4.8 .9 .5 2.5 .1
80ci .5 .3 4.9 8.1 1.5 .8 4.2 .2
90ci .6 .4 7.0 11.6 2.1 1.1 6.0 .2
95ci .9 .5 9.5 15.7 2.9 1.5 8.1 .3
99ci 1.6 1.0 17.5 28.8 5.2 2.7 14.8 .6
ELEM: Ca Na
60ci .1 .9
80ci .1 1.6
90ci .2 2.3
95ci .2 3.1
99ci .4 5.6
Detection Limit in Elemental Weight Percent (Average of Sample):
ELEM: Si Al Ti V Cr Fe Mn Mg
60ci014 .009 .008008
80ci024 .014 .014013
90ci035 .021 .020018
95ci047 .028 .027025
99ci087 .051 .049045

Project	ed Dete	ction Lir	nits (998	t CI) in	Elementa	l Weight	Percent	(Average	of	Sample):
ELEM:	Si	Al	Ti	v	Cr	Fe	Mn	Mq		
	.16	.31		.47	.47	.47	.47	.63		
TIME:	.10	. 51	.47			.4/		.03		
PROJ:			.692	.410	.395		.361			
TIME:	.31	.63	.94	.94	.94	.94	.94	1.25		
PROJ:			.489	.290	.279		.255			
TIME:	.63	1.25	1.88	1.88	1.88	1.88	1.88	2.50		
PROJ:			.346	.205	.197		.180			
TIME:	1.25	2.50	3.75	3.75	3.75	3.75	3.75	5.00		
PROJ:			.245	.145	.140		.128			
TIME:	2.50	5.00	7.50	7.50	7.50	7.50	7.50	10.00		
PROJ:			.173	.102	.099		.090			
TIME:	5.00	10.00	15.00	15.00	15.00	15.00	15.00	20.00		
PROJ:			.122	.072	.070		.064			
TIME:	10.00	20.00	30.00	30.00	30.00	30.00	30.00	40.00		
PROJ:			.087	.051	.049		.045			
TIME:	20.00	40.00	60.00	60.00	60.00	60.00	60.00	80.00		
PROJ:			.061	.036	.035		.032			
TIME:	40.00	80.00	120.00	120.00	120.00	120.00	120.00	160.00		
PROJ:			.043	.026	.025		.023			
TIME:	80.00	160.00	240.00	240.00	240.00	240.00	240.00	320.00		
PROJ:			.031	.018	.017		.016			
TIME:	160.00	320.00	480.00	480.00	480.00	480.00	480.00	640.00		
PROJ:			.022	.013	.012		.011			
TIME:	320.00	640.00	960.00	960.00	960.00	960.00		1280.00		
PROJ:			.015	.009	.009		.008			
TIME:	640.00	1280.00			1920.00			2560.00		
PROJ:			.011	.006	.006		.006			
11100										
ELEM:	Ca	Na								
60ci		.009								
80ci		.014								
90ci		.021								
95ci		.028								
99ci		.051								
								(-	~	a b b b
Project	ted Deteo	ction Lir	nits (99%	š CI) in	Elementa	l Weight	Percent	(Average	oİ	Sample):
ELEM:	Ca	Na								
TIME:	.63	.47								
PROJ:		.411								
TIME:	1.25	.94								
PROJ:	1.25	.291								
TIME:	2.50	1.88								
PROJ:	2.50	.206								
TIME:		3.75								
	5.00	.145								
PROJ:										
TIME:	10.00	7.50								
PROJ:		.103								
TIME:	20.00	15.00								
PROJ:		.073								
TIME:	40.00	30.00								
PROJ:		.051								
TIME:	80.00	60.00								
PROJ:		.036								
TIME:	160.00	120.00								
PROJ:		.026								
TIME:	320.00	240.00								
PROJ:		.018								
TIME:	640.00	480.00								
PROJ:		.013								
TIME:	1280.00	960.00								

PROJ: TIME: PROJ:	 2560.00 	.009 1920.00 .006						
Analyt	ical Sens	sitivity	in Eleme	ntal Wei	ght Perce	ent (Aver	age of S	Sample):
ELEM:	Si	Al	Ti	V	Cr	Fe	Mn	Mg
60ci	.089	.009	.013	.002	.008	.024	.003	.015
80ci	.149	.015	.021	.003	.013	.040	.006	.025
90ci	.215	.022	.031	.005	.019	.057	.008	.035
95ci	.290	.030	.041	.006	.025	.078	.011	.048
99ci	.532	.055	.076	.012	.046	.143	.020	.088
ELEM:	Ca	Na						
60ci	.012	.008						
80ci	.021	.014						
90ci	.030	.020						
95ci	.040	.027						
99ci	.074	.050						

The user may obtain a large amount of information besides elemental and oxide weight percent data; these expanded capabilities include formula and mineral end member calculations, an extended set of detection limit and statistics including homogeneity and analytical sensitivity. See the User's Guide and Reference documentation for calculation details.

Digitized Sample Data Collection and Analysis

Next the user will perform a digitized traverse across an unknown pyroxene grain. The user can digitize standards, unknowns or wavescan positions based on random points, linear traverse or rectangular or polygon gridded areas. Check that the *Unknowns* button is clicked.

Standards Unknowns Wavescans All Samples Select Stds Select All Delete All Delete Selected Samples	Digitize Plot Fiducials Peaking Conditions Sample Setups File Setups	 Confirm Standard Positions Confirm Unknown Positions Confirm Wavescan Positions Calibrate Peak Positions Acquire Standard Samples Acquire Unknown Samples Acquire Wavescan Samples Acquire Standard Samples (again Automation Options Calibrate on Assigned Standards Use "Quick" Standards
All Samples Select Stds Select All Delete All Delete Selected Samples Import from A	Fiducials Peaking Conditions Sample Setups File Setups	 Calibrate Peak Positions Acquire Standard Samples Acquire Unknown Samples Acquire Wavescan Samples Acquire Standard Samples (again Acquire Options Calibrate on Assigned Standards Use "Quick" Standards
Select All Delete All Delete Selected Samples Import from A	Peaking Conditions Sample Setups File Setups	 Acquire Standard Samples Acquire Unknown Samples Acquire Wavescan Samples Acquire Standard Samples (again Acquire Options Calibrate on Assigned Standards Use "Quick" Standards
Select All Delete All Delete Selected Samples Import from A	Conditions Sample Setups File Setups	Acquire Unknown Samples Acquire Wavescan Samples Acquire Standard Samples (again Automation Options Calibrate on Assigned Standards Use "Quick" Standards
Select All Delete All Delete Selected Samples Import from A	Sample Setups File Setups	 Acquire Standard Samples (again Automation Options Calibrate on Assigned Standards Use "Quick" Standards
Delete All Delete Selected Samples Import from A	File Setups	 Calibrate on Assigned Standards Use "Quick" Standards
Delete Selected Samples Import from A		Use "Quick" Standards
	ASCII File	
Delete Selected Positions Export Selector w X Y Z	1 1324 05	Use Filament Standby After Use Confirm During Acquisition Use RDM Auto Focus C New Sample C Every Point C Digitized C Interval
		Standard Points To Acquire 4 Automate Confirm Delay (sec) 10 Standard X Increment (um) 10 Re-Standard Y Increment (um) 10
		 Use Last Unknown (or Standard) Use Digitized Sample Conditions Use Digitized Sample Setups Use Digitized File Setups

Click the **Digitize** button in the **Automate!** window.

This opens the **Digitize Sample Positions** dialog box.

Digitize Sample	Positions	
Sample Type C Standard C Unknown C Wavescan	Unknown Samp name and click Wavescan butt position, click	w unknown position, click the e Type option, enter a sample the Create New Unknown or on. To create a new standard the Standard Sample Type select a standard from the Standard List.
Referenced To F	iducial Set: 2, Set NONE	up Number: O and File Setup:
Unknown or Wa	vescan Position S	amples
unknown sampl	e	
Cre	eate New Unknow	n or Wavescan
Standard Position 81 Albite 203 Fayalite 205 Tephroite 206 Orthopyro: 207 Kyanite 210 Wollaston 211 V205	kene	
212 Rutile 222 Ni-Olivine		
222 Ni-Olivine	ment Grain	AutoFocus On
222 Ni-Olivine		AutoFocus On Rectangular Grid

To create an unknown digitized sample click *Unknown* under *Sample Type* and enter a sample name in the *Unknown* or *Wavescan Position Samples* text box. Next, click the **Create New Unknown or Wavescan** button. The unknown sample will now appear in the *Position List* list box of the **Automate!** window.

Digitize Sample	e Positions		
Sample Type — O Standard O Unknown O Wavescan	Unknown Sa name and d Wavescan position, d	new unknown position, click f ample Type option, enter a san click the Create New Unknown button. To create a new stand click the Standard Sample Typ nd select a standard from the Standard List.	or ard
leferenced To F		Setup Number: O and File Set DNE	up:
Unknown or Wa	avescan Positic	n Samples	
Pyroxene Trave	erse		
Cr	eate New Unkr	own or Wayescan	
			_
Standard Positi 81 Albite 203 Fayalite 205 Tephroite 206 Orthopyro 207 Kyanite 210 Wollaston 211 V205 212 Rutile 222 Ni-Olivine	xene iite		•
Standard Positi 81 Albite 203 Fayalite 205 Tephroite 206 Orthopyro 207 Kyanite 210 Wollaston 211 V205 212 Rutile 222 Ni-Olivine	xene iite	AutoFocus Dn	•
Standard Positi 81 Albite 203 Fayalite 205 Tephroite 206 Orthopyro 207 Kyanite 210 Wollaston 211 V205 212 Rutile 222 Ni-Olivine	xene iite ment Grain		*

Finally, click the **Linear Traverse** button to create a traverse of digitized points. Other options are rectangular and polygon grids.

The Linear Traverse Parameters dialog box opens.

Enter Stage Coord	inales rui 11av	reise End Foints	
X Start Position	10.7353	X Stop Position	10.7353
Y Start Position	35.5725	Y Stop Position	35.5725
Z Start Position	11.1038	Z Stop Position	11.1038
Update Start		Update Stop	
Total Distance	.000000	Distance in Microns	.000000
Traverse Interpola • Use Number Of			ОК
	n Microns Per	Step	Cancel
O Use Step Size	in microns i ci	C100/08/00	
		0	<u>.</u>
Number Of Points			<u></u>
○ Use Step Size Number Of Points Step Size in Micro Fractional Steps R	ns	0	J

Move to the start position of the linear traverse, click the **Update Start** button. Move to the stop position and click the **Update Stop** button. The total distance is displayed.

Select the Use Number of Points Per Traverse or Use Step Size in Microns Per Step button and adjust the text boxes appropriately.

Enter Stage Coord		-	-
X Start Position	10.4366	X Stop Position	10.7772
Y Start Position	35.6145	Y Stop Position	35.6145
Z Start Position	11.1077	Z Stop Position	11.1054
Update Start		Update Stop	
Total Distance	.340608	Distance in Micron	\$ 340.608
Traverse Interpola	ite Position Opt	ions	ок
Use Number Of	Points Per Tra	verse	
O Use Step Size	In Microns Per	Step	Cancel
		28	
Number Of Points			
	ns	15.4822	
Number Of Points Step Size in Micro Fractional Steps R		15.4822	

Click the **OK** button returning to the **Automate!** window.

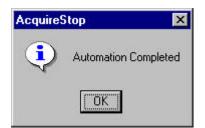
Now all of the calculated analysis positions have been digitized and listed. Under Automation Actions click the Acquire Unknown Samples button.

Positio	n List (multi-s			1999 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 -		Move	Automation Actions
	ndards Ur knowns	1 Fid 2	Pyroxene T	raverse)igitize	Confirm Standard Positions
1000	vescans Samples					Plot	Confirm Wavescan Positions
					Fi	iducials	Acquire Standard Samples
Selec	ct Stds				P	eaking	Acquire Unknown Samples
Sele	ect All					nditions	Acquire Standard Samples (again
ć.					Sam	ple Setups	Automation Options
Dele	ete All				File	e Setups	Calibrate on Assigned Standards
							Use "Quick" Standards
D	elete Selecte	d Samples	l l	Import fro	m ASCII F	File	Use Filament Standby After
1.00.01	elete Selecte elete Selecte			Import fro Export Sele	1 22 72270	325	Use Confirm During Acquisition
0.0.0	Vertein Mattern VAN		z	Export Sele	1 22 72270	325	Use Confirm During Acquisition Use RDM Auto Focus C New Sample C Every Point
De	elete Selecter	I Positions	Z 11.1065	Export Sele	ected San	ples	Use Confirm During Acquisition Use ROM Auto Focus C New Sample C Every Point C Digitized C Interval
De low 12	elete Selecter	I Positions		Export Sele	ected San Grain #	ples Focus 🔺	Use Confirm During Acquisition Use RDM Auto Focus C New Sample C Every Point
De low 12 13 14	× 10.6069 10.6224 10.6379	Positions Y 35.6145 35.6145 35.6145	11.1065 11.1064 11.1063	Export Sele W 2.999987 2.999987 2.999987	ected Sam Grain # 1	Focus 0 0 0 0 0 0	□ Use Confirm During Acquisition □ Use ROM Auto Focus ○ New Sample C Every Point ○ Digitized C Interval Standard Points To Acquire 4
De low 12 13 14 15	X 10.6069 10.6224 10.6379 10.6533	Positions Y 35.6145 35.6145 35.6145 35.6145 35.6145	11.1065 11.1064 11.1063 11.1062	Export Sele 2.999987 2.999987 2.999987 2.999987 2.999987	ected Sarr Grain # 1 1 1 1	Pocus ▲ 0 0 0 0 0	Use Confirm During Acquisition Use ROM Auto Focus New Sample C Every Point Digitized C Interval Standard Points To Acquire 4 Automate Confirm Delay (sec) 10
De low 12 13 14 15 16	X 10.6069 10.6224 10.6379 10.6533 10.6588	Y 35.6145 35.6145 35.6145 35.6145 35.6145 35.6145	11.1065 11.1064 11.1063 11.1062 11.1061	Export Sele 2.999987 2.999987 2.999987 2.999987 2.999987 2.999987	ected San Grain # 1 1 1 1 1 1	Focus Focus O O O O O O O O O O O O O O O O O O O	□ Use Confirm During Acquisition □ Use ROM Auto Focus ○ New Sample C Every Point ○ Digitized C Interval Standard Points To Acquire 4
De low 12 13 14 15 16 17	X 10.6069 10.6224 10.6379 10.6533 10.6583 10.6688 10.6843	Y 35.6145 35.6145 35.6145 35.6145 35.6145 35.6145 35.6145	11.1065 11.1064 11.1063 11.1062 11.1061 11.1060	Export Sele 2.999987 2.999987 2.999987 2.999987 2.999987 2.999987 2.999987	ected Sam Grain # 1 1 1 1 1 1 1	Focus Focus O O O O O O O O O O O O O O O O O O O	Use Confirm During Acquisition Use ROM Auto Focus C New Sample C Every Point C Digitized C Interval Standard Points To Acquire 4 Automate Confirm Delay (sec) 10 Standard X Increment (um) 10
De low 12 13 14 15 16 17 18	X 10.6069 10.6224 10.6379 10.6533 10.6583 10.6688 10.6988	Y 35.6145 35.6145 35.6145 35.6145 35.6145 35.6145 35.6145	11.1065 11.1064 11.1063 11.1062 11.1061 11.1060 11.1059	Export Sele 2.999987 2.999987 2.999987 2.999987 2.999987 2.999987 2.999987 2.999987 2.999987	ected Sam Grain # 1 1 1 1 1 1 1 1 1	Pocus ▲ 0 0 0 0 0 0 0 0 0 0	Use Confirm During Acquisition Use ROM Auto Focus New Sample C Every Point Digitized C Interval Standard Points To Acquire 4 Automate Confirm Delay (sec) 10
De low 12 13 14 15 16 17 18 19	X 10.6069 10.6224 10.6379 10.6533 10.6688 10.6988 10.6998 10.7153	Y 35.6145 35.6145 35.6145 35.6145 35.6145 35.6145 35.6145 35.6145	11.1065 11.1064 11.1063 11.1062 11.1061 11.1060 11.1059 11.1058	Export Sele 2.999987 2.999987 2.999987 2.999987 2.999987 2.999987 2.999987 2.999987 2.999987 2.999987	ected Sam 1 1 1 1 1 1 1 1 1 1 1 1 1	Pocus ▲ 0 0 0 0 0 0 0 0 0 0 0 0	Use Confirm During Acquisition Use ROM Auto Focus C New Sample C Every Point C Digitized C Interval Standard Points To Acquire 4 Automate Confirm Delay (sec) 10 Standard X Increment (um) 10 Re-Standard Y Increment (um) 10
De ow 2 3 4 5 6 7 8 9 20	X 10.6069 10.6224 10.6533 10.6533 10.6688 10.6988 10.7153 10.7308	Y 35.6145 35.6145 35.6145 35.6145 35.6145 35.6145 35.6145 35.6145 35.6145	11.1065 11.1064 11.1063 11.1062 11.1061 11.1060 11.1059 11.1058 11.1057	Export Sele 2.999987 2.999987 2.999987 2.999987 2.999987 2.999987 2.999987 2.999987 2.999987 2.999987 2.999987 2.999987	ected Sam Grain # 1 1 1 1 1 1 1 1 1 1 1 1 1	Pples Focus ▲ 0 0 0 0 0 0 0 0 0 0 0 0 0	Use Confirm During Acquisition Use ROM Auto Focus C New Sample C Every Point C Digitized C Interval Standard Points To Acquire 4 Automate Confirm Delay (sec) 10 Standard X Increment (um) 10 Re-Standard Y Increment (um) 10 © Use Last Unknown (or Standard)
De low 12 13 14 15 16 17 18 19 20 21	X 10.6069 10.6224 10.6379 10.6533 10.6688 10.6843 10.6998 10.7153 10.7308 10.7462	Y 35.6145 35.6145 35.6145 35.6145 35.6145 35.6145 35.6145 35.6145 35.6145 35.6145	11.1065 11.1064 11.1063 11.1062 11.1061 11.1060 11.1059 11.1058 11.1057 11.1057	Export Sele 2.999987 2.999987 2.999987 2.999987 2.999987 2.999987 2.999987 2.999987 2.999987 2.999987 2.999987 2.999987 2.999987	ected Sam Grain # 1 1 1 1 1 1 1 1 1 1 1 1 1	Pples Focus ▲ 0 0 0 0 0 0 0 0 0 0 0 0 0	Use Confirm During Acquisition Use ROM Auto Focus C New Sample C Every Point C Digitized C Interval Standard Points To Acquire 4 Automate Confirm Delay (sec) 10 Standard X Increment (um) 10 Re-Standard Y Increment (um) 10
De low 12 13 14 15 16 17 18 19 20	X 10.6069 10.6224 10.6533 10.6533 10.6688 10.6988 10.7153 10.7308	Y 35.6145 35.6145 35.6145 35.6145 35.6145 35.6145 35.6145 35.6145 35.6145	11.1065 11.1064 11.1063 11.1062 11.1061 11.1060 11.1059 11.1058 11.1057	Export Sele 2.999987 2.999987 2.999987 2.999987 2.999987 2.999987 2.999987 2.999987 2.999987 2.999987 2.999987 2.999987	ected Sam Grain # 1 1 1 1 1 1 1 1 1 1 1 1 1	Pples Focus ▲ 0 0 0 0 0 0 0 0 0 0 0 0 0	Use Confirm During Acquisition Use ROM Auto Focus C New Sample C Every Point C Digitized C Interval Standard Points To Acquire 4 Automate Confirm Delay (sec) 10 Standard X Increment (um) 10 Re-Standard Y Increment (um) 10 © Use Last Unknown (or Standard) C Use Digitized Sample Conditions

Click **Run Selected Samples** button to initiate the traverse. The **AutomateConfirmSelected** window opens, click **Yes**.

Automat	eConfirmSelected 🛛 🕅
?	Number of Standard Position Samples: 0 Number of Unknown Position Samples: 1 Number of Wavescan Position Samples: 0
	Elapsed Time for Last Analysis: 188 seconds Are you sure you want to run these automated samples?

When the traverse is completed the familiar **AcquireStop** window appears. Click the **OK** button returning the user to the **Automate!** dialog box.



To analyze the data obtained from the traverse, the user opens the **Analyze!** window and selects the Un + 4 *Pyroxene Traverse* unknown sample in the *Sample List*.

Analyze!					_ 🗆 ×
Sample List (multi-select)	(double-click to see inten	sity data)	Analyze	Data	KRaws
C Standards Un 1 ⊙ Unknowns Un 2	* setup Pyroxene #164		Analyze Selecte	d Line(s)	>>Excel
C Waynessans Un 3	Pyroxene #164		Pause Betweer	1 Samples	
C All Samples	Pyroxene Traverse		Delete Sele	cted Samp	le(s)
Select All			Undelete Sel	ected Sam	ple(s)
Specified Concentrations	Standard Assignments	Name/Descriptio	on Conditions	Element	s/Cations
		Total Weig Calculated Atomic We	l Oxygen 🗍		l Oxygen ss Oxygen ar
Сору					
	· · · · · ·				
<pre></pre>					P
Delete Selected Line(s)	Undelete Selected Lin	e(s) List F	Report (Calculation	Options
Сору					
•					Þ

Again, save the log window output to the text editor. Click the **Analyze** button to calculate compositions and finally view the disk log in the text editor. A portion is shown below.

Un 4 Pyroxene Traverse

TakeOff = 40 KiloVolts = 15 Beam Current = 40 Beam Size = 2

Traverse across grain Number of Lines: 23 Number of 'Good' Lines: 23 Current Date and Time: 3/2/99 7:49:52 PM									
Average Average Average	Calcu. Atomic ZAF It	% Total: Oxygen: Weight: eration: ted by Ca	21.738 3.00	Aver Aver Aver	erage Tot age Exce age Atom age MAN cry and I	ss Oxyge ic Numbe Iteratic	n: r: 12 n: 4	.828 .000 .377 4.00 Matrix Co	prrection
Results	in Ele	mental We	ight Per	cents					
SPEC: TYPE:	0 CALC								
AVER: SDEV:	43.828 .109								
ELEM: BGDS: ABS%: TIME:	Si MAN -20.88 10.00	MAN -28.28	Ti MAN -3.15 30.00	V MAN -2.06 30.00	Cr MAN -1.43 30.00	Fe MAN 53 30.00	Mn MAN 83 30.00	Mg MAN -32.28 20.00	
ELEM: 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80	Si 23.353 23.482 23.441 23.407 23.366 23.555 23.473 23.356 23.286 23.446 23.312 23.447 23.456 23.282 23.546 23.546 23.564 23.564 23.560 23.624 23.560 23.624 23.400 23.553 23.410 23.450	4.003 4.013 3.999 3.981 3.997 3.961 3.981 4.015 4.021 3.987 4.026 4.012 4.025 4.009 3.992 4.004 3.974 4.016 3.985 4.012	Ti .283 .292 .345 .282 .301 .300 .308 .299 .316 .287 .272 .337 .287 .265 .282 .299 .309 .295 .272 .280 .295 .272 .280 .284 .284 .287	V .019 .020 .010 .026 .019 .009 .015 .027 .021 .026 .029 .026 .029 .025 .021 .015 .014 .015 .026 .004 .025 .021	Cr .594 .607 .614 .616 .602 .626 .593 .598 .588 .588 .588 .583 .585 .590 .602 .573 .576 .612 .590 .625 .613 .590 .620	Fe 3.728 3.668 3.625 3.623 3.598 3.705 3.701 3.707 3.618 3.688 3.644 3.627 3.680 3.643 3.679 3.590 3.624 3.640 3.630 3.640 3.630 3.692 3.688 3.670 3.644	Mn .093 .102 .111 .102 .069 .098 .110 .099 .083 .095 .088 .095 .088 .102 .094 .094 .094 .094 .094 .087 .084 .096 .094 .100 .088 .107 .101	$10.347 \\ 10.316 \\ 10.362 \\ 10.315 \\ 10.373 \\ 10.374 \\ 10.398 \\ 10.345 \\ 10.324 \\ 10.299 \\ 10.276 \\ 10.376 \\ 10.308 \\ 10.353 \\ 10.311 \\ 10.297 \\ 10.315 \\ 10.331 \\ 10.337 \\ 1$	99.545 99.385 99.211 99.241 99.613 99.439 99.316 99.059 99.360 98.900 99.576 99.352 98.987 99.598 99.446 99.305 99.637 99.739
AVER: SDEV: SERR: %RSD: STDS:	23.448 .093 .019 .4 206	.004	.293 .020 .004 6.8 212	.019 .008 .002 42.0 211	.600 .017 .004 2.9 224	3.657 .038 .008 1.0 203	.095 .010 .002 10.0 205	10.329 .033 .007 .3 206	99.372
STKF: STCT:	.2112 4872.5	.2706 23252.8	.5519 1851.9	.5083 2467.5	.6408 4164.4	.4982 4400.5	.4894 3826.7	.1774 12205.5	
UNKF: UNCT: UNBG:	.1831 4223.6 7.1	2398.0	.0025 8.2 2.2	.0002 .8 4.1	.0051 33.0 6.3	.0307 271.3 12.8	.0008 6.2 9.0		
ZCOR: KRAW:	1.2808 .8668	1.4337 .1031	1.1940 .0045	1.2089 .0003	1.1797 .0079	1.1909 .0616	1.2113 .0016	1.4793 .3937	

PKBG: INT%:	598.50 .00		4.68			116.59 .00
ELEM: BGDS: ABS%: TIME:	Ca MAN -3.21 20.00	Na MAN -46.92 30.00				
ELEM: 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80	Ca 12.369 12.512 12.404 12.476 12.504 12.410 12.360 12.453 12.499 12.480 12.420 12.513 12.445 12.445 12.445 12.445 12.469 12.469 12.469 12.469 12.535 12.458 12.458 12.458	Na .638 .628 .629 .649 .628 .636 .650 .638 .632 .646 .649 .627 .647 .630 .657 .621 .633 .631 .618 .628 .631 .644	SUM 99.132 99.545 99.385 99.211 99.241 99.613 99.316 99.059 99.360 99.576 99.352 98.987 99.598 99.446 99.305 99.637 99.637 99.503 99.503 99.597 99.243 99.368			
AVER: SDEV: SERR: %RSD: STDS:	12.465 .049 .010 .4 210	.636 .010 .002 1.6 81	99.372			
STKF: STCT:	.3205 11337.2	.0500 2170.0				
UNKF: UNCT: UNBG:	.1147 4058.2 35.5	.0033 143.0 19.2				
ZCOR: KRAW: PKBG: INT%:	1.0865 .3580 115.18 .00	1.9321 .0659 8.44 .00				

Results in Oxide Weight Percents

SPEC:	0
TYPE:	CALC

AVER:	.000
SDEV:	.000

ELEM:	SiO2	A1203	TiO2	V203	Cr203	FeO	MnO	MgO	SUM
58	49.960	7.564	.472	.028	.868	4.796	.120	17.158	99.132
59	50.237	7.583	.486	.030	.887	4.719	.132	17.107	99.545
60	50.149	7.556	.575	.015	.898	4.664	.143	17.183	99.385
61	50.076	7.522	.471	.039	.900	4.661	.132	17.106	99.211
62	49.989	7.552	.502	.029	.880	4.629	.089	17.201	99.241
63	50.392	7.484	.500	.014	.915	4.767	.126	17.203	99.613
64	50.217	7.521	.514	.022	.867	4.761	.142	17.242	99.439
65	49.967	7.585	.498	.039	.874	4.768	.128	17.155	99.316
66	49.816	7.597	.528	.030	.856	4.654	.108	17.120	99.059
67	50.160	7.534	.478	.009	.918	4.745	.123	17.078	99.360
68	49.874	7.607	.453	.043	.830	4.688	.113	17.041	98.900
69	50.162	7.580	.562	.038	.851	4.667	.126	17.207	99.576
70	50.180	7.606	.478	.013	.854	4.735	.132	17.095	99.352
71	49.809	7.575	.443	.037	.862	4.686	.121	17.169	98.987
72	50.373	7.542	.470	.030	.879	4.733	.121	17.099	99.598
73	50.412	7.565	.498	.023	.838	4.618	.112	17.076	99.446
74	50.258	7.509	.516	.021	.842	4.663	.108	17.105	99.305
75	50.403	7.589	.492	.022	.895	4.683	.124	17.133	99.637
76	50.539	7.529	.454	.038	.862	4.670	.121	17.142	99.739
77	50.146	7.580	.468	.006	.913	4.749	.129	17.140	99.503
78	50.388	7.598	.474	.021	.896	4.745	.114	17.086	99.597
79	50.082	7.591	.449	.046	.863	4.722	.139	17.064	99.243
80	50.168	7.498	.479	.043	.906	4.688	.131	17.054	99.368
AVER:	50.163	7.560	.490	.028	.876	4.705	.123	17.129	99.372
SDEV:	.200	.036	.033	.028	.026	.049	.123	.054	99.314
SERR:	.200	.007	.005	.012	.020	.010	.012	.011	
%RSD:	.042	.007	6.8	42.0	2.9	1.0	10.0	.011	
• 1010	. 7	. 5	0.0	72.0	2.9	1.0	10.0	. 5	
ELEM:	Ca0	Na2O	SUM						

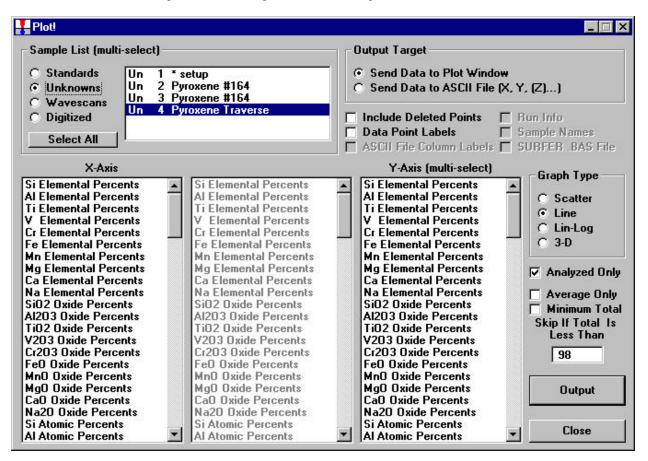
ELEM:	CaO	Na2O	SUM
58	17.306	.860	99.132
59	17.506	.857	99.545
60	17.356	.847	99.385
61	17.457	.848	99.211
62	17.495	.875	99.241
63	17.365	.846	99.613
б4	17.295	.857	99.439
65	17.425	.876	99.316
66	17.489	.860	99.059
67	17.462	.852	99.360
68	17.379	.871	98.900
69	17.508	.875	99.576
70	17.413	.845	99.352
71	17.413	.872	98.987
72	17.499	.850	99.598
73	17.418	.886	99.446
74	17.447	.837	99.305
75	17.443	.853	99.637
76	17.532	.851	99.739
77	17.539	.833	99.503
78	17.431	.847	99.597
79	17.436	.851	99.243
80	17.535	.867	99.368

AVER: SDEV: SERR: %RSD: Results	17.441 .069 .014 .4 Based on	.857 .014 .003 1.6 6 Atom	99.372 s of o						
SPEC: TYPE:	0 CALC								
AVER: SDEV:	6.000 .000								
ELEM: 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80	Si 1.826 1.828 1.827 1.829 1.825 1.829 1.824 1.823 1.829 1.824 1.823 1.829 1.827 1.825 1.829 1.824 1.832 1.834 1.832 1.831 1.834 1.832 1.832 1.832 1.832	Al .326 .325 .324 .325 .321 .323 .326 .328 .324 .328 .327 .327 .327 .327 .323 .324 .323 .324 .325 .322 .325 .326 .327 .322	Ti .013 .013 .016 .013 .014 .014 .014 .014 .014 .015 .013 .012 .015 .013 .012 .013 .012 .013 .014 .014 .013 .012 .013 .012 .013	V .001 .001 .001 .001 .001 .001 .001 .00	Cr .025 .026 .026 .025 .025 .025 .025 .025 .025 .025 .024 .024 .024 .025 .025 .025 .025 .025 .025 .025 .024 .026 .026 .026 .026 .026	Fe .147 .144 .142 .142 .141 .145 .145 .145 .146 .142 .145 .144 .144 .144 .144 .142 .142 .142 .142	$\begin{array}{c} Mn \\ . 004 \\ . 004 \\ . 004 \\ . 003 \\ . 004 \\ . 004 \\ . 004 \\ . 004 \\ . 004 \\ . 004 \\ . 004 \\ . 004 \\ . 004 \\ . 004 \\ . 004 \\ . 004 \\ . 004 \\ . 004 \\ . 004 \\ . 004 \end{array}$	Mg .935 .928 .933 .931 .936 .932 .936 .934 .934 .934 .933 .929 .937 .927 .926 .930 .928 .928 .928 .928 .928 .928 .928 .929 .927	SUM 10.015 10.013 10.011 10.013 10.017 10.010 10.013 10.017 10.017 10.012 10.015 10.015 10.015 10.015 10.015 10.011 10.009 10.010 10.009 10.014 10.009 10.013 10.013
AVER: SDEV: SERR: %RSD:	1.829 .003 .001 .2	.325 .002 .000 .6	.013 .001 .000 6.7	.001 .000 .000 42.1	.025 .001 .000 2.9	.143 .002 .000 1.0	.004 .000 .000 9.9	.931 .003 .001 .4	10.013
ELEM: 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77	Ca .678 .683 .678 .683 .684 .676 .675 .681 .686 .682 .682 .683 .683 .683 .682 .679 .681 .679 .681 .679 .682 .684	Na .061 .060 .060 .062 .060 .061 .062 .062 .062 .062 .062 .062 .062 .062	SUM 10.015 10.013 10.011 10.013 10.017 10.010 10.013 10.017 10.012 10.015 10.015 10.015 10.015 10.015 10.011 10.009 10.010 10.009 10.014						

78	.679	.060	10.013
79	.682	.060	
80	.685	.061	
AVER: SDEV: SERR: %RSD: Pyroxene	.681 .003 .001 .4 Mineral	.061 .001 .000 1.7 End-Me	10.013 mber Calculations
58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80	Wo 38.5 38.9 38.7 38.9 38.8 38.6 38.4 38.7 38.9 38.9 38.8 38.8 38.8 38.8 38.7 38.9 38.9 38.9 38.9 38.9 38.9 38.9 38.9	En 53.1 52.9 53.2 53.0 53.1 53.2 53.3 53.0 53.0 53.0 53.0 53.1 53.0 53.1 53.0 53.1 53.0 53.1 53.0 53.1 53.0 53.1 53.0 53.2 53.2 53.2 53.2 53.2 53.2 53.2 53.2	Fs 8.3 8.2 8.1 8.1 8.0 8.3 8.3 8.3 8.3 8.3 8.3 8.3 8.1 8.2 8.1 8.2 8.1 8.2 8.1 8.2 8.1 8.1 8.1 8.1 8.2 8.1 8.1 8.1 8.1 8.1 8.1 8.1 8.1 8.1 8.1
AVER:	38.8	53.0	8.2
SDEV:	.1	.1	.1

Plotting Analysis Data

The use may wish to examine the traverse data in a graphical presentation. Click the **Plot!** button in the main **PROBE FOR WINDOWS** log window. This opens the **Plot!** dialog box.

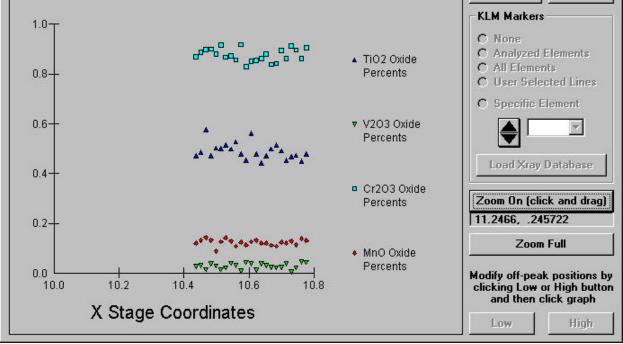


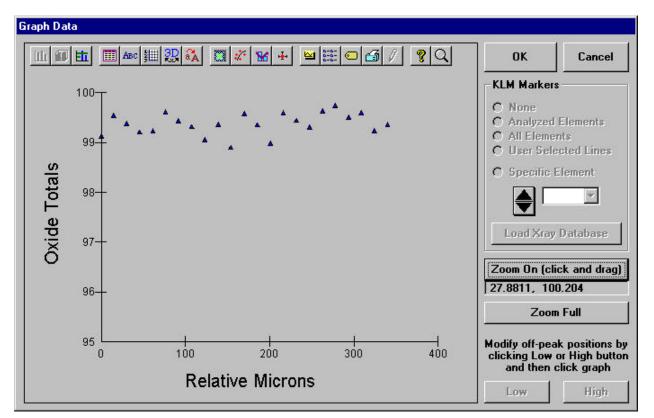
First, choose the pertinent samples from the *Sample List* list box. Select the required *X*-Axis, *Y*-Axis (and *Z*-Axis) items from the axis lists. Choose a *Graph Type* and the button *Send Data to Plot Window*. Finally, click the **Output** button.

Sample List (multi-select)		Output Target	
Unknowns Un 2 Un 3	* setup Pyroxene #164 Pyroxene #164	 Send Data to Plot Window Send Data to ASCII File (X) 	. Y, (Z))
C Digitized	Pyroxene Traverse		Run Info Sample Names SURFER .BAS File
X-Axis		Y-Axis (multi-select)	- Graph Tupo
Mg Formula Atoms Ca Formula Atoms Na Formula Atoms Elemental Totals Oxide Totals Atomic Totals Formula Totals Line Numbers On Beam Current Ab Beam Current DateTime Elapsed Hours X Stage Coordinates Z Stage Coordinates W Stage Coordinates	 Si Elemental Percents Al Elemental Percents Ti Elemental Percents V Elemental Percents Cr Elemental Percents Fe Elemental Percents Mn Elemental Percents Na Elemental Percents SiO2 Oxide Percents Al2O3 Oxide Percents TiO2 Oxide Percents Cr2O3 Oxide Percents Cr2O3 Oxide Percents Fe O Oxide Percents 	Si Elemental Percents Al Elemental Percents Ti Elemental Percents V Elemental Percents Cr Elemental Percents Fe Elemental Percents Mn Elemental Percents Ma Elemental Percents Ca Elemental Percents Na Elemental Percents SiO2 Oxide Percents SiO2 Oxide Percents V203 Oxide Percents Cr203 Oxide Percents Fe0 Oxide Percents	Graph Type Graph
Relative Microns Si Raw K-Ratios Al Raw K-Ratios Fi Raw K-Ratios	MnO Oxide Percents MgO Oxide Percents CaO Oxide Percents Na20 Oxide Percents	MnO Oxide Percents MgO Oxide Percents CaO Oxide Percents Na2O Oxide Percents	Output
/ Raw K-Ratios Cr Raw K-Ratios	Si Atomic Percents Al Atomic Percents	Si Atomic Percents	- Close

Percents for the Y-Axis. This graph is displayed below. Furthermore, the weight percent concentration of any point may be read directly off the plot using the two-way **Hot Hit On/Zoom On** button.

Here the user selects the X-Stage Coordinates for the X-Axis and multi-selects the TiO₂, V_2O_3 , Cr_2O_3 and MnO Oxide





Another graph of interest is *Relative Microns* (traverse steps) versus Oxide Totals.

Closing the Current Run and Probe for Windows

The user ends the analysis session from the main PROBE FOR WINDOWS log window. Select **File** from the menu bar and click **Close** from the menu selections.

Probe For Windows [E:\Probe Operators\Manual Files\pyro	ene01.mdb]	_ 🗆 ×
<u>File E</u> dit <u>S</u> tandard <u>X</u> ray <u>A</u> nalytical <u>R</u> un <u>O</u> utput <u>H</u> elp	· · · · · · · · · · · · · · · · · · ·	
New	Automate!	Plot!
Open Save <u>A</u> s		•
Close		
Eind File		
File Information Compact		
<u>P</u> rint Log Print Set <u>u</u> p		
Egit		
E:\Probe Operators\Manual Files\pyroxene01.mdb E:\Probe Operators\Manual Files\brass01.MD8 E:\Probe Operators\UNIVERSITY_CLIENTS\Plank\tpglas01.MD8 E:\Probe Operators\UNIVERSITY_CLIENTS\Plank\tpfeld01.MD8		

This opens the **ProbFormCloseFile** window, click **Yes** to close this file.

ProbForm	nCloseFile 🔀
?	Are you sure you want to close the current Probe for Windows file E:\Probe Operators\Manual Files\pyroxene01.mdb?
	<u>Yes</u> <u>N</u> o

Close PROBE FOR WINDOWS by selecting File from the menu bar and clicking Exit.

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