Probe for EPMA Quick Start Instructions

Setting up a New Run for Quantitative Acquisition

This guide is intended as a quick start and just covers the basic steps for creating a new Probe for EPMA run. Please see the Getting Started and Advanced Topics manuals for more details and step by step instructions. On-line context sensitive help is available by simply hitting the F1 key. For menu help, select the menu and then hit the F1 key.

1. Open Probewin.exe (Probe for EPMA) by double-clicking on the Probewin.exe icon shortcut.



2. When prompted "Do you want to interface to the microprobe" click "Yes". For off-line data processing click "No".



- 3. Create a new probe run by selecting the File | New menu.
- 4. In the C:\UserData folder enter a filename that describes your EPMA activity for this session and browse/create a folder that will allow you to locate your data subsequently.



For example if your name is Joe Smith and you are characterizing Al-Ti alloys and the date is 12-08-2009 you might create a probe run file with the following path: C:\UserData\Smith\12-2009\Al-Ti_12-08-2009.MDB.

Once you enter a filename the program will prompt you with a user information dialog. You should edit the user name and sample identification and if necessary the account number and other information fields which are automatically saved to the USER.MDB user database.

File Information		
File Name	C:\UserData\Smith\12-2009\AI-Ti_12-08-2009.MDB	
Version	8.31 Type PROBE	OK
User	Joe Smith	
Title	Al-Ti alloys	ancei
Department	Analytical Chemistry	
Account #	4532343-3 Project Microscopy	
Description	Experimental run #23 products	A
Date Created	12/6/2009 2:39:53 PM Date Modified 12/6/2009 2:39:5	3 PM
Last Updated	12/6/2009 2:39:53 PM	

Note: the User database can be subsequently browsed using the Userwin.exe application for reporting, re-charge and/or accounting purposes.

5. Next, open the 'Acquire!' window by clicking the 'Acquire!' button in the Probewin Log window.



6. In the 'Acquire!' window click the 'New Sample' button to create a new sample template for your analyses. See "Creating a New Run" in the Getting Started Manual for more details.

Acquire!											_ 🗆 X
SP1	SP2	SP3	SP4	SP5	x	Y		z	- P	roaress/Bea	am Deflection
157.200	157.200	161.700	157.200	157.200	50.3500	50.5000	9.2000	0			
1-PET	2-PETH	3-LIFH	4-TAP	5-LiF		Faraday			_		
.00	.00	.00	.00	.00		.00			-		
· ·			•			.000000				÷	•
Current Sa	nple:					Start Stan	dard or l Start W	Jnknown Acquisition /avescan	um	50.3500 .000000 0	50.5000 .000000 0
New	Sample		PHA			Move		Stage	Magn	ification	3200
Element	s/Cations	Pe	ak/Scan (Options	Acquis	ition Optic	ins	Imaging	Kilov	olts	15
Analytica	Conditio	ns	Count Ti	nes	Spec	ial Option	s	Peaking Options	Beam	Current	30
Combined	Conditio	ns	Locate	•	Ra	ate Meter		Start Peaking	Acqu	ire String	

- 7. From this 'New Sample' dialog you can:
 - Create a blank sample (just click OK).

• Or select previously saved individual element setups from the SETUP.MDB element setup database (previously saved from the 'Analyze!' window, 'Add To Setups' button) using the 'Load Element Setups' button.

• Or select a previously saved sample setup from within the current probe run (not available until a sample setup has been saved from the 'Analyze!' window, 'Save Setups' button) using the 'Load Sample Setup' button.

• Or load a sample setup from a previous probe run using the 'Load File Setup' button.

New Sample								
New Sample Type	OK	Cancel						
• Unknown	Load Elen	ent Setup						
C Wavescan	Load Sam	ple Setup						
	Load Fi	le Setup						
Add/Remove Standards	Load Mult	iple Setup						
Load Wavescan Fr	om Another F	Probe Run						
New Sample Description		Add <cr></cr>						
		A lateral late						
		-						
To add standards to the standard list below, cancel this dialog, then click the Standard Add Standards to Run menu item from the main menu.								

8. If creating a blank sample, one may then use the 'Move' window to select appropriate spectrometers, crystals, and also elements and x-ray lines to move to using the drop down crystal lists and also the colored periodic table buttons. This would be the case when creating a new run "from scratch".



Once the first N elements are selected, click the 'Go Spectros' button to move the spectrometers to the nominal peak positions for the selected elements. The program will move spectrometers, flipping any crystals that are necessary.

Move Motors and	Change Crysta	als!			1		
Stage Target X E08500 Z 9.20000 Jog St Use Stage	Positions Y 50.5000	Increment 100 Park Stage	Z Axis Adju	st ement .0010 sitions ear	Go All Positio Au Excha Filam	Go Spectros ns Stage ito Focus ange Sample ent Standby Close	
Spectrometer	l arget Positior	is (Load Element)	Setups From A	cquire Elen	nents/L	ations Buttonj	
PET V	PETH T	SP3	5P4	LiE	.		
88.0076	80.1688	159.311	90.9079	134.728	-1	<u> </u>	
Ti ka C	V ka C	Cr ka	Al ka	Fe ka	Spectr	6 C	

At this point one could use the 'Peaking' and 'PHA' buttons (see graphic buttons next to the tiny periodic table buttons) in the 'Move' window to manually peak the spectrometers (on appropriate standards), but it is probably better to immediately click the 'Acquire!' window, 'Elements/Cations' button and read in the nominal spectrometer element setups from the Move window using the colored element/x-ray line buttons as shown below.

elected S	amples	ole			OK	Cancel
011 1 1	anknown som	940			Load El	ment Setup
					Load Sa	mple Setup
					Add/Remo	ve Standards
					Reload Stand	lard Assignments
						in from MODE minds
					i V Cr	AI Fe
					and the second second	
					a ka ka	ka ka
lick Eleme	ant Row to Ex	dit Element/C	ations Parame	ters (click en	ta ka ka	ka ka
lick Eleme	Element	dit Element/C X-Ray	ations Parame	ters (click en	co ka ka	Id) On-Peak
lick Eleme Channel	Element	dit Element/C X-Ray ka	ations Parame Acquired Yes	ters (click en Spectro 1	Crystal PET	ka ka ki On-Peak 89.0076
Tick Eleme	ent Row to Ed	dit Element/C X-Ray ka	ations Parame Acquired Yes	ters (click en Spectro 1	Crystal PET	On-Peak 88.0076
lick Eleme	Element	dit Element/C X-Ray ka	Acquired Yes	ters (click endowed and the second se	Crystal PET	di ka ka Jdj 0n-Peak 88.0076
Tick Eleme	Element	dit Element/C X-Ray Ka	Acquired Yes	ters (click en Spectro 1	cov to an Crystal PET	ka ka kij On-Peak 89.0076
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Click Elome	Element	dit Element/C X-Ray ka	ations Parame Acquired Yes	ters (click en Spectro 1	Crystal PET	ka ka ddj 0n-Peak 89.0076
Click Eleme	Element Ui	dit Element/C X-Ray ka	Actions Parameter Acquired Yes	ters (click en	Crystal PET	Idj 0n-Peak 89.0076
Channel	Element Li	dit Element/C X-Ray ka	Acquired Acquired Yes	Spectro 1	Crystal PET	ka ka ka kd) 0n-Peak 88.0076
Channel	Element Li	dit Element/C X-Ray ka	Acquired Acquired Yes	Spectro 1	Crystal PET	ka ka ka kij 0n-Peak 98.0076
Channel	Element Di	ka	Acquired Acquired Yes	ters [click em	Crystal PET	ka ka ka kdj 0n-Peak 88.0076

Repeat step 8 for additional elements on the various spectrometers. Later one can use the manual or automated peaking and PHA acquisition from the 'Acquire!' or 'Automate!' windows to optimize the spectrometer Bragg angle and PHA settings.

9. However, if the 'Acquire!' window, 'New Sample' button, 'Load Element Setups' or 'Load File Setup' buttons were utilized in step 7 above, then the user has already loaded previously saved element or sample setups to obtain optimized spectrometer settings (though it might still be a good idea to re-peak the spectrometers and check the PHA settings as described in the following steps).

	Umont Setup Database Cornol Sample: Un 1 - unknown sample Da Spectro 1 FEL (68.0000 V La Spectro 2 FETH (100.16) c La Spectro 3 JUHI (153.3) d ka Spectro 5 LE (134.20)	Electrical State Data From NUP MOB Database Edit data State Electrical St	Load File Setup - C:VLreeD at a Smith 12:2009 Al TL 12:05:2003 MDD 12/6/2009 3:11:04 PM	Change Folder
\langle	Colling clock Analyzed Element status see Element Setuor c c Add to Sample Delete All Elements From Sample Add To Database >>	Date Tiz/C/2009 3:10:36 FM Posle Data FM EV.sen2back/sex11/2.2009/AJ-Ti_12:4 nn/Hi/Lo Pas 90:3073 Jod Type/Ditted FM Jod Type/Ditted FFF Still/Loft Space FF Bace/Min/Dian/B FF Bace/Min/Dian/B FF Bace/Min/Dian/B FF State/Difference FF Bace/Min/Dian/B FF State/Difference FF Bace/Min/Dian/B FF State/Difference FF	Des Smith Al-T i alloys Un 2 unknown sample	OK
	Clove C SETUP HOB SETUP3 HOB (Interl) SETUP3 HOB (Interl) Hovescan and Pasking Pasa Wavescan H/Lo/Points/Time Paskace Hit/Lo/Points/Time Stat/Stop/PB/Coont/Attempto	StadPeak Tollgd 513 513 513 553 Dn/Hi/Lo sec 10 5 5 0 0 710 13 753 753 10 710 10 75 5 0 0 710 10 20 70 710 10 75 75 50 70 710 10 75 75 50 50 75 76 <	TO = 40, KeV = 15, Beam = 30, Size = 2 Maghan = 4000, Med = Analog Spot Samples List Un = 1 * unknown sample Si 500 Set = 1 fram metal Si 500 Set = 1 fram metal Si 500 Set = 1 fram metal Si 510 Set = 1 fram metal Si 510 Set = 1 Alaminum metal Si 513 Set = 1 Alaminum metal Un = 2 * unknown sample	Search for Files Element List That Spectron 1 File (10210774) vit As Spectron 2 PE 114 (102115 vit As Spectron 2 11791 (1553.73) file ka Spectron 5 LiF (134.720)

Note that if you load a file setup from a previous probe run, the program will ask you if you want to load the standard intensities from the previous run. If the standardization was recently acquired it might be ok to use, though usually one should re-acquire the standards to ensure maximum accuracy.

NewFileS	etupLoadStandardData
2	Do you want to load the standard intensity data from C:\UserData\Smith\12-2009\Al-TI_12-06-2009.MDB (8), if not already loaded?
	<u>Y</u> es <u>N</u> o Cancel

10. To manually peak the spectrometers, use the 'Acquire!' window, 'Peaking Options' and 'Start Peaking' buttons (after manually locating an appropriate standard for peaking for each element or set of elements). See "Manually Peaking Using the Acquire! Window" in the Getting Started manual for more details.

Acquire!										_ 🗆 ×
SP1	SP2	SP3	SP4	SP5	X	¥	0.00	Z	Progress/Bea	m Deflection
1-PET	2-PETH	3-LIFH	4-TAP	5-LiF	30.3300	Faraday	9.20	000		
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						.000000			(•
Current Sa Normal Ac	Current Sample: Un 1 * unknown sample Start Standard or Unknown Acquisition Normal Acquisition							50.3500	50.5000	
Data Row	s: O	Goo	d Data Ro	ws: O			Start	Wavescan	um .000000	.000000. 0
New	Sample		PHA			Move		Stage	Magnification Beam Mode	3200
Elemen	ts/Cations	Pe	ak/Scan (Options	Acquis	ition Optic	ns	Imaging	Kilovolts	15
Analytica	l Conditio	ns	Count Ti	nes	Spec	ial Option	: /	Peaking Options	Beam Current Beam Size	30
Combine	d Conditio	ns	Locate	,	Ra	ate Meter		Start Peaking	cquire String	2

For automated peaking use the 'Automate!' window, 'Peaking' button to select the elements for peaking (be sure the check the 'Peak Spectrometers' checkbox), and then select the standards to peak in the 'Automate!' window, 'Position List' and click the 'Run Selected Samples' button to start the automated peaking.

But before starting the automated peaking, this might be a good time to check that the instrument conditions and beam are properly set. You can use the 'Acquire!' window, 'Analytical Conditions' button to set those parameters.

I	Acquire!						X
	SP1 SP2	SP3 SP4 SP5		x x	z		Progress/Beam Deflection
	1-PET 2-PETH 3	9.311 90.9079 134.720 -LIPH 4-TAP 5-L1F	\$ 30.33	Faraday	9.20000		
	.00 .00	.00 .00 .00)	.00			
	Current Sample: Un	1 unknown sample					i t
	Normal Acquisition Uni	cnown		Start Star	dard or Un	known Acquisition	50.3500 50.5000
	Data Rows: 0	Good Data Rows: 0			Start War	vescan	m .00000 .000000 px 0 0
	New Sample	РНА		Move		Stage	Magnification 3200
	Elements/Cations	Peak/Scan Options	Acq	uisition Optio	ins	Imaging	Kilovolts 15
<	Analytical Conditions	cal Conditions Oount Times			Special Options Peaking Options		Beam Current 30
	Combined Conditions	Locate		Rate Meter		Start Peaking	Acquire String

11. It might be also be a good idea to check the 'Automate!' window, 'Confirm Standard Positions' checkbox.

Automatel		
Protection List (mother self) (double selek to see date) Standard C 11 STLF10 Abarisous notat Usakaram S (1) 11 11 U Stafform notat Warresons R 2011 11 U Stafform notat Stafford Stafford C Stafford	Move Stage Digilize Plot Fiducials Replicates Conditions Sample Setupe File Setups	Confine Actions Confine Marken Positions Confine Standard Samples Acquire Standard Samples Acquire Standard Samples Confine Marken Actigned Standards Confine Marken Actigned Confine Marken Confine Marken Actigned Confine Marke
Delete Selected Samples Delete Selected Positions New X Y Z W Gr 1 50155000 50:50000 9:200000 0 1	ain II (POS File) septes (to *.POS) tain II Focus 0	Le Bran Delection Per Ponton Engress 2006 Based BackAsh Contine AURON Sample Catalash Contine AURON Sample Setup Use ROM Avide Focus Oxide Focus Contine AURON Sample Catalash Digitad Instruct 5 Standard Points To Acquire Automatic Contine Datag (see) 10 Standard Y Increment (um) 6 Re Standard Y Increment (um) 6
KeV = 15 Curr = 30 Size = 2, Mag = 400 Mode = Analog Spot San MagAnal = 4000 MagImag = 400 ImgShit = 2, 3 File Setup = NONE	rple Setup (row) Number = 0	Use Last Unknown Sample Use Digitized Conditions Use Digitized Sample Setups Use Digitized File Setups Use Digitized Hultiple Setups
Multiple Setups = NONE	Replicates = 1	Run Selected Samples

12. If the 'Peak On Assigned Standards' checkbox is checked, be sure to assign the elements to specific standards using the 'Analyze!' window, 'Standard Assignments' button so that the program only attempts a peak center on the specified primary standard.



13. Note that a PHA acquisition can be manually or automatically acquired before or after the peaking procedure (normally the PHA acquisition is performed after the peak center).

Figure 1 Parts in Parts	Bud Group Marked
Elements to Peak (multi-select) - ti ka Spec I PET (88.0076) v ka Spec 2 PETH (80.1600) cr ka Spec 3 LIFH (159.311) al ka Spec 5 Lif (134.720) fe ka Spec 5 Lif (134.720)	Prak Ceeler Method C Interval Halving T Prakbile File options below) Cancel Cancel Skip P/B Check Before Peaking
	ROM Peaking Type Cliferinal & Parabolic & Maxima & Gaussian
	C Dual Maxima/Parabolic C Dual Maxima/Gaussian ⊂ Highest Intensity
Double-click element to move to spectrometer peak position	Peak Center Distance Acquire Automated PHA Scan Prior To Peaking Acquire Automated PHA Scan After Freaking C Acquire PHA Baselice Window Scan (* Acquire PHA Baselice Window Scan (* Acquire PHA Baselice Window Scan (* Acquire PHA Baselice Window Scan
Plot Selected Peak Center	Display PHA Dialog Prior To Peaking (manual) Display PHA Dialog After Peaking (manual)
Return To On Peak (start analysis) Positions	Display Spectrometer Pre-Scan for Confirmation Display Spectrometer Post-Scan for Confirmation Use BOM Based Scanning for Pre/Post Scan

14. When the 'Automate!' window, 'Run Selected Samples' button is clicked, the program will move automatically to each selected standard and perform the specified peaking and PHA acquisitions. During this time the program will allow you to pause to confirm (and refocus) the location of each standard on the standard block (the position adjustments will be automatically remembered for next time).

Confirm Positions	5				
St 524 Chro	mium metal				
Please adjust the click OK when rea click th	sample stage pos ady. If you need m e Pause button.	ition and nore time	<		Time remaining 9.30
Refl Tran On Off	Remove Faraday	Jog Cancel	Auto Focus	Pause	ОК
					/

Information about the spectrometer peak intensities will be located in the Probewin Log window. If the peak operation is successful the program will indicate "Yes" under the "peaked" column. A "No" without an asterisk means the spectrometer was not specified or did not peak properly (the asterisk means no peak attempt data yet).

ROM Paral	oolic Pea	lk Center	Results:					
Element	Spectr	Peaked	StartPk	StopPk	Std	Offset	StartI	StopI
ti ka	1 PET	Yes	88.4240	88.4940	522	49	1605.5	1572.4
v ka	2 PETH	Yes	79.6966	79.6581	523	.508	2766.4	2737.4
cr ka	3 LIFH	*No	.000000	.000000	524	.071	.0	.0
al ka	4 TAP	Yes	90.9685	91.3303	513	43	1717.0	1712.3
fe ka	5 LiF	*No	.000000	.000000	526	.445	.0	.0

The "Offset" is the offset from the theoritical peak position in spectrometer units. Generally the found peak should be within a few % of the calculated peak position or something may be wrong.

Once the spectrometers are all peaked properly and the PHA scans look good as shown here, one may proceed to specify the acquisition times and acquisition order for each element.



15. Note that once the peaking and PHA acquisitions are completed the results can be reviewed from the 'Run' | 'Display, Fit and Export Spectrometer Peaking and PHA Scans' menu.



Note that all spectrometer peaking and PHA acquisitions (PHA, Bias and Gain scans) are automatically stored here (except for those performed using the Move window).

You are now ready to acquire wavescan and/or standard intensities.

Wavescan Acquisition To Check For Off-Peak Interferences

- 1. At this time it might be appropriate to acquire a wavescan sample to determine if there are any off-peak interferences that need to be dealt with. Usually it is sufficient to acquire a manual wavescan on a sample or standard with a composition similar to your unknown although that is not strictly necessary, since any composition will serve to simply display the KLM markers.
- 2. First go to an appropriate sample for the wavescan acquisition, then click the 'Acquire!' window, 'New Sample' button and select the 'Wavescan' option. Enter a name such as "check bgds" and click OK.

	New Sample		
	New Sample Type	ОК	Cancel
(O Unknown	丿 Load Eleme	ent Setup
	Wavescan	Load Samp	le Setup
		Load File	Setup
	Add/Remove Standards	Load Multip	ole Setup
	Note that a new standar default on the last unkno analyzed elements in a ru buttons above or first cre- make any necessar	d sample element sel wn sample in the run, n, either click one of ate a new unknown s y changes to the eler	tup is based by To change the the Load Setup sample and then ment setup.
1	Load Wavescar	From Another Pr	obe Run
\subseteq	New Sample Name	\mathcal{I}	
	check bads		
	Joneon byde		
	New Sample Descript	ion	Add <cr></cr>
	New Sample Descript	ion	Add <cr></cr>
	New Sample Descript	ion tandard list below, ca Add Standards to Ru re main menu.	Add <cr> Add in the second sec</cr>

3. Then check the 'Acquire!' window, 'Count Times' dialog to make sure that the count times for the wavescan elements are reasonable, then click OK.

CHER LIE		to Lat Ct	Ante Third	-						
Channel	Element	Spectro	Crystal	On-Peak	Hi-Peak	Lo-Peak	MaxCoun Factor	Wave	Peak	Quick
	ti ka	1	PET	10.00	5.00	5.00	1000000(1.00	3.00	8.00	.50
2	v ka	2	PETH	10.00	5.00	5.00	1000000(1.00	3.00	8.00	.50
}	cr ka	3	LIFH	10.00	5.00	5.00	1000000(1.00	3.00	8.00	.50
1	al ka	4	TAP	10.00	5.00	5.00	1000000(1.00	3.00	8.00	.50
j	fe ka	5	LiF	10.00	5.00	5.00	1000000(1.00	3.00	8.00	.50
<u>.</u>										
∢ am Ave	ages aam (nA)			435 sea		2 3 ETH LIFH	4 5 TAP LIF			OK
am Ave minal B hange th ormalizati ensity dis for o	ages ∋am (nÅ) e Nominal Bi on constant olay. For exa ps/nÅ inten	1.0000 aam to modi used for the mple, enter sity display.	10 fy the ×-ray 1 (nA)	435 sec 7 m Calculated Spectromete Motion and Acquisition	1 28 PET f in Ti	2 3 ETH LIFH ▼ Cr	4 5 TAP LIF RI Fe			OK Cancel

4. When you are ready to acquire the wavescan sample, simply click the 'Acquire!' window, 'Start Wavescan' button and the program will automatically acquire an intensity scan for each element automatically.



5. Once the wavescan acquisition has been completed, use the 'Plot!' window to display the wavescan intensities. See "Off-Peak Adjustments From the Plot! Window" in the Getting Started manual for more details.



7. Use the spin button to select the next spectrometer and element pair and click the 'Output' button to display the wavescan and the current off-peak positions (in green). The x-ray KLM markers can be displayed by selecting the 'Analyzed Elements' option.



Then use the mouse to click and drag the preferred zoom area to see the background better.



8. Then simply adjust the off-peak positions by clicking the 'Low' and/or 'High' buttons and clicking on the graph where they should be re-located.



9. When you click OK, the new off-peak positions will be utilized automatically in the next unknown or standard acquisition. Repeat steps 7 to 9 for each element in the wavescan.

Acquisition of Standard Intensities

- 1. In the 'Automate!' window, click on the 'Standards' option and click the 'Select Stds' button to select the current standards in the run. You have previously confirmed standard positions during peaking, but you can check that option again if you would like.
- 2. Check the 'Acquire Standard Samples' checkbox and then click on the 'Run Selected Samples' button. See "Loading Standard Position Files" in the Getting Started manual for more details.

	lick to see data)	- · · · · ·	Automation Actions
G Standards St 1100 Fid 0 SF	M 1259 (Al alloy)	Move Stage	Confirm Standard Positions
Unknowns Wovescans St 514 Fid 0 Silio St 522 Fid 0 Tita	ninum metal con metal nium metal	Digitize	Confirm Unknown Positions
All Samples St 523 Fid 0 Van St 524 Fid 0 Chr	adium metal omium metal	Plot	Peak Spectrometers Peaking
St 526 Fid 0 Ron St 528 Fid 0 Nic Select Stds St 530 Fid 0 Zim	metal : metal	Fiducials	Acquire Standard Samples
Select All St 532 Fid 0 Ger	manium metal bium metal	Replicates	Acquire Wavescan Samples
Auto Focus St 546 Fid 0 Pall St 547 Fid 0 Silv St 550 Fid 0 Tin	adium metal er metal metal	Conditions	-Automation Options
Update St 654 Fid 0 NBS	SRM-654b	Sample Setups	Peak on Assigned Standards
Delete All St 1100 S	BM 1259 (Al alloy)	File Setups	Use Filament Standby Afterwards
Re-Load Curren	t Row = 4 of 4	Multiple Setups	Use Confirm During Acquisition
	Export Selected	Samples (to *.POS)	Combine Multiple Sample Setups
Row X Y 1 50/35020 50/51855	Z W 9 201676 0	Samples (to *.POS) Grain # Focus 1 0	Combine Auf Frances in a sample Combine Multiple Sample Setury in the RBM Auto Focus in New Sample C Every Point Digitized C Interval 5 Standard Points To Acquire Automate Confirm Delay (sec) Standard X Increment (um) Re-Standard Interval Inc) Re-Standard Interval Inc)
K Y 1 50 35020 50 51865 1 50 35020 50 51865 1 50 35020 50 51865 1 50 35020 50 51865 1 50 35020 50 51865 1 50 35020 50 51865 1 50 35020 50 51865 1 50 35020 50 51865 1 50 35020 50 51865 1 50 35020 50 51865 1 50 35020 50 51865 1 50 35020 50 51865 1 50 35020 50 51865 1 50 35020 50 51865 1 50 35020 50 51865 1 50 35020 50 51865 1 50 35020 50 51865 1 50 35020 50 51865 1 50 35020 50 51865 1 50 5000 50 5000 1 50 5000 50 5000 1 50 5000 50 5000	Cupor Selected Cupor Selected Solution Commode = Analog Sport Solution ImgShift = 2, 3 Solup = NONE	Sampler (to *.POS) Grain II [Focus 1 0	Continer Auf Frances in Sample Continer Auffahle Sample Setup: Use RDM Auto Focus C New Sample C Every Point C Digitized C Interval 5 Standard Points To Acquire Automate Confirm Delay (sec) 10 Standard Y Increment (um) Re-Standard Y Increment (um) Re-Standard Y Increment (um) Re-Standard V Increment (um) C Use Digitized Sample Setups C Use Digitized Sample Setups C Use Digitized Sample Setups C Use Digitized Sample Setups

3. Once primary standards have been run, you can check that they agree with each other by running secondary standard and checking that it analyzes correctly from the 'Analyze!' window by selecting the secondary standard and clicking the 'Analyze' button.

C Unknowns Wavescans	St 513 Set 1 St 522 Set 1	Aluminum mot					
C Unknowns C Wavescans	St 522 Set 1	AND INCOME.	al	Com	bine Selected	Samples	>>Excel
C Wavescans	EA E223 E.A. 8	Titanium meta	1	Los	Report C	alculation (Options
	St 524 Set 1	Chromium met	al				
C All Samples	St 526 Set 1	Iron metal			ause Between	Samples	Report
Select All	St 550 Set 1	Tin metal			ise All Matrix C	orrections	
Add To Setup	St 1100 Set 1	SRM 1259 (A	l alloy]	Del	ete Selected S slete Selected :	ample(s) Sample(s)	Match
Save Setups				Com	bined Condition	ns Cour	nt Times
Specified Concer	trations Stan	dard Assignme	nts Name/I	Description	Conditions	Elements	/Cations
St 1100 Set 1 SF TO = 40, KeV =	IM 1259 (Al allo 15. Ream = 30	9) Size - 2	.000 T	otal Oxygen Calculated Oxy	99.722 rgen 14.215	Total We Z - Bar	sight %
IMagAnal = 4000.1	I. Mode = Analo	a Spot	.000 E	жсеза Охуден	n 28.132	Atomic W	/eight
MagAnal = 4000.1 Results in Element Copy Ti	I. Mode = Analo al Weight Perce	n Spot nt Cr	.000 E	Fe	n 28.132	Atomic W	/eight Ma
IMagAnal = 4000.1 Results in Element Copy Ti verage: .04	V V 002	Cr .205	AI 89.563	Fe .210	si .190	Atomic W Cu 1.600	/eight Mg 2.4
IMagAnal = 4000. Results in Element Copy Ti verage: .04 itd Dev: .01	I. Mode = Analo al Weight Perce V 5002 5 .021	Cr .205 .031	AI 09.563 .246	Fe .210 .028	si .190 .000	Atomic W Cu 1.600 .000	/eight Mg 2.4 .00
MaaAnal = 4000. Results in Element Copy Ti verage: .04 td Dev: .01 vublished: .04	I. Mode = Analo al Weight Perce V 5002 5 .021 0 n.a.	Cr .205 .031 .173	.000 E Al 09.563 .246 89.716	Fe .210 .028 .205	5i .100 .000 .100	Atomic W Cu 1.600 .000 1.600	/eight Mg 2.4 .0(2.4
IMaaAnal = 4000. Results in Element Copy Ti verage: .045 itd Dev: .011 'ublished: .046 itd Err: .000	Mode = Analo al Weight Perce 5002 5 .021 0 n.a. 7 .011	Cr .205 .031 .173 .015	.000 E AI 89.563 .246 89.716 .123	Fe .210 .028 .205 .014	n 28.132 Si .190 .000 .190 .000	Atomic W Cu 1.600 .000 1.600 .000	/eight Mg 2.4 .00 2.4 .00
IMaaAnal = 4000. Results in Element Copy Ti iverage: .04 id Dev: .01 volished: .04 id En: .00 cRel SD: 33.	Mode = Analo al Weight Perce V 5002 5 .021 0 n.a. 7 .011 0 -1153.6	a Soot rel 205 .031 .173 .015 15.0	AI 89.563 .246 89.716 .123 .3	Fe	n 28.132 Si .100 .000 .190 .000 .00	Atomic W Cu 1.600 .000 1.600 .000 .000	/eight Mg 2.4 .00 2.4 .00 .00 .00 .00
Maatual = 4000. Results in Element Copy Ti verage: .045 itd Dev: .011 vblished: .041 itd Err: .000 Effel SD: .33.1 finimum: .022	Mode = Analos al Weight Perce 5 .002 5 .021 0 n.a. 7 .011 0 .1153.6 5 .030	Cr .205 .031 .173 .015 15.0 .171	AI 89.563 .246 89.716 .123 .3 89.425	Fe	n 28.132 Si .190 .000 .100 .000 .00 .00 .180	Atomic W Cu 1.600 .000 1.600 .000 .0 1.600	/eight 2.4 2.4 .00 2.4 .00 .0 .0 .0
IMaadnal = 4000. Results in Element copy Ti verage: .044 id Dev: .011 'ublished: .040 id En: .000 Rel SD: 33.3 funinum: .051	Mode = Analos al Weight Perce 5 .002 5 .021 0 n.a. 7 .011 0 .1153.6 5 .030 8 .021	Cr .205 .031 .173 .015 15.0 .171 .246	AI 89.563 .246 89.716 .123 .3 89.425 89.932	Fe .210 .028 .205 .014 13.4 .182 .235	n 28.132 Si .190 .000 .100 .000 .00 .00 .180 .190	Atomic W Cu 1.600 .000 1.600 .000 .000 1.600 1.600	/eight Mg 2.4 .00 2.4 .00 .0 .0 .0 .0 .0 .0 .0 .0
MagAnal = 4000. Results in Element verage: .044 itd Dev: .011 itd Dev: .011 itd En: .000 Rel SD: .33. finimum: .029 daximum: .051	I. Mode – Analo al Weight Perce V 5 .002 5 .021 0 n.a. 7 .011 0 -1153.6 5 .030 8 .021	Cr .205 .031 .173 .015 15.0 .171 .246	AI 09.563 .246 09.716 .123 .3 89.425 09.932	Fe .210 .028 .205 .014 13.4 .182 .235	n 28.132 Si .190 .000 .190 .000 .0 .180 .180 .190	Atomic W Cu 1.600 .000 1.600 .000 .0 1.600 1.600	Anight Hg 2.41 .00 2.41 .00 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0
Magknal = 4000. Results in Element Copy Ti verage: .004 itd Dev: .011 vubished: .041 itd Err: .000 Rel SD: .33. (1. Mode = Anato al Weight Purce 5 .002 5 .021 9	a Soot int Cr .205 .031 .173 .015 15.0 .171 .246 Undek	AI 09.563 .246 09.716 .123 .3 89.425 09.932 ete Selected I	Fe	n 28.132 Si .190 .000 .100 .000 .0 .180 .190 Analyze S	Atomic W Cu 1.600 .000 1.600 .000 1.600 1.600	/eight Mg 2.41 .00 2.41 .00 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0
Moadvaal = 4000. Segy Ti verage: .044 to Dev: .011 ublished: .041 td Err: .000 Rel SD: 33. timinum: .025 Delete Selec Copy Ti	1. Mode = Anado al Weight Perce v 5002 5 .021 0 n.a. 7 .011 0 -1153.6 5 .030 8 .021 ted Linc(s)	Cr .205 .031 .173 .015 15.0 .171 .246 Undek	AI 09.563 .246 09.716 .123 .3 89.425 09.932 ete Selected I	Fe	n 28.132 Si .100 .000 .100 .000 .000 .180 .180 .180	Atomic W Cu 1.600 .000 1.600 .00 1.600 1.600 Selected Lin Cu	/eight Mg 2.4 .00 2.4 .00 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0
Maakhad = 4000. Results in Element verage: 104 40 Dev: 0.01 ublished: 044 14 En: 000 Breisbed: 044 14 En: 000 Delete Select Delete Select Copy Ti 29 G 0.055	1. Mode = Anador al Weight Perce 5 -002 5 .021 0 n.a. 7 .011 0 -1153.6 5 .030 8 .021 Ated Line(s) V 5 .021	a Soot vol Cr .205 .031 .173 .015 15.0 .171 .246 Undek Cr .171	AI 09.563 .246 09.716 .123 .3 89.425 09.932 ete Selected I AI 09.932	Fe	Analyze S Si .100 .000 .100 .000 .100 Analyze S .100	Atomic W Cu 1.600 .000 1.600 1.600 1.600 1.600 Cu 1.600	/eight Mg 2.4 .00 .2.4 .00 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0
Maachaal = 4000. Results in Element vertage: L044 40 Dev: .011 vblished: .044 40 Ere: .003 Rel SD: 33.1 Inimum: .024 assinum: .055 Delete Selec Copy Ti 29 G .045 D G .044	1. Mode = Anador al Weight Perce 5002 5021 0 n.a. 7 .011 0 -1153.6 5030 9 .021 Ated Line(s) V 021 3030	a Soot ent Cr .205 .031 .173 .015 15.0 .171 .246 Undek Cr .171 .206	AI 09.563 .246 09.716 .123 .3 89.425 ete Selected I AI 09.932 09.932	Fe .210 .028 .205 .014 13.4 .182 .235 Line(s) Fe .102 .235	n 28.132 Si .100 .000 .190 .000 .190 .190 .180 Analyze S Si .180 .180	Atomic W Cu 1.600 .000 1.600 .000 1.600 1.600 1.600 Cu 1.600 1.600	/eight Mg 2.4 .00 2.4 .00 .1 .2.4 2.4 2.4 2.4 2.4 2.4 2.4 2.4 2.4 2.
MaaAnad = 4000. Kesult in Element versope:	1. Mode - Analog al Weight Perce 5021 5021 0 . n.a. 7 .011 01153.6 5030 8021 Atol Line(s) V 5	a Soot vet Cr .205 .031 .173 .015 15.0 .171 .246 Undek Cr .271 .206 .246	AI 09.563 .246 09.716 .123 .3 89.425 09.932 ete Selected I AI 09.932 89.425 09.452	Fe	Analyze S Si .100 .000 .100 .000 .100 .100 .100 .10	Atomic W Cu 1.600 .000 .000 .000 .000 1.600 1.600 1.600 1.600 1.600	/eight Mg 2.4 .00 2.4 .01 2.4 .01 .01 .01 .01 .01 .01 .01 .01

See "Analyze Standard Data" in the Getting Started manual for more details.

In this case a good secondary standard for an Al-Ti alloy might be a NIST standard in which the user can compare the measured 'Average' results with the 'Published' results from the Standard.MDB standard database.

In the Log window the analysis is printed out with the Published values and the relative percent error ("%VAR") so the user can quickly compare the expected value with the actual measured value. Note that if the standard being analyzed is the assigned primary standard for that element, then the "%VAR" will be close to zero (but not exactly due to the presence of other elements not assigned as the primary standard for that element).

However elements that are not using the standard as the assigned primary standard (that is a secondary standard) will provide a meaurement of the relative accuracy of the instrument assuming that the secondary is close to the composition of the unknown samples to be analyzed.



In the log window the output is similar but more detailed. Here is a NIST Al alloy analyzed using pure metals as elements as primary standards for all elements:

ELEM: 29 30 31	Ti .055 .043 - 025 -	V .021 . .030 .	Cr 171 89 206 89 246 89	Al .932 . .425 . .452	Fe 182 100. 235 99.	SUM 061 579 611
32	.058	.004 .	198 89	.445 .	233 99.	638
AVER: SDEV: SERR: %RSD:	.045 .015 .007 33.0	002 .021 .011 -1153.6	.205 .031 .015 15.0	89.563 .246 .123 .3	.210 .028 .014 13.4	99.722 .227
PUBL: %VAR:	.040 13.09	n.a. .00	.173 18.64	89.716 17	.205 2.41	.000

DIFF:	.005	.000	.032	153	.005
STDS:	522	523	524	513	526

Note the "%VAR" and "DIFF" lines which show the relative % error from the published composition and the algebraic difference in absolute weight %.

Using the 'Analyze!' window, 'Data' button it is also useful to check that the "SDEV" or measured standard deviation of the intensities are within 3 sigma of the predicted variance as shown in the line labled "1SIG".

On-Peak	(off-peak	correc	ted) or	MAN On-1	Peak X-ra	ay Counts	(cps/lnA)	(and Faraday
Current)	:							
ELEM:	ti ka	v ka	cr ka	al ka	fe ka	BEAM		
BGD:	OFF	OFF	OFF	OFF	OFF			
SPEC:	1	2	3	4	5			
CRYST:	PET	PETH	LIFH	TAP	LiF			
ORDER:	1	1	1	1	1			
29G	.16	.06	.51	267.70	.54	29.982		
30G	.13	09	.61	265.97	.70	29.991		
31G	.07	01	.73	266.07	.57	30.015		
32G	.17	.01	.59	266.01	.70	30.016		
AVER:	.13	01	.61	266.44	.63	30.001		
SDEV:	.04	.06	.09	.84	.08	.017		
1SIG:	.06	.06	.08	.94	.07			
SIGR:	.78	.98	1.13	.90	1.19			
SERR:	.02	.03	.05	.42	.04			
%RSD:	33.0 -1	153.5	15.0	.3	13.4			

Variances larger than 3 sigma may indicate sample inhomogeneity or instrument instability.

Digitizing Position Samples

1. From the 'Automate!' window click on the 'Digitize' button. You will now be able to digitize stage positions of samples you wish to acquire intensity data for.



2. In the 'Digitize Sample Positions' window choose the 'Unknown' option and enter a sample name in the text field (a sample description is optional) and click the 'Add New Unknown or Wavescan To Position List' to add an empty position sample to the 'Automate!' window position sample list.

	Poigitize Sample Positions	- IX
\langle	Sample Type Standad G Unknown Sarole Type option, clic Unknown Sarole Type option, erker a sar and click the Create New Unknown or Vavescan Vavescan Standad Sample Type option and select a from the Standard List	k the iple name avescan click the standard
	NONE and Multiple Setups: NONE	e setup:
	Positions Picture Snap! Stag	le
	Unknown or Wavescan Position Samples (Name/Descri	ption)
<	Al-Ti alloy, random points	
		×
<u> </u>	Add New Unknown To Position List	ize 1
	- Standard Compositions Added To Bun (relect to create	nowl
	513 Alumium metal 522 Titanium metal 523 Vanadium metal 524 Chromium metal 526 Iron metal 526 Iron metal	- -
	Add/Remove Standards To/From Run	
	1 Increment Grain 🗌 Use Digitized Auto	Focus
	Single Point(s) Shotoun 12	er Size
	Linear Traverse Rectangular	Grid
	Digitize Image Polyage G	nid
	Digitize Cluster (of Random Points)	

3. Then click on the 'Stage' button to bring up the 'Stage Map' window to navigate to the sample coordinates. Select the appropriate stage map image or drawing from the 'Holder Selection' drop down list.



- 4. In the 'Stage Map' window, double-click on where you think your sample is. Use the instrument joystick or stage fine adjustment controls and locate your first acquisition position. Once you find a good spot, focus on the sample surface using reflected light, using the instrument Z stage position adjustment.
- 5. In the 'Digitize Sample Positions' window, click on 'Single Point(s)' or 'Linear Traverse' or whatever mode you want to digitize coordinate data and click OK once you have established the coordinates for that acquisition. You may create any number of position samples, with any sample name and digitize any number of points in each position sample.

Digitize Sample I	Positions		_ 🗆 ×
Sample Type C Standard C Unknown C Wavescan Referenced To Fig	To create a ni Unknown Sample and click the Cre button. To create Standard Sample fro Jucial Set: 0, Sett INE and Multiple	ew unknown Type option sate New Un a new stand Type option m the Stand up Number Setups: N	position, click the n, enter a sample name known or Wavescan Jard position, click the and select a standard ard List. C O and File Setup: DNE
Positions	Picture Si	nap!	Stage
Unknown or Way	escan Position S	amples (Na	ame/Description)
Al-Ti alloy, rando	om points		
			<u> </u>
			~
Add New Unkr	nown To Position	List	⊻ Auto Increment Auto Digitize 1
Add New Unkr	nown To Position	List	Auto Increment Auto Digitize 1
Add New Unkr Standard Compos 513 Aluminum m 523 Vanadium n 524 Chromium n 526 Liron metal	nown To Position eitions Added To I eital eital netal eital	List F	Auto Increment Auto Digitize 1 t to create new)
Add New Unky Standard Compos 513 Aluminum m 522 Trianium m 524 Chromium n 524 Chromium n 526 Iron metal Add	nown To Position itions Added To I ietal etal ietal ietal	List Run (selec	Auto Increment Auto Digitize 1 t to create new)
Add New Unkn Standard Compos 513 Aluminum m 522 Fitanium m 524 Chronium 524 Chronium 524 Chronium 524 Chronium 524 Chronium 524 Chronium 524 Chronium 524 Chronium 524 Chronium 524 Chronium	nown To Position itions Added To I tetal stal netal retal /Remove Standar ment Grain	List Run (selec ds To/Fro	Auto Increment Auto Digitize 1 t to create new) n Run pitized AutoFocus
Add New Unka Standard Compos 523 Tianium m 523 Tianium m 524 Chronium 524 Chronium 524 Chronium 526 Iron metal Add	nown To Position sitions Added To I stal	List Run (selec ds To/Fron	Auto Increment Auto Digitize 1 tto create new n Run hitzed AutoFocus Number Size
Add New Unke Standard Compor 513 Aluminum m 522 Trainium m 524 Chromium 524 Chromium 524 Chromium 524 Chromium 526 Iron metal Add 1 Incree	nown To Position itions Added To I ietal tetal retal retal //Remove Standar ment Grain	List Run (selec ds To/Fro Use Dig Shot	Auto Digitize [Auto Digitize [t to create new] n Run niptized AutoFocus Number Size gun 12 40
Add New Unker Standard Compose 513 Aluminum m 522 Trainium m 524 Lonomium 524 Lonomium 526 Iron metal 526 Iron metal 41 Incree 41 Single P	nown To Position itions Added To I setal setal setal setal retal ment Grain oint(s) averse	List Fun (selec ds To/Fron Use Dig Shot IIII R	Auto Increment Auto Digitize [t to create new] n Run nitized AutoFocus Number Size gun 12 40 ectangular Grid
Add New Unke Standard Composition 523 Rainium m 523 Vanadium 524 Chromium 524 Chromium 526 Iron metal Add 1 Incre 53 Single P Linear Tr	nown To Position itions Added To I tetal tetal netal itions Standar (Remove Standar ment Grain foint(s) averse Image	List Run (selec ds To/From Use Dig Shot IIII R	Auto Increment Auto Digitize [t to create new] n Run nitized AutoFocus Number Size gun 12 40 Polygon Grid

6. Repeat steps 4 and 5 until all of your unknown samples have been digitized.

7. In the 'Stage Map' window, choose to show locations of the sample by selecting from the 'Positions' options, for example 'Unknowns' to double check where your coordinate positions are located graphically in instrument stage coordinates.

Tip: **Picture Snap!** is a great tool included in Probe for EPMA. It simply requires an image file (jpeg, bmp, or gif) of your sample mount from any source (slide scanner, flat bed scanner or electron image from any instrument). Access Picture Snap! from the Probewin log window, 'Run' menu by selecting the 'Display Picture Snap!' menu.



Load your image file and then choose the 'Window' | 'Calibrate' menu. In the 'Picture Snap Calibration' window, select either the 'Two Points' option (for orthogonal rectangular samples) or the 'Three Points' option (for round samples subject to rotation).

Picture Snap Calibration		
Point #1 Calibration		Close
X Pixel Coordinate	0	
Y Pixel Coordinate	0	Two Points Three Points
Pick Pixel Coordi Picture	nate on	To calibrate the picture select two diagonal coordinates
X Stage Coordinate	50.36995	(for rectanglar samples) or three points (for round
Y Stage Coordinate	50.52176	samples subject to
Read Current Sta Coordinate	ge Move To	rotation) on the picture for which you can accurately locate the stage positions.
Point #2 Calibration -		Then click the Calibrate Picture button.
X Pixel Coordinate	15360	
Y Pixel Coordinate	15360	Calibrate Picture
Pick Pixel Coordi	nate on	
X Stage Coordinate	50.36995	Display Calibration Points
Y Stage Coordinate	50 52176	X and Y Pixel
Read Current Sta Coordinate	ge Move To	Coordinates are actually given in "Twip" units! (1440 twips per logical inch)

Use the stage controls and navigate to 2 or 3 points that you can easily recognize on the image and also find the stage coordinates of in the instrument imaging system (visible light or electron imaging). Click 'Read Current Stage Coordinate' to read the stage position of the feature. Generally choose 2 points that are diagonally opposed on the sample or if using three points, choose points that describe a triangle over most of the image area for best accuracy. Then also click the 'Pick Pixel Coordinate On Picture' and click the corresponding spot on the picture for the image coordinates for each calibration position.

When finished choosing reference points click the 'Calibrate Picture' button. Now you should be able to navigate anywhere on your image by double-clicking the feature in the image. Other menus allow you to display the position sample coordinates as they are digitized.

Automated Sample Acquisition

1. In the 'Automate!' window choose the 'All Samples' option. Then click the 'Select Stds' button and establish that you picked the correct standards for your samples. Then holding down the <ctrl> button select the unknowns you also wish to acquire intensities for.



- 2. Now click the following checkboxes: 'Confirm Standard Positions', 'Acquire Standard Samples' (optional since you may have just done this), 'Acquire Unknown Samples', 'Acquire Standards Again', and optionally the 'Use Filament Standby Mode Afterwards' and 'Use Confirm During Acquisition'.
- 3. Double-check everything and click the 'Run Selected Samples' button. This will bring up a confirmation dialog with the total time estimate. Check carefully and click "Yes" and the automated run will start. The standard positions will be confirmed again. Make sure they are still in focus.



Manual Acquisition

1. You may also simply acquire sample data manually using the 'Acquire!' window. Simply click the 'Acquire!' window, 'New Sample' button, click the 'Unknown' option (or click the 'Standard' option and select a standard from the list for running a standard manually) and enter a sample name. Note that wavescan samples can be acquired from this same window and should be used to check for off-peak interferences.



2. Then click the 'Acquire!' window, 'Start Standard Or Unknown Acquisition' button to start the manual data acquisition. The elapsed time meter will display the acquisition progress. When finished you should acquire additional replicate points until the average and standard deviations look reasonable. See "Manual Count Acquisition Using the Acquire! Window" in the Getting Started manual for more details.

Acquire!												_ 🗆 X
SP1 SP2	SP3	SP4	SP5	50 36	X Y	9.20	Z	—Г	Progres:	s/Bea	m Defi	ection
Ti-PET V-PETH	Cr-LIFH	AL-TAP	Fe-LiF	50.50	Absorbed	,			Ti	v	Cr A	l Fe
3.40 3.40 6342. 9906.	3.40 4527.	3.40 7966.	3.40 1933.		.00.000							
Current Sample: Un Normal Acquisition	3 * 34! Jnknown	554-545			Start Stan	dard (or Unknown Acqu	isition	50.3	699	50.	5218
Data Rows: 0	Goo	d Data Ro	ws: O			Star	Wavescan	u	n .000 «	1000 0	.00	0000 0
New Sample		PHA			Move		Stage	Ma	gnificat	ion		1000
Elements/Cation	s Pe	ak/Scan (ptions	Acq	uisition Optio	ns	Imaging	Kile	an nou ovolts	6	Anai	ng spot
Analytical Condition	ns	Count Tir	nes	Sp	pecial Option:	:	Peaking Opti	ons Be	am Curr	ent		30
Combined Condition	ns	Locate	;		Rate Meter		Start Peaki	ng Ac	quire St	ring	PE	Z B OFF

3. Click the 'New Sample' button again to name a different unknown sample for manual acquisition. Note that your samples may be specified any way (up to 100 points per

sample) that you prefer, although usually all data points in a single samples should be related spatially or compositionally since an average and standard deviation will be calculated for each sample.

Analyzing Your Data

To obtain your composition results simply use the 'Analyze!' window and select the samples to analyze and click the 'Analyze' button.



Use the 'Calculation Options' to add oxygen by stoichiometry, atomic percents, detection limits, etc. Use the 'Elements/Cations' button to add unanalyzed elements for calculation purposes (leave the x-ray line blank).

Calculation Options	
Selected Samples St 654 Set 1 NBS SRM-654b	OK Cancel
	EDS Calculation Data
	© Do Not Use EDS Element Data
	C Use EDS Spectrum Element Data
	Assign EDS Spectral Elements
	Integrated Intensity Data Options
	C Do Not Use Integrated Intensities
Sample Conductive Coating (need to explicitly turn o	n in Analytical Analysis Options)
Element Density Thickness (A)	se Standard menu to specify standard coatings
c <u>▼</u> 2.1 200 M	Use Conductive Coating
- Calculations Options	
Display Results As Oxides	Calculate with Staichiometric Owners
Calculate Atomic Percents	Calculate as Elemental
Calculate Detection Limits and Sensitivity	
Calculate Projected Detection Limits Calculate Homogeneity Banges	Use Particle/Film Calculations
Calculate Alternate Homogeneity Ranges	
Calculate Pearson's Linear Correlation Coefficient	\$
Element By Difference:	
Stoichiometry To Calculated Uxygen:	Atoms Of To 1 Oxygen
Stoichiometry To Another Element:	
Hydrogen Stoichiometry To Excess Uxygen	n:u natio .00 UH = 1, H2U = 2
- Formula and Mineral Calculations	
Calculate Formula Based On	Add specified oxygen, etc. from the
No Mineral End-Member Calculation	Elements/Cations
C Olivine C Feldspar C Pyroxene C Garr	et (Ca,Mg,Fe,Mn) C Garnet (AL,Fe,Cr)
🔲 🗖 Amphibole (Ague, Auto Normalization) 👘 Bioti	te (Brimhall and Ague, Halog Code)

Many more output options are available from the Probewin Log window, 'Output' menu and the 'Plot!' window. See "Output of Analyzed Data" in the Getting Started manual for more details.

Tips & Common Problems

- 1. Note that by acquiring intensity data for all the elements in each standard you can examine the complete analysis of each and see that you should be able to get close to zero concentrations on standards that do not contain the element of interest. This is very important for trace elements- that is: can you measure zero? If the concentration is significantly negative then it is likely that one or more off-peak positions is being interfered by a secondary x-ray peak.
- 2. Establish which spectrometers should be used for which elements. You will want to avoid crystal flipping within a single sample. Put in proper count times for what you are doing. Check that the count times are approximately balanced for all spectrometers to avoid a spectrometer sitting idle (you might as well be counting photons).
- 3. Use the 'Stage Map' window displaying the unknowns to show where all of your random points or linear traverses are. Figure out which numbers correspond to the unknowns you want.
- 4. If you made a mistake in the digitizing go to the 'Automate!' window and double click on the sample you need to alter. The sample positions you have digitized will come up in the box below the sample position list. Choose the duplicate or mis-digitized points and click on 'Delete Selected Positions' then OK.
- 5. Consider acquiring images on all your sample positions. These positions can be plotted on the images once the acquisition has completed.



John Donovan, Probe Software 12-14-2009