

**UVA Instructor Guide for easyScan 2 STM's and AFM's**  
(Version 7 Jun 2011)

Despite their diminutive size the easyScan STM's and AFM's are *remarkably* flexible instruments. This flexibility extends to the control software that not only operates *both* types of instrument but which does so in a *huge* variety of modes. However, for a student lab, flexibility causes problems when instruments end up in modes entirely inappropriate for the samples being examined. The software exacerbates this problem by not password protecting its many setup files. It is thus very easy for a student to change and save an inappropriate setting which can then become the default for that instrument. Over the last five years such inappropriate/corrupted software settings have led to MOST of the problems we have had in our student labs (problems that were often first misidentified as equipment malfunctions). To mitigate this problem we now go to considerable trouble to pre-configure the operating software for both types of instrument. This guide records our settings as well as our techniques for protecting those settings. (The resulting files are also posted on our website, on the same webpage where you found this guide).

**1) Using a password-protected administrative account, install the Nanosurf software.**

By default the program will be written to folder: **C:/Program Files/Nanosurf easyScan2**

**2) Setup the User Interface level using the menu choice:**

**Options/Config User Interface . . .**

- Click the "**Standard Level**" radio button
- Uncheck "**Save workspace on exit**" (IMPORTANT! Otherwise inadvertent changes are saved)

**3) Setup the program to automatically load the proper head calibration file:**

The head calibration file should be stored in this folder (now protected from students):

**C:/Program Files/Nanosurf easyScan2/Calibrations/**

Several ".hed" files are installed by default. These hold calibration data for the STM and AFM "heads." But the data are different for every single STM and AFM unit and use of the wrong files (or the default files) can produce degraded instrument operation (or lack of operation). We therefore dedicate one PC to each instrument and do the following:

- On each PC delete all of the ".hed" files EXCEPT the one for that PC's specific instrument (the name of this file should be of the form **##-##-###.hed** with the numbers matching the instrument's serial number as given on a label on the bottom of the head). Note that for our units the instrument ".hed" files were delivered on a separate (non program) CD.
- Configure the program to automatically load that correct ".hed" file by using menu choice:

**Options/Config Scan Head . . .**

In the box that pops up, click **Load** to select the instrument's particular ".hed" file from the calibrations folder, then click "OK"

*The full name of this file should now be displayed in a small box at the bottom of the program screen (2nd box from the right).*

===== FOR STM's =====

**4-STM) Define custom program display and parameters:**

i) Call up the default parameter set via menu choice:

**File/Parameters/Open/Load**

Got to folder: **C:/Program Files/Nanosurf easyScan2/Config/**

Select file: **Default\_EZ2-STM.par**

ii) Click on the **Operating Mode** icon: 

Make sure operating mode is STM

iii) Click on **Positioning** icon: 

Resize the **Approach** panel buttons to make their labels fully readable:

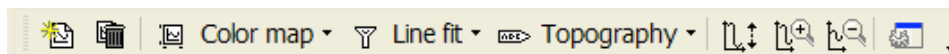


iv) Click on the **Imaging** icon: 

- Expand the **Imaging Area**, **Imaging Options** and **Imaging Modes** sub bars
- Click on the **upper** square data window (once selected it will be surrounded by a **blue box**)

On the program's upper margin, for the three drop down choices, select Color Map, Line Fit and Topography.

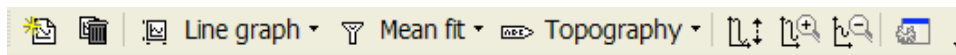
The upper program border order should now look like this:



- Click on the **lower** square data window (once selected it will be surrounded by a **blue box**)

On the program's upper margin, for the three drop down choices, select Line Graph, Mean Fit and Topography.

The upper program border order should look like this:

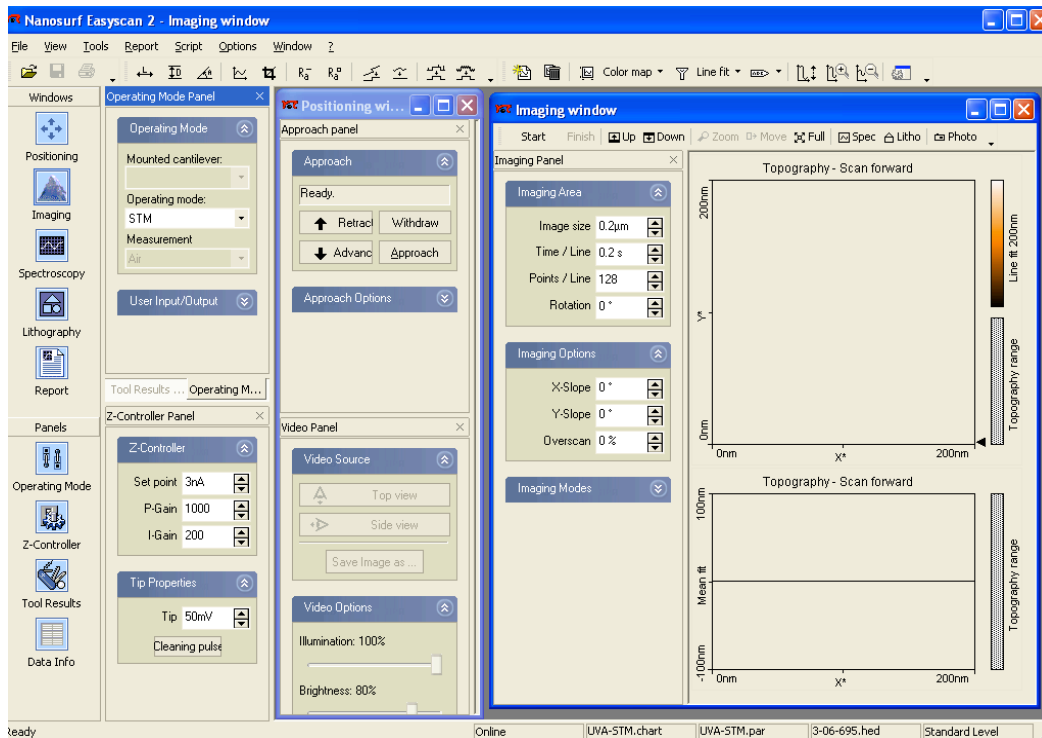


vi) Click on **Z-Controller** icon  and enter these values

"Set point" = 3 nA      "P gain" = 1000      "I gain" = 200      "Tip voltage" = 50 mV

vii) Move and resize all windows so they do not overlap

The resulting **STM** display should resemble this (optimized for a 1024 x 768 pixel screen size):



viii) Save this data/arrangement to the folder: C:/Program Files/Nanosurf easyScan2/Config

Using these menu choices:

**File/Workspace/Save As** (we save to "UVA\_STM.gui")

**File/Chart Arrangement/Save As** (we save to "UVA\_STM.chart")

**File/Parameters/Save As** (we save to "UVA\_STM.par")

### 5-STM) Configure the program to automatically load the above now customized files

Use the menu choices:

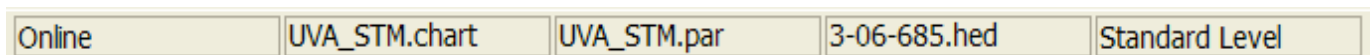
**Options/Config Scan Controller . . .**

In the box that pops up, go to the top **"Start configuration"** pane

Use the Browse button for the **"Default parameters at startup"** to select your customized ".par" file from the config folder (for us this is now UVA\_STM.par). Then click **OK**

Use the Browse button for the **"Default chart arrangement at startup"** to select the appropriate ".chart" file from the config folder (for us this is now UVA\_STM.chart). Then click **OK**

The bottom of an STM program screen should now boot to this:



The numbers in the 4th entry (##-##-###.hed) should match your STM's serial number

===== FOR AFM's =====

**4-AFM) Define default AFM program display and parameters:**

i) Call up the default parameter set via menu choice:

**File/Parameters/Open/Load**

Got to folder: **C:/Program Files/Nanosurf easyScan2/Config/**

Select file: **Default\_EZ2-AFM.par**

ii) Ensure that the full default range of cantilever types is available by using menu choice:


**Options/Config Cantilever Types**

In the **Cantilever Browser** window that pops up, click the **Default** button

iii) Click on the **Operating Mode** icon: 


- Select your **Mounted Cantilever** type: we use ACL-A or NCLR
- Select Operating Mode: we use dynamic force (which opens up the **Mode Properties** panel)
- Select **Measurement environment** of "Air"
- Under **Mode Properties** check: **Auto set** and **Display sweep chart**

iv) Click on the **Positioning** icon: 

- Resize the buttons to make their labels fully readable: 
- For AFM models with built-in TV cameras, also expand the **Video Source** and **Video Options** sub bars, as well as the TV image space.

v) Click on the **Z-controller** icon: 

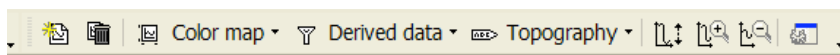
- Expand the **Z-Controller** sub bar

vi) Click on the Imaging icon: 

- Expand the **Imaging Area**, **Imaging Options** and **Imaging Modes** sub bars
- Click on the **upper** square data window (once selected it is surrounded by a **blue box**)

On the program's upper margin, for the three drop down choices, select Color Map, Derived Data and Topography.

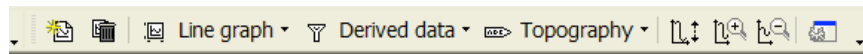
The upper program border order should now look like this:



- Click on the **lower** square data window (once selected it is surrounded by a **blue box**)

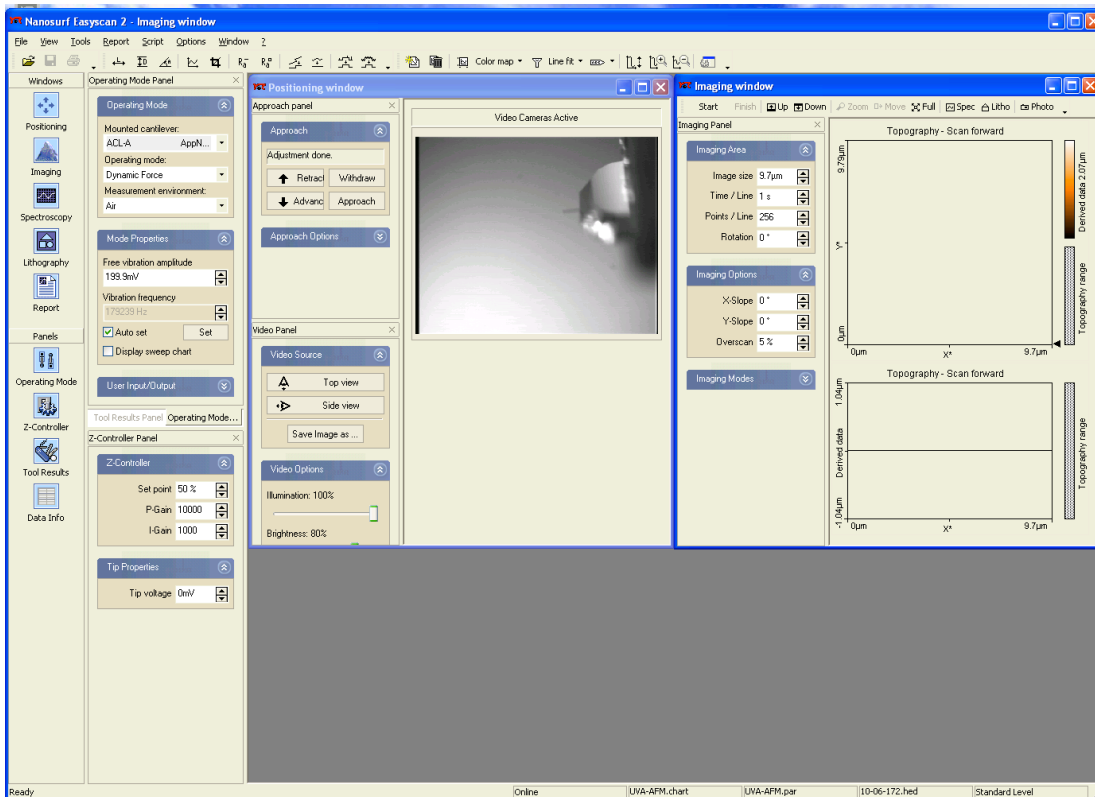
On the program's upper margin, for the three drop down choices, select Line Graph, Derived Data and Topography.

The upper program border order should now look like this:



- vii) Move and resize all windows so they do not overlap

The resulting **AFM** display should resemble this (optimized for a 1400 x 1050 pixel screen size):



- viii) Save this data/arrangement to the folder: **C:/Program Files/Nanosurf easyScan2/Config**

Using these menu choices:

- File/Workspace/Save As** (we save to "UVA\_AFM.gui")
- File/Chart Arrangement/Save As** (we save to "UVA\_AFM.chart")
- File/Parameters/Save As** (we save to "UVA\_AFM.par")

**5-AFM) Configure the program to automatically load the above now customized files**

Use the menu choices:

- Options/Config Scan Controller . . .**

In the box that pops up, go to the top **"Start configuration"** pane

Use the Browse button for the **"Default parameters at startup"** to select your customized ".par" file from the config folder (for us this is now UVA\_AFM.par). Then click **OK**

Use the Browse button for the **"Default chart arrangement at startup"** to select the appropriate ".chart" file from the config folder (for us this is now UVA\_AFM.chart). Then click **OK**

**The bottom of an STM program screen should now boot to this:**

Online	UVA_AFM.chart	UVA_AFM.par	10-06-172.hed	Standard Level
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The numbers in the 4th entry (##-##-###.hed) should match your AFM's serial number

===== **For both STM's and AFM's** =====

**6) On each PC create a student account that does NOT have administrative privileges.**

**7) From that student login, repeat steps 2, 3 and 5 from above** (because the software requires that calibration and configuration file auto loading must be specified for each and every PC user).

===== **Final comments and warnings** =====

All except step 4 above must be done for each and every controlling PC (taking care to specify the correct "hed" file for the exact STM or AFM that PC will be controlling!).

But files created in step 4 for one unit (i.e. par, chart, and gui files) can just be copied to other PC's controlling identical units (i.e. STM files copied to other STM PC's, or AFM files to other AFM PC's).

Thus, in the hope that they will save you time/grief, we have posted the files we have created:

UVA_STM.par	UVA_AFM.par
UVA_STM.chart	UVA_AFM.chart
UVA_STM.gui	UVA_AFM.gui

Unfortunately the program will NOT auto load the gui file. Students will thus still have to load that file.

*Final Warning:*

*The above works well on a new PC, greatly simplifying student use and their success rates. But even this setup will not completely prevent students from saving new program settings. Those settings, in absolutely mysterious ways (defying the principles of rational software design) end up taking precedence over the settings you have just laboriously created. This occurs even after the easyScan program is deleted and reinstalled!*

*Thus be warned: After five years of student use, we were still compelled to wipe our PC's hard drives, to reinstall Windows, and repeat the above. So let it be hoped that Nanosurf/Nanoscience soon develops a more bulletproof version of their otherwise very capable software.*