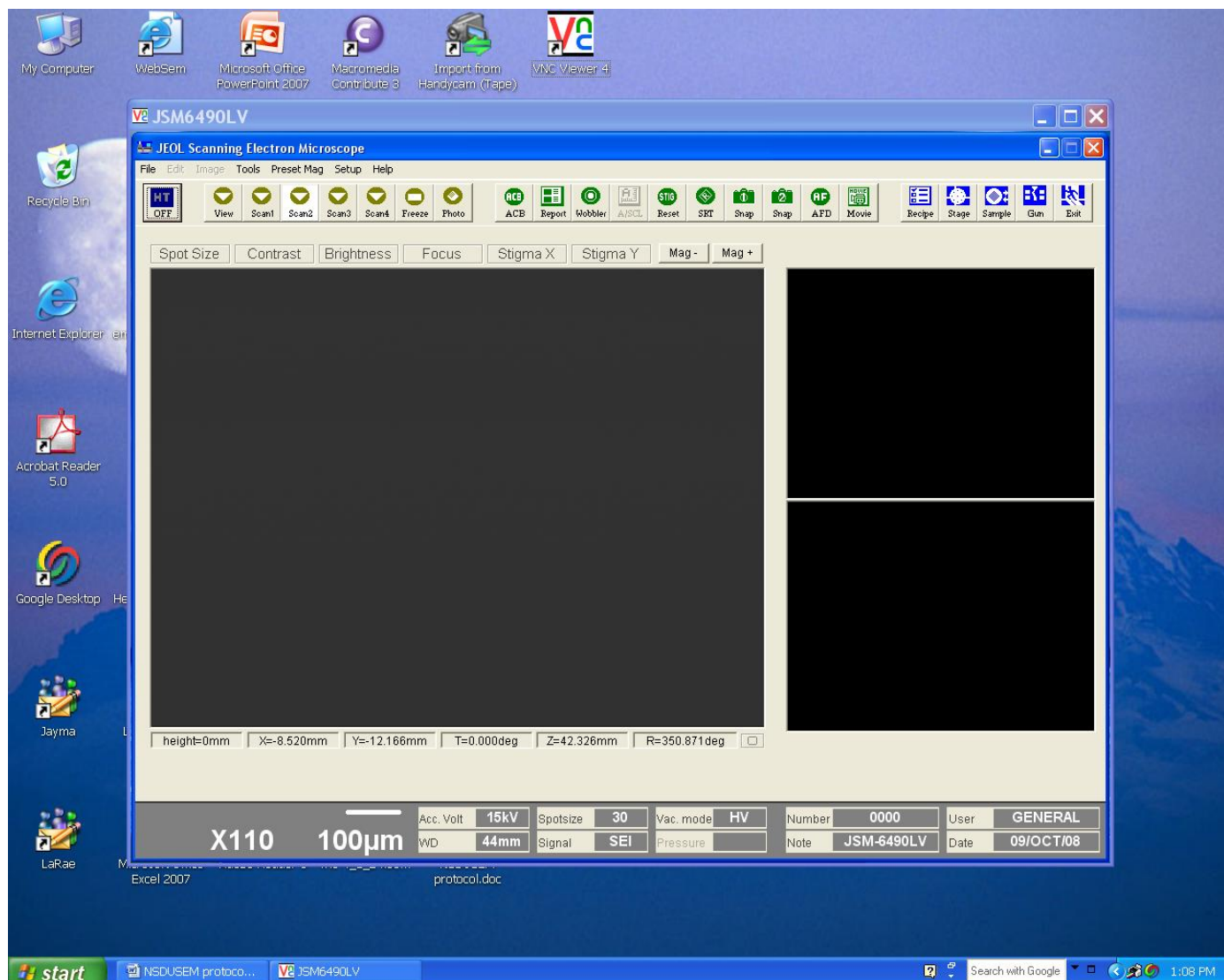


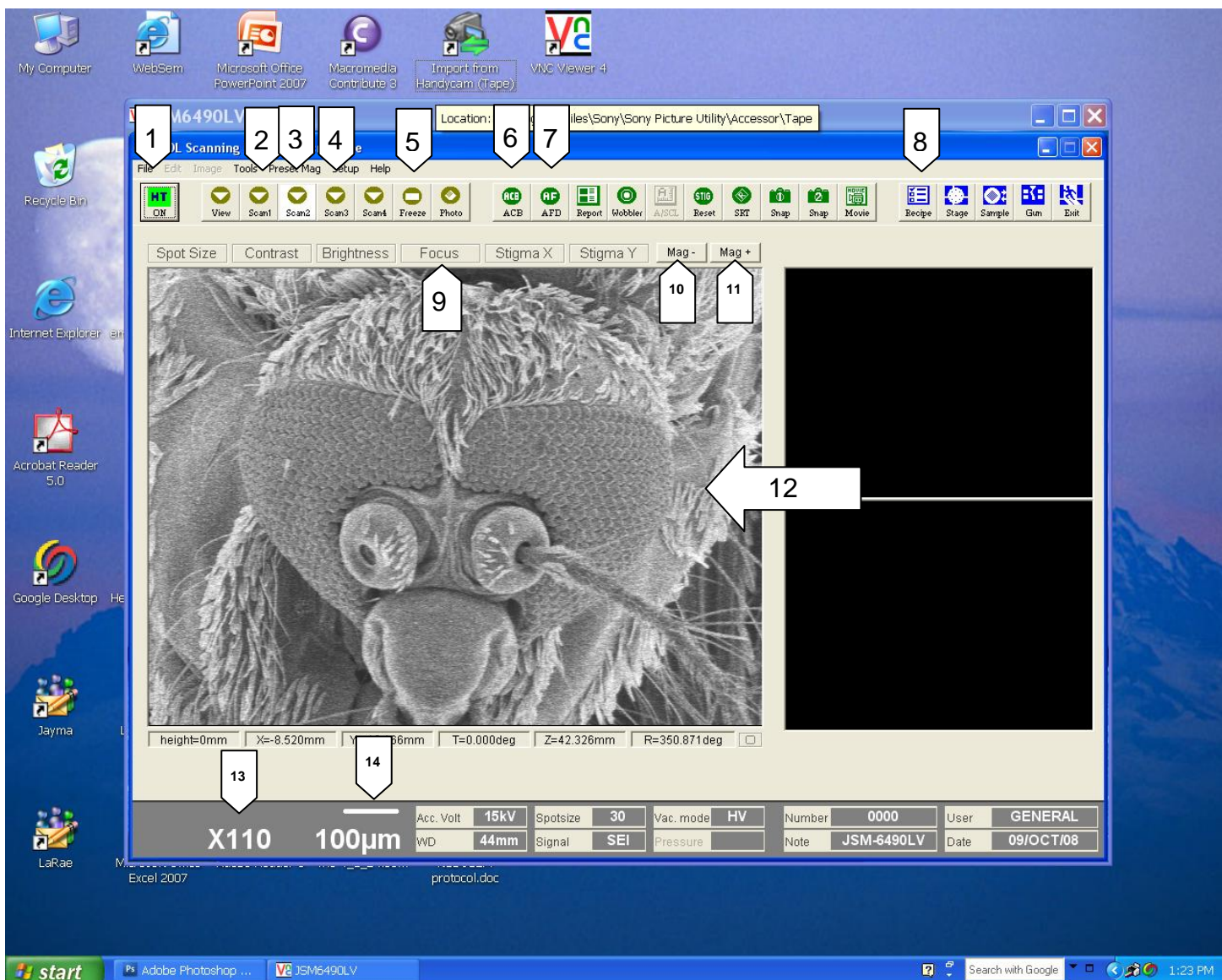
## SEM Remote Users' Manual

Now you have installed VNC Viewer and accessed the NDSU scanning electron microscope!



The following will introduce you to some of the most commonly used controls of the microscope. Please don't use any other buttons or menus without the advice of the Electron Microscopy Center staff--it is *possible* to damage the microscope while operating it. However, that's really not likely if you don't "experiment" too much, so relax and enjoy your session.

Be a little patient until you learn how quickly the microscope controls will respond. If you click something repeatedly, you may be starting the function over again when it has not had a chance to be completed the first time.



1. **HT**, high tension. Toggles to turn the electron beam on/off.
2. **Scan1**. Provides a smaller screen in the center of the image area to make focusing easier.
3. **Scan2**. “Standard” viewing mode. Use this when looking at your sample, moving around to different areas, etc.
4. **Scan3**. Slow scan speed for obtaining higher resolution images; you will use this when you want to photograph your sample.
5. **Freeze**. Stops the scan so that you can save it—that’s how you take a photograph. The ‘Save’ button only shows up when you have the image frozen. To unfreeze the image, just click the Scan1 or Scan2 button.
6. **ACB**. Auto Contrast/Brightness. Useful when your image is too dark or too glaring white.
7. **AFD**. Autofocus. This can be helpful, but you also will need to focus “manually” to get the best possible resolution. See #9 below.

8. **Recipe.** A number of preset image conditions have been saved for you here. This may help you to quickly locate the various samples loaded for your SEM session. See “Movement” below.
9. **Focus** (manual). Critical focusing is probably the one thing that will require some patience! You may want to use the AFC button to try to get close on the focus before you fine-tune it manually (or you can always use AFC if you have a little trouble with manual focus, get lost, and can't figure out which way you need to go to get back to where you can see something.) For fine focus, depress the 'Focus' button with the LEFT mouse button and move the mouse up or down *while keeping the mouse button depressed*. Take your time. For coarse focus, depress the 'Focus' button with the RIGHT mouse button move the mouse up or down. Use coarse focus only at lower magnifications, and move the mouse very slowly. How fast the focus responds to mouse motion depends partly on the speed of your Internet connection.
10. **Mag-**. Decrease magnification, one step per mouse click. Keep the left mouse button pressed to zoom out to the lowest available magnification.
11. **Mag+**. Increase magnification, one step per mouse click. Keep the left mouse button pressed to zoom in.
12. Main screen image display area for live, frozen, or file images.
13. Readout of current magnification.
14. Size indicator bar. An object in your sample that is as long as this bar measures about the length stated below the bar. The bar and the legend for it change as you vary the magnification. In the screenshot above, the line is 100  $\mu\text{m}$  (micrometers, or microns) long. For reference, a micron is 1/1000 of a millimeter; the diameter of a human hair is about 50  $\mu\text{m}$ . The lower limit of unaided human vision is around 40  $\mu\text{m}$ .

## MOVEMENT:

Learning how to move around and view different parts of your sample and various specimens takes just a little practice.

Click Center. If you see a feature that you would like to examine more closely, you can put the cursor on it and double-click (left mouse button); that centers the point on which you clicked. This is useful when you plan to increase magnification, because if you “mag up” on something that it at the edge of your field of view, you will lose sight of it.

Pan Field. If you want to move across the sample to the right, for example, you can move the mouse so that the cursor approaches the right edge of the field of view. An arrowhead will appear. (This arrowhead *points* to the left, but don't let that bother you.) Hold down the left mouse button, and the field of view will move continuously to the right until you let up the mouse button or move the mouse so that the arrowhead disappears.

Recipe. The 'Recipe' button, number 8 above, will be useful in moving among the different samples that the EM Center staff has set up for your session. Up to seven samples may be loaded for you. If you click 'Recipe,' you will see a list of short sample names. Clicking on one of these names brings up a stored thumbnail image of that sample. Then if you click 'Execute,' the microscope stage will move to the selected specimen, and conditions (magnification, working distance, etc.) will be those used to acquire the recipe. Then you may explore the new specimen.

## ACQUIRING IMAGES:

You can think of the SEM as a large (expensive) digital camera. To acquire an image (take a picture or micrograph), go through the following steps:

- 1) Find the area you want to photograph and adjust the magnification, focus, and contrast/brightness so that the screen image looks “just right” to you.
- 2) Press button 4 (Scan3) for a slowed-down, higher quality scan of your sample.
- 3) Press button 5 (Freeze) to stop the scan. The current cycle will be completed, so this may take a few seconds. After you freeze the image, you will see white text across the bottom of the frozen image showing the magnification, micron marker, etc. A new button, ‘Save,’ will appear just above the microscope image, but we won’t be using that. **To take your picture, click on the ‘File’ item at top left in the main menu bar. Click ‘Save Image File.’ That will open a storage folder that has been set up for you. Type in a descriptive filename for your image. Click the ‘Save’ button at the bottom of the menu box.** Then return to normal operation by using button 3, ‘Scan2.’ You may want to make a note of the name of the operator and the image taken. All your images, .tif files about 1 MB in size, will be e-mailed to you by the EM Center staff after your session ends.