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Introduction

Plot Digitizer is a useful program for extracting data from a linear, semi-log, or log-log plot. For example, if you are interested in extracting the values of data points in a graph for which you do not have the corresponding data table, Plot Digitizer can help.

Using an optical scanner, create a bitmap image of the plot and open the image file in Plot Digitizer. Then, after calibration, you can extract the data values by merely clicking on the points. The data can then be exported to an ASCII file, an MS Excel file or a MS Word file.

Plot Digitizer features a zoom window to aid you in clicking on precisely the point you are interested in, and it even corrects for the possible rotation of the image you are analyzing and the non-orthogonality of the axes.

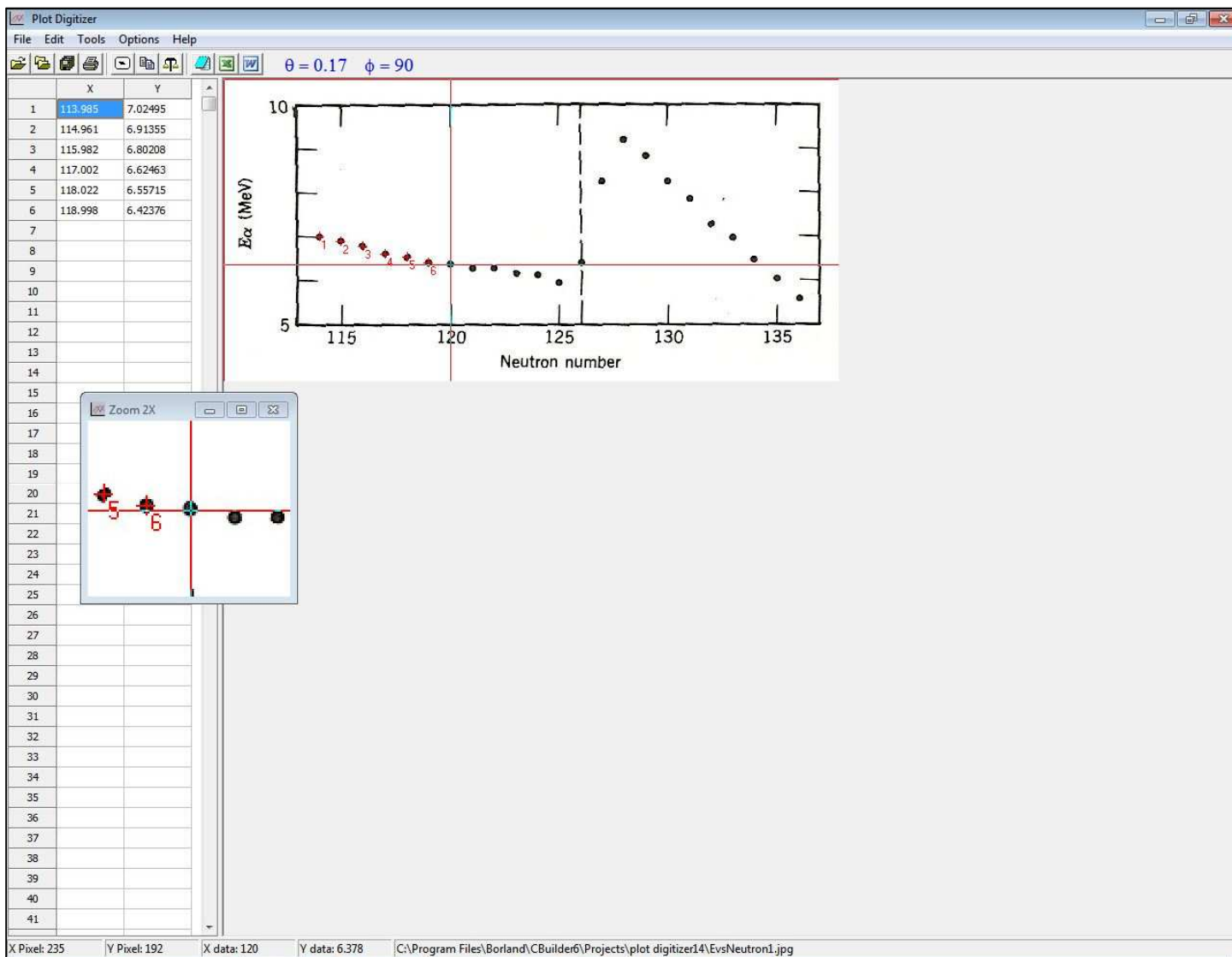


Figure 1: Plot Digitizer screen shot.

Open an Image File

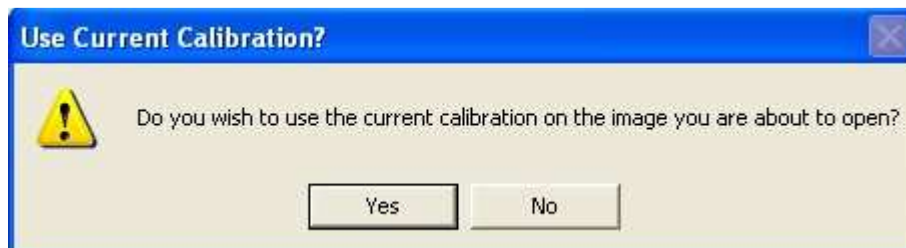
The first step, of course, is to open an image. Open an image of the plot you want to digitize. Image files must be bitmap or jpeg format.

To open a file, select **File** and click **Open Image File** (See Figure 2).



Figure 2: File Menu options

Note: If you have already calibrated an image and then open a new image, you will be given the option of using the existing calibration on the new image.



Open a Project File

If you have previously saved your progress in a project file, you can resume right where you left off by choosing **File** and selecting **Open Project File** (See Figure 3).



Figure 3: Open a project file.

Select Plot Type

You next need to select a plot type. Plot Digitizer can digitize a linear graph, a semi-log graph, or a log-log graph. The default is linear.

To select a plot type (See Figure 4):

1. Click **Options** on the menu bar.
2. Select **Plot Type**.
3. Choose a plot type.

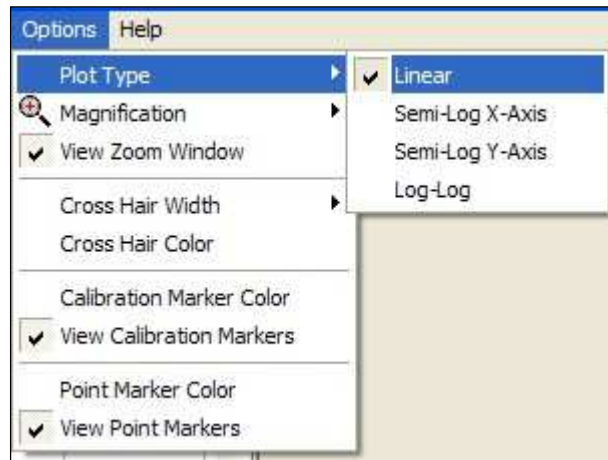



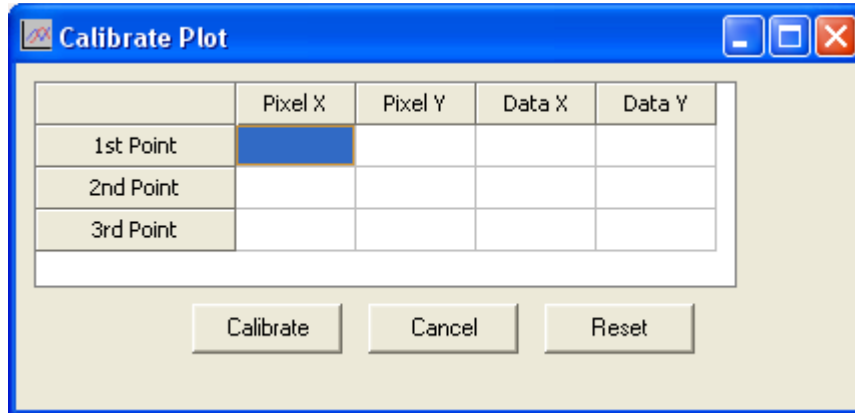
Figure 4: Select plot type. Linear, semi-log, or log-log graph.

Calibrate Plot

Once you have loaded a plot to digitize, you must calibrate it. You can calibrate your plot by using any three points in your plot so long as not all three points are along the same line.

To calibrate a plot:

1. Click **Tools** and select **Calibrate Plot**. The *Calibrate Plot* window (See Figure 5) pops up.
(Alternatively, you can click the calibrate button on the toolbar, , or type **CTRL-K**).



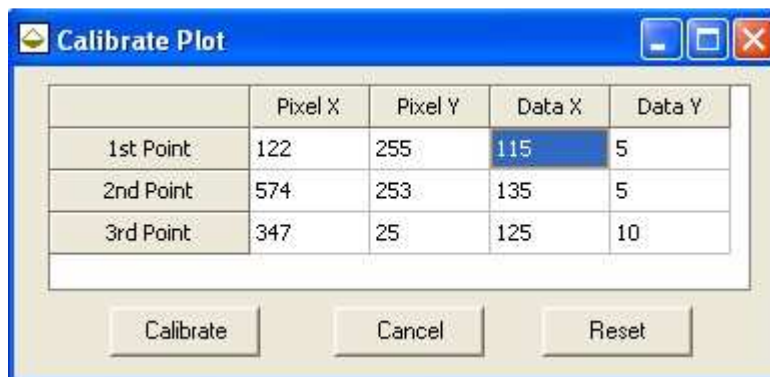
	Pixel X	Pixel Y	Data X	Data Y
1st Point				
2nd Point				
3rd Point				

Calibrate Cancel Reset

Figure 5: Calibration window.

2. **Left-Click** any point on the plot (making uses of the Zoom window) that you want to use as a calibration point. Notice that the pixel coordinates are recorded in the calibration table. If you make a mistake, then **Right-Click** to erase the pixel coordinates just recorded **OR** choose **Reset** to start again.
3. Type in the physical values for the calibration point you have just recorded.
4. Repeat steps 2 & 3 twice more for any other two calibration points. (NOTE: Be sure that not all three points line along the same line.)

i.e.)



	Pixel X	Pixel Y	Data X	Data Y
1st Point	122	255	115	5
2nd Point	574	253	135	5
3rd Point	347	25	125	10

Calibrate Cancel Reset

Figure 6: Click Calibrate to complete the calibration procedure.

5. Once all three points are entered into the calibration window, click the **Calibrate** button in the calibrate window (See Figure 6).
6. Now note that as you move the mouse around on the plot image, the pixel coordinates and the actual values are given in the status bar at the bottom of the screen.

Record Data

Once plot has been calibrated, you can then begin recording data.

- To record data simply **Left-Click** on the plot. A Point Marker is drawn on the clicked data point. See the Point Markers topic to see how to use this feature.
- If you make a mistake, then **Right-Click** to erase the data point just recorded. The point marker will be erased as well.

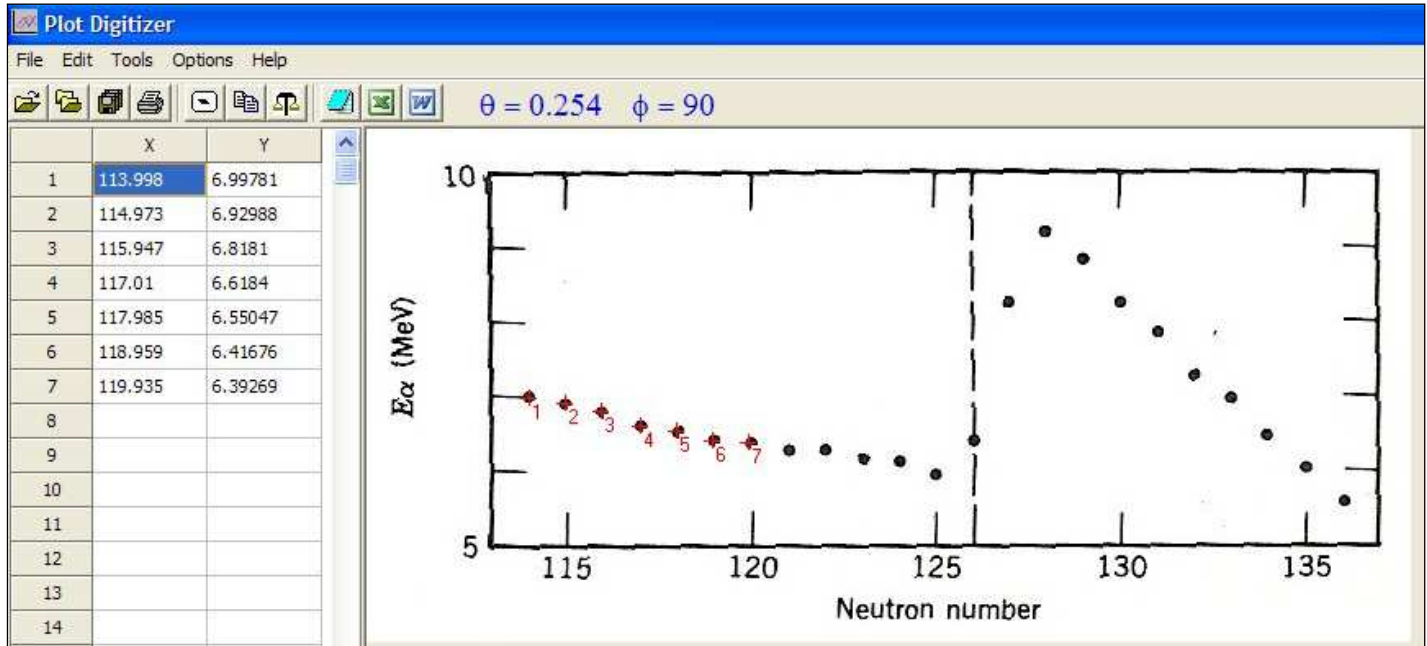
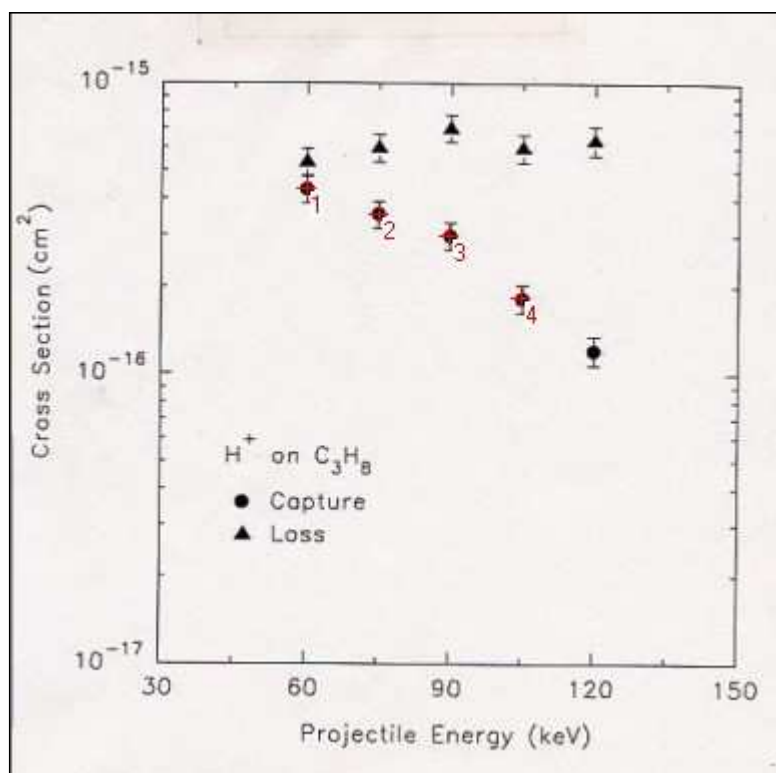


Figure 7: Recording data once image is calibrated. Point markers are drawn on the clicked data points as the values are recorded in the data table. The numbers correspond to the point's location in the data table.

Note: In the example in Figure 7, the angle $\theta = 0.254$ degrees is the angle of the X-axis with respect to the horizontal. The 90 degree angle ϕ is the angle between the X and Y-Axis. The data you record correct for these angles.

Point Markers

Point markers are small + symbols that are drawn onto a calibrated image to indicate that a data point has been clicked and recorded in the data table. Once an image has been calibrated, subsequent clicks on the image will record the data point in the data table and a small + will be drawn on the image to mark the data point clicked. The clicked data points will also be numbered with its row number in the data table.



	X	Y
1	60.5699	1.56904E-16
2	75.6063	1.49043E-16
3	90.2203	1.42417E-16
4	105.308	1.23384E-16
5		

Figure 8: Note the small red +'s on the data points clicked thus far. The number next to each clicked point is the row number of that point in the data table.

Toggle this feature on and off by clicking **Options** and selecting **Use Point Markers**.

Default setting is on.

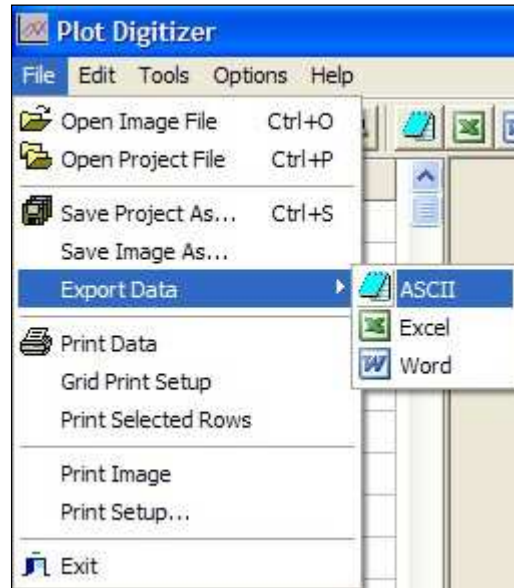



Export Data

The data you have obtained can be exported to an ASCII file, an MS Excel file, or an MS Word file.

To export data:

1. Click **File** and select **Export Data**.
2. Choose the format you want.

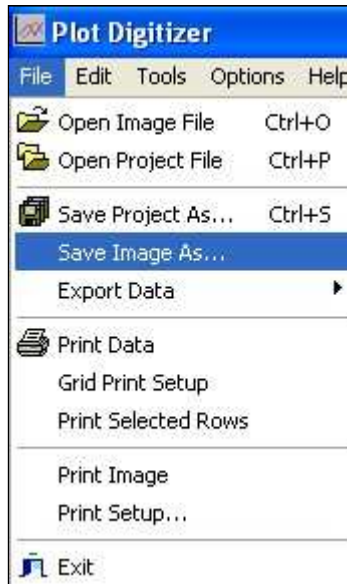


Alternatively, you can click the appropriate button on the tool bar.  (ASCII, Excel, Word).

Save Image

As you click on data points in your image, the data is recorded in the data table and the clicked data points are marked with a point marker. The on-screen image containing the point markers can be saved as a bitmap or jpeg image.

To save the image, choose **File** and select **Save Image As...**



In the resulting dialog box, you can save the image as a bitmap or jpeg image.

Save Project As

You can save your progress at any time by saving your work as a project file. When you choose **File** and select **Save Project As**, Plot Digitizer saves you progress in six files.

Plot Digitizer saves:

1. A bitmap copy of the image you have been working on (your original scanned image is left in tact).
2. Two small bitmap files.
3. The calibration data table
4. The data table showing points digitized thus far.
5. A *.ppr file containing project settings.

Note: You must take care that all five files that are created when saving a project remain in the same directory on your hard drive.

To save the project:

1. Click **File** and select **Save Project As...** or click the  button.



Use Calibration on Multiple Images

You can use an existing calibration on more than one image. To do so:

- Open an image and calibrate it.
- Open a new image and you will be asked if you want to use the existing calibration on the new image. Select **Yes**. (See Figure 9)

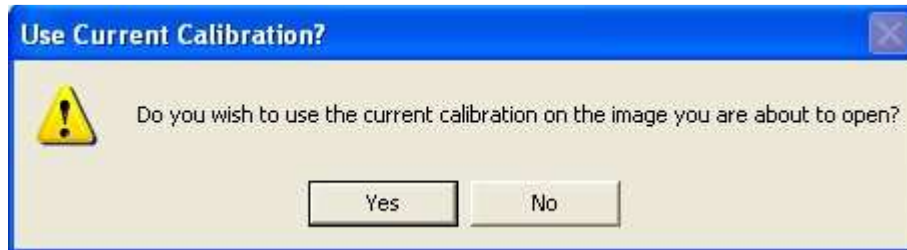


Figure 9: If a calibration currently exists and you attempt to open the new image, you'll be given the option of reusing the current calibration or resetting it.

Printing

Print Data

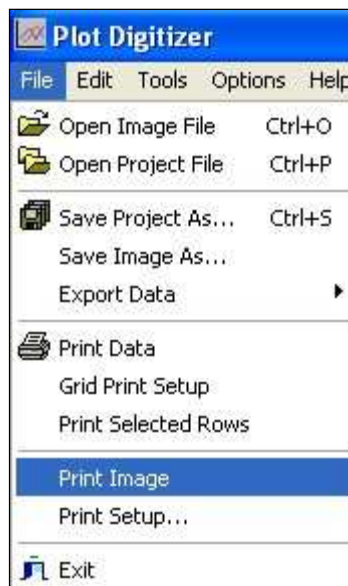
To print data you can either:

- a) Click **File** and select **Print Data**.
or
- b) Select a range of cells in the data grid and then click **File** and select **Print Selected Rows** to print just a selected set of the data.

Print Image

As you click on data points in your image, the data is recorded in the data table and the clicked data points are marked with a point marker. The on-screen image containing the point markers can then be printed.

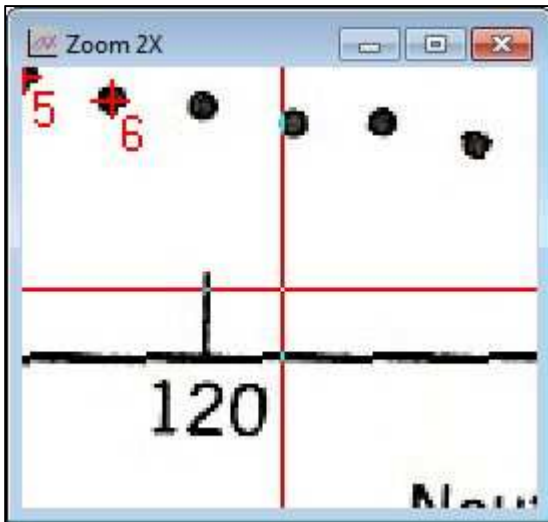
To print the image, click **File** and select **Print Image**.



Zoom Window

Use the zoom window to aid you in selecting points to click. The default magnification is 2X.

You can toggle the zoom window on and off by clicking **Tools** and selecting **View Zoom Window**.



The Zoom window settings are found on the **Tools** menu.

Magnification : 2X, 4X, 8X, 16X

Cross Hair Color: Bring up a color palette and choose a color for the cross hair.

Cross Hair Width: Change the cross hair line width from 1 to 4.

Note: You can also access the Zoom Window settings by **Right-Clicking** on the Zoom Window.

Label Columns


To change the name of the X and Y column in the data table to match the axis labels of the plot you're digitizing, choose **Edit**→**Label Columns** from the file menu or click the  button on the tool bar. See Figure 10.



Figure 10: Change the label of the X & Y columns on the data table.

Color Selection

You can choose the color for the cross hair, the calibration point markers and data point markers.

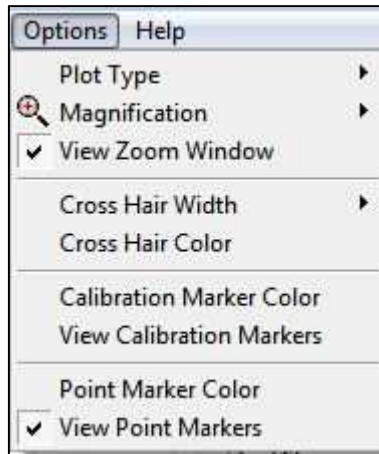


Figure 11: Choose colors.

In any case above you choose a color using the standard windows color palette.



Figure 12: Standard windows color palette.