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Drexel Plot

Developed By:

The Software Development Group

Drexel University

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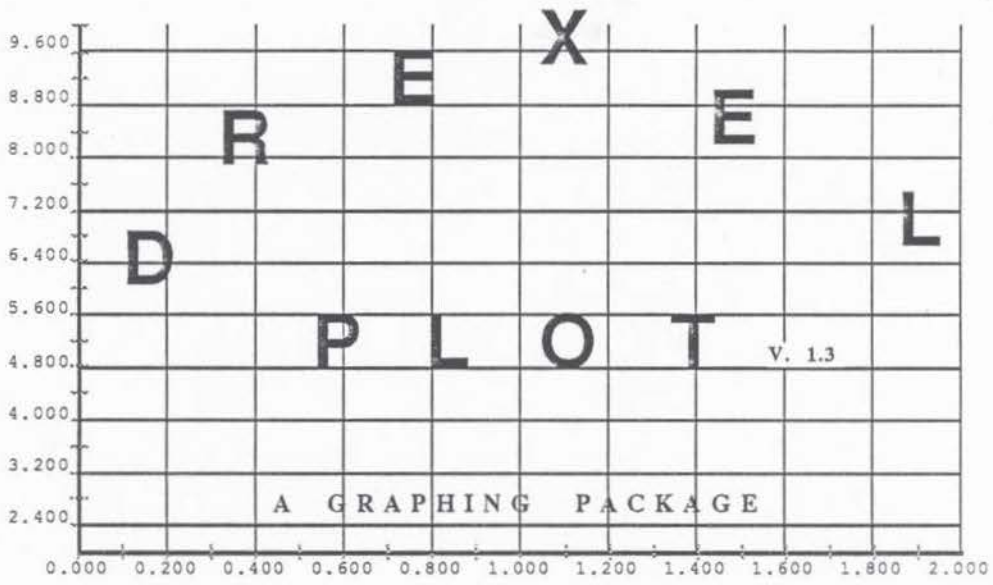

OFFICE OF COMPUTING SERVICES,

SOFTWARE DEVELOPMENT GROUP

DREXEL UNIVERSITY

Drexel Plot:

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Documentation based on Drexel Plot version 1.3.

August 12, 1986

Drexel Plot:

A Graphing Package

Contents

(continued)

Drexel Plot

A Graphing Package

Drexel Plot is a software package designed specifically for graphing line graphs and scatter graphs. This package uses four menus: **File, Edit, Data**, and **Graph**. The **File** and **Edit** menus offer many common Macintosh **File** and **Edit** commands, as well as an "Open SYLK" and a "Copy Plot" command. The **Data** and **Graph** menus, however, offer specific graphing options with which you can:

◊ enter as many as four sets of data, and place as many as four lines on the same graph

◊ select your own range, increments, and axis origin for your grid

◊ choose the decimal places for the numbers on your grid

The Manual:

This manual may be used as a quick reference to Drexel Plot, or as an in-depth training guide to graphing with Drexel Plot. If you would like to learn basic graphing techniques using this application, you may want to work through the tutorials at the beginning of this manual. Each successive tutorial includes more advanced plotting techniques, so if you are truly a novice at graphing, you will probably want to begin with Tutorial #1. If you are quite familiar with graphing techniques, however, and need to know only the specific commands required to operate Drexel Plot, you can refer to the reference and glossary sections at the back of this manual.

The Tutorials:

Each tutorial contains a variety of procedures and instructional questions, as well as helpful tips and definitions for using Drexel Plot. To help you distinguish between these elements, they will be labeled throughout the tutorials as follows:

1. numbers mark the guided procedures you will follow to use the Drexel Plot package

? indicates instructional questions

 indicates special reminders

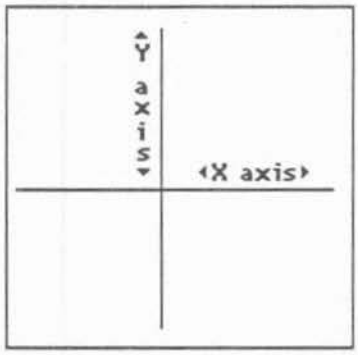
SMALL CAPS indicate words which are included in the glossary

marks the upper right hand corner of every page of the reference and glossary sections

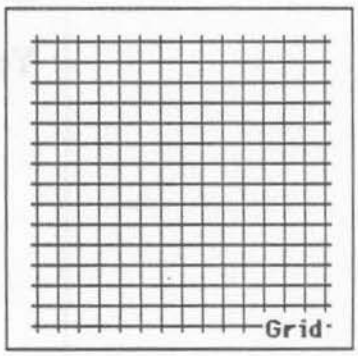
Some General Principles of Graphing

What is a graph?

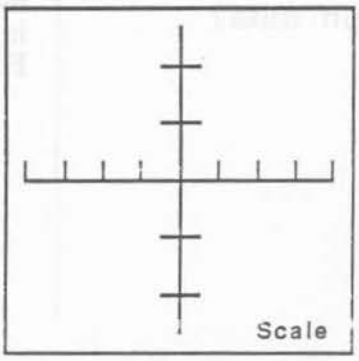
A graph is a visual representation of the relationship between two sets of numbers — that is, paired data. It is composed of two main axes: one axis is a horizontal line called the X AXIS, and the other axis is a vertical line called the Y AXIS.



These axes are often placed on a GRID — a special format of evenly-spaced horizontal and vertical lines.



A grid divides the X and Y axes into even intervals - in other words, it makes a SCALE along these axes. You can think of a scale in this instance, then, as a line which is divided into regular intervals — for example, 1...2...3..., or 5...10...15..., etc.



To prepare a scale along the X and Y axes, place one set of the numbers in your data set at regular intervals along the X axis, and the other set of numbers at regular intervals along the Y axis. The interval you choose for the X axis does not have to be equal to the interval you choose for the Y axis. For instance, you could have a graph that looks like this:

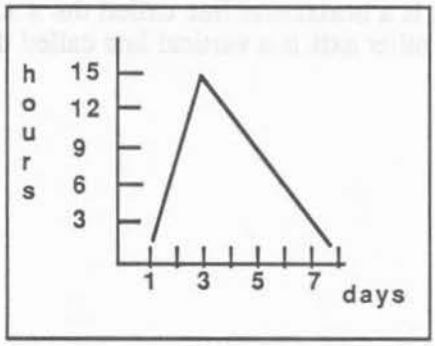


Figure P1

Notice also that the numbers along the X axis do not have to be in the same ***units*** (for example, degrees, days, hours, etc.) as the numbers along the Y axis. On the graph above, the X axis is divided into equal ***intervals*** and the Y axis is divided into equal ***intervals*** — but each axis is divided into different ***units***.

You can see, therefore, that there are three main rules to remember about a graph:

1. each axis must be divided into regular intervals
2. the interval you choose for the X axis may be different from the interval you choose for the Y axis.
3. the intervals along one axis may be in different units from the intervals along the other axis.

How do you graph data?

You're interested in making a graph so that you can see the relationship between two sets of numerical data — for instance, the average temperature for each month in a year. Now you know what a graph is, but how do you actually graph data? First, you'll need to learn a few definitions:

◊ To begin, you can call the collection of numbers that you want to place on your graph a DATA SET.

- Within that data set are DATA PAIRS, or pairs of corresponding numbers. Using Figure P1, for example, one corresponding pair might be the number of hours you worked during a certain day: let's say, 9 hours on day 2.

- The data from your data set which fall along the X axis are called the X COORDINATES and the data which fall along the Y axis are called the Y COORDINATES.

- A data pair is usually represented like this: (2,9) or, (X coordinate, Y coordinate.)

Now — to graph your data set, begin by creating a scale: determine a range of numbers that includes all the numbers in your data set, and then place those representative numbers at regular intervals along the X and Y axes. Next, look at your first data pair (X,Y), and determine where those numbers will fall on their respective axes. Then, draw an imaginary vertical line from the X coordinate, and draw an imaginary horizontal line from the Y coordinate. The point at which these two lines meet is called an INTERSECTION.

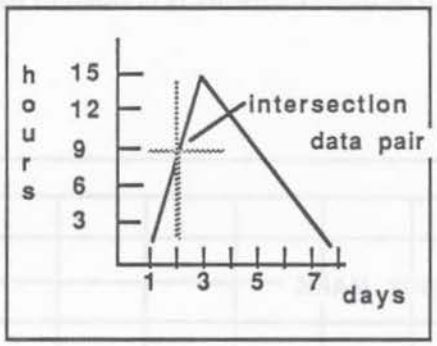


Figure P2

When you are graphing data on a grid, you must place a point (a dot or symbol) at the intersection of each corresponding set of numbers on the X and Y axes : this is called "plotting the points." Each of these points, then, represents one data pair - or one X coordinate and the corresponding Y coordinate. After you have plotted all of your points and have drawn a line connecting them, you have created a graph. (Figure P3)

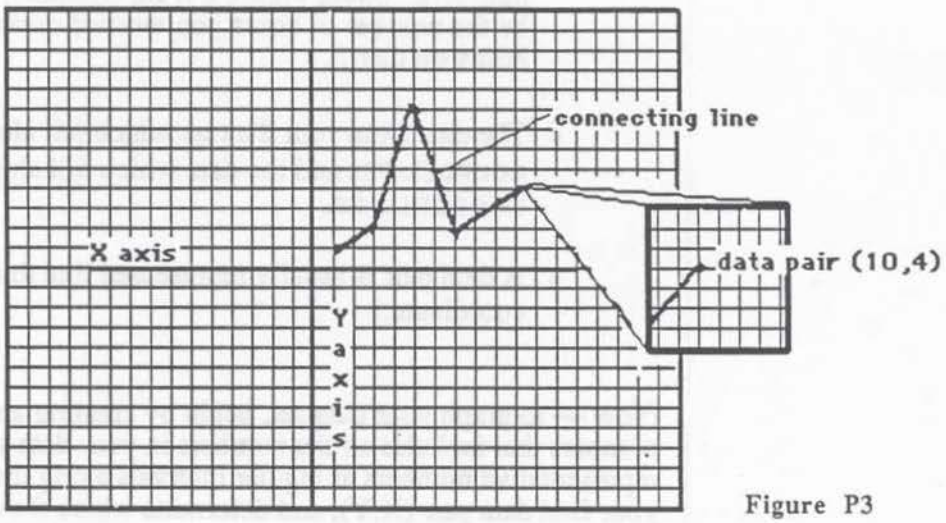


Figure P3

What is the Drexel Plot grid?

Figure P4 shows the Drexel Plot grid. Each element of this grid has been labeled to help you understand the various terminology which is used throughout this manual. Each of these elements is defined in the glossary and in Tutorials #1 - #3.

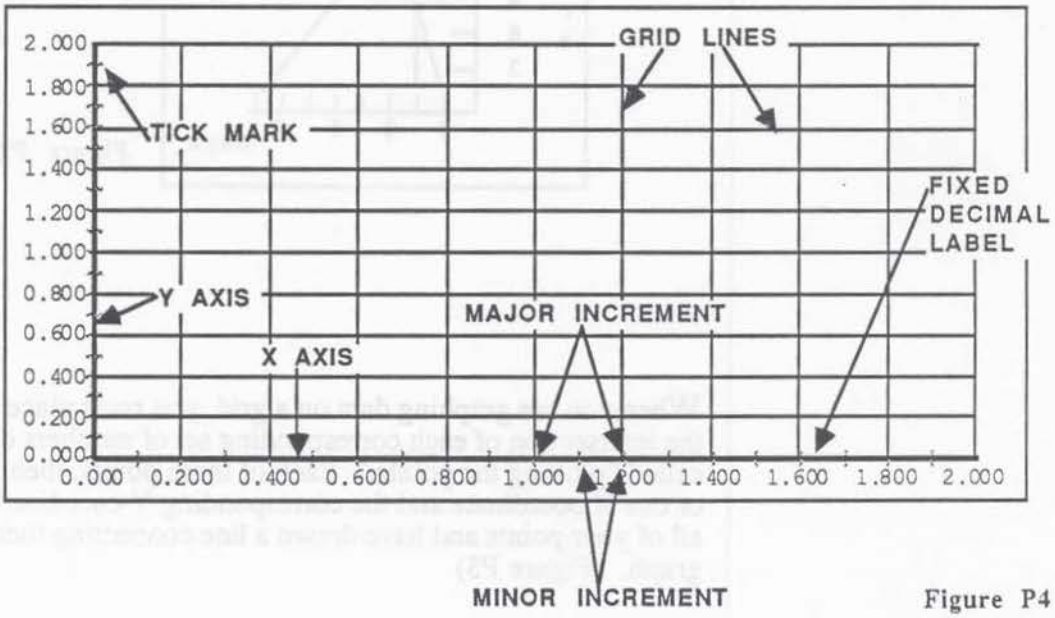


Figure P4

Tutorial #1

Graphing One Data Set

you will learn.....

- entering data
- editing data
- preparing the grid

Tutorial #1

Graphing One Data Set

In this tutorial, you will be plotting the average monthly snowfall for Philadelphia, Pennsylvania. You will learn how to enter data, edit data, and prepare the grid lines.

For this exercise, the list of snowfall accumulation and the list of months together are called a data set. One part of the data set, in this case the months, will represent the X coordinates and will be plotted along the X axis: the other part of the data set, the snowfall, will represent the Y coordinates and will be plotted along the Y axis.

Drexel Plot will accept only numerical data; therefore, if you have data which is not numerical you will have to convert it to numbers before you can enter it into the Drexel Plot data set window.

Entering data

1. **Insert the Drexel Plot disk into your Macintosh.**

2. **Click on the darkened Drexel Plot icon to open the Finder window.**

3. **Now open the Drexel Plot application by clicking on the Drexel Plot icon.**

   You should see the window labeled, "data set 1." In this window, there is a table with two cloumns labeled, "X-Coord" and "Y-Coord." In the cells under these columns, you can enter the values contained in your data set — in other words, the pairs of numbers which you want to graph.

Here is the data set for this tutorial:

Month	Average Snowfall (inches)
January	5.3
February	6.2
March	3.7
April	0.2
May	0
June	0
July	0
August	0
September	0
October	0
November	0.7
December	4.2
January	5.3

Remember: for this tutorial, the months data will be the X coordinates, and the snowfall data will be the Y coordinates.

?

How do you plan to enter the "months" data in this table?

On some graphs you could simply write the names of the months along the X axis: however, since Drexel Plot will accept only numerical data, you must choose numbers to represent the months. Begin with January as month #1.

4. Enter the first X coordinate in the first cell of the data set. Press RETURN.

After you have typed a number into a cell, you can move to the next cell by pressing either the RETURN key or the ENTER key, or by clicking the mouse in the following cell.

5. After you have entered all of your data, click in the circle labeled, "Use Data."

This indicates that you want to graph the data.

A few tips:

Don't worry if you see your numbers "growing" after you press the RETURN or ENTER key (for example, 5.300 instead of 5.3). This is due to the number of decimal places entered in the Decimal Digits cell of the "Display Format" command in the **Data** menu. You will be able to adjust this number later.

The square labeled, "Index Range" in the lower right hand corner of the Data Set window allows you to graph only a portion of the data which you have entered in the window. For example, if you wanted to graph only the snowfall data from February to April, or cells #2 - #4, you would enter the cell numbers "2" and "4" in the Index Range boxes.

? No one is a perfect typist. How can you correct a mistake you have made while typing in your data?

See the following instructions.

Editing data

1. **Select the cell where you have made the error.**
2. **Choose "Clear" from the Edit menu.**
3. **Type in the corrected number.**

You can also edit a data set using the same editing techniques you would use with MacWrite or other Macintosh applications. However, in Drexel Plot you can change only one cell at a time — you cannot select and clear an entire group of cells at one time.

*****Now you are ready to set up your grid.*****

Preparing the grid

1. **Select "Grid" from the Graph menu.**

In this box, you can set up the major elements of your grid: for example, the type of lines you want on the grid or the type of labels you want on the X and Y axes.

2. **In the column marked "Label", click in the boxes labeled "ON" for the X and Y axes.**

Label: The label option lets you choose whether or not you want to label the increments of the X and Y axes with your numerical data. If the boxes marked "ON" are blank, then the label option is not active. For this tutorial, let's label both axes.

3. **Double click in the square labeled, "Decimal Digits" at the bottom of the Grid box, and type in the number "1."**

Labels (Decimal Digits): This option lets you choose the number of decimal places you want

to represent with the labels on the grid. Whenever you choose to label your axes, you will also have to choose how many decimal places you would like to represent with the labels. You may choose to represent your decimal numbers either as fixed decimals or as floating decimals. Fixed decimals will have a finite number of decimal places, while floating decimals will be denoted by scientific notation — for example, "1*e* + 0."

? Why would you want to change the number of decimal places on the grid label?

Look at the snowfall data: notice that any element in this data set has a maximum of one decimal place; therefore, to keep your graph from looking too cluttered, you may choose to display only one decimal place for the grid label.

Remember: changing the decimal digits in the Grid window will change only the decimal digits on the grid - it will not change the decimal digits in the data set window.

4. Now look in the section labeled, "Grid Type."

This option lets you decide what kinds of lines you want to form your grid. You may choose any combination of lines and tick marks to make up your grid. Here is an example of a grid composed of lines and tick marks. (Fig. 1.0)

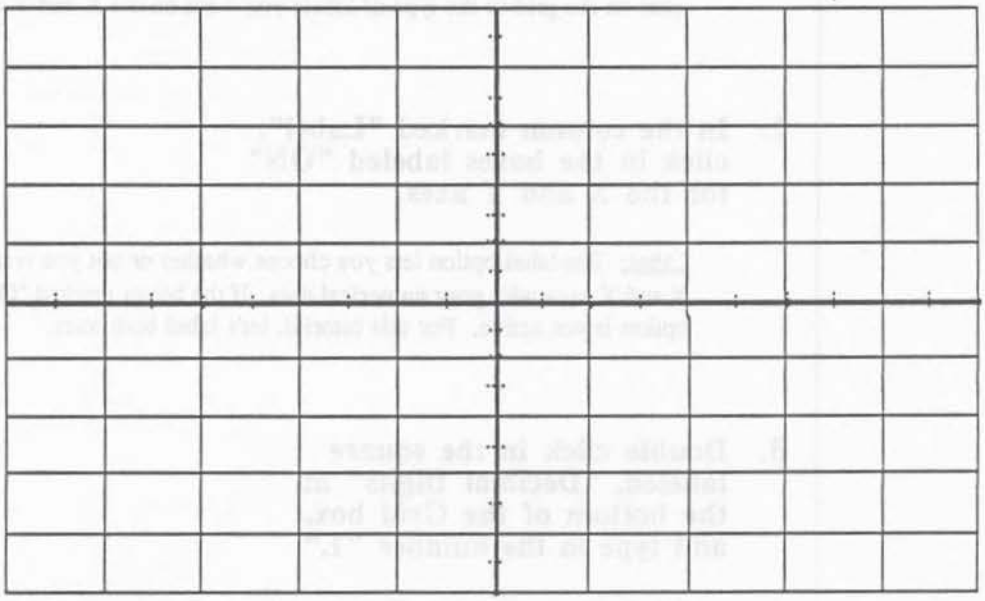


Figure 1.0

5. **Click in both circles labeled "line" for the major increments.**

Remember: the options you select in the Grid box will determine ***only*** the features of your grid — not of your graphed data. The Grid Type option, therefore, will set up the lines which ***actually form the grid***: it will not affect the lines which represent your plotted data points.

6. **Click in the circles labeled "tick" for the minor increments.**

Since this graph is a simple graph, it is not necessary to have lines representing the minor intervals. It would be nice to know, however, exactly where the minor intervals do occur on the graph; therefore, you can mark these intervals with small "tick marks" along the axes.

7. **Click on "OK" in the Grid box, and then choose "Show Graph" from the Graph menu.**

Your graph should look like this: (Figure 1.4)

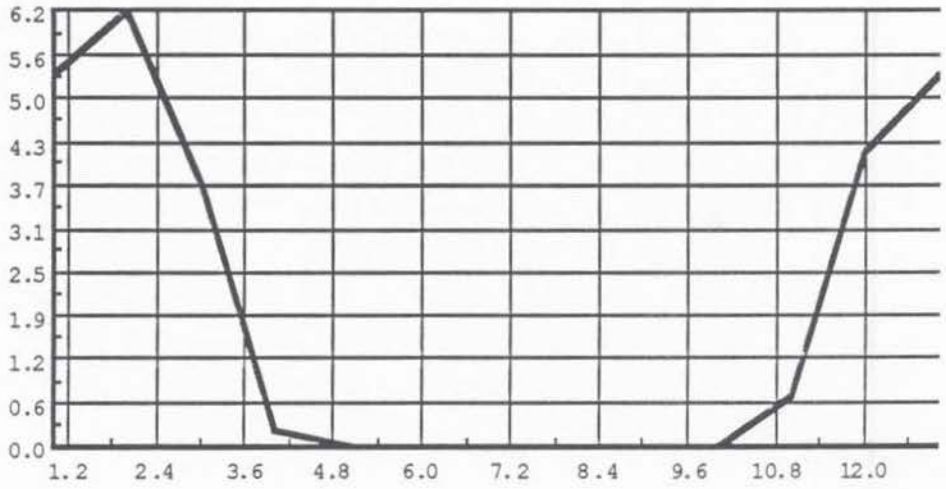


Figure 1.4

8. 'Now save this graph and label it "SNOW."

In this tutorial you have learned how to create a simple graph using Drexel Plot. Now you are ready to learn some more advanced graphing techniques.

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Remember: the options you select in the Grid box will determine *only* the features of your grid — not of your graphed data. The Grid Type option, therefore, will set up the lines which *actually form the grid*: it will not affect the lines which represent your plotted data points.

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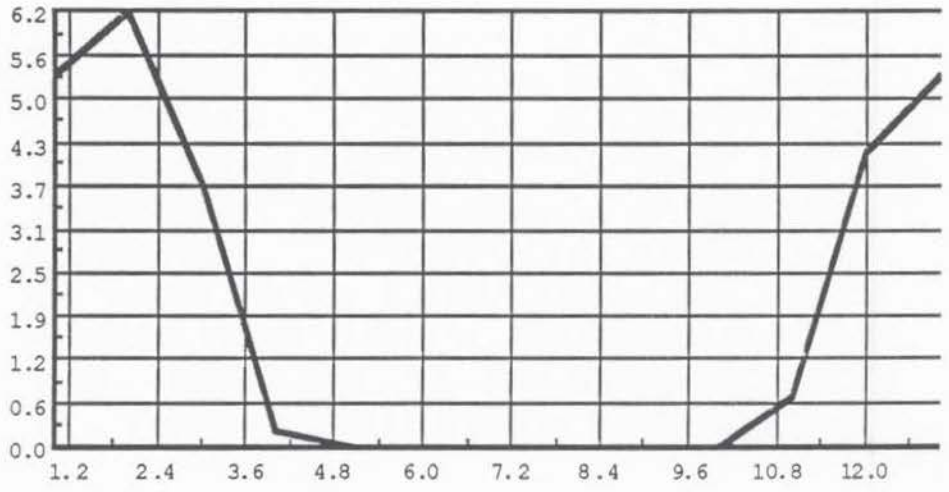


Figure 1.4

8. Now save this graph and label it "SNOW."

In this tutorial you have learned how to create a simple graph using Drexel Plot. Now you are ready to learn some more advanced graphing techniques.

Tutorial #2

Adding More Data to Your Graph

you will learn.....

- adjusting decimal places in a data set
- choosing line types

Tutorial #2

Adding More Data to Your Graph

With the graph you made in Tutorial #1, you can determine the average snow accumulation for any one month of a year. If you follow the plotted line on the graph, you will see that there was no snow at all during months, #5 - #10 (May - October), and that the greatest accumulation occurred during month #2 (February). In this tutorial, you will add some rainfall data to the snow accumulation graph, and you will learn how to adjust the graph to accommodate both data sets. Specifically, you will learn to adjust the decimal places in a data set window, and to choose line types for your plotted data. Once you have graphed your data, you will be able to see the average rainfall accumulation for each month. By combining this graph with the graph from Tutorial #1, you will also be able to compare the average snowfall and the average rainfall for each month.

This is Data Set II:

Month	Average Rainfall (inches)
January	3.16
February	3.11
March	3.52
April	3.29
May	3.34
June	3.65
July	4.10
August	4.50
September	3.41
October	2.79
November	3.10
December	3.21
January	3.16

? Do you see any difference between this rainfall data and the snowfall data from Tutorial #1?

The rainfall data is represented with two decimal places, and the snowfall data is represented with only one decimal place.

1. Open the file you saved from tutorial #1.

2. **Choose, "Show Data Set II" from the Data menu and enter the rainfall and months data.**

   Again, the months will represent the X coordinates and rainfall will represent the Y coordinates. (See the instructions in Tutorial #1 if you have trouble with this step).

3. **Now, click on the option, "Use Data."**

Adjusting decimal places in the Data Set window

When you enter your data into Data Set II, you may notice that the numbers in the "X-Coord" and "Y-Coord" columns will not be entered with two decimal places, but instead will be automatically increased to three decimal places. How can you adjust the numbers in the Data Set window so they will have only two decimal places?

1. **Choose "Display Format" from the Data menu.**

2. **Double click on the box labeled "Decimal Digits", and enter the number "2." (Be sure the button labeled, "Fixed Decimal" is also darkened).**

3. **Now click on "OK", and return to the Data Set II window.**

   You will see that all of your numerals in both Data Set I and Data Set II are now represented with two decimal places.

Remember: use the "Display Format" command whenever you wish to adjust the number of decimal places in your Data Set windows.

*****Now you should choose a different line to represent each data set.*****

Choosing line types

? How can you tell which line on your graph represents snowfall, and which line represents rainfall?

You will have to distinguish these two lines with different symbols or by different line thicknesses.

1. Select "Line Controls" from the Graph menu.

In this window, you may choose different lines and symbols to represent your data. This is especially helpful if you are graphing more than one set of data on one graph.

2. Click in the circle marked, "Data Set I", then choose a thick line with no symbols to represent your first data set.

Drexel Plot will automatically save the line control options you entered for Data Set I.

3. Now click in the circle labeled, "Data Set II" and choose a thin line with the "*" character.

For future graphs, you can use any symbol on the Macintosh keyboard.

4. Click on "OK" to close the Line Type window, and then choose "Show Graph" from the Graph menu.

Your graph should look like this: (Fig. 2.0)

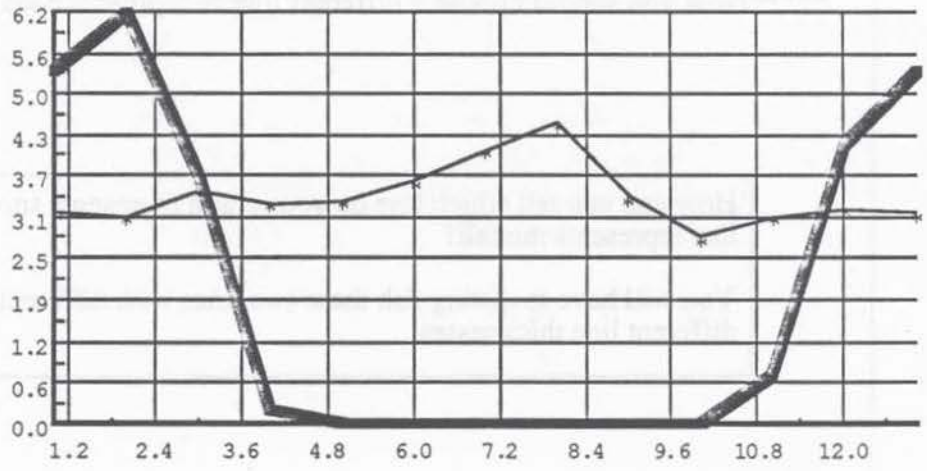


Figure 2.0

5. Save this graph using the "Save" command in the File menu.

You will use this graph for Tutorial #5.

In this tutorial, you learned how to graph two data sets. Next, you will learn how to custom design the elements of your grid and graph.

Tutorial #3

Using Automatic and Manual Scaling

you will learn.....

- using Automatic Scaling
- using Manual Scaling
- adjusting the range of the grid scale
- adjusting the increments of the grid scale
- adjusting the axis origin

Tutorial #3

Using Automatic and Manual Scaling

In Tutorials #1 and #2, Drexel Plot automatically set a scale on your grid according to the numbers you entered in your data set. For some graphs, you may prefer this AUTOMATIC SCALING function. But suppose you wanted a grid scale that included a range of data larger than the range covered by your data set? Or, suppose you wanted to change the increments on the scale? Drexel Plot has another option which lets you adjust these elements — MANUAL SCALING. Try entering the following temperature data into a data set, and graphing it using automatic scaling. You will have to create a new file for this exercise.

Using Automatic Scaling

1. **First, create a new Drexel Plot file by choosing "New" from the File menu.**

2. **Now enter the following data into Data Set I and click on "Use Data."**

Data Set I

Month	Average Temperature (°F)
January	33.1
February	33.8
March	41.6
April	52.2
May	63.0
June	71.8
July	76.6
August	74.7
September	68.4
October	57.5
November	46.2
December	36.2
January	33.1

3. **After you have entered this data, choose "Grid" from the Graph menu and enter the number "1" in the box labeled, "decimal digits."**

4. Now click on "OK" and choose "Show Graph" from the Graph menu.

Did you remember to "Use Data"?

Your graph should look like this: (Fig. 3.0)

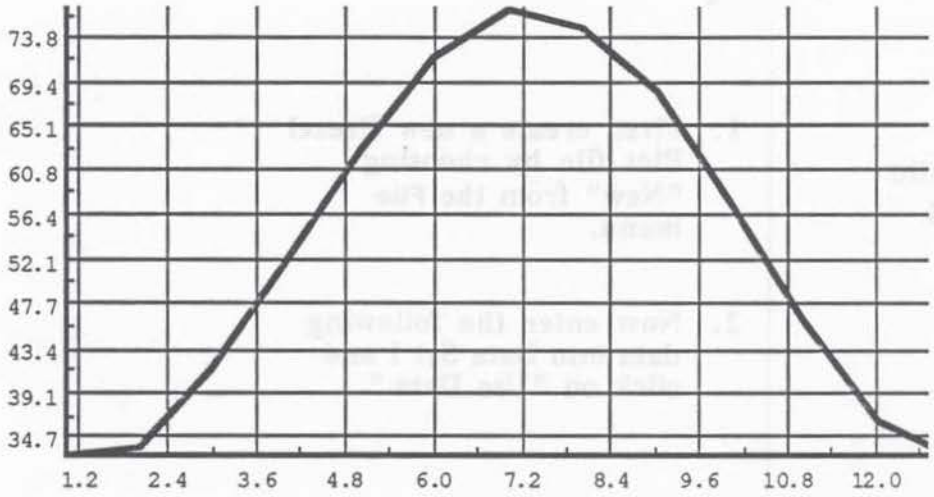


Figure 3.0

Using Manual Scaling

Although Figure 3.0 is an accurate graph of the temperature data, you may wish to adjust the scale of the X and Y axes to include a wider range of temperatures — for instance, -2°F or 105°F. In addition,you may want to place a more standard increment along your axes: for example, 5°F or 10°F along the Y axis, and 1 (month) along the X axis. To change the increments and the labels on your graph, you can use the Drexel Plot scaling option, "Manual Scaling."

1. Choose "Scaling" from the Graph menu.

The circle labeled, "Automatic Scaling" is darkened: when you choose this option, Drexel Plot will create a grid of 10 horizontal and 10 vertical lines, and will create a scale along each axis by dividing your range of data equally among the ten lines (see Fig. 3.0). If you choose "Manual Scaling", you will be able to design your own grid range and scale.

Adjusting the Grid Range:

1. **Select the option labeled, "Manual Scaling" in the "Scaling" box.**

   Notice that four squares are provided for you to adjust the range of your grid: a low and high value for the X axis, and a low and a high value for the Y axis. You will also see that the range for the X values (months) does not need to be adjusted for this particular graph.

2. **Double click in the first square in the Y range.**

   Since you are preparing a graph of temperature data, you will want the scale on the grid to include a wide range of real temperatures. For this graph, try a temperature range of 30°F to 90°F:

3. **Type in the number,"30."**

4. **Press RETURN.**

5. **Now enter "90" in the remaining box for the Y axis.**

6. **Click on "OK."**

   Your graph should look like this: (Fig. 3.1)

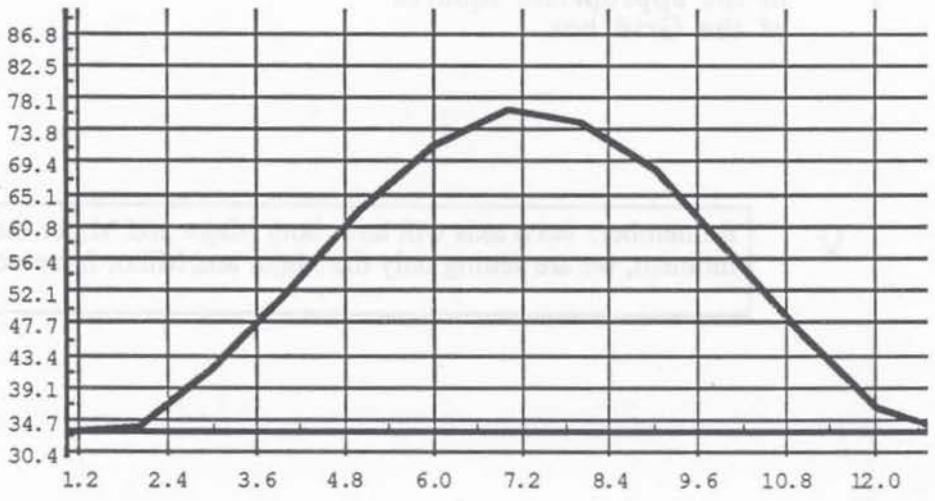


Figure 3.1

adjusting grid increments on the Y axis

The graph in Figure 3.1 still doesn't look quite right. For one thing, the scale along the Y axis is still in increments of 4.3 units; therefore, the graph looks too crowded. Even worse, the axis origin is in the wrong place — about (1,33). You will be able to change the axis origin in the last section of this tutorial. For now, concentrate on changing the grid increments.

1. Choose "Grid" from the Graph menu.

When you are choosing the increments for your grid, it is important to consider the range of your data. For example, data such as temperatures can range anywhere from below 0°F to above 90°F. With this wide range of data, you cannot possibly use an increment of 1°F on your grid. For the data in this tutorial, it is logical to pick a Major Increment of 5°F, and a Minor Increment of 2.5°F, for the Y axis.

Remember: the increments on the X and Y axes must be in regular, repeating intervals.

2. Enter the Major and Minor Increments for the Y axis in the appropriate squares of the Grid box.

Remember: *each* axis will have both Major and Minor Increments: at this moment, we are setting only the Major and Minor Increments for the Y axis.

*****Here's a little help to get you started:*****

i. **Double click in the "Y" square of the row labeled, Major Increment.**

ii. **Type in the number, "5."**

iii. **Press RETURN two times to get to the box labeled "Minor Increment" for the Y axis.**

iv. **Now type in the number, "2.5."**

adjusting grid increments on the X axis

If you look at the data representing the X coordinates (months), you will notice that it has a small range (1 - 13) and occurs in regular increments (units of 1 month). Therefore, you can use an interval of "1" for the Major Increments on the X axis of your graph, and an interval of 0.5 for the Minor Increments.

1. **Enter the appropriate values for the Major and Minor Increments of the X axis.**

2. **Click on "OK."**

Your graph should look like this: (Fig. 3.2)

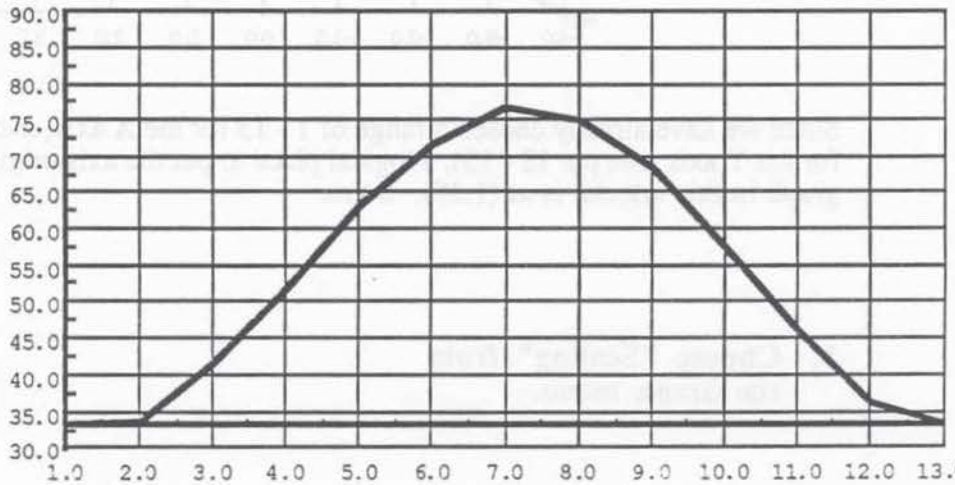
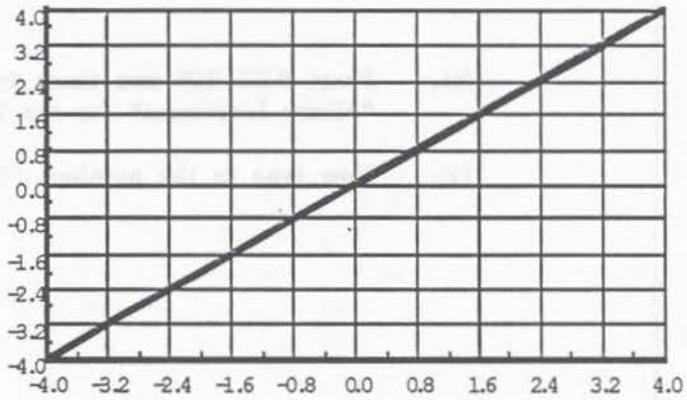


Figure 3.2

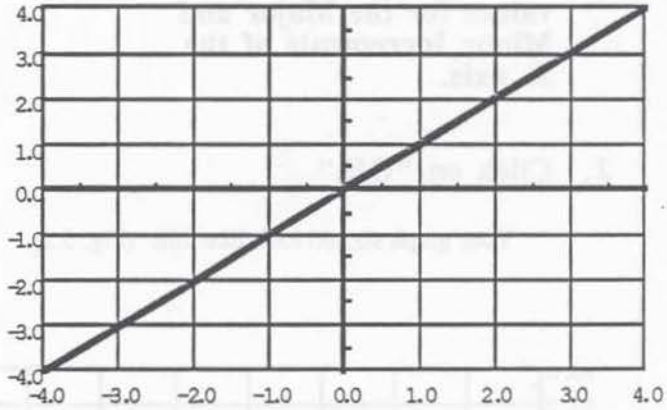
Adjusting the Axis Origin

Your graph is beginning to look a little better, but you still must adjust the axis origin. When you use Automatic Scaling, Drexel Plot will set the axis origin at the lowest X coordinate and the Y coordinate of your data set .

For example, if you use Automatic Scaling to plot data which ranges from -4.0 to 4.0 on each axis, your graph would look like this:



With Manual Scaling, however, you could choose your own axis origin. If we set the axis orign at (0,0) for this same set of data, your graph would look like this:



Since we have already chosen a range of 1 - 13 for the X axis, and a range of 30°F - 90°F for the Y axis (see pp. 12 - 13), a logical place to put the axis origin for the temperature graph in this tutorial is at (1,30). So.....

1. Choose "Scaling" from the Graph menu.

2. Double click in the axis origin square for the Y axis.

The origin for the X axis is already set at "1" by Automatic Scaling, so you won't need to adjust this number.

3. Now, type in the number, "30", and click "OK."

Your graph should look like this: (Fig. 3.3)

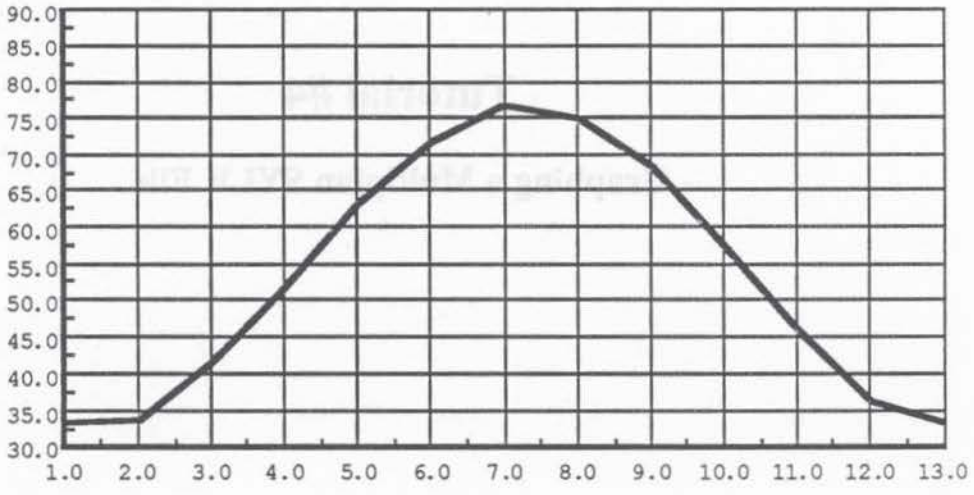


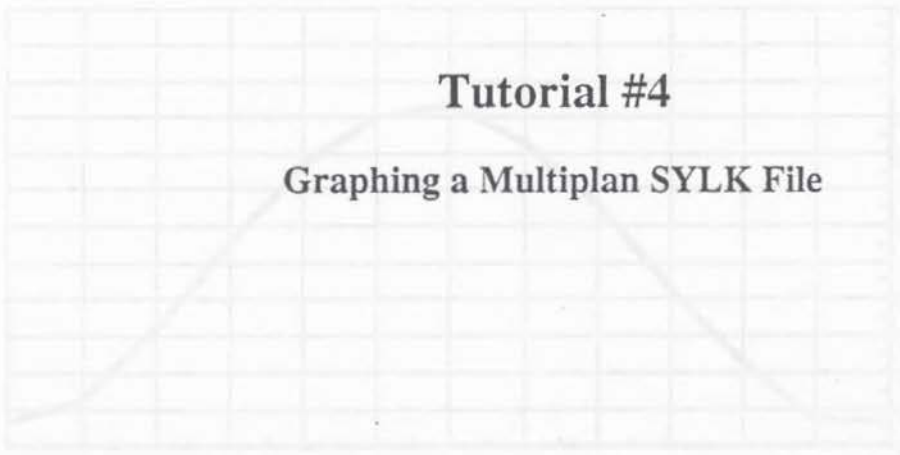
Figure 3.3

You have seen that you can adjust the axis origin *and* the scale of your grid with Drexel Plot's Manual Scaling option. Once you've made these adjustments, however, you cannot return to the Automatic Scaling option without losing all of the changes you made with Manual Scaling. But remember that you do not have to change *every* available option with Manual Scaling. In some instances, you might want to change only one element of your grid - for example, the scale. In these cases, you should use Automatic Scaling to prepare your grid, and then use Manual Scaling to make your changes.

Through Tutorials #1 - #3, you have learned almost everything you will need to know to graph data using Drexel Plot: entering data, setting up your graph, and adjusting your graph to fit your data. The next two tutorials will cover extra information: how to plot Multiplan SYLK files, how to use the "Copy Plot" option in the **Edit** menu, and how to use Drexel Plot's special 'zoom' function.

Tutorial #4

Graphing a Multiplan SYLK File



you will learn.....

- opening a SYLK file in Drexel Plot
- entering SYLK file data into a Drexel Plot data set

Tutorial #4

Graphing a Multiplan SYLK File

A Multiplan SYLK (Symbolic Link) FILE is a special data format for a Multiplan spreadsheet which can be easily transferred to another computer or Macintosh application. If you have a collection of data entered in a Multiplan spreadsheet which you would like to graph with Drexel Plot, you must save the document as a SYLK file, using the "Save As" command in the **File** menu of the Multiplan application. You may then transfer all or part of that file to a Drexel Plot diskette.

You will see a Multiplan document on the Finder of your Drexel Plot diskette. This document is a Multiplan SYLK file of the average monthly temperature in Philadelphia, Pennsylvania.

avg. temp.

This is how the SYLK file appears in a Multiplan document: (Fig. 4.0)

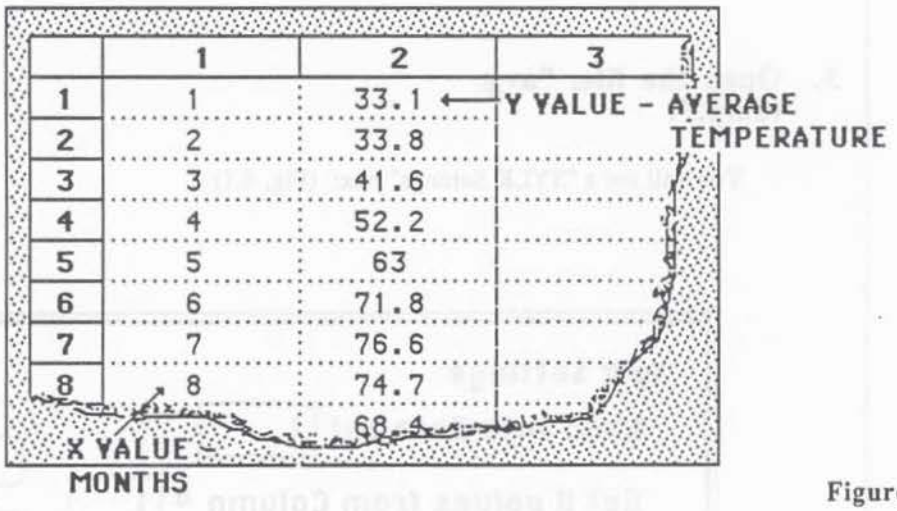


Figure 4.0

Remember: you can create a SYLK file only by using the "Save As" command in the **File** menu of the Multiplan application, and then clicking on the button labeled, "SYLK."

?

A Multiplan document will accept text as well as numerical data; so, why are the months in Figure 4.0 represented by numbers?

Although the Multiplan application accepts text and numerical data, the Drexel Plot application does not. If you want to transfer a Multiplan SYLK file to Drexel Plot, therefore, all of your data in the SYLK file must be entered as numbers. You may still have text headings in the SYLK file as long as they are not a part of the data which you intend to graph.

Opening a SYLK file in Drexel Plot

1. **Open the Drexel Plot application by clicking on the Drexel Plot icon and choosing "Open" from the File menu.**

2. **Choose "Open SYLK" from the File menu.**

   After you have chosen the "Open SYLK" option, a list of all the SYLK files on your diskette will appear on your screen. There should be only one SYLK file in this list on a new Drexel Plot diskette.

3. **Open the file, "avg. temp.".**

   You will see a "SYLK Settings" box: (Fig. 4.1)

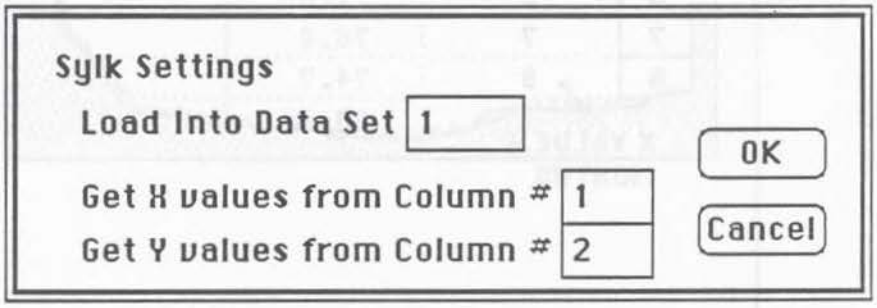


Figure 4.1

You must enter three values in the SYLK Settings box:

- ◇ the number of the data set in which you want to enter your data.
- ◇ the column number of the SYLK file which contains the values representing the X coordinates
- ◇ the column number of the SYLK file which contains the values representing the Y coordinates

Entering SYLK file data into a Drexel Plot data set

1. **Enter the appropriate numbers for each of the SYLK settings (data set #, X-Coord, Y-Coord) and click on the "OK" button. (See Fig. 4.0 for appropriate values.)**

   After you click "OK", the diskette will 'read' your SYLK file and will automatically enter the spreadsheet values into the data set.

? Will your data be plotted automatically on the Drexel Plot grid?

No - Drexel Plot cannot use the data you have entered until you have chosen the "Use Data" option in the Data Set box.

2. **Choose "Show Data Set I" from the Data menu.**

3. **Click on "Use Data," then choose "Show Graph" from the Graph menu.**

You have now graphed a Multiplan SYLK file with Drexel Plot: the graph should look like this: (Fig. 4.2)

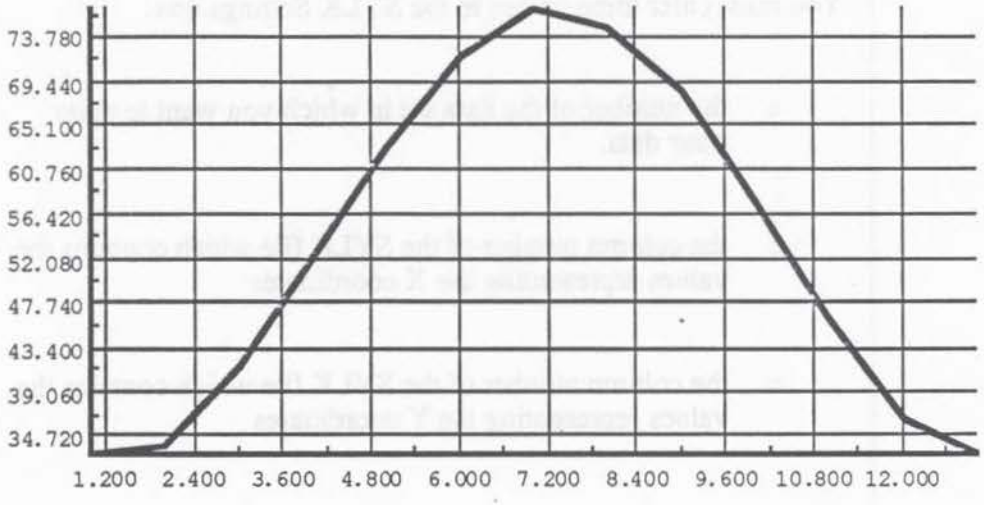


Figure 4.2

In this tutorial you graphed a Multiplan SYLK file. If you wish, you may use Manual Scaling to modify the range, major and minor increments, and axis origin of your graph.

Now let's look at some additional features of Drexel Plot.

Tutorial #5

Additional Features

you will learn.....

- using the "Copy Plot" command
- pasting a Drexel Plot grid into MacPaint
- using the 'zoom' feature

Tutorial #5

Additional Features

Drexel Plot offers two features which enable you to easily manipulate a Drexel Plot graph: the "Copy Plot" command, and the 'zoom' function. You can use the "Copy Plot" command to copy a Drexel Plot graph, and then paste that graph into another Macintosh application. You can use the 'zoom' function to magnify certain portions of your graph. Each feature is discussed below.

Using "Copy Plot"

You can add text and graphics to your Drexel Plot graph by pasting it into MacDraw. Suppose, for example, you wanted to write the names of the months along the X axis of the rainfall/snowfall graph you created in Tutorial #2? Using MacDraw, you can add these names, as well as any other additional graphics:

1. **Open the Drexel Plot document which you saved from Tutorial #2.**

2. **Choose "Show Graph" from the Graph menu.**

3. **Now, select "Copy Plot" from the Edit menu.**

   When you choose this option, Drexel Plot will place a copy of your graph into the Macintosh Clipboard (see the Macintosh User's Guide if you do not understand the Clipboard).

4. **Quit Drexel Plot.**

5. **Eject the Drexel Plot disk, but *do not* turn off the Macintosh.**

   If you turn off the Macintosh after you have ejected the diskette, you will erase the contents of the Clipboard.

6. **Insert MacDraw into your Macintosh.**

   If you are working with only one disk drive, the Macintosh will ask you to 'swap disks' several times.

7. **Click on the MacDraw icon and choose "Open" from the File menu.**

   Now you will see a blank MacDraw screen.

8. **Choose "Paste" from the Edit menu.**

   Your Drexel Plot graph will automatically be transferred from the Clipboard to the Macintosh screen. Now your graph has become a MacDraw document, and can be edited as you wish.

Pasting a Drexel Plot grid into MacPaint

You can also add text and graphics to your Drexel Plot graph by pasting the graph into MacPaint. Because the MacPaint screen is smaller than the Drexel Plot screen, however, you will not be able to use the "Copy Plot" command to paste a Drexel Plot grid into MacPaint — a portion of the graph will be cut off in the MacPaint application. You can, however, paste a Drexel Plot grid into MacPaint using the Macintosh 'screen dump' technique.

1. **Open the Drexel Plot document which you saved from Tutorial #2.**

2. **Choose "Show Graph" from the Graph menu.**

3. **Now, press and hold all of these keys at the same time: SHIFT, COMMAND, 3.**

   When you press this combination of keys, you will automatically create a MacPaint document of your graph.

4. **Close your Drexel Plot document, and return to the Finder.**

   Do you see the icon of the new MacPaint document?

Screen 0

5. **Copy the MacPaint icon onto a disk which contains a MacPaint application.**

Your Drexel Plot graph is now a MacPaint document, but it is also still saved as a Drexel Plot application. Using the SHIFT - COMMAND - 3 sequence, you can automatically create a MacPaint document of a Drexel Plot graph, or any other Macintosh application.

Using the 'zoom' feature

If you have created an especially complex graph, you might want to enlarge one portion of it in order to see the plotted points more clearly. You can use Drexel Plot's 'zoom' function to do this.

1. **Open the Drexel Plot document which you saved from Tutorial #2.**

2. **Choose "Show Graph" from the Graph menu.**

Determine the area of your graph which you want to enlarge.

3. **Place the pointer (arrow) in the upper left corner of the area which you plan to enlarge.**

4. **Hold down the mouse button and drag the mouse diagonally to the bottom right corner of the area you're enlarging.**

Drexel Plot will automtically switch your graph to the Manual Scaling mode, and will enlarge the particular area of your graph.

5. **Now select "Scaling" from the Graph menu, choose the Automatic Scaling mode, and click "OK."**

You will see that the enlarged portion of your graph has returned to its original size.

You can use the "Copy Plot" command to copy a 'zoomed' graph into MacPaint (remember — it will cut off some of the graph) or MacWrite. This command does not work as well with the MacDraw application, however, because the 'zoomed' graph will copy into MacDraw along with some extraneous material.

Now you have completed five tutorials which will help you to use the Drexel Plot graphing package. Remember — you can always refer to the reference and glossary sections for additional help while you're using Drexel Plot.

A Drexel Plot Reference and Glossary

In this menu...	select...	to...	using...
File	"Open Sylk"	open a Multiplan Sylk file within Drexel Plot and enter the numerals contained in the Multiplan cells into a Drexel Plot data set.	
	"Print"	print a plot. Use standard or high quality only.	
Edit	"Copy Plot"	copy a Drexel Plot graph into other Macintosh applications such as MacDraw and MacWrite.	
Data	"Show Data Set I"	enter your data into the data table. You may enter up to 255 pairs of data (X and Y coordinates) in each data window.	**index range** — graph only a certain portion of your entered data. For example, to graph data pairs #2 through #4, enter the numbers, "2" and "4" in the Index Range boxes at the bottom of the Data Set box. **use data** — graph your data. If you do not click on this option, your data will be entered in the data set, but it will not be graphed on the grid.
	Show Data Set II" (also III and IV)	enter additional data sets as you did with your first data set.	
	"Display Format"	set the desired number of decimal places in the data set box.	

In this menu...	select...	to...	using...
Graph	"Show Graph"	see your lines graphed according to the data which you entered and selected in the data set boxes.	
	"Scaling"	adjust your graph to the desired range, axis origin, data set, and scaling options.	**automatic scaling**— have the grid range, grid increments, and axis origin automatically set according to your data set. **manual scaling**— retain the option of setting your own grid range, grid increments, and axis origin. This option is helpful when your data covers a particularly wide range. **range**— set your maximum and minimum X and Y coordinates. This option will operate only with "Manual Scaling." **axis origin**— adjust the X and Y axes to any midpoint position to accomodate both positive and negative data points. This option will operate only with "Manual Scaling."
	"Grid"	adjust the increments on the X and Y axes; choose between labeled and non-labeled axes; choose the number and type of decimal digits you wish to represent on the axis labels; and choose the type of line you wish to have on your grid.	

A Drexel Plot Glossary

automatic scaling — an option provided by Drexel Plot which automatically sets the range, and major and minor increments of your graph based upon the numbers you enter in the data set.

axis origin — the point on a graph where the X axis and the Y axis intersect.

data pair — the corresponding X and Y coordinates of a data set.

data set — a group of data pairs which you wish to graph.

fixed decimal — a number having a finite number of decimal places represented along the axis of a graph.

floating decimal — a number along the X and Y axes in which the decimal places are represented by scientific notation (base 10).

graph — a visual representation of the relationship between two sets of numbers.

grid — a series of regularly - spaced horizontal and vertical lines on which you construct your graph.

intersection — the point on a graph at which an imaginary line drawn vertically from the X axis crosses an imaginary line drawn horizontally from the Y axis.

major increment — the largest regularly repeating interval along the X and Y axes which creates a series of regularly repeating divisions along the axes.

manual scaling — an option provided by Drexel Plot which allows you to set your own range, and major and minor increments of your graph.

minor increment — a regularly repeating interval along the X and Y axis which is one-half the length of a major increment.

range — the totality of points included in a data set.

scale — a series of numbers, placed at regular intervals along the X and/or Y axes of your graph, which represents the total set of X coordinates and/or Y coordinates of your data set.

SYLK file — a special data format for a Multiplan spreadsheet which you can transfer to another Macintosh application.

tick mark — a small slash which marks the position of the major and/or minor increments along the X and Y axes .

X axis — the main horizontal line of a graph where the scale for the X values is placed.

X coordinate — the X value of a data pair which is located on the scale along the X axis.

Y axis — the main vertical line of a graph where the scale for the Y values is placed.

Y coordinate — the Y value of a data pair which is located on the scale along the Y axis.