

Paper 146-2009

**SAS/GRAPH<sup>®</sup> for the Timid****Earl Westerlund, University of Rochester, Rochester, NY****ABSTRACT**

SAS/GRAPH is one of the foundation products of SAS<sup>®</sup>, and an invaluable tool for anybody who needs to see the information in the data. Its procedures work the same way as any other procedure. But the number of procedures, statements and options available are so numerous – and, in many cases, cryptic – that many people become intimidated.

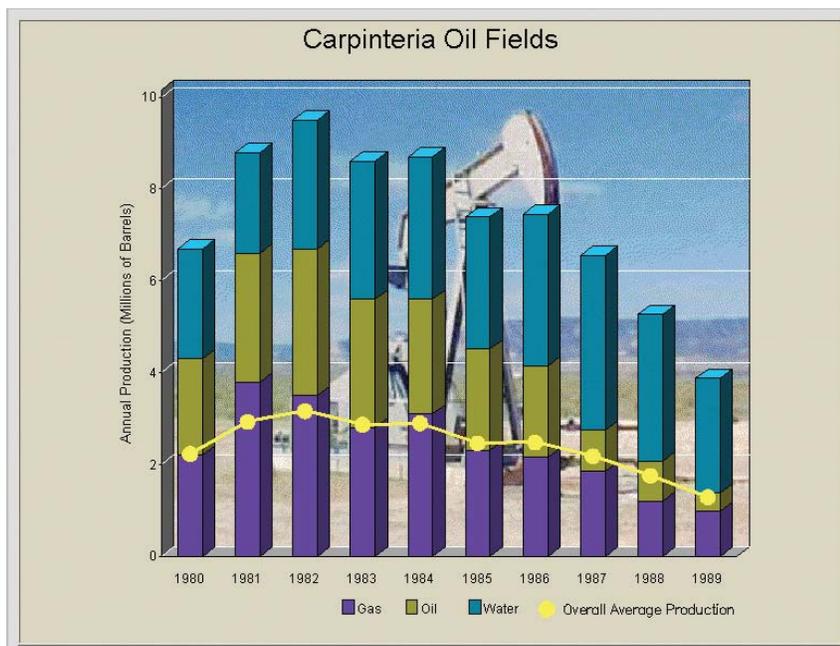
The purpose of this paper is to provide a gentle introduction to SAS/GRAPH, with numerous examples to show how the fundamentals work. It is based on the following premises:

- If you can create a crosstab in PROC FREQ, you can create a plot in PROC GPLOT.
- If you can set a title or footnote, you can change the appearance of a graph line.
- If you can change the linesize of a listing, you can change the color of the title text.

This paper is intended for those who have not used SAS/GRAPH, or those who have tried and given up in frustration.

**INTRODUCTION**

One of the reasons that people perceive SAS/GRAPH to be difficult is the abundance of options. There are options to display multiple colors, 3D charts and graphs, add graphic backgrounds, etc. This is an example from a SAS marketing brochure:



Source: [http://www.sas.com/technologies/bi/query\\_reporting/graph/factsheet.pdf](http://www.sas.com/technologies/bi/query_reporting/graph/factsheet.pdf)

This graph requires a number of statements and options to produce. It's very intimidating for a newcomer to SAS/GRAPH. (It's also unnecessarily busy; much of the information in this graph is distorted or obscured.)

We are going to stick to the basics:

- The GPLOT and GCHART procedures
- A few enhancements to the TITLE and FOOTNOTE statements
- A few new statements

- A few new options

We are not going to discuss all the various options and permutations of these statements, but only those used in these simple examples. Not only will sticking to these few components make your life simpler, they will often result in better graphs.

## THE GPLOT PROCEDURE

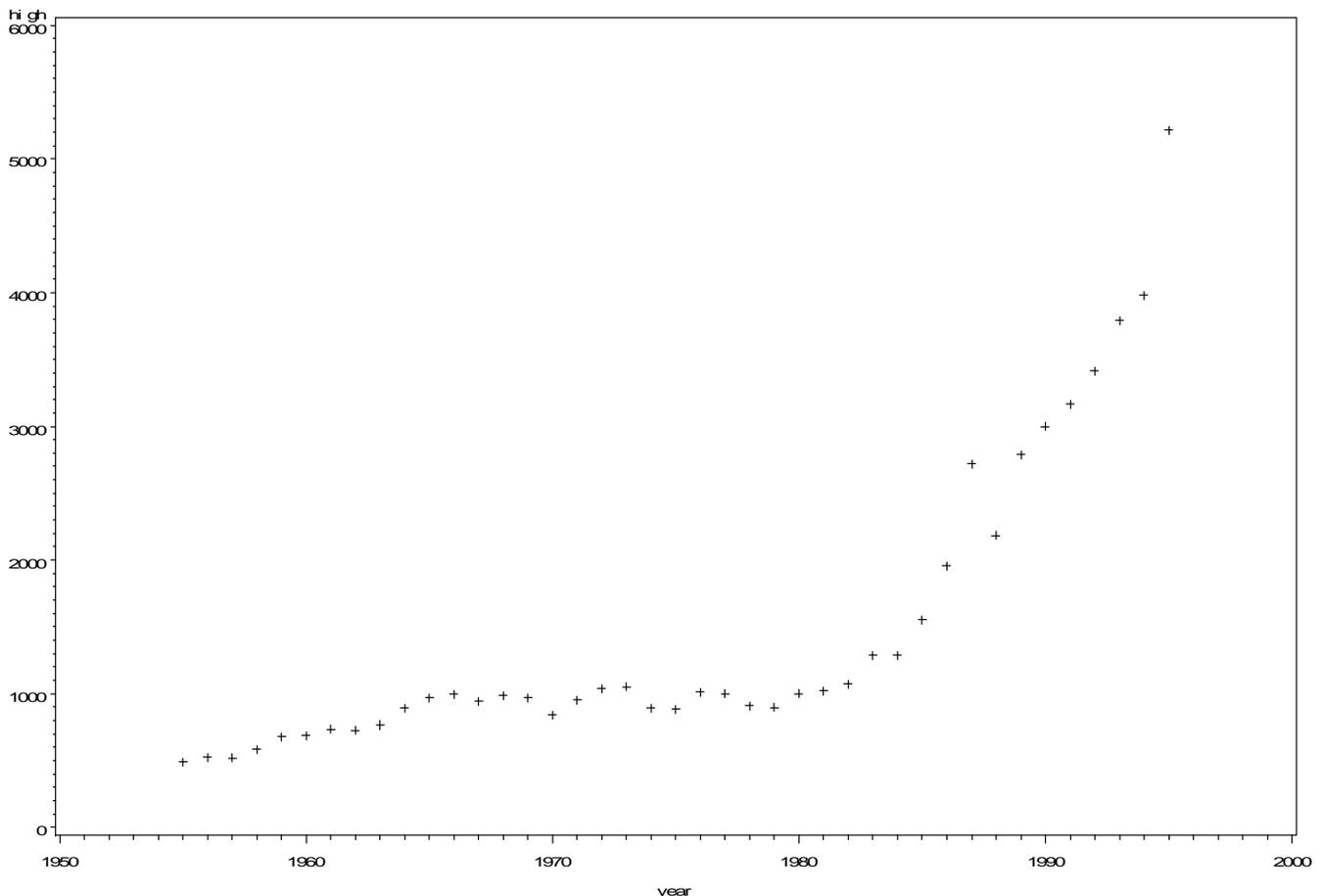
For the GPLOT procedure examples, we will use the yearly high and low values of the Dow Jones Industrial Average from 1955 through 1995:

year	hdate	high	ldate	low
1955	30DEC1955	488.40	17JAN1955	388.20
1956	06APR1956	521.05	23JAN1956	462.35
1957	12JUL1957	520.77	22OCT1957	419.79
1958	31DEC1958	583.65	25FEB1958	436.89
		.		
		.		
		.		

## STARTING SIMPLY

The simplest form of the procedure is to specify the data set, and the Y vs. X pairs to plot. The Y value comes first in the pair:

```
proc gplot data=SASdataset;
  plot high*year;
run; quit;
```



gpl of 1. sas

This produces a very simple, yet useful, graph:

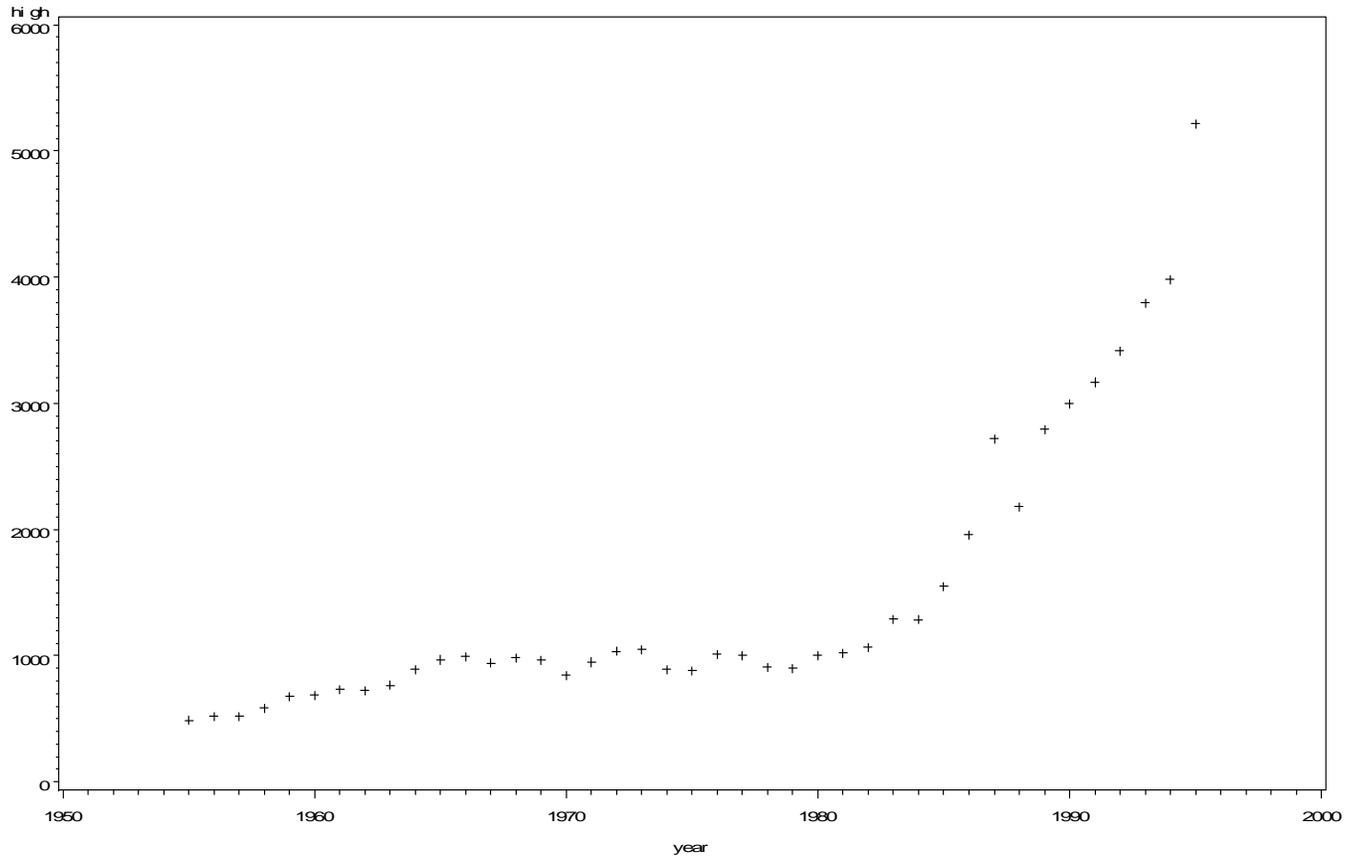
(The reason for including both the RUN and the QUIT statements is that GPLOT is an interactive procedure. Changes can be made to the graph without restarting the procedure.)

### ADDING A TITLE

You will probably want to add a title. We do this the same way any other SAS output gets titles: with a TITLE statement.

```
title 'Dow Jones Yearly Highs';  
proc gplot data=SASdataset;  
  plot y*x;  
run; quit;
```

Dow Jones Yearly Highs



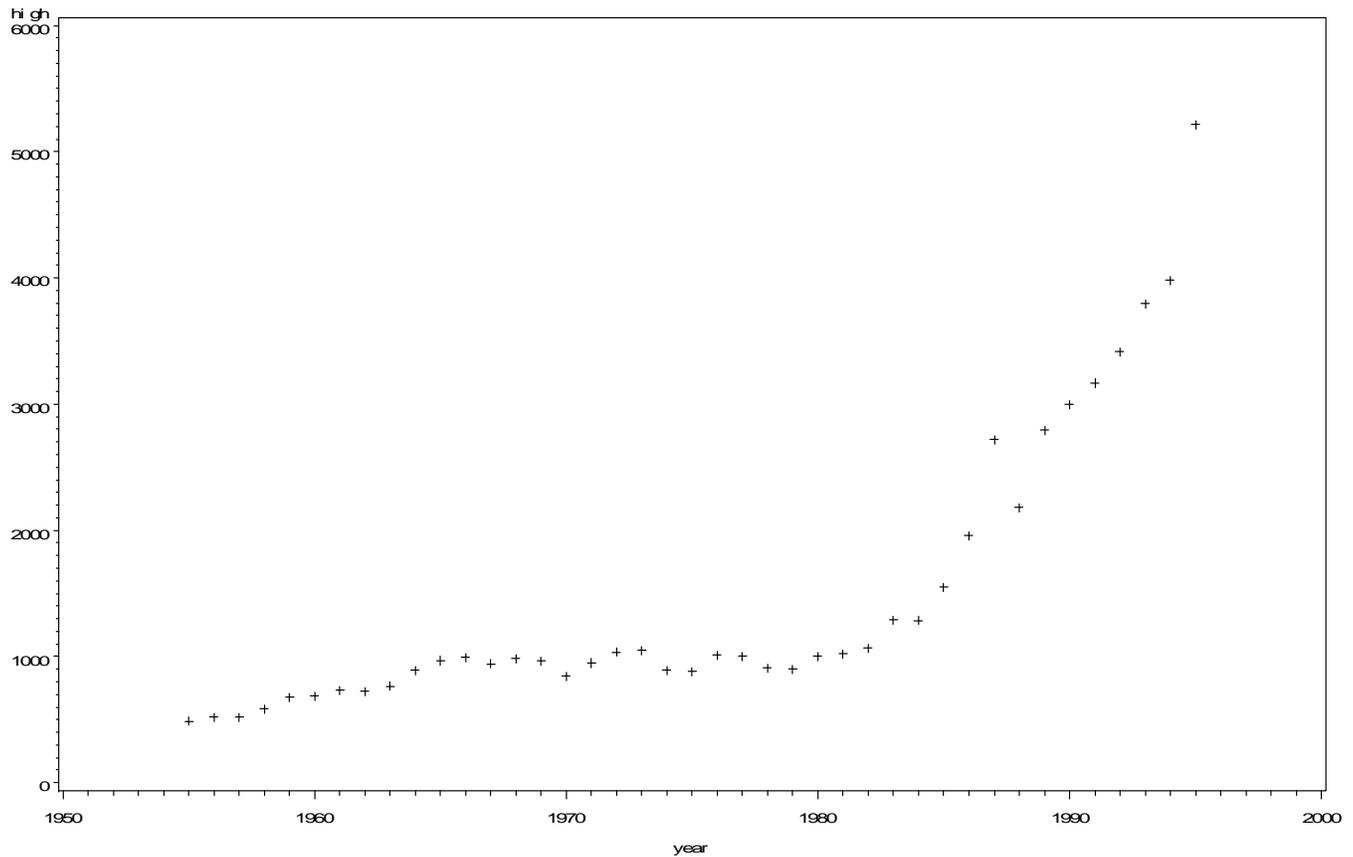
apl of 2. sas

## ADDING A BIT OF STYLE

The plots we have generated so far use simple fonts. SAS provides a number of fonts to make your output a bit more readable. Colors are also available, as we show in our enhancement to the TITLE statement.

```
title c=blue f=swissb 'Dow Jones Yearly Highs';  
proc gplot data=stocks;  
  plot high*year;  
run; quit;
```

### Dow Jones Yearly Highs



gplot 2a. sas

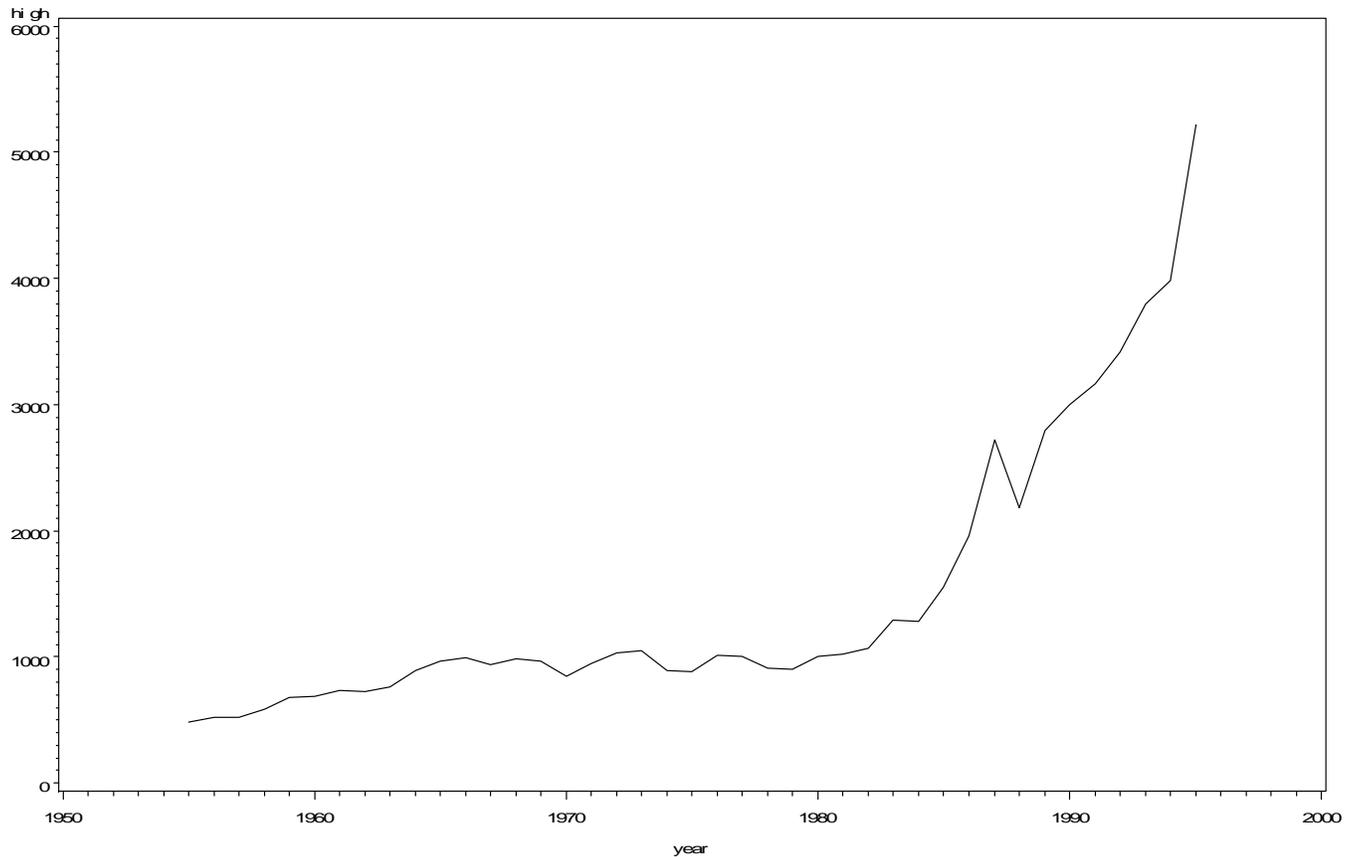
The "c=" designates the color; "f=" designates the font to use. All text following the specifications is rendered in that style.

## CONNECTING THE DOTS

Sometimes, it's preferable to connecting the points in a graph with a line. The style of the line is modified in SAS/GRAPH with the use of the SYMBOL statement.

```
title c=blue f=swissb 'Dow Jones Yearly Highs';  
symbol i=join;  
proc gplot data=stocks;  
  plot high*year;  
run; quit;
```

### Dow Jones Yearly Highs



qpl of 3. sas

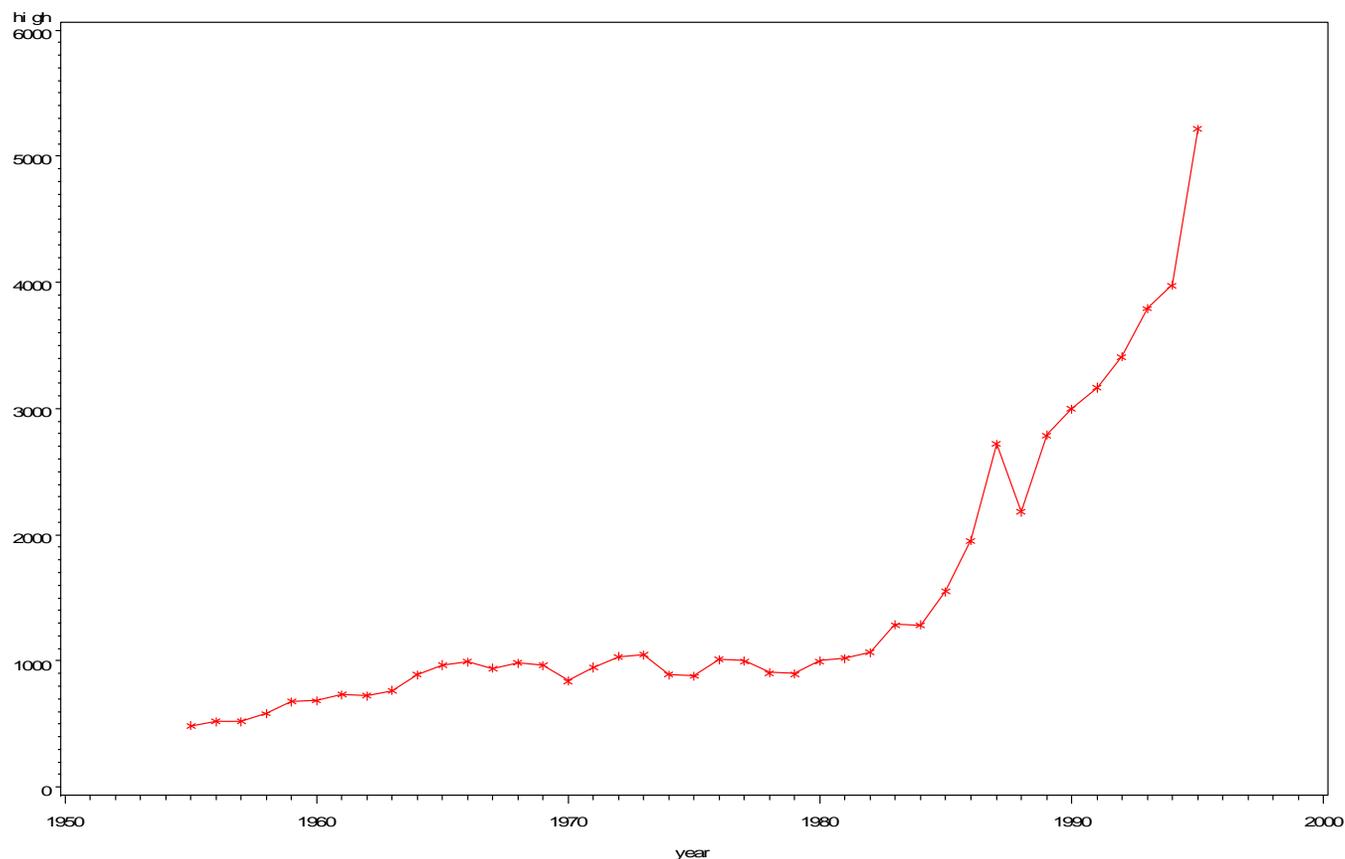
The "i=join" refers to the "interpolation" option, telling SAS how join the points. The default, as we have seen, is "i=None". We want to simply connect the dots.

## RESTORING THE DOTS AND ADDING COLOR TO THE LINE

We've connected the dots, but now the points themselves are missing. If we want to restore them, we can use other options of the SYMBOL statement. We can also make the line a different color:

```
title c=blue f=swissb 'Dow Jones Yearly Highs';
symbol i=join v=star c=red;
proc gplot data=stocks;
  plot high*year;
run; quit;
```

### Dow Jones Yearly Highs



qpl of 3a. sas

The “v=star” refers to the “value” option, telling SAS how display a star symbol at each points. The “c=red” tells SAS to make the line red, similarly to how we made the title blue.

## LABELING THE AXES

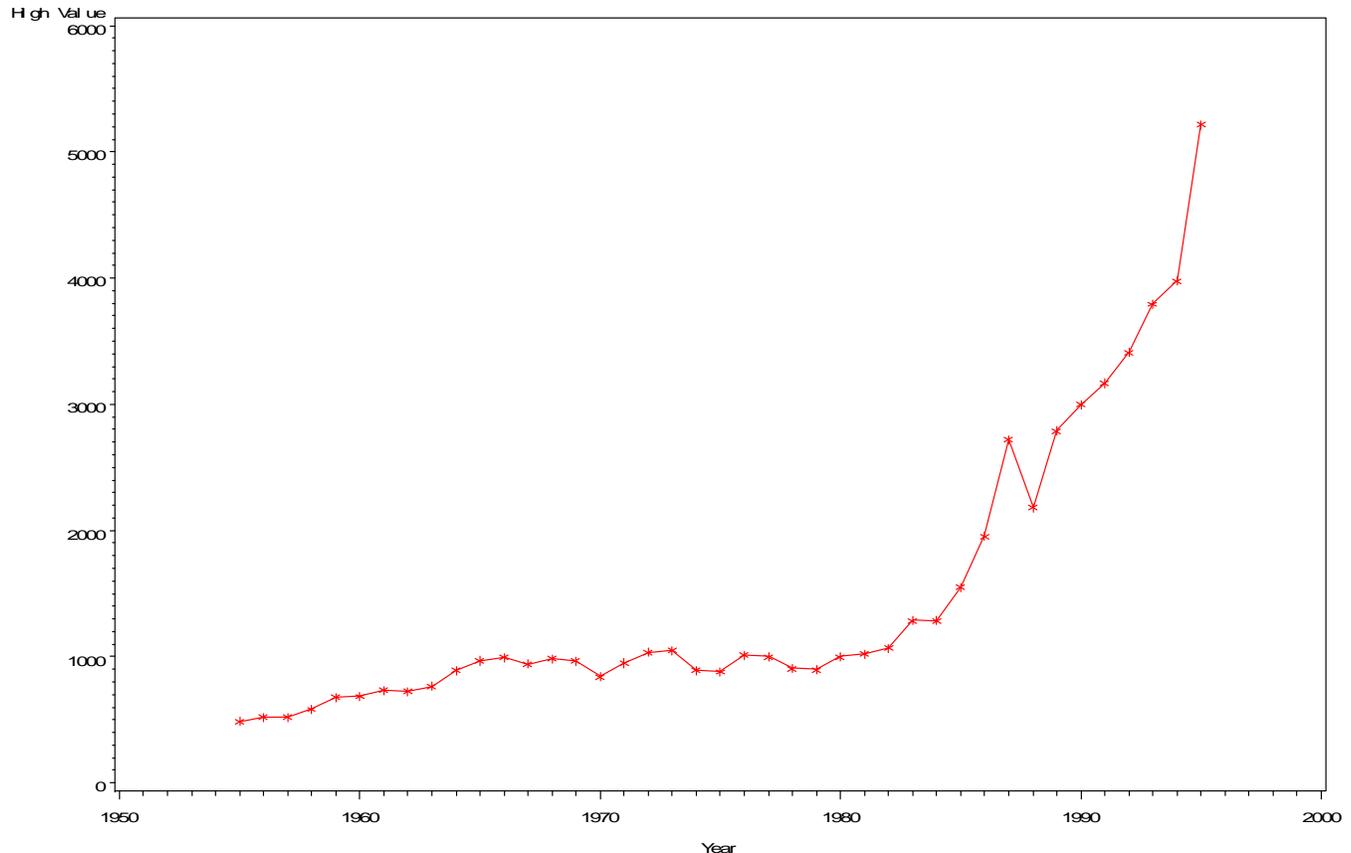
Unless changed, the descriptions of the X and Y axes are simply the names of the variables. Often, a fuller description is better. AXIS statements are used for this:

```

title c=blue f=swissb 'Dow Jones Yearly Highs';
symbol i=join v=star c=red;
axis1 label=('High Value');
axis2 label=('Year');
proc gplot data=stocks;
  plot high*year / vaxis=axis1 haxis=axis2;
run; quit;

```

### Dow Jones Yearly Highs



gpl of 4. sas

We made quite a few changes here.

- First, the AXIS statements define how the axis looks. The number following the word AXIS allows us to make multiple axis definitions. There is no significance beyond identification.
- Next, the LABEL= option defines the label that will be displayed on the axis. Note that the parentheses are required.
- Finally, we modified the PLOT statement to add options. The vaxis= (vertical, or Y axis) and haxis= (horizontal, or X axis) options are how the two axes we defined get matched up.

## CHANGING THE SCALE OF THE PLOT

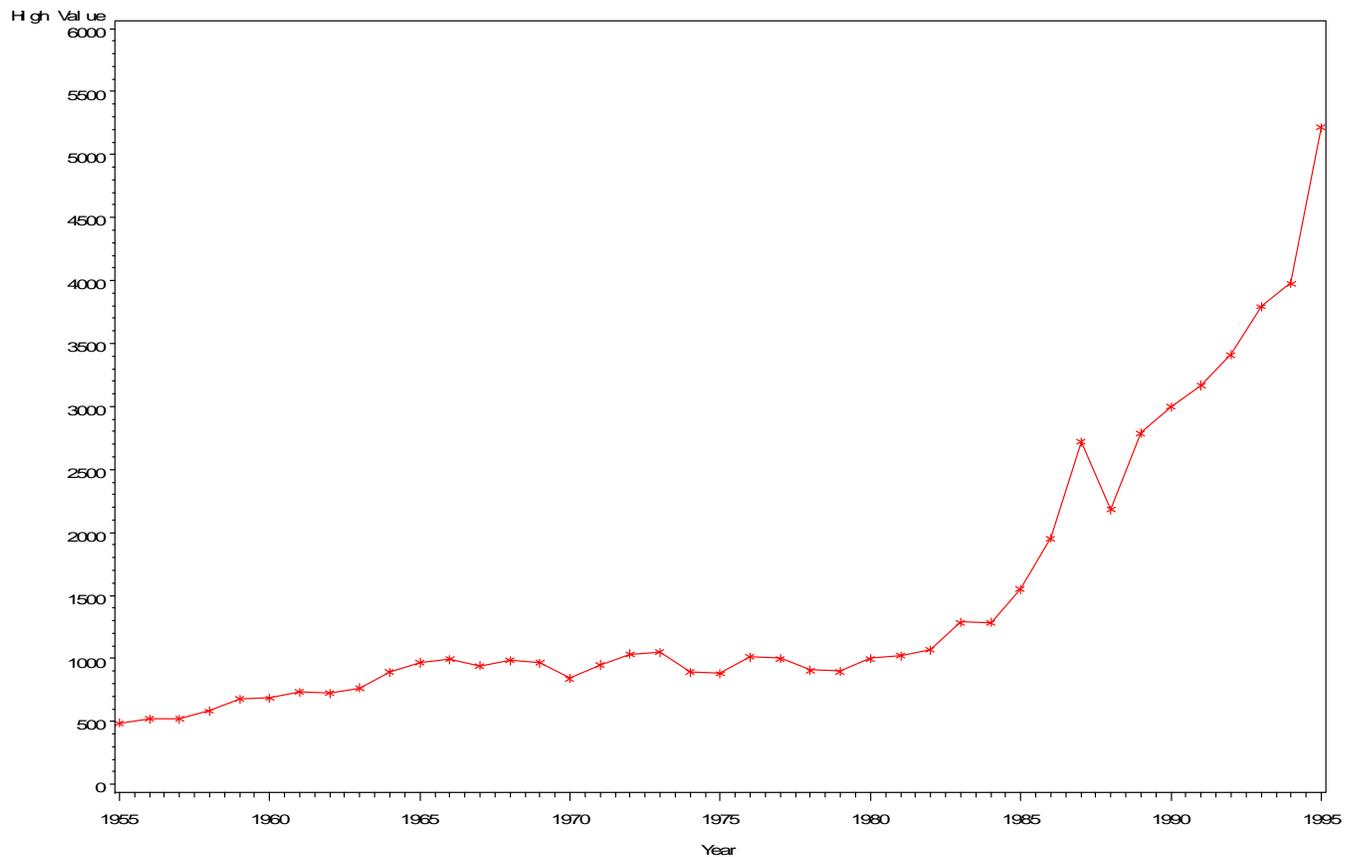
This graph has a lot of white space between the left and right, and the increments are farther apart than we might like. If we don't want to use the default scaling that SAS has defined, we can specify our own scaling in the AXIS statements.

```

title c=blue f=swissb 'Dow Jones Yearly Highs';
symbol i=join v=star c=red;
axis1 order=(0 to 6000 by 500) label=('High Value');
axis2 order=(1955 to 1995 by 5) label=('Year');
proc gplot data=stocks;
  plot high*year / vaxis=axis1 haxis=axis2;
run; quit;

```

### Dow Jones Yearly Highs



gplot4a.sas

The ORDER= option specifies the minimum and maximum values, and the increment (much like the specification of a DO loop).

## ADDING COLOR AND FONT TO THE AXES

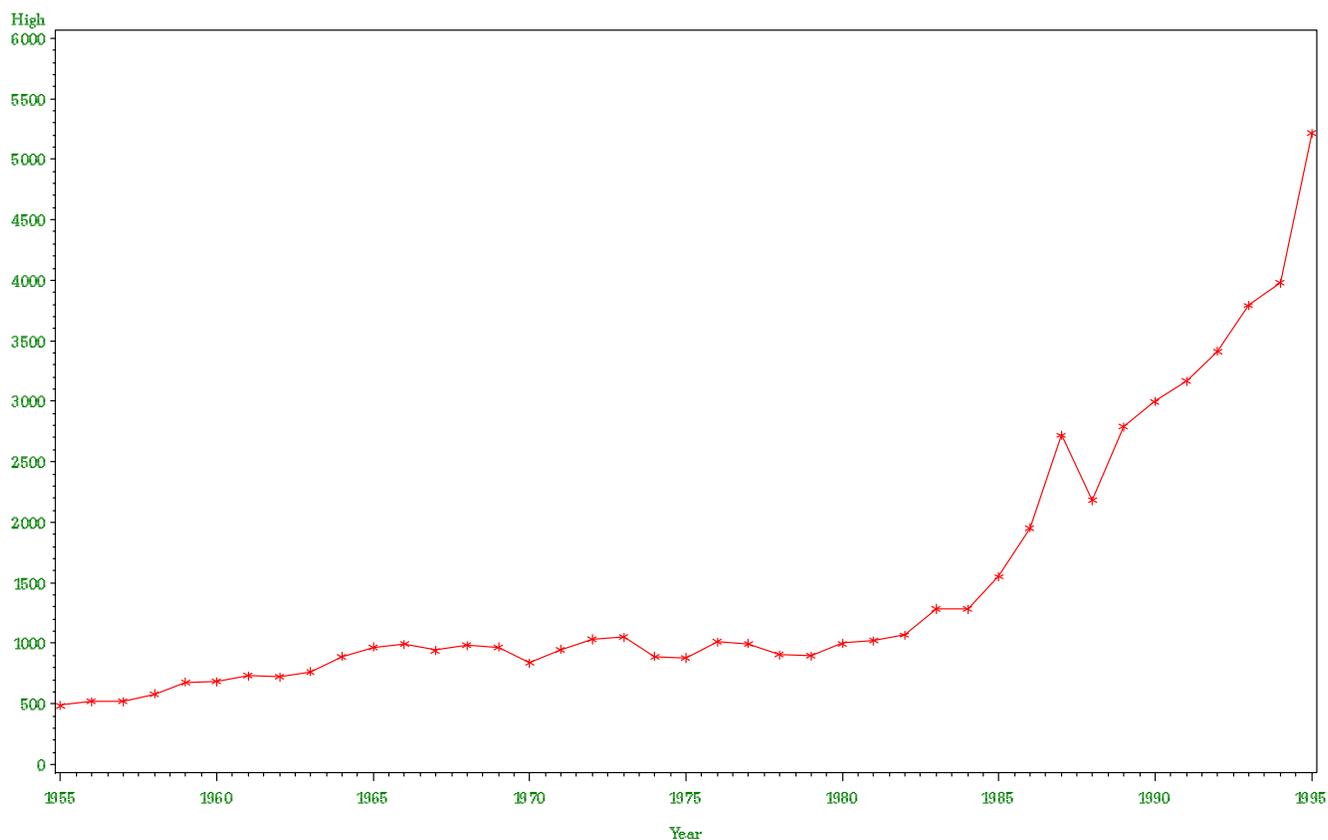
Just as we can change the color and font of the title, we can change the color and font of the axes: We do this with the GOPTIONS statement. This statement performs a similar function to the OPTIONS statement, but controls various graphics options.

```

title c=blue f=swissb 'Dow Jones Yearly Highs';
symbol i=join v=star c=red;
axis1 order=(0 to 6000 by 500) label=('High');
axis2 order=(1955 to 1995 by 5) label=('Year');
goption ftext=zapfb ctext=green;
proc gplot data=stocks;
  plot high*year / vaxis=axis1 haxis=axis2;
run; quit;

```

### Dow Jones Yearly Highs



gplot5.sas

The FTEXT= and CTEXT= options control the font and color of any text in the plot that is not otherwise specified.

## GRAPHING TWO LINES

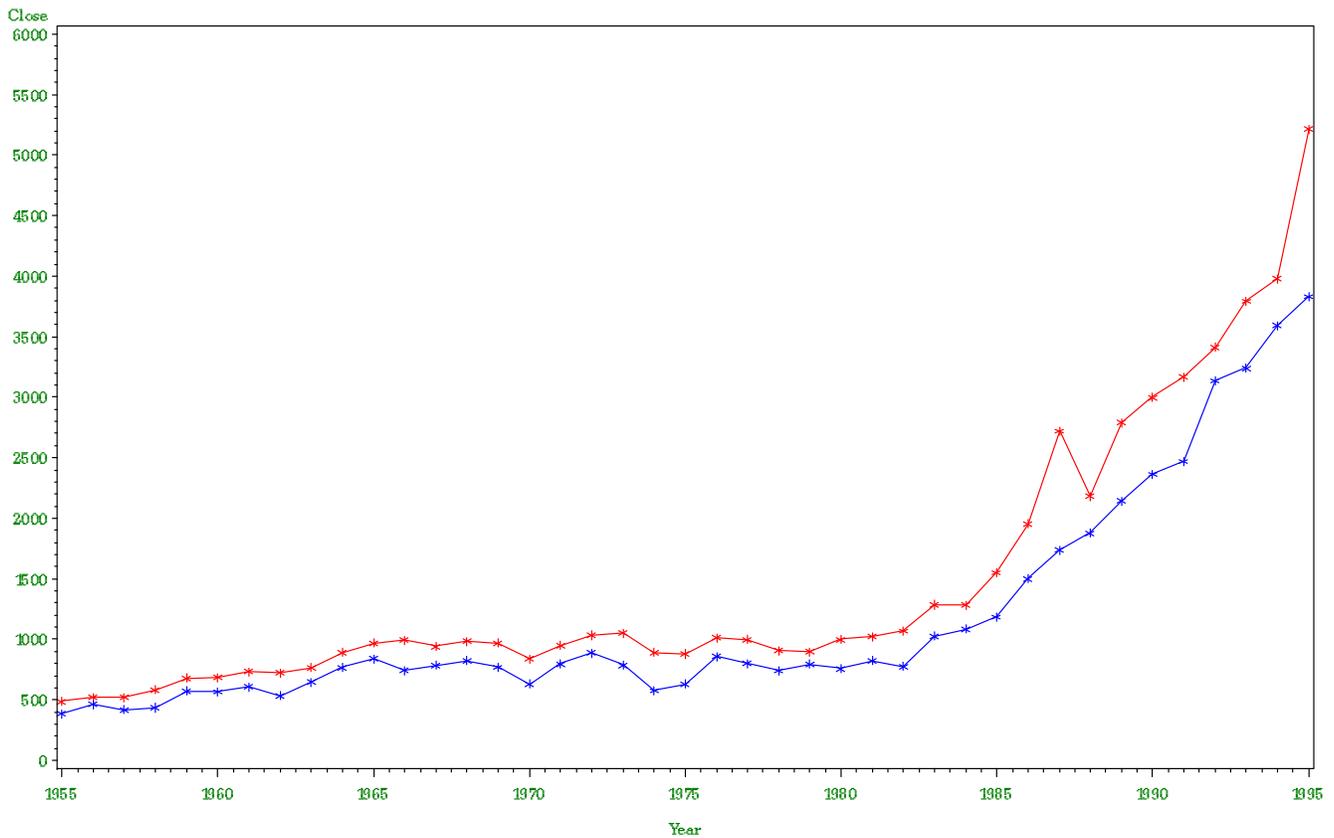
Our data contains both high and low values for each year. We can plot both values on the same graph by using another SYMBOL statement and another PLOT statement option.

```

title c=blue f=swissb 'Dow Jones Yearly Highs';
symbol1 i=join v=star c=red;
symbol2 i=join c=blue v=star;
axis1 order=(0 to 6000 by 500) label=('High');
axis2 order=(1955 to 1995 by 5) label=('Year');
goption ftext=zapfb ctext=green;
proc gplot data=stocks;
  plot high*year=1 low*year=2 / overlay vaxis=axis1 haxis=axis2;
run; quit;

```

**Dow Jones Yearly Highs and Lows**



gplot6.sas

We have added a second SYMBOL statement, calling it SYMBOL2 (and adding a "1" to the first SYMBOL, to distinguish them). Then we added a second plot specification to the PLOT statement, and used "=1" and "=2" to tell SAS which symbol to apply to which X-Y pair. We also had to add the OVERLAY option, because the procedure's default behavior is to generate separate plots.

## THE GCHART PROCEDURE

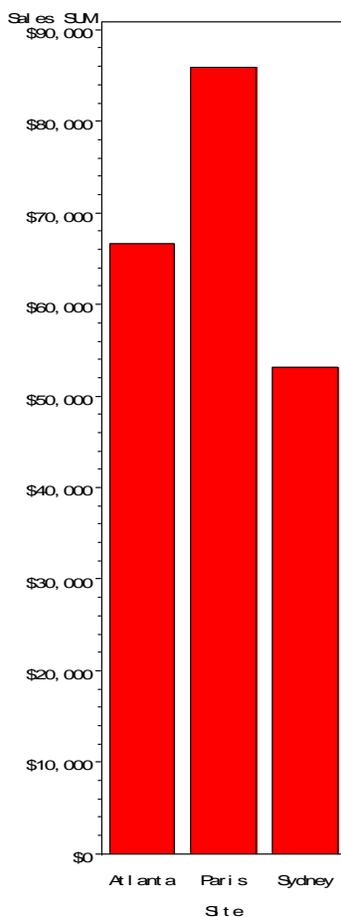
For the GCHART procedure examples, we will use sales data for a fictitious company, from three departments in three cities for four calendar quarters:

Dept	Site	Qtr	Sales
Parts	Sydney	1	4043.97
Parts	Atlanta	1	6225.26
Parts	Paris	1	3543.97
Repairs	Sydney	1	5592.82
Repairs	Atlanta	1	9210.21
Repairs	Paris	1	8591.98
Tools	Sydney	1	1775.74
Tools	Atlanta	1	2424.19
Tools	Paris	1	5914.25
.	.	.	.
.	.	.	.
.	.	.	.

## STARTING SIMPLY

We will cover GCHART in much less detail. We will start with a simple vertical bar chart of total sales at each site.

```
proc gchart data=SASdataset;
  vbar site / sumvar=sales;
run; quit;
```

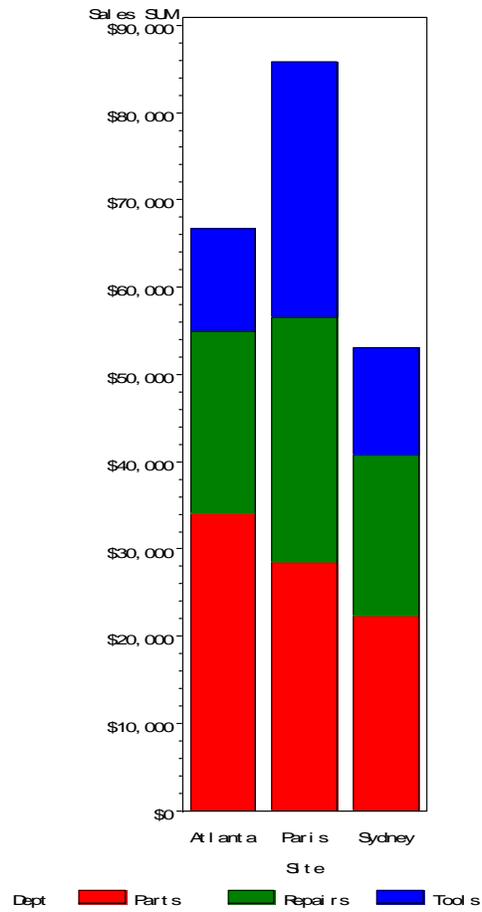


gchart1.sas

### ADDING SUBGROUPS

If we want to know which departments contributed to each site's sales, we can use a subgroup.

```
proc gchart data=SASdataset;  
  vbar site / sumvar=sales subgroup=dept;  
run; quit;
```



gchart2.sas

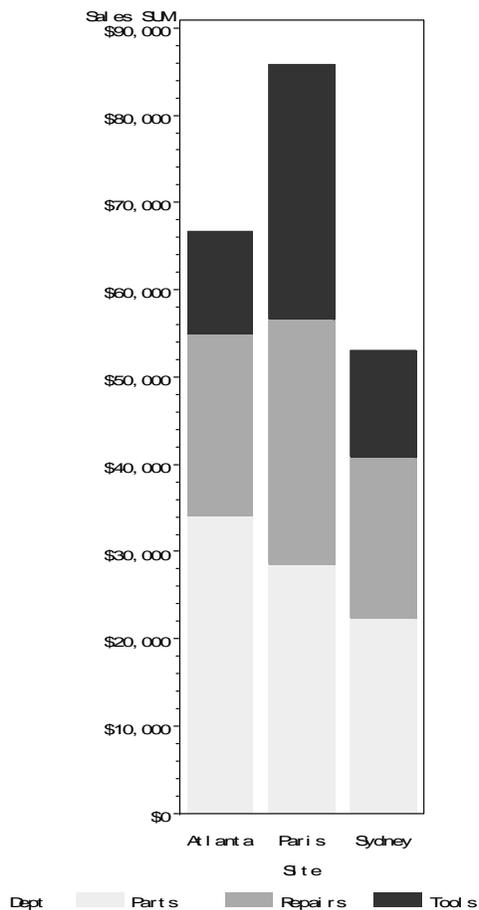
## SHADES OF GRAY

If you need to make black and white copies, the above will not display well. You can use the PATTERN statement to change colors.

```

pattern1 c=grayee;
pattern2 c=grayaa;
pattern3 c=gray33;
proc gchart data=SASdataset;
  vbar site / sumvar=sales subgroup=dept;
run; quit;

```



gchart3.sas

Each pattern specification is assigned to a subgroup. The “graynn” colors are a way to specify shades of gray. The last two characters are actually hexadecimal digits from ‘00’X to ‘FF’X (0 to 255 decimal) representing the degree of darkness. A higher number indicates a lighter shade. “GRAYFF” is white, and “GRAY00” is black

## REFERENCES AND RESOURCES

There are a number of resources available to aid you in your further exploration and understanding of SAS/GRAPH:

- The SAS/GRAPH Reference Manual is over 1,600 pages long. (Fortunately you don't have to read it all!) It's also available online at <http://support.sas.com/documentation/onlinedoc/graph/index.html>
- SAS also supplies a wealth of code samples at <http://support.sas.com/ctx/samples/index.jsp>. There's a good chance that a sample of what you need to do is available there.
- Don't forget the Proceedings of past years' conferences. They are searchable at <http://www.lexjansen.com>.

## CONCLUSIONS

We have covered a small fraction of the features, options, and procedures available in SAS/GRAPH. But with just this small fraction, we have managed to produce some informative graphs and charts. I hope I have helped you become less timid about using SAS/GRAPH, and have become emboldened to explore it further.

## ACKNOWLEDGMENTS

SAS and SAS/GRAPH are registered trademarks of SAS Institute, Inc. of Cary, NC, USA.

Thanks to my co-workers Alicia Brocht, Tori Ross and Joe Weber, for sitting through a very rough first draft of this talk, and for offering suggestions to make it considerably less rough.

## CONTACT INFORMATION

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