

Presentation Quality Graphics with SAS/GRAPH®

Keith Cranford, Marquee Associates, LLC

Abstract

The SAS/GRAPH® Annotate Facility along with hardware fonts can be used to produce presentation quality graphics that compete with the commonly used Windows-based software packages. This paper will give some guidance in the use of these tools. A brief introduction to the Annotate Facility will be given, and the use of True Type fonts within the SAS System will be illustrated. Also, aspects of publishing these graphs in PDF and GIF formats will be discussed.

Tools

SAS/GRAPH® provides several tools for producing presentation quality graphs. Among these are various options in each of the procedures, the Annotate Facility, and hardware fonts (in particular, True Type fonts in the Windows environment). The latter two of these tools will be discussed in this section.

The Annotate Facility in the SAS/GRAPH product can be used to enhance your graphics. This is accomplished through a data set of instructions to draw lines or figures at defined locations or write text to the SAS/GRAPH output. This data set consists of variables, which define these instructions. Among these variables are:

- FUNCTION: what to do (e.g., LABEL, DRAW, etc.)
- X: horizontal axis location
- Y: vertical axis location
- STYLE: style of line, or font for text
- SIZE: thickness of line, or font size for text
- XSYS: coordinate system for horizontal axis
- YSYS: coordinate system for vertical axis
- POSITION: relative positioning of text
- WHEN: when to draw

For example, you may want to label the points on a line plot. To do this, you need to indicate what function you want to perform (FUNCTION = 'LABEL'), where you want to place the label (X = horizontal-axis variable value, Y = vertical-axis variable value, and POSITION = centered above the point), and what you want to label (TEXT = vertical-axis variable value). The following code would accomplish this.

```
data anno ;
  set data ;
  length function $ 8 text $ 15 ;
  retain xsys ysys '2' when 'a' ;
  function = 'LABEL' ;
  x = x ;
  y = y ;
  text = put(y, best.) ;
  style = 'swissb' ;
  size = 2 ;
  position = '2' ;
run ;
```

```
proc gplot plot=data anno=anno ;
  plot y * x ;
run ;
```

These variables can be populated either through assignment statements (as in the above example), or using annotate macros that are available through SAS/GRAPH. The macros are accessible upon issuing the macro %annomac, which activates these macros. Some of the common macros listed below are more fully documented in the SAS/GRAPH User's Guide, Volume 1.

- %LABEL: draws text
- %MOVE: moves without drawing
- %DRAW: draws a line from the previous point
- %LINE: draws a line between to points
- %BAR: draws a bar
- %CIRCLE: draws a circle

In the previous example, the assignment statements could be replaced by the %LABEL macro, with the appropriate parameters.

```
%annomac ;
data anno ;
  set data ;
  length function $ 8 text $ 15 ;
  retain xsys ysys '2' when 'a' ;
  %label(x,y,put(y,best.),black,0,0,2,swissb,2) ;
run ;
```

By default, SAS/GRAPH can use a limited selection of fonts including SIMPLEX, DUPLEX or SWISS. However, in a Windows environment, a user can access system True Type fonts, such Times Roman or Arial, through the SAS/GRAPH font utility. This is documented in TS-300C, "Producing Hardcopy Graphics under Windows 95 & NT." In order to use these fonts you must install them through the font utility, which is done through the following steps:

1. Select the desired Windows printer driver from the Print Setup window. Note that there are four generic Windows device drivers:
 - WINPRTM: for black and white (monochrome) printers
 - WINPRTG: for gray-scale printers (PostScript or laser)
 - WINPRTC: for color printers
 - WINPLOT: for plotters
2. Invoke the SAS/GRAPH Font Utility by selecting Help ==> Utility application ==> SAS/GRAPH Font Management Utility.
3. Select HARDCOPY for "Device type to install fonts for."
4. Specify the appropriate WINPRTx driver name in the DEVICE NAME field (the same one selected in Step 1 above).
5. Follow the remaining instructions create a device catalog and a font catalog. Also, the CONFIG.SAS file can be updated to automatically assign the appropriate library references upon invocation of SAS.

Once the fonts have been registered in the SAS System, you will need to know how to reference them. To view the available fonts, submit the following program.

```
proc gdevice c=gdevice0.devices nofs ;
  list WINPRTx ;
run ;
```

This produces a listing report specifying the chartype number, the font name, and whether the font is scalable. Keep this listing handy, since it is needed to specify the desired font.

There are two ways to use these fonts.

- Specify `CHARTYPE = n` in the `GOPTIONS` statement, where *n* is the number that corresponds to the chartype of the font you want to use. This will apply to all text in the graph.
- Specify a font using the `HWDMXnnn` naming convention, where *nnn* is the number that corresponds to the chartype of the font you want to use. This provides maximum flexibility since any number of fonts or styles, such as bold or italics, can be used in a single graph.

The label example above used the `SWISSB`, or Swiss Bold, font, which is available directly from SAS/GRAPH. However, if you want to use a Times Roman font instead, first find the corresponding chartype number from the listing described above. Then, use the hardware font name for the `STYLE` of the label. If Times Roman is chartype 20, the new program might look like this.

```
data anno ;
  set data ;
  length function $ 8 text $ 15 ;
  retain xsys ysys '2' when 'a' ;
  %label(x,y,put(y,best.),black,0,0,2,hwdmx020,2) ;
run ;
```

Combining SAS/GRAPH capabilities with the Annotate Facility and True Type fonts, provides you with the tools that can produce high quality graphics.

Some Helpful Suggestions

The following suggestions or guidelines can help make using the Annotate facility easier and more useful.

- Let SAS/GRAPH procedures do as much as possible
- Break the annotation into groups
- Use the `ORIGIN=` option to anchor the graph

The first suggestion is a time saver. The SAS/GRAPH procedures provide a lot of flexibility and features, which should be taken advantage of. Before adding any annotation the basic graph should first be refined. In most cases, this is enough and no annotation is needed; however, when enhancements are needed the amount of annotation is kept to a minimum.

This leads to the second suggestion. It is best to work in pieces by defining groups of annotation, such as a table, title or labeling, and then add one annotation at time. Doing this will allow you to concentrate development in one area and will also help in debugging.

A helpful hint is using the `ORIGIN=` option on the `AXIS` statement. This allows you to anchor your graph, which helps in placing annotation outside the graph, such as tables.

Publishing Your Graphs

There are many ways to publish your SAS/GRAPH output, including simply printing the graphs for copying and distribution. However, it may be more convenient to publish and distribute the graphs in

some electronic means. Two ways of electronic publishing are shown in this section. The first is creating a GIF file from SAS/GRAPH output. This is useful when the graph is used in a document or included in an HTML document or Web page. The second is a PDF file, which can also be linked to a Web page, but provides the person viewing the graph more flexibility in both viewing and printing the file.

SAS Institute provides drivers for GIF file formats, which make it easy to create the files using PROC GREPLAY. You do this by setting the DEVICE= graphics option to GIF and specifying a filename to send the resulting graphics file. The following example illustrates using PROC GREPLAY to create a GIF file from an existing SAS/GRAPH graph catalog entry.

```
options device = gif gaccess=gsasfile ;
filename gsasfile 'graph1.gif' ;

proc greplay igout = library.graphs nofs ;
  replay graph1 ;
run ;
quit ;
```

An Adobe® PDF (Portable Document Format) file is another convenient way to distribute your graphs electronically. To create this file you will need Adobe® Distiller V3.01, a part of the Adobe Acrobat suite of tools. For someone to view this file, however, only Adobe Acrobat Reader (a free program which can be downloaded from www.adobe.com), is needed. Producing a PDF file directly from the SAS System is documented in TS-570, "Printing from the SAS System under Windows, Windows 95, and Windows NT." Of particular interest here is Section F, "Problems using Adobe PDF drivers interactively." The content of this section is described here.

This process requires a setup step in Adobe Distiller before running your SAS program. However, once this is done the rest is automatic. The process is as follows.

1. In Adobe Distiller select Distiller ==> Watched Folders
2. In the Watched Folders select a directory (must already exist) such as: c:\temp
3. In the "Check Watched Folders" box you can set how often you want Distiller to check for output
4. In the SAS System, use the Adobe Distiller Assistant driver (which will automatically be available after you install Adobe Acrobat) and direct output to the "watched" subdirectory adding an IN subdirectory to the name. For example,

```
options sysprint = 'c:\temp\in\graph.prn' 'Distiller Assistant V3.01' ;
```

5. Once the .PRN file is created Adobe Distiller automatically converts the file to the .PDF file. It then copies both files to the OUT subdirectory under the target. In the above example, two files will be created with the names graph.prn and graph.pdf.

An example of the full SAS code needed to create a PDF file is given below. In this example, the graph entry is named 'GRAPH1' and found in the GRAPHS catalog in the LIBRARY library.

```
options sysprint = 'c:\temp\in\graph1.prn' 'Distiller Assistant V3.01' ;
options device=winprtc rotate=portrait ;

proc greplay igout=library.graphs nofs;
  replay graph1 ;
run;
quit;
```

For consistency, the name of the PDF file should be the same as the graph entry name. This can be done easily by making these into macro variables.

Conclusion

SAS/Graph is a powerful and flexible tool for producing and distributing presentation quality graphs. This can be accomplished by taking better advantage of the tools provided in SAS/GRAPH such as the Annotate Facility and hardware fonts, and using the publishing tools, such as GIF and PDF files for distributing the graphs.

SAS and SAS/GRAPH are registered trademarks or trademarks of SAS Institute, Inc. in the USA and other countries. Indicates USA registrations.

Other brand and product names are registered trademarks or trademarks of their respective companies.

Keith Cranford
Marquee Associates, LLC
3810 Medical Pkwy, Suite 153
Austin, TX 78756
Phone: 512/453-6140
Fax: 512/453-6120
kcranford@aol.com