A Grid Overlay to Make SAS/GRAPH® Layout Easy

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ABSTRACT

Specifying the placement of graphic components such as annotations and legends can be a time consuming process, since many iterations may be required before the final result is satisfactory. The size and location of graphics elements may change when a graph designed for one device is printed on another. This paper will show how to create a printer dependent template (grid overlay) and how to use it as a guide to create and modify graphs.

INTRODUCTION

Creating a graph using SAS/GRAPH software is a simple task, but customizing the graph for different printers or device drivers is not that easy. If the specifications of the new and old printers or device drivers are not the same, then graphics output area is also not the same. As a result, the origin of the graph may shift away from its original position, including changes in the size of graphic components(such as pie slices, bar width etc.) The final graph may distort slightly or in some cases dramatically.

If one needs to create a new customized SAS/GRAPH or wants to keep the existing texture of the old graph but needs to use new device driver or printer, a grid overlay will cut down the time and effort.

ANALYSIS

Graphics Output Area

One of the way to recreate the graph on the new device is to use the same HSIZE=, VSIZE=, PCOLS=, PROWS=, HORIGIN= and VORIGIN= options in the GOPTIONS statements, but this approach does not utilize the features of the new printer or device driver. For example, if the new printer can use a larger HSIZE and VSIZE values, this extra space will be wasted if the HSIZE and VSIZE values of the old printer are used. Figure 1 shows the graphics output area for QMSCOLOR and QMS® 1000 printers on 8.5X11 inch paper. These are the printer specifications provided by the manufacturer.
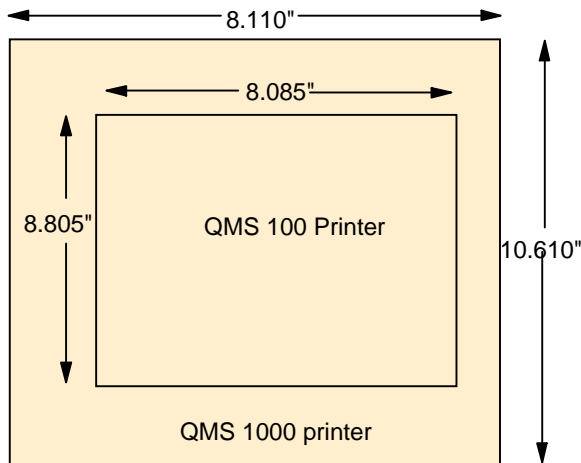
Figure 1: Graphic Output Area

PCOLS= and PROWS= options are used for portrait mode. LCOLS= and LROWS= options are used for landscape mode. HPOS= options override the values of LCOLS and PCOLS, and VPOS= options override the values of LROWS and PROWS.

Device Driver

To create a printed copy of the graph, you need a PostScript(TM) printer and the SAS Institute-supplied device driver specific to that printer. The Institute device drivers are available in the SASHELP.DEVICES catalog. The values from the GDEVICE:Detail window should be compared with the actual printer specifications. Figure 2 shows the Detail window for the Institute-provided QMSCOLOR driver for the model QMSCOLOR 100 printer.
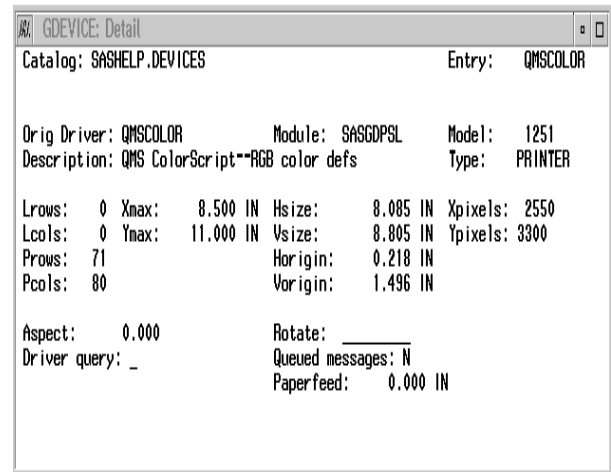
Figure 2: Detail Window for QMSCOLOR Driver

HSIZE and VSIZE values usually depict the total graphics output area for a device or a printer. HORIGIN and VORIGIN values specify the start of a display area from the lower left corner of the graphic output area.

If the device driver for the printer you are going to use does not have a matching device driver in the SASHELP.DEVICES catalog, copy the closest device driver to a libref called GDEVICE0. GDEVICE0 is assigned by you and it should have a catalog called DEVICES. You should remind yourself that you can not copy or edit device drivers in the SASHELP.DEVICES catalog. For example, model QMS 1000 printer does not have a matching device driver in the SASHELP.DEVICES catalog. Since the QMS 100 is similar to the QMS 1000, you could copy the QMSCOLOR device driver from SASHELP.DEVICES to GDEVICE0.DEVICES catalog. For example, the QMSCOLOR driver is renamed to MAGICOL3. Figure 3 shows the Detail window for MAGICOL3 with the manufacturer's specification. XPIXELS and YPIXELS values are doubled to get 600X600dpi resolution on the QMS 100 printer. The XPIXELS and YPIXELS values are doubled because QMS 1000 is a 600X600 dpi printer. You can use

following code to use PROC GDEVICE procedure to edit device drivers.

Values for PROWS and PCOLS are automatically calculated by SAS software, accompanied by a warning in the SAS log. But you can estimate the values by following formulas:

```
/* code to edit device driver*/
proc gdevice c=gdevice0.devices;
run;
```

```
calculations for PROWS values
   PROWS=(old PROWS)*(new VSIZE)/(old VSIZE)
e.g.PROWS=71*10.610/8.805~81
calculations for PCOLS values
   PCOLS=(old PCOLS)*(new HSIZE)/(old HSIZE)
e.g.PCOLS=70*8.110/8.085~86
```

```
GDEVICE: Detail
Catalog: GDEVICE0.DEVICES                          Entry:     MAGICOL3

Orig Driver: QMSCOLOR          Module:  SASGDPSL    Model:     1251
Description: QMS 1000 --CMY color defs             Type:      PRINTER

Lrows:    0  Xmax:      8.500 IN  Hsize:       8.110 IN  Xpixels: 5100
Lcols:    0  Ymax:     11.000 IN  Vsize:      10.610 IN  Ypixels: 6600
Prows:   86                        Horigin:     0.200 IN
Pcols:   81                        Vorigin:     0.200 IN

Aspect:      0.000                Rotate:  _____
Driver query: _                  Queued messages: N
                                 Paperfeed:    0.000 IN
```
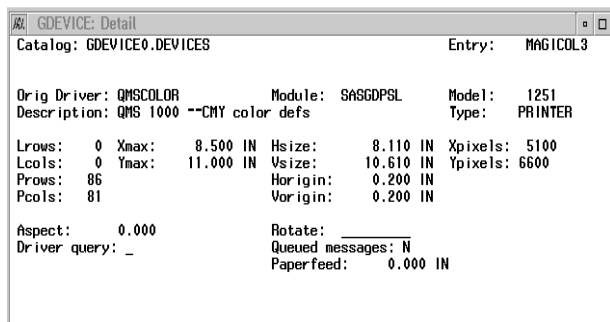
Figure 3: Detail Window for QMS 1000 Driver

Create Grid Layout(Template)

The SAS/GRAPH annotate facility is used to generate a template. For the above samples, 2 templates are required. Templates are simply horizontal and vertical lines that form a grid; this grid is used to describe any location on the printed page. This grid based measuring system is customized to the usable graphic output area for the device driver. Grid lines spaced at 1 percent intervals seem to be optimal; this lets you "eyeball" distances to 0.1 percent resolution. Templates for the device MAGICOL3 are illustrated in Figure 4 and Figure 5. The following SAS code generates the horizontal grid lines of a template for the MAGICOL3 device driver :

```
*use MAGICOL3 or QMSCOLOR;
%let mprint=MAGICOL3;

goptions reset=all device=os2 target=&mprint;run;

*annotations to create line;
data anno;
  length color style function $ 8 text $150 ;
  retain hsys xsys ysys '3' ;

do i=0 to 99;
```

```
  function='move'; x=0; y=i; output;
  if mod(i,2)=0 then do;
    function='bar'; x=100; size=.1; l=0; color='gray66';
    style='solid'; when='b'; y=i+1; output;
    function='label'; color='black'; size=1.5; when='a';
    style='swiss'; x=1; y=i; position='C';
    text=put(i+1,3.); output;
    x=50; position='B'; text=put(i+1,3.); output;
    x=100; position='A'; text=put(i+1,3.); output;
    end;
  else do;
    function='draw'; x=100; size=.1; l=1; color='black';
    when='b'; output;
    function='label'; color='black'; size=1.5;
    when='a'; style='swiss'; x=1; y=i; position='C';
    text=put(i+1,3.); output;
    x=50; position='B'; text=put(i+1,3.); output;
    x=100; position='A'; text=put(i+1,3.); output;
    end;
  end;

* draw the lines;
goptions display;
proc ganno anno=anno
  name="&mprint" des="Horizontal template for &mprint";
  run;
```

Following SAS code generated vertical grid lines or template for MAGICOL3 device driver:

```
*use MAGICOL3 or QMSCOLOR;
%let mprint=MAGICOL3;

   goptions reset=all device=os2 target=&mprint;run;

*create template by SAS/Graph annotations;
 data pieanno;
   length color style function $ 8 text $150 ;
   retain hsys xsys ysys '3' ;
   do i=0 to 99;
     function='move';x=i;y=0;output;
     if mod(i,2)=0 then do;
        function='bar'; y=100; size=.1; l=0; color='gray66';
        style='solid';
        when='b'; x=i+1; output;
        function='label'; color='black'; size=1;
        when='a'; style='swiss';
        y=1; x=i; position='B'; text=put(i+1,3.);
        angle=270; output;
        y=50; position='B'; text=put(i+1,3.); output;
        y=98; position='B'; text=put(i+1,3.); output;
       end;
      else do;
       function='draw'; y=100; size=.1; l=1; color='black';
       when='b'; output;
       function='label'; color='black'; size=1;
       when='a'; style='swiss';
       y=1; x=i; position='B'; text=put(i+1,3.);
       angle=270; output;
       y=50; position='B'; text=put(i+1,3.); output;
       y=98; position='B'; text=put(i+1,3.); output;
       end;
```

```
     end;

  * create template;
  goptions display;
  proc ganno anno=pieanno
   name="&mprint" des="Vertical template for &mprint";
    run;
```

The Same code can be used to create grid lines for the QMSCOLOR device driver; all you need to do is change the value of the MPRINT macro variable to QMSCOLOR.
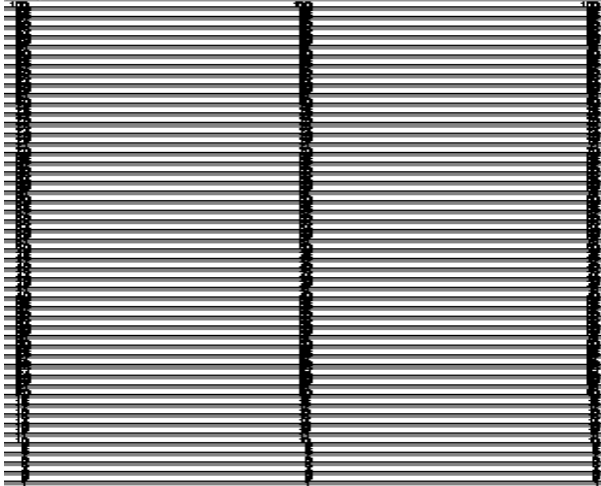

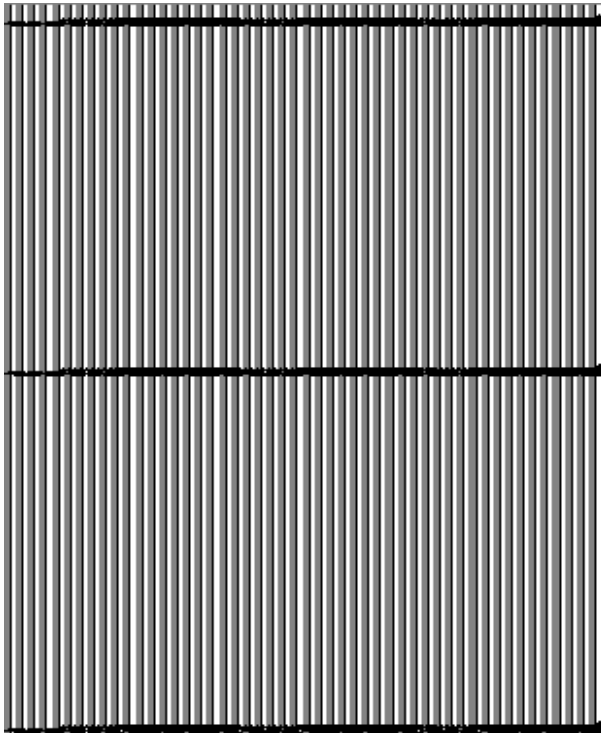**Fig 4: Horizontal Grid Lines for MAGICOL3 driver**

Fig 5: Vertical Grid Lines for MAGICOL3 Driver

Create New GRAPH

The template is drawn on transparent media, so it can be laid over the blank sheet of paper. This way the coordinates, axis length, text height, size of graphic components could be accurately measured before the graphs is created. There is no place for assumption for your part. Such as, if you assign a origin of a plot at x=10 pct and y=40 pct, you can not assign YLENGTH to be 80% of the graphic area since it will exceed the graphic area by 20 horizontal grid lines. As you know by now that all grid lines are drawn based on the total graphic output.

Modify Existing Graph

Since new template is already on transparent media, you can lay it on top of old graph to figure out how much the origin is shifted, change in size of the text and graphics components. You did not have to create the graph using the new driver and the old program to check dissimilarities. Grid overlay already will get the accurate measurements for you. Trial and error method would not be required to modify the old graph to the new device driver. Such as, if a SAS PLOT is created in QMSCOLOR driver using x=10 pct and y=20 pct, then by using MAGICOL3 template you will find new x=11.5 pct and new y=20.8 pct

CONCLUSION

By utilizing resources already available in SAS/GRAPH software, the grid overlay method increases the efficiency of creating customized graphs.

REFERENCES

SAS Institute Inc.(1994), SAS/GRAPH Software: Reference, Version 6, First Edition, Cary, NC: SAS Institute Inc.

ACKNOWLEDGMENTS

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