

GR004

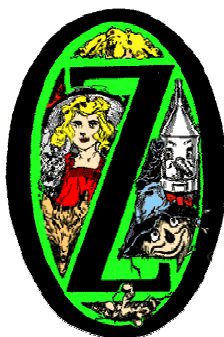
To Right Click or Left Click:

Three Different Devices, Four Different Graphic Presentations

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ABSTRACT

SAS® and SAS/GRAPH® provide us with the capability of producing many different types of graphic objects in conjunction with some special SAS-provided add-ins. Such graphic objects include JAVA enabled graphics, Active-X enabled graphics, static HTML graphics, animated graphics, and drill-down graphics. In addition to the ability to publish these graphics on intranets and the internet, these graphic objects may be downloaded, uploaded, and/or incorporated into documents, spreadsheets, etc., sometimes without losing their special capabilities.

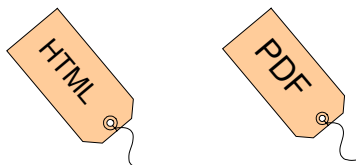


STYLES, DESTINATIONS, AND DEVICES, OH MY! A LITTLE BACKGROUND. (WE'RE NOT IN KANSAS ANYMORE.)

ODS, or the Output Delivery System, incorporates several elements, STYLES, DESTINATIONS, and DEVICES, in the production of the many presentation options SAS provides.

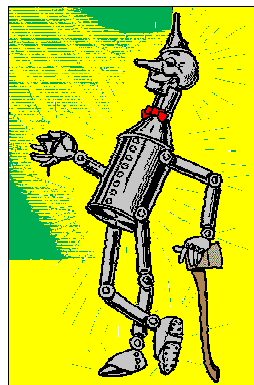
STYLES dictate how SAS output looks, including fonts, sizes, colors and backgrounds. Pre-written styles are provided for every procedure in SAS. In addition, users may write their own styles. This might involve adding a background with a company logo, etc. to procedural output. Version 9 provides even more pre-written styles and the ability to use cascading style sheets.

DESTINATIONS, sometimes called TAGSETS, involve where the output from a SAS procedure goes. Some examples of destinations are print (the default), HTML, XML, PDF, LaTeX, CSV, and output files. SAS provides us with a number of canned destinations, but users can and do create their own custom destinations.



DEVICES are specifically associated with graphic output, and determine the type of graphic image you create when you output a graphic image to a destination. Early SAS/GRAPH users will recall that devices used to produce graphics were frequently specific printers or monitors. With the increase in the production of graphics for intranets and the internet, devices such as GIF (most common), JAVA, and Active-X have come into their own. Graphics produced with the GIF device are generally static (although they can be animated), while graphics produced with the JAVA and Active-X devices have special capabilities. In some cases, such as PDFs, destinations and devices are one and the same: the PDF destination incorporates any SAS procedural output, graphs included, into a PDF document.

The examples presented below are all variations of the same graphic using the same data set, using different devices and destinations. The first three examples use the HTML destination with three different devices, while the fourth uses the PDF destination. No device is required for the PDF destination as there is no interactivity.



THE DEVICES AND DESIRES OF OUR OWN HEARTS (IF I ONLY HAD A HEART!)

The SAS system gives us multiple publishing options with which to present our data. There are "drilldown" HTML documents, graphics and maps; PDFs containing output from multiple procedures, etc. The data user may wish to manipulate the appearance of a graphic themselves without actually

performing any SAS programming. It might be desirable to insert SAS-created HTML documents or graphics into other forms of software such as Microsoft Word or Excel. SAS version 8 and the Output Delivery System allow for such desires with such output formats as JAVA, Active-X, XML, PDF, etc. as well as HTML, SAS listings, and data sets.

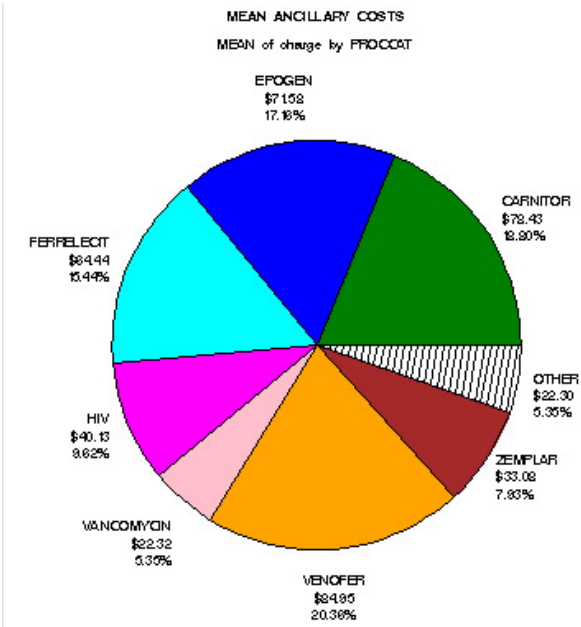
Below follow four pie charts created using the SAS system on the same data using different devices. Portions of the code used to create each pie chart precede the images.

STATIC HTML PIE CHART:

```
/* specify the directory to write HTML files to */

filename odsout '.';
ods listing close;
options reset=global;
options device=gif hsize=4 in vsize=4 in ftext=swiss;
ods html body='daypie1.htm' path=odsout;
proc gchart data=ee.daylevel (where=(proccat in
('EPOGEN', 'FERRELECIT', 'IRON_DEXTRAN', 'HIV', 'CALCIJEX',
'CARNITOR', 'VENOFER', 'VANCOMYCIN', 'ZEMPLAR', 'OTHER')));
pie proccat / sumvar=charge type=mean
percent=outside value=outside;
title1 f=swissb h=1 "MEAN ANCILLARY COSTS";
run;
quit;
ods html close;
```





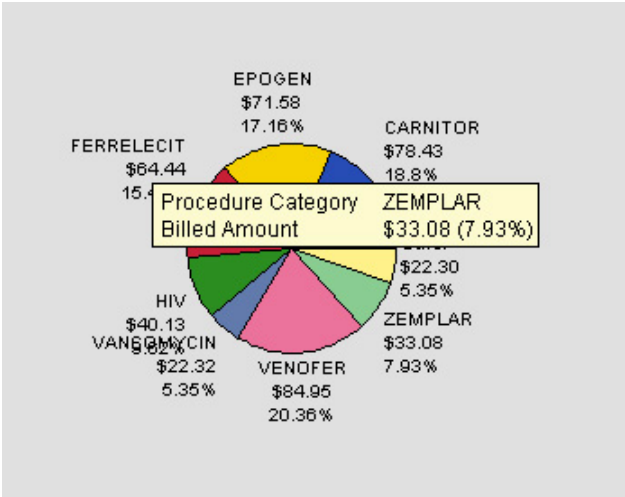
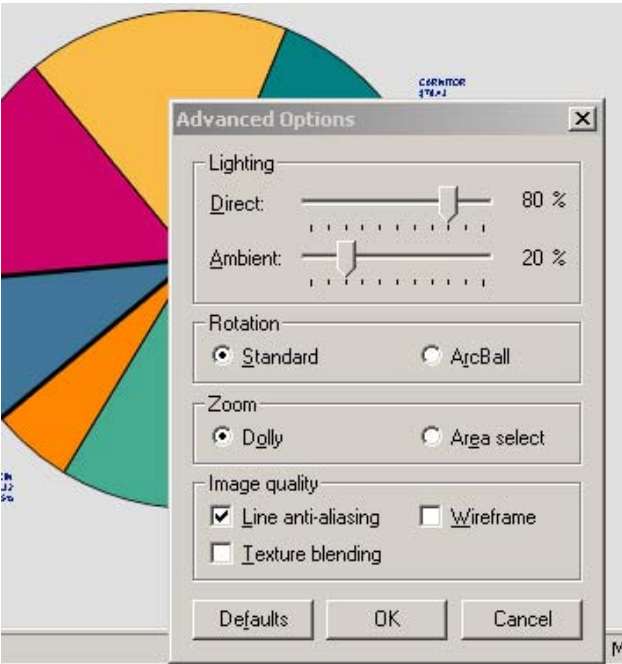
JAVA PIE CHART:

JAVA graphics can be manipulated by right clicking on the image with the mouse. Rolling over portions of the graphics gives additional information as portrayed below. You can change the graph type, colors, etc. with a single click. *Note: You MUST have SAS Version 8 or above OR the special JAVA applet installed on the displaying system or the JAVA capabilities will not work.*

```
goptions reset=global;
goptions device=java hsize=4 in vsize=4 in ftext=swiss;
ods html body='javapiel.htm' path=odsout;
proc gchart data=ee.daylevel (where=(proccat in
('EPOGEN','FERRELECIT','IRON_DEXTRAN','HIV','CALCIJEX',
'CARNITOR','VENOFER','VANCOMYCIN','ZEMPLAR','OTHER')));
pie proccat / sumvar=charge type=mean
percent=outside value=outside;
title1 f=swissb h=1 "MEAN ANCILLARY COSTS";
run;
quit;
ods html close;
```

Active-X graphics can also be manipulated by right clicking on the image with the mouse. The capabilities are slightly different from those of JAVA graphics. *Note: You MUST have SAS Version 8 or above OR the Active-X application downloaded from Microsoft installed on the displaying system or the Active-X capabilities will not work.*

```
goptions device=activex hsize=4 in vsize=4 in ftext=swiss
htext=.5;
ods html body='actxpiel.htm' path=odsout;
proc gchart data=ee.daylevel (where=(proccat in
('EPOGEN','FERRELECIT','IRON_DEXTRAN','HIV','CALCIJEX',
'CARNITOR','VENOFER','VANCOMYCIN','ZEMPLAR','OTHER')));
pie proccat / sumvar=charge type=mean
percent=outside value=outside;
title1 f=swissb h=1 "MEAN ANCILLARY COSTS";
run;
ods html close;
quit;
```

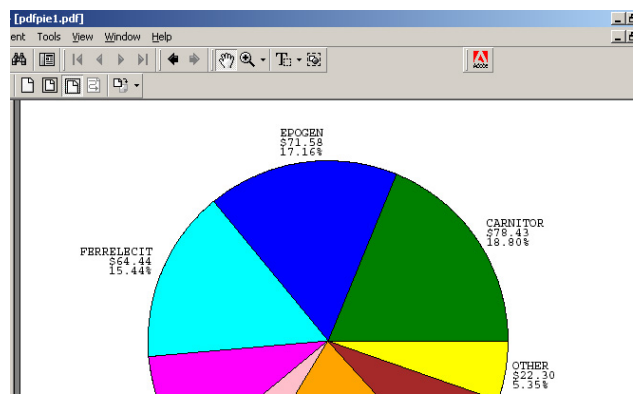


PDF PIE CHART:

SAS produced PDF graphics are not interactive in any way. There are, however, advantages to producing large volumes of graphics and/or tables using the SAS V8 PDF device, as you can manipulate bookmarks and styles to make accessing the different graphics very easy. It also makes it hard to "manipulate the data", a very credible fear of web publishers whether using the SAS system or not!

```
goptions reset=global;
ods pdf file='c:\esrdpac\pdfpiel.pdf';
proc gchart data=ee.daylevel (where=(proccat in
('EPOGEN','FERRELECIT','IRON_DEXTRAN','HIV','CALCIJEX',
'CARNITOR','VENOFER','VANCOMYCIN','ZEMPLAR','OTHER')));
pie proccat / sumvar=charge type=mean
percent=outside value=outside;
title1 f=swissb h=1 "MEAN ANCILLARY COSTS";
run;
quit;
ods pdf close;
```

ACTIVE-X PIE CHART:



Note: Graphic cropped to save room in paper.

AN IMPORTANT TIP REGARDING PRODUCING SAS HTML GRAPHICS WITH THE GIF DEVICE

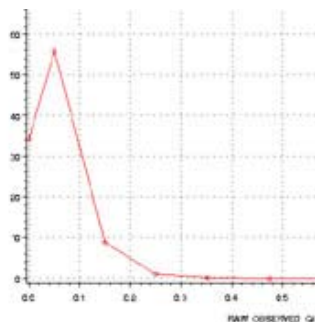
NAME= OPTION

The SAS system creates files other than the output HTML file when producing graphics using the GIF device. These files are GIF files and must be linked to the HTML graphic in order for it to publish correctly. SAS generates a separate GIF file for EACH TYPE of graphic, numbering multiple graphics of the same type sequentially. These GIF files MUST be in the directory where the HTML files reside and are called from using a browser. In addition, if you run more than one program generating the same types of graphics in the same directory, the GIF files from the most recent program will overwrite the older GIF files, creating errors. You can use the NAME= option in your graphics code to specify the names of your GIF files which eliminates this issue. Although it is not currently documented as available on all graphics procedures, it is.

Example:

```
ods html body="qm.cht.htm";
options reset=global;
options device=gif border=ftext=swissb;
symbol1 color=red interpol=join value=diamond;
pattern1 value=msolid color=red;
proc gplot data=ol_qm;
  plot percent*ol_qm / name="ol_qm"
    vaxis=0 10 20 30 40 50 60 70 80 90 100
    haxis=0.0 0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9 1.0 1.1
    grid;
  title3 "OL_QM";
run;

ods html close;
quit;
```



Note: Graphic is cropped to save room in the paper.

It is also possible to consolidate several graphic images into a

single graphic file, cutting down on the number of files. This is particularly easy when using the PDF and HTML destinations. SAS allows you to combine output from multiple procedures when using the Output Delivery System. Both the PDF and HTML destination also allow you to index or bookmark the output from different procedures within a single PDF or HTML file. In addition, you can use by variables to dictate the "bookmarks" in your graphics image file.

FILE ORGANIZATION BY TOOLS WITHIN THE HTML DESTINATION

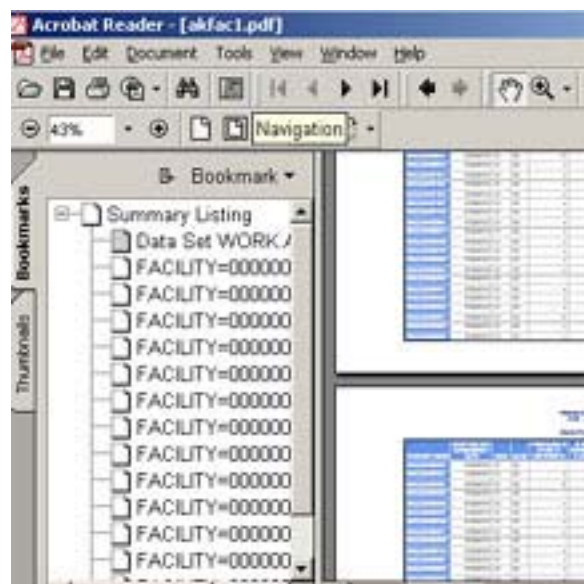
It is also possible to consolidate several graphic images into a single graphic file, cutting down on the number of files. This is particularly easy when using the PDF and HTML destinations. SAS allows you to combine output from multiple procedures when using the Output Delivery System. Both the PDF and HTML destination also allow you to index or bookmark the output from different procedures within a single PDF or HTML file. In addition, you can use by variables to dictate the "bookmarks" in your graphics image files. Use of the WEBFRAME device in the HTML destination allows you to generate thumbnails of graphics on the left side instead of the procedure name.

Example:

```
options orientation=landscape papersize=letter leftmargin=.5
rightmargin=.5 topmargin=.5 bottommargin=.5;

ods pdf file="c:\tremor\akfac1.pdf"
author="Abt Associates Inc."
keywords="QI Resident Facility QIO"
subject="Quality Indicators"
title="Resident Level Quality Indicator Summary"
startpage=now
style=dd.facilweb;

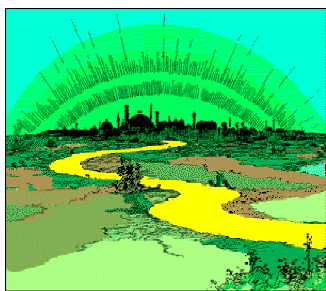
ods proclabel="Summary Listing";
proc print data=akanal label uniform split='*';
var dateplug aa8a aa8b cres1 cpru2 cpru3 cinfx cbeh4 cntc3
triggers;
id res_id;
by fac_itl;
pageby fac_itl;
format cres1 cpru2 cpru3 cinfx cbeh4 cntc3 trigs.;
title1 'TREMOR / MEGAQI';
title2 "PDF - Alaska";
run;
quit;
ods pdf close;
```



WHAT ELSE CAN I DO WITH MY HTML GRAPHICS?

HTML files can be read directly into Microsoft Excel and Microsoft Word, as well as other non-Microsoft packages. Open the software package you wish to use and open the HTML file. HTML listings opened with Excel will appear as a spreadsheet; HTML listings opened with Word are imported as tables. If importing HTML listings into Excel, set up your columns with appropriate formats BEFORE inserting the HTML file. Avoid using titles and footnotes and use OPTIONS NODATE NONUMBER to avoid annoying little formatting issues. If importing into ANY package avoid using styles with colored backgrounds and white print. They do not print well except on color printers! In addition, it is a lot easier to manipulate the HTML output in SAS than in MS Word, which requires that you select each separate table in a document to modify colored backgrounds, etc. HTML graphics are imported as PICTURES in Excel and Word. Again, manipulating the output in SAS is a lot easier than trying to edit the graphic in Microsoft Word or Excel.

THE EMERALD CITY, OR COMING UP IN VERSION 9 (FOLLOW THE YELLOW BRICK ROAD)



In addition to many new graphic options and procedures, HTML graphic files produced using the JAVA (or JAVAIMG) and ACTIVE-X (or ACTXIMG) devices will no longer lose their special capabilities when imported into other software packages. For example, within a MS Word document you will be able to

right click on a SAS-produced graphic created using the ACTIVE-X device, and change the graph type, colors, perspective, etc. This can be accomplished by using the RTF destination (specifically designed for use with Microsoft products) and the Active-X device. RTF Active-X graphs can be created on any system (MVS, AIX Unix, and the PC), ported to a PC, and viewed or used in a Microsoft application.

In Version 8.2, the GUI for Active-X controls was improved. In Version 9, the various controls have been incorporated into a single property sheet, making changes to graph styles and color schemes as quick as a click of the mouse. These changes make it possible for graphics within a Microsoft Word document published on the internet to be manipulated by any viewer.

CONCLUSION

SAS Version 8 provides many new, and some improved older tools, to produce some truly amazing results. Intranet or internet publishing in a variety of useful forms becomes easy using SAS Version 8's Output Delivery System. In addition, importing customized SAS output seamlessly into outside software products has become easy.



Presentation of data using the SAS system has come a long way since the ubiquitous PROC PRINT output of the 70's, using new destinations, devices, and styles; enabling SAS programmers to become

wizards of ODS.

With the advent of Version 9, we can look forward to even greater capability in the area of information visualization. There is even an experimental MAPIMP procedure which allows SAS users to import external geographic data sets for use in the GMAP procedure. There's nothing like SAS!

REFERENCES

SAS Online Documentation (PC SAS V612, PC SAS V8, AIX UNIX SAS V612, AIX UNIX SAS V8, RED HAT LINUX 6.2 SAS V8)

The Complete Guide to the SAS Output Delivery System, Versions 7-1 and 8

ACKNOWLEDGMENTS

SAS Technical Support has been incredibly helpful, especially Robert Allison. If you haven't checked out SAS Technical Tips yet, you are in for a pleasant surprise! A really helpful link is http://support.sas.com/techsup/sample/sample_graphv7.html.

Himesh Patel and Ravi Devarajan of the SAS Institute have written several illuminating and exciting papers on information visualization which provided me with helpful tips and hopes for the future. If you have a chance to attend the V9 session following my presentation, please do so! You will be blown away by all the new graphic tools available in Version 9, and the new capabilities of our old Version 8 procedures.

The Oz graphics were obtained from the wonderful Oz library web page, www.halycon.com/piglet.

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