

CHAPTER

5

Managing SAS Output

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Printing

The SAS System under Windows uses the Windows Print Manager. This means you can spool printed output from your SAS session (such as the contents of the PROGRAM

EDITOR and OUTPUT windows and results of procedures and the DATA step) to the Print Manager and manage this output in the same manner as you manage output from other Windows applications. You can also take advantage of Windows TrueType fonts and fonts supported by your printers. For details about using the Print Manager, see your Windows documentation. “Producing Graphics” on page 139 discusses how to route graphics from your SAS session to printers.

Printing from within a SAS Window

To print the contents of one of the SAS windows, make that window active (by clicking on it) and select

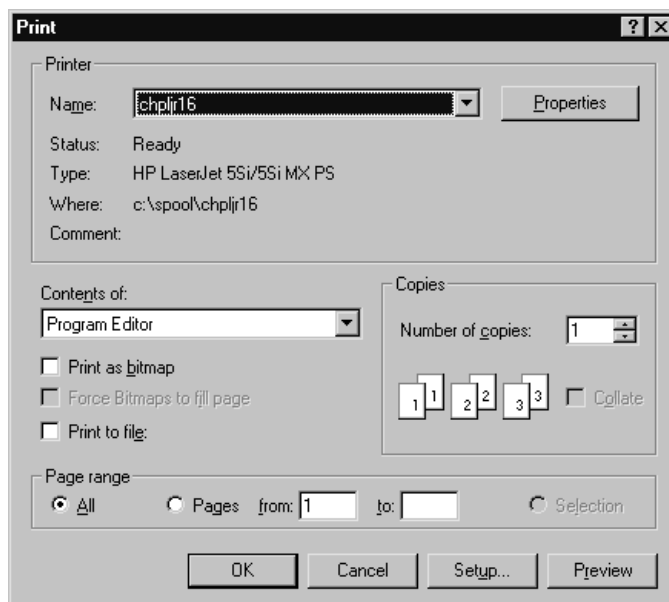


From the Print dialog box (shown in Display 5.1 on page 126), you can choose from several options:

- To print the contents of the currently selected window as text, click on **[OK]**.
- To print the contents of the currently selected window as a bitmap (that is, as a picture of the window instead of as text), select the **Print as Bitmap** checkbox; then click on **[OK]**.
- To print the contents of the currently selected window to a printer file (formatted for the current printer), select the **Print to File** checkbox, optionally type in the file name, and then click **[OK]**.
- To print the contents of the Windows clipboard, click on the field labeled **Contents of:**. From the displayed listbox, select **Clipboard (text)** (or **Clipboard (bitmap)** if you are printing it as a bitmap); then click on **[OK]**.

Note: The Print dialog box might differ somewhat from what you see on your system, depending on which Windows operating system you use to run SAS, and on the active SAS window. △

Display 5.1 The Print Dialog Box



The Print dialog box displays the destination printer's name, status, and type of printer. To change the destination printer, click on the **Name** combo box and select a new printer from the list.

You can perform other printing tasks by combining the above methods. For example, you can print the contents of the currently selected window as a bitmap to a printer file by selecting both the **Print to File** and **Print as Bitmap** check boxes.

Here is a summary of the SAS-related options that the Print dialog box offers:

Contents of:

displays the name of the window whose contents you want to print. You can choose between the currently selected window and the Windows clipboard. If you select **Print as Bitmap**, you can also print a bitmap of the main SAS window or of the entire screen.

Print to File

prints the selected window to a printer file. For example, if your currently selected printer is a PostScript printer, the resulting printer file will be in PostScript format. The Print dialog box prompts you for a filename.

Note that you cannot edit the resulting printer file; it is in a format readable only by the type of printer specified in the Print dialog box. If you want to save the contents of an application window to a text file without printer formatting, select the **File** pull-down menu and then select **Save As...**

Print as Bitmap


prints the currently selected window as a bitmap instead of as text.

Force Bitmaps to Fill Page

scales the bitmap as needed to fill the entire printed page. The Print dialog box window displays this checkbox only when you select **Print as Bitmap**.

Page range

specifies the range of pages of output to print. **Selection** is enabled if the current window is a text window with selected text.

For more detailed information about the Print dialog box, click the  button and then click the area you want to know about.


Note: Although the Print dialog box offers a Collate option, this option is enabled only if the printer supports collating on its own. The SAS System does not collate its output pages. Δ

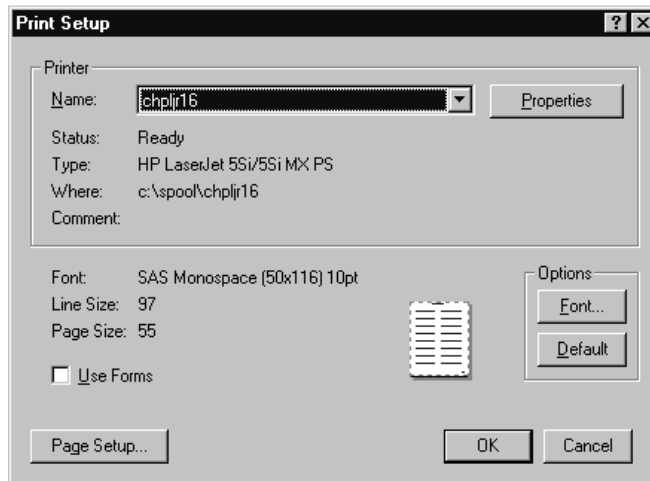
Changing the Print Options

The Print Setup dialog box (shown in Display 5.2 on page 128) lets you control how the SAS System prints information. For example, you use this dialog box to select the page setup and the font used to print.

You can access this dialog box by selecting

You could also click on  from the Print dialog box. If you are using an application that does not provide access to the menus, you can enter DLGPRTSETUP at a command line. You can use the DLGPRTSETUP command to programmatically specify every aspect of your printer settings. For details, see "DLGPRTSETUP" on page 284.

Display 5.2 The Print Setup Dialog Box

The SAS System consults these sources for default printer settings (in order of precedence, first to last):

- the SYSPRINT system option
- the system default printer (which you can select by adjusting the printer's properties in the Printers window).

Here is a summary of the information presented in the Print Setup dialog box:

Printer:

displays the name of the currently selected printer. To change the settings specific to your printer, click on **Properties**. If you accessed the Print Setup dialog box using the **Setup...** button on the Print dialog box, you cannot change the printer destination from this dialog box.

Font

displays the current font. To change the font, click on **Font...** and select a new font, style, and size from the Font dialog box.

When you change the font size, the SAS System recalculates the maximum LINESIZE and PAGESIZE values displayed on the Print Setup dialog box.

Note: SAS tabular and columnar reports are formatted assuming the use of a monospace font. Use of a proportionally spaced font might produce improperly formatted reports. Δ

Line Size and Page Size

display the maximum calculated line size and page size, respectively, for the current printer and font settings. Although you cannot set these values directly from this dialog box, you can adjust them by changing the page setup, the font, and the destination printer. Click on **Page Setup...** to access the Page Setup dialog box. From there, you can change the margins, page orientation, and papersize, which in turn affects the line size, page size, and papersource. The LINESIZE and PAGESIZE system options change when you click on **OK**.

Also, the Print Setup dialog box contains a graphic that depicts the current page orientation and margin settings.

Note: The margin settings affect printed output only. Δ

Use Forms

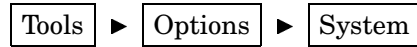
specifies whether to use SAS System print forms, as described in “Using SAS System Print Forms” on page 133.

To revert back to the default printer settings, click on **Default**.

Changing the Print Options Using the SAS System Options Window

To change the printer options using the SAS System Options window, you must know the values of the printer name, font, and line and page size you want to use.

To open the SAS System Options window, select



You can then make the following changes to the printing system options:

- To change the printer:
 - select the **Log and procedure output control** folder and then select the **Procedure output** folder
 - With the right mouse button, click on **Sysprint** and select **Modify Value** from the pop-up menu.
 - Enter a printer name in the New Value text box and click on **OK**. The printer name must be entered as it appears in the Windows Printer folder. The printer name is case-sensitive.
- To change the Font:
 - select the **Log and procedure output control** folder and then select the **Procedure output** folder
 - With the right mouse button, click on **Sysprintfont** and select **Modify Value** from the pop-up menu.
 - Enter a font in the New Value text box and click on **OK**

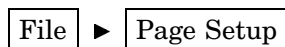
For valid values, see “SYSPRINTFONT” on page 469.
- To change the Line Size and Page Size:
 - select the **Log and procedure output control** folder and then select the **Log and procedure output** folder
 - With the right mouse button, click on **Linesize** or **Pagesize** and select **Modify Value** from the pop-up menu.
 - Enter a line size or page size in the New Value text box and click on **OK**

Changing the Page Setup Options

The Page Setup dialog box (shown in Display 5.3 on page 130) lets you set the margins, orientation, paper, and paper source for your printed output.

You can access this dialog box by:

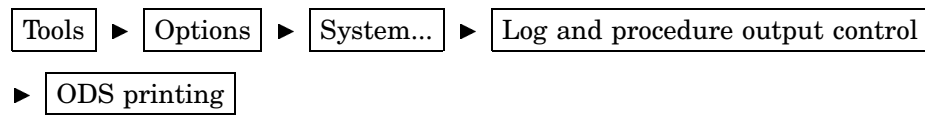
- entering DLGPAGESETUP in the command bar
- selecting



- clicking on **Page Setup** from the Print Setup dialog box

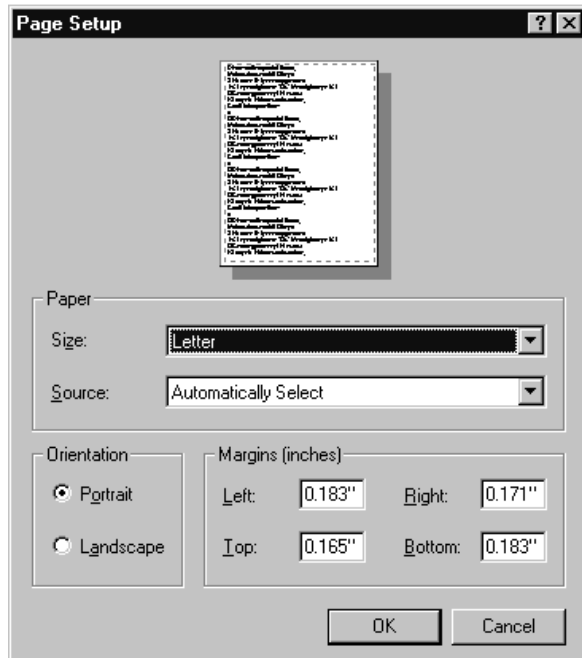
You can also change the margins, orientation, paper, and paper source using the LEFTMARGIN, RIGHTMARGIN, TOPMARGIN, BOTTOMMARGIN, ORIENTATION, PAPERSIZE, PAPERSOURCE, and PAPERTYPE system options from the SAS System Options window. To change these options:

- 1 Select



- 2 Place the cursor over the appropriate system option, click the right mouse button, and select **Modify Value**.
- 3 Enter a new value and click on **OK**

Display 5.3 Page Setup Dialog Box



Here is a summary of the information presented in the Page Setup dialog box:

Paper

lets you select the paper size and source of the paper (such as automatic selection, envelop feeder, manual feeder, or printer tray) for printing. To change the paper size or source, click in the combo box and highlight a selection. The paper size can be one of the following; additional paper sizes may be supported. Note that not all printers support these paper sizes:

LETTER

Letter, 8-1/2-by-11-inch paper

LEGAL

Legal, 8-1/2-by-14-inch paper

A4

A4 Sheet, 210-by-297-millimeter paper

CSHEET

C Sheet, 17-by-22-inch paper

DSHEET

D Sheet, 22-by-34-inch paper

ESHEET

E Sheet, 34-by-44-inch paper

LETTERSSMALL

Letter Small, 8-1/2-by-11-inch paper

TABLOID

Tabloid, 11-by-17-inch paper

LEDGER

Ledger, 17-by-11-inch paper

STATEMENT

Statement, 5-1/2-by-8-1/2-inch paper

EXECUTIVE

Executive, 7-1/4-by-10-1/2-inch paper

A3

A3 sheet, 297-by-420-millimeter paper

A4SMALL

A4 small sheet, 210-by-297-millimeter paper

A5

A5 sheet, 148-by-210-millimeter paper

B4

B4 sheet, 250-by-354-millimeter paper

B5

B5 sheet, 182-by-257-millimeter paper

FOLIO

Folio, 8-1/2-by-13-inch paper

QUARTO

Quarto, 215-by-275-millimeter paper

10X14

10-by-14-inch paper

11X17

11-by-17-inch paper

NOTE

Note, 8-1/2-by-11-inch paper

ENV_9

#9 Envelope, 3-7/8 by 8-7/8 inches

ENV_10

#10 Envelope, 4-1/8 by 9-1/2 inches

ENV_11

#11 Envelope, 4-1/2 by 10-3/8 inches

ENV_12

#12 Envelope, 4-3/4 by 11 inches

ENV_14

#14 Envelope, 5 by 11-1/2 inches

ENV_DL

DL Envelope, 110 by 220 millimeters

ENV_C5

C5 Envelope, 162 by 229 millimeters

ENV_C3
C3 Envelope, 324 by 458 millimeters

ENV_C4
C4 Envelope, 229 by 324 millimeters

ENV_C6
C6 Envelope, 114 by 162 millimeters

ENV_C65
C65 Envelope, 114 by 229 millimeters

ENV_B4
B4 Envelope, 250 by 353 millimeters

ENV_B5
B5 Envelope, 176 by 250 millimeters

ENV_B6
B6 Envelope, 176 by 125 millimeters

ENV_ITALY
Italy Envelope, 110 by 230 millimeters

ENV_MONARCH
Monarch Envelope, 3-7/8 by 7-1/2 inches

ENV_PERSONAL
6-3/4 Envelope, 3-5/8 by 6-1/2 inches

FANFOLD_US
U.S. Standard Fanfold, 14-7/8-by-11-inch paper

FANFOLD_STD_GERMAN
German Standard Fanfold, 8-1/2-by-12-inch paper

FANFOLD_LGL_GERMAN
German Legal Fanfold, 8-1/2-by-13-inch paper

Margins

displays the amount of space to leave blank from the top, bottom, left, and right edges of the paper. To change the margins, click in the text box and type in the margin size.

Orientation

lets you select either Portrait or Landscape. Portrait prints vertically, and landscape prints horizontally.

Previewing Your Output before You Print

To see how the contents of a window will appear as printed output, select the window you want to preview and then select

►

Alternatively, you can click the Print Preview toolbar button.

In the Preview window, you can use the and buttons to navigate through the pages to be printed. The current page number and total number of pages are displayed at the bottom of the window. You can also magnify your view of the current page (to 100%) by clicking on , or by simply clicking inside of the page. To reduce your view, click on or inside of the page again.

In the Print Preview window, you can navigate by using the following shortcut keys:

Key	Action in Full Page mode	Action in Zoom mode
PgDn	Advance to next page	Scroll down on current page
PgUp	Go back to previous page	Scroll up on current page
Ctrl+PgDn	none	Scroll right on current page
Ctrl+PgUp	none	Scroll left on current page
Ctrl+Home	Go to first page	Go to first page
Ctrl+End	Go to last page	Go to last page

Note:

Not all SAS application windows support the Print Preview feature. Δ

Using SAS System Print Forms

To use a form to print from the SAS System, select the **Use Forms** check box in the Print Setup dialog box. When you print, the SAS System prints your output with the current print form.

To specify a print form as the current print form, use the FORMNAME command, or specify the FORMS option in your SAS configuration file or in the SAS System Options window. To learn the name of the current form, issue the FORMNAME command with no parameters.

Using the FORM Window

The FSFORM command opens the FORM window, in which you can define print forms to use when you print SAS output. You can specify printer, page formats, margins, fonts, and printer control language in a FORM entry.

SAS print forms are especially useful when you use the PRINT command from within an interactive SAS session and when you print from SAS/AF windows.

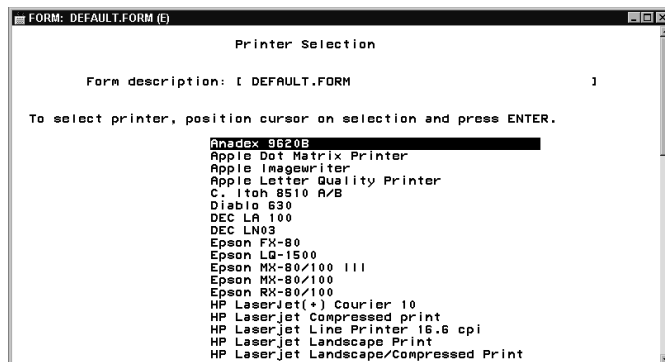
To invoke the FORM window, issue the following command:

```
FSFORM catalog-name.form-name
```

See the SAS System online Help for more information about the FSFORM command.

While the majority of the frames in the FORM window are the same across all operating systems, the first frame you see after issuing the FSFORM command is the Printer Selection frame which lists the printers you are able to use under Windows. Display 5.4 on page 134 shows the default information for this frame. (To navigate through the FORM window frames, use the **Next Screen** and **Previous Screen** commands located under the **Tools** menu.)

Display 5.4 Printer Selection Frame



The information in the Printer Selection frame is also site-dependent, so the printer list at your site may be different from the one shown in Display 5.4 on page 134.

The Printer Selection frame appears only when you create a new print form. After you create a form, it is stored in your user profile catalog or whatever catalog was specified with the FSFORM command (entry type FORM). The next time you modify this form, the Printer Selection frame is skipped. You cannot return to the Printer Selection frame from the second FORM window frame.

Printing with SAS Commands

If you prefer entering commands to using menus, you can use the PRINT or SPRINT command to print the contents of the active window. For more information about these commands, see the SAS System Help.

Sending DATA Step Output to a Printer

You may want to spool your DATA step output to a printer instead of to a file. Use the FILENAME statement and the PRINTER device-type keyword to accomplish this, as in the following example:

```
filename myfile printer;
data _null_;
  set mydata;
  file myfile;
  where city='Cincinnati';
  put _all_;
run;
```

In this example, the PRINTER device-type keyword specifies to print the output to the printer specified in the SYSPRINT system option. For more information on the SYSPRINT system option, see “SYSPRINT” on page 468.

Sending Printed Output to a File

You can send your printed output to a file by selecting the **Print to File** check box in the Print dialog box, and then specifying the name of a file to print to. This is *not* the same as a save operation; the resulting printer file contains all the printer control language necessary to support whatever options you have chosen with the Printer

Setup dialog box, such as fonts and page orientation. In most cases, this printer file is not readable with a text editor; it is meant only to be sent to the printer.

You can also route printed output to a file using the FILENAME statement, which is useful for routing DATA step output. Here is an example:

```
filename myfile printer altdest='c:\sas\results.dat';
data _null_;
  set qtrldata;
  file myfile;
  where sales ge 1000;
  put _all_;
run;
```

In this example, the output from the DATA step is routed to a file, yet still contains all the printer control information necessary for you to use your printer to produce formatted output.

Another method of sending printed output to a file is to direct the output to the FILE: device instead of a printer in the Windows printer Properties dialog box **Ports** page. If you assign the FILE: device to a printer, Windows prompts you for a file name each time you print. When you send output to a file, the contents of the file are overwritten if the file already exists. For more information about changing printer properties, see your Windows documentation.

Printing in Batch Mode

When you run SAS jobs in batch mode, you do not have access to the Print and Printer Setup dialog boxes, but you can still take advantage of the Print Manager. Use the SYSPRINT system option to specify your default printer (and the SYSPRINTFONT system option to specify your printer font, if desired) as described in “SYSPRINT” on page 468. For example, suppose your SAS configuration file contains the following option:

```
-sysprint "f2hp5"
```

Then, your SAS program might contain the following statements:

```
filename myfile printer;
data _null_;
  set schools;
  file myfile;
  where enrolled le 500;
  put _all_;
run;
```

When you submit your job, the SAS System uses the SYSPRINT printer specification to spool your output from the DATA step to the Windows Print Manager.

Default Printer Details

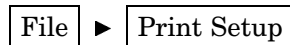
The SAS System looks for a default printer as follows (in order of precedence, first to last):

- the SYSPRINT system option value
- the Windows system default printer.

The SYSPRINT system option is defined as the Windows default printer during SAS installation.

To see the value of the SYSPRINT system, open the Print Setup dialog box either by:

- selecting



- enter DLGPRTSETUP in the command bar.

To change the SYSPRINT system option, see “Changing the Print Options” on page 127.

Routing Procedure Output to a Web Browser

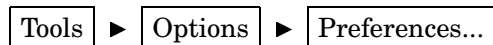
With Version 8 of SAS, the Output Delivery System can create your procedure output in HTML to be viewed in a web browser. If you have Microsoft Internet Explorer 4.0 (IE) or above installed, SAS displays the procedure output HTML file within the SAS System Results Viewer window. If you are not using IE, the procedure output HTML file is displayed in the web browser specified in the Preferences dialog box **Web** page. Having IE installed lets you stay within the SAS System to view the HTML output.

For more information on using HTML within the Output Delivery System, see *The Complete Guide to the SAS Output Delivery System*.

Configuring Preferences for HTML Output

For the SAS System to create an HTML file from your procedure output and to know where to display the HTML file, you configure the **Results** and **Web** pages of the Preferences dialog box.

To open the Preferences dialog box, select



To configure the **Results** page of the Preferences dialog box:

- Click on the **Results** page.
- Select the **HTML** check box.
- Click in the **Style** box and highlight a style. The style defines colors and fonts to display your output.
- Select where to save your HTML file. To save HTML files only while the current SAS session is active, select the **Use WORK folder** check box. Saving HTML files to a temporary folder is useful when you are testing a procedure and creating a multitude of HTML files, as when you exit the SAS System, all temporary files are deleted.

To save HTML files to a folder that is not deleted when The SAS System exits, enter a path in the **Folder** text box or click on **Browse** to search for a folder.

- Under **View results using**, select **Internal browser** to view the HTML output in a SAS window or select **Preferred browser** to view the HTML output in the Web browser specified on the **Web** tab. If you do not have Microsoft Internet Explorer installed, you must select **Preferred browser**.

To configure the **Web** page of the Preferences dialog box:

- Click on the **Web** page.
- To view the HTML output in the default browser that is configured in the Windows Registry, select the **Use default** radio button.

To view HTML from a web browser other than the default browser, select the **other** radio button and enter the browser's path and file name, or click on **Browse** to find the browser file name. For information on how to view the Windows Registry, see your operating system documentation.

Using the Results Viewer Window

The SAS System uses the Results Viewer window to display ODS HTML output when you select **Internal browser** from the **Results** page of the Preferences dialog box. You can open any ODS HTML output listed in the Results window or any HTML file on your system.

To open ODS HTML output in the Results Viewer:

- 1 Select the **Results** window.
- 2 Expand the Print folder containing the ODS HTML output by clicking once on +.
- 3 Double-click on the output you want to view.

You can compare one or more HTML files by opening multiple instances of the Results Viewer. To open another Results Viewer window, from the Results window:

- 1 Click the right mouse button on the output data set name.
- 2 Select **Open in New Window**.

To open an HTML file on your system:

- 1 Click anywhere in the Results Viewer window.
- 2 Select Open from the toolbar.
- 3 Specify the HTML file in the Open dialog box.

The Results Viewer functions are available from either menus or the toolbar. The following functions are available:

Back

displays the previous HTML file in the active Results Viewer window.

Forward

displays the next HTML file in the active Result Viewer window.

Save Background as...

opens the Save As dialog box to save the background image.

Select All

selects all text. Selected text can only be copied to the clipboard.

View Source

opens the current Results Viewer page in Notepad. Within Notepad you can view or modify your HTML file. If you modify the HTML file, use **Refresh** to reload the HTML file in the Results Viewer. To save changes to your HTML files, be sure your HTML files are not saved in the WORK folder or other temporary folders.

Print

opens the Internet Explorer Print dialog box.

Refresh

reloads the current HTML page into the Results Viewer.

Properties

displays the Properties page for the current Results Viewer page.

Routing Procedure Output and the SAS Log to a File

This section provides examples of routing SAS procedure output and the SAS log to a file. Although not every method of routing output is included, the easiest or most common methods are represented here. Most of this task is the same across operating systems and is discussed in the SAS System Help. However, the specification of external filenames and devices is system dependent. For complete information about the various ways to reference external files, see “Referencing External Files” on page 106.

You can route your SAS procedure output or the SAS log to a file in one of several ways. The method you choose depends on the method you use to run the SAS System, the moment at which you make your decision to route the output or SAS log, and your personal preference.

Some methods of sending SAS procedure output or the SAS log to a file include using

- the Save As dialog box, invoked either from the **File** menu, the pop-up menu for the window that you want to save, or by entering DLGSAVE in the command bar.
- the FILE command
- the PRINTTO procedure
- various system options, including PRINT and ALTLOG.

The examples in this section illustrate only some of these routing methods. For more information, see the SAS System Help.

Using the Save As Dialog Box

The easiest way to save the contents of the active window to a file is to select



from the main SAS window, making sure that the active window (for example, LOG or OUTPUT) contains the output that you want to save. For more information about the Save As dialog box, see “Saving Window Contents to a File” on page 31.

Using the PRINTTO Procedure

In batch SAS sessions, the SAS procedure output and the SAS log are written by default to files named *filename.LST* and *filename.LOG*, respectively, where *filename* is the name of your SAS job. For example, if your SYSIN file is MYPROG.SAS, the procedure output file is named MYPROG.LST, and the log file is named MYPROG.LOG. However, you can override these default filenames and send your output and log to any file you choose. For example, suppose your job contains the following statements, which assign the fileref MYOUTPUT to the file C:\SAS\FIRST.TXT. Then the PROC PRINTTO statement tells the SAS System to send any upcoming SAS procedure output to the file associated with MYOUTPUT.

```
filename myoutput 'c:\sas\first.txt';
proc printto print=myoutput;
run;
```

Any PROC or DATA statements that follow these statements and that generate output send their output to the C:\SAS\FIRST.TXT file, not to the default procedure output file. If you want to change back to the default file, issue an empty PROC PRINTTO statement like the following example:

```
proc printto;
run;
```

Issuing these statements redirects the SAS procedure output to the default destination (*filename.LST*). In this way, you can send the output and log from different parts of the same SAS job to different files.

Note: If you route procedure output to a file, the resulting file may contain carriage control characters. To suppress these control characters when you include the file in the PROGRAM EDITOR, set the RECFM= option to P in the FILENAME statement. Note that this affects the way the file is read into the PROGRAM EDITOR, not the file itself. △

If you want to send the SAS log to a specific file, use the LOG= option instead of the PRINT=option in the PROC PRINTTO statement. For more information about the PRINTTO procedure, see “PRINTTO” on page 365 and *SAS Procedures Guide*.

Note: When you use the PRINTTO procedure to route SAS procedure output or the SAS log, the Status window does not reflect any rerouting of batch output but indicates it is routing the procedure output file and log to *filename.LST* and *filename.LOG*. △

Using SAS System Options

You can use SAS system options to route your SAS output or SAS log to a file. For example, if you want to override the default behavior and send your procedure output from a batch SAS job to the file C:\SAS\PROG1.TXT, you can invoke the SAS System with the following command:

```
SAS -SYSIN C:\SAS\PROG1
    -PRINT C:\SAS\PROG1.TXT
```

This SAS command executes the SAS program PROG1.SAS and sends the procedure output to the file C:\SAS\PROG1.TXT. You can treat the SAS log similarly by using the LOG system option instead of the PRINT system option. Two other related system options, the ALTPRINT and ALTLOG options, are explained in “ALTPRINT” on page 407 and “ALTLOG” on page 407.

Note: The Status window does reflect the PRINT and LOG system options values when recording where the procedure output and log are being sent. △

Producing Graphics

For full details about using SAS/GRAPH software, see *SAS/GRAPH Software: Reference*. For further details about using graphics and fonts with the SAS System under Windows, see “Overview of Graphics Considerations” on page 511.

Producing Graphics on Your Display

In most cases, output is automatically displayed on your monitor when you run a SAS/GRAPH procedure; it is not necessary to specify a SAS/GRAPH device driver. Information about your graphics display is stored in a Windows information file and is automatically used by the SAS System during an interactive SAS session.

Here is a simple example of how to produce a graphic:

```
data hat;
  do x=-5 to 5 by .25;
```

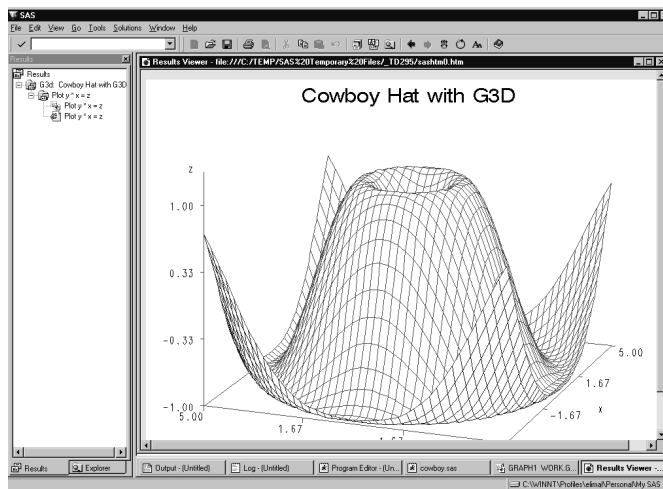
```

do y=-5 to 5 by .25;
  z=sin(sqrt(x*x+y*y));
  output;
end;
end;
proc g3d data=hat;
  plot y*x=z/ctop=red;
  title 'Cowboy Hat with G3D';
run;
quit;

```

Display 5.5 on page 140 shows the output for this program:

Display 5.5 Cowboy Hat Program Output



If you use the `DEVICE=` option in the `GOPTIONS` statement to route your graphics to a hardcopy device, and then you want to return to using your monitor to display graphics, you must specify a driver. Submit the following statement to display graphics output on your monitor:

```
goptions device=win;
```

You should also use the `WIN` device driver to produce graphics on your display when you run your SAS job in batch mode.

If you specify that your program output is to be displayed in HTML, your graphic is converted to a .GIF file and stored in the same folder as your SAS System data set. For more information, see *The Complete Guide to the SAS Output Delivery System*.

Printing Graphics

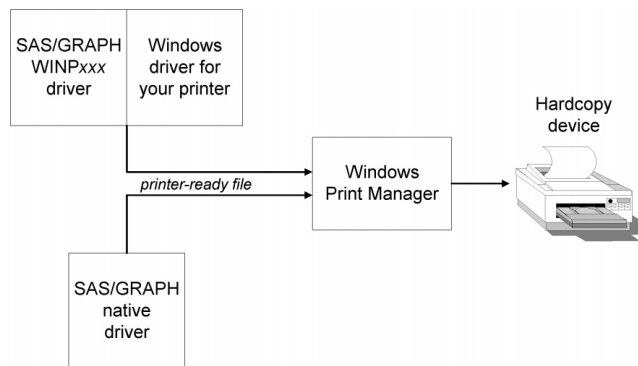
You can use two methods to print output from SAS/GRAPH:

- Use a Windows printer driver for your device (supplied with Windows or with your output device). This method allows SAS/GRAPH to send generic graphics commands to the Windows printer driver, which then translates the commands to a format the printer can use.
- Use a SAS/GRAPH printer driver to create a printer-specific graphics stream that can be sent directly to the device. When you use a SAS/GRAPH printer driver (also called a SAS/GRAPH native printer driver, meaning that it creates output

using the printer language that is native to the target device), SAS bypasses the Windows printer drivers and creates printer-ready output for your device. SAS/GRAPH printer drivers on Windows are similar to those used by the SAS System on mainframe and UNIX operating systems.

After SAS prepares output for a printer (by using either Windows printer drivers or a SAS/GRAPH printer driver), the output is sent to the Windows Print Manager, which then queues it for printing on the device of your choice. Figure 5.1 on page 141 illustrates how you can use the two sets of printer drivers within SAS/GRAPH to produce output for a given device.

Figure 5.1 SAS/GRAPH Generic Printer Drivers versus SAS/GRAPH Native Printer Drivers



The method that you choose depends on the output device you are using. For more information, see “Choosing between a SAS/GRAPH Native Driver and the WINPxxx Driver” on page 143. You can control both graphics printing methods by using either the Print and Print Setup dialog boxes or the `SYSPRINT=` option and the `GOPTIONS DEVICE=` statement.

Using the SAS/GRAPH Generic (WINPxxx) Drivers

To print a graphic using the SAS/GRAPH generic device drivers with the Windows printer drivers:

- 1 From the **File** pull-down menu, select **Print Setup** and verify that the **Printer** field in the Print Setup dialog box contains the correct Windows printer driver and port. You can use the Print Setup dialog box to select any printer driver/port combinations that you have installed in Print Manager. (To install new drivers and port combinations, you can use the Add Printer Wizard in Windows, which you can access through the Windows Control Panel.)

Alternatively, you can use the `SYSPRINT` system option to assign the destination printer (for example, `options sysprint='HP LaserJet III'`);. Note that you may assign only printer driver names that have been previously configured in Windows.

- 2 Run your SAS/GRAPH program with the following `GOPTIONS`: `GOPTIONS DEVICE=WINPxxx`; The value of `WINPxxx` you specify depends on the type of output device you use to print your graph:

`WINPRTM`

for black and white (monochrome) printers

WINPRTG
for grayscale printers

WINPRTC
for color printers

WINPLOT
for plotters.

The orientation of graphics output is determined by the following:

- If you specify the GOPTIONS ROTATE= option, the output is oriented according to the value you specify for ROTATE. For example, if you specify **goptions rotate=landscape**, then the output is oriented as landscape, regardless of the settings in the Print Setup dialog box.
- If you do not use the GOPTIONS ROTATE= option, the output is oriented according to the settings in the Print Setup dialog box.

Note: Graphic printing is affected by the margins specified in the Page Setup dialog box. If you modify the margins when printing graphics and your intention is to keep the graphic proportional, be sure to change the Top and Bottom margins by the same amount you change the Left and Right margins. Δ

Using the SAS/GRAPH Native Printer Drivers

SAS/GRAPH native drivers produce output in the native language of the target device. Examples of SAS/GRAPH native drivers include:

PS	produces Postscript output
HPLJS3	produces output in the PCL5 language used by Hewlett Packard LaserJet III printers
HP7550	produces HPGL output used by Hewlett Packard 7550 plotters.

After the SAS/GRAPH native printer driver has produced output in the native language of the target device, SAS then routes the output to the device using Windows Print Manager. The SAS System bypasses the Windows driver that is currently associated with the target device, but it does respect the destination specified in the Print Setup dialog box when deciding where to send the output.

To print a graph using a SAS/GRAPH printer driver, run your SAS/GRAPH program with the following GOPTIONS:

```
goptions device=driver-name;
```

where *driver-name* is the name of a valid SAS/GRAPH device driver. For example,

```
goptions device=hpljs2;
```

formats the graph for the Hewlett-Packard LaserJet Series II printer. (You can view the complete list of SAS/GRAPH drivers by submitting the PROC GDEVICE statement.)

To print a graph to a printer file (also called a graphics stream file, or GSF) instead of directly to a printer, specify the GSFNAME option on the GOPTIONS statement with the filename or fileref that points to where you want the output. For example:

```
filename graphout "graphpic.prn";
goptions gsfname=graphout gsfmode=replace
        device=hpljs2;
```

Printing and Previewing from the GRAPH Window

You can preview a graph that you create and, at the same time, format it for optimal display on the device of your choice. To preview the graph before you print it, run your SAS/GRAPH program with the following GOPTIONS statement:

```
goptions targetdevice=driver-name;
```

where *driver-name* is either one of the WINPxxx drivers or a SAS/GRAPH native driver.

By specifying a target device, SAS/GRAPH can format the graph with colors and attributes appropriate for the target printer. To print the graph after it is displayed, select the **File** pull-down menu and then select **Print**.

Note: If you do not specify a TARGETDEVICE before you create the graph, SAS/GRAPH will prompt you (in the Print dialog box) for a device driver name when you attempt to print the graph that you are previewing. (In most cases the WINPRTM or WINPRTC driver is specified by default.) The graph colors, orientation, and sizing might not be optimal for the output device you specify. Δ

Choosing between a SAS/GRAPH Native Driver and the WINPxxx Driver

When deciding whether to use SAS/GRAPH native drivers or the WINPxxx series of drivers, you need to consider such factors as the device you are using and the type of output you want to produce. Note the following specific considerations:

- If no Windows printer driver is available for your device, use a SAS/GRAPH native driver.
- If you have a device for which there is no SAS/GRAPH native driver, you should use the WINPxxx driver, provided there is a Windows printer driver available for the device. In cases where a new model of hardcopy device becomes available between releases of the SAS System and the hardware vendor provides a new Windows driver that uses new features of the device, you can use a WINPxxx driver to take advantage of those features.
- If you want to use options such as HSIZE= or VSIZE= to customize the size specifications used in your graph, using SAS/GRAPH native drivers usually produces more reliable results.
- To use TrueType fonts in your SAS/GRAPH output, use one of the WINPxxx drivers and specify the font just as you would specify one of the installed hardware fonts for your printer. For more information about generating hardware fonts, see “Overview of Graphics Considerations” on page 511.

Importing Graphics from Other Applications

SAS/GRAPH lets you import bitmap and vector graphics that were created by other software packages. This provides a couple of benefits:

- You can create your graphic using another graphics editor, then import the graphic into SAS/GRAPH to produce output on a specialized device.
- You can merge clip art and graphs from other applications with the graphs that you create in SAS/GRAPH.

You can import bitmap graphics into these SAS System windows:

- GRAPH window. (The imported graphic becomes a new GRSEG entry in the current catalog.)
- Graphics Editor. (The imported graphic becomes part of the current graph.)
- Image editor window. (The imported graphic becomes a new image.)

The SAS System provides two ways to import bitmap graphics into SAS/GRAPH:

- From the application you used to create the graphic, copy the graphic to the Windows clipboard; then switch to your SAS Session and paste the graphic into the SAS/GRAPH window, as described in “Pasting Graphics from the Windows Clipboard” on page 144.
- From the SAS/GRAPH window (or the Graphics Editor or Image editor) import the graphics file using the Import Image dialog box, as described in “Importing a Graphics File from within a SAS/GRAPH Window” on page 144.

To import vector graphics, use the GIMPORT procedure to import computer graphics metafile (CGM) files. The imported files are stored as GRSEG catalog entries. This method preserves the individual graphic objects in the imported graph, whereas the other two methods treat the imported graphic as a single (uneditable) bitmap. For more information about PROC GIMPORT, see *SAS/GRAPH Software: Reference*.

Pasting Graphics from the Windows Clipboard

If the tool you use to create the source graphics is a Windows application, then you can use the Windows clipboard to copy the graphics to your SAS session.

- 1 From the application you used to create the graphic, select the graphic and copy it to the clipboard using the copy procedures for your graphics tool.
- 2 Switch to your SAS session (or start your SAS session, if it is not already running).
- 3 With the SAS/GRAPH window active, select **Paste** from the **Edit** menu (or use the GPASTE command). The graphic is pasted into the SAS/GRAPH window.

Importing a Graphics File from within a SAS/GRAPH Window

SAS/GRAPH provides import filters to translate graphics files created in other applications to a format that you can use with the SAS System.

You can import graphics from other applications that produce files in any of the formats shown in Table 5.1 on page 144.

Table 5.1 Graphics Import File Formats

Graphics File Format	File Extension
Microsoft Windows bitmap	BMP
Microsoft Windows metafile	WMF
enhanced metafile	EMF
Device independent bitmap	DIB
JPEG format	JPG
graphic interchange format (GIF)	GIF
tag image file format (TIFF)	TIF
PC Paintbrush	PCX
Truevision Targa	TGA
Encapsulated PostScript Interchange (EPSI)	PS
Portable Network Graphics	PNG
Photo CD image	PCD

Graphics File Format	File Extension
Portable Pixmap	PBM
X Window bitmap	XBM
X Window dump	XWD

To import bitmap graphics into SAS/GRAPH:

- 1 With the GRAPH window active, select the **Import Image...** menu item from the **File** menu.
- 2 Use the Import Image dialog box to select the source directory and graphics file. Ensure that the **Format** field shows the correct source format; this indicates which import filter SAS/GRAPH will use. You can have the SAS System automatically detect the file format of the file to import by selecting AUTO as the **Format**. Click on **OK**.

Note: Automatic file format detection using AUTO does not detect the DIB, EMF, and WMF file formats △

You can also include IMAGE catalog entries in your graphs. For information about including IMAGE catalog entries, see *SAS/GRAPH Software: Reference*.

Exporting Graphics for Use with Other Applications

The SAS System provides these methods of exporting graphics created in SAS/GRAPH for use with other word processing or desktop publishing packages, or for display on the internet or intranet:

- Export the graphics to a file from the GRAPH window, Graphics Editor, or Image editor, as described in “Exporting a Graphic to a File from a SAS/GRAPH Window” on page 145.
- Copy the graphics (or a portion of them) to the Windows clipboard, then paste the contents of the clipboard into the target application (as a bitmap), as described in “Pasting Graphics from SAS/GRAPH into other Windows Applications” on page 146.
- Create a computer graphics metafile (CGM) file for use with a specific graphics package, using drivers that are included with the SAS System, as described in “Creating CGM Files for Export to Other Applications” on page 146.
- Create a Windows metafile for use with another Windows application, as described in “Creating WMF (Windows Metafile) Files for Export to Other Applications” on page 148.

You can also use SAS/GRAPH to create GIF and VRML files for use with web browsers, PDF files for use with the Adobe Acrobat reader, and many other useful types of graphics files. For more information about how to create these types of files, see *SAS/GRAPH Software: Reference* and the SAS online Help for SAS/GRAPH.

Exporting a Graphic to a File from a SAS/GRAPH Window

SAS/GRAPH provides export filters to translate graphics generated in SAS/GRAPH into formats that you can use with other applications, such as spreadsheet and desktop publishing programs.

You can export graphics from SAS/GRAPH in any of the formats shown in Table 5.2 on page 146.

Table 5.2 Graphics Export File Formats

Graphics File Format	File Extension
Microsoft Windows bitmap	BMP
Microsoft Windows metafile enhanced metafile	WMF EMF
Device independent bitmap	DIB
JPEG format	JPG
graphic interchange format (GIF)	GIF
tag image file format (TIFF)	TIF
Adobe PostScript	PS
Encapsulated PostScript Interchange (EPSI)	PS
Portable Network Graphics	PNG
Portable Pixmap	PBM

To export a graph from the GRAPH window:

- 1 With the GRAPH window as the active window, select the **File** pull-down menu and then select **Export Image...**
- 2 In the Export Image dialog box, select the target file format.
- 3 Specify the directory and filename for the exported graphic. Click on **OK**.

For more information about exporting graphics to a SAS IMAGE catalog entry from the Image editor, see the SAS online Help for SAS/GRAPH.

Pasting Graphics from SAS/GRAPH into other Windows Applications

A quick way to export graphics from the SAS System to another Windows application is to use the Windows clipboard. When you copy information from SAS/GRAPH to the clipboard, you can then paste that information into any application that accepts DIB, BMP or WMF input.

To copy information from SAS/GRAPH to the clipboard:

- 1 From the GRAPH window, hold down the left mouse button and drag the mouse over the portion of the graph you want to copy. A selection box marks off the selected area as you move the mouse. When you are finished, release the mouse button.

If you do not select an area of the graph to copy, the next step will copy the entire graph to the clipboard.

- 2 With the GRAPH window still active, press CTRL+C (or select **Copy to Paste Buffer** from the **Edit** menu).

This copies the graph to the clipboard. From here, you can switch to the target application and paste the graph (typically by using the **Paste** or **Paste Special** options in the other Windows application). For more information about how to paste information from the clipboard, see the documentation for the other Windows application.

Creating CGM Files for Export to Other Applications

You can export graphs from SAS/GRAPH to other graphics packages using drivers developed specifically for those packages. When you use computer graphics metafiles

(CGMs) as the medium of transport between packages, your graph retains its separate components that you can independently edit and size. (The editing capabilities you can use depend on the target graphics package.)

To create a CGM from SAS/GRAPH, set GOPTIONS as follows:

```
FILENAME fileref 'filename.CGM';
GOPTIONS DEVICE=CGMxxxx GSFNAME=fileref
          GSFMODE=REPLACE;
```

where CGMxxxx is the appropriate CGM driver for your target application, and filename.CGM is the name of the file you want to create. Table 5.3 on page 147 lists the graphics packages to which you can export CGMs, the appropriate drivers to use, and the SAS Institute document that describes how to export the file and use it with the target application. You access these documents *free of charge* from SAS Institute's Technical Support Division on the SAS Institute web site.

The driver names marked with an asterisk (*) are already provided with Version 8 of the SAS System. For each driver that is not provided, the corresponding document describes how to build the driver.

Table 5.3 CGM Drivers and Documentation for Popular Graphics Packages

Package	Suggested Driver	Document
Aldus PageMaker	CGMAPMA*	TS-252F
Aldus Persuasion	CGMAPSA*	TS-252D
BPS 35 MM Express	CGM35	TS-252
Borland Quattro Pro (Windows)	CGMBQWC	TS-252J
Borland Quattro Pro (DOS)	CGMBQA*	TS-252
CorelDRAW 5	CGMCOR5L	TS-252R
Frame Tech FrameMaker	CGMFRCA* CGMFRGA* CGMFRMA* PSCFRAME PSGFRAME PSMFRAME	TS-252H
Harvard Graphics 2.12 for DOS	CGHHG	TS-252
Harvard Graphics 3.0 for DOS	CGMHG3A*	TS-252A
Harvard Graphics for Windows	CGMHGWA*	TS-252C
Harvard Graphics 3.0 for Windows	CGMHG3L	TS-252T
ImageBuilder	CGMIMG	TS-252
Interleaf 5	CGMCILFC* CGMGILFG* CGMMILFM* PSILEAFC PSILEAFG PSILEAFM	TS-252I
Lotus Ami Pro 3.0	CGMAM3C* CGMAM3G CGMAM3M	TS-252M
Lotus Ami Pro 2.0	CGMAMIA	TS-252
Lotus Freelance for DOS	CGMFLALJ* CGMFLAPL* CGMFLAPT*	TS-252
Lotus Freelance for Windows 2.0	CGMFL2C* CGMFL2G CGMFL2M	TS-252K

Package	Suggested Driver	Document
Lotus Freelance for Windows 1.0	CGMFLWA*	TS-252
Lotus 1-2-3 4.0	CGM123C*	TS-252N
Lotus 1-2-3	CGM123	TS-252
Lotus Office 97	CGMLOT97 CGMLT97P	TS-252Y
Microsoft Word for Windows 6.0	CGMMW6C* CGMMW6G CGMMW6M	TS-252L
Microsoft Word for Windows 2.0	CGMMWWC*	TS-252B
Microsoft PowerPoint	CGMMPPA	TS-252E
Microsoft Office 97	CGMOFF97 CGMOF97P	TS-252X
Polaroid CI3000	CI3000	TS-252
WordPerfect 5.1 for DOS	CGMWPCA CGMWPCAP* CGMWPGA CGMWPGAP* CGMWPCA CGMWPCAP*	TS-252G
WordPerfect 5.2 for Windows	CGMWPWA*	TS-252
WordPerfect 6.0 for Windows (Beta)	CGMWP6C CGMWP6G CGMWP6M	TS-252O
WordPerfect 6.0A for Windows	CGMWPGCA	TS-252P
WordPerfect 6.1 Windows	CGMWPGIL	TS-252S
WordPerfect 6.0 for UNIX	CGMWPUXL	TS-252U
WordPerfect Presents for DOS	CGMWPCA* CGMWPGA* CGMWPCA*	TS-252G
Zenographics Pixie	CGMPIX	TS-252

Creating WMF (Windows Metafile) Files for Export to Other Applications

To learn how to export WMF files from SAS/GRAPH software, contact SAS Institute's Technical Support Division and ask for document TS-352C, which explains this process for several target applications. For information about creating graphics for use with Microsoft Office 97, ask for document TS-252X. For information about creating graphics for use with Lotus Office 97, ask for document TS-252Y.

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