

Printing with the SAS® System Under OS/2® or Windows -- It's a Snap

Jeffrey M. Abolafia

Sally Muller

University of North Carolina at Chapel Hill

Introduction

Versions 6.08 and 6.10 of the SAS System under OS/2 and Windows introduced several new features which facilitated the printing process. One especially useful, but complex feature, introduced in Version 6.08 is the ability to print through a form. The forms sub-system allows users to create customized templates containing printer attributes. However, version 6.10 added several printing options so that the forms sub-system is no longer necessary. In Version 6.11, several modifications were made to the printing process, but no new features were added.

This paper presents a tutorial for printing under OS/2 and Windows. The tutorial will cover printing alternatives in SAS 6.11, including print setup, printing without the forms sub-system, printing through forms, and creating forms. The paper will also note the changes that accompany Version 6.11 of the SAS System.

Printing in SAS 6.11

Since Version 6.08, each window contains a simple stream of text which does not include printer control codes for print attributes such as page breaks, page orientation, margins, or font characteristics. SAS 6.08 used a form in order to get the desired print configuration. A form is simply a template which describes printer attributes.

In SAS 6.10 and 6.11, the forms sub-system still exists, but is being deemphasized. Forms are no longer necessary to control printer attributes such as margins, fonts, or page

orientation. Instead, output can be customized by using a series of print dialog boxes. A second enhancement, introduced in SAS 6.10, is that the linesize and pagesize formatting options are automatically adjusted to match printer settings.

To Use or Not to Use Forms

While the forms sub-system is no longer necessary, forms remain a useful printing alternative, especially when using more than one print configuration. However, a major drawback of the forms sub-system is that it requires a large amount of time for initial setup, a new form for each print configuration, and a knowledge of printer control language.

While these are valid criticisms of the forms sub-system, they are offset by the following:

- 1) Normally a user/organization needs only about four different print configurations: Landscape compressed, landscape uncompressed, portrait compressed, and portrait uncompressed.
- 2) Only one person in an organization needs to know the forms creation process and the printer control language. After forms are set up, they can be copied into a user's SASUSER.PROFILE.
- 3) Once a form is created, specifying a new form changes print configurations more quickly than going through a series of dialog boxes. A macro can further simplify this process (see Appendix).
- 4) Forms created in SAS 6.08 will still work in SAS 6.10 and

6.11.

Printing from the SAS Application Work Space (DMS)

In Version 6.11, the SAS DMS has two menu items related to printing, both under the File menu:

- * Print
- * Print Setup

By default, the system default printer along with its print configuration is used. If print configurations other than the default are needed, print setup is necessary. Therefore, the first consideration when printing is print setup configuration.

Print Setup

You can access the Print Setup dialog box (Figure 1) by selecting 'File' -> 'Print Setup' from the SAS AWS or by choosing the Setup button from the Print dialog box.

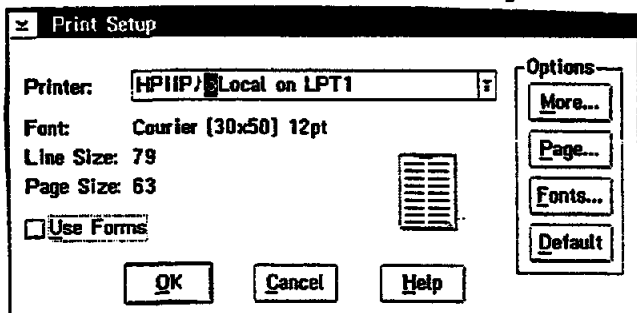


Figure 1. Printer Setup Dialog Box

Below is a summary of the information presented in the Print Setup dialog box.

Printer:

Displays the currently selected printer and its port location. SAS looks for the default printer in the following places in order of precedence: 1) the SYSPRINT system option, 2) the settings in the SASUSER.PROFILE2.OS2PRINT(for OS/2) or SASUSER.PROFILE2.WNSPRINT(for Windows) catalog member, and 3) the system default printer.

A printer other than the default can be selected by clicking on the arrow portion of the field and then choosing another printer from the listbox. The default printer can also be changed by using the SYSPRINT system option.

Use Forms:

To print through the forms subsystem, click in the Use Forms checkbox. The SAS system will print your output using the current print form. If the current print form contains printer control characters, then the system's printer object must be by-passed. This can be accomplished by specifying the SAS system option Sysprint with the first argument only, as in the following statement:

```
options sysprint='lpt1:' ;
```

If Use Forms is selected, then no other fields will be available.

NOTE: If you are printing through a form, the desired form must be selected before invoking the Print Dialog box. To specify a form as the current form type FORMNAME form_name on the command line, where form_name is the desired form. Once a form is selected, it becomes the default form for the duration of the current SAS session.

Font:

Displays the current font. To change the font choose the Fonts button (see below).

Line Size and Page Size:

Displays the calculated line size and page size for the current printer and font settings. You cannot directly reset the values in this box. They are adjusted by changing the font, font size, margins, or page orientation.

More:

Clicking on the More button,

displays a printer specific dialog box. The contents of this dialog box are based on the printer selected. Printer attributes that can be set in this dialog box include orientation; number of copies, resolution, dual-sided printing, and performance options.

Page:

The Page button can be selected to set top, bottom, left, and right margins.

Fonts:

You can click on Fonts to display a list of available fonts. You can choose a font, font style(e.g. bold), font emphasis, and font size.

Once you have completed setting the printer options, click on OK to save your configuration and close the Printer Setup dialog box.

The Printing Process

Once printer setup is complete, the printing process is similar for both of the printing methods described above.

From the DMS window that you would like to print, use the popup menu to select 'File' -> 'Print'. This will bring up the Print dialog box(Figure 2). This box can also be displayed by making the desired DMS window active and selecting the DMS menu items 'File' -> 'Print' or by clicking on the printer icon.

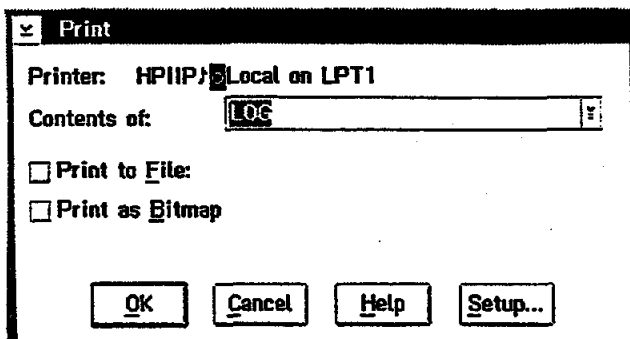


Figure 2. Print Dialog Box

Below is a summary of the options in the Print dialog box.

Printer:

Displays the currently selected printer and port (Figure 2). If you are by-passing the print manager, only the port will be displayed. Click on the Setup button to select another printer or to change the print settings. This will display the Printer Setup Dialog box described above.

Contents of:

Displays the name of the window that you want to print. You can click on the arrow part of the field to choose between the currently selected window and the clipboard.

Print to File:

You can route your printed output to a file by clicking on the Print to File checkbox and specifying a filename. Using this method, you will ensure that the file will contain all the desired printer control information. In contrast, when the contents of a window are saved using 'File' -> 'Save as', the file will not be formatted with regard to page size or page ejects.

Print as Bitmap:

By selecting the Print as Bitmap checkbox, you can print your output as a bitmap instead of text.

Force Bitmap to Fill Page:

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

Once you have finished setting the print options, click on OK to print the file and close the Print dialog box.

Notes on Printing Through Print Manager

1. If you print through a form that contains printer control characters you must by-pass the print manager. The print manager will interpret the printer control characters as text to be printed.
2. When using this method, SAS output can be managed like any other output under OS/2 or Windows. You can hold jobs, delete queued jobs, and monitor the queue.
3. A print job can be held by changing the status to 'Hold' on the OS/2 or Windows printer object. This causes all jobs to be held until the status on the printer object is changed to 'Release'.

Creating Forms in OS/2 or Windows

Customized Forms can be created by using the FORM window. The FORM window consists of six screens that allow you to create a catalog entry for a specified printer and host system. Information on linesize, pagesize, orientation, font type and size, printer margins, and printer control language can be specified.

You can create or edit a form by typing `FSFORM formname` on the command line of any window (where `formname` is the name of the form that you would like to create or edit). By default, forms are stored in `SASUSER.PROFILE`. To create or edit a form in another SAS catalog type `FSFORM libname.catalog.formname`.

Printer Selection Frame -- When you create a new form, the Printer Selection frame appears first. This frame only appears when creating a new form. Once in the frame, move your cursor to the printer that best matches the one

you are using and press ENTER. Your selection will take effect, and the Text Body and Margin Information frame will be displayed (Figure 3). It should be noted that once you have made your printer selection, you cannot return to the Printer Selection frame.

```

FORM LAYOUT EDIT
Text Body and Margin Information

Text Body
Characters per line: 178
Lines on first page: 50
Lines on following: 50

Margins
First page: Left: 10 Top: 10 Bottom: 10
Following pages: Left: 10 Top: 10 Bottom: 10
    
```

Figure 3. Text Body and Margin Information Frame

Text Body and Margin Information-- When you edit an existing form, the Text Body and Margin Information frame appears first. You can obtain information on the acceptable values for any of the fields in this frame by typing '?' in the field and pressing enter. You can specify page formats by editing the following fields:

Characters per line:
specifies the number of characters to print across the pages. Characters per line should be determined by the horizontal printing area of your paper and font size.

Lines on first page:
specifies the number of lines to print on the first page.

Lines on following:
specifies the number of lines to print on pages that follow the first page.

The number of lines on the first page and the pages that follow should be based on the vertical area of your paper and font size. You may have to experiment with this field.

NOTE: The number of lines per page and characters per line should be exactly the same as specified in the SAS options Pagesize and Linesize. You can enter the value -99 in the characters per line and lines per page fields. This indicates that the values for the SAS options LINESIZE and PAGESIZE should be used. Also, the number of lines per page in the form should be the same as the number of lines per page the printer is set up for (this could be set in the printer control language panel described below).

First page/Following Page margin:
Specify the top, bottom, and left margins for the first page and all additional pages. The number of characters per line determines the right margin. By default, the top, bottom, and left margins have been set to zero. If a number other than zero is specified, that number is added to the default margin position of the printer.

Carriage Control Information --
To get to frame #3, the Carriage Control Information frame (Figure 4), select 'Locals' -> 'Next Screen' from the popup menu. In this frame, you can specify whether you want carriage control information included with the output and where you want page breaks.

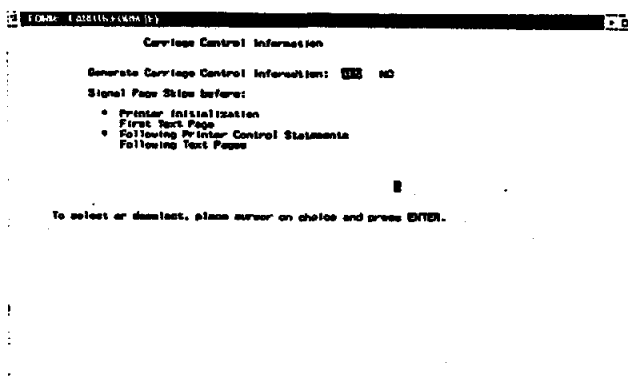


Figure 4. Carriage Control Information Frame

The Generate Carriage Control Information field allows you to

specify whether you want to include information about page breaks. If you want to include information about page breaks, place your cursor on the YES field and press ENTER. To remove carriage control characters, position the cursor on the NO field and press ENTER. If you chose the NO option, the Signal Page Skip parameters will be ignored.

If carriage control characters are being generated, you can specify where you want page breaks and other carriage control information. Page skips can be generated in any or all of the following places:

Printer initialization:
before any printer control characters are sent to the printer to initialize it.

First Text Page:
before the first page of text is printed. This field must be selected for any form that contains printer control codes.

Following Printer Control Statements:
before any printer control language is sent for the following pages of text.

Following Text Pages:
before the following text pages are printed.

To select a field, position the cursor on any of the fields and press ENTER. An asterisk(*) should appear to the left of the field. To deselect a field, place your cursor on the field again and press ENTER. The asterisk should disappear.

Print File Parameters -- Select 'Locals' -> 'Next Screen' to get to the next frame, the Print File Parameters frame (Figure 5). This frame allows you to specify print file information based on the host system and printer selected.

The Hold print request checkbox can be used to hold a print request. You can receive information on the acceptable values of any other field by typing a question mark(?) in the field and pressing ENTER.

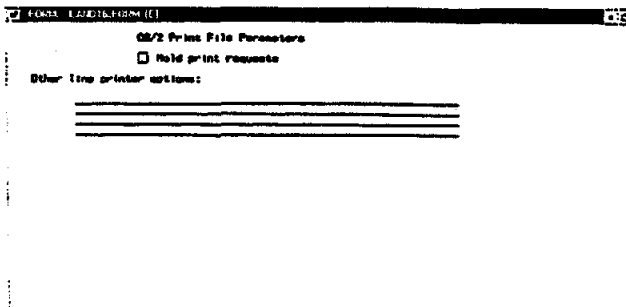


Figure 5. Print File Parameters Frame

Font Control Information -- You can display the Font Control Information frame (Figure 6) by selecting 'Locals' -> 'Next Screen'. The attributes defined in this frame are based on the printer you selected in the Printer Selection window. Different functions are performed on the upper half and the lower half of this screen.

The upper half contains the control character definition fields. These fields allow you to choose up to eight printing characters to use in your form definition. SAS will translate these printing characters into printer control characters. Printer control characters are characters (typically non-printing) that inform the printer that the following text is a printer command. The printer control characters determined in the upper half of the screen are used in the bottom portion to define text attributes and in the next frame to define printing modes.

When using the control character definition fields, remember that SAS, by default, uses the tilde(~) to represent the ESC keys and the caret(^) to represent the CTL key.

If your printer uses other characters as control characters, they can be defined in this section. For each control character that you define, specify the special character, its decimal representation, and a description. You can make changes to any of the fields in this frame by positioning your cursor on the field you want to edit, then by typing in the field. You can receive information on the acceptable values for any field by typing a question mark (?) in the field and pressing ENTER.

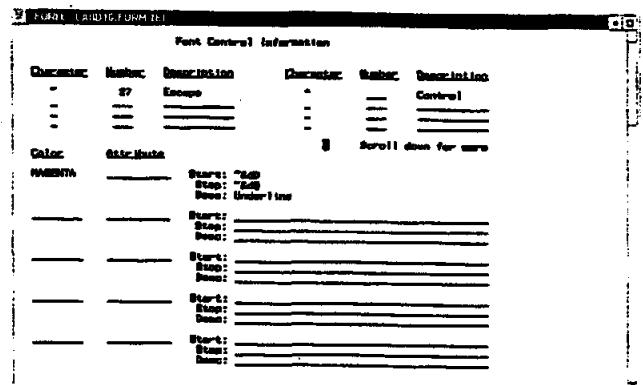


Figure 6. Font Control Information Frame

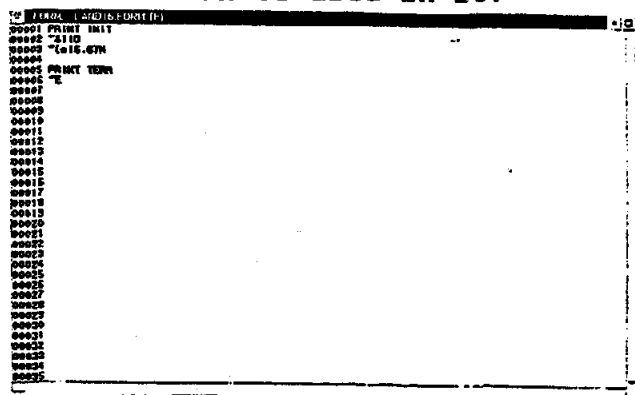
The lower part of the font control information screen allows you to associate a color and/or attribute (e.g., highlight, underline) with a control code used by your printer for printing in special mode (e.g., italic, bold). In Figure 6, the color magenta is associated with the text attribute underline. For example, if you wanted to underline a title, select 'View' -> 'Colors' -> 'Title' from the popup menu of the Output window. Then click on the button to the left of MAGENTA and click on OKAY. When the contents of the Output window are printed, titles will be underlined.

SAS supplies some default text attribute definitions with the correct start and stop sequences for each special printing mode supported by the printer that you have selected. To specify

additional text attributes, enter the color and/or attribute. The Start field is the printer control sequence required by your printer to turn the printing mode on. The Stop field is the printer control sequence required by your printer to turn the printing mode off. The Description field can be used to document the printing mode you are specifying.

Print Control Language -- Select 'Locals' -> 'Next Screen' to get to the final frame, the Print Control Language Frame(Figure 7). In the Print Control Language frame you can enter control sequences that are sent to the printer. You can send control language sequences before text is sent, in between pages of text, and after all text is sent. This frame is especially useful for formatting the contents of a window without having to manually adjust your printer settings or SAS Setup and Font options.

Unlike the other frames described in this paper, the Printer Control Language frame is a text editor frame, and all text editor commands can be used in it.



```

TO: [LOCAL] (SEND TO FONT)
00001 PRINT INIT
00002 "110
00003 "16.67H
00004
00005 PRINT TERM
00006 "
00007
00008
00009
00010
00011
00012
00013
00014
00015
00016
00017
00018
00019
00020
00021
00022
00023
00024
00025
00026
00027
00028
00029
00030
00031
00032
00033
00034
00035

```

Figure 7. Print Control Language Frame

The Printer Control language frame can be used to set the page orientation, the font type, the font size, the number of characters per line, or other print characteristics. Your printer manual describes the control languages sequences that you need to specify. Your printer

manual should also describe the order which the control codes should be sent to the printer. Your printer will not respond correctly if all items are not ordered correctly.

To tell the printer when to use a control language sequence the following labels should be used. Each label should be placed on a line by itself.

PRINT INIT

sends control language sequences before sending any text to the print file.

PAGE n

sends control language sequences to the print file before the specified pages(n), where n is used to represent the page number. The control sequences will continue to be sent before each page until another page label is reached. The control sequences can be stopped by specifying a page label with no control sequences.

PAGE LAST

sends control language sequences to the print file after all text for an individual item is sent.

PAGE TERM

sends control language sequences to the print file after all text is sent for all items. This section is used to reset the printer to its default mode.

Figure 7 displays a sample Printer Control Language frame for a Hewlett-Packard LaserJet IIP . Line 1 specifies that the printer control codes that follow are to be sent to the printer before any text is sent. Line 2 contains the printer control sequence for landscape page orientation. Line 3 specifies the sequence for 16.67 cpi pitch. Line 4 indicates that the control sequence to follow is to be sent to the print file after all text is sent. Line 5 has the printer control code needed to reset the printer to its default

mode. Select 'File' -> 'End' to save the form. If a SAS library and Catalog was not specified, the form will be saved as SASUSER.PROFILE.formname.FORM, where formname is the name for the form that you have chosen.

Conclusion

Version 6.11 of the SAS System contains several features which provide an alternative to printing through the forms sub-system. Although SAS is deemphasizing the forms sub-system, it is the opinion of the authors that printing through forms is an effective and useful alternative.

Acknowledgments

The authors would like to thank James Hosking and Suzanne Craymer for providing input and reviewing drafts of this paper.

SAS is a registered trademark or trademark of SAS Institute Inc. in the USA and other countries. OS/2 is a registered trademark or trademark of International Business Machines Corporation. ® indicates USA registration. Other brand and product names are registered trademarks of their respective companies.

REFERENCES

SAS Institute Inc. (1990), SAS Language: Reference, Version 6, First Edition. Cary, NC: SAS Institute Inc.

SAS Institute Inc. (1993), SAS Companion for the OS/2 Environment: Version 6, Second Edition. Cary, NC: SAS Institute Inc.

SAS Institute Inc. (1993), SAS Companion for the Microsoft Windows Environment: Version 6, First Edition. Cary, NC: SAS Institute Inc.

SAS Institute Inc. (1993), "Printing with SAS 6.08 under

Windows or OS/2". Cary, NC: SAS Institute Inc.

SAS Institute Inc. (1994), OS/2 Environment: Changes and Enhancements to the SAS System Release 6.10. Cary, NC: SAS Institute Inc.

SAS Institute Inc. (1994), Microsoft Windows Environment: Changes and Enhancements to the SAS System Release 6.10. Cary, NC: SAS Institute Inc.

APPENDIX

The macro SETFORM can be used to automate the process of changing print forms. SETFORM is used most efficiently when stored in an autorecall library. When invoked, SETFORM will reset the default print form and the SAS options Linesize and Pagesize. SETFORM has one parameter--form. Form should be set to an existing print form in SASUSER.PROFILE. The macro SETFORM should be updated whenever a new print form is added to SASUSER.PROFILE.

```
%MACRO SETFORM(FORM=LAND16) ;
```

```
/* ----- */
/* Macro to define print form & set corresponding options */
/* ----- */
/* Valid values for form macro are: */
/* Port10 Portrait, Courier, 10 cpi 60 lines, 78 chars */
/* land10 Landscape, Courier, 10 cpi 48 lines, 105 chars */
/* port16 Portrait, Lineprinter, 16.67 cpi, 83 lines, 133 chars */
/* Land16 Landscape, Lineprinter, 16.67 cpi, 60 lines, 173 chars */

DM "FORMNAME &FORM" ;
%put ==> Print with form: &form;
%IF (%UPCASE(&FORM) EQ PORT10) %THEN
    %str(OPTIONS PS=60 LS=78;) ; /* Portrait, Courier 10 cpi */
%ELSE %IF (%UPCASE(&FORM) EQ LAND10) %THEN
    %str(OPTIONS PS=48 LS=105;) ; /* Landscape, Courier cpi */
%ELSE %IF (%UPCASE(&FORM) EQ PORT16) %THEN
    %str(OPTIONS PS=83 LS=133;) ; /* Portrait, 16.67 cpi */
%ELSE %IF (%UPCASE(&FORM) EQ LAND16) %THEN
    %str(OPTIONS PS=60 LS=173;) ; /* Landscape, 16.67 cpi */
%MEND SETFORM;
```