The REPORT Procedure: Common Questions and Problems

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ABSTRACT

As the REPORT procedure adds a new perspective to the task of report writing, new concepts like windowing, templates, and breaking have been added to make report design more sophisticated and user friendly. Adding a new procedure designed specifically for generating reports to a system of software that already includes several report writing procedures brings questions as to which method of generating reports is best, or more appropriate for specific reports.

This paper addresses the most commonly asked questions from users who have utilized the test versions of PROC REPORT for their applications. It discusses new concepts that have caused confusion and also emphasizes special features that were added to the procedure to make it the most powerful and flexible report writing tool in the SAS System.

INTRODUCTION

The REPORT procedure combines the power of customized report writing with the user friendliness and interactivity provided by pull-down menus and windows to bring SAS users an extensive tool for report design. Understanding the new concepts introduced by the procedure makes report design more simple. Developing an awareness of the functionality of the procedure also helps you to better understand the types of applications for which it is best suited.

This paper attempts to explain the new concepts and stresses the importance of the features provided by the procedure. Several features were added to the procedure as it neared its completion in order to provide the functionality available in the QPRINT procedure, part of the Version 5 supplemental library.

WHAT IS THE STATUS OF THE REPORT PROCEDURE AND WHEN WILL IT BE DOCUMENTED?

PROC REPORT was first available in Release 6.06 of the SAS System under MVS, CMS, and VMS operating systems. It is also available under AOS/VS, PRIMOS, and OS/2. Under all systems running Release 6.06, PROC REPORT is currently only available experimentally. That is, its functionality is in place, but it has not undergone final revisions and has not been thoroughly tested. The purpose of shipping the procedure experimentally is primarily to receive feedback from users about what they do and do not like about the procedure. Though several design flaws were found, the overall feedback has been extremely positive and users seem very excited about the potential of the procedure.

The Institute’s goal is to ship PROC REPORT as production software by Release 6.08 of the SAS System. It may even be shipped in its production version in Release 6.07.

Preliminary documentation for the procedure consists of SAS Technical Report P-202, The REPORT Procedure, Experimental Release in a tutorial-type format for getting started with the procedure. PROC REPORT has changed in many ways since this technical report was written, and the procedure is more advanced than the preliminary documentation described. The production documentation for PROC REPORT is SAS Guide to the Report Procedure: Usage and Reference, Version 5, First Edition and is available now.

WHAT IS THE BASIC DESIGN BEHIND THE PROCEDURE?

PROC REPORT was designed as a windowing procedure to be used interactively, enabling custom step-by-step design of a report. The procedure enables you to control placement of all variables and text. Colors and special attributes can also be assigned to fields. Different usage types are available for each variable in order to allow grouping, condensing of multiple values, and summarizations to be performed. The procedure also provides the ability to add computed variables to the report. Once the report has been designed, the report design can be saved into a special file called a template. This template can be referenced in the PROC REPORT statement to have the customized report used when the data is displayed without bringing the procedure up in the windowing environment.

Because many users prefer to run their applications in batch mode, PROC REPORT also provides a batch language. This language provides statements similar to DATA step statements, that enable you to design the report, defining usage, controlling variable placement, and so on just like in the windowing environment. Using the windowing environment may be more simple, and if possible it is probably best to design reports in the windowing environment. The templates can then be saved and referenced in a batch job to print the customized report.

WHAT MODES OF EXECUTION CAN BE USED?

PROC REPORT can be executed in a batch mode, in an interactive line-mode environment, or in SAS Display Manager System environment. The batch language can be used to design reports in a batch program or a previously defined template can be referenced to print a report in batch.

PROC REPORT can be invoked with windowing capabilities in either line mode or by using display manager. If the procedure is not invoked with the FS or WINDOWS option, the data will be written to the OUTPUT window in display manager or wherever the PRINT file has been specified running in line mode, using either the default report or the specified template.

WHAT HARDWARE REQUIREMENTS OR ADDITIONAL PRODUCTS MUST BE ACCESSED?

Due to the sophisticated windowing interactivity, users commonly assume that they will have to use special types of terminals or purchase additional SAS products to use the procedure. PROC REPORT is available to use experimentally with base SAS software beginning with Release 6.06. No additional products are required.

PROC REPORT fully supports mouse capabilities. It takes advantage of pull-down menus and also enables commands to be selected by positioning and clicking the mouse. However, mouse capabilities are not required. The procedure is just as functional running on a simple IBM® 3279 terminal. The procedure enables you to define function keys to enter commands. It also enables you to move your cursor and position it to identify fields and generate commands. Many of the tasks involved in setting up the report are done by placing the cursor in a specific location and hitting the enter key.
HOW COMPLEX ARE THE GENERATED REPORTS?

PROC REPORT can generate reports of virtually any degree of complexity. Invoking the procedure displays a report very similar to the type produced by the PRINT procedure. (See The PRINT Procedure later in this paper.)

Custom designing the report enables you to generate reports as detailed as the type produced by the PRINT procedure. (See The PRINT Procedure.) Once you become familiar with the REPORT procedure, it will probably be your first choice in designing any basic report. Some of the capabilities it provides are:

- the ability to fully manipulate the positioning of variables, labels, and text
- the ability to delete variables or add new or computed variables
- the ability to calculate and display statistics
- the ability to make calculations using computed statistics
- the ability to control grouping of like values
- the ability to specify breaks in the report based on variable values
- the ability to display data in panels across the page
- the ability to span columns with labels and headings.

WHAT PROCEDURES DOES THE REPORT PROCEDURE MAKE OBSOLETE?

PROC REPORT was not designed as a replacement for any existing SAS procedure. It was created expressly for designing custom reports. It does provide many of the capabilities that already exist in some reporting procedures, but provides more flexibility with and customization of the actual report.

The PRINT Procedure

The initial report displayed by PROC REPORT is very similar to the output produced by PROC PRINT. PROC REPORT does not print an OBS column, though a variable could be set equal to the observation number in a DATA step, and that variable could appear as an OBS column. A major advantage to using PROC PRINT for simple reports is that its syntax is extremely simple and well understood. PROC PRINT is also designed to automatically print the report most aesthetically. PROC REPORT uses a default format, assuming that the user will make whatever modifications are desired.

Output 1 shows the default report produced by PROC REPORT.

Output 2 PROC REPORT QPRINT Capabilities

The TABULATE Procedure

The TABULATE procedure, which has always been extremely popular for creating tables and displaying statistics and percentages, will still be used widely. PROC REPORT, through the use of ACROSS variables (see WHAT IS THE SIGNIFICANCE OF A VARIABLE’S USAGE? later in this paper), also provides the ability to display data in tabular format. However, horizontal and vertical lines must be added explicitly. Denominator definitions for calculating percentages will also have to be calculated in the COMPUTE window.

Output 1 PROC REPORT Default Report

The QPRINT Procedure

During the design of PROC REPORT, it became apparent that the functionality users were requesting from PROC QPRINT could be incorporated into the REPORT procedure. PROC QPRINT, which is a supplemental procedure, is not available in Release 6.06. The most commonly used features included the MULTIPLE= option for requesting multiple panels, which is simply handled with the PANELS= option in PROC REPORT. Another popular use was the HEAD statement for spanning columns with text, which is also easily handled by the REPORT procedure. The capabilities for skipping lines and underlining have also been implemented quite simply.

Output 2 shows a report produced by PROC REPORT showing some of the QPRINT capabilities.
Output 3 shows the similar capabilities of table layout provided by PROC REPORT.

Output 3 PROC REPORT Table Layout Capabilities

The COMPUTAB Procedure

Available in SAS/ETS® software, the COMPUTAB procedure has been a popular report generating tool. Users who are accustomed to PROC COMPUTAB will find the batch language in PROC REPORT very familiar and easy to use. A major difference in PROC COMPUTAB and PROC REPORT is that the COMPUTAB procedure actually enables modification of variable values, and PROC REPORT does not. However, the capabilities for spanning columns, inserting text, and establishing breaks are very similar.

Output 4 shows the breaking capabilities provided by PROC REPORT.

Output 4 PROC REPORT Breaking Capabilities

The MEANS Procedure

PROC REPORT can generate the same statistics available in the MEANS procedure, while at the same time providing reporting capabilities. The REPORT procedure does not create an output data set but can generate a template for producing the customized report with statistics on demand.

Output 5 shows PROC REPORT output that is very similar to PROC MEANS output.

Output 5 PROC REPORT Statistical Output

The FREQ Procedure

Dealing with classification and hierarchical data is as natural to PROC REPORT as it is to the TABULATE procedure or the FREQ procedure. The REPORT procedure can easily produce frequency counts for values. Percentages are also available but must be defined in the COMPUTE window.

Output 6 shows frequencies calculated by PROC REPORT.

Output 6 PROC REPORT Calculated Frequencies

WHAT IS THE PURPOSE OF THE VARIOUS WINDOWS?

Invoking PROC REPORT by specifying the WINDOWS option automatically brings you into the REPORT window. The REPORT window is outlined and fills most of the screen. The KEYS window is just below the REPORT window. Note that the name of the window appears in the upper left corner of the window.
The GLOBALS window provides access to other display manager windows. These include TITLE, FOOTNOTE, and KEYS. The COMMAND option removes the action bar and displays the command line.

WHAT IS THE SIGNIFICANCE OF A VARIABLE'S USAGE?

Variable identification, letting the procedure know which variable you wish to move, define, and so on, is the first step in setting up a report. A variable is selected by moving the cursor to the variable's location and hitting enter. Use the DEFINE command to verify or change the attributes of the variable. Variable attributes include usage, formatting and spacing information, justification, and printing information. Most of these attributes are obvious, but often a variable's usage can cause unexpected problems in creating a report.

Display 2 2DEFINITION Window

A variable's usage is either DISPLAY, ORDER, GROUP, ACROSS, ANALYSIS, or COMPUTED. By default, all character variables have a usage of DISPLAY. DISPLAY variables are variables whose values are printed in the report; that is, they are not grouped and statistics are not calculated with them.

A numeric variable has a default usage of ANALYSIS. ANALYSIS variables are associated with a statistic and SUM is the default. Statistics can be calculated for analysis variables when other variables on the report are grouped together. New variables can be computed using the statistics from the ANALYSIS variables.

Values of a variable whose usage is ORDER are only printed the first time the value occurs. PROC REPORT sorts the values of the variable and only prints the first occurrence. Unlike a usage of GROUP, observations are not collapsed.

A variable whose usage is GROUP will also be sorted and only printed once, but it will also group the observations having the same value and summarize statistics across the different group values, producing one line of output per group variable value.

ANACROSS variable is one whose values print across the top of the report, usually with statistics or other variables underneath. COMPUTED variables are variables you actually create by using the COMPUTE window.

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Choosing the type of usage a variable will have is very important because there are restrictions to the types of usage a variable can have if grouping or structuring variables across the top is done. For example, if you want to group or produce totals for a variable, multiple observations are condensed so that only one observation for each grouping is printed. If this is the case, grouping cannot be done if one of the variables on the report has a usage of DISPLAY or ORDER. When this happens, the procedure gives you a warning that grouping cannot yet take place. The variable with the inappropriate type should then be deleted from the report or its usage changed.

**HOW DOES BREAKING DIFFER FROM BY GROUPS?**

Breaking is used to control when and how a report is broken into sections. It is used with grouping in order to make the report more clear and to display subtotal or summary information. Breaking can be done on variables or on the entire report.

Breaking on variables is done by identifying the variable and then selecting the BREAK command. You are then prompted for where you want the break to appear, how you want the break highlighted, and the type of spacing you want.

Breaking on the entire report is used to produce a grand total. It is done by choosing the RBREAK option from the pull-down menu displayed when choosing the EDIT button. It also prompts you for details on printing.

Breaking is used more for finishing the look of a detailed summary report. It is not similar to BY processing. BY processing is supported by PROC REPORT through the use of the BY statement. Grouping is somewhat similar to BY processing in that it sorts the data and also groups and condenses like values. If a BY statement is used with the procedure, BY processing occurs before any grouping is done.

**HOW ARE VARIABLES ADDED TO THE REPORT?**

The first step to adding a variable to the report is to identify the location in which it will be placed. This is done by identifying next to which existing variable it will be placed. The steps follow:

- Identify beside which variable it is to be positioned.
- Select where the variable will be added by choosing the appropriate command, for example, ADD_RIGHT.
- Choose whether the added variable will be a DATASET VARIABLE, STATISTIC, or COMPUTED variable.

For a COMPUTED variable, do the following:

- Choose a COMPUTED variable.
- Assign it a name and choose the EDIT PROGRAM button.
- Assign the value to the variable in the COMPUTE window.
- Back out of the COMPUTE window.

**HOW IS THE REPORT PRINTED?**

Currently, the only way to print a customized report is to store the template and invoke the procedure specifying the template to use without bringing up the REPORT window. For example, once you have the report detailed the way you want it to appear, use the following steps to store the report:

- Choose the EDIT button.
- Select the RSTORE option.
- Specify the appropriate libref and assign a name to the catalog and the individual report.
- Choose the QUIT option to end the procedure.

The template is now stored. To use the template to print the customized report, invoke the procedure specifying the data set name and the report name. Do not specify the WINDOWS option. The report will appear in the OUTPUT window and can be printed from there. It could also be run in line mode or in a batch job.

**CONCLUSION**

PROC REPORT offers many alternatives to starting out with a DATA step or attempting to customize PROC PRINT beyond its capabilities. It is designed to guide you step by step through setting up your application. It offers a great deal of versatility in report style and yet provides a simple method for adding simple text and moving variables.

New features and abilities will continue to be added to the procedure as it progresses. Once the production version is available, PROC REPORT will be an excellent first choice for the task of generating a special report.

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