

BUILDING CUSTOM-DESIGNED REPORTS FOR FINANCIAL EXECUTIVES

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INTRODUCTION

This paper describes a report writer that gives financial executives the capability to custom design and run any report without consulting a SAS® programmer. The report writer was developed by the authors for financial analysts and executives in a Financial Planning Department. After some background is given, the report writer's specific features are covered, and its ease-of-use is discussed.

BACKGROUND

Financial analysts are responsible for forecasting sales and profits on different contracts. This data is maintained in a SAS database. Each observation in the database is a forecast of a different contract's sales and profits and is identified by a forecast number. Each forecast has variables that contain monthly historical data (actuals) through the current month of the current fiscal year, monthly forecast data for the remaining months of the fiscal year, monthly forecast data for the next fiscal year, and yearly forecast data for several future years. Also, variables are used to categorize the forecasts by division, business area, product, and other groupings.

In the past, the Financial Planning Department's reporting capabilities consisted of menus with options for hard-coded reports. Financial executives were able to run these reports but were limited to those on the menus. Requests for reports not on the menus were constantly being made. Different variations of similar reports were added. Unnecessary reports remained. The menus became long, confusing and cluttered.

From a programming standpoint, it became increasingly difficult to keep up with the hard-coded reports that were needed. Executives were becoming too dependent on programmers to program and run reports. From a management standpoint, information was difficult to get in a timely manner. The cost of programming the many different reports was being questioned at a time when company-wide cost reductions were being sought. The actual task of running these reports was being delegated to clerks.

In summary:

- Menus were too long and confusing.
- Reports with obscure descriptions were being run by mistake.
- Excessive time was spent keeping up with report requests.
- We were losing management's support for the SAS System.

In order to regain support and get management to appreciate the capabilities of the SAS System,

we developed a report writer to give executives a method to run their own custom-designed reports at any time. Our objective was to keep the report writer consistent and easy-to-use. We wanted to:

- Provide maximum flexibility.
- Minimize typing.
- Keep screens clear, orderly and consistent.
- Keep instructions and options brief and to the point.
- Display the report parameters as defined.
- Provide shortcuts for the experienced person.
- Provide help options where needed.
- Avoid separate "how-to" instructions that could become obsolete.

The finished product provides a tremendous amount of flexibility and, at the same time, requires little typing. Executives now have the ability to run their own custom reports without feeling like technical or clerical personnel.

REPORT WRITER FEATURES

THE REPORT WRITER MENU

To provide a method flexible enough to satisfy most report requirements, our report writer needed to allow the individual to define information such as:

- what file to use,
- what subset of the file to use,
- what sort and summary sequence to use,
- what time period to report,
- what financial variables to report.

The SAS macro language is well-suited to prompt for and receive information. However, simply prompting for the information in sequential order can be cumbersome and confusing. For example, if the same report needs to be run over different time periods, it can be tedious to continually input information that may not change between reports. Also, if a lot of information is needed, the individual may lose track of what has already been input by the time the last piece of information is requested.

With this in mind, we designed a macro-driven report writer, controlled through a single report writer menu (see figure 1). This menu has options to define a report (SUB, FIL, REP, PER and VAR -- hereafter, the definition options), run the report (R), get on-line help (H) or exit SAS (X). All actions start and stop with this menu. After each definition option is selected and changed, the analyst is returned to the report writer menu. After each report is run, or after on-line help has been viewed, the analyst is also returned to the report writer menu.

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ANALYST ==> JUDE NAES                ACTUALS THROUGH JULY 1986
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MONTHLY SALES FORECASTING SYSTEM
REPORT WRITER MENU
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THE FOLLOWING REPORT MAY BE RUN:

SUB  ABC CORPORATION SALES
FIL  FORECAST DATA
REP  DETAIL BY DIVISION, SALES CATEGORY
PER  OCTOBER 1985 TO SEPTEMBER 1986
VAR  SALES, GROSS PROFIT, % TO SALES

R.   RUN THE REPORT.
H.   HELP.
X.   EXIT SAS.
-----
ENTER YOUR CHOICE OR PRESS ENTER TO RETURN TO THE MAIN MENU.

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Figure 1

As each definition option is changed, the others retain their most recent values. Similarly, all five definition options retain their values after a report is run. Thus, similar reports can easily be run by only changing those options that need to be changed. For example, if the same report needs to be run over two different time periods, first define the report with the initial time period, run it, then change the time period and run it again.

The report defined in figure 1 is the default report that is ready to run when the report writer menu is accessed. This is the most frequently-requested report. The analyst may use the default values or change any or all of the definition options in any order.

DEFINING A REPORT

A report is defined by changing the report definition options. As the options are changed, select macro variables are also changed. These macro variables display the current option definitions on the report writer menu and control the report generation when option R is selected. The report definition options are described in more detail below. They are described in the order that they appear on the report writer menu (see figure 1). The order corresponds to the order that these option definitions are used in report titles, column headings and the body of the report. However, the options may be selected and changed in any order, or the initial values may be left as they are.

SUB -- Define a subset of the file to use

The SUB option is used to define a subset of the SAS data file to be used for the report. When this option is selected, a sub-menu of available subsets is shown (see figure 2). Options 1 and 2 are frequently-used subsets.

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THE FOLLOWING SUBSETS MAY BE SELECTED:

1.  ABC CORPORATION SALES.
2.  ACME DIVISION SALES.

A.  ANALYST-DEFINED.
P.  PROGRAMMER-DEFINED.

ENTER YOUR CHOICE OR PRESS ENTER TO CANCEL.

```

Figure 2

Option A leads to a second sub-menu (see figure 3). This sub-menu is used to define additional subsets. Subsets are selected by entering the codes of the subsets desired. There is no restriction on the number of subset codes that may be entered or on the order in which they must be entered. The subset codes are divided into four groups. Choosing more than one code from the same group will result in an "OR" condition, which means that all forecasts from each subset will be reported. Choosing codes from two or more groups will result in an "AND" condition, which means that only forecasts common to each subset will be reported.

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THE FOLLOWING SUBSETS MAY BE SELECTED:

A.  ABC CORP. SALES           L.  FIRM FIXED PRICE SALES
B.  ACME DIVISION SALES      M.  FIXED PRICE REDETERMINABLE SALES
C.  OTHER DIVISION SALES     N.  FIXED PRICE INCENTIVE SALES
D.  TARGET SALES             O.  COST PLUS FIXED FEE SALES
E.  CONTRACT SALES           P.  COST PLUS INCENTIVE FEE SALES
F.  FUTURE SALES             Q.  TIME AND MATERIAL SALES
                                R.  WARRANTY SALES

G.  DOMESTIC SALES           H.  HELP
I.  FOREIGN SALES
J.  FOREIGN DIRECT SALES
K.  FOREIGN FMS SALES

ENTER YOUR CHOICE OR PRESS ENTER TO CANCEL.

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Figure 3

For example, entering GJ will define your subset as all forecasts that are domestic or foreign direct sales. But, entering BGJ will define your subset as only those forecasts within the Acme Division that are domestic or foreign direct sales. Note that options 1 and 2 in figure 2 can also be defined through this sub-menu.

Option P on the first sub-menu (see figure 2) is used to input a subset that is not available with the other options. This option requires the assistance of a programmer. (Option P has yet to be needed.)

When a choice is entered, the macro variable SUBSET is set to the corresponding SAS IF statement. The macro variable SUBLIT is set to the subset's description. These macro variables are generated if the analyst-defined option (A) is used. Once a subset is chosen (or the request is cancelled), the analyst is returned to the report writer menu, where the current subset selection (&SUBLIT) is displayed.

FIL -- Define a file to use

The FIL option is used to define the SAS data file that will be used in the report. When this option is selected, a sub-menu of available files is shown (see figure 4). The forecast data file is always available. Other files are "snapshots" of the current or prior forecast data files. These files are maintained through a special file maintenance menu, which is not covered here. Each of the files has the same variables. The data values and number of observations may be different.

THE FOLLOWING FILES MAY BE SELECTED:

- F. FORECAST DATA.
- 1. KLP 9/27/85 REVIEW.
- 2. FEBRUARY 1986 CORPORATE BOARD MEETING.
- 3. APRIL 1986 BOARD MEETING.
- 4. FY 1986 PLANNING MEETING.
- 5. FY 1986 FINANCIAL REVIEW.

ENTER YOUR CHOICE OR PRESS ENTER TO CANCEL.

Figure 4

When a choice is entered, the macro variable FIELDSN is set to the file's SAS dataset name. The macro variable FILLIT is set to the file's current description, as shown on the sub-menu. Once a file is chosen (or the request is cancelled), the analyst is returned to the report writer menu, where the current file selection (&FILLIT) is displayed.

REP -- Define a sort and summary sequence to use

The REP option is used to define the report sort and summary sequence. The option is called "REP," because the sort and summary description is most often used to describe the report. When this option is selected, a sub-menu of available

report sort and summary sequences is shown (see figure 5). Options 1 and 2 are frequently-used reports.

THE FOLLOWING REPORTS MAY BE SELECTED:

- 1. DETAIL BY DIVISION, SALES CATEGORY.
- 2. SUMMARY BY DIVISION, SALES CATEGORY.
- A. ANALYST-DEFINED.

ENTER YOUR CHOICE OR PRESS ENTER TO CANCEL.

Figure 5

Option A leads to a second sub-menu (see figure 6). This sub-menu is used to define additional sort and summary sequences. Sequences are selected by entering the by-variable codes in the order that the data should be sorted and summarized. Up to four by-variable codes may be entered. If a detail report is desired, the forecast number code must be entered last. If the forecast number code is omitted, a summary report is defined, where the data will be summarized to the last by variable.

THE FOLLOWING BY VARIABLES MAY BE SELECTED:

- | | |
|-----------------------|----------------------|
| A. DIVISION | G. DESTINATION |
| B. BUSINESS AREA | I. FINANCIAL PLANNER |
| C. SALES CATEGORY | J. PRODUCT |
| D. F/D CLASSIFICATION | K. SALES TYPE |
| E. CONTRACT TYPE | L. FORECAST TYPE |
| F. CUSTOMER | M. FORECAST NUMBER |
| H. HELP | |

ENTER YOUR CHOICE OR PRESS ENTER TO CANCEL.

Figure 6

For example, entering BCM will define a DETAIL BY BUSINESS AREA, SALES CATEGORY report. When this report is run, each business area, sales category combination will begin on a new page, and the detail forecasts within them will be reported. Business area, sales category and grand totals will also be reported. Entering BC will define a SUMMARY BY BUSINESS AREA, SALES CATEGORY

report. When this report is run, each business area will begin on a new page, and each sales category total within the business area will be reported. Business area and grand totals will also be reported. Note that options 1 and 2 in figure 5 can also be defined through this sub-menu by entering ACM and AC, respectively.

When a choice is entered, the macro variable REPCCHARS is set to the chosen by-variable codes (i.e., BCM from the first example, above). The macro variable REPLIT is set to the sort and summary sequence description. These macro variables are generated if the analyst-defined option (A) is used. Once a report is chosen (or the request is cancelled), the analyst is returned to the report writer menu, where the current sort and summary selection (&REPLIT) is displayed.

PER -- Define a time period to report

The PER option is used to define the type of data (monthly, quarterly or yearly) and the time period to report. When this option is selected, a sub-menu of available time periods is shown (see figure 7). Options 1 through 4 are frequently-used periods. They represent monthly and quarterly periods for the current and next fiscal years. Option Y will define yearly totals for: (1) all prior fiscal years, (2) the current fiscal year, (3) the next fiscal year, (4) the following fiscal year, and (5) all future fiscal years.

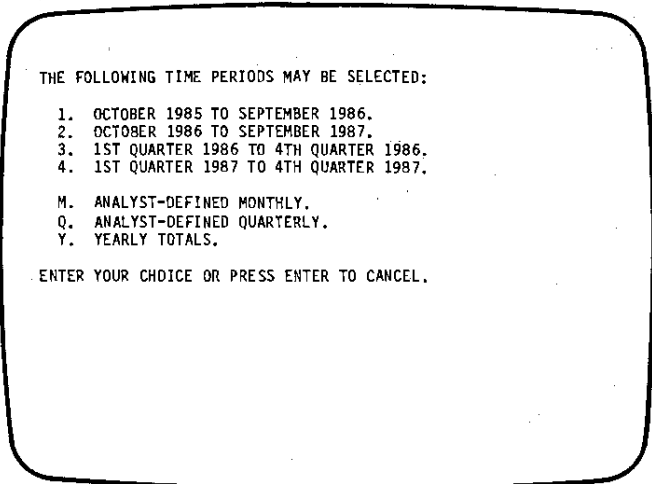


Figure 7

Option M leads to a second sub-menu (see figure 8). This sub-menu is used to define additional monthly time periods. Ranges of 1 to 12 months may be chosen. Option Q also leads to a second sub-menu (see figure 9). This sub-menu is used to define additional quarterly time periods. Ranges of 1 to 8 quarters may be chosen.

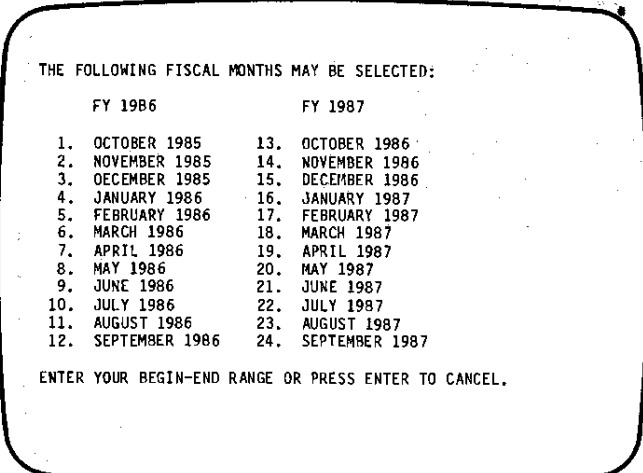


Figure 8

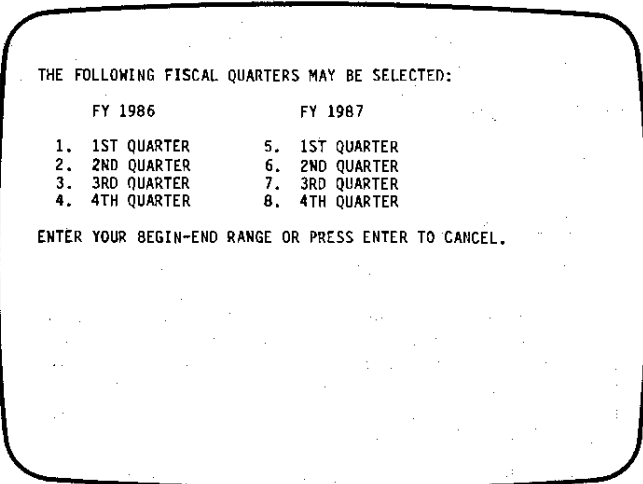


Figure 9

When a choice is entered, the macro variable PERTYPE is set to the data type (M, Q or Y). Macro variables PERBEG and PEREND are set to the begin and end points of the time period range. Once a time period is chosen (or the request is cancelled), the analyst is returned to the report writer menu, where the current time period selection is displayed (through a "function-type" macro).

VAR -- Define the financial variables to report

The VAR option is used to define what financial variables to report. When this option is selected, a sub-menu of available financial variables is shown (see figure 10). The option numbers correspond to the number of variables to be reported.

THE FOLLOWING FINANCIAL VARIABLES MAY BE SELECTED:

1. SALES.
2. SALES, GROSS PROFIT.
3. SALES, GROSS PROFIT, % TO SALES.
4. SALES, GROSS PROFIT, % TO SALES, COMMISSIONS.

ENTER YOUR CHOICE OR PRESS ENTER TO CANCEL.

Figure 10

When a choice is entered, the macro variable VARNUM is set to the number of variables to be reported. The macro variable VARLIT is set to a list of the variables selected, as shown on the sub-menu. Once the variables are chosen (or the request is cancelled), the analyst is returned to the report writer menu, where the current selection of financial variables (&VARLIT) is displayed.

RUNNING A REPORT

Whenever an individual is in the report writer menu, a report is defined and ready to run. This is true upon first access to the menu, or upon return to the menu from defining an option, viewing a help screen or running a report. When option R is selected, no errors need to be checked for. All definition option choices have already been validated in their respective sub-menus.*

Once the R option is selected, a routine determines whether the report should be run to 8-1/2 x 11 or 11 x 8-1/2 paper, based on the time span to be reported. A utility macro is used to prompt for an output device -- printer or screen. If printer is selected, the macro determines which printer has the proper paper for the report.

The macro variables established with the report definition options are then fed into a macro called RWSETUP. This macro is used to set additional macro variables for the sort and summary by variables, report titles, column headings and report centering. These macro variables are then fed into another macro called RWSHELL, which generates the SAS code to run the report.

RWSHELL uses three steps to run the report. First, a DATA step is used to subset the data, calculate time span totals and keep needed variables. Then, the data is run through a PROC SUMMARY to sort the data and summarize it to the last by-variable level. Finally, another DATA step is used in conjunction with FILE PRINT to accumulate "upper-level" by-variable totals, accumulate grand totals and print the report.

REPORT LAYOUT

FILE PRINT is used to give the report a professional appearance, neatly laid out and centered on letter-size paper. This makes the report easily used for presentation.

The report definition options are used to define what the data will be and how it will be manipulated. They are also used to define report titles, column headings and how the report will look. For example, figure 11 shows a report writer menu with a report defined and ready to run. (The definitions for SUB and REP are from examples described earlier.) Figure 12 shows a page of the report after it was run. Note how the report layout corresponds to the report writer menu.

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ANALYST ==> JUDE NAES                                ACTUALS THROUGH JULY 1986
=====
MONTHLY SALES FORECASTING SYSTEM
REPORT WRITER MENU
=====
THE FOLLOWING REPORT MAY BE RUN:

SUB  ACME DIVISION, DOMESTIC & FOREIGN DIRECT SALES
FIL  FORECAST DATA
REP  SUMMARY BY BUSINESS AREA, SALES CATEGORY
PER  AUGUST 1986 TO OCTOBER 1986
VAR  SALES, GROSS PROFIT

R.   RUN THE REPORT.
H.   HELP.
X.   EXIT SAS.
=====
ENTER YOUR CHOICE OR PRESS ENTER TO RETURN TO THE MAIN MENU.
    
```

Figure 11

ACME DIVISION, DOMESTIC & FOREIGN DIRECT SALES
MONTHLY FORECAST DATA
FY 1986-87 SUMMARY BY BUSINESS AREA, SALES CATEGORY
ACTUAL \$ (000) THROUGH JULY 1986

AIRCRAFT PRODUCTS		---1986---		-1987-		TOTAL
		AUG	SEP	OCT		
2 RADARS	SALES	999	999	999	999	999
	G.P.	99	99	99	99	99
4B TESTING DEVICES	SALES	999	999	999	999	999
	G.P.	99	99	99	99	99
5 RADIO EQUIPMENT	SALES	999	999	999	999	999
	G.P.	99	99	99	99	99
9 NAVIGATIONAL EQUIPMENT	SALES	999	999	999	999	999
	G.P.	99	99	99	99	99
TOTAL AIRCRAFT PRODUCTS	SALES	99999	99999	99999	99999	99999
	G.P.	9999	9999	9999	9999	9999

Figure 12

* The ability to run a report without further error checks was the main reason that we decided to "load" a default report rather than save the parameters from the last use of the report writer. In theory, a special file that was available during the last use of the report writer could have been deleted. If that file was the last file used, then upon access to the report writer, the currently defined report would NOT be ready to run because the file would not exist.

The SUB option description (ACME DIVISION, DOMESTIC & FOREIGN DIRECT SALES) is the first title line. The data reported is limited to the subset chosen.

The FIL option description (FORECAST DATA) is part of the second title line. The data in the report is from the file selected. The fourth title line corresponds to the literal in the upper right-hand corner of the menu. This reflects what part of the file is ACTUAL data vs. forecasted data.

The REP option description (SUMMARY BY BUSINESS AREA, SALES CATEGORY) is part of the third title line. The business area (AIRCRAFT PRODUCTS) is the heading for the left-hand column. Summarized sales categories (2, 4B, 5 and 9) within AIRCRAFT PRODUCTS are reported, followed by the business area total. Other business areas are reported on following pages, with the grand total at the end.

The PER option contributes to the second (MONTHLY) and third (FY 1986-87) title lines. It determines the column headings above the financial data.

The VAR option (SALES, GROSS PROFIT) determines what financial variables will appear in the body of the report.

By understanding the relationship between the report writer menu and the report layout, the report can easily be used as a reference for future runs.

EASE-OF-USE

You have seen the specific features of the report writer and have probably noticed that the amount of required reading and typing is minimized. Definition options are chosen by entering three-character codes. Selections on the sub-menus are made by entering either one-character codes or numbers. Input is always made at the cursor location. There is no need to move the cursor anywhere else on the screen to make selections. All possible input errors are checked. If an input error is made, the mistake is shown and the analyst is returned to the menu or sub-menu from which the error occurred. This gives him the opportunity to re-input his selection.

Shortcuts are available to anyone who uses the report writer. Shortcuts allow the analyst to pick options from a sub-menu without having the sub-menu appear on the screen. This is done by entering the sub-menu option along with the report definition option (i.e., PER.3). Shortcuts can also be used to go directly to the analyst-defined sub-menus (i.e., REP.A). If an invalid sub-menu option is selected with a shortcut, it is noted, and the analyst is placed directly in the sub-menu where the correct selection can be made. An experienced person, familiar with the sub-menu options, can quickly define a report without leaving the report writer screen.

Nesting of sub-menus is limited to two. When the sub-menus are completed, the analyst is re-

turned to the report writer menu, where the current selections are shown. Analysts may continue to pick and choose until they have built their own custom-designed report. Sub-menus always give the option to press ENTER to cancel and immediately return to the report writer menu.

The screen is cleared before any new menus or help screens are displayed. Screen design is such that no menu will ever attempt to provide more information than the screen size can accommodate. The menus and sub-menus are consistently laid out to provide familiarity. The menu headers are designed so that people know exactly where they are.

Similar reports are easily run by changing only the options that need to be changed. For example, a series of reports different only in their summary sequence may be needed. The four options that remain constant can be defined, and the REP option can be repeatedly changed to get the different summary sequences.

Help screens are provided where needed. When selected, they always give information specific to the menu from which they were chosen. This feature (when properly maintained) assures that the "how-to" instructions are current throughout the system.

The report writer option definitions are used as report titles when they are run. Since they are used as titles, reports can be rerun by referring to the titles. This feature, like the help screens, eliminates the need for separate "how-to" instructions or "report books" that may become obsolete.

CONCLUSION

Due to constant needs for different ways of looking at financial data, an easy-to-use method of building custom reports for financial executives was developed with a macro-driven report writer. No computer background is assumed or required of the executive. The defining and running of reports is controlled from a single report writer menu. The report writer gives a maximum amount of flexibility but only requires a minimum amount of typing. As a result, hundreds of different reports may be easily generated without the assistance of a SAS programmer.

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