

Creating Superlative Reports Using ODS RTF

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ABSTRACT

ODS RTF has been a very popular method for generating tables, listing and graphs in industry due to its flexibility. However, PROC REPORT options that work in listing outputs may not work when generating output in ODS RTF format. Hence, it may not always be straightforward to achieve desired output in ODS RTF. This paper focuses on some useful tips and tricks that can be utilized to format reports using ODS RTF. Some of the topics include aligning decimals in columns, controlling column width, using split character option in header as well as text, displaying special symbols in the report, adding titles and footnotes to graphs created using PROC SGPLOT and PROC SGPANEL, etc. The paper includes examples and sample SAS codes that can be directly implemented in different situations to make the reader comfortable in using ODS RTF as a powerful tool.

INTRODUCTION

PROC REPORT is a commonly used procedure to display tables and listings. It is commonly used along with ODS to create reports in RTF and PDF format. ODS RTF has been a very popular method due to its flexibility. However, all the common commands in PROC REPORT do not work with ODS RTF. This paper includes detail code and output tables for each of the mentioned tips.

In this case, laboratory analysis dataset (ADLB) is used as an example. A summary statistic tables based on the ADLB data has been used as an example to demonstrate in this paper.

Example ADLB dataset:

USUBJID	TRTA	PARAM	PARAMCD	AVISIT	PARCAT1	AVAL
101	Trt A	Hemoglobin	HEMO	Baseline	HEMATOLOGY	7
101	Trt A	Hemoglobin	HEMO	End of Treatment	HEMATOLOGY	5.8
101	Trt A	Hemoglobin	HEMO	Follow up	HEMATOLOGY	6.6
101	Trt A	Erythrocytes	ERYTHRO	Baseline	HEMATOLOGY	2.83
101	Trt A	Erythrocytes	ERYTHRO	End of Treatment	HEMATOLOGY	2.4
101	Trt A	Erythrocytes	ERYTHRO	Follow up	HEMATOLOGY	2.51
102	Trt A	Hemoglobin	HEMO	Baseline	HEMATOLOGY	10.7
102	Trt A	Hemoglobin	HEMO	End of Treatment	HEMATOLOGY	7.6
102	Trt A	Hemoglobin	HEMO	Follow up	HEMATOLOGY	12.1
102	Trt A	Erythrocytes	ERYTHRO	Baseline	HEMATOLOGY	4.34
102	Trt A	Erythrocytes	ERYTHRO	End of Treatment	HEMATOLOGY	3.05
102	Trt A	Erythrocytes	ERYTHRO	Follow up	HEMATOLOGY	4.15

PROC REPORT Code:

This code is used to display the table created using PROC MEANS to get descriptive statistics including n, mean, standard deviation and median.

```
ODS RTF file = C:/home/tab1.rtf";
PROC REPORT DATA = table;
COLUMNS PARCAT1 AVISIT PARAM _NAME_ val;
DEFINE PARCAT1 / group "Parameter Category";
DEFINE AVISIT / group "Visit";
DEFINE PARAM / group "Parameter";
DEFINE _NAME_/ display "Statistics";
DEFINE VAL/display "Value";
RUN;
ODS RTF CLOSE;
```

Output Table:

The table generated below is the ODS RTF table created after using PROC REPORT without using any specific commands or options. This table can be made more aesthetic and informative.

Parameter Category	Visit	Parameter	Statistics	
HEMATOLOGY	Baseline	Erythrocytes	n	3
			mean	3.15
			std	1.06
			median	2.83
		Hemoglobin	n	3
			mean	8.43
			std	1.99
			median	7.6
	End of Treatment	Erythrocytes	n	3
			mean	2.51
			std	0.49
			median	2.4
		Hemoglobin	n	3
			mean	7.03
			std	1.07
			median	7.6
	Follow up	Erythrocytes	n	3
			mean	3.03
			std	0.97
			median	2.51
		Hemoglobin	n	3
			mean	8.57
			std	3.07

I. Justification and alignment of values with decimal point

In the above table, for the value column, the values are not aligned across different rows. To align these and to get the desired output, following changes the code can be made. There are numerous ways of doing this. We have demonstrated a combination of PROC FORMAT and COMPUTE block.

Code:

```
PROC FORMAT;
    PICTURE twodec low-high='009.99';
    PICTURE onedec low-high='009.9  ';
    PICTURE nodec low-high='009      ';
RUN;

ODS RTF file = "C:/home/tab1.rtf";
PROC REPORT DATA = table NOWD STYLE (column) = [just = c asis = on protectspecialchars = off];
COLUMNS PARCAT1 AVISIT PARAM _NAME_ val;
DEFINE PARCAT1 / group "Parameter Category";
DEFINE AVISIT / group "Visit";
DEFINE PARAM / group "Parameter";
DEFINE _NAME_ / display "Statistics";
COMPUTE val;
    len = lengthn(scan(put(val.sum,best8.),2,'.'));
    if len = 0 then call define(_col_,'format','nodec. ');
    else if len = 1 then call define(_col_,'format','onedec. ');
    else if len = 2 then call define(_col_,'format','twodec. ');
ENDCOMP;
RUN;
ODS RTF CLOSE;
```

Output Table:

Parameter Category	Visit	Parameter	Statistics	
HEMATOLOGY	Baseline	Erythrocytes	n	2
			mean	3.59
			std	1.07
			median	3.59
		Hemoglobin	n	2
			mean	8.85
			std	2.62
			median	8.85
	End of Treatment	Erythrocytes	n	2
			mean	2.73
			std	0.46
			median	2.73
		Hemoglobin	n	2
			mean	6.7
			std	1.27
			median	6.7
	Follow up	Erythrocytes	n	2
			mean	3.33
			std	1.16
			median	3.33
		Hemoglobin	n	2

Parameter Category	Visit	Parameter	Statistics	
			mean	9.35
			std	3.89
			median	9.35

II. Controlling column width

In the above displayed table, the column widths have been automatically assigned by the ODS. For specifying actual column width, 'style = [cellwidth = xx]' can be used to determine actual column width.

Code:

```
ODS RTF file = C:/home/tab2.rtf";
PROC REPORT DATA = table;
COLUMNS PARCAT1 AVISIT PARAM _NAME_ val;
DEFINE PARCAT1 / group "Paramater Category" style = [cellwidth = 1.5 in];
DEFINE AVISIT / group "Visit" style = [cellwidth = 1.5 in];
DEFINE PARAM / group "Parameter" style = [cellwidth = 1.5 in];
DEFINE _NAME_ / display "Statistics" style = [cellwidth = 1.5 in];
DEFINE VAL/display style = [cellwidth = 1.5 in];
RUN;
ODS RTF CLOSE;
```

Output Table:

Parameter Category	Visit	Parameter	Statistics	val
HEMATOLOGY	Baseline	Erythrocytes	n	2
			mean	3.59
			std	1.07
			median	3.59
		Hemoglobin	n	2
			mean	8.85
			std	2.62
			median	8.85
	End of Treatment	Erythrocytes	n	2
			mean	2.73
			std	0.46
			median	2.73
		Hemoglobin	n	2
			mean	6.7
			std	1.27
			median	6.7
	Follow up	Erythrocytes	n	2
			mean	3.33

Parameter Category	Visit	Parameter	Statistics	val
			std	1.16
			median	3.33
		Hemoglobin	n	2
			mean	9.35
			std	3.89
			median	9.35

III. Using split character and escape character

Split character can be used display the column header, data in the cells onto separate lines. Escape character can also be used with ODS RTF similar to the way it is used otherwise.

Code:

```
ODS RTF file = "C:/home/tab3.rtf";
ODS ESCAPECHAR = '#';
TITLE 'Protocol No. 100245 #n Descriptive Statistics of Hematology';
PROC REPORT DATA = table nowd split = '*';
COLUMNS PARCAT1 AVISIT PARAM _NAME_ val;
DEFINE PARCAT1 / group "Parameter * Category";
DEFINE AVISIT / group "Visit";
DEFINE PARAM / group "Parameter";
DEFINE _NAME_/ display "Statistics";
DEFINE VAL/display "Value";
RUN;
ODS RTF CLOSE;
```

Output Table:

Protocol No. 100245
Descriptive Statistics of Hematology

Parameter Category	Visit	Parameter	Statistics	Value
HEMATOLOGY	Baseline	Erythrocytes	n	2
			mean	3.59
			std	1.07
			median	3.59
		Hemoglobin	n	2
			mean	8.85
			std	2.62
			median	8.85
	End of Treatment	Erythrocytes	n	2
			mean	2.73
			std	0.46
			median	2.73

Parameter Category	Visit	Parameter	Statistics	Value
		Hemoglobin	n	2
			mean	6.7
			std	1.27
			median	6.7
	Follow up	Erythrocytes	n	2
			mean	3.33
			std	1.16
			median	3.33
		Hemoglobin	n	2
			mean	9.35
			std	3.89
			median	9.35

IV. Display special symbols in the report

While displaying reports in RTF ODS escape character can be used for a wide range of formatting options. It can be used for displaying special characters in the title as well as column header. Based on the complexity of the text the code can be complicated or simple. The same technique can also be used to underline, italicize or bold text as well as to change color of the text.

The above ADLB example cannot be used to demonstrate special characters, hence, another example has been used to demonstrate this.

Code:

```
DATA temp;
INPUT col1 $ col2 $;
DATALINES;
86.76 86.31
;
run;

ODS RTF FILE = " C:/home/tab4.rtf";
ODS ESCAPECHAR = "^";
TITLE1 'Listing of All subjects displaying AUC^{sub (0-)^S={font_face=symbol}^{sub a}^S={}^{sub )}} and AUC^{sub (0-)^S={font_face=symbol}^{sub t}^S={}^{sub )}}values';
proc report data = temp split = "*";
COLUMNS COL1 COL2;
DEFINE COL1 / DISPLAY 'AUC^{sub (0-)^S={font_face=symbol}^{sub a}^S={}^{sub )}}* (ng.hr/ml)';
DEFINE COL2 / DISPLAY 'AUC^{sub (0-)^S={font_face=symbol}^{sub t}^S={}^{sub )}}* (ng.hr/ml)';
RUN;
ODS RTF CLOSE;
```

Output Table:

Listing of All subjects displaying $AUC_{(0-\alpha)}$ and $AUC_{(0-\tau)}$ values

$AUC_{(0-\alpha)}$ (ng.hr/ml)	$AUC_{(0-\tau)}$ (ng.hr/ml)
86.76	86.31

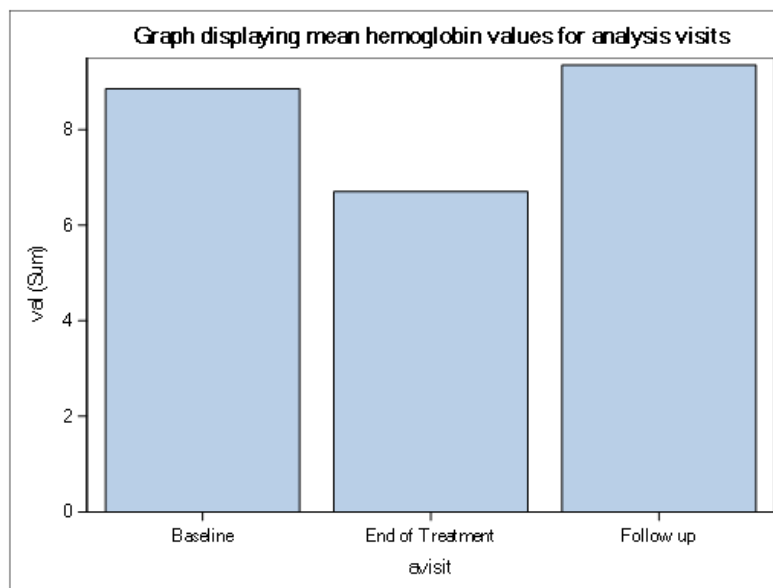
V. Adding titles and footnotes to graphs

Graphs also follow a similar process like tables for titles, footnotes, displaying special characters, etc. More recently SG procedures including PROC SGPLOT, PRIC SG PANEL, etc. are used to create graphs. The following example displays a very basic graph displaying the title. Similarly, footnotes and in graph tables can also be displayed.

Code:

```
proc sort data = tab; by param val; run;
options orientation=portrait nobyline;
ODS RTF file = 'C:/home/tab4.rtf';
ods graphics / height=4in;
title1 "Graph displaying mean hemoglobin values for analysis visits";
ods startpage = no;
proc sgplot data=tab;
vbar avisit / response = val ;
RUN;
ODS RTF CLOSE;
```

Output Graph:



CONCLUSION

ODS RTF is a very powerful and convenient way of displaying reports. The tables, listings, and graphs created in RTF can be viewed in majority of word processors and hence can be used for various purposes. Simple changes need to be made at the PROC REPORT by adding options, using escape characters, split character, etc. level to get desired changes to the RTF output. The above paper demonstrated five very common and frequently required ODS RTF outputs. These can be required and used singly as well as in combination to match your table to the desired mock shell.

CONTACT INFORMATION

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