

ODS: Odious or Not

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ABSTRACT

For years you have been producing a listing for output from your procedures and it has been just what management wanted and needed. However, now, they want the output in a format that they can share with others. We all know that the ordinary listing can be quite limiting. So, now we have the ability with the Output Delivery System (ODS) to make our output fancier and more user-friendly. But how do we do it? What do we need to know about ODS in order to produce output that our managers will read. This presentation will give you the basics of ODS. It will take you from the simple commands to the changes that are needed to produce different types of output and output files.

INTRODUCTION

The Output Delivery System (ODS) was introduced in version 7 and has been a very popular addition. It has given us capabilities that didn't exist in previous versions of the software. Before we had ODS, we could only put one procedure on a page. SAS/GRAPH did have the capability of putting several graphs on the same page with the GREPLAY procedure. However, with ordinary reporting procedures like PROC PRINT or PROC REPORT, this was not possible. You were also forced to use the SAS Monospace font or Courier New which uses a space as a delimiter. You couldn't use a proportional font like Arial or New Times Roman because strange things would happen to your output. There is another major problem with SAS Monospace. Courier New is available on all computers, SAS Monospace is not. You needed to have SAS on your PC in order to read the report in SAS Monospace. This was a very undesirable situation if the report was going to be reviewed by upper management because they typically were not SAS users.

Other difficulties ensued because customization of reports was very time consuming and difficult. Of course, there were things that could be done, like import the output from your SAS program into an MS Word table. There were inherent problems with this solution because the output is space delimited. This causes problems when there were data fields that were multiple words, they would end up in two columns. For example, if the data listed states in the United States, each word of a two word state like New York or South Carolina would be placed in a separate column. So, there ended up being a great deal of manual intervention to fix the problems.

ODS solves a great deal of the problems that existed in the old output listings. One of the features of ODS is that there are a variety of output formats available. These include HTML, RTF and PDF files. These file formats do not require that the recipient have SAS loaded on their computer. This makes the format more versatile and affords users greater flexibility. Another advantage of ODS is that you can create datasets from most of the procedures. In the past, there were a number of procedures that only created listing output and it was difficult to capture the data that was generated. ODS is simple to start using to create professional looking output that can be reviewed by colleagues at all levels, whether they are SAS users or not.

ODS TERMINOLOGY

With ODS you can choose the destination of your output. You can also control the style and format of the output. Here is some of the terminology used when using ODS. Through the use of table definitions, you can control the basic structure and format of the output. A table definition is a set of instructions that describes how to format the data. For example, you can tell it how to order the columns, the text and order of the column headings and the font size and face. The style definitions tell the background color, table borders and color schemes.

Another very important concept when working with ODS is that of the output object. Each procedure can have several objects of which the output is comprised. The output object contains the result of a step and the information as to how to format the results. For example, the Univariate procedure has a component for the data as well as for the presentation of the statistical measures.

There are many types of output destinations. These include, but are not limited to: listing, html, rtf, pdf, post-script and pcl printer and output datasets. There are many choices as to the final product based on the needs of the user. If this information is needed for further processing, then the creation of an output dataset is great. If the data is in the final format from an analysis, the various files can be used for presentation of the data.

SIMPLE ODS

Let's see how simple it is to get started using ODS. There are three things that are necessary to start using ODS. We need a file in which to send the results, instructions to open a file and instructions to close a file. We need a minimum of two statements to accomplish this. In the example below, we have the ODS HTML statement that tell us we want to create an HTML file and we specify what the file is and ODS Close statement to say that we are finished with that file. We can have one procedure in between the open and close statement or many. All of the procedures between these two statements will go into the same file. If we want to send the data to many files, we would need one open and close for each file we want to create. Here is an example of the statements that we need.

```
ods html file='c:\myfile\my.html';  
procedures or data steps  
ods html close;
```

Here is an example of a simple frequency procedure. The data for this procedure are student records that indicate the Name, Gender, Height, Weight and Grades from a Math and English class. The register wants to find out how many males and females are in the school. The first table statement is a simple listing with a cumulative frequency and a cumulative percent of all students by gender. The next question to be answered is how many males and females have received a grade of A, B or C in their math class. So, the second table statement provides a multidimensional table of gender by class grade for the math class. Without any ODS statements, the data is presented in a list format. (See example one)

```
proc freq data=sesug.class;  
  tables sex;  
  tables sex*math;  
  format sex $sex.;  
  label sex='Gender'  
    math='Math Grade';  
  title "Example One: Simple Frequency Procedure Listing Without ODS";  
run;
```

As you can see from the listing, it is a very plain listing, but not very pretty. How can we deliver this in a different way that is more pleasing to read, but easy to create? All we need to do is add a couple of statements to direct the output to a file using ODS. All we need to do is tell ODS what type of file to create and where it is to reside. The basic statements that are needed are:

```
ODS filetype FILE=path;  
ODS filetype close;
```

We can easily create a document to be opened in MS Word by using RTF as the file type. Changing the filetype to HTML will create a file that we can open in a web browser. For the path, we can use the actual location of the file or we can create a LIBNAME statement with a LIBREF and the path and use the file reference instead of the whole path. Either one is acceptable and can be used.

In the example below, we are creating an RTF file that can be opened with MS Word. We have defined the filetype as RTF and the path is a file on our C:/ drive. By adding 2 statements to a procedure, we have created a file with a much different kind of output. Note that using the following code, we are taking the output from one procedure and placing it into a file. If we want the output from two procedures to populate the file, we place the ODS CLOSE statement at the end of the code for the second procedure. (See example two)

```
ODS RTF FILE='C:/ODS.RTF';  
proc freq data=sesug.class;  
    tables sex;  
    tables sex*math;  
    format sex $sex.;  
    label    sex='Gender'  
           math='Math Grade';  
run;  
ODS RTF CLOSE;
```

Not that we know how simple it is to create multiple procedure output in the same program, we need to explore the ease or difficulty in reading that output. The reviewer will need to scroll through the entire file to find the output that is to be reviewed. One of the benefits of creating an HTML file is that you can generate a table of contents (TOC) for your output. When you create the TOC, you can click on the output of choice and jump directly to it without having to scroll. You need to add a couple of optional statements to the ODS statement. The BODY= option creates a single file. The BODY file contains the results. The CONTENTS option creates the TOC. The CONTENTS file contains the procedure name and links to the procedure output. You will also need to add the FRAME option. The FRAME file tells the browser how to display the BODY and CONTENTS file on the same screen. The code below uses all three options to create the BODY and CONTENTS files while the FRAME option tells ODS how to display the results. (See example three)

```
ods html body='c:\hasug\means1b.html'  
      contents='c:\hasug\means1c.html'  
      frame='c:\hasug\means1f.html';  
title 'Class Vital Statistics';  
proc means data=class maxdec=2 mean min max;  
    class sex;  
    var weight height;  
run;  
title 'Class Grade Averages';  
proc means data=class maxdec=2 mean min max;  
    class sex;  
    var mgrade egrade;  
run;  
ods html close;
```

The next problem to tackle is the TOC itself. For every procedure that you include in the output, the name of the procedure is always the procedure name (i.e., The Means Procedure, The Frequency Procedure). Another problem is that the outcome of the procedure always says Summary Statistics. This does not create a very professional looking output. We can add a PROCLABEL statement and customize the titles that are printed in the TOC. In this manner, we can run the same procedure multiple times and specify exactly what each one is.

```
ods html      body='c:\hasug\means5b.html'
              contents='c:\hasug\means5c.html'
              frame='c:\hasug\means5f.html';
ods proclabel 'Weight and Height';
title 'Class Vital Statistics';
proc means data=class maxdec=2 mean min max;
class sex;
var weight height;
run;
ods proclabel 'Grades';
title 'Class Grade Averages';
proc means data=class maxdec=2 mean min max;
class sex;
var mgrade egrade;
run;
ods html close;
```

CONCLUSION

There is so much to learn about ODS, but you can start very quickly to create custom output with very few statements that are added to your program code. As you learn more about the Output Delivery System, your output can take on a whole new look and the recipients will be able to review the documents using all types of tools including browsers and word processor software. This paper has given you a quick start and a couple of simple options to use. You are only limited by your imagination.

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Example 1: Simple Frequency Procedure Listing Without ODS

Gender				
Sex	Frequency	Cumulative Percent	Cumulative Frequency	Percent
Female	12	48.00	12	48.00
Male	13	52.00	25	100.00

Table of Sex by math

Sex(Gender)		math(Math Grade)		
Frequency	Percent	Row Pct	Col Pct	Total
		A	B	C
Female	3	1	8	12
	12.00	4.00	32.00	48.00
	25.00	8.33	66.67	
	60.00	20.00	53.33	
Male	2	4	7	13
	8.00	16.00	28.00	52.00
	15.38	30.77	53.85	
	40.00	80.00	46.67	
Total	5	5	15	25
	20.00	20.00	60.00	100.00

Example 2: ODS Output using RTF

Gender				
Sex	Frequency	Percent	Cumulative Frequency	Cumulative Percent
Female	12	48.00	12	48.00
Male	13	52.00	25	100.00

Table of Sex by math				
Sex(Gender)	math(Math Grade)			
Frequency	A	B	C	
Percent				
Row Pct Col Pct				
Female	3 12.00 25.00 60.00	1 4.00 8.33 20.00	8 32.00 66.67 53.33	12 48.00
Male	2 8.00 15.38 40.00	4 16.00 30.77 80.00	7 28.00 53.85 46.67	13 52.00
Total	5 20.00	5 20.00	15 60.00	25 100.00

Example 3: HTML Output with Table of Contents

Table of Contents

1. The Means Procedure
·[Summary statistics](#)
2. The Means Procedure
·[Summary statistics](#)

Class Vital Statistics

The MEANS Procedure

Sex	N Obs	Variable	Mean	Minimum	Maximum
F	17	Weight	95.74	50.50	133.00
		Height	58.75	50.00	66.50
M	18	Weight	123.03	83.00	166.00
		Height	63.77	57.30	72.00

Class Grade Averages

The MEANS Procedure

Sex	N Obs	Variable	Mean	Minimum	Maximum
F	17	Mgrade	2.53	0.00	4.00
		Egrade	2.59	1.00	4.00
M	18	Mgrade	2.61	1.00	4.00
		Egrade	2.89	1.00	4.00

Example 4: HTML Output with Table of Contents Labeled

Table of Contents

1. Height and Weight
 - [Summary statistics](#)
2. Grades
 - [Summary statistics](#)

Class Vital Statistics

The MEANS Procedure

Sex	N Obs	Variable	Mean	Minimum	Maximum
F	17	Weight	95.74	50.50	133.00
		Height	58.75	50.00	66.50
M	18	Weight	123.03	83.00	166.00
		Height	63.77	57.30	72.00

Class Grade Averages

The MEANS Procedure

Sex	N Obs	Variable	Mean	Minimum	Maximum
F	17	Mgrade	2.53	0.00	4.00
		Egrade	2.59	1.00	4.00
M	18	Mgrade	2.61	1.00	4.00
		Egrade	2.89	1.00	4.00