

Part 1

Introduction

Chapter 1 Why Use ODS? **3**

Chapter 2 ODS Basics **13**

Chapter 1

Why Use ODS?

Limitations of Traditional SAS Output **4**

Difficulties with Importing Standard Listing Output into a Word Processor **6**

ODS Output: A Variety of Formats to Fit Your Needs **8**

If all you want are quick results displayed on screen or roughly printed out in a stack of output, you can put this book away right now.

However, if you're like the rest of us, you want more from your output. That's because most SAS output is shared with others.

You want your output to be appealing, to help you tell a story. You want your output to be impressive: it should look like you worked on it for hours, even if it only took you a few minutes. You also want your output to be easy to share with other software packages and other users, whether they are across the hall or across the globe.

This chapter shows how you can take some basic SAS output and transform it from simple line-printer output into a beautiful integrated Web page, a word-processor-friendly RTF file, high-resolution printed output, or a bookmarked PDF file.

This chapter will not show any ODS code, but rather it will just give you a taste of the types of output you can produce and what they look like. Subsequent chapters get into the details of the code.

Limitations of Traditional SAS Output

Before you can appreciate the wonder of ODS, you need to see where we're starting from. The following example is a series of simple procedures that describe some sales data. It includes a PROC FREQ, a PROC UNIVARIATE, and a PROC PRINT for some outliers.

```
options formdlim=' ';
title "Frequencies";
proc freq data=sales;
    table ProductName Department;
run;

title "Univariate";
proc univariate data=sales;
    var ItemsSold;
run;

title "Outliers for Price";
proc print data=sales;
    where ItemPrice>13;
    var ItemPrice;
run;
```

The procedures have been run in SAS Release 6.12, producing Output 1.1. Because three different procedures are used here, the resulting output is a series of reports—first, a report with two frequency tables, then a report with univariate statistics, and finally a report with line-item details for the outliers. (Some of this output has been trimmed in order to fit the results on the page.)

By default, SAS puts each of these results on a separate page. To keep this output as short as possible, the FORMDLIM option has been used to remove the page breaks. However, even without the page breaks, the resulting output sprawls across a number of pages. In Output 1.1, only the frequency tables and the first part of the univariate results will fit on the first page.

If you only have time to quickly glance at the top page of this report, this output doesn't tell you much of a story. You can't see all of the results. For example, what if the outliers for ItemsSold and ItemPrice are the most important message in the report? This information is buried on the second page. You can't see the extreme values for ItemsSold and the outlier report for ItemPrice.

Also, this report is just plain ugly. Because this is SAS listing output, spaces are used to line up the columns of data and headings. This forces you to use a monospace font rather than a proportional font. Proportional fonts (like the Times New Roman used for the text you are reading right now) are much easier to read. But if you used a proportional font with SAS listing output, nothing would line up. To see what SAS listing output would look like with a proportional font, look at Output 1.2.

Output 1.1

Frequencies				
Product				
ProductName	Frequency	Percent	Cumulative Frequency	Cumulative Percent
Kona	83	16.60	83	16.60
Colombian	88	17.60	171	34.20
French Roast	74	14.80	245	49.00
Italian Roast	85	17.00	330	66.00
Guatemalan	98	19.60	428	85.60
Sumatran	72	14.40	500	100.00

Department				
Department	Frequency	Percent	Cumulative Frequency	Cumulative Percent
Wholesale	134	26.80	134	26.80
Internet	208	41.60	342	68.40
Mail Order	87	17.40	429	85.80
Retail	71	14.20	500	100.00

Univariate
Variable: ItemsSold (Items Sold)

Moments			
N	500	Sum Weights	500
Mean	297.542	Sum Observations	148771
Std Deviation	143.283945	Variance	20530.2888
Skewness	0.03353578	Kurtosis	-1.1733197
Uncorrected SS	54510235	Corrected SS	10244614.1
Coeff Variation	48.155872	Std Error Mean	6.40785281

Basic Statistical Measures

Location		Variability	
Mean	297.5420	Std Deviation	143.28394
Median	292.0000	Variance	20530
Mode	200.0000	Range	498.00000
		Interquartile Range	244.00000

NOTE: The mode displayed is the smallest of 2 modes with a count of 5.

Tests for Location: Mu0=0

Test	-Statistic-	-----p Value-----	
Student's t	t 46.43396	Pr > t	<.0001
Sign	M 250	Pr >= M	<.0001
Signed Rank	S 62625	Pr >= S	<.0001

(... remaining output trimmed in order to fit results on this page ...)

Difficulties with Importing Standard Listing Output into a Word Processor

When you're delivering a set of results, frequently you need to combine them with a text-based report that explains what is going on. Ideally, you'd like to combine the results and the text into a single document.

With SAS listing output, it's possible to import your results into a word processor and add explanations and annotations. However, it takes a bit of work to make the results look nice.

Output 1.2 shows what the output from the previous example looks like when it is opened in Word. Because the default font in Word was set to Arial, a proportional font, these results look terrible. Nothing lines up. In addition, the lines under the table headings have been converted to a bunch of strange characters. This is because these lines were originally rendered in the SAS Monospace font. The codes that generate the smooth lines in table headings work just great if you stick to this monospace font, but as soon as you switch fonts, you get nonsense characters.

To fix this output, the font can be changed to SAS Monospace. Now, if you look at Output 1.3, you can see that everything lines up properly. However, it's still not very attractive. Monospace fonts are not as easy on the eye as proportional fonts. Table 1.1 illustrates some common proportional and fixed (monospace) fonts, and shows the difference proportional spacing can make. Not only are proportional fonts more appealing, but they also save space. Notice how much longer the lines of fixed-width fonts have to be to display the same text.

Table 1.1

Font	Sample text	Type
Arial	This is some sample text to show how the font looks.	Proportional
Times New Roman	This is some sample text to show how the font looks.	Proportional
Courier	This is some sample text to show how the font looks.	Fixed
SAS Monospace	This is some sample text to show how the font looks.	Fixed

If you want to use a proportional font yet still keep your columns straight, you need to convert this output into Word tables. Then you can change to any font and everything will still line up.

Word is good at converting text to tables, but SAS listing output presents a challenge. The items are separated by spaces, and Word creates a new table column wherever spaces occur. This means that if you've got a space within a column, such as between the words "French" and "Roast" in the row labels of the PROC FREQ, Word will split this column into two columns.

While there's no doubt you can use a word processor to clean up your SAS listing output, it's a lot of work because it requires so much tweaking to get things to look right. Now that ODS has arrived, there's no need to go through all this. Turn the page to enter the world of ODS.

Output 1.2 SAS Listing Output after Importing into Word

Document1 - Microsoft Word

File Edit View Insert Format Tools Table Window Help

Normal Arial 10 B I U

Frequencies

The FREQ Procedure

Product

ProductName	Frequency	Cumulative Percent	Cumulative Frequency	Cumulative Percent
Kona	83	16.60	83	16.60
Colombian	88	17.60	171	34.20
French Roast	74	14.80	245	49.00
Italian Roast	85	17.00	330	66.00
Guatemalan	98	19.60	428	85.60
Sumatran	72	14.40	500	100.00

Output 1.3 Results of Changing to a Monospace Font

Document1 - Microsoft Word

File Edit View Insert Format Tools Table Window Help

Normal SAS Monospace 10 B I U

Frequencies

The FREQ Procedure

Product

ProductName	Frequency	Percent	Cumulative Frequency	Cumulative Percent
Kona	83	16.60	83	16.60
Colombian	88	17.60	171	34.20
French Roast	74	14.80	245	49.00
Italian Roast	85	17.00	330	66.00
Guatemalan	98	19.60	428	85.60
Sumatran	72	14.40	500	100.00

ODS Output: A Variety of Formats to Fit Your Needs

Output 1.4 is produced by the same SAS code as the previous example, but now ODS has directed the output to HTML. You are looking at how the output would appear if you were viewing it with a Web browser.

Output 1.4

Table of Contents

- The Freq Procedure
 - Table ProductName
 - One-Way Frequencies
 - Table Department
 - One-Way Frequencies
- The Univariate Procedure
 - ItemsSold
 - Moments
 - Basic Measures of Location and Variability
 - Tests For Location
 - Quantiles
 - Extreme Observations
- The Print Procedure
 - Data Set WORK.SALES

Frequencies

The FREQ Procedure

Product				
ProductName	Frequency	Percent	Cumulative Frequency	Cumulative Percent
Kona	83	16.60	83	16.60
Colombian	88	17.60	171	34.20
French Roast	74	14.80	245	49.00
Italian Roast	85	17.00	330	66.00
Guatemalan	98	19.60	428	85.60
Sumatran	72	14.40	500	100.00

Department				
Department	Frequency	Percent	Cumulative Frequency	Cumulative Percent
Wholesale	134	26.80	134	26.80
Internet	208	41.60	342	68.40

For a color version of Output 1.4, see page 282 in Appendix 3.

Instead of sprawling from page to page, as the listing output did, this output is neatly packaged with a table of contents to take you directly to whatever you want to view. Instead of using ugly fixed-width fonts, the HTML output uses several good-looking fonts. Instead of being in black and white, the HTML output appears in shades of blue and gray.

All of this adds up to a packaged set of results that you wouldn't be embarrassed to share with your boss. And because this is HTML output, you can place it on your company intranet or Internet site. This way your boss can view the report even if he or she is out of the country.

But why stop with HTML output? With ODS you can create the same report in a number of formats sure to please every user. Output 1.5 shows the same results as in the previous examples, this time converted to RTF and imported into Word. The RTF version does not have the table of contents, because this feature is not currently supported for the RTF destination, but the rest of the output appears the same in HTML or RTF.

Output 1.5

Product				
ProductName	Frequency	Percent	Cumulative Frequency	Cumulative Percent
Kona	83	16.60	83	16.60
Colombian	88	17.60	171	34.20
French Roast	74	14.80	245	49.00
Italian Roast	85	17.00	330	66.00
Guatemalan	98	19.60	428	85.60
Sumatran	72	14.40	500	100.00

Department				
Department	Frequency	Percent	Cumulative Frequency	Cumulative Percent
Wholesale	134	26.80	134	26.80
Internet	208	41.60	342	68.40
Mail Order	87	17.40	429	85.80
Retail	71	14.20	500	100.00

Note the striking difference between this output and the ugly results we got when we imported SAS listing output into Word in the previous example (Outputs 1.2 and 1.3). The ODS output has been converted into Word tables and is ready to go, with no tweaking needed.

If you want to change the font used for this output, you can do so without losing the column alignments. Now that your output is in a word processor, it's easy to add explanatory text and annotations. For example, if you want to explain something about the mail order figure, you can use a Word callout box to add a note with an arrow pointing to the number it describes.

The RTF output is nice if you need to incorporate other information, or if you plan to send your output to others for further editing or annotation. However, if all you need is an attractive printout, you can use ODS to send high-resolution output directly to your printer. Output 1.6 shows the same results as earlier, but as they appear when printed using ODS PRINTER.

Output 1.6

Product				
ProductName	Frequency	Percent	Cumulative Frequency	Cumulative Percent
Kona	83	16.60	83	16.60
Colombian	88	17.60	171	34.20
French Roast	74	14.80	245	49.00
Italian Roast	85	17.00	330	66.00
Guatemalan	98	19.60	428	85.60
Sumatran	72	14.40	500	100.00

Department				
Department	Frequency	Percent	Cumulative Frequency	Cumulative Percent
Wholesale	134	26.80	134	26.80
Internet	208	41.60	342	68.40
Mail Order	87	17.40	429	85.80
Retail	71	14.20	500	100.00

This output looks even better than the Word output. In fact, if your goal is to create the most professional looking results from your output, printer output is the way to go. You get crisp table lines and fonts, and you can use color if you have a color printer.

ODS printer output also gives you the option of creating a PDF file so you can make this printable file available via the Internet. HTML output looks great and loads quickly for people with slow Internet connections, but printing capabilities are limited. If you expect visitors to your Web site to print out your results, PDF format is the best approach.

There's one more type of ODS output we haven't seen yet. The previous examples all showed ways of producing reports from your output. But what if you want to do further analysis? In the past, only some SAS procedures were able to produce output data sets that contained some of their results. Now, ODS allows you to create a data set from most procedures. The data set contains all of the results the procedure is capable of producing in printed output.

Though you can create data sets from any part of the output, in this example, the frequencies and the extreme observations from the univariate analysis were chosen. Output 1.7 shows what these data sets look like.

Output 1.7

Output data set: Frequencies

Obs	Table	ProductName	Frequency	Percent	Cum		Department
					Frequency	Percent	
1	ProductName	Kona	83	16.60	83	16.60	
2	ProductName	Colombian	88	17.60	171	34.20	
3	ProductName	French Roast	74	14.80	245	49.00	
4	ProductName	Italian Roast	85	17.00	330	66.00	
5	ProductName	Guatemalan	98	19.60	428	85.60	
6	ProductName	Sumatran	72	14.40	500	100.00	
7	Department		134	26.80	134	26.80	Wholesale
8	Department		208	41.60	342	68.40	Internet
9	Department		87	17.40	429	85.80	Mail Order
10	Department		71	14.20	500	100.00	Retail

Output data set: Extreme observations from Univariate

Obs	VarName	Low	LowObs	High	High
					Obs
1	ItemsSold	51	48	547	154
2	ItemsSold	52	264	547	392
3	ItemsSold	52	143	548	142
4	ItemsSold	52	58	549	66
5	ItemsSold	54	440	549	127

If you compare the data set from the frequency distributions to the output shown on the previous page, you can see that the output data set contains every number that was in the table. Unlike previous versions of SAS, Version 8 allows you to obtain a data set from virtually every result it can produce in printed output.

With these data sets, you can now run further analyses using procedures or the DATA step, or you can create summarized reports with selected results.

