The Output Delivery System (ODS)

Overview of ODS

The SAS Output Delivery System (ODS) gives you flexibility in generating, storing, and reproducing SAS procedure and DATA step output along with a wide range of formatting options.

ODS enables you to create reports for popular software applications. For example, use the ODS PDF statement to create PDF files for viewing with Adobe Acrobat or for printing. With ODS, you easily create output in a variety of formats, including Microsoft Excel and Power Point, HTML, PDF, and RTF.

Opening and Closing ODS Destinations

You use ODS statements to specify destinations for your output. Each destination creates a specific type of formatted output. The following table lists some of the ODS destinations that are currently supported.

Destination	Result
Document	a hierarchy of output objects that enables you to render multiple ODS output without rerunning procedures.
EXCEL	writes Excel spreadsheet files that are compatible with Microsoft Office 2010 and later versions.
HTML	output that is formatted in Hypertext Markup Language (HTML). You do not have to specify the ODS HTML statement to produce basic HTML output.
Markup Languages Family	output that is formatted using markup languages such as Extensible Markup Language (XML).
Output	SAS data sets.
Printer Family (PDF, and so on)	output that is formatted for a high-resolution printer such as PostScript (PS), Portable Document Format (PDF), or Printer Control Language (PCL) files.
RTF	Rich Text Format output.

This book covers the EXCEL, HTML, PDF, and RTF destinations.

Note: SAS Studio has user interface controls to create and save HTML, PDF, and RTF ODS output.

Using Statements to Open and Close ODS Destinations

Syntax

For each type of formatted output that you want to create, you use an ODS statement to open the destination. At the end of your program, you use another ODS statement to close the destination so that you can access your output.

Syntax, ODS statement to open and close destinations:

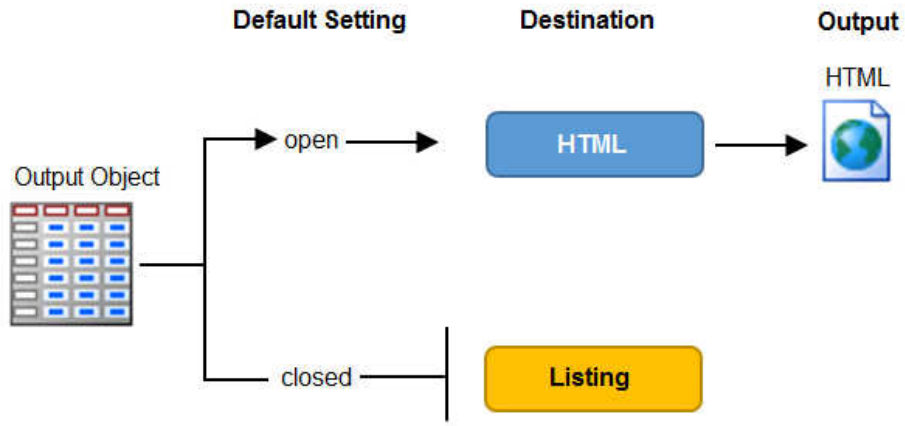
ODS *open-destination*;

ODS *close-destination* **CLOSE;**

- *open-destination* is a keyword, and any required options for the type of output that you want to create. Here are examples:
  - HTML FILE=*'html-file-pathname'*
  - LISTING
- *close-destination* is a keyword for the type of output.

You can issue ODS statements in any order, depending on whether you need to open or close the destination. Most ODS destinations are closed by default. You open them at the beginning of your program and close them at the end. The exception is the HTML destination, which is open by default.

Figure 16.1 *Default ODS Destination*



Closing Multiple ODS Destinations at Once

You can produce output in multiple formats at once by opening each ODS destination at the beginning of the program.

When you have more than one open ODS destination, you can use the keyword _ALL_ in the ODS CLOSE statement to close all open destinations at once.

Closing the HTML Destination

Because open destinations use system resources, it is a good idea to close the HTML destination at the beginning of your program if you do not want to produce HTML output. Here is an example:

```
ods html close;
```

The HTML destination remains closed until you end your current SAS session or until you re-open the destination. It is good programming practice to reset the ODS destination to HTML output (the default setting) at the end of your programs.

```
ods html path="%qsysfunc(pathname(work))";
```

Creating HTML Output with ODS

The ODS HTML Statement

To create simple HTML output files in the default location using the default file-naming conventions, you do not have to specify the ODS HTML statement. However, to create HTML output with options specified, you open the HTML destination using the ODS HTML statement.

Note: You do not have to specify the ODS HTML statement to produce basic HTML output unless the HTML destination is closed.

Syntax, ODS HTML statement:

ODS HTML BODY = *file-specification*;

ODS HTML CLOSE ;

- *file-specification* identifies the file that contains the HTML output. The specification can be any of the following:
  - a quoted string that contains the HTML filename (use only the filename to write the file to your current working directory, such as **`C:\Users\Student1\Documents and Settings\`*`username`*`\My Documents\My SAS Files`**). Example: **`ODS HTML BODY=`** "*myreport.html*";
  - a quoted string that contains the complete directory path and HTML filename (include the complete pathname if you want to save the HTML file to a specific location other than your working directory). Example: **`ODS HTML BODY=`** "*c:\Users\Student1\reportdir\myreport.html*";
  - a fileref (unquoted file shortcut) that has been assigned to an HTML file using the FILENAME statement. Example: **`FILENAME MYHTML`** "*c:\reportdir\myreport.html*"; **`ODS HTML BODY=MYHTML`**;
  - a SAS catalog entry in the form *entry-name*.html. Note that the catalog name is specified in the PATH= option and the *entry-name*.html value for the BODY= option is unquoted. Example: **`ODS HTML PATH=`***work.mycat* **`BODY=`***myentry* **`BODY=bodyfile.html`**;

TIP FILE= can also be used to specify the file that contains the HTML output. FILE= is an alias for BODY=.

TIP You can also use the PATH= option to explicitly specify a directory path for your file.

Example: Creating Output with PROC PRINT

The following program creates PROC PRINT output in an HTML file. The ODS HTML BODY= option specifies the file **`C:\Users\Student1\cert\admit.html`** in the Windows operating environment as the file that contains the PROC PRINT results.

```
ods html body='C:\Users\Student1\cert\admit.html';
proc print data=cert.admit label;
  var sex age height weight actlevel;
  label actlevel='Activity Level';
run;
ods html close;
ods html path="%qsysfunc(pathname(work))";
```

The HTML file admit.html contains the results of all procedure steps between the ODS HTML statement and ODS HTML CLOSE statement.

Output 16.1 *HTML Output*

Obs	Sex	Age	Height	Weight	Activity Level
1	M	27	72	168	HIGH
2	F	34	66	152	HIGH
3	F	31	61	123	LOW
4	F	43	63	137	MOD
5	M	51	71	158	LOW
6	M	29	76	193	HIGH
7	F	32	67	151	MOD
8	M	35	70	173	MOD
9	M	34	73	154	LOW
10	F	49	64	172	LOW
11	F	44	66	140	HIGH
12	F	28	62	118	LOW
13	M	30	69	147	MOD
14	F	40	69	163	HIGH
15	M	47	72	173	MOD
16	M	60	71	191	LOW
17	F	43	65	123	MOD
18	M	25	75	188	HIGH
19	F	22	63	139	LOW
20	F	41	67	141	HIGH
21	M	54	71	183	MOD

Creating HTML Output with a Table of Contents

Overview

The BODY= specification is one way to create an HTML file containing procedure output. To create an HTML file that has a table of contents with links to the output of each specific procedure, specify additional files in the ODS HTML statement.

Syntax, ODS HTML statement to create a linked table of contents:

ODS HTML

BODY=*body-file-specification*

CONTENTS=*contents-file-specification*

FRAME=*frame-file-specification*;

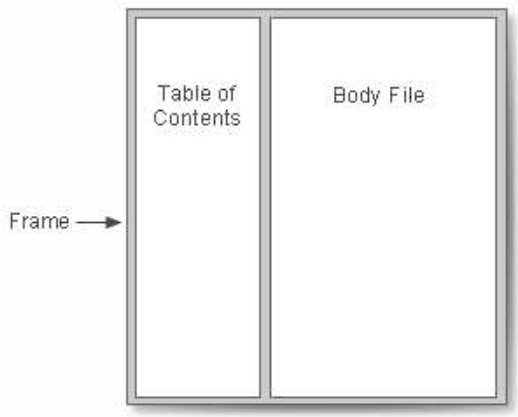
ODS HTML CLOSE;

- *body-file-specification* is the name of an HTML file that contains the procedure output.
- *contents-file-specification* is the name of an HTML file that contains a table of contents with links to the procedure output.
- *frame-file-specification* is the name of an HTML file that integrates the table of contents and the body file. If you specify FRAME=, you must also specify CONTENTS=.

TIP To direct the HTML output to a specific storage location, specify the complete pathname of the HTML file in the *file-specification*.

Here is an example that does the following:

- The BODY= specification creates the file data.html in **`C:\Users\Student1\cert\`** directory. The body file contains the results of the two procedures.
- The CONTENTS= specification creates the file toc.html in the **`C:\Users\Student1\cert\`** directory. The table of contents file has links to each procedure output in the body file.
- The FRAME= specification creates the file frame.html in the **`C:\Users\Student1\cert\`** directory. The frame file integrates the table of contents and the body file.



```
ods html body='C:\Users\Student1\cert\data.html'
  contents='C:\Users\Student1\cert\toc.html'
  frame='C:\Users\Student1\cert\frame.html';
proc print data=cert.admit (obs=10) label;
  var id sex age height weight actlevel;
  label actlevel='Activity Level';
run;
proc print data=cert.stress2 (obs=10);
  var id resthr maxhr rechr;
run;
ods html close;
ods html path="%qsysfunc(pathname(work))";
```

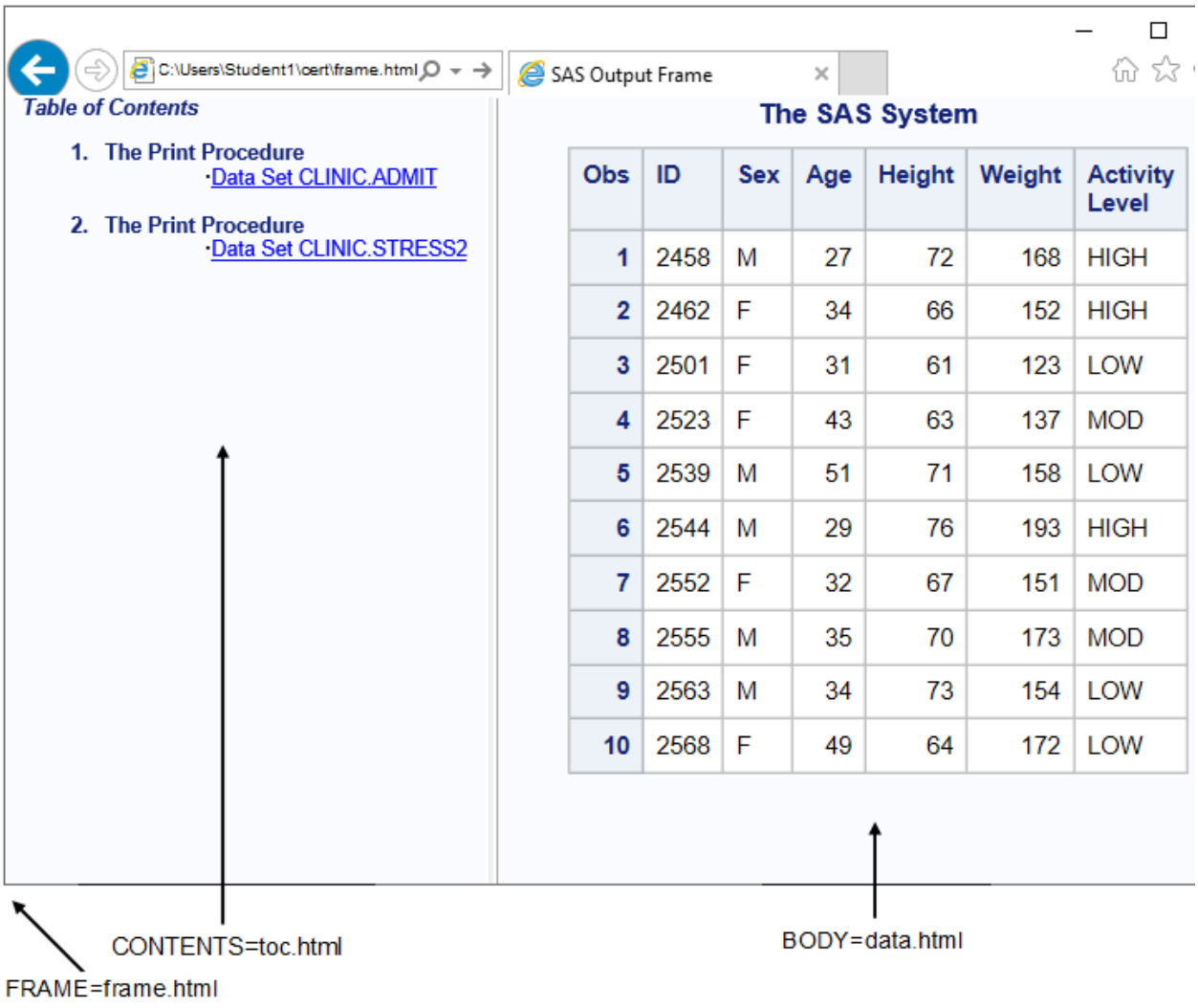
Viewing Frame Files

The Results window does not display links to frame files. In the Windows environment, only the body file automatically appears in the internal browser or your preferred web browser.

To view the frame file that integrates the body file and the table of contents, select **File ⇨ Open** from within the internal browser or your preferred web browser. Then open the frame file that you specified using FRAME=. In the example above, this file is frame.html, which is stored in the Cert directory in the Windows environment.

The frame file, frame.html, is shown below.

Figure 16.2 *Frame File, frame.html (partial output)*



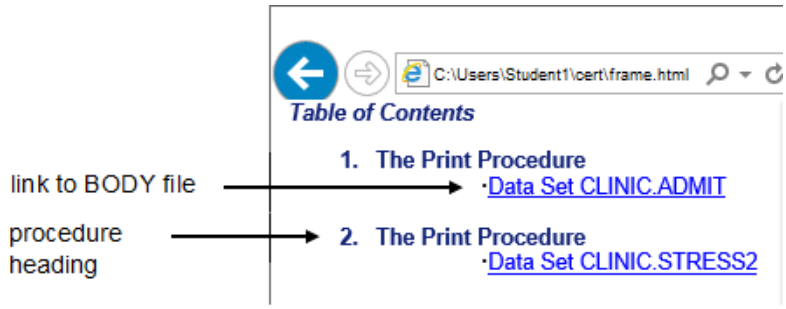
Obs	ID	Sex	Age	Height	Weight	Activity Level
1	2458	M	27	72	168	HIGH
2	2462	F	34	66	152	HIGH
3	2501	F	31	61	123	LOW
4	2523	F	43	63	137	MOD
5	2539	M	51	71	158	LOW
6	2544	M	29	76	193	HIGH
7	2552	F	32	67	151	MOD
8	2555	M	35	70	173	MOD
9	2563	M	34	73	154	LOW
10	2568	F	49	64	172	LOW

Using the Table of Contents

The table of contents that was created by the CONTENTS= option contains a numbered heading for each procedure that creates output. Below each heading is a link to the output for that procedure.

TIP On some browsers, you can select a heading to contract or expand the table of contents.

Figure 16.3 *Table of Contents*



Using Options to Specify Links and Paths

Overview

When ODS generates HTML files for the body, contents, and frame, it also generates links between the files using HTML filenames that you specify in the ODS HTML statement. If you specify complete pathnames, ODS uses those pathnames in the links that it generates.

The following ODS statement creates a frame file that links to **`C:\Users\Student1\cert\toc.html`** and **`C:\Users\Student1\cert\data.html`**, and a contents file that has links to **`C:\Users\Student1\cert\data.html`**.

```
ods html body='C:\Users\Student1\cert\data.html'
         contents='C:\Users\Student1\cert\toc.html'
         frame='C:\Users\Student1\cert\frame.html';
```

A portion of the source code for the HTML file frame.html is shown below. Notice that the links have the complete pathnames from the file specifications for the contents and body files.

Example Code 1 *Source Code for the HTML File Frame.html*

```
<FRAME MARGINWIDTH="4" MARGINHEIGHT="0" SRC="C:\Users\Student1\cert\toc.html"
    NAME="contents" SCROLLING=auto>
<FRAME MARGINWIDTH="9" MARGINHEIGHT="0" SRC="C:\Users\Student1\cert\data.html"
    NAME="body" SCROLLING=auto>
```

These links work when you are viewing the HTML files locally. If you want to place these files on a web server so that others can access them, then the link needs to include either the complete URL for an absolute link or the HTML filename for a relative link.

The URL= Suboption

To provide a URL that ODS uses in all the links that it creates to the file, specify the URL= suboption in the BODY= or CONTENTS= file specification. You can use the

URL= suboption in any ODS file specification except FRAME= (because no ODS file references the frame file).

Syntax, URL= suboption in a file specification:

(**URL= "*Uniform-Resource-Locator*";**

- *Uniform-Resource-Locator* is the name of an HTML file or the full URL of an HTML file. ODS uses this URL instead of the file specification in all the links and references that it creates that point to the file.

TIP The URL= suboption is useful for building HTML files that might be moved from one location to another. If the links from the contents and page files are constructed with a simple URL (one name), they work as long as the contents, page, and body files are all in the same location.

Example: Relative URLs

In this ODS HTML statement, the URL= suboption specifies only the HTML filename. This is the most common style of linking between files because maintenance is easier. The files can be moved as long as they all remain in the same directory or storage location.

```
ods html body='C:\Users\Student1\cert\data.html' (url='data.html')
  contents='C:\Users\Student1\cert\toc.html' (url='toc.html')
  frame='C:\Users\Student1\cert\frame.html';
```

The source code for frame.html has only the HTML filename as specified in the URL= suboptions for the body and contents files.

Example Code 2 *Source Code for the HTML File Frame.html*

```
<FRAME MARGINWIDTH="4" MARGINHEIGHT="0" SRC="toc.html"
    NAME="contents" SCROLLING=auto>
<FRAME MARGINWIDTH="9" MARGINHEIGHT="0" SRC="data.html"
    NAME="body" SCROLLING=auto>
```

Example: Absolute URLs

Alternatively, in this ODS HTML statement, the URL= suboptions specify complete URLs using HTTP. These files can be stored in the same or different locations.

```
ods html body='C:\Users\Student1\cert\data.html'
        (url='http://mysite.com/cert/data.html')
        contents='C:\Users\Student1\cert\toc.html'
        (url='http://mysite.com/cert/toc.html')
        frame='C:\Users\Student1\cert\frame.html';
```

As you would expect, the source code for Frame.html has the entire HTTP addresses that you specified in the URL= suboptions for the body and contents file.

Example Code 3 *Source Code for the HTML File Frame.html*

```
<FRAME MARGINWIDTH="4" MARGINHEIGHT="0" SRC="http://mysite.com/cert/data.html"
    NAME="contents" SCROLLING=auto>
<FRAME MARGINWIDTH="9" MARGINHEIGHT="0" SRC="http://mysite.com/cert/toc.html"
    NAME="body" SCROLLING=auto>
```

TIP When you use the URL= suboption to specify a complete URL, you might need to move your files to that location before you can view them.

The PATH= Option

Use the PATH= option to specify the location of the files.

Syntax, PATH= option with the URL= suboption:

PATH=*file-location-specification*<(URL=NONE | "*Uniform-Resource-Locator*">

- *file-location-specification* identifies the location where you want HTML files to be saved. It can be one of the following:
  - the complete pathname to an aggregate storage location, such as a directory or partitioned data set
  - a fileref (file shortcut) that has been assigned to a storage location
  - a SAS catalog (*libname.catalog*)
- *Uniform-Resource-Locator* provides a URL for links in the HTML files that ODS generates. If you specify the keyword NONE, no information from the PATH= option appears in the links or references.

  If you do not use the URL= suboption, information from the PATH= option is added to links and references in the files that are created.

Note: In the z/OS operating environment, if you store your HTML files as members in a partitioned data set, the PATH=value must be a PDSE, not a PDS. You can allocate a PDSE within SAS as shown in this example:

```
filename pdsehtml '.example.htm'
    dsntype=library dsorg=po
    disp=(new, catlg, delete);
```

You should specify valid member names for the HTML files (without extensions).

Example: PATH= Option with URL=NONE

In the following program, the PATH= option directs the files data.html, toc.html, and frame.html to the **`C:\Users\Student1\cert\`** directory in the Windows operating environment. The links from the frame file to the body and contents files contain only the HTML filenames data.html and toc.html.

```
ods html path='C:\Users\Student1\cert\' (url=none)
  body='data.html'
  contents='toc.html'
  frame='frame.html';
proc print data=cert.admit;
run;
proc print data=cert.stress2;
run;
ods html close;
ods html path="%qsysfunc(pathname(work))";
```

This program generates the same files and links as the previous example in which you learned how to use the URL= suboption with the BODY= and CONTENTS= file specifications. However, it is simpler to specify the path once in the PATH= option and to specify URL=NONE.

TIP If you plan to move your HTML files, you should specify URL=NONE with the PATH= option to prevent information from the PATH= option from creating URLs that are invalid or incorrect.

Example: PATH= Option without the URL= Suboption

In the following program, the PATH= option directs the files data.html, toc.html, and frame.html to the **C:\Users\Student1\cert** directory in the Windows operating environment. The links from the frame file to the body and contents files contain the complete pathnames, **C:\Users\Student1\cert\data.html** and **C:\Users\Student1\cert\toc.html**:

```
ods html path='C:\Users\Student1\cert\'
  body='data.html'
  contents='toc.html'
  frame='frame.html';
proc print data=cert.admit;
run;
proc print data=cert.stress2;
run;
ods html close;
ods html path="%qsysfunc(pathname(work))";
```

Example: PATH= Option with a Specified URL

In the following program, the PATH= option directs the files data.html, toc.html, and frame.html to the **C:\Users\Student1\cert** directory in the Windows operating environment. The links from the frame file to the body and contents files contain the specified URLs, http://mysite.com/cert/data.html, and http://mysite.com/cert/toc.html:

```
ods html path='C:\Users\Student1\cert\ (url='http://mysite.com/cert/')
  body='data.html'
  contents='toc.html'
  frame='frame.html';
proc print data=cert.admit;
run;
proc print data=cert.stress2;
run;
ods html close;
ods html path="%qsysfunc(pathname(work))";
```

Changing the Appearance of HTML Output

Style Templates

You can change the appearance of your HTML output by specifying a style in the STYLE= option in the ODS HTML statement. Here are some of the style templates that are currently available:

- Banker
- BarrettsBlue
- Default
- HTMLblue
- Minimal
- Statistical

TIP To see a list of styles that SAS supplies, submit the following code:

```
proc template;
  list styles/store=sashelp.tmplmst;
run;
```

Syntax, STYLE= option:

STYLE=*style-name*;

- *style-name* is the name of a valid SAS or user-defined style template.

TIP Do not enclose *style-name* in quotation marks.

Example: The STYLE= Option (Banker Style)

In the following program, the STYLE= option applies the Banker style to the output for the PROC PRINT step:

```
ods html body='C:\Users\Student1\cert\data.html'
  style=banker;
proc print data=cert.admit label;
  var sex age height weight actlevel;
run;
ods html close;
ods html path="%qsysfunc(pathname(work))";
```

Figure 16.4 *PROC PRINT Output with Banker Style Applied (partial output)*

Obs	Sex	Age	Height	Weight	ActLevel
1	M	27	72	168	HIGH
2	F	34	66	152	HIGH
3	F	31	61	123	LOW
4	F	43	63	137	MOD
5	M	51	71	158	LOW
6	M	29	76	193	HIGH

Note: Your site might have its own, customized, style templates.

Creating PDF Output with ODS

The ODS PDF Statement

To open, manage, or close the PDF destinations that produce PDF output, use the ODS PDF statement:

Syntax, ODS PDF statement:

ODS PDF <(<ID=>*identifier*)> <*action*>;

- (<ID=>*identifier*) enables you to open multiple instances of the same destination at the same time. Each instance can have different options.
  - *identifier* can be numeric or can be a series of characters that begin with a letter or an underscore. Subsequent characters can include letters, underscores, and numerals.
- *action* can be one of the following:
  - CLOSE action closes the destination and any files that are associated with it.
  - EXCLUDE *exclusions*| ALL | NONE action excludes one or more output objects from the destination.

  Note: The default is NONE. A destination must be open for this action to take effect.
  - SELECT *selections*| ALL | NONE action selects output objects for the specified destination.

  Note: The default is ALL. A destination must be open for this action to take effect.
  - SHOW action writes the current selection list or exclusion list for the destination to the SAS log.

  Note: If the selection or exclusion list is the default list (SELECT ALL), then SHOW also writes the entire selection or exclusion list. The destination must be open for this action to take effect.

In SAS Studio, the PDF destination is open by default. In SAS Studio, you must use the ODS PDF statement with at least one action or option. When you do this, it opens another instance of a PDF destination and creates PDF output.

The ODS Printer Family of Statements

The ODS PDF statement is part of the ODS printer family of statements. Statements in the printer family open the PCL, PDF, PRINTER, or PS destination, producing output that is suitable for a high-resolution printer. The ODS PCL, ODS PRINTER, and ODS PS statements are also members of the ODS printer family of statements.

Opening and Closing the PDF Destination

You can modify an open PDF destination with many ODS PDF options. However, the FILE= and SAS options perform the following actions on an open PDF destination:

- close the open destination referred to in the ODS PDF statement
- close any files associated with the open PDF destination
- open a new instance of the PDF destination

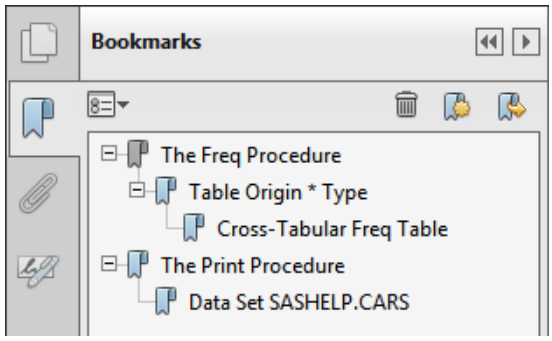
Note: If you use one of these actions, you should explicitly close the destination yourself.

Working with the Table of Contents

The ODS PDF destination provides the following navigation tools:

- The default table of contents (TOC), which is a clickable bookmark tree that is not printed.

Figure 16.5 *PDF Output Default Bookmark Tree*



- A printable table of contents, which is generated using the CONTENTS=YES option in the ODS PDF FILE= statement. The output that is created this way is static and does not count toward the page count of the PDF file. The text "Table of Contents" is customizable using PROC TEMPLATE, and the text of each of the entries is customizable with the ODS PROCLABEL statement and CONTENTS= options in some of the PROC statements.

Figure 16.6 *PDF Output Default Table of Contents Page*

The text displayed by the nodes of each tool is controlled with the following:

- the ODS PROCLABEL statement
- the CONTENTS=, the DESCRIPTION=, and the OBJECTLABEL= options
- the DOCUMENT destination and procedure
- the TEMPLATE procedure

Example: Creating PDF Output Using the FILE= Option

This example opens an instance of the PDF destination to create PDF output. The FILE= option specifies the PDF filename.

```
ods html close;
ods pdf file="SamplePDF";
proc freq data=sashelp.cars;
  tables origin*type;
run;
ods pdf close;
```

Figure 16.7 *PDF Output of FREQ Procedure*

Create a Table of Contents 1

The FREQ Procedure

Frequency Percent Row Pct Col Pct	Table of Origin by Type						
	Type						
Origin	Hybrid	SUV	Sedan	Sports	Truck	Wagon	Total
Asia	3 0.70 1.90 100.00	25 5.84 15.82 41.67	94 21.96 59.49 35.88	17 3.97 10.76 34.69	8 1.87 5.06 33.33	11 2.57 6.96 36.67	158 36.92
Europe	0 0.00 0.00 0.00	10 2.34 8.13 16.67	78 18.22 63.41 29.77	23 5.37 18.70 46.94	0 0.00 0.00 0.00	12 2.80 9.76 40.00	123 28.74
USA	0 0.00 0.00 0.00	25 5.84 17.01 41.67	90 21.03 61.22 34.35	9 2.10 6.12 18.37	16 3.74 10.88 66.67	7 1.64 4.76 23.33	147 34.35
Total	3 0.70	60 14.02	262 61.21	49 11.45	24 5.61	30 7.01	428 100.00

Example: Creating a Printable Table of Contents

By default, ODS PDF does not create a printable table of contents, only a click-able bookmark tree. This example shows you how to create a printable table of contents.

```
ods html close;
title "Create a Table of Contents";
options nodate;
ods pdf file="MyDefaultToc.pdf" contents=yes bookmarklist=hide;
proc freq data=sashelp.cars;
  tables origin*type;
run;
proc print data=sashelp.cars (obs=15);
run;
ods pdf close;
ods html path="%qsysfunc(pathname(work))";
```

The ODS PDF statement uses the following options:

- The FILE= option specifies the PDF filename.
- The CONTENTS=YES option specifies that a table of contents is created.
- The BOOKMARKLIST=HIDE option specifies that a bookmark tree is created, but hidden.

Figure 16.8 *Printable Table of Contents for PDF Output*

Table of Contents

Changing the Appearance of PDF Output

Style Templates

You can change the appearance of your PDF output by specifying a style in the STYLE= option in the ODS PDF statement. The default style for PDF output is Pearl. Here are the style templates that are currently available:

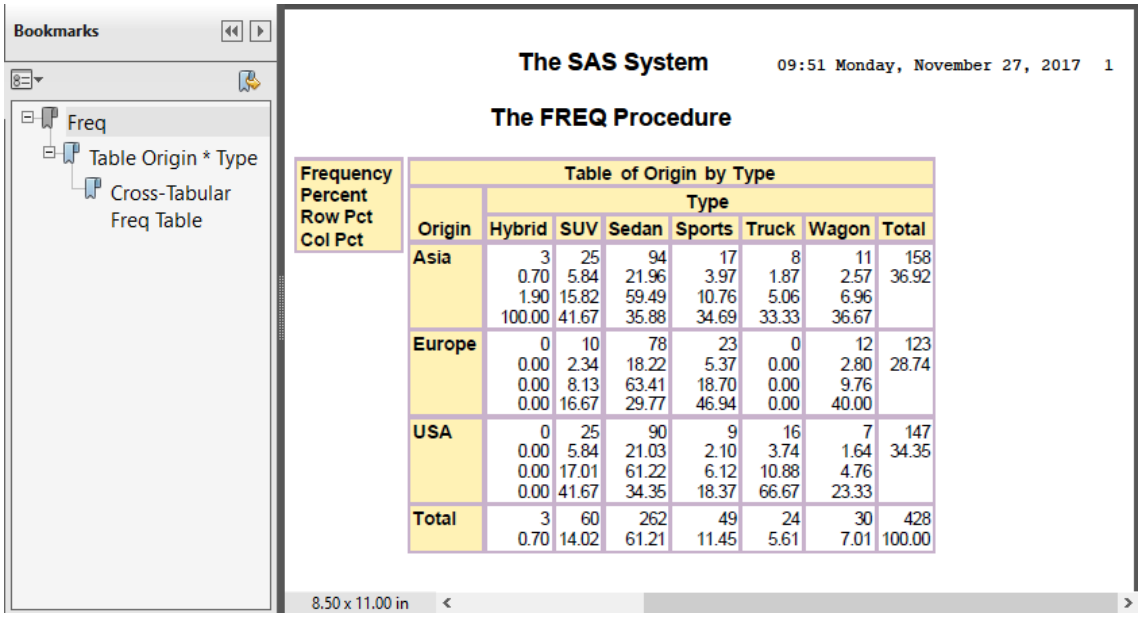
- FancyPrinter
- FestivalPrinter
- GrayscalePrinter
- Journal
- MeadowPrinter
- MonoChromePrinter
- Monospace
- NormalPrinter
- Pearl
- Printer
- Sapphire
- SasDocPrinter
- SeasidePrinter

Example: The STYLE= Option (FestivalPrinter Style)

In the following program, the STYLE= option applies the FestivalPrinter style to the output for the ODS PDF statement:

```
ods html close;
ods pdf file="SamplePDF" style=FestivalPrinter;
proc freq data=sashelp.cars;
  tables origin*type;
run;
ods pdf close;
```

Figure 16.9 *ODS PDF Output with the FestivalPrinter Style Applied*



Creating RTF Output with ODS

The ODS RTF Statement

To open, manage, or close the RTF destinations that produces output that is written in Rich Text Format for use with Microsoft Word, use the ODS RTF statement:

Syntax, ODS RTF statement:

ODS RTF <(<ID=>*identifier*)> <*action*>;

- (<ID=>*identifier*) enables you to open multiple instances of the same destination at the same time. Each instance can have different options.
  - *identifier* can be numeric or can be a series of characters that begin with a letter or an underscore. Subsequent characters can include letters, underscores, and numerals.
- *action* can be one of the following:
  - CLOSE action closes the destination and any files that are associated with it.
  - EXCLUDE *exclusions*| ALL | NONE action excludes one or more output objects from the destination.

  Note: The default is NONE. A destination must be open for this action to take effect.
  - SELECT *selections*| ALL | NONE action selects output objects for the specified destination.

  Note: The default is ALL. A destination must be open for this action to take effect.
  - SHOW action writes the current selection list or exclusion list for the destination to the SAS log.

  Note: If the selection or exclusion list is the default list (SELECT ALL), then SHOW also writes the entire selection or exclusion list. The destination must be open for this action to take effect.

Opening and Closing the RTF Destination

You can modify an open RTF destination with many ODS RTF options. However, the FILE= option performs the following actions on an open RTF destination:

- close the open destination referred to in the ODS RTF statement
- close any files associated with the open RTF destination
- open a new instance of the RTF destination

TIP If you use the FILE= option, you should explicitly close the destination yourself.

Understanding How RTF Formats Output

RTF produces output for Microsoft Word. Although other applications can read RTF files, the RTF output might not work successfully with the other applications.

The RTF destination enables you to view and edit the RTF output. ODS does not define the vertical measurement, which means that SAS does not determine the optimal place to position each item on the page. For example, page breaks are not always fixed because you do not want your RTF output tables to split at inappropriate places when you edit your text. Your tables remain intact on one page, or they break where you specify.

However, Microsoft Word requires the widths of table columns, and Microsoft Word cannot adjust tables if they are too wide for the page. Therefore, ODS measures the width of the text and tables (horizontal measurement). All of the column widths can be set properly by SAS, and the table can be divided into panels if it is too wide to fit on a single page.

In short, when producing RTF output for input to Microsoft Word, SAS determines the horizontal measurement, and Microsoft Word controls the vertical measurement. Because Microsoft Word can determine how much room there is on the page, your tables are displayed consistently even after you modify your RTF file.

Note: Complex tables that contain a large number of observations can reduce system efficiencies and take longer to process.

ODS RTF and Graphics

ODS RTF produces output in rich text format, which supports three formats for graphics that Microsoft Word can read.

Format for Graphics	Corresponding SAS Graphics Driver
emfblips	EMF
pngblips	PNG
jpegblips	JPEG

When you do not specify a target device, the default target is EMF.

Example: Using the STYLE= Option (FestivalPrinter Style)

In the following program, the STYLE= option applies the FestivalPrinter style to the output for the ODS RTF statement:

```
ods html close;
ods rtf file="SampleRTF" style=FestivalPrinter;
proc freq data=sashelp.cars;
  tables origin*type;
run;
ods rtf close;
```

Figure 16.10 *ODS RTF Output with the FestivalPrinter Style Applied*

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The SAS System

The FREQ Procedure

Table of Origin by Type							
Origin	Type						
Frequency Percent Row Pct Col Pct	Hybrid	SUV	Sedan	Sports	Truck	Wagon	Total
Asia	3 0.70 1.90 100.00	25 5.84 15.82 41.67	94 21.96 59.49 35.88	17 3.97 10.76 34.69	8 1.87 5.06 33.33	11 2.57 6.96 36.67	158 36.92
Europe	0 0.00 0.00 0.00	10 2.34 8.13 16.67	78 18.22 63.41 29.77	23 5.37 18.70 46.94	0 0.00 0.00 0.00	12 2.80 9.76 40.00	123 28.74
USA	0 0.00 0.00 0.00	25 5.84 17.01 41.67	90 21.03 61.22 34.35	9 2.10 6.12 18.37	16 3.74 10.88 66.67	7 1.64 4.76 23.33	147 34.35
Total	3 0.70	60 14.02	262 61.21	49 11.45	24 5.61	30 7.01	428 100.00

Creating EXCEL Output with ODS

The ODS EXCEL Statement

To open, manage, or close the Excel destinations that produce Excel spreadsheet files that are compatible with Microsoft 2010 and later versions, use the ODS EXCEL statement:

Syntax, ODS EXCEL statement:

ODS EXCEL <(<ID=>*identifier*)> <*action*>;

ODS EXCEL <(<ID=>*identifier*)> <*option(s)*>;

- (<ID=>*identifier*) enables you to open multiple instances of the same destination at the same time. Each instance can have different options.
  - *identifier* can be numeric or can be a series of characters that begin with a letter or an underscore. Subsequent characters can include letters, underscores, and numerals.
- *action* can be one of the following:
  - CLOSE action closes the destination and any files that are associated with it.
  - EXCLUDE *exclusions*| ALL | NONE action excludes one or more output objects from the destination.

  Note: The default is NONE. A destination must be open for this action to take effect.
  - SELECT *selections*| ALL | NONE action selects output objects for the specified destination.

  Note: The default is ALL. A destination must be open for this action to take effect.
  - SHOW action writes the current selection list or exclusion list for the destination to the SAS log.

  Note: If the selection or exclusion list is the default list (SELECT ALL), then SHOW also writes the entire selection or exclusion list. The destination must be open for this action to take effect.

Details About the Excel ODS Destination

The ODS destination for Excel uses Microsoft Open Office XML Format for Office 2010 and later. This statement produces XML and represents a way to define and format data for easy exchange.

The ODS destination for Excel creates Microsoft spreadsheet in ML XML. Each table is placed in its own worksheet within a workbook. This destination supports ODS styles, trafficlighting, and custom formats. Numbers, currency, and percentages are correctly detected and displayed. Style override, a TAGATTR= style attribute, can be used to create custom formats for the data. By default, titles and footnotes are included in the worksheet, but they are part of the header and footer of the worksheet.

Portrait is the default printing orientation. The orientation can be changed to landscape.

Example: Customizing Your Excel Output

The following example illustrates a customized Excel workbook that contains PROC MEANS output.

```
ods excel file='multitablefinal.xlsx'   /*#1*/
  options (sheet_interval="bygroup"             /*#2*/
    suppress_bylines='yes'                      /*#3*/
    sheet_label='country'                       /*#4*/
    embedded_titles='yes');                     /*#5*/
title 'Wage Rates By Manager';
proc means data=cert.usa;
  by manager;
  var wagerate;
run;
ods excel close;                                /*#6*/
```

1 The ODS EXCEL statement opens an instance of an Excel workbook and creates a new Excel workbook called Multitablefinal.xlsx.

2 The SHEET_INTERVAL= option creates a new worksheet for each BY group.

3 The SUPPRESS_BYLINES= option suppresses the BY lines for each BY group.

4 The SHEET_LABEL= option customizes the worksheet label.

5 The EMBEDDED_TITLES= option embeds the title that is created by the TITLE statement in the output.

6 THE ODS CLOSE statement closes the destination and any associated files.

Figure 16.11 *Customized Excel Output*