

Are You At Odds With ODS?

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Abstract

The introduction of the Output Delivery System (ODS) in the SAS® System version 7 gave programmers a consistent mechanism for formatting output from SAS Procedures and Data steps to printers and HTML. The defaults provided by ODS are more than adequate for formatting simple reports, but are not necessarily ideal for other types of reports, particularly if standards exist for company reporting.

This paper will discuss the different options for customising and standardising ODS-formatted HTML reports, using examples for PROC REPORT, PROC TABULATE and the Data Step.

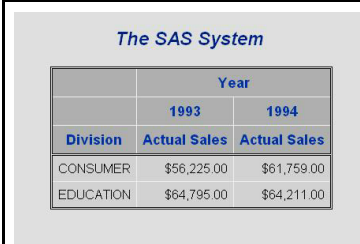
ODS Defaults

The following SAS code demonstrates some of the Style Templates provided with SAS software version 8, and above:

```
%LET style = Default; /* or Theme, D3d, Minimal */
ODS HTML BODY = 'c:\temp\page.htm' STYLE = &style;

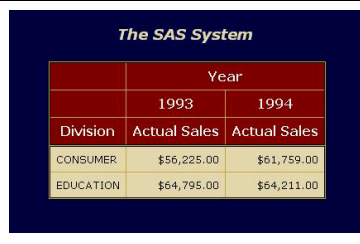
PROC REPORT DATA = sashelp.prdsale (WHERE = (country = 'CANADA')) NOWD;
  COLUMN division year,actual;
  DEFINE division / GROUP;
  DEFINE year / ACROSS;
  DEFINE actual / SUM;
RUN;

ODS HTML CLOSE;
```



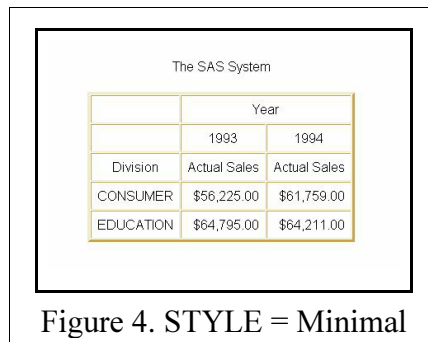
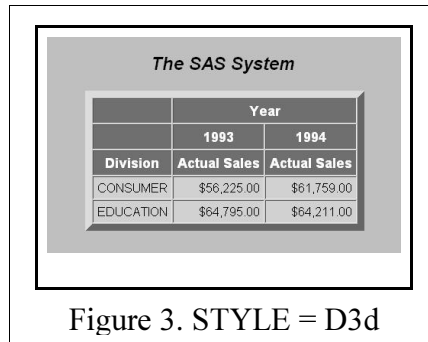
The SAS System		
Division	Year	
	1993	1994
Actual Sales	Actual Sales	Actual Sales
CONSUMER	\$56,225.00	\$61,759.00
EDUCATION	\$64,795.00	\$64,211.00

Figure 1. STYLE = Default



The SAS System		
Division	Year	
	1993	1994
Actual Sales	Actual Sales	Actual Sales
CONSUMER	\$56,225.00	\$61,759.00
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Figure 2. STYLE = Theme



ODS HTML Options

By default all filenames are relative to the current working directory, and any links created will have full paths. To change this behaviour, so that filenames are in a specified folder and links are relative to the web page, use the following ODS HTML statement option, PATH=, e.g.:

```
PATH = 'c:\temp' (URL = NONE)
```

The BODY= (or the equivalent FILE=) option is required to define where the generated HTML will be written. The location can be either a filename, e.g.:

```
BODY = 'page.htm'
```

or a file reference from a FILENAME statement, e.g.:

```
BODY = fileref
```

To remove the default web page title of 'SAS Output' use the TITLE= option:

```
BODY = 'page.htm' (TITLE = ' ')
```

Customising Reports from PROC REPORT

The general customisation of the appearance of report generated using PROC REPORT only requires STYLE= options on the PROC statement. More specific formatting of individual data columns, or even data items, can be achieved using STYLE= options on the other statements, e.g. DEFINE, BREAK, RBREAK, or COMPUTE. The STYLE= options can be applied to different parts of the report by using the form STYLE(XXX)=, where XXX is:

- Column = data cells.
- Header = column headers.
- Summary = summary data items.
- Lines = COMPUTE, BREAK or RBREAK LINES statement text.
- Calldef = CALL DEFINE statements.

For example:

```
PROC REPORT DATA = sashelp.prdsale NOWD
  STYLE(COLUMN CALLDEF) = [FOREGROUND = black BACKGROUND = white
    FONT_STYLE = roman FONT_SIZE = 10pt]
  STYLE(HEADER) = [FOREGROUND = black BACKGROUND = yellow
    FONT_WEIGHT = bold FONT_STYLE = roman FONT_SIZE = 12pt]
  STYLE(SUMMARY LINES) = [FOREGROUND = black BACKGROUND = white
    FONT_WEIGHT = bold FONT_STYLE = roman FONT_SIZE = 10pt];
  TITLE 'Sales Report (REPORT)';
  COLUMNS year country,actual;
  DEFINE year / GROUP STYLE = [FOREGROUND = black BACKGROUND = yellow
    FONT_WEIGHT = bold FONT_STYLE = roman FONT_SIZE = 12pt];
  DEFINE country / ACROSS;
  DEFINE actual / SUM;
  RBREAK AFTER / SUMMARIZE;
RUN;
```

Sales Report (REPORT)

	Country		
	CANADA	GERMANY	U.S.A.
Year	Actual Sales	Actual Sales	Actual Sales
1993	\$121,020.00	\$127,404.00	\$121,053.00
1994	\$125,970.00	\$118,594.00	\$116,296.00
	\$246,990.00	\$245,998.00	\$237,349.00

Customising Reports from PROC TABULATE

The general customisation of the appearance of report generated using PROC TABULATE only requires STYLE= options on the PROC statement. More specific formatting of individual data columns, or even data items, can be achieved using STYLE= options on the other statements:

- Class = column data label text.
- Classlev = column data items.
- Keyword = summary data label text.
- Var = analysis data label text.
- Table = analysis data items and other table-related characteristics, such as empty cells and cell borders.

For example:

```
PROC TABULATE DATA = sashelp.prdsale STYLE = [FOREGROUND = black
    BACKGROUND = white FONT_STYLE = roman FONT_SIZE = 10pt];
    TITLE 'Sales Report (TABULATE)';
    CLASS year country / STYLE = [FOREGROUND = black BACKGROUND = yellow];
    CLASSLEV year country / style = [FOREGROUND = black
        BACKGROUND = yellow];
    KEYWORD ALL SUM / STYLE = [FOREGROUND = black BACKGROUND = yellow];
    KEYLABEL ALL = ' ' SUM = ' ';
    VAR actual / STYLE = [FOREGROUND = black BACKGROUND = yellow];
    TABLE (year ALL * [STYLE = [FOREGROUND = black BACKGROUND = white
        FONT_WEIGHT = bold FONT_SIZE = 10pt]] ,
        country * actual * F = dollar12.2 /
        BOX = [STYLE = [FOREGROUND = black BACKGROUND = yellow]] ;
RUN;
```

Sales Report (TABULATE)			
	Country		
	CANADA	GERMANY	U.S.A.
	Actual Sales	Actual Sales	Actual Sales
Year			
1993	\$121,020.00	\$127,404.00	\$121,053.00
1994	\$125,970.00	\$118,594.00	\$116,296.00
	\$246,990.00	\$245,998.00	\$237,349.00

Customising Reports from PROC PRINT

The following customisation functionality was only introduced in SAS version 8.2. The areas of the report that can be customised are more limited. Most commonly changed are the data columns and column headers, although, by default, the summary data lines will be formatted in the same way as the column headers, e.g.:

```
PROC PRINT DATA = sashelp.prdsale (WHERE = (product = 'CHAIR' AND
country = 'CANADA' AND year = 1994 AND quarter = 1)) NOOBS
STYLE(HEADER) = [FOREGROUND = black BACKGROUND = yellow
FONT_WEIGHT = bold FONT_STYLE = roman FONT_SIZE = 12pt];
TITLE 'Sales Report (PRINT)';
VAR year country actual / STYLE = [FOREGROUND = black
BACKGROUND = white FONT_STYLE = roman FONT_SIZE = 10pt];
SUM actual / STYLE = [FOREGROUND = black BACKGROUND = white
FONT_WEIGHT = bold FONT_STYLE = roman FONT_SIZE = 10pt];
RUN;
```

Customising Reports from Data Steps

The ODS features associated with the Data Step only create simple tables. The ODS options on the FILE statement allow the selection of the report columns and any style customisation. The PUT _ODS_ statement generates the report itself.

For example:

```
DATA _NULL_;
SET sashelp.prdsale (WHERE = (product = 'CHAIR' AND country = 'CANADA'
AND year = 1994 AND quarter = 1));
TITLE 'Sales Report (DATA)';
FILE PRINT ODS = (VARIABLES = (year country actual));
PUT _ODS_;
RUN;
```

Year	Country	Actual Sales
1994	CANADA	\$877.00
1994	CANADA	\$845.00
1994	CANADA	\$425.00
1994	CANADA	\$641.00
1994	CANADA	\$992.00
1994	CANADA	\$202.00
1994	CANADA	\$786.00
1994	CANADA	\$160.00
1994	CANADA	\$199.00
1994	CANADA	\$88.00
1994	CANADA	\$746.00
1994	CANADA	\$927.00

Standardising with PROC TEMPLATE

Adding STYLE= options to PROC and Data Step statements will allow you to customise your HTML reports, but it will have to be done every time the report is generated. PROC TEMPLATE can be used to create a new ODS style, or modify a style that already exists, so that this ODS style can then be used to perform your customisations for every report automatically.

The following entries in PROC TEMPLATE are used to customise specific sections of reports from Data Steps, and PROCs PRINT, REPORT and TABULATE:

- Body = the whole HTML page area.
- SysTitleAndFooterContainer = the report area within the HTML page.
- SystemTitle = the report title text.
- Table = the default report text.
- Data = the report data items.
- Header = the report column headers, and also the summary data lines in PROC PRINT.
- DataEmphasis = PROC REPORT summary data lines.
- RowHeader = PROC TABULATE row titles and data.

For example:

```
PROC TEMPLATE;
  DEFINE STYLE htmlstyle;
  PARENT = styles.default;
  STYLE table FROM table / FOREGROUND = black BACKGROUND = white
    FONT_SIZE = 10pt FONT_STYLE = roman;
  STYLE data FROM data / FOREGROUND = black BACKGROUND = white
    FONT_SIZE = 10pt FONT_STYLE = roman;
  STYLE header FROM header / FOREGROUND = black BACKGROUND = yellow
    FONT_SIZE = 12pt FONT_WEIGHT = bold;
  STYLE rowheader FROM rowheader / FOREGROUND = black
    BACKGROUND = yellow FONT_SIZE = 12pt FONT_WEIGHT = bold;
  STYLE dataemphasis FROM dataemphasis / FOREGROUND = black
    BACKGROUND = white FONT_SIZE = 10pt FONT_STYLE = roman
    FONT_WEIGHT = bold;
END;
RUN;
```

Using your own CSS Stylesheets

This feature was introduced as ‘experimental’ in SAS version 8.0, but appears to be ‘production’ in 8.1 and 8.2, and it works very well!

The following code will create an HTML cascading stylesheet (CSS) called stylesheet.css, from the ODS style ‘HTMLStyle’:

```
ODS HTML BODY = "page.htm"
  STYLESHEET = "stylesheet.css" (URL = "stylesheet.css")
  STYLE = HTMLStyle;
```

The following code will not create a stylesheet, but will use an existing stylesheet, stylesheet.css, instead of the default ODS style:

```
ODS HTML BODY = "page.htm" STYLESET = (URL = "stylesheet.css");
```

Adding Hyperlinks to Data Items

Data displayed in reports can be treated as plain data, or enhanced with HTML. For example:

```
DATA dsn2;
  SET dsn;
  value1nk = "<A HREF=' " !! TRIM(value) !! ".html'>" !! Value !! '</A>';
RUN;
```

Having added the enhancements to the data values the default action of PROC REPORT is to convert special characters, such as '&', '<' and '>', to '&', '<,' and '>'. To prevent this conversion, use the STYLE= option PROTECTSPECIALCHARS = NO, e.g.:

```
PROC REPORT DATA = dsn2 NOWD SPLIT = ' '
  STYLE (COLUMN) = [PROTECTSPECIALCHARS = NO];
```

Including your own HTML

The BODY= options NO_TOP_MATTER and NO_BOTTOM_MATTER can be used to help insert your own HTML wherever you want. 'Top matter' is the HTML header section and the start of the body of the web page. 'Bottom matter' is the end of the body of the web page. For example:

```
FILENAME htmlfile 'page.htm';

ODS HTML BODY = htmlfile (NO_BOTTOM_MATTER);
....
ODS HTML CLOSE;

FILENAME htmlfile 'page.htm' MOD;

DATA _NULL_;
  FILE htmlfile;
  PUT '<P>This adds more HTML';
  PUT '<HR>';
  STOP;
RUN;

ODS HTML BODY = htmlfile (NO_TOP_MATTER);
....
ODS HTML CLOSE;

FILENAME htmlfile CLEAR;
```

Using the ODS HTML Names

By default ODS creates internal links before each PROC's HTML output with the prefix 'IDX', i.e. IDX, IDX1, IDX2, etc. If you know how many outputs will be in the page, then you can create your own contents table, e.g.:

```
DATA _NULL_;
  FILE htmlfile;
  PUT '<TABLE BORDER=0>' ;
  PUT '<TR><TD><A HREF="#IDX">Report 1</A></TD></TR>' ;
  PUT '<TR><TD><A HREF="#IDX1">Report 2</A></TD></TR>' ;
  PUT '<TR><TD><A HREF="#IDX2">Report 3</A></TD></TR>' ;
  PUT '</TABLE>' ;
  STOP;
  RUN;
```

Putting It All Together

To illustrate what can be achieved using these techniques, the SAS code below will generate a web page for a fictitious consultants list. For ease of coding the web page title, and HTML and CSS filenames are stored in SAS macro variables:

```
%LET groupname = Independent Consultants List;
%LET htmlname = c:\temp\consultants.htm;
%LET css = stylesheet.css;
FILENAME htmlfile "&htmlname";
TITLE;
```

The skills information to be displayed comes from simple SAS dataset with a single record for each consultant:

```
DATA sasuser.consultants (KEEP = email name surname e_name base macro
  sql fsp af eis graph stat access ereporter eguide ntserver
  unixserver intrnet webeis webaf);
  INFILE DATALINES4 TRUNCOVER DSD DLM=' , ' ;
  LENGTH email name surname $50
         e_name $120
         base macro sql fsp af eis graph stat access ereporter eguide
         ntserver unixserver intrnet webeis webaf $1
  ;
  LABEL name = "Member's Name"
        e_name = "Member's Name"
        surname = 'Surname'
        email = 'Email Address'
        base = 'Base'
        macro = 'Macro'
        sql = 'SQL'
        fsp = 'FSP'
        af = 'AF Frame'
        eis = 'EIS'
        graph = 'Graph'
        stat = 'Stat'
        access = 'Access'
        ereporter = 'Enterprise Reporter'
        eguide = 'Enterprise Guide'
        ntserver = 'NT Server'
```

```

        unixserver = 'UNIX Server'
        intrnet = 'IntrNet'
        webeis = 'webEIS'
        webaf = 'webAF'
    ;
INPUT email name;
INPUT base macro sql fsp af eis graph stat access;
INPUT ereporter eguide ntserver unixserver intrnet webeis webaf;
surname = SCAN(name, 2, ' ');
e_name = "<A HREF='mailto:" !! TRIM(email) !! "?subject=&groupname'"
        !! TRIM(name) !! '</A>';
    DATALINES4;
phil.holland@bcs.org.uk,Phil Holland
5,5,5,4,5,4,5,3,5
4,4,4,4,2,2,2
    ;
    ;
    ;
    ;
    RUN;

```

The new HTML file is initialised by generating the web page header using ODS, remembering to use the NO_BOTTOM_MATTER option, otherwise the web page will end before any data has been included:

```

ODS HTML BODY = htmlfile (NO_BOTTOM_MATTER TITLE = "&groupname")
    STYLE SHEET = (URL = "&css");

ODS HTML CLOSE;

```

Having generated the header the HTML file is reopened in append mode to allow more HTML to be added at the end of the file, starting with the Introduction and the Table of Contents:

```

FILENAME htmlfile "&htmlname" MOD;

DATA _NULL_;
FILE htmlfile;
PUT '<H2>';
PUT "&groupname";
PUT '</H2>';
PUT '<P>';
PUT '<HR>';
PUT '<P>';
PUT "The &groupname is a group of independent";
PUT 'consultants, who work';
PUT 'together to benefit each other. The following skills matrices
    list the skills';
PUT 'used in contracts undertaken by those consultants. To send an
    email to one';
PUT "of the consultants listed below just click on the Member's Name
    and complete";
PUT 'the message section.';
PUT '<HR>';
PUT '<P>Contents:';
PUT '<P><SL>';
PUT "<LI><A HREF='#IDX'>Skills matrix (part 1) - Core</A>";
PUT "<LI><A HREF='#IDX1'>Skills matrix (part 2) - Analysis</A>";
PUT '</SL>';
PUT '<P>Key:<BR>';

```

```

PUT '5=Expert, 4=Good, 3=Capable, 2=Some&nbsp;knowledge,
    *=no&nbsp;information.';
PUT '<HR>';
STOP;
RUN;

```

The ODS statement is used next to direct the output from PROC REPORT to the HTML file. Note the use of NO_TOP_MATTER, as the web page has already been started, NO_BOTTOM_MATTER, as more information will be added after the output from PROC REPORT, and STYLESHEET, as the style has been previously stored in a CSS file:

```

ODS HTML BODY = htmlfile (NO_TOP_MATTER NO_BOTTOM_MATTER)
    STYLESHEET = (URL = "&css");

```

The PROC REPORT options are the same for both reports: NOWD to run the procedure in batch mode, SPLIT to select the character used to split the column labels, and STYLE to make certain the HTML around the email address in the 'name' column data is included correctly.

```

PROC REPORT DATA = sasuser.consultants NOWD SPLIT = ' '
    STYLE(COLUMN) = [PROTECTSPECIALCHARS = NO];
TITLE "Skills matrix for the &groupname (part 1):";
COLUMNS surname e_name base macro sql fsp af eis graph stat access;
DEFINE surname / ORDER NOPRINT;
DEFINE e_name / ORDER;
DEFINE base / DISPLAY CENTER;
DEFINE macro / DISPLAY CENTER;
DEFINE sql / DISPLAY CENTER;
DEFINE fsp / DISPLAY CENTER;
DEFINE af / DISPLAY CENTER;
DEFINE eis / DISPLAY CENTER;
DEFINE graph / DISPLAY CENTER;
DEFINE stat / DISPLAY CENTER;
DEFINE access / DISPLAY CENTER;
RUN;

PROC REPORT DATA = sasuser.consultants NOWD SPLIT = ' '
    STYLE(COLUMN) = [PROTECTSPECIALCHARS = NO];
TITLE "Skills matrix for the &groupname (part 2):";
COLUMNS surname e_name ereporter eguide ntserver unixserver intrnet
    webeis webaf;
DEFINE surname / ORDER NOPRINT;
DEFINE e_name / ORDER;
DEFINE ereporter / DISPLAY CENTER;
DEFINE eguide / DISPLAY CENTER;
DEFINE ntserver / DISPLAY CENTER;
DEFINE unixserver / DISPLAY CENTER;
DEFINE intrnet / DISPLAY CENTER;
DEFINE webeis / DISPLAY CENTER;
DEFINE webaf / DISPLAY CENTER;
RUN;

ODS HTML CLOSE;

```

The final disclaimer paragraph is added after the ODS section has been closed:

```
DATA _NULL_;
FILE htmlfile;
PUT '<P>';
PUT '<HR>';
PUT '<P>';
PUT 'Note the information given above should be verified with the
    individual';
PUT 'consultants.<BR>';
PUT 'The maintainer of the tables is not liable for any errors or
    omissions.';
STOP;
RUN;
```

The HTML file is completed by generating the web page terminators using ODS, remembering to use the NO_TOP_MATTER option, otherwise a new empty web page will be created instead:

```
ODS HTML BODY = htmlfile (NO_TOP_MATTER) STYLE SHEET = (URL = "&css");

ODS HTML CLOSE;
```

To complete the coding the web page uses a CSS file, stylesheet.css, which is given below:

```
.table{
Font-Family: Arial, Helvetica, Helv;
Font-Size:10pt;
Font-weight:normal;
Font-style:normal;
Color:#000000;
BackGround-Color:#FFFFFF;
Border:1px outset #000000;
}
.SysTitleAndFooterContainer{
Font-Family: Arial, Helvetica, Helv;
Font-Size:small;
Font-weight:normal;
Font-style:normal;
Color:#002288;
BackGround-Color:#E0E0E0;
Border:0;
Width:100%;
}
.data{
Font-Family: Arial, Helvetica, Helv;
Font-Size:10pt;
Font-weight:normal;
Font-style:normal;
Color:#000000;
BackGround-Color:#FFFFFF;
Text-align: left;
}
TD{
Font-Family: Arial, Helvetica, Helv;
Font-Size:10pt;
Font-weight:normal;
```

```

Font-style:normal;
Color:#000000;
BackGround-Color:#FFFFFF;
Text-align: right;
}
.Body{
Font-Family: Arial, Helvetica, Helv;
Font-Size:small;
Font-weight:normal;
Font-style:normal;
Color:#002288;
BackGround-Color:#E0E0E0;
Margin-Left:8px;
Margin-Right:8px;
}
.SystemTitle{
Font-Family: Arial, Helvetica, Helv;
Font-Size:large;
Font-weight:bold;
Font-style:italic;
Color:#002288;
BackGround-Color:#E0E0E0;
}
.rowheader{
Font-Family: Arial, Helvetica, Helv;
Font-Size:12pt;
Font-weight:bold;
Font-style:normal;
Color:#000000;
BackGround-Color:#FFFF00;
}
.dataemphasis{
Font-Family: Arial, Helvetica, Helv;
Font-Size:10pt;
Font-weight:bold;
Font-style:normal;
Color:#000000;
BackGround-Color:#FFFFFF;
}
.header{
Font-Family: Arial, Helvetica, Helv;
Font-Size:12pt;
Font-weight:bold;
Font-style:normal;
Color:#000000;
BackGround-Color:#FFFF00;
}

```

The generated web page will look like this:

Independent Consultants List

The Independent Consultants List is a group of independent consultants, who work together to benefit each other. The following skills matrices list the skills used in contracts undertaken by those consultants. To send an email to one of the consultants listed below just click on the Member's Name and complete the message section.

Contents:

- [Skills matrix \(part 1\) - Core](#)
- [Skills matrix \(part 2\) - Analysis](#)

Key:
5=Expert, 4=Good, 3=Capable, 2=Some knowledge, *=no information.

Skills matrix for the Independent Consultants List (part 1):

Member's Name	Base	Macro	SQL	FSP	AF Frame	EIS	Graph	Stat	Access
Phil Holland	5	5	5	4	5	4	5	3	5

Skills matrix for the Independent Consultants List (part 2):

Member's Name	Enterprise Reporter	Enterprise Guide	NT Server	UNIX Server	IntrNet	webEIS	webAF
Phil Holland	4	4	4	4	2	2	2

References

- 'The Complete Guide to the SAS Output Delivery System', SAS OnlineDoc V8
- 'ODS for PRINT, REPORT and TABULATE', Lauren Haworth, SUGI 26, <http://www2.sas.com/proceedings/sugi26/p003-26.pdf>

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Copies of the code used in the paper can be found on the web site given above.

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