

SAS® Code to Make Excel Files Section 508 Compliant

Christopher J. Boniface, U.S. Bureau of the Census;

Nora Szeto U.S. Bureau of the Census;

Hung Pham, U.S. Bureau of the Census

ABSTRACT

Can you create hundreds of great looking excel tables all within SAS® and make them all Section 508 compliant at the same time? This paper will examine how to use ODS TAGSETS EXCELXP and other BASE SAS® features to create fantastic looking excel worksheet tables that are all Section 508 compliant. This paper will demonstrate that there is no need for any outside intervention or pre or post-meddling with the excel files to make them Section 508 compliant. We do all with simple BASE SAS® code.

INTRODUCTION

Section 508 requires that federal agencies make online information and services fully available to the approximately 54 million Americans who have vision disabilities, many of whom cannot access information that is not Section 508 compliant. Those with vision disabilities use assisted devices called screen readers to read the contents of the screen or website to them. This paper shows how the U.S. Bureau of the Census created hundreds of Excel tables to be published on its website for its 2012 Annual Social and Economic Supplement (ASEC) to the Current Population Survey (CPS) Poverty report and made all of them Section 508 compliant. The excel tables can be found at <http://www.census.gov/hhes/www/cpstables/032012/pov/toc.htm>

It will show that no pre or post-processing was done to the excel files. No empty excel shells were created first and made Section 508 compliant and later filled with data via Dynamic Data Exchange (DDE) or other post-processing methods. Rather, we create hundreds of section 508 Excel files using simple BASE SAS® code. We examine which parts of any Excel table need to be made 508 compliant, including cell A1, rows with indentation, and footnote links. Moreover, we review how we create the excel files with ODS TAGSETS.EXCELXP. Additionally, we reveal a few ODS tricks with style in PROC FORMAT, title and footnote statements to make the Excel tables Section 508 compliant.

WHAT IS SECTION 508 COMPLIANCE?

Section 508 requires that federal agencies make online information and services fully available to the approximately 54 million Americans who have vision disabilities, many of whom cannot access information that is not Section 508 compliant. For HTML or Excel files, the data must be readable for both those with or without disabilities. This sounds difficult at first with possible pre or post-processing to accomplish it. However, after closer examination, it is not nearly as difficult and all is possible within BASE SAS® code.

SAS® Code to Make Excel Files Section 508 Compliant

The first thing that we need to do in our SAS® code to make our Excel file Section 508 compliant is to insert a new row at cell A1 of the Excel file. This new row in cell A1 needs to contain a description of the Excel table listing the location of all column and row headers for all sub-tables in the Excel file. We can do this by using a title1 statement in our SAS® program. However, we need to make this row invisible or unseen by those without a vision disability. To do this we can change the color of the text in our title1 statement to white on a white background.

```
title1 j=left color=white "Table with row headers in column A and column headers  
in rows 9 through 10, 26 through 27, 43 through 44 and 60 through 61";
```

POV01_50_1 - Microsoft Excel

File Home Insert Page Layout Formulas Data Review View Add-Ins

A9 Table with row headers in column A and column headers in rows 9 through 10, 26 through 27, 43 through 44, and 60 through 61

	A	B	C	D	E	F	G	H	I	J	K	L
2	POV01: Age and Sex of All People, Family Members and Unrelated Individuals Iterated by Income-to-Poverty Ratio and Race: 2011											
3	Below 50% of Poverty -- All Races											
4	For information on confidentiality protection, sampling error, nonsampling error, and definitions, see www.census.gov/aprd/techdoc/cps/cpsmar12.pdf											
5	Source: U.S. Census Bureau, Current Population Survey, 2012 Annual Social and Economic Supplement.											
6	(Numbers in thousands)											
7												
8	All Races											
9		All people (1)			People in families (2)			People in unrelated subfamilies (3)			Unrelated individuals	
10	All Races Below 50%	All income levels	Below 50% of poverty (5)	Percentage below 50% of poverty (6)	All income levels	Below 50% of poverty (5)	Percentage below 50% of poverty (6)	All income levels	Below 50% of poverty (5)	Percentage below 50% of poverty (6)	All income levels	Below 50% of poverty (5)
11	Total (1)	308,456	20,356	6.6	252,316	13,763	5.5	1,623	442	27.2	54,517	6,151
12	Under 18 years	73,737	7,252	9.8	72,762	6,875	9.4	846	259	30.6	129	119
13	Under 5 years (1)	19,970	2,449	12.3	19,735	2,359	12.0	235	90	38.2	(N/A)	(N/A)
14	5 to 17 years	53,766	4,803	8.9	53,027	4,516	8.5	610	169	27.7	129	119
15	18 to 64 years	193,213	12,164	6.3	151,083	6,433	4.3	759	179	23.6	41,371	5,552
16	18 to 24 years	30,140	3,187	10.6	23,822	1,486	6.2	122	46	37.5	6,196	1,655
17	25 to 34 years	41,219	3,174	7.7	30,101	1,821	6.0	312	80	25.5	10,806	1,273
18	35 to 44 years	39,927	2,109	5.3	33,043	1,339	4.1	192	41	21.5	6,693	729
19	45 to 54 years	43,955	2,016	4.6	35,190	977	2.8	101	11	10.6	8,664	1,028
20	55 to 59 years	20,470	915	4.5	15,823	401	2.5	23	2	(B)	4,624	512
21	60 to 64 years	17,501	763	4.4	13,104	410	3.1	9	0	(B)	4,388	354
22	65 years and over	41,507	940	2.3	28,472	455	1.6	18	4	(B)	13,017	481
23	65 to 74 years	23,383	457	2.0	17,393	230	1.3	15	4	(B)	5,976	223
24	75 years and over	18,123	483	2.7	11,079	225	2.0	4	0	(B)	7,041	257

POV01

Ready Count: 75 100%

Display 1. Excel Table with a Table Description in cell A1

Cell A1 is hidden in Display 1. However, when placing the cursor on cell A1, the contents are revealed in the display box at the top of the screen under the "Page Layout" pull-down menu and above column B. The screen reader will pick up this title in cell A1 with the description of the table. For those with disabilities, they will know where the row and column headers of each sub-table are located in the Excel file. For those without disabilities, cell A1 will go unnoticed because we changed the color to white. Essentially, the color is "white on white" and cell A1 appears invisible to the naked eye.

Next, we need to alter all rows that are indented. In each of our ASEC Poverty tables, we have several rows that are indented. Screen readers cannot read indents or blank spaces. Thus, we need to add "white dots" to each row header that has indentation. We will have to add one white dot for each space or indent.

```
proc format;
value agef (notsorted multilabel)
0-17      = '~S={foreground=white}...~S={}Under 18 years'
0-4       = '~S={foreground=white}...~S={}Under 5 years (1)'
5-17      = '~S={foreground=white}...~S={}5 to 17 years'
18-64     = '~S={foreground=white}...~S={}18 to 64 years'
18-24     = '~S={foreground=white}...~S={}18 to 24 years'
25-34     = '~S={foreground=white}...~S={}25 to 34 years'
35-44     = '~S={foreground=white}...~S={}35 to 44 years'
45-54     = '~S={foreground=white}...~S={}45 to 54 years'
55-59     = '~S={foreground=white}...~S={}55 to 59 years'
60-64     = '~S={foreground=white}...~S={}60 to 64 years'
65-high   = '~S={foreground=white}...~S={}65 years and over'
65-74     = '~S={foreground=white}...~S={}65 to 74 years'
75-high   = '~S={foreground=white}...~S={}75 years and over'
```

```
run;
```

Notice the use of style elements in the PROC FORMAT. We change the color of the format to white by using the foreground style and changing its value to white. We then add periods or dots for each space of indentation that is necessary for that row header value. We then close out the style and thus, change the foreground color back to black. Black is the default foreground color. Thus, only the dots are color white. The rest of the row header is black. Thus, the white dots are unseen by those without disabilities. They appear as blank spaces to the naked eye. However, for those with disabilities the screen reader picks up the dots. The screen reader alerts the user to the indentation. The user with the vision disability knows that this is a row header with indentation. Display 2 shows no dots or periods in cell A13. However, we see the "white dots" in the display box at the top of the screen below the "Page Layout" pull-down menu and above column B.

POV01_50_1 - Microsoft Excel									
File Home Insert Page Layout Formulas Data Review View Add-Ins									
A13 ...Under 5 years (1)									
	A	B	C	D	E	F	G	H	I
6	(Numbers in thousands)								
7									
8	All Races								
9		All people (1)			People in families (2)			People in unrelated s	
10		All Races Below 50%	All income levels	Below 50% of poverty (5)	Percentage below 50% of poverty (6)	All income levels	Below 50% of poverty (5)	Percentage below 50% of poverty (6)	All income levels
11	Total (1)		308,456	20,356	6.6	252,316	13,763	5.5	1,623
12	Under 18 years		73,737	7,252	9.8	72,762	6,875	9.4	846
13	Under 5 years (1)		19,970	2,449	12.3	19,735	2,359	12.0	235
14	5 to 17 years		53,766	4,803	8.9	53,027	4,516	8.5	610
15	18 to 64 years		193,213	12,164	6.3	151,083	6,433	4.3	759
16	18 to 24 years		30,140	3,187	10.6	23,822	1,486	6.2	122
17	25 to 34 years		41,219	3,174	7.7	30,101	1,821	6.0	312
18	35 to 44 years		39,927	2,109	5.3	33,043	1,339	4.1	192
19	45 to 54 years		43,955	2,016	4.6	35,190	977	2.8	101
20	55 to 59 years		20,470	915	4.5	15,823	401	2.5	23
21	60 to 64 years		17,501	763	4.4	13,104	410	3.1	9

Display 2. Excel Table with "White Dots" for the rows with indentation

Our ASEC Poverty tables have footnote links at the bottom of each table. We need to identify and label these for the screen reader. To identify the footnote link, we add a row above the link to alert the screen reader to the footnote link in the next row. The description in this row needs to identify the row number and column header of the footnote link.

```
%if &i=4 %then %do; /* There are 4 sub-tables in the Excel worksheet */
footnote1 j=1 color=white h=9pt "A website link to the footnote descriptions is in
row 75, column A";
footnote2 j=1 h=9pt underlin=1
link="http://www.census.gov/hhes/www/cpstables/03&marchcps./povnotes.htm" "Poverty
Footnotes";
%end;
```

In the code above, the footnote1 statement contains the description and location of the footnote link. Notice that we change the color of the text to white, so that it is unseen by the naked eye. However, the screen reader will read this text and alert the user with a vision disability to a footnote link in row 75, column A of the table. The footnote2 statement contains the actual footnote link with the appropriate URL address.

Hundreds of Section 508 Excel Files

We exploit ODS TAGSETS EXCELXP to create the excel files. We wrap the ODS TAGSETS EXCELXP in a macro loop to create multiple excel files. We utilize several ExcelXP Tagset options to get the table to look exactly the way we want. Our Excel worksheet has several sub-tables. For Section 508 Compliance, there should not be a blank space between the sub-tables. To accomplish this we add the skip_space option to the ODS TAGSETS EXCELXP statement. This option allows you to specify spacing between objects in a report with the objects listed in a comma separated list. The first value in the list for skip_space corresponds to the spacing between the sub-tables. We want no spaces between sub-tables, so the first value in the list for skip_space is "0".

```
%macro iterations; /* Create 135 Excel tables by race and poverty group */
%do raceit=1 %to 9; /* Nine Race Groups */
    %do percentit=1 %to 15; /* Fifteen Poverty Group Levels */

%macro print_report_excel;
ods escapechar='~';

ods tagsets.excelxp path="&outp" file="POV01_&ratio2._&raceit..xls"
style=styles.newstyle options(header_data_associations="yes" autofit_height='yes')
options(embedded_titles="yes" embedded_footnotes='yes' sheet_interval='none'
absolute_column_width="24,10,10,10,10,10,10,10,10,10,10,10,10"
sheet_name='POV01' skip_space="0,0,0,1,1,0,0");

title1 j=left color=white "Table with row headers in column A and column headers
in rows 9 through 10, 26 through 27, 43 through 44, and 60 through 61";
title2 j=left bold height=11pt "POV01: Age and Sex of All People, Family Members and
Unrelated Individuals Iterated by Income-to-Poverty Ratio and Race: &incyear";
title3 j=left bold height=11pt "Below &ratio2.% of Poverty -- &race4";
title4 j=left height=9pt underlin=1
link="http://www.census.gov/apds/techdoc/cps/cpsmar&yr..pdf" "For information on
confidentiality protection, sampling error, nonsampling error, and definitions,
see www.census.gov/apds/techdoc/cps/cpsmar&yr..pdf";
title5 j=left height=9pt "Source: U.S. Census Bureau, Current Population
Survey, &marchcps Annual Social and Economic Supplement.";
title6 j=left height=9pt "(Numbers in thousands)";

%do i=1 %to 4; /* There are 4 sub-tables in the Excel worksheet */

/* generate output */

%if &i=1 %then %do;
    title7 " ";
    title8 j=left bold height=9pt
"&&title&i"; %end;
%else %do;
    title1;title2;title3;title4;title5;title6;title7;title8;
    title1 j=left bold height=9pt "&&title&i";
%end;

proc report data=section&i nowd spanrows split='|' out=rept&i;
column rowhead2 fam_type, (count_sum poverty_sum poverty_pct);
define rowhead2 / "&race2 | Below &ratio2.%" group order=data flow style(column) =
[protectspecialchars=off];
define fam_type / ' ' across order=data preloadfmt missing ;
define count_sum / 'All | income | levels' style(column)=[tagattr="format:##,##0"];
```

```

define poverty_sum / "Below | &ratio2.% of | poverty (5)"
style(column)=[tagattr="format:#,##0"];
define poverty_pct / "Percentage | below &ratio2.% of | poverty |
(6)" f=pctf. style(column)=[tagattr="format:##0.0"] ;
run;

%end;
%print_report_excel;
footnote;
ods _all_ close;

%end;
%end;
%mend iterations;
%iterations;

```

CONCLUSION

Yes, it is possible to create hundreds of Section 508 Compliant Excel files using BASE SAS® code without any post or pre-processing. We showed how to add a table description in cell A1 of the Excel file. Moreover, we revealed how to create “white dots” for indented row headers using PROC FORMAT with style to make the dots white and invisible to the naked eye. Furthermore, we discussed adding a row to label the upcoming footnote link to alert the user with a vision disability. Lastly, we exploited ODS TAGSETS EXCELXP to create multiple excel files and made use of the skip_space option to assure no spacing between sub-tables. Creating hundreds of Section 508 Excel files need not be a tedious task. You do not need to process the Excel file outside of SAS® either before or after the fact. You can create hundreds of fantastic looking Section 508 Compliant Excel tables all within BASE SAS® code.

ACKNOWLEDGMENTS

Thanks very much to Jane Eslinger and Chevell Parker of SAS® for their technical support in assisting us with the code to make our Excel Tables 508 compliant. Additional thanks to Kim Wortman, Dahlia Panton and James Creech of the Census Bureau for their tutorial on making Excel files 508 compliant.

CONTACT INFORMATION

Your comments and questions are valued and encouraged. Contact the author's at:

Name: Christopher J. Boniface
U.S. Census Bureau
Washington D.C., 20233
Work Phone: (301)763-5769
E-mail: christopher.j.boniface@census.gov

Name: Nora P. Szeto
U.S. Census Bureau
Washington D.C., 20233
Work Phone: (301)763-5920
E-mail: nora.p.szeto@census.gov

Name: Hung X. Pham
U.S. Census Bureau
Washington D.C., 20233
Work Phone: (301)763-5909
E-mail: hung.xuan.pham@census.gov

SAS and all other SAS Institute Inc. product or service names are registered trademarks or trademarks of SAS Institute Inc. in the USA and other countries. ® indicates USA registration.

Other brand and product names are trademarks of their respective companies.