

---

# Contents

Preface	xi
Acknowledgments	xiii
About the Author	xv
How to Use This Book and the Accompanying CD	xvii

## Part 1 Getting Started

Chapter 1	Creating a Simple Report	3
1.1	Basic Syntax	4
1.2	Routing Reports to ODS Destinations	6
1.3	Other Reporting Tools: A Brief Comparison of Capabilities	7
1.3.1	PROC REPORT vs. PROC PRINT	8
1.3.2	PROC REPORT vs. PROC TABULATE	8
1.3.3	PROC REPORT vs. DATA _NULL_	8
1.4	The PROC REPORT Process: An Overview	9
1.4.1	PROC REPORT Terminology	9
1.4.2	Processing Phases	11
1.5	Chapter Exercises	12
Chapter 2	PROC REPORT: An Introduction	13
2.1	Introduction to the COLUMN Statement	16
2.2	Defining Types of Columns	17
2.2.1	Default Define Types DISPLAY and ANALYSIS	18
2.2.2	Using Define Usage ORDER	19
2.2.3	Using Define Type GROUP	22
2.2.4	Using Define Type ACROSS (and GROUP)	24
2.3	Doing More on the COLUMN Statement	25
2.3.1	Using the Comma to Form Nested Associations	26
2.3.2	Attaching Statistics with a Comma	26
2.3.3	Using Parentheses to Form Groups	28
2.3.4	Nesting Statistics under an ACROSS Variable	29
2.4	Other DEFINE Statement Options	31
2.4.1	Specification of an Analysis Statistic	31
2.4.2	Formatting the Values	33
2.4.3	Controlling the Order of the Displayed Values	34
2.4.4	Using the N Statistic without an ANALYSIS Variable	36
2.4.5	Associating Statistics with DEFINE Statements	37

2.5	Adding Text	39
2.5.1	Using the COLUMN Statement to Add Text	41
2.5.2	Using the DEFINE Statement to Add Text	43
2.5.3	Using the SPLIT= Option with Text	44
2.6	Compute Blocks	45
2.6.1	Inserting a Blank Line	46
2.6.2	Adding Lines of Text	47
2.6.3	Writing Formatted Values	49
2.6.4	Using SAS Language Elements	51
2.7	Sequencing of Step Events	52
2.8	Chapter Exercises	54
Chapter 3	Creating Breaks	57
3.1	Generating Breaks Using BREAK and RBREAK	57
3.2	BREAK Statement	59
3.2.1	Skipping a Line between Groups	59
3.2.2	Summarizing across a Group	61
3.2.3	Suppressing the Summarization Label	65
3.2.4	Generating a Page for Each Group Level	67
3.2.5	Combining Summaries with Detail Reports	68
3.3	RBREAK Statement	69
3.3.1	Using RBREAK in a Detail Report	69
3.3.2	Using RBREAK with BREAK in a Detail Report	70
3.3.3	Using RBREAK and BREAK in a Summary Report	71
3.4	Chapter Exercises	73
Chapter 4	Only in the LISTING Destination	75
4.1	Using the HEADLINE and HEADSKIP Options	76
4.2	Blank Lines, Overlines, and Underlines	78
4.3	Repeat Characters	79
4.3.1	Adding Repeated Characters to Spanning Headers	80
4.3.2	Repeat Characters with the SPLIT= Option	82
4.4	PROC REPORT Statement Options	83
4.4.1	Creating Boxes on the Report	83
4.4.2	Controlling the Centering of the Report	85
4.4.3	Adjusting the Width of Numeric and Computed Columns	85
4.4.4	Creating Multiple Panels on a Page	86
4.4.5	Using the PSPACE= Option	87
4.4.6	Controlling the Size of the Page	88
4.4.7	Using the FORMCHAR Option	89
4.4.8	Wrapping Data Lines	91

4.5	Other DEFINE Statement Options	92
4.5.1	Specifying the Column Width	93
4.5.2	Using the FLOW Option to Wrap Text	93
4.5.3	Adding Spaces between Columns	94
4.6	Chapter Exercises	96
Chapter 5	Creating and Modifying Columns Using the Compute Block	97
5.1	Coordinating with the COLUMN and DEFINE Statements	98
5.2	Calculations Based on Statistics	99
5.3	Calculating Percentages within Groups	101
5.4	Using _PAGE_ with BEFORE and AFTER	103
5.5	Using the OUT= Option to View Report Break Information	104
5.6	Chapter Exercises	106
Part 2	Taking PROC REPORT Beyond the Basics	
Chapter 6	Refining Our Understanding of the PROC REPORT Step	109
6.1	Additional DEFINE Statement Options	110
6.1.1	Changing Display Order with DESCENDING	110
6.1.2	Specification of Column Justification	111
6.1.3	Allowing the Use of Missing Classification Items	113
6.1.4	Controlling the Use of Analysis Items with All Missing or Zero Values	115
6.1.5	Using NOPRINT	118
6.1.6	Identification Columns	119
6.1.7	Creating Vertical Page Breaks	120
6.2	Using Variable Aliases	121
6.3	Nesting Variables	122
6.4	Taking Full Advantage of Formats	123
6.4.1	User-Defined Formats	123
6.4.2	Preloading Formats	126
6.4.3	Order Based on Format Definition	130
6.5	Other PROC Statement Options	131
6.5.1	Removing Headers	131
6.5.2	Using NAMED Output	132
6.5.3	Debugging with the LIST Option	134
6.5.4	Including MISSING Classification Levels	134

6.6	BY-Group Processing	136
6.6.1	Using the BY Statement	137
6.6.2	Creating Breaks with BY Groups	138
6.6.3	Using the #BYVAL and #BYVAR Options	139
6.6.4	BY Groups and the Output Delivery System	141
6.7	Calculations Using the FREQ Statement	144
6.8	A Further Comment on Paging Issues	145
6.9	Chapter Exercises	146
Chapter 7	Extending Compute Blocks	147
7.1	Understanding the Events of the Compute Block Process	149
7.1.1	Setup Phase: Generating the Computed Summary Information	150
7.1.2	Report Row Phase: Generating the Report	150
7.1.3	Process Example	151
7.2	Referencing Columns and Report Items in a Compute Block	154
7.2.1	Using Direct Variable Name References	156
7.2.2	Using Compound Variable Names	159
7.2.3	Using an Alias as a Column Reference	160
7.2.4	Using Absolute Column References: Referring to a Column by Its Number	161
7.2.5	Using the Automatic Temporary Variable <code>_BREAK_</code>	164
7.3	Using BEFORE and AFTER	166
7.4	Changing the Grouping Variable Values on Summary Lines	169
7.4.1	Specifying Text in a Compute Block	170
7.4.2	Using a Formatted Value	171
7.4.3	Creating a Dummy Column	173
7.5	Introducing the CALL DEFINE Routine	174
7.6	COMPUTE Statement Options and Switches	179
7.6.1	Justification of LINE Statement Text	179
7.6.2	Creating Character Variables with the CHARACTER and LENGTH= Options	180
7.7	Using Logic and SAS Language Elements	182
7.7.1	Using the SUM Statement with Temporary Variables	183
7.7.2	Repeating GROUP and ORDER Variables on Each Row	185
7.7.3	Counting Items across Page Breaks in the LISTING Destination	187
7.8	Doing More with the LINE Statement	191
7.8.1	Creating Group Summaries	192
7.8.2	Adding Repeated Characters	194
7.8.3	Understanding LINE Statement Execution	197

7.9	Examples of Common Tasks	199
7.9.1	Writing a Grand Total on Every Page	200
7.9.2	Combining Values into One Field or Column	202
7.9.3	Combining Values with Nested ACROSS Variables	204
7.9.4	Calculating a Weighted Mean	206
7.10	Chapter Exercises	209
Chapter 8	Using PROC REPORT with ODS	211
8.1	Introduction to the STYLE= Option	213
8.2	Using STYLE= to Change Attributes	216
8.2.1	Changing Text and Cell Attributes	216
8.2.2	Adding a Logo to Your Report	219
8.2.3	Controlling Report Size	223
8.2.4	Adding Horizontal and Vertical Spaces to Separate Data	223
8.3	Using CALL DEFINE to Change Style Attributes	227
8.3.1	Using CALL DEFINE in a Simple Report	228
8.3.2	Creating Shaded Rows	229
8.3.3	Conditional Assignment of Attributes	231
8.4	Creating Trafficlighting Effects	232
8.4.1	Building Trafficlighting Formats	233
8.4.2	Using Formats with the STYLE= Option	233
8.4.3	Controlling Trafficlighting with CALL DEFINE	236
8.4.4	Trafficlighting in the Presence of Computed Variables and Summary Lines	236
8.4.5	Trafficlighting When Differentiating between Columns	240
8.4.6	Differentiating between Columns on Group Summary Rows	242
8.4.7	Trafficlighting on the REPORT Summary Row	245
8.4.8	A Few Things to Remember When Using Formats for Trafficlighting	249
8.5	Embedding Hyperlinks within Your Table	249
8.5.1	Linking Titles and Footnotes Using HTML Anchor Tags and the LINK= Option	250
8.5.2	HTML Anchor Tags as Data Values	255
8.5.3	Establishing Links Using CALL DEFINE	257
8.5.4	Forming Links Using STYLE=	260
8.5.5	Creating Links in a PDF Document	262
8.5.6	Creating Links in an RTF Document	265
8.5.7	Automation Using the Macro Language	266
8.5.8	Using Formats to Build a Link	268

- 8.6 Using the Escape Character for In-Line Formatting 270
  - 8.6.1 Controlling Superscripts and Subscripts 271
  - 8.6.2 Displaying Page Numbers 273
  - 8.6.3 Generating a Dagger 277
  - 8.6.4 Using the Escape Character with S={ } and {STYLE} to Change Style Attributes 279
  - 8.6.5 Line Breaks and Wrapping 282
  - 8.6.6 Passing Raw Destination-Specific Codes 289
- 8.7 Using TITLE and FOOTNOTE Statement Options 292
- 8.8 Creating Tip or “Flyover” Text for HTML and PDF 293
  - 8.8.1 Using CALL DEFINE 293
  - 8.8.2 Placing Tip Text Using STYLE= 295
  - 8.8.3 Placing Tip Text Using ~S={ } 297
- 8.9 Specifying Multiple Columns for RTF and PDF 298
- 8.10 Adding Text through the TEXT= Option 300
- 8.11 RIGHTMARGIN: Aligning Numbers When Using CELLWIDTH 301
- 8.12 Chapter Exercises 304

## Part 3 Extending PROC REPORT

### Chapter 9 Reporting Specifics for ODS Destinations 309

- 9.1 RTF 310
  - 9.1.1 Using the BODYTITLE Option 311
  - 9.1.2 Adding RTF Control Words 312
  - 9.1.3 Post-processing of RTF Files 313
- 9.2 PDF 314
  - 9.2.1 Adding PDF File Descriptors 314
  - 9.2.2 Setting the Default Margins 315
- 9.3 HTML and Other Markup Destinations 316
  - 9.3.1 Exporting a Report to Microsoft Excel 316
  - 9.3.2 Setting Tagset Attributes 322
  - 9.3.3 HTML Tags and Repeat Characters 323

### Chapter 10 Solving Other Common Report Problems 325

- 10.1 Creating Vertically Concatenated Tables 326
  - 10.1.1 A Simple Table 326
  - 10.1.2 Ordering the Generated Classifications 332
  - 10.1.3 Text and Number Alignment in Derived Columns 335
  - 10.1.4 Doing More in the PROC REPORT Step 338

10.2	Automating the PROC REPORT Process	341
10.2.1	Things to Think about When Automating	342
10.2.2	Macro Variable Resolution Issues	343
10.3	Coordinating Graphics with PROC REPORT	345
10.3.1	Using CALL DEFINE to Import Graphics	345
10.3.2	Using GPRINT and GREPLAY	352
10.3.3	Using the Annotate Facility to Generate Lines	355
10.4	Workarounds for Monospace-Only Options	357
10.5	Generating Separate Reports on the Same Page	360
10.5.1	ODS LAYOUT	360
10.5.2	HTML Reports	362
10.5.3	RTF and PDF Reports: Using STARTPAGE=NEVER	363
10.5.4	Aligning Columns across Reports	365
Chapter 11	Details of the PROC REPORT Process	367
11.1	Step Sequence Review	368
11.2	Building a Simple Table with Summary Lines	371
11.3	Compute Block Processing	372
11.3.1	Creating a Computed Variable	372
11.3.2	Multiple Compute Blocks	373
11.3.3	Summary Lines and Compute Blocks in the Same Report	374
11.3.4	Using Compute BEFORE and COMPUTE AFTER with Summary Lines	375
11.4	Using the ACROSS Define Usage	378
Appendix 1	Exercise Solutions	383
A1.1	Solutions to Chapter 1 Exercises	383
A1.2	Solutions to Chapter 2 Exercises	384
A1.3	Solutions to Chapter 3 Exercises	389
A1.4	Solutions to Chapter 4 Exercises	391
A1.5	Solutions to Chapter 5 Exercises	394
A1.6	Solutions to Chapter 6 Exercises	397
A1.7	Solutions to Chapter 7 Exercises	402
A1.8	Solutions to Chapter 8 Exercises	408
Appendix 2	Syntax and Example Index	417
A2.1	PROC REPORT Step	418
A2.1.1	Primary Statements	418
A2.1.2	PROC REPORT Statement Options	418
A2.1.3	BY Statement Options	419

A2.1.4	COLUMN Statement Options	420
A2.1.5	DEFINE Statement Options	420
A2.1.6	BREAK Statement Options	422
A2.1.7	RBREAK Statement Options	422
A2.1.8	COMPUTE Statement Options	422
A2.1.9	In the Compute Block	423
A2.1.10	Other PROC REPORT Step Statements	423
A2.2	Output Delivery System	423
A2.2.1	ODS Destinations	424
A2.2.2	ODS Statements and Options	424
A2.2.3	HTML Destination Options	425
A2.2.4	PDF Destination Options	425
A2.2.5	RTF Destination Options	426
A2.3	Attribute Control and Modification	426
A2.3.1	STYLE= Option	426
A2.3.2	CALL DEFINE Routine	427
A2.3.3	Attribute Modifiers	428
A2.4	System Options	429
Appendix 3	Example Locator	431
A3.1	Combination Detail and Summary Reports	431
A3.1.1	Transposing Rows and Columns	432
A3.1.2	Specifying and Calculating Statistics	432
A3.1.3	Enhancing Tables	432
A3.1.4	Controlling Pages	433
A3.1.5	Controlling the Order of the Report's Rows	433
A3.2	Calculating Percentages	433
A3.3	Processing Weighted Means and Totals	433
A3.4	Understanding Processing Phases and Event Sequencing	434
References		435
Index		449