Table of Contents

Acknowledgments ..... **vii**

1 Introduction to Dates and Times in SAS 1

1.1 How Does It Work? (January 1, 1960 and Midnight as Zero) **2**
1.2 Internal Representation (Storage as Integers or Real Numbers) **2**
1.3 External Representation (Basic Format Concepts) **3**
1.4 Date and Time as Numeric Constants in SAS **3**
1.5 System Options Related to Dates **5**
1.6 Length and Numeric Requirements for Date, Time, and Datetime **12**

2 Displaying SAS Date, Time, and Datetime Values as Dates and Times as We Know Them 15

2.1 How Do I Use a Format? **16**
2.2 So Just How Many Built-in Formats Are There for Dates and Times? **18**
2.3 A Quick Note About Date Formats, Justification, and ODS **19**
2.4 Detailed Discussion of Each Format **19**
2.4.1 Date Formats **19**
2.4.2 Time Formats **43**
2.4.3 Datetime Formats **47**
2.5 Creating Custom Date Formats Using the VALUE Statement of PROC FORMAT **54**
2.6 Creating Custom Date Formats Using the PICTURE Statement of PROC FORMAT **56**
2.7 The PUT() Function and Formats **60**

3 Converting Dates and Times into SAS Date, Time, and Datetime Values 63

3.1 Avoiding the Two-Digit Year Trap **64**
3.2 Using Informats **65**
3.3 The INFORMAT Statement **66**
3.3.1 Using Informats with the INPUT Statement **66**
3.3.2 Informats with the INPUT() Function **67**
3.3.3 When the Informat Does Not Match the Data Being Read **68**
3.4 Listing and Discussion of Informats **70**
3.4.1 Date Informats **70**
3.4.2 Time Informats **75**
3.4.3 Datetime Informats **77**
3.4.4 ANYDT and Its Variants **77**

4 Date and Time Functions 85

4.1 Current Date and Time Functions **86**
4.2 Extracting Pieces from SAS Date, Time, and Datetime Values **86**
4.3 Creating Dates, Times, and Datetimes from Numbers **89**
4.4 Calculating Intervals **93**
4.4.1 Calculating Elapsed Time with DATDIF() and YRDIF() **93**
4.4.2 The Basics of SAS Intervals **96**
4.4.3 The Interval Calculation Functions: INTCK and INTNX **98**

5 Deeper into Dates and Times with SAS 107

5.1 Macro Variables and Dates **108**
5.1.1 Automatic Macro Variables **108**
5.1.2 Putting Dates into Titles **109**
5.1.4 Using %SYSFUNC() to Create Dates, Times, and Datetimes in Macro Variables **110**
5.1.4 Using CALL SYMPUT() and SYMGET() with Dates, Times, and Datetimes **111**
5.2 Shifting SAS Date and Time Intervals **113**
5.3 Graphing Dates **122**

5.4 The Basics of PROC EXPAND **127**
5.4.1 Capabilities of PROC EXPAND **127**
5.4.2 Using PROC EXPAND to Convert to a Higher Frequency **129**
5.4.3 Using PROC EXPAND to Convert to a Lower Frequency..... **130**
5.4.4 Using PROC EXPAND to Interpolate Missing Values..... **132**
5.4.5 The OBSERVED= Option for the CONVERT Statement in PROC EXPAND..... **133**
5.5 International Date, Time, and Datetime Formats and Informats..... **136**
5.5.1 "EUR" Formats and Informats..... **137**
5.5.2 "NL" Formats..... **140**
5.5.3 Specific Language Date Formats and Informats..... **143**
5.6 Other Software and Their Dates (Excel, Oracle, DB2)..... **144**

Appendix A Quick Reference Guide to SAS Date, Time, and Datetime Formats 145

Index 147