



From *The Essential Guide to SAS® Dates and Times*,
Second Edition. Full book available for purchase [here](#).

Contents

| | |
|--|------------|
| About This Book | vii |
| Acknowledgments | xi |
| Chapter 1: Introduction to Dates and Times in SAS..... | 1 |
| 1.1 How Does It Work? (January 1, 1960, and Midnight as Zero) | 1 |
| 1.2 Internal Representation..... | 2 |
| 1.3 External Representation (Basic FORMAT Concepts)..... | 2 |
| 1.4 Date and Time as Numeric Constants in SAS..... | 3 |
| 1.5 Length and Numeric Requirements for Date, Time, and Datetime | 5 |
| 1.6 General SAS Options for Dates | 7 |
| Chapter 2: Displaying SAS Date, Time, and Datetime Values as Dates and Times as We Know Them..... | 9 |
| 2.1 How Do I Use a Format? | 10 |
| 2.2 How Many Built-In Formats Are There for Dates and Times? | 13 |
| 2.3 Date Formats, Justification, and ODS | 13 |
| 2.4 Detailed Discussion of Each Format..... | 14 |
| 2.4.1 Date Formats | 14 |
| 2.4.2 Time Formats | 37 |
| 2.4.3 Datetime Formats..... | 41 |
| 2.5 Creating Custom Date Formats Using the VALUE Statement of PROC FORMAT..... | 47 |
| 2.6 Creating Custom Date Formats Using the PICTURE Statement of PROC FORMAT..... | 48 |
| 2.7 Creating Custom Formats Using PROC FCMP for Processing | 52 |
| 2.8 The PUT() Function and Formats..... | 55 |

| | |
|---|-----------|
| Chapter 3: Converting Dates and Times into SAS Date, Time, and Datetime Values | 57 |
| 3.1 Avoiding the Two-Digit Year Trap | 57 |
| 3.2 Using Informats | 59 |
| 3.3 The INFORMAT Statement..... | 59 |
| 3.3.1 Using Informats with the INPUT Statement..... | 60 |
| 3.3.2 Informats with the INPUT() Function | 61 |
| 3.3.3 When the Informat Does Not Match the Data Being Read | 62 |
| 3.4 Listing and Discussion of Informats | 64 |
| 3.4.1 Date Informats | 64 |
| 3.4.2 Time Informats..... | 73 |
| 3.4.3 Datetime Informats..... | 78 |
| 3.4.4 The "ANYDATE" Series of Informats..... | 81 |
| 3.4.5 So Why Not Just Use the "ANYDATE" Series of Informats? | 86 |
| Chapter 4: ISO 8601 Dates, Times, Datetimes, Durations, and Functions 91 | 91 |
| 4.1 What Is ISO 8601? | 91 |
| 4.2 ISO 8601 Formats..... | 92 |
| 4.2.1 ISO Date Formats | 93 |
| 4.2.2 ISO Time Formats..... | 93 |
| 4.2.3 ISO Datetime Formats..... | 99 |
| 4.3 ISO 8601 Informats | 103 |
| 4.3.1 ISO Date Informats..... | 104 |
| 4.3.2 ISO Time Informats | 105 |
| 4.3.3 ISO Datetime Informats | 108 |
| 4.4 Time Zone Functions | 111 |
| 4.4.1 Introduction..... | 111 |
| 4.4.2 The TIMEZONE= Option..... | 111 |
| 4.4.3 List of Time Zone Functions..... | 112 |

| | |
|---|------------|
| 4.5 ISO 8601 Durations and Intervals | 116 |
| 4.5.1 ISO Duration and Interval Representations | 116 |
| 4.5.2 ISO 8601 Duration and Interval Formats | 117 |
| 4.5.3 ISO 8601 Duration and Interval Informats..... | 121 |
| 4.5.4 CALL IS8601_CONVERT | 123 |
| 4.6 Conclusion | 136 |
| Chapter 5: Date and Time Functions | 137 |
| 5.1 Current Date and Time Functions | 137 |
| 5.2 Extracting Pieces from SAS Date, Time, and Datetime Values..... | 138 |
| 5.3 Creating Dates, Times, and Datetimes from Numbers or Other Information..... | 140 |
| 5.3.1 Introduction..... | 140 |
| 5.3.2 List of Functions and Their Descriptions | 140 |
| 5.4 Calculating Elapsed Time, and the HOLIDAY() Function | 145 |
| 5.4.1 Calculating Elapsed Time with DATDIF() and YRDIF()..... | 145 |
| 5.5 The Basics of SAS Intervals | 149 |
| 5.5.1 The Interval Calculation Functions: INTCK() and INTNX()..... | 151 |
| 5.6 Modifying SAS Intervals | 159 |
| 5.7 Creating Your Own SAS Intervals | 169 |
| 5.8 Interval Functions about Intervals..... | 176 |
| 5.8.1 INTFIT(argument-1,argument-2,type)..... | 177 |
| 5.8.2 INTFMT('interval','size') | 178 |
| 5.8.3 INTGET(argument1,argument2,argument3) | 179 |
| 5.8.4 INTSHIFT('interval') | 180 |
| 5.8.5 INTTEST('interval')..... | 181 |
| 5.9 Retail Calendar Intervals and Seasonality..... | 181 |
| 5.9.1 Retail Calendar Intervals | 181 |
| 5.9.2 Seasonality Functions..... | 183 |
| Chapter 6 Deeper into Dates and Times with SAS..... | 185 |
| 6.1 Macro Variables and Dates..... | 185 |
| 6.1.1 Automatic Macro Variables | 185 |
| 6.1.2 Putting Dates into Titles | 186 |
| 6.1.3 Using %SYSFUNC() to Create Dates, Times, and Datetimes in Macro Variables..... | 187 |
| 6.1.4 Using Dates in Macros..... | 189 |

| | |
|---|------------|
| 6.2 Graphing Dates | 194 |
| Johnny's Savings Account | 194 |
| 6.3 The Basics of PROC EXPAND | 200 |
| 6.3.1 Capabilities of PROC EXPAND..... | 200 |
| 6.3.2 Using PROC EXPAND to Convert to a Higher Frequency | 202 |
| 6.3.3 Using PROC EXPAND to Convert to a Lower Frequency..... | 203 |
| 6.3.4 Using PROC EXPAND to Interpolate Missing Values | 205 |
| 6.3.5 The OBSERVED= Option for the CONVERT Statement in PROC EXPAND | 206 |
| 6.4 International Date, Time, and Datetime Formats and Informats | 212 |
| 6.4.1 "EUR" Formats and Informats | 213 |
| 6.4.2 NLS Formats | 214 |
| 6.5 NLS Date, Time, and Datetime Conversion Functions..... | 221 |
| 6.6 Date Formats and Informats for Other Calendars..... | 225 |
| 6.6.1 Hebrew Date Formats | 226 |
| 6.6.2 Japanese and Taiwanese Date Formats..... | 226 |
| 6.6.3 Japanese and Taiwanese Date Informats | 226 |
| 6.7 Other Software and Their Dates (Excel, Oracle, DB2)..... | 227 |
| 6.7.1 The SASDATEFMT= System Option | 228 |
| 6.8 Conclusion | 229 |
| Appendix A: A Quick Reference Guide to SAS Date, Time, and Datetime Formats..... | 231 |
| Appendix B: A Quick Reference Guide to NLS Date, Time, and Datetime Formats..... | 235 |
| Appendix C: Troubleshooting Dates 101 | 239 |
| Index..... | 253 |