

## Paper CC08\_05

### SAS® Dating Tips - A Beginner's Guide to SAS Dates Erik S. Larsen, Independent Consultant

#### Abstract

Do you want to be the life of the party at SESUG 2005? Being proficient at using SAS dates and times may not make you instantly popular, but it will make your programs work better and allow you to use the power of SAS dates to manipulate data and make your reports and graphs look more professional. We will explore the basics of how SAS stores dates and times internally and how you can use them to calculate values in terms of days, weeks and years. Finally, we will explore some date functions and formats to make your reports look so good you will never want to look at a Microsoft Excel® spreadsheet again.

#### The Basics

First off, let's get down to basics. How are dates stored in SAS? Generally speaking, SAS has two types of variables it stores in its data sets: numeric and character. SAS dates, times and datetimes fall into the numeric category, and more specifically, integer numbers (except for fractions of seconds.) When SAS moved from Version 5 to 6, it was decided to store dates and times in SAS as the number of days and/or seconds from January 1, 1960.

A SAS date value of zero is equivalent to January 1, 1960. Negative numbers refer to dates prior to January 1, 1960 and positive numbers refer to dates after January 1, 1960. It is a useful to know this feature because it allows the user to manipulate dates in mathematical terms. The example below shows how you can calculate the number of days between treatments:

```
DATA DATES;  
    PREV_DT = '14FEB2005'd;  
    NEXT_DT = '28MAR2005'd;  
  
    DAYS = NEXT_DT - PREV_DT + 1;  
RUN;
```

You will notice the letter "d" after the quotes. This tells SAS that it is a SAS date value, and not just a character constant. This allows for the following:

```
DAYS = 16,523 - 16,481 + 1 = 43
```

Without the “d”, SAS would attempt to add two character constants to a numeric constant (1) and in the SAS log, resulting in a message of “Invalid numeric data.”

### **Input and Output (or I/O)**

SAS also provides numerous (too numerous to mention in this paper!) ways to input and display SAS dates. The SAS language can read in just about any date format you can imagine such as DDMONYYYY in the previous example and other common types such as MMDD-YYYY and YY-MM-DD. Once a date is in a SAS data set, you are able to manipulate it regardless of format. An example is below:

```
DATA DATES;  
    INPUT      JOBDATE MMDDYY8.  
              BEGDATE YMMDD6.  
              ENDDATE DATE9.;  
RUN;
```

All of the above variables, JOBDATE, BEGDATE and ENDDATE are SAS date values and can be manipulated in many ways. The only assumption is that the input file has dates in the input format shown in the program. The **DATE9.** informat assumes that the input data for ENDDATE is in a DDMONYYYY format. The SAS Online Documentation has just about any format or informat you need to read in or display dates in reports and graphs.

### **Functions and Manipulation**

SAS dates also have several basic functions available to the programmer. These allow you to perform subsetting or recasting dates by years, months or even days. These are useful again for data manipulation or extraction, allowing the programmer to pull only certain records in a given month or a particular day of the week. Some examples are below:

```
MON      = MONTH(JOBDATE);  
DAY      = DAY(JOBDATE);  
YR       = YEAR(JOBDATE);  
RE_DATE = MDY(MON, DAY, YR);
```

The value of MON will be an integer from 1 to 12 and DAY will have a value of 1 to 31. The value of YR is the four digit year integer value. These functions allow you to group, subset, and analyze data by these categories. The MDY function will create a SAS date from variables and constants representing the month, day and year respectively. These functions are some of the more popular (and useful) in the SAS language, but as

mentioned before, check the SAS Online Documentation for an full list of available SAS date functions.

### **SAS Datetime values**

A SAS datetime value is similar to a date value in that it is a number of intervals from January 1, 1960. The difference is that it is the number of seconds from January 1, 1960. This allows the programmer to perform similar operations that are performed on SAS dates in finding the difference in datetime values and two extremely useful functions, DATEPART and TIMEPART. These functions will take a SAS datetime value and extract only the SAS date or time, respectively. An example is below:

```
DT    = '13DEC1968:12:32:12' dt;  
DATE = DATEPART(DT);  
TIME = TIMEPART(DT);
```

Please note that the “**dt**” after the quotes tells SAS that the DT variable is a SAS datetime value. This is analogous to the “**d**” for SAS date constants and similarly, a “**t**” for a SAS time constant.

Often times when extracting from an external database, such as Sybase or Oracle, columns that are dates are actually date-time stamps. One of the classic mistakes that beginning programmers make with SAS datetime values is that they read a SAS datetime value out of a database and then either manipulate or output a datetime value with a date format. SAS will not tell you that you are making this mistake in the SAS log but you will notice that your date values and calculations will not appear correct. Be careful!!!!

### **SAS Time values**

A SAS time value is similar to a SAS datetime except that it is the number of seconds from midnight shown in hours, minutes and seconds. In the above example, the value for TIME will be the number of seconds from midnight to 12:32:12PM, or 45,132. Again, you can format this value however you choose, and once again be careful not to format a time as a date value. SAS will allow you to do it, but it will not display how you would like it!

### **Conclusion**

This small introduction to SAS date, time and datetime values just scratches the surface of what you can do with these types of variables. Storing SAS date values allows you to harness the power of SAS to manipulate dates in many ways and display them in several different formats. In the SAS Online Documentation, there are numerous other formats, informats and functions to apply to these types of variables. One of my favorite “interview questions” is to ask an applicant how a SAS date is stored internally. With the

above information, you now have more than enough ammunition to answer the question appropriately.

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