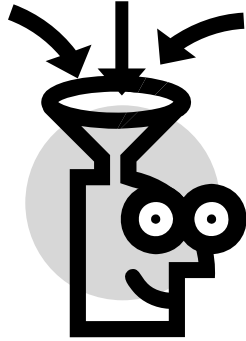


# My Friend the *SAS<sup>®</sup> Format*



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## My Friend the SAS Format

- What You Will Learn in the Presentation
  - Overview of Core Format Functionalities
    - Can't cover everything in 50 minutes!
  - Using Formats to *“alter the external representation of the values of variables in a SAS data set”*
    - SAS Supplied Formats
    - Creating Your Own Formats Using PROC FORMAT
      - Value Formats
      - Picture Formats
    - Permanent vs. Temporary Formats
    - Creating SAS Formats Using Variables in SAS Data Sets
      - Input Control Data Sets

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## What Does a SAS Format “do”?

- A Format is an instruction that the SAS System uses when portraying, or otherwise using, the values of variables in a SAS data set
  - Character Formats
  - Numeric Formats
- SAS-Supplied Formats
- User Created Formats
  - PROC FORMAT

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## How Do We Use Formats?

- Most SAS Procedures Use the Formatted Values of Variables
- Formats are “associated” to variables
  - In a **Data Step**
    - Add Format Associations to the Descriptor Portion of a Data Set When it is Created
  - In a **Procedure Step**
    - Apply Format(s) to Variable(s) When Using a Procedure
  - Using **PROC DATASETS**
    - Add Format Associations to the Descriptor Portion of an Existing SAS Data Set

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## What Does a SAS Format “do”?

- Where are SAS Formats “kept”?
  - SAS-Supplied Formats
    - Part of the SAS System
  - In **Format Catalogs**
    - Special entry type in SAS Data Libraries
    - Automatically by PROC FORMAT the first time you create a Format in that library
  - **WORK.FORMATS**
    - Location of temporary user-created formats
  - **LIBNAME.FORMATS**
    - Location(s) of permanent user-created formats where *LIBNAME* is the name of the SAS Library Reference (LIBREF)

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## A Basic Example

```
62 data dates;  
63 input month day year;  
64 date = mdy(month,day,year);  
65 datalines;  
66 01 01 2001  
67 04 11 2005  
68 07 04 1776  
69 07 04 1976  
70 07 04 2005  
71 ;  
72 run;  
73  
74 title 'My Friend the SAS Format';  
75  
76 proc print data=dates;  
77 title2 'Date Values Without Format';  
78 run;
```

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## A Basic Example

My Friend the SAS Format  
Date Values Without Format

Obs	month	day	year	date
1	1	1	2001	14976
2	4	11	2005	16537
3	7	4	1776	-67019
4	7	4	1976	6029
5	7	4	2005	16621

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## A Basic Example

```
81 proc print data=dates;  
82 format date mmddyy10.;  
83 title2 'Using the MMDDYY10 Format';  
84 run;
```

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## A Basic Example

My Friend the SAS Format  
Using the MMDDYY10 Format

Obs	month	day	year	date
1	1	1	2001	01/01/2001
2	4	11	2005	04/11/2005
3	7	4	1776	07/04/1776
4	7	4	1976	07/04/1976
5	7	4	2005	07/04/2005

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## A Basic Example

```
86 proc print data=dates;  
87 format date worddate.;  
88 title2 'Using the WORDDATE Format';  
89 run;
```

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## A Basic Example

Obs	month	day	year	date
1	1	1	2001	January 1, 2001
2	4	11	2005	April 11, 2005
3	7	4	1776	July 4, 1776
4	7	4	1976	July 4, 1976
5	7	4	2005	July 4, 2005

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## Key Concept

- Formats “alter the external representation” of the values of variables stored in SAS data sets
- The “internal value” remains the same, but how we “see” it, “outside” of the data set, is controlled by the Format we choose to associate to the variable.

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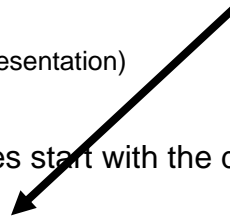
## Another Example of Date Formats

Formatted Value	Format Applied
16537	No Format Applied
04/11/05	MMDDYY8.
04/11/2005	MMDDYY10.
11/04/2005	DDMMYY10.
11 APR05	DATE7.
11 APR2005	DATE9.
APR2005	MONYY7.
2	QTR.
2005	YEAR
05Q2	YYQ4.
2005Q2	YYQ6.
April 11, 2005	WORDDATE.
2	WEEKDAY.
Monday	DOWNAME.
Monday, April 11, 2005	WEEKDATE.
11 April 2005	WORDDATX.

## Making Your Own Formats

- PROC FORMAT
  - Permanent and Temporary
    - Value and Picture Formats
    - Informats (not covered in this presentation)
- Rules:
  - Formats for character variables start with the dollar sign (\$)
  - Format names can be up to **32** characters long
    - Including the dollar sign (\$) if you are creating a character format
    - The dollar sign “counts towards” the 32 character maximum format length

**New in SAS 9.1 !**



## Making Your Own Formats

- More Rules...
  - User created FORMATS cannot
    - have the same names as SAS-supplied formats
    - end with a number
- Common mistakes people make when creating their own Formats
  - Creating a Character Format for a numeric variable or vise-versa
  - Specifying overlapping ranges of values
  - Not including all values in ranges

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## Making Your Own Formats

```
115  
116 proc print data=SUGI30.GRADES(obs=10);  
117 title2 'First Ten Observations from SUGI30.GRADES';  
118 run;
```

```
My Friend the SAS Format  
First Ten Observations from SUGI30.GRADES
```

Obs	id	FINAL	SAT_M	PREREQ
1	1	D	525	B
2	2	D	533	C
3	3	B	545	B
4	4	D	582	A
5	5	C	581	C
6	6	B	576	D
7	7	C	572	B
8	8	A	609	A
9	9	C	559	C
10	10	C	543	D

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## Making Your Own Formats

```

121 * one value of variable is mapped to one format label;
122 proc format;
123   value $one_f
124
125
126
127
128 run;
129
130 ods rtf file='c:\format1.rtf' style=statistical bodytitle;
131 proc freq data=SUGI30.grades;
132 tables final;
133 format final $one_f.;
134 title2 'Using a Character Format';
135 run;
136 ods rtf close;

```

'A' = 'Excellent'  
 'B' = 'Very Good'  
 'C' = 'Average'  
 'D' = 'Below Average'  
 'F' = 'Failed';

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## Making Your Own Formats

### My Friend the SAS Format Using a Character Format

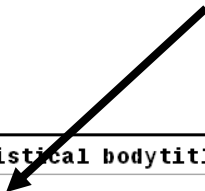
#### The FREQ Procedure

Final Course Grade				
FINAL	Frequency	Percent	Cumulative Frequency	Cumulative Percent
Excellent	4	13.33	4	13.33
Very Good	10	33.33	14	46.67
Average	7	23.33	21	70.00
Below Average	7	23.33	28	93.33
Failed	2	6.67	30	100.00

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## Making Your Own Formats

```
139 ods rtf file='c:\format2.rtf' style=statistical bodytitle;  
140  
141 proc freq data=SUGI30.grades ORDER=FORMATTED;  
142 tables final;  
143 format final $one_f.;  
144 title2 'Using a Character Format with ORDER=FORMATTED';  
145 run;  
146 ods rtf close;
```




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## Making Your Own Formats

### My Friend the SAS Format Using a Character Format with ORDER=FORMATTED

#### The FREQ Procedure



Final Course Grade				
FINAL	Frequency	Percent	Cumulative Frequency	Cumulative Percent
Average	7	23.33	7	23.33
Below Average	7	23.33	14	46.67
Excellent	4	13.33	18	60.00
Failed	2	6.67	20	66.67
Very Good	10	33.33	30	100.00

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## Using Formats to “Bin” or Collapse a Variable

- One useful benefit of Formats is avoiding the need to create variables in a data set that are “re-codes” of other variables in the data set.
- Instead, use a Format!
- Example, “bucket” grades in to two groups
  - Passed (A,B and C)
  - Failed (D,F)

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## Making Your Own Formats

```
148 proc format;
149 * map several values of variable to one format label;
150 value $two_f
151     'A', 'B', 'C' = 'Passed'
152     'D', 'F' = 'Failed';
153     run;
154
155 proc freq data=sugi30.grades;
156 tables prereq*final;
157 * associate one format to TWO variables;
158 format prereq final $two_f.;
159 label
160 prereq = 'Grade in Pre-Requisite Class'
161 final = 'Final Grade in This Class';
162 title2 'Using a Format to Bucket Observations';
163 run;
```

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## My Friend the SAS Format Using a Format to Bucket Observations

### The FREQ Procedure

Table of PREREQ by FINAL			
PREREQ(Grade in Pre-Requisite Class)	FINAL(Final Grade in This Class)		Total
	Passed	Failed	
Frequency			
Percent			
Row Pct			
Col Pct			
→ Passed	17	8	25
	56.67	26.67	83.33
	68.00	32.00	
	80.95	88.89	
→ Failed	4	1	5
	13.33	3.33	16.67
	80.00	20.00	
	19.05	11.11	
Total	21	9	30
	70.00	30.00	100.00

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## Making Your Own Formats

*How can we use Formats to "bin" the values of continuous numeric variables?*

## Making Your Own Formats

```

169 proc format;
170   value sat1f 200 - 400 = 'Well Below Average'
171              401 - 450 = 'Below Average'
172              510 - 550 = 'Average'
173              551 - 600 = 'Above Average'
174              600 - 800 = 'Well Above Average';
175 run;
176
177 ods rtf file='c:\format4.rtf' bodytitle style=analysis;
178 proc freq data= SUGI30.grades;
179 tables sat_m;
180 format sat_m sat1f.; ←
181 title 'My Friend the SAS Format';
182 title2 'Using a Format to Collapse Ranges of a Numeric Variable';
183 run;
184 ods rtf close;

```

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## Making Your Own Formats

My Friend the SAS Format  
Using a Format to Collapse Ranges of a Numeric Variable

The FREQ Procedure

SAT Math Score					
	SAT_M	Frequency	Percent	Cumulative Frequency	Cumulative Percent
	→ 463	1	3.33	1	3.33
	→ 471	1	3.33	2	6.67
	→ 488	1	3.33	3	10.00
	Average	7	23.33	10	33.33
	Above Average	18	60.00	28	93.33
	Well Above Average	2	6.67	30	100.00

Because 463, 471 and 488 were values of SAT\_M that were NOT included in the specified ranges, their "internal" values are displayed by PROC FREQ

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## Making Your Own Formats

```

187 proc format;
188   value sat2f low-500 = '500 or below'
189           501 - 550 = '501 to 550'
190           551 - 600 = '551 to 600'
191           601 - high = '601 and higher';
192 run;
    
```

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## Making Your Own Formats

### My Friend the SAS Format Using a Format to Collapse Ranges of a Numeric Variable

The FREQ Procedure

SAT Math Score				
SAT_M	Frequency	Percent	Cumulative Frequency	Cumulative Percent
500 or below	3	10.00	3	10.00
501 to 550	7	23.33	10	33.33
551 to 600	18	60.00	28	93.33
601 and higher	2	6.67	30	100.00

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## Making Your Own Formats

```
204 * apply formats to two variables in the same proc freq task;
205 ods rtf file='C:\format6.rtf' bodytitle style=d3d;
206 proc freq data=sugi30.grades;
207 tables final * sat_m;
208 format sat_m sat2f. final $two_f.;
209 title3 'Applying Two Formats to Two Different Variables';
210 run;
211 ods rtf close;
```

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## Making Your Own Formats

*My Friend the SAS Format*  
*Using a Format to Collapse Ranges of a Numeric Variable*  
*Applying Two Formats to Two Different Variables*

The FREQ Procedure

Table of FINAL by SAT_M					
FINAL(Final Course Grade)	SAT_M(SAT Math Score)				Total
Frequency Percent Row Pct Col Pct	500 or below	501 to 550	551 to 600	601 and higher	
Passed	0	4	15	2	21
	0.00	13.33	50.00	6.67	70.00
	0.00	19.05	71.43	9.52	
	0.00	57.14	83.33	100.00	
Failed	3	3	3	0	9
	10.00	10.00	10.00	0.00	30.00
	33.33	33.33	33.33	0.00	
	100.00	42.86	16.67	0.00	
Total	3	7	18	2	30
	10.00	23.33	60.00	6.67	100.00

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## Permanent vs. Temporary Formats

- By Default, User-Created Formats are placed in the FORMATS Catalog in the WORK library
  - They “go away” when the SAS Session is terminated
- The LIBRARY=*libref* option is used with PROC FORMAT to specify a SAS Library in which to place *permanent formats*
  - If a FORMATS Catalog does not exist, either in the WORK library or in another library, PROC FORMAT automatically creates one.

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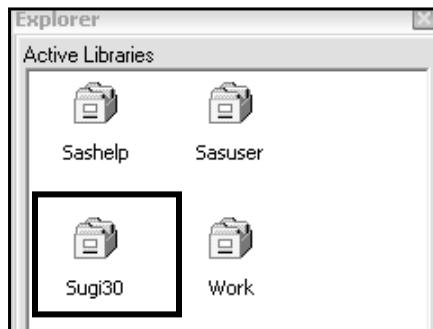
## Making Your Own Formats

```
92 proc format LIBRARY = SUGI30;
93 value sat2f low-500 = '500 or below'
94             501 - 550 = '501 to 550'
95             551 - 600 = '551 to 600'
96             601 - high = '601 and higher';
97
98 value $one_f 'A' = 'Excellent'
99             'B' = 'Very Good'
100            'C' = 'Average'
101            'D' = 'Below Average'
102            'F' = 'Failed';
103 value sat1f 200 - 400 = 'Well Below Average (200-400)'
104            401 - 450 = 'Below Average (401-540)'
105            451 - 550 = 'Average (451-550)'
106            551 - 600 = 'Above Average (551-600)'
107            601 - 800 = 'Well Above Average (601-800)';
108 value $two_f 'A', 'B', 'C' = 'Passed'
109            'D', 'F' = 'Failed';
110
111 run;
```

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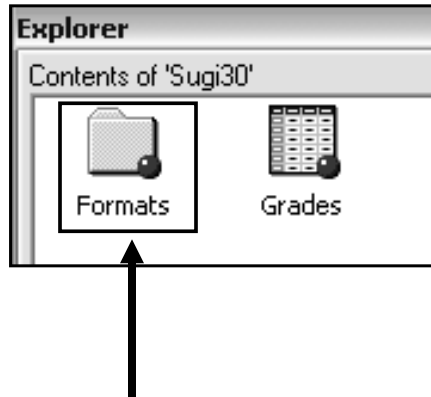
## Making Your Own Formats



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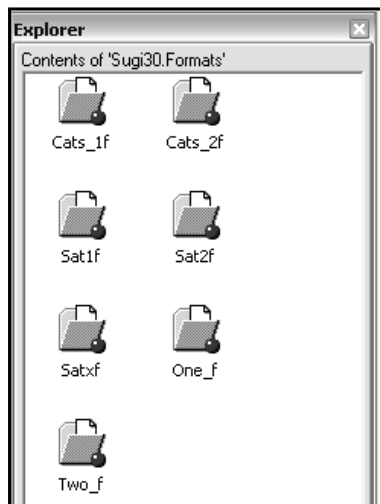
## Making Your Own Formats



**SAS created the FORMATS Catalog in the Library referenced with the SUGI30 Libref. The FORMATS Catalog remains in this Library unless it is deleted by the user**

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## Making Your Own Formats



Clicking on the FORMATS catalog icon shown on the previous page shows the entries in the catalog. Additional information about the formats is obtained by using the FMTLIB option in PROC FORMAT, shown on the next page.

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# Making Your Own Formats

```

218 * display contents of the permanent formats catalog;
219
220 proc format library=sugi30 FMTLIB;
221 title2 'Using the FMTLIB Option';
222 run;
    
```

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# Making Your Own Formats

My Friend the SAS Format  
Using the FMTLIB Option

FORMAT NAME: SAT2F LENGTH: 14 NUMBER OF VALUES: 4			
MIN LENGTH: 1 MAX LENGTH: 40 DEFAULT LENGTH 14 FUZZ: STD			
START	END	LABEL (VER. V7 V8 10APR2005:16:32:31)	
LOW		500	500 or below
	501	550	501 to 550
	551	600	551 to 600
	601	HIGH	601 and higher

FORMAT NAME: SATXF LENGTH: 18 NUMBER OF VALUES: 5			
MIN LENGTH: 1 MAX LENGTH: 40 DEFAULT LENGTH 18 FUZZ: STD			
START	END	LABEL (VER. V7 V8 05FEB2005:21:07:21)	
	200	400	Well Below Average
	401	450	Below Average
	510	550	Average
	551	600	Above Average
	601	800	Well Above Average

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## Associating User-Created Formats to Variables

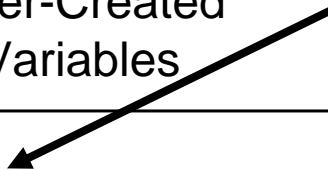
- By default, the SAS System searches ONLY the FORMATS catalogs
  - Containing SAS-supplied FORMATS
  - In the WORK Library (if one exists)
- No other libraries are searched for FORMATS unless you give SAS explicit directions about which (other) Libraries to include in its search Formats that have been associated to variables.
- Consider the error on the next page.

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## Associating User-Created Formats to Variables

```
187 proc freq data= SUGI30.grades;
188 tables sat_m;
189 format sat_m sat2f ;
ERROR: The format SAT2F was not found or could not be loaded.
190 title 'My Friend the SAS Format';
191 title2 'Using a Format to Collapse Ranges of a Numeric Variable';
192 run;

NOTE: The SAS System stopped processing this step because of errors.
NOTE: PROCEDURE FREQ used (Total process time):
      real time           0.01 seconds
      cpu time             0.01 seconds
```



**Without explicit instructions, the SAS System does not "know" to find Character Format \$two\_f in the FORMATS Catalog in the SUGI30 Library. This is a commonly-encountered error!**

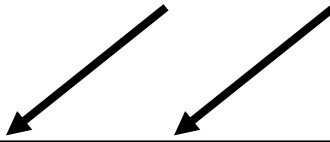
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## Associating User-Created Formats to Variables

- The **FMTSEARCH** SAS System Option
  - Supplies the name(s) of additional Libraries the SAS System should search for Formats
- The **NOFMterr** SAS System Option
  - Instructs SAS to continue Data and/or Procedure Step processing even if Format(s) cannot be found
  - Very useful if someone gives you a data set but not the user-created Formats that go with it!

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## Associated User-Created Formats to Variables



```
224 options fmtsearch=(sugi30) nofmterr;  
225 proc freq data= SUGI30.grades;  
226 tables sat_m;  
227 format sat_m sat2f.;  
228 title 'My Friend the SAS Format';  
229 title2 'Using a Format to Collapse Ranges of a Numeric Variable';  
230 run;
```

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## Creating Your Own Formats with Input Control SAS Data Sets

- You can create both permanent and temporary formats using variables and observations in SAS data sets
  - These data sets are used by PROC FORMAT to create formats and are called ***Input Control SAS Data Sets***
    - They must contain the following three character variables
      - **FMTNAME**
      - **START**
      - **LABEL**

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## Creating Your Own Formats with Input Control SAS Data Sets

- Example: Create formats from SAS data set ADVREPT.TRANS\_FMTS
  - This data set started out as an EXCEL spreadsheet containing transaction code information, it was imported to a SAS data set.
  - Task: Create a format representing transaction category. The variables to be used from ADVREPT.TRANS\_FMTS are
    - DETAIL
    - DETAIL\_DESC

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## Creating Your Own Formats with Input Control SAS Data Sets

*My Friend the SAS Format*  
*First 15 Observations from SUGI30.TRANS\_FMTS*

Obs	Primary	Secondary	Secondary_Desc	Detail	Detail_Desc
1	C	10	Clothing-Children	2	Clothing-Children-Girls
2	C	10	Clothing-Children	3	Clothing-Children-Boys
3	C	10	Clothing-Children	4	Clothing-Children-Infants
4	C	10	Clothing-Children	5	Clothing-Children-Other
5	A	11	Automotive	6	Automotive-Licensing
6	A	11	Automotive	7	Automotive-Detailing
7	A	11	Automotive	8	Automotive-Parts
8	A	11	Automotive	9	Automotive-Repairs
9	A	11	Automotive	10	Automotive-Other
10	A	11	Automotive	11	Automotive-Maintenance-Warranty
11	E	12	Electronics	12	Electronics-Power-Supplies
12	E	12	Electronics	13	Electronics-Portable-Entertainment
13	E	12	Electronics	14	Electronics-Direct-Satellite-Dishes
14	E	12	Electronics	15	Electronics-Turtables
15	E	13	Electronics	16	Electronics-Home Entertainment

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## Creating Your Own Formats with Input Control SAS Data Sets

- Now that we know the variable names, it is a relatively straightforward process to create an Input Control SAS Data Set that PROC FORMAT will use to build the desired format
  - Remember, the three required variables in the Input Control SAS Data Set are
    - FMTNAME
    - START
    - LABEL

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## Creating Your Own Formats with Input Control SAS Data Sets

```

232 * create the input control data set;
233
234 data format2(keep=fmtname start label);
235   set advrept.trans_fmts(
236     rename=(detail_desc=label detail=start));
237 retain fmtname 'transcat';
238 run;
239
240 * use the input control data set to create the format;
241 proc format library = SUGI30 cntlin=format2;
242 run;

```

The required variables LABEL and START are created using the RENAME SAS data set option. The third required variable, FMTNAME, was created using the RETAIN statement in the Data Step. Temporary SAS data set Format2 contains the three variables specified in the CNTLIN option in the PROC FORMAT task.

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## Creating Your Own Formats with Input Control SAS Data Sets

My Friend the SAS Format  
First 15 Observations from Input Control Data Set Format2

Obs	start	label	fmtname
1	2	Clothing-Children-Girls	transcat
2	3	Clothing-Children-Boys	transcat
3	4	Clothing-Children-Infants	transcat
4	5	Clothing-Children-Other	transcat
5	6	Automotive-Licensing	transcat
6	7	Automotive-Detailing	transcat
7	8	Automotive-Parts	transcat
8	9	Automotive-Repairs	transcat
9	10	Automotive-Other	transcat
10	11	Automotive-Maintenance-Warranty	transcat
11	12	Electronics-Power-Supplies	transcat
12	13	Electronics-Portable-Entertainment	transcat
13	14	Electronics-Direct-Satellite-Dishes	transcat
14	15	Electronics-Turntables	transcat
15	16	Electronics-Home Entertainment	transcat

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## Creating Your Own Formats with Input Control SAS Data Sets

```
proc format library = advrept fmtlib;
select transcat;
title 'Format Library Information for TRANSCAT';
run;
```

The FMTLIB option generates information about all the FORMATS and INFORMATS in the catalog given in the LIBRARY= option. Using the SELECT (as shown here) or EXCLUDE statement limits the output generated by the FMTLIB option to only the desired FORMATS or INFORMATS.

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## Creating Your Own Formats with Input Control SAS Data Sets

FORMAT NAME: TRANSCAT LENGTH: 35 NUMBER OF VALUES: 48		
MIN LENGTH: 1 MAX LENGTH: 40 DEFAULT LENGTH 35 FUZZ: STD		
START	END	LABEL (VER. U7 U8 11APR2005:08:50:24)
2		Clothing-Children-GIRLS
3		Clothing-Children-Boys
4		Clothing-Children-Infants
5		Clothing-Children-Other
6		Automotive-Licensing
7		Automotive-Detailing
8		Automotive-Parts
9		Automotive-Repairs
10		Automotive-Other
11		Automotive-Maintenance-Warranty
12		Electronics-Power-Supplies
13		Electronics-Portable-Entertainment
14		Electronics-Direct-Satellite-Dishes
15		Electronics-Turntables

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## Creating Your Own Formats with Input Control SAS Data Sets

- Input Control SAS Data Sets Are Also Used to Create Formats for Ranges of Values
  - Both the START and the END variables are required in the Input Control SAS Data Set
  - Example: In the ADVREPT.TRANS\_FMTS data set, the variable DETAIL (for which a variable was just created), “maps” to a second variable, called SECONDARY\_DESC.
  - The START and END values for the Input Control Data Set are obtained using PROC MEANS.

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## Creating Your Own Formats with Input Control SAS Data Sets

*My Friend the SAS Format*  
First 15 Observations from ADVREPT.TRANS\_FMTS

Obs	Primary	Secondary	Secondary_Desc	Detail	Detail_Desc
1	C	10	Clothing-Children	2	Clothing-Children-Girls
2	C	10	Clothing-Children	3	Clothing-Children-Boys
3	C	10	Clothing-Children	4	Clothing-Children-Infants
4	C	10	Clothing-Children	5	Clothing-Children-Other
5	A	1	Automotive	6	Automotive-Licensing
6	A	1	Automotive	7	Automotive-Detailing
7	A	1	Automotive	8	Automotive-Parts
8	A	1	Automotive	9	Automotive-Repairs
9	A	1	Automotive	10	Automotive-Other
10	A	1	Automotive	11	Automotive-Maintenance-Warranty
11	E	12	Electronics	12	Electronics-Power-Supplies
12	E	12	Electronics	13	Electronics-Portable-Entertainment
13	E	12	Electronics	14	Electronics-Direct-Satellite-Dishes
14	E	12	Electronics	15	Electronics-Turmtables
15	E	12	Electronics	16	Electronics-Home Entertainment

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## Creating Your Own Formats with Input Control SAS Data Sets

```

proc means nway noprint
  data=advrept.trans_fmts;
class secondary_desc;
var detail;
output out=fmt2(drop=_TYPE_ _FREQ_
  rename=(secondary_desc=label)) min=startn max=endn;
run;

options nocenter nonumber nodate fmtsearch=(advrept);
proc print data=fmt2 noobs;
title 'Advanced Reporting';
title2 'Specifying Ranges in Input Control Data Set';
run;

```

The variables created by PROC MEANS are numeric.

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## Creating Your Own Formats with Input Control SAS Data Sets

Advanced Reporting Specifying Ranges in Input Control Data Set		
label	startn	endn
Automotive	6	11
Clothing-Children	2	5
Clothing-Men	46	49
Clothing-Women	39	45
Electronics	12	18
Gardening	101	103
Hardware	50	84
Houseware	20	29
Toys	104	104
Travel	32	35
Travel-Leisure	36	38

The smallest and largest values for the variable SECONDARY\_DESC are obtained using PROC MEANS and output to a temporary SAS data set. The required variable LABEL is made by using the RENAME SAS Data Set option in the Output Statement.

Since the variables START and END in an Input Control SAS Data SET must be character variables, the Data Step on the next page performs numeric-to-character conversion and also creates the variable FMTNAME by utilizing the RETAIN statement.

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## Creating Your Own Formats with Input Control SAS Data Sets

```

data fmt2final(keep=fmtname start end label);
length start end $ 4;
set fmt2;
retain fmtname 'secondf';
* numeric to character conversion;
start = put(startn, 4.);
end = put(endn, 4.);
run;

proc format library = advrept
    cntlin = fmt2final fmtlib;
run;
    
```

Numeric to  
Character  
Conversion

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## Creating Your Own Formats with Input Control SAS Data Sets

Advanced Reporting  
Frequency Table Using SECONDF Format

FORMAT NAME: SECONDF LENGTH: 17 NUMBER OF VALUES: 11		
MIN LENGTH: 1 MAX LENGTH: 40 DEFAULT LENGTH 17 FUZZ: STD		
START	END	LABEL (VER. 8.2 30DEC2001:21:36:18)
2	5	Clothing-Children
6	11	Automotive
12	18	Electronics
20	29	Houseware
32	35	Travel
36	38	Travel-Leisure
39	45	Clothing-Women
46	49	Clothing-Men
50	84	Hardware
101	103	Gardening
104	104	Toys

Format library information for the format SECONDF

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## Using MULTILABEL Formats

- **New** to Version 8, MULTILABEL formats allow you to specify both
  - A Primary label, *and*
  - Secondary labels
    - To values of variables upon which the format is to be applied
  - Only Three BASE SAS Procedures can use MLFs
    - MEANS
    - SUMMARY
    - TABULATE
- MLF's allow you to assign the same observation in the input data set to multiple format labels.

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## Using MULTILABEL Formats

- Example:
  - create a MLF (Multilabel Format) for the two digit variable in ADVREPT.TRANSACTIONS representing credit card type.

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## Using MULTILABEL Formats

```

620
621 proc format library=advrept;
622   value $cardf (multilabel)
623     'VC' = 'Visa Classic'
624     'MC' = 'Master Card Classic'
625     'VP' = 'Visa Platinum'
626     'MP' = 'Master Card Platinum'
627     'MG' = 'Master Card Gold'
628     'VG' = 'Visa Gold'
629     'VC', 'VP', 'VG' = 'Total, Visa'
630     'MC', 'MG', 'MP' = 'Total, Master Card';
631 run;

```

Diagram annotations: An arrow points from the title to the `multilabel` parameter in line 622. A box labeled "PRIMARY LABEL" points to the first assignment in line 623. A box labeled "SECONDARY LABEL" points to the second assignment in line 629. A box highlights the entire line 629.

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## Using MULTILABEL Formats

```

proc means data=advrept.transactions
  maxdec = 2 mean sum p50 nway;
format cardtype $cardf. charge_amount dollar16.2;
class cardtype/mlf;
var charge_amount;
output out=x mean= sum= p50=/autoname;
run;

proc print data=x;
title2 'Multilabel Formats: Data Set Created by PROC MEANS';
run;

```

Diagram annotations: An arrow points from the title to the `mlf` parameter in line 7. Another arrow points from the title to the `autoname` parameter in line 10.

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# Using MULTILABEL Formats

## PROC MEANS-generated output in the OUTPUT Window

**Advanced Reporting**  
**Multilabel Formats: Data Set Created by PROC MEANS**  
**The MEANS Procedure**  
**Analysis Variable : charge\_amount Transaction Charge Amount**

Credit Card Type	N Obs	Mean	Sum	50th Pct1
Master Card Classic	52798	515.30	27206890.11	515.16
Master Card Gold	86611	515.05	44609348.78	515.77
Master Card Platinum	34746	522.78	18164543.35	523.77
<b>Total, Master Card</b>	<b>174155</b>	<b>516.67</b>	<b>89980782.24</b>	<b>517.42</b>
<b>Total, Visa</b>	<b>85619</b>	<b>513.63</b>	<b>43976349.40</b>	<b>512.39</b>
Visa Classic	52733	513.32	27068908.04	511.67
Visa Gold	14665	509.72	7475032.87	507.06
Visa Platinum	18221	517.67	9432408.49	518.86

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# Using MULTILABEL Formats

- Limitation in SAS 8 with MLFs:
  - NOTSORTED Option cannot be specified in addition to the MULTILABEL Option
  - Format labels for MLFs in SAS 8 are therefore stored in sort order.
  - Workaround, if you are still using SAS 8:
    - Add a digit (or two) as the first characters of the format label so that the labels are stored in the desired order

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## Using MULTILABEL Formats

```
607 proc format library=advrept;  
608   value $card2f (multilabel)  
609     'VC' = '5Visa Classic'  
610     'MC' = '1Master Card Classic'  
611     'VP' = '7Visa Platinum'  
612     'MP' = '3Master Card Platinum'  
613     'MG' = '2Master Card Gold'  
614     'VG' = '6Visa Gold'  
615     'VC', 'VP', 'VG' = '8Subtotal, Visa'  
616     'MC', 'MG', 'MP' = '4Subtotal, Master Card';  
617   run;
```

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## Using MULTILABEL Formats

```
proc means data=advrept.transactions  
                                NOPRINT descendtypes;  
format cardtype $card2f. ;  
class cardtype/mlf; ←  
var charge_amount;  
output out=x(rename=( _FREQ_ = trans_count))  
       mean= sum= p50=/autoname;  
run;
```

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## Using MULTILABEL Formats

### Advanced Reporting

Multilabel Formats: Data Set Created by PROC MEANS  
A Work-Around for Problems with MLFs

Obs	cardtype	_TYPE_	trans_ count	charge_ amount_ Mean	charge_ amount_ Sum	charge_ amount_ P50
1	1Master Card Classic	1	52798	515.302	27206890.11	515.160
2	2Master Card Gold	1	86611	515.054	44609348.78	515.770
3	3Master Card Platinum	1	34746	522.781	18164543.35	523.765
4	4Subtotal, Master Card	1	174155	516.671	89980782.24	517.420
5	5Visa Classic	1	52733	513.320	27068908.04	511.670
6	6Visa Gold	1	14665	509.719	7475032.87	507.060
7	7Visa Platinum	1	18221	517.667	9432408.49	518.860
8	8Subtotal, Visa	1	85619	513.628	43976349.40	512.390
9		0	259774	515.668	133957131.64	515.730

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## MLFs in SAS 9

```

data patients;
input name $ age;
datalines;
mary 10
fred 28
john 7
erica 29
tim 5
susan 13
andrew 47
peter 37
cindy 16
thea 21
joe 20
tilly 58
ruth 75
rick 8
richard 19
helen 26
alexa 10
heather 2
;
run;

proc format;
value multilabelfmts (multilabel)
0 - 12 = 'Child'
13 - 19 = 'Adolescent'
0 - 19 = 'Children & Adolescents'
20 - 21 = 'Young Adult'
low - 21 = 'Children, Adolescents & Young Adults'
22 - high = 'All Adults'
low - high = 'All Patients';
run;

proc means data=patients mean median maxdec=2;
* use MLF _without_ NOTSORTED;
format age multilabelfmts.;
class age/MLF; * <=<= USE Multilabel Format Option;
var age;
title3 'Using Multilabel Formats';
title4 'Default: SORTED';
run;

```

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# MLFs in SAS 9


Getting the Most from SAS(r) 9 Software  
New Formats and Informats  
Using Multilabel Formats  
Default: SORTED

Analysis Variable : age			
age	N Obs	Mean	Median
Adolescent	3	16.00	16.00
All Adults	7	42.86	37.00
All Patients	18	23.94	19.50
Child	6	7.00	7.50
Children & Adolescents	9	10.00	10.00
Children, Adolescents & Young Adults	11	11.91	10.00
Young Adult	2	20.50	20.50

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# MLFs in SAS 9

```
634 proc format;
635   value multilabelfmts (multilabel NOTSORTED)
636     0 - 12 = 'Child'
637     13 - 19 = 'Adolescent'
638     0 - 19 = 'Children & Adolescents'
639     20 - 21 = 'Young Adult'
640     low - 21 = 'Children, Adolescents & Young Adults'
641     22 - high = 'All Adults'
642     low - high = 'All Patients';
643 run;
```



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## MLFs in SAS 9

```
646 ods listing close;
647 ods rtf file = 'C:\means2.rtf' style=sasweb bodytitle;
648 proc means data=patients mean median maxdec=2;
649 * use MLF _with_ NOTSORTED;
650 format age multilabelfmtN;
651 class age/ preloadfmt order=data MLF;
652 var age;
653 title3 'Using Multilabel Formats';
654 title4 'Option: NOTSORTED';
655 run;
656 ods rtf close;
657 ods listing;
```

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## ORDER=DATA in PROC MEANS When a Multilabel Format is Applied

**ORDER=DATA | FORMATTED | FREQ | UNFORMATTED**

specifies the order to group the levels of the class variables in the output, where

**DATA**

orders values according to their order in the input data set.

**Interaction:** If you use PRELOADFMT, then the order of the values of each class variable matches the order that PROC FORMAT uses to store the values of the associated user-defined format. If you use the CLASSDATA= option in the PROC statement, then PROC MEANS uses the order of the unique values of each class variable in the CLASSDATA= data set to order the output levels. If you use both options, then PROC MEANS first uses the user-defined formats to order the output. If you omit EXCLUSIVE in the PROC statement, then PROC MEANS appends after the user-defined format and the CLASSDATA= values the unique values of the class variables in the input data set based on the order in which they are encountered.

**Tip:** By default, PROC FORMAT stores a format definition in sorted order. Use the NOTSORTED option to store the values or ranges of a user defined format in the order that you define them.

**Featured in:** [Computing Output Statistics with Missing Class Variable Values](#)

**Excerpt from PROC MEANS Documentation  
(SAS 9.1.3 on-line version)**

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# MLFs in SAS 9

Getting the Most from SAS(r) 9 Software  
New Formats and Informats  
Using Multilabel Formats  
Option: NOTSORTED

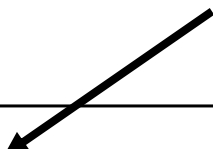
Analysis Variable : age			
age	N Obs	Mean	Median
Child	6	7.00	7.50
Adolescent	3	16.00	16.00
Children & Adolescents	9	10.00	10.00
Young Adult	2	20.50	20.50
Children, Adolescents & Young Adults	11	11.91	10.00
All Adults	7	42.86	37.00
All Patients	18	23.94	19.50

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# Picture Formats

```
579 data phonenumbers;
580 input number 1-18;
581 datalines;
582 7079967380
583 4155193206
584 2125551414
585 2024561515
586 9162430728
587 1009997865
588 9958909
589 43408085
590 1010000
591 ;
592 run;
```

```
594 proc format;
595 picture phonefmt
596     2000000-9999999 = '999-9999'
597     2000000000-9999999999 = '999 999-9999'
598     other = 'Invalid Phone Number';
599 run;
600
601 ods rtf file='C:\format9.rtf' style=sasweb;
602 proc print data=phonenumbers;
603 format number phonefmt.;
604 title 'My Friend the SAS Format';
605 title2 'Using a PICTURE Format';
606 run;
607 ods rtf close;
```



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## PICTURE Formats

Obs	number
1	707 996-7380
2	415 519-3206
3	212 555-1414
4	202 456-1515
5	916 243-0728
6	Invalid Phone Number
7	995-8909
8	Invalid Phone Number
9	Invalid Phone Number

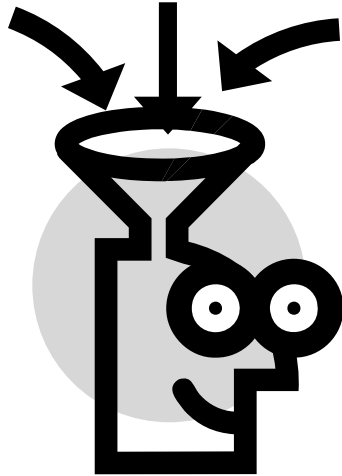
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## Summary and Conclusion

- Formats are an essential part of the SAS System
- Control how we see the values of variables
- Provide many tools to:
  - Enhance the visual appeal of our reports/analyses
  - Reduce coding time
  - Eliminate re-keying of data
  - Keep us employed!

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**Thanks for Attending!**



**Questions?**

**Comments?**

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