

GENERATE DATA LISTINGS FOR A NEW DRUG APPLICATION IN 5 MINUTES AS A PART OF AUTOMATED REPORT SYSTEM

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ABSTRACT

Each SAS programmer in pharmaceutical industry knows how much time it takes to write programs to produce tables and data listings for a new drug application. Almost every company spent some programming time to facilitate this process and develop some sort of global system of programs that would apply for each study.

This presentation demonstrates one part of automated report system: how to produce data listings. This part is built up in SAS Application using SAS/FRAME® and Screen Control Language. But right now the author wants to show the hidden process how to generate any kind of listings for customized report and save them in Microsoft® Word document. She doesn't emphasize on Application Development, but shows the macros that can be used by programmers who are not familiar with Screen Control Language.

The system includes a few macros that are compiled and stored in the SAS® Catalog. They can be used for any study without changes. Nevertheless the author shows you all tricks and techniques how to adapt these macros to your company needs and requirements.

Using these techniques half of your report will be done in 5 minutes!

OVERVIEW

The MACRO %GLISTINGS is the major and the only macro that we have to call to generate a report for a specified SAS data set as shown in the examples #1-3. The other macros are compiled and stored in SAS Catalog and they don't require any changes from study to study. If report has to be generated for all or some files of the database for specific study, than the macro %ALLFILES is called first as shown in the example #4.

EXAMPLE #1

1) **Generate Data Listings for DEMOG file including all variables.** There is one condition for data, patients' id shouldn't be 0. Title for this listings is "DEMOGRAPHIC DATA".

```
**** SET PARAMETERS *****;
libname db "n:\database";

* EXAMPLE #1 *****;
%GLISTING(insds=db.demog ,
          condit=pat ne "0",
          tit2=STUDY NAME,
          tit3=DEMOGRAPHIC DATA
        );
```

2) After submitting this program, a window will appear with all listed variables from requested file and you are asked to mark the variables that you would like to include in the report. If we need all variables in your report, we will mark ALL with a sign "X".

If we want some specific variables, we can mark them with a sign "X" or numbers 1,2,3....

If we mark variables with numbers, these numbers will be the order they appear in the report.

		1,2,3,... sorted by x or X- pick up this field for report	
	ALL VARIABLES		x
PAT	___	AGE	___
Patient number		Age	
ANALGNSA	___	BMI	___
Analgesic/NSAID?		Bmi	
ETHNORIG	___	SEX	___
Ethnic origin		Sex	
HT	___	WT	___
Height		Weight	
GRADE	___		
Grade (Outerbridge)			

See Output 1 for this Example later in this paper.

NOTE: If there is no enough space for all variables on the page, this program will automatically create PART 1, PART 2, ... for your report. The variables that were marked with numbers will be carried over for all of these parts and merged with the others.

EXAMPLE #2

1) **Generate Data Listings for DEMOG file, where is will be printed by treatment.** Title for these listings is "DEMOGRAPHIC DATA". Second title will be left justified and include information about treatment group. Footnote2 will be left justified and tell that data listings include all data.

```
* EXAMPLE #2 *****;
%GLISTING(insds=MYSET,
          tit2=STUDY NAME,
          tit4=DEMOGRAPHIC DATA*,
          tit5=%str(leftjustTreatment
Group: #byval1),
          foot2=%str(leftjust*Includes all
data),
          do_by=tmt );
```

In this example once again a window appears with listed variables and their labels. We mark specific ones that should be in the report. We can mark ALL VARIABLES as "X" or if we want to sort the data, mark them with the numbers and they will appear in the report in specific order and "sorted by". See Output 2 for this example later in this paper.

STUDY NAME	1,2,3,... sorted by		
	x or X- pick up this		
	field for report		
ALL VARIABLES	_____		
PAT	<u>1</u>	AGE	<u>4</u>
Patient number		Age	
TMT	---	BMI	<u>x</u>
Treatment		Bmi	
ETHNORIG	<u>3</u>	SEX	<u>2</u>
Ethnic origin		Sex	
HT	<u>x</u>	WT	<u>x</u>
Height		Weight	
GRADE	<u>x</u>	ANALGNSA	---
Grade (Outerbridge)		Analgesic/NSAID?	

EXAMPLE #3

1) **Generate Data Listings for DEMOG file including only some variables that specified in VARNAMES=** Whenever we need to sort our output by any variable, we put it in parameters HEAD=... and these variables also appear first in the listed order. Titles and footnotes are the same as in Examples 1,2 and also we want to calculate pages' number.

```
* EXAMPLE #3 *****;
%GLISTING(insds=MYSET ,
          condit=pat_id ne "0",
          tit2=&study,
          tit4=DEMOGRAPHIC DATA,
          tit5=pagenumber,
          tit6=%str(leftjustTreatment Group:
#byval1),
          foot2=%str(rightjustProgram name
g:\MYPROGRAM.sas),
          varnames=sex race age weight height
bmi,
          head=pat_id ,
          do_by=tmt
          );
```

EXAMPLE #4

1) If we need to generate a report for a few files from the database, we recall the macro %ALLFILES without any parameters. The window with all file names from specified database will appear and we have to pick up appropriate ones. This macro will create the file names file1 file2...as macro variables.

```
**** SET PARAMETERS *****;
libname db "n:\database";

%MACRO MYREPORT;
%ALLFILES;

%DO ifile=1 %TO &files ;
%GLISTING(insds=db.&&file&ifile,
          tit2=This is all data
          );
%END;
%MEND MYREPORT;
%MYREPORT;
```

2) After calling macro ALLFILES, the window will appear with files' names from specified database and we have to mark the files that we need for report.

STUDY NAME		
or X- pick up this field for report		
ALL ___		
AE	ILLNESS	RTG
WBSTIFF1	CONMED	IMPRCOM
SCRMED	WORK	CONSENT
IMPROV	TEGNER	DEMO
IMPROV1	TRIALMED	INJECTIO
TFFICACY	LEQIND	VISIT
EFFIFINA	MEDHIST	FINAL
MEDHIST	WAPAIN	GENPHYS
OVERALL	WAPAIN1	IECRIT
WBSTIFF		

TIT1/8 Titles in the report
 FOOT2/7 Footnotes in the report
 VARNAMES Variables from SAS data set in the Report
 HEAD Variables to be sorted by and keep in the presented order
 DO_BY "Do by" report. Start new page for do_by variable. Usually this is treatment.

OUTPUT

1. Report in the SAS Output Window
2. File specified in OUTTO, ready to be used in Microsoft® Word

3) Then %GLISTINGS works as in examples #1-3.

NOTE 1: There are some keywords for Titles and Footnotes that we can use.

- Leftjust - moves text to the left
- Rightjust - moves text to the right
- Pagenumber – calculates page numbers and generates a title like “Page 1 of 30”.

NOTE 2: The Output is always automatically saved in Microsoft Word format in the output file.

HOW TO USE %GLISTINGS MACRO

```
%GLISTING( insds = &panel ,
refer = 1,
condit= ,
tit1 = , tit2 = , tit3 = ,
tit4 = , tit5 = , tit6 = ,
tit7= , tit8= ,
foot2= , foot3= , foot4= ,
foot5= , foot6= , foot7= ,
varnames= allvars,
head= allheads,
do_by=
);
```

Parameter	Represents
INSDS	The name of the SAS data set
REFER	The number of reference for report, most of the time blank
CONDIT	Any condition for variables

Example

```
%GLISTING( insds= adverse,
condit= pat_id ne . ,
tit1=This is a test,
tit2=pagenumber,
do_by=trt );
```

THE WHOLE STRUCTURE

Macro Glisting is a major macro and it calls several more that are compiled and stored in the SAS® Catalog library:

ALLFILES - Creates a window with files names from the specified database library and gives us a choice to pick up particular files to run one by one.

- 1) This macro runs proc contents and assigns files names to macro variables FILE1, FILE2, FILE3....
- 2) Then we use these names to display in the window and allow the user to choose what file to work with.

ALLVARS – Creates a window with the variables names and labels from specified file and gives us a possibility to mark appropriate ones.

Uses the same idea as ALLFILES macro only works with variables.

- 1) It reads file instead of library. Then using %SYSFUNC keeps variables' names, labels and formats as macro variables.

```
%let name&i=%SYSFUNC(VARNAME(&dsid,&i));
%let labl&i=
%QSYSFUNC(VARLABEL(&dsid,&i));
%let fmts&i=%SYSFUNC(VARFMT(&dsid,&i));
```

- 2) These new macro variables are used to display information in the window and allow us to pick up desirable ones.
- 3) Proc report will be run in %DO_REP Macro presenting marked variables.

NEWFMTS – Change the formats for selected variables to the formats that they have to be presented in the report.

MYLOOPCO – Inside macro that generates loops for variables to accommodate them properly on the screen.

CREATE – Separates header from the main body of the report.
Header is sorted variables that we want to see in specific order in the report.

DO_REP- Run Proc Report to print out the report with assigned variables and splits the report into the parts in case if the space doesn't allow to keep all variables.
Header's variables are carried over from part to part.

THEEND - Reformat output in the way we want to see in the printed report. Put Titles and Footnotes in the appropriate positions(left/right justified) and calculates the number of pages.
Gives you an option to save the report in Microsoft® Word document.
Was presented in the PharmaSug98 conference in the article "A Macro to Produce Pre-Formatted Electronic Documents".

CONCLUSION

Presented Macros have been successfully used for a long time to generate data listing report for a new drug application. The output of your report is automatically saved in the Microsoft® Word document to be used for FDA electronic submission.

The Macros are very easy to use, modify or update and take little, almost no time to run. There are some general procedures were implemented to generate tables for a new drug application report but this topic is beyond this presentation.

ACKNOWLEDGMENTS

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%ALLFILES	(optional)
%GLISTING(...)	
if &varnames=ALLVARS	→ %ALLVARS
	v
	%MYLOOPCO
	%NEWFMTS
Else	→ %CREATE
%DO_REP	→ %THEEND

EXAMPLE #1, ❶

STUDY NAME
DEMOGRAPHIC DATA

August 3, 1998

PATIENT NUMBER	SEX	RACE	AGE	WEIGHT	HEIGHT	BMI	GRADE	ANALGNSA
1	MALE	CAUCAS	39	82	181	25.0	I	NO
6	FEMALE	CAUCAS	70	67	160	26.2	III	NO
8	FEMALE	CAUCAS	58	70	166	25.4	II	NO
11	MALE	CAUCAS	62	76	172	25.7	III	NO
12	MALE	CAUCAS	50	85	172	28.7	III	NO
16	MALE	CAUCAS	57	120	182	36.2	II	NO
19	FEMALE	CAUCAS	45	85	163	32.0	III	NO
23	FEMALE	CAUCAS	59	78	163	29.4	II	NO
24	FEMALE	BLACK	59	70	160	27.3	II	NO
2	FEMALE	CAUCAS	52	58	165	21.3	III	NO
4	FEMALE	CAUCAS	73	68	172	23.0	III	NO
9	MALE	CAUCAS	65	90	187	25.7	II	NO
10	FEMALE	CAUCAS	50	63	163	23.7	III	YES
13	MALE	CAUCAS	54	90	172	30.4	III	NO
17	FEMALE	CAUCAS	56	72	160	28.1	III	YES
21	FEMALE	CAUCAS	59	56	159	22.2	II	NO
3	MALE	CAUCAS	59	92	172	31.1	II	NO
5	FEMALE	CAUCAS	63	70	157	28.4	II	NO
7	FEMALE	CAUCAS	64	90	172	30.4	III	NO
14	FEMALE	CAUCAS	51	53	160	20.7	II	NO
15	FEMALE	CAUCAS	60	80	157	32.5	II	NO
18	MALE	CAUCAS	57	100	178	31.6	III	NO
20	MALE	CAUCAS	53	72	178	22.7	II	NO
22	MALE	CAUCAS	38	86	187	24.6	I	NO
25	MALE	CAUCAS	53	95	172	32.1	II	NO

=====

EXAMPLE #2, ②

STUDY NAME August 3, 1998
 DEMOGRAPHIC DATA*

TREATMENT GROUP: DRUG A

PATIENT NUMBER	SEX	RACE	AGE	WEIGHT	HEIGHT	BMI	GRADE	ANALGNSA
1	MALE	CAUCAS	39	82	181	25.0	I	NO
6	FEMALE	CAUCAS	70	67	160	26.2	III	NO
8	FEMALE	CAUCAS	58	70	166	25.4	II	NO
11	MALE	CAUCAS	62	76	172	25.7	III	NO
12	MALE	CAUCAS	50	85	172	28.7	III	NO
16	MALE	CAUCAS	57	120	182	36.2	II	NO
19	FEMALE	CAUCAS	45	85	163	32.0	III	NO
23	FEMALE	CAUCAS	59	78	163	29.4	II	NO
24	FEMALE	BLACK	59	70	160	27.3	II	NO

*Includes all data

STUDY NAME August 3, 1998
 DEMOGRAPHIC DATA*

TREATMENT GROUP: DRUG B

PATIENT NUMBER	SEX	RACE	AGE	WEIGHT	HEIGHT	BMI	GRADE	ANALGNSA
2	FEMALE	CAUCAS	52	58	165	21.3	III	NO
4	FEMALE	CAUCAS	73	68	172	23.0	III	NO
9	MALE	CAUCAS	65	90	187	25.7	II	NO
10	FEMALE	CAUCAS	50	63	163	23.7	III	YES
13	MALE	CAUCAS	54	90	172	30.4	III	NO
17	FEMALE	CAUCAS	56	72	160	28.1	III	YES
21	FEMALE	CAUCAS	59	56	159	22.2	II	NO

*Includes all data

EXAMPLE #3, ③

STUDY NAME

August 3, 1998

DEMOGRAPHIC DATA*
(page 1 of 3)

TREATMENT GROUP: DRUG A

PATIENT NUMBER	SEX	RACE	AGE	WEIGHT	HEIGHT	BMI
1	MALE	CAUCAS	39	82	181	25.0
6	FEMALE	CAUCAS	70	67	160	26.2
8	FEMALE	CAUCAS	58	70	166	25.4
11	MALE	CAUCAS	62	76	172	25.7
12	MALE	CAUCAS	50	85	172	28.7
16	MALE	CAUCAS	57	120	182	36.2
19	FEMALE	CAUCAS	45	85	163	32.0
23	FEMALE	CAUCAS	59	78	163	29.4
24	FEMALE	BLACK	59	70	160	27.3

Program name: g:\MYPROGRAM.sas