Workarounds for SASWare Ballot® Items
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ABSTRACT
As part of its effort to insure that SAS Software is useful to its users, SAS® Institute collects suggestions for changes and enhancements and asks users to rank them in importance. This paper presents workarounds for several SASWare Ballot items.

UPDATES
I did not have access to Version 8 when I wrote this paper. After V8 becomes available, I will revise this paper as needed. I will also incorporate comments received at SUGI. The new version will be available on my web page at the address shown below. You will be able to register for notification of future updates.

INTRODUCTION
SASWare Ballot items often ask for a way to do something that SAS Software can already do. Sometimes the existing procedure is not obvious, or is hidden in a Changes and Enhancements document, or requires macro coding. This paper presents a few workarounds for requests on the SASWare Ballot.

The number after a request title is the year in which the item appeared on the SASWare Ballot.

NOT COVERED IN THIS PAPER
Literally dozens of items on past years' ballots have been addressed by the Output Delivery System. One such item is item #1 on the 2000 SASWare Ballot - "provide a system option to control the number of decimal places printed for any output". Such items are not addressed here.

Also not addressed here are items which are directly answered in the Changes and Enhancements documentation.

There are also many other items which could have been addressed given more space.

GENERAL

A partial workaround is to code:

```
OPTIONS NODATE;
TITLE "%SYSFUNC(datetime(), datetime.)";
```

The SYSFUNC macro is documented in Macro Facility Enhancements to Release 6.09E and Release 6.11. It allows you to use a data step function in the macro language, and format the result. In this case, the DATETIME function is used to obtain the current date and time as a SAS datetime value; the value is then run through the DATETIME function.

An advantage to this method is that you can specify any date, time, or datetime format that you want, or combinations of functions. The primary disadvantage is that you cannot place the resulting date into the default location of the system date; it must go into a title or footnote location.

The following code places both the English and Italian dates into the title line:

```
TITLE "%SYSFUNC(date(), date9.)) / %SYSFUNC(date(), itadfde9.))";
```

The result is

```
20JAN2000 / 20Gen2000
```

PROVIDE A SYSTEM OPTION TO RESET ALL OPTIONS BACK TO THE DEFAULT SETTING AT INITIALIZATION OF THE SAS SYSTEM (1998)

A general solution is complicated in version 6, but if you want to save only certain settings, and those settings are available through the new GETOPTION function, you can write a pair of macros or data steps to save and restore values.

Here's a data step solution:

```
options ls=132;
/* Save options */
data saveopts;
length optvalue $200.;
optvalue = getoption("linesize", "keyword");
output;
optvalue = getoption("pagesize", "keyword");
output;
run;
/* Do some stuff here that might change LS and PS */
options ls=64 ps=30;
title 'Small page';
proc print data=sasuser.iris (obs=10);
run;
/* Restore the settings */
data _null_;
set saveopts;
call execute('options ');
call execute(optvalue);
call execute(';');
run;
/* The following step will run with the original settings */
title 'Big page';
proc print data=sasuser.iris (obs=10);
run;
```
This produces an extra data set and messages in the log. A macro solution might be cleaner. The one shown below is simple; it saves and restores only three specified values:

```sas
%macro saveopts;
   %global saveopts;
   %let saveopts =
      %sysfunc(getoption(ls, keyword))
      %sysfunc(getoption(ps, keyword))
      %sysfunc(getoption(center, keyword));
%mend saveopts;

%macro restopts;
   options &SAVEOPTS.;
%mend restopts;
```

```sas
/* Set some options. */
options ls=132 ps=60 center;
/* Save them. */
%saveopts;
/* Change values. */
options ls=64 ps=30 nocenter;
title 'Small page';
proc print data=sasuser.iris (obs=10);
run;
/* Restore original values. */
%restopts;
title 'Original page';
proc print data=sasuser.iris (obs=10);
run;
```

The macros could be much more elaborate. You could, for example, pass the names of the options you want to save as a parameter. You could also specify the name of the option into which values would be saved, which would allow you to switch back and forth between several different sets of options.

In version 8, as I understand it, this problem will be much easier to solve.

**ALL PROCEDURES**

**PROVIDE AN OPTION TO PRODUCE A HEADER LINE WHEN THE INPUT DATASET CONTAINS NO OBSERVATIONS (1999, 1998)**

This is one of the most commonly asked questions on the SAS-L email list. This solution is simple and will handle almost all data sets correctly. It will also handle WHERE clauses:

```sas
%macro prnt0obs
   (data=_last_,
    msg="No items to display.",
    line=5,
    column=5);
   data _null_; file print;
   put #&line. @&column. "||quote(&msg.)||";
set &data; call execute('run cancel;');
   stop;
   run;
%mend prnt0obs;
```

You might use it like this:

```sas
title 'Iris Data';
proc print data=sasuser.iris
   (where=(sepallen=0));
%prnt0obs( data=sasuser.iris
   (where=(sepallen=0)));
```

There will be no observations in SASUSER.IRIS fulfilling the WHERE clause, so this code will be generated:

```sas
data _null_; file print;
   put #5 @5 "No items to display.";
```

A page will be printed in the log telling you that no observations were available to print. Note that the setup for the PROC PRINT will be used for on this page (I consider that to be a good feature).

If the WHERE clause selects some observations, this code would be generated:

```sas
data _null_; file print;
   put #5 "No items to display.";
run cancel;
```

The run cancel statement will stop the data step from executing, and the "no items" page will not print.

A more common solution to this type of problem is to use the NOBS= option of the SET statement to obtain the number of observations; if NOBS = 0, then your print a message. There are two problems with that method: it doesn't work correctly with data sets that have deleted observations, or with any kind of view; and it doesn't handle WHERE clauses. Using the observation count from DICTIONARY.TABLES or SASHELP.VTABLE has similar problems.

Another alternative is to use the data set information function ATTRN to get the number of logical observations (NLOBS). This works, but doesn't handle WHERE clauses. You also have to check whether the data set is a real data set or a view; if it's a view, you still have to iterate through the observations. That approach is a lot more work with probably no gain in execution speed.

**DATA STEP**


If you know whether the variable in question is numeric or character, you can accomplish this indirectly by setting up an array consisting of all variables of its type, then iterating through the array until you find the name you want:

```sas
76 data _null_;
77 call execute('data _null_; file print;');
78 call execute("put #&line. @@column. " || quote(&msg.) || ";");
79 set sasuser.iris (obs=3);
80 array _numvar _numeric_;
81 length _varname $8.;
```
82 do over _numvar;
83 call vname(_numvar, _varname);
84 if _varname = 'SPEC_NO' then
85 do;
86 put _numvar=;
87 leave;
88 end;
89 end;
90 end;
91 run;

SPEC_NO=1
SPEC_NO=3
SPEC_NO=2

Note that the IF statement in line 85 isn't restricted to a strict equality test; you could also choose to print all variables whose names contain a particular string, or you could choose the variable to print based on the value of some other variable in the observation. If you plan to print more than one variable, you should delete the LEAVE statement.


CONTAINS can be accomplished with the INDEX function; the following two data steps produce equivalent results:

80 data test1;
81 set sasuser.feeder;
82 where pmenu contains 'sasdesk';
83 run;

NOTE: The data set WORK.TEST1 has 5 observations and 8 variables.

84 data test2;
85 set sasuser.feeder;
86 where index(pmenu, 'sasdesk') > 0;
87 run;

NOTE: The data set WORK.TEST2 has 5 observations and 8 variables.

BETWEEN-AND can be accomplished with compound operators; the following two data steps produce equivalent results:

112 options nostimer nofullstimer;
113 data;
114 set sasuser.iris;
115 where sepallen between 50 and 60;
116 run;

NOTE: The data set WORK.DATA1 has 67 observations and 5 variables.

117 data;
118 set sasuser.iris;
119 if 50 <= sepallen <= 60;
120 run;

NOTE: The data set WORK.DATA2 has 67 observations and 5 variables.

LIKE can be accomplished with the new regular expression functions. These functions provide much more functionality than LIKE, but can be quite complicated to use. The following two data steps produce equivalent results:

177 data;
178 set sashelp.manage;
179 where keywords like '%male%er%';
180 run;

NOTE: The data set WORK.DATA12 has 5 observations and 7 variables.

181 data;
182 retain rx; drop rx;
183 if _n_ = 1 then
184 rx = rxparse('``: "male" : "er" ;
185 set sashelp.manage end=eodata;
186 if rxmatch(rx, keywords) > 0;
187 if eodata then
188 call rxfree(rx);
189 run;

NOTE: The data set WORK.DATA13 has 5 observations and 7 variables.

Regular expressions are too complicated to discuss here. The documentation is no longer available for version 6, but is the same as in version 7. For an overview, see Mike Rhoads paper from SUGI22, Some Practical Ways to Use the New SAS Pattern-Matching Functions.

Unfortunately, the regular expression functions were implemented in a way that makes them unavailable in WHERE clauses.

ALLOW THE IN OPERATOR TO ACCEPT EXPRESSIONS AND VARIABLE NAMES (1998)

A workaround in the data step is to use the SELECT statement instead. Instead of using

if x in (a, b) then
   put 'hello';

(which doesn't compile), use

select (x);
when (a, b)
   put 'hello';
otherwise
   end;

PROC CATALOG

ALLOW THE USE OF THE _ALL_ KEYWORD ON THE DELETE STATEMENT WITH THE APPROPRIATE ENTRY TYPE TO DELETE ALL MEMBERS WITH THE SPECIFIED ENTRY TYPE (1999)

What is wanted here is the ability to code something like:

proc catalog;
   delete _all_ / entrytype=format;
run;

Posters
You can’t do that, but you can use the system table DICTIONARY.CATALOG to prepare a list of entries to delete:

```sas
proc format;
  value a
    1 = 'a'
    2 = 'b';
  value b
    3 = 'x'
    4 = 'y';
run;
%let entries = ;
proc sql noprint;
  select objname
  into :entries separated by ' ' 
  from dictionary.catalogs
  where libname = 'WORK'
       and memname = 'FORMATS'
       and memtype = 'CATALOG'
       and objtype = 'FORMAT';
quit;
proc catalog catalog=work.formats;
  delete &ENTRIES. / entrytype=format;
run;
quit;
```

A data step solution using SASHELP.VCATALG is also possible:

```sas
data _null_; 
set sashelp.vcatalg
(where=(libname='WORK'
          and memname='FORMATS'
          and memtype='CATALOG'
          and objtype='FORMAT'))
end=enddata;
if _n_ = 1 then 
call execute('proc catalog
catalog=work.formats;');
else 
call execute('run; quit;');
r
run;
```

In my tests, the data step solution was substantially slower than the SQL solution (over a minute to execute vs. less than a second). Either solution can be embedded into a macro, and the data step solution translates fairly easily into a pure macro solution using the data set functions (it would probably still be slow – I’d use SQL and live with some messages in the log).

**PROC SORT**

**ADD AN OPTION TO OUTPUT OBSERVATIONS DELETED BY THE NODUP OR NODUPEKEY OPTION TO AN ALTERNATE DATA SET (1999, 1998)**

Since the NODUP option does not work correctly anyway, adding an option to output the deleted observations would not be especially useful anyway (see my SUGI 25 poster The Problem With NODUPLICATES). This workaround uses PROC SORT followed by a datastep with FIRST. and LAST.

```sas
data test;
  input A B $ @@;
cards;
  1 A 2 B 2 A 3 C 3 X
  4 D 1 A 3 C 3 C 5 E
run;
proc sort data=test;
  by b a;
run;
data nodups dups;
  set test;
  by b a;
  if first.a then
    output nodups;
  else
    output dups;
run;
```

**PROVIDE THE ABILITY TO SPECIFY A FUNCTION IN THE BY STATEMENT AND SORT BY ITS RESULT (1998)**

This capability would be used to sort a data set according to some value which is not in the data set, but which can be calculated from variables in the data set. It’s easy to do this with PROC SQL.

This example creates a small data set and then sorts it by the absolute value of variable A:

```sas
data test;
  inputAB$@ @
cards;
  1A-  2B2C3D-  3E
run;
proc sql;
  create table test as
      select *
      from test
      order by abs(a);
quit;
```

The results:

<table>
<thead>
<tr>
<th>OBS</th>
<th>A</th>
<th>B</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>A</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>2</td>
<td>C</td>
</tr>
<tr>
<td>3</td>
<td>-2</td>
<td>B</td>
</tr>
<tr>
<td>4</td>
<td>-3</td>
<td>E</td>
</tr>
<tr>
<td>5</td>
<td>3</td>
<td>D</td>
</tr>
</tbody>
</table>

**REFERENCES**


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