This paper describes a macro system designed to reduce confusion over the origin of output. It is primarily designed for CMS SAS users and for jobs submitted to OS from CMS. Using the macro system, output can be annotated so that one can easily determine the origin of the source program producing the output, and the date and time it was run. Specifically, the macro traces the CMS userid, the CMS minidisk file that created the output, and the date and time the output was produced. Output from SAS procedures, PUT statements, and SAS/GRAPH® can be annotated using this system composed of two EXECs and a SAS macro.

To initiate the source program tracking system, users must modify their SAS EXEC and write a QUERYCON EXEC to communicate with VMBATCH®. Changes to the EXECs are made once, and saved permanently on the user's minidisk for future use.

The following changes should be made to the SAS EXEC:

```
replace:
parse upper ARG ARGSTRING
with:
parse upper ARG fn others '(' options
  if fn = 'USERID
    then sysparm = USERID
  else sysparm = 'SYSPARM'
fn

replace:
'SAS' ARGSTRING
with:
'SAS' fn others '(' sysparm options
```

The QUERYCON EXEC is listed below:

```
/* querycon exec */
EXECIO * CP (STEM CON. STRING QUERY CONS'
parse var con.3 addr how userid
push userid
return rc
```

The JOBID SAS macro is listed in Appendix A. It can be saved as a SAS source file and brought into the program using %INCLUDE, or for ease of use, it can be added to the user's AUTOCALL macro library. The Source Program Tracking System is now ready for use.

Initiation of the Source Program Tracking System is done from within the program whose output is to be annotated. Specifications for the JOBID macro are dependent on the type of output to be annotated (i.e., is the output generated by SAS procedures, PUT statements, or SAS/GRAPH®). Once the type of output has been determined, the appropriate positional/keyword parameters can be included in the macro call from within the program.

The JOBI D macro is easy to use. Table 1 lists available parameters and their default values. The following examples illustrate its use for three types of output.

**Examples**

**Ex 1.** For procedures that produce printed output, use the FOOTNOTE option in the macro call, e.g.

the macro call:

```
%JOBID(FOOTNOTE)
```

generates:

```
FOOTNOTE "USERID(FILENAME) 04/03/90 11:15"
```

In this example the user supplies the option FOOTNOTEn, where n = 1 by default and may take on values n = 1 to 10. The JOBID macro generates a footnote that is LEFT justified. A useful strategy is to place a macro call of this form at the beginning of a program. Because footnote statements are global statements, all subsequent output is annotated with the JOBID output string.

**Ex 2.** For graphics procedures, use the GRAPHICS option in the JOBID macro call, e.g.

the macro call:

```
%JOBID(GRAPHICS, HEIGHT = 1.25)
```

generates:

```
NOTE MOVE = (0.0 IN, 0.01 IN)
F = SIMPLEX
H = 1.25
C = BLACK
"USERID(FILENAME) 04/03/90 11:17"
```

The macro generates a complete NOTE statement with the appropriate subcommand to place the JOBID output string in the lower left corner of the graphics output. The JOBID macro call must be placed within the SAS/GRAPH PROC whose output is to be annotated, as NOTE statements are not global.

**Ex 3.** For FILE PRINT output, use a PUT statement with pointer control commands in the argument of the JOBID macro call, e.g.

the macro call:

```
PUT %JOBID(#60);
```

generates:

```
PUT #60 "USERID(FILENAME) 04/03/90 11:19"
```

In this example the JOBID macro generates the pointer control to place the JOBID output string on line 60 of each page of the output.

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Table 1

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Default Value</th>
<th>Description of Use</th>
</tr>
</thead>
<tbody>
<tr>
<td>arg</td>
<td>FOOTNOTE</td>
<td>This positional parameter is used to define the action the macro will take to annotate the output. Other options include: GRAPHICS, TITLE, and pointer control commands.</td>
</tr>
<tr>
<td>DATEFMT</td>
<td>= MDY</td>
<td>Keyword parameter used to define date style. Other options include: DMY, YMD, and DATE7.</td>
</tr>
<tr>
<td>TIME</td>
<td>= YES</td>
<td>Keyword parameter to specify inclusion of the time the job executed. To suppress the inclusion of time, specify NO.</td>
</tr>
<tr>
<td>BEFORE</td>
<td>=</td>
<td>Keyword parameter specifying character constants to be placed before the JOBID output string.</td>
</tr>
<tr>
<td>AFTER</td>
<td>=</td>
<td>Keyword parameter specifying character constants to be placed after the JOBID output string.</td>
</tr>
</tbody>
</table>

The following keyword parameters are relevant only when GRAPHICS options are specified, and affect only the JOBID output string on graphics output:

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Default Value</th>
<th>Description of Use</th>
</tr>
</thead>
<tbody>
<tr>
<td>FONT</td>
<td>= SIMPLEX</td>
<td>Keyword parameter specifying graphics font.</td>
</tr>
<tr>
<td>HEIGHT</td>
<td>= 0.5</td>
<td>Keyword parameter specifying font height.</td>
</tr>
<tr>
<td>COLOR</td>
<td>= BLACK</td>
<td>Keyword parameter specifying font color of the JOBID output string.</td>
</tr>
<tr>
<td>MOVE</td>
<td>= (0.0 IN, 0.01 IN)</td>
<td>Keyword parameter specifying the location of the JOBID output string on the graph.</td>
</tr>
</tbody>
</table>
Xmacro jobid(arg, /* FOOTNOTE, TITLE, GRAPHICS, pointer control */
  * datefmt=MDY, /* date style MDY, DMY, YMD, DATE */
  * Time=YES, /* include time of day? */
  * before, /* character constant "before" jobid string */
  * after, /* character constant "after" jobid string */
  * Options for Graphics only */
  * font=SIMPLEX, /* graphics font */
  * height=0.5, /* font height */
  * color=BLACK /* font color */
  * move=(0.0 IN, 0.01 IN)); /* location of id string */

/* EXAMPLE */
/* */
/* 'tjobid(FOOTNOTE) */
/* Procedures */
/* 'tjobid(GRAPHICS) */
/* PUT 'tjobid(#)60); */
/* File Print */
/* */
%let arg = 'tupcase(&arg);
%let u&argll = u" %then %let arg=FOOTNOTE1;
%let datefmt = %upcase('datefmt);
%if %index(&datefmt,DATE) %then %let date=%sysdate;
%else %let date=&mm/&dd/&yy;
%local mm dd yy ml;
%let mm = %scan(&sysdate,1,0123456789);
%let dd = %substr(&sysdate,1,%index(&sysdate,6mm)-1);
%let yy = %substr(&sysdate,1,3);
%let ml = %str(XX JAN FEB MAR APR MAY JUN JUL AUG SEP OCT NOV DEC);
%let mm = %eval(%index(&ml,&mm)/4);
%let mm = %substr(0 &mm, %length(&mm), 2);
%let dd = %substr(0 &dd, %length(&dd), 2);
%if "&datefmt" = "YHD" %then %let date=%yy/&mm/&dd;
%else %if "&datefmt" = "YDI" %then %let date=%dd../&mm../&yy;
%else %let date=%mm../&dd../&yy;
%let time = %upcase(&time);
%if %substr(&time,1,1) = Y %then %let time=%sysdate;
%local userid pgmj;
%if &sysscp = CMS %then %do;
  %let userid = &sysjobid;
  %let pgm = &sysparm;
  %if %substr(&sysjobid,1,3) = VHB %then %do;
    %exec QUERYCON EXEC * ;
    %if &sysrc = 0 %then %do;
      %exec QUERYCON;
      %exec SENTRY;
    %end;
  %end;
%end;
%let userid = %substr(&userid,1,%index(&userid,-1));
%let pgm = %substr(&pgm,1,%index(&pgm,-1));
%let pad = ';
%if %index(&arg,FOOTNOTE) %then %do;
  %let arg = %put 'tuserid(&pgm) &date&time' &after %pad %pad %pad;
%end;
%else %if %index(&arg,GRAPHICS) %then %do;
  %let arg = %put NOTE MOVE=&move F=&font H=&height C=&color
    &before "userid(&pgm) &date&time" &after %pad %pad %pad;
%end;
%end jobid;

%let arg = %upcase(&arg);
%if "&arg" = "" %then %let arg=FOOTNOTE1;
%let datefmt=%upcase('datefmt);
%if %index(&datefmt,DATE) %then %let date=%sysdate;
%else %let date=&mm/&dd/&yy;
%let time = %upcase(&time);
%if %substr(&time,1,1) = Y %then %let time=%sysdate;
%local userid pgmj;
%if &sysscp = CMS %then %do;
  %let userid = &sysjobid;
  %let pgm = &sysparm;
  %if %substr(&sysjobid,1,3) = VHB %then %do;
    %exec QUERYCON EXEC * ;
    %if &sysrc = 0 %then %do;
      %exec QUERYCON;
      %exec SENTRY;
    %end;
  %end;
%end;
%let userid = %substr(&userid,1,%index(&userid,-1));
%let pgm = %substr(&pgm,1,%index(&pgm,-1));
%let pad = ';
%if %index(&arg,FOOTNOTE) %then %do;
  %let arg = %put 'tuserid(&pgm) &date&time' &after %pad %pad %pad;
%end;
%else %if %index(&arg,GRAPHICS) %then %do;
  %let arg = %put NOTE MOVE=&move F=&font H=&height C=&color
    &before "userid(&pgm) &date&time" &after %pad %pad %pad;
%end;