

Ode to SAS 76.5 by Ogden Crash*

From North Carolina we present to you
an update of SAS 76.2.

This pristine release is better and newer,
Abends and errors and problems are fewer.

Its PL/I is now optimized,
The blocking default is brand-newly sized.

Some options were altered, and some were unchanged,
Internally, SAS is now neatly arranged.

Several procedures, often requested,
Now are available, ready and tested.

PROC PDSCOPY deals with utilities,
It makes former MOVEs naught but futilities.

PROC FORMAT's a new one that lets you provide
Your own value labels at your SAS output's side.

We are all proud of this latest release,
and we hope that our users will find it a breeze.
You're advised to consult the new green SLUG,†
Which lists the new goodies, but nary a bug.
So let's say welcome, we're glad it's arrived,
Long life to SAS 76.5.

Reprinted with permission from *Communications*,
the newsletter of the University Computer Center,
City University of New York.

*Ogden Crash is Harriet Schabes' pen name.

†SLUG is the acronym for the *SAS Supplemental
Library User's Guide*, the documentation for new
features in SAS 76.5.



SAS Institute Inc • Post Office Box 10066 • Raleigh, North Carolina 27605 • (919) 834-4381
Fall 1977 • volume III number 2

courses San Francisco in January

Make a SAS week of it by
attending the SAS Short Course
January 26-27 in San Francisco before
you go to Las Vegas for the SUGI
meeting January 29.

The beautiful Hyatt Regency San
Francisco is the location for the Short
Course. Instructors will be Jim
Goodnight, John Sall, and Bill
Gjertsen. Topics to be covered

include basic SAS concepts, data
management, modeling procedures,
SAS for data processing, and a
potpourri of new SAS 76.5 features.

To register, call SAS Institute at
(919) 834-4381.

conference SAS users to meet in Las Vegas

"A maelstrom of organization"
was the way one observer described
preparations for the SAS Users

Group, International (SUGI)
conference to be held January
30-February 1 in Las Vegas.

If you haven't sent in your
registration, send it today. Don't
forget to send the Caesar's Palace
registration card too.

If you didn't receive any
information about the conference,
give SAS Institute a call and we'll get
it to you immediately.

Co-chairmen Rodney Strand and
Michael Farrell report that over sixty
papers have been accepted for
presentation at Las Vegas. These
papers are listed below.

Papers accepted for SUGI conference, Las Vegas:

Business Applications

Terry Flynn, Occidental Petroleum Company,
Chairman

Invited Papers

H. W. "Barry" Merrill, Suntech, Inc.
Using SAS to Tune MVS

Mario Morino, Morino Associates, Inc.
*SAS: The Necessary Utility for Computer
Performance Evaluation and Control*

Kenneth W. Kolence, Institute for Software
Engineering
*Using Software Physics to Size Workloads
with SAS*

Contributed Paper

Maxine Potter, Armco Steel Corporation
*History Problems and Practical Applications
of SAS in the Large Industrial Organization*

Research Data Management

Wendell Smith, University of Carolina at
Chapel Hill, Chairman

continued

Invited Papers

Rudolph C. Mendelsohn, U. S. Department of Labor, Bureau of Labor Statistics
The Data Base Approach at the Bureau of Labor Statistics

Frank E. Harrell, Jr., University of North Carolina
Capabilities of SAS as a Clinical Research Data Management and Analysis System

Glen A. Augustine, Mayo Clinic
SAS as a Management System for Routine Echocardiograms

Contributed Papers

Joel Achtenberg and J. Phillip Miller, Washington University
Interfacing MUMPS-based Data Entry System to SAS

Mark R. Schultz, TASC
Pinpointing Data with 'DARTS'

Helene Enid Cavior, Federal Bureau of Prisons, Federal Correctional Institute
Simulating a Hierarchical Master File Structure Using SAS

Max F. Ellis, 3-M Company
A Logical Data Definition Capability in SAS

Jane Beth Markley, UNC-Chapel Hill
A SAS Data File Management System for Data from Kidney Dialysis Patients

Frank J. Potter, Merck & Company
SAS as a User-Maintained Data Base System

J. Phillip Miller, D. Powell and C. R. Cloninger, Washington University
The Use of SAS for the Analysis of Family Studies

Lynn B. Eggering, Washington University
Adherence Monitoring at the Clinic Level with the Use of SAS

R. J. Olson and Rodney H. Strand, Oak Ridge National Labs
Management of Diverse Environmental Data with SAS

Robert Bronstein, U.S.V. Pharmaceutical Corporation
Stability Scheduling Using SAS

Sharon Bucci, TASC
Data Base and Analysis of Power Plant Cooling Systems

E. N. Caldwell, WVNET
SAS's Vital Role in a Statewide Fuel Conversion and Energy Conservation Study

Michael S. Lajiness, T. P. Tesar and P. L. Kemp, Upjohn Company
SAS and the Analysis of Clinical Data at the Upjohn Company

Paul D. Hopkins, Research & Development Branch, Statistical Reporting Service, U. S. Department of Agriculture
PROC CODIN - A Procedure for Coded Data Entry

Peggy Pearsall, USDA-ARS
The KWIKPLOT Procedure

Linear Models

Ramon C. Littell, University of Florida, Chairman

Invited Papers

Walter R. Harvey, Ohio State University (with L. A. Swiger)
Orthogonal Polynomial Fitting with Arbitrary Spacings and Correlated Means

William L. Sanders, University of Tennessee
Analysis of a Repeated Measures Experiment with Incomplete Data

Contributed Papers

Kareem Nakkash and Bradford T. Greene, Richard Katon Associates, Inc.
Computer Program for Ridge Regression

I. K. Hwang, Merck & Company
Using SAS-GLM in Kinetic Modeling

John A. Courtright, Cleveland State University
Repeated Measures in SAS

H. I. Patel, Louisiana State University
SAS Procedure for the Analysis of Covariance with Intra-Class Regression Model in One- and Two-way Classifications

James A. Bolognese, Merck & Company
Adjusted Means from SAS76

Michael Conlon and Jean B. Holzer, University of Florida
Use of the ABSORB Statement in SAS

Medical Applications

Ken Offord, Mayo Clinic, Chairman

Invited Papers

Professor David Hurst, Biostatistics Department, University of Alabama
Some Statistical Problems in Biomedical Data Analysis

Contributed Papers

M. L. Moeschberger and Ernest Hilderbrand, University of Missouri
Use of SAS Procedures in Estimating Survival Curves

Chaio Yeh, ICI
Unsymmetrical Parallel Line Bioassay Using SAS

Michael S. Lajiness, Upjohn Company
Evaluating Drug Reinforcement Using SAS

Edward M. Bosanac, West Virginia Department of Finance & Administration
A SAS-Based Small-Area Data Profile System: Its Use in Primary Care Resource Development

Edward L. Spitznagel, Jr. and W. D. Owens, Washington University
Maintenance and Analysis of Anesthesia Surgery Data with SAS

J. D. Quick, University of Rochester Medical Center; Merwyn R. Greenlick, Kaiser Health Services Research Center
Multivariate Prediction of Neonatal Mortality with Emphasis on Health Care Inputs

Statistical Applications

Robert Anderson, Milliken Service Corporation, Chairman

Invited Papers

Kenneth L. Koonce (co-author: Emilio Icaza), Louisiana State University
Some Applications of the Discriminant Procedure

Kenneth White, Rice University
Applications in Econometrics - Problems and Procedures

Contributed Papers

Robert Parks and M. McBride, Washington University
Principal Component Regression with PROC MATRIX

Robert Rogers, North Central Forest Experiment Station, University of Missouri
A SAS Macro for Calculating Coefficients of Ridge Regression

Paul Slater, West Virginia University
Response Surface Contour Plotting in SAS

C. Bean and James Dunn, University of Arkansas
A SAS Macro for Maximum Likelihood Probit Analysis with Multiple Predictors

J. Phillip Miller, Washington University
Maximum Likelihood Estimation of the Multivariate Logistic

Don Henderson, USDA-ARS
KRUWALC, A Macro for Categorical Data

H. Hill, F. Morgan and Richard Nelson, Clemson University
'Lifetest' Procedure for Analyzing Reliability Data

Don Henderson, USDA-ARS
Macro Commands for Tukey Type Smoothing

Samuel Carmer, University of Illinois
Use of MATRIX Proc for Single Degree of Freedom Contrasts in Factorial Experiments

Jerry Oglesby and Lowell Bahner, University of West Florida
Test of Model for Predicting Kepone Accumulation in Selected Estuarine Species

William Reynolds, University of North Carolina, Chapel Hill
SAS Supplemental Procedure SPSS

Nat H. Wooding, Virginia Electric & Power Company
Improving SAS Procs Without Rewriting SAS

Edward L. Spitznagel, Jr., Washington University
KWIC Indexes with SAS

Teaching Applications

Rudolph J. Freund, Texas A & M, Chairman

continues

Invited Papers

Thomas A. Bubolz (co-author: James E. Gentile), Iowa State University
SAS Applications in a Three-Course Sequence in Statistical Computing

William J. Wilson, University of North Florida
Use of SAS in a Statistical Methodology Course

Robert D. Morrison, Oklahoma State University
Use of SAS in Graduate Level Service Courses in Statistics: A Survey of Practices in the Southern Region

Contributed Papers

Ione Cockrell and Dorsey Glenn, S. C. Commission on Alcohol and Drug Abuse
Interactive Teaching with SAS

Dan Chilko and E. J. Hamer, West Virginia University
Generating Multivariate Normal Data in SAS

technical

fall 1977

Help SAS improve diagnostics

Several SAS users have asked for a directory of SAS error messages, including the corrective action for each problem.

We try to include all this information in SAS diagnostic messages. Doing this means that you don't have to spend your time poring over error message manuals.

If you feel that a message is ambiguous or incomplete, we want to know about it. Please send to SAS Institute the computer output for any diagnostic messages that you feel need improvement, along with your comments and suggestions.

SAS clinic

Recently the following SAS statement came across our desk:

```
INPUT P 1-3 PH 4 FIELD1 13 STREAM1 14 TIME1 15
      FIELD2 16 STREAM2 17 TIME2 18
      FIELD10 40 STREAM10 41 TIME10 42;
```

This SAS user could have saved himself time by using format lists to read the three sets of variables

FIELD1-FIELD10, STREAM1-STREAM10, and TIME1-TIME10:

```
INPUT P 1-3 PH 4 @13 (FIELD1-FIELD10) (1. +2)
      @14 (STREAM1-STREAM10) (1. +2)
      @15 (TIME1-TIME10) (1. +2);
```

What does this INPUT statement do?

- reads in the P and PH variables just as the first INPUT statement did
- reads in all the FIELD variables by starting at column 13, reading FIELD1 with a format of 1., moving the pointer over two columns to 16, reading FIELD2, and so on
- reads the STREAM and TIME variables in the same manner.

Rearranging FREQ tables

When you analyze questionnaire data, it's often useful to see table values from PROC FREQ come out in the same order they had on the questionnaire.

For example, let's say that one item in your questionnaire was:

17. What is your attitude toward overtime work?

- ☐ hate extra work
- ☐ willing to work extra
- ☐ enjoy extra work

You code the answer as A, B, or C, and use PROC FORMAT to assign value labels:

```
PROC FORMAT;
  VALUE $ATT A=HATE
             B=WILLING
             C=ENJOY;
```

Next you print tables with PROC FREQ. Since the values are alphabetized before the table is printed, the answers appear in the order ENJOY, HATE, and WILLING. You want them in the order they had on the questionnaire.

The solution lies in the value label: assign the value A) HATE to the value A, and so on:

```
PROC FORMAT;
  VALUE $ATT A=A) HATE
             B=B) WILLING
             C=C) ENJOY;
```

Now the values will be alphabetized just as you want them, and the frequency tables can be compared directly to the questionnaire.

Are you missing any decimal places?

How column input really works

Veteran SAS users are familiar with both column input

```
INPUT X 10-12;
```

and formatted input

```
INPUT @10 X 3.;
```

In fact, the effects of these two statements are identical.

Ⓚ

When SAS encounters an INPUT statement containing column input, it translates column to formatted input:

- the first column number becomes the pointer direction
@'s value
@10
- the second column value minus the first column plus 1 becomes the width for the numeric format w.
3.
- when a \$ appears,
INPUT A \$ 10-15;
- SAS uses the \$w. format
INPUT @10 A \$6.;
- if a decimal specification appears,
INPUT X 23-27 2;
the decimal specification becomes the d value in the numeric format w.d
INPUT @23 X 5.2;

This situation affects SAS users most often when they use PROC PRINT or PROC FREQ to print numeric values containing decimal places. Data values that include decimal points are always read correctly. However, if the INPUT statement did not include a decimal specification for the variable, the variable's implied format (see p. 49, *SAS User's Guide*) also does not include a decimal part. Consequently, when PROC PRINT uses the implied format to print the values, the decimal part is not printed.

This problem can be solved by using either a decimal specification to read the data

INPUT X 10-13 1;

or a FORMAT statement after the INPUT statement

FORMAT X 4.1;

Exact-size random sampling

Researchers often need a random sample of the observations in a data set. When the precise number of observations in the sample isn't important, these SAS statements serve:

DATA SAMPLE; SET FULL;
IF UNIFORM(0)>.2 THEN DELETE;

For each observation, the UNIFORM function produces a random number between 0 and 1. This is a 20% sample, and the random number's value will fall between 0 and .2 for about 20% of the observations. These observations will be included in the sample data set.

The problem with this method is that you can't specify the exact number of observations for the sample data set. You can only say that the number will be about 20%.

For an exact-sized random sample, these SAS statements can be used:

DATA SAMPLE; SET FULL;
RETAIN NOBS 101 NSAMP 20;
NOBS=NOBS-1;
IF UNIFORM(0)<NSAMP/NOBS;
NSAMP=NSAMP-1;

This method requires that you know the exact number of observations in your data set. You must specify this number, plus 1, in the RETAIN statement. The number observations you want in the sample data set must also be specified in the RETAIN statement. Counters are decremented each time an observation is read and each time an observation is selected for the sample. The probability of selection will thus be equal for all observations, and an exact number of observations will be selected.

Note that the subsetting IF statement causes SAS to return for another observation when the current observation isn't selected; NSAMP is not decremented in this case.

Solving eigenvalue systems

Several callers have recently asked us about getting eigenvalues of nonsymmetric matrices. These users want to solve the eigenvalue problem

$$(A - \lambda B)x = 0$$

where A and B are positive-definite symmetric, with λ and x to be determined. The obvious next step is multiplication by B^{-1} to get

$$(B^{-1}A - \lambda I)x = 0$$

However, now you have a nonsymmetric matrix $B^{-1}A$. You can reduce the problem to a symmetric one with a trick that has been around a long time but isn't obvious.

Let U be the upper Choleski root (see the MATRIX function HALF, *SAS User's Guide*, p. 165) such that $U'U=B$. Then

$$(A - \lambda B)x = 0$$

Let $B = LU$, where

$$U = \text{HALF}(B) \text{ and } L=U'$$

Therefore

$$(A - \lambda LU)x = 0$$

$$(L^{-1}A - \lambda U)x = 0 \quad \text{multiply by } L^{-1}$$

$$(L^{-1}AU^{-1} - \lambda I)Ux = 0 \quad \text{factor out } U$$

Note that the roots of $L^{-1}AU^{-1}$ are the same as the roots of $B^{-1}A$, and that the characteristic vectors of $B^{-1}A$ are U^{-1} times the characteristic vectors of $L^{-1}AU^{-1}$.

The MATRIX statements that correspond to these operations are:

UI=INV(HALF(B));
W=UI'*A*UI;
EIGEN LAMBDA X W;
X=UI*X;

CALL documentation

It's possible to write your own routines that process observations in a SAS program and then invoke the routines with a CALL statement. The string-handling routines, described in the Summer 1977 issue of *SAS Communications*, work this way.

For documentation of the CALL facility, write or call SAS Institute.

Jeanne

*staff additions***Camp, Council join SAS**

Michael Camp has joined SAS Institute. Michael, who graduated from Stetson University with a degree in mathematics, comes to SAS from Informatics, Inc., where he was Eastern Regional Manager of Technical Services. Michael's responsibilities at SAS include consulting and marketing.

Another new staff member is Kathy Council. Kathy is a graduate of UNC-Greensboro, and received her master's in statistics from North Carolina State University. Before joining SAS, Kathy was Coordinator of Institutional Studies at NCSU. At SAS Institute, Kathy handles consulting and marketing communications.

Billie Parrish has also joined the staff as an administrative assistant.

New quarters

The expanding SAS staff recently moved to another building in the same complex. The new offices occupy an entire floor, doubling our square footage. The physical address, 2806 Hillsborough Street, remains the same.

*publications***SAS Views**

The SAS publications rainbow gained an orange band recently in *SAS Views*. The SAS Short Course notes, rewritten and reduced, make up *SAS Views*. These notes are taken from the overhead slides used in the course: hence the name *SAS Views*.

SAS Views, a valuable supplement to the SAS literature, contains many insightful examples of using SAS profitably. The best way to get a copy is to take the SAS Short Course. If you can't do this, a few copies of the 276-page book are available from SAS Institute for \$40.00 each.

SAS Introductory Guide

SAS Views isn't a substitute for the *SAS Introductory Guide*, also known as the *SAS Primer*. The *Introductory Guide*, although delayed, promises to be the perfect vehicle for teaching SAS to novices. In fact, familiarity with the *SAS Introductory Guide* will soon be a prerequisite for the SAS Short Course.

Publication date for the *Introductory Guide* is March 1978.

352 installations