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OFFICE OF POLICY ANALYSIS, RESEARCH & STATISTICAL SERVICES

NEW YORK STATE DIVISION of CRIMINAL JUSTICE SERVICES

PREDICTIVE ATTRIBUTE ANALYSIS WITH VALIDATION EXTENSIONS:

User's Guide for the PAAVE Computer Program

February, 1985

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NEW YORK STATE
DIVISION OF CRIMINAL JUSTICE SERVICES
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I.

PURPOSE AND OBJECTIVES

Predictive Attribute Analysis Project

The purpose of this project has been to provide criminal justice researchers with a better understanding of the Predictive Attribute Analysis method. This goal has been pursued through the review of existing references, the consideration of explicit and implicit characteristics of the method, the development of an enhanced PAA computer program, and the use of the program to examine the empirical performance of the method.

The project has produced three major products: a Technical Report, the PAAVE Computer Program, and the User's Guide for the program.

Specific objectives incorporated into the project were (1) the development of a better understanding of the characteristics of the PAA method than was available through a review of existing PAA literature, (2) the use of this knowledge to design a flexible computer program to conduct the analysis, and (3) the application of the program to both artificial and real-world data systems to investigate remaining methodological issues. The focus of these objectives was to provide a clear set of recommendations for the use of the PAA method in criminal justice research applications.

Our study of Predictive Attribute Analysis has left us uneasy with the casual use of the method. There are complex logical and statistical undercurrents which are unfortunately belied by the simplistic tree diagrams and subgroup delineations that are the product of an analysis. Our cross-validation studies have shown that poor replicability of results is a serious problem. Unless researchers using the method are aware of these kinds of issues, the results of a particular analysis have the potential for erroneous interpretation.

PAA Technical Report

The Technical Report for the project provides a description of the PAA method and a discussion of the important methodological issues that bear on its use. The contents of the report include (1) a description of the features of the PAA method, (2) a review of some published applications and evaluations of PAA, (3) a statement of methodological issues affecting the use and interpretation of PAA, (4) a discussion of statistical issues relevant to an understanding of these methodological issues, (5) a brief description of the PAAVE computer program, (6) a discussion of a series of simulation analyses performed to empirically investigate remaining questions about PAA, and (7) a summary providing conclusions and recommendations concerning the proper use of Predictive Attribute Analysis.

We recommend that users of the computer program read the Technical Report carefully, since the program documentation materials contain little discussion of the logical,

methodological, or statistical issues that should be considered when conducting a PAA.

PAAVE Computer Program

The PAAVE computer program was written not just to provide a vehicle for PAA computational processing, but also as a means to study some of the issues that have been found to affect the validity and reliability of PAA results.

The basis of the program is the original PAA procedure described by MacNaughton-Smith (1963, 1965). Computational features discussed in the applications literature, as well as features deemed useful as a result of the present project, have been added. Where generalized answers about the credibility of an analysis cannot be easily given, we have tried to provide users with appropriate feedback mechanisms so that relevant information pertaining to a specific analysis can be obtained through the program.

One of the most interesting and novel features of the program -- bootstrap resampling -- was not a part of the original conceptualization. It was added because of our concern for the numerous sources of instability within the analysis of a particular data system; preliminary analyses made it clear that some means would have to be provided to evaluate the strength of such effects. The feedback we gained from early bootstrap resampling runs provided such valuable insights for our own work that we decided to automate and incorporate bootstrapping directly into the distribution version of the program.

PAAVE User's Guide

This User's Guide for the computer program provides a detailed description of the various functions and capabilities of the program. Included are some suggestions for the use of the program and two complete sample PAA runs with documentation for all their associated parameter specifications.

A general description of the processing flow is given, followed by a discussion of the function of each program module. Documentation is provided for all specifications and options available within the program. Some general guidelines and suggestions for making best use of the features provided by the program are presented. Two example PAA runs are provided; they illustrate parameter specifications for both a standard analysis and for an analysis using the bootstrap validation procedures.

II.

INTRODUCTION AND BACKGROUND

Predictive Attribute Analysis

Predictive Attribute Analysis is a quasi-statistical technique for the sequential subdivision of groups on the basis of the attributes of those groups that predict a dichotomous criterion.

PAA processing proceeds as follows: Given a set of predictor variables for a criterion of interest, the analysis begins by selecting a best predictor attribute for the criterion variable. The total group is then divided into subgroups on the basis of the presence or absence of this predictor attribute. The analysis then proceeds to find the best predictor attribute within each of the subgroups and to define new subgroups at this level, continuing in this manner until specified stopping criteria are met.

The PAA method has often been used to explore interaction effects among a given set of predictor variables as well as to define characteristics of important subgroups of a particular population. Results are usually summarized in the form of a PAA 'tree' (dendograph), where branches represent the sequence of sub-categorizations and where nodes show the particular attributes found to be most useful in predicting the criterion attribute. For example, the observed rate for the { incarcerate / not-incarcerate } decision might be expected to differ proportionally depending on the { race }, { sex}, and { prior-history } characteristics of individuals; a PAA might be used to see if particular combinations of these attributes have especially high or low incarceration rates.

Characteristics of particular subgroups might be studied further, or a prediction table or equation might be constructed. Because a PAA provides a logical decision process for selecting predictors, the (tedious) alternative of examining all possible combinations of contingency tables is avoided.

The PAA technique is also often used to highlight the interaction between the relative usefulness of prediction information and the subgroup membership of an individual. An analysis typically yields a different succession of predictor variables for each different subgroup.

Predictive Attribute Analysis is a categorical data analysis method that is based on the mechanization of a set of decision rules rather than on a formal statistical procedure. More generally, PAA can be viewed as one of the many prediction methods intended for use with restricted-value dependent measures. The PAA method has been considered useful by some practitioners because it is a relatively efficient automation of an otherwise complex and cumbersome decision process.

Statistical considerations are a secondary (rather than primary) aspect of the PAA prediction process. They provide the means for selecting particular variables at particular decision points, but they are <u>pointwise</u> to the extent that information on either horizontal or vertical planes of the analysis is not

incorporated into the decision. For example, the selection of a predictor attribute for a given subgroup is not affected by that variable's correlation with any previously-selected predictors for that PAA branch.

<u>PAAVE Computer Program</u>

The mainframe FORTRAN computer program for Predictive Attribute Analysis was developed to (1) carry out the computational efforts required to perform a PAA analysis (with support for data input and dichotomization), (2) allow flexible user specification of parameters controlling the PAA processing, and (3) provide several kinds of feedback to the user regarding the level of confidence appropriate to the results of an analysis.

Numerous modifications to the originally-conceived computer program were a byproduct of the series of simulation analyses done as a part of the evaluation component of the project. While we have not, in this <u>User's Guide</u>, attempted to illustrate all the possible variations of program options, the full set of options is available in the program as an incentive for others to study further the characteristics of the PAA method.

The program does not incorporate certain extensions to the PAA method that are found in some other branch-analysis programs such as AID or CHAID. Such extensions (like allowing multiple-category data rather than only dichotomous data, or attempting look-ahead computations for upcoming nodes in a branch) were not included because they are already available in existing computer programs and because they were not required for us to address the fundamental issues bearing on the PAA method.

It was, however, realized early in the project that the PAA computer program would need to offer a variety of different kinds of feedback to the user. Enhancements to the otherwise-straightforward PAA processing computations thus took the form of (1) providing ancillary information about the predictor variables competing for selection at a particular node, and (2) adding a variety of branch termination controls and general predictor-selection options, such as being able to force a particular variable at a particular node. In addition, four alternative statistical coefficients were made available for use as predictor-selection criteria.

The program was designed and written in a modular and structured format; control of specific processing functions is given to specific program subroutines. This programming style was used in order to facilitate program modification and extension as well as to allow easier access to some of the individual program functions (dichotomization, bootstrap resampling) by other FORTRAN computer programs. Users of the program who wish to supplement the existing features with additional processing options should find the routines amenable to modification without undue effort.

A diagram of the modular components of the program is presented in Appendix A-2. Raw data input, dichotomization,

contingency table construction, statistical calculations, and program output are each handled, for the most part, by separate routines. The PAA algorithm itself is the responsibility of a supervisory routine, and general program execution and parameter specification are controlled by the main routine.

The program was designed to provide considerable flexibility in the specification of PAA processing options. To control branch termination, a statistical test is available as well as absolute and relative cell and marginal frequency criteria. In addition, to allow testing of particular hypotheses, the selection of any predictor can be forced at any point in the analysis. Processing can be limited to a maximum depth (level) for all branches, or can be allowed to proceed regardless of the results of stopping criteria tests.

Output is available at several levels of detail depending on the needs (and paper supply) of the analyst. At the most voluminous level, all contingency tables and statistical coefficients can be printed. The standard print mode provides one page of output for each node in the PAA processing tree, plus a summary page. For simulation runs, a summary-level output is available, or selected output can be written to online files and post-processed by other computer programs.

The computer program was written, with as few exceptions as possible, in standard FORTRAN-77 to facilitate conversion to mainframe systems other than the Burroughs 6900/7900 on which it was developed. A 'non-Burroughs-FORTRAN' version of the program has been compiled and run on a Sperry (UNIVAC) 1100/83.

The CANDE timesharing system, through which access to the Burroughs 6900/7900 was available, is a batch-oriented system that does not allow individual users control over program runtime scheduling. It was therefore difficult to incorporate user interactivity into the program during the development stage. Based on the results of early analyses, it was decided that a high degree of interactivity was indeed not necessary since the node-to-node decision complexity requires considerable study of factors not easily digested in a few moments study at an online terminal. Instead, an interactive routine for the input of parameter specifications was added to the program, since this function could be performed prior to the execution of the main program.

Methodological Issues

A number of questions have been raised about the use of PAA as a general purpose prediction method. Central issues involve the reproducibility of results and the validity of the associated interpretations. Methodological and statistical issues, discussed at length in the Technical Report, are overviewed below.

There are three issues related primarily to validity. First, does PAA have the ability to recover a known structure from a given data system? Second, does PAA recover the best

(most efficient and parsimonious) model representing the data? Third, how do interrelationships among the predictors affect the analysis?

Two issues relate primarily to reliability: do the results of an analysis replicate for (1) the sequence of selected predictor variables and/or (2) the individuals comprising each of the terminal subgroups?

Two further issues relate to both validity and reliability - they are concerned with the sensitivity of the analysis to the specific statistical criterion used for assessing relative predictability and to the set of stopping criteria used to terminate branch processing.

Recommendations for Program Use

In light of our study of these methodological issues, we summarize some general recommendations for the use of the Predictive Attribute Analysis method below. These guidelines are based on more complete discussions contained in the Technical Report as well as on our own experiences in using the PAA method.

Appropriate Applications for PAA

* A PAA should not be the first step in the analysis of a complex data set, nor should it be the last.
* Predictive Attribute Analysis is not appropriate for model-development applications.

* Predictive Attribute Analysis is perhaps best used as a somewhat serendipitous pre-formal-analysis data description technique. As such, the analysis is used as an exploratory tool to suggest effects and relationships that might not have previously occurred to the analyst.

Choice of a PAA Design

* Some prior theory, however complete, should guide the specification of parameters supplied to the Predictive Attribute Analysis.
* Especially important parameters are the statistical criterion used to measure predictive power, the stopping criteria used, and the depth at which the analysis results are to be considered acceptably valid.
* Careful attention must be given to the composite of measures used in an analysis; the PAA method is not a multivariate procedure where interrelationships among the predictor variables are explicitly controlled.

Interpretation of Results

* The PAA method has observed instability with respect to replication across samples drawn from a particular population data system. This is true for both the branching pattern of predictor variables and for the particular individuals comprising the membership of the terminal subgroups.

* A PAA should be regarded as only one component of a comprehensive analytic strategy, typically incorporating several statistical techniques, which attempts to converge on a proper interpretation.

Summary

A Predictive Attribute Analysis, as a cautiously conducted and properly interpreted component of a well-planned and thorough research design, may provide useful information to the criminal justice data analyst. Its inherent limitations, however, argue against casual use and informal interpretation. Research conclusions which are based on the results of a Predictive Attribute Analysis should always be accompanied by additional supporting evidence.

III.

PROGRAM FEATURES

PAA Algorithm

The PAAVE computer program is an implementation of the procedure for conducting a Predictive Attribute Analysis described by MacNaughton-Smith (1965). Enhancements have been added to allow the specification of different statistical measures for predictor-selection and to provide a number of different combinations of branch-termination criteria. A mechanism to perform validation analyses via bootstrap resampling has also been incorporated into the program.

Predictive Attribute Analysis is a technique for sequentially dividing groups on the basis of attributes of those groups that effectively predict a criterion. Given a set of predictor variables for a criterion measure of interest, the analysis begins by selecting a best predictor attribute for the criterion. This choice is made by comparison of statistical measures calculated for each 2x2 contingency table that is formed by pairing each predictor with the criterion. The total group is then divided into two subgroups on the basis of the presence/absence of the characteristic represented by the chosen predictor attribute.

At successive levels, the procedure is repeated independently for each subgroup. The result of the next level of processing is four subgroups, each of which is defined by one of the four possible categories of the two predictor variables. At the following level there are eight subgroups, each defined by one of the 2^3 possible combinations of the attributes implied by the three predictor variables.

This processing algorithm is implemented in the computer program by (1) constructing the appropriate 2x2 tables, (2) calculating the desired statistical measure for each table, (3) checking termination criteria to see if the analysis for the particular branch should proceed, and (4) selecting a predictor and defining resultant subgroups. A computational path to each node is retained as the branching develops.

Parameter Specifications

Parameter information to control the various aspects of PAA processing may be supplied either as 'card-formatted' information or as responses to an interactive parameter specification routine. The option for interactively specifying parameters eliminates the necessity to refer to program documentation when initially setting up an analysis; the batch-oriented option is useful for rerunning previous analyses where only a few parameter specifications are changed, or where the same analysis is to be performed on several sets of data.

Data Input and Manipulation

The program provides flexible data input procedures. Raw data may be input in any valid FORTRAN real-value format, and the program accepts run-time input of this format specification. Variables need not be pre-coded in any particular manner, since the dichotomization routine can perform required transformations.

Minimal data checking can also be performed during this dichotomization if desired.

The PAA algorithm requires that the data be reread once for each level to which the analysis proceeds. To facilitate this processing, the raw data (dichotomized if necessary) is written as unformatted binary data to a temporary file. Successive rereads are performed from this file, reducing the FORTRAN I/O overhead as much as possible. This file is not deleted after the run has completed and may be used by subsequent runs. In addition, a program option is available to write the dichotomized data (in formatted form) to a file for analysis by other programs.

Dichotomization

Four types of dichotomization are available through the program. Dichotomization of either continuous or categorical data can be accomplished by using (1) a cutpoint, (2) limiting values for ranges, (3) clusters of values, or (4) a critical value. If desired, the program will simply dichotomize data (and perhaps write to a file), terminating without proceeding to the PAA section of the program.

Data are initially read into the program as real-valued numbers. If dichotomization is requested through the parameter specification options, these data values are then processed by the dichotomization subroutine before being written to the temporary binary file.

Dichotomization by using a cutpoint recodes all values above and equal to that cutpoint into one set and all values below the cutpoint into the other set. The cutpoint is specified as a single real number. This option is suggested for use only with 'clean' data, since no checking is done for erroneous or nonsensical values.

Dichotomization using selected ranges of values is done by specifying the upper and lower limits of each range. The program checks to see if each data point is between the (presumed nonoverlapping) minimum and maximum values of each range. If the point is not contained in either range, it is considered missing and dropped from the analysis.

Dichotomization using clusters of values is similar to the range recategorization above, except that sets of particular points must be specified.

Specification of a critical value allows dichotomization by recoding all data not equal to that critical value to another single value. This option would also be suggested for use only with 'clean' data.

Contingency Table Construction

Contingency tables are computed for pairings of the criterion measure with each of the predictor measures. They must be recalculated at each level of the analysis, since subgroups are conditional on values of previously selected predictor variables. As previously noted, the data is read from a binary (unformatted) file for these operations. (No attempt was made to provide sufficient internal 'core' storage to avoid rereading data, since data sets used for PAAs are typically large and

FORTRAN would not allow adequate storage for most applications.)

Normal program output provides a printout of the selected predictor/criterion contingency table at each node, both in frequency and percentage form. A program option will print all contingency tables (in a condensed format) for a particular level, if desired.

Statistical Coefficients

The program offers four statistical coefficients for measuring either association or predictive association in the 2x2 contingency tables. Chi-square, Phi, Uncertainty, and Lambda coefficients are available as the predictor-selection criterion.

The choice of one of these measures is not a trivial decision, since the outcome of the analysis can be quite different as a function of the criterion used for selecting predictor variables. See the accompanying Technical Report for a discussion of these different statistics and their assumptions.

The formulae used to calculate these statistics are given in the Technical Report; the corresponding FORTRAN code is found in the STATIS subroutine (Appendix A-1.f). Numerical values of these statistics were checked by comparison with those computed by a recognized statistical package, the Statistical Package for the Social Sciences.

For any of these statistics, a minimum value can be specified such that processing for a particular branch will be terminated if no contingency table has a larger-value statistic. This critical value can derive from probabilistic considerations, such as when the tabled value of Chi-square for protection against a given Type II error rate is used.

Branch Termination Criteria

Six different branch termination criteria are available within the program; they may be used separately or in combination. The options fall into three categories: statistical (probabilistic) checks, frequency checks, and percentage checks. The frequency and percentage checks can be applied to 2x2 cells or to marginal sums.

The program will check for a minimum cell size or a minimum cell percentage of the 2x2 table total. This option might be invoked, for example, if Chi-square were the statistical measure being used and it was desired to avoid tables with cell counts less than five.

The program will check for a minimum subgroup size or a minimum subgroup percentage. The emphasis here is on the terminal subgroups; one may be explicit about size (or relative size) limitations on the groups of individuals derived from the analysis.

The program will also check the subgroup ratio at each node. This quantity is defined as the ratio of the number of individuals in the smaller subgroup to the number of individuals in the larger subgroup. This option is useful in analyses where unbalanced splits are not desired; that is, where terminal subgroups are expected to have roughly equivalent numbers of individuals.

As mentioned, the program can check the value of the maximum statistic found for the set of 2x2 tables at each node against a specified minimum statistic. This minimum value could be determined from a table of probabilities, or could be an ad hoc specification based on prior work with a particular data system. It is suggested, however, that probabilistic specifications be conservative if substantive interpretations are to be drawn from the analysis. The number of tables processed by a typical PAA is very large, greatly magnifying the expectation of Type II errors within an analysis relative to multivariate procedures which control for this kind of error in an analysis-wide manner.

Analysis Output

Because of the potentially voluminous output deriving from the intermediate processing stages of a Predictive Attribute Analysis, the computer program offers several levels of detail for output. These options range from complete variable array dumps appropriate for program development work to terse analysis summary vectors useful for extended bootstrap simulation work.

In addition, a number of 'temporary' files used internally by the program are retained after completion of the run and may be examined by the analyst. (We definitely encourage post-processing of PAA results in order to better understand the nature of a particular analysis.) These include (1) the parameter specification file, (2) the dichotomized raw data file (unformatted binary or optionally, formatted), (3) the processing tracer file, which can include a number of intermediate-level dumps of contingency tables and statistics, (4) the PAA summary tree file associated with the bootstrap simulations, and (5) the tracer file associated with the bootstrap simulations, which includes terminal subgroup information.

Bootstrap Resampling

Implementation of the bootstrap technique for cross-validation has been an important addition to the computer program because it allows an analyst to actually see the distribution of PAA results where an analysis is replicated some large number of times. This typically provides far more insight than is gained from the single cross-validation analysis usually done for a predictive study. It is particularly appropriate for use with Predictive Attribute Analysis because of its nonparametric derivation, lack of restrictive distributional assumptions, and potential range of application.

The bootstrap is discussed in more detail in Chapter V of this User's Guide.

IV.

PROCESSING SPECIFICATIONS AND OPTIONS

Program Dimensions and Limitations

The PAAVE program, as configured for use on the Burroughs 7900 and as provided to the Bureau of Justice Statistics, consists of approximately 2500 lines of FORTRAN-77 code. It can process 50 variables (49 independent and 1 dependent) and an 'unlimited' number of cases in the normal processing mode (10000 cases in the bootstrap validation mode). Up to 64 terminal subgroups, five PAA levels, can be determined through the program.

These program dimensions are, of course, somewhat arbitrary and chosen in consideration of the characteristics of our local Burroughs installation. Users at other computer sites analyzing other kinds of data systems may find that alternative combinations of array dimensions produce faster and more efficient program execution.

We attempted to write the program in a standard and portable FORTRAN code. The few known machine-specific sections of code are highlighted in the program documentation. Aside from the compiler-specific information and the pre-execution file specifications required by some operating systems, other code which is likely to be machine-dependent is that related to the random number function and to the re-read processing; see commentary in the internal program documentation.

Program File Requirements

The PAAVE program makes use of up to seven online files for various input/output functions. These files and their contents are described in Table 4.1 . Creation, initialization, and permanant storage or printing of these files is a function of the specific operating system under which the program is run. Parameter and data input files are assumed to be properly filled and available to the program at execution time (with the exception of SAVFIL, which is written and subsequently re-read by the program).

Using The Program

We overview here the general use of the program in the context of (1) program installation, (2) program compilation and object-code generation, (3) online file considerations, and (4) program execution and output redirection.

Program installation should be done by someone familiar with the FORTRAN language and the computer on which the PAAVE program is to be run. Once the tape containing the program source code has been successfully read, the information contained in this User's Guide and the internal program documentation should be sufficient to compile and test the program.

The steps required for program compilation and object-code generation are computer-specific operations. The complete PAAVE program consists of the one main-routine and nine sub-routines. An ancillary routine ("PROMPT") is provided for the interactive input of the parameter specification information, but should not be linked with the main PAAVE program.

The steps required for the initialization and maintainance of each of the online files is again dependent on the particular computer on which the program is run. Any error messages that are encountered should reference the particular unit number in question; the User's Guide can then be consulted for the file type and function.

Program execution from an interactive terminal can result in unexpected program operation unless some of the input/output units are reassigned from their default locations. In particular, the usual default location for Unit #5 is the terminal keyboard; the PAAVE program expects to find the correctly formatted parameter specification information there. While this information can indeed be input from the terminal keyboard at execution time, most users probably prefer to input (and edit) this information prior to execution -- the ancillary PROMPT routine can serve this function of parameter entry.

The 'formal' output from the analysis is sent to Unit #9, which does not normally default to the terminal screen. Unit #6, which does usually default to the screen, contains the program execution messages (the quantity of which depends on the Trace Mode selected). The user can thus monitor the processing of the program at the terminal and then send the formal PAA output to a printer.

Program execution in a batch environment is straightforward. No intervention is required of the user once all of the program specifications are made and the program is queued for execution.

Parameter Specifications

The following pages contain documentation for each of the PAAVE parameter specification cards .

Some parameter cards are always required, while others are optional depending on the particular processing specifications desired. The sequence of cards is important and must conform to the order outlined in Table 4.2 below; the card-id information in the first four columns of each card facilitates visual identification of parameter types as well as serving as a program check.

CARD #: 1 - 3

REQUIRED?: Yes

CONTENTS: Title information for the analysis
- 3-lines of 72-columns
- Printed at the top of each page of output

FORMAT: ("PPPP ", 18A4/ "PPPP ",18A4/ "PPPP ",18A4)

```
PPPP ************************************************************************
PPPP ************************************************************************
PPPP ************************************************************************
----|----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
         1         2         3         4         5         6         7         8
         0         0         0         0         0         0         0         0
```

Where: "*" = Any FORTRAN-acceptable character

EXAMPLE:

```
PPPP Predictive Attribute Analysis for Probation-Eligible OBTS Sample
PPPP   Statistical Criterion =  Lambda
PPPP   Max Levels            =  3
----|----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
PPPP ************************************************************************
----|----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
         1         2         3         4         5         6         7         8
         0         0         0         0         0         0         0         0
```

CARD #: 4

REQUIRED?: Yes

CONTENTS:
Number of cases
Number of variables
Program mode selection:
- Program mode
- Interactive mode
- Trace mode
- Dichotomization mode
- Write mode
- Plot mode
- Simulation mode

FORMAT: ("PPPP ", I5, 2x, I3, 7I3)

```
PPPP nnnnn  ppp  m  i  t  d  w  p  s
----|----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
         1         2         3         4         5         6         7
         0         0         0         0         0         0         0
```

Where:

```
"nnnnn"   = The number of cases to be read  [0=Read-to-end]
"ppp"     = The number of variables  [MAX=50]
"m"       = Program mode:
               0 = Test mode (no processing)
               1 = Dichotomization mode (no PAA processing)
               2 = PAA mode (normal)
"i"       = Interactive mode:
               0 = Batch mode (parameter input file exists)
               1 = Parameter prompt mode (create file)
"t"       = Trace mode:
               0 = Normal program operation
               1 = Subroutine path traced on 'MSGFIL'
               2 = Above plus supplemental processing info
               3 = Above plus data dumps (use with caution!)
"d"       = Dichotomization mode:
               0 = No dichotomization requested
               1 = Dichotomize raw data (as specified below)
```



```
"w"       = Written output mode:
               0 = Minimal output -- summary info only
               1 = Normal output -- 1-page-per-node plus summary
"p"       = Plot mode  [not yet implemented]
"s"       = Bootstrap resampling mode:
               0 = Normal 1-pass processing
               1 = Simulation mode (as specified below)
```

EXAMPLE:

```
PPPP  2345   25  2  0  0  1  1  0  0
----|----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
PPPP nnnnn  ppp  m  i  t  d  w  p  s
----|----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
         1         2         3         4         5         6         7         8
         0         0         0         0         0         0         0         0
```

CARD #: 5

REQUIRED?: Yes

CONTENTS:
Maximum level of PAA processing
Statistical measure to be used
Dependent variable #
Selection vector for independent variable #'s

FORMAT: ("PPPP ", 3I5, 2x, 50I1)

```
PPPP MxLev Stat  Dep  iiiiiiiiiiiiiiiiiiiiiiiiiiiiiiiiiiiiiiiiiiiiiiiiii
----|----+----+----+----+----+----+----+----+----+----+----+----+----+----+----
         1         2         3         4         5         6         7         
         0         0         0         0         0         0         0         0
```

Where:
```
"MxLev"  = Maximum levels of PAA processing  [MAX=5]
"Stat"   = Statistical measure to be used:
              1 = Lambda
              2 = Uncertainty
              3 = Phi
              4 = Chi-Square
"Dep"    = Dependent variable index #
"i"      = Independent variable selection vector:
              0 = Do not use
              1 = Use as independent (predictor) variable
```

EXAMPLE:

```
PPPP    3    4    5  11110111111
----|----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
PPPP MxLev Stat  Dep  iiiiiiiiiiiiiiiiiiiiiiiiiiiiiiiiiiiiiiiiiiiiiiiiii
----|----+----+----+----+----+----+----+----+----+----+----+----+----+----+----
         1         2         3         4         5         6         7         8
         0         0         0         0         0         0         0
```


CARD #: 6

REQUIRED?: Yes

CONTENTS:
```
Branch Termination Options:
     Apply minimum cell frequency criterion?
     Apply minimum cell percentage criterion?
     Apply minimum subgroup frequency criterion?
     Apply minimum subgroup percentage criterion?
     Apply minimum subgroup ratio criterion?
     Apply minimum statistic value criterion?
Termination criterion values:
     Minimum cell frequency
     Minimum cell percentage
     Minimum subgroup frequency
     Minimum subgroup percentage
     Minimum subgroup ratio
     Minimum statistic value
Force independent variable selection?
```

FORMAT: ("PPPP ", 7I1, 2x, 7F7.3, 2x, I1)

```
PPPP ttttttt  111.111222.222333.333444.444555.555666.666777.777  f
----|----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
         1         2         3         4         5         6         7         8
         0         0         0         0         0         0         0         0
```

Where:
```
"t"       = Selection vector for termination options
                0 = Do not use
                1 = Use this criterion (default or input value)
"111.111" = Input value for criterion
```

```
"000.000" = Use default value:
                 Min cell frequency            =  5.0
                 Min cell percentage           =  0.001
                 Min subgroup frequency        = 10.0
                 Min subgroup percentage       =  0.001
                 Min subgroup ratio            =  0.1
                 Min statistic value:
                      Lambda                   =  0.01
                      Uncertainty              =  0.01
                      Phi                      =  0.01
                      Chi-Square               =  3.841
"f"       = Force selection of variables:
                 0 = No
                 1 = Yes (as specified below)
```

EXAMPLE:

```
                                                        010.321  0
PPPP 1000001  005.000
----|----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
PPPP ttttttt  111.111222.222333.333444.444555.555666.666777.777  f
----|----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
         1         2         3         4         5         6         7         8
         0         0         0         0         0         0         0         0
```


CARD #: 7 - 11

REQUIRED?: Optional:
Required if 'Force Variables' option = 1 (CARD-6)

CONTENTS: Selection vector of variable #'s to force at particular nodes

FORMAT: ("FFFF ", I2/ 5x,2I2/ 5x,4I2/ 5x,8I2/ 5x,16I2)

```
FFFF aa
FFFF bbcc
FFFF ddeeffgg
FFFF hhiijjkkllmmnnoo
FFFF ppqqrrssttuuvvwwxxyyzz!!@@##$$%%
----|----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
         1         2         3         4         5         6         7         8
         0         0         0         0         0         0         0         0
```

```
Where:   "aa"     = Variable index # for Level 0, Node 1
         "bb"     = Variable index # for Level 1, Node 1
         "cc"     = Variable index # for Level 1, Node 2
         "dd"     = Variable index # for Level 2, Node 1
          ...
         "%%"     = Variable index # for Level 4, Node 16
         "00"     = Select variable at this position normally
```

EXAMPLE:

```
FFFF 07
FFFF 0303
FFFF 02040608
FFFF 0000000000000000
FFFF 00000000000000000000000000000000
----|----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
FFFF aa
FFFF bbcc
FFFF ddeeffgg
FFFF hhiijjkkllmmnnoo
FFFF ppqqrrssttuuvvwwxxyyzz!!@@##$$%%
----|----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
         1         2         3         4         5         6         7
         0         0         0         0         0         0         0
```


CARD #: 12

REQUIRED?: Optional;
Required if bootstrap validation mode specified (CARD 4)

CONTENTS: Number of (re)samples to draw

FORMAT: ("SSSS ", I3)

```
SSSS bbb
----|----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
         1         2         3         4         5         6         7         8
         0         0         0         0         0         0         0         0
```

Where: "bbb" = Number of (re)samples to draw [MAX=200]

EXAMPLE:

```
SSSS 100
----|----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
SSSS bbb
----|    --+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
         1         2         3         4         5         6         7         8
         0         0         0         0         0         0         0         0
```

CARD #: 13

REQUIRED?: Optional;
Required if dichotomization requested
Must be followed by blank card to indicate end of specification

CONTENTS: Index of variable
Type of dichotomization
1 = Cutpoint
2 = Value ranges
3 = Value clusters
4 = Critical value
Dichotomization parameters

FORMAT:

```
Type = 1:  ( "DDDD ", I3, I3, 1x, F7.3 )
Type = 2:  ( "DDDD ", I3, I3, 1x, 4F7.3 )
Type = 3:  ( "DDDD ", I3, I3, 1x, I3, 9F7.3 / 15x, I3, 9F7.3 )
Type = 4:  ( "DDDD ", I3, I3, 1x, F7.3 )
```

```
       TYPE
       ----
DDDD aa  1 nnn.nnn

DDDD aa  2 LO1.limHI1.limLO2.limHI2.lim

DDDD aa  3  c  val.111val.222val.333val.444val.555val.666val.777val.888val.999
DDDD        c  val.111val.222val.333val.444val.555val.666val.777val.888val.999

DDDD aa  4 mmm.mmm
----|----+----+----+----+----+----+----+----+----+----+----+----+----+----+----
         1         2         3         4         5         6         7         
         0         0         0         0         0         0         0         0
```

Where:

```
"aa"      = Variable index #
"c"       = Count for number of values specified  [MAX=9]
"nnn.nnn" = Cutpoint value
"???.lim" = Range limits, defined as:
                 [ LO1.lim, HI1.lim ] for Group 1
                 [ LO2.lim, HI2.lim ] for Group 2
"val.???" = Values for cluster specifications
```



```
"mmm.mmm" = Critical point value
```

EXAMPLE:

```
       TYPE
       ----
DDDD 04  1 025.500
DDDD
----|----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
DDDD aa  1 nnn.nnn
----|----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
         1         2         3         4         5         6         7         8
         0         0         0         0         0         0         0         0


       TYPE
       ----
DDDD 05  2  10.000 20.000 40.000 50.000
DDDD
----|----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
DDDD aa  2 LO1.limHI1.limLO2.limHI2.lim
----|----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
         1         2         3         4         5         6         7         8
         0         0         0         0         0         0         0         0


       TYPE
       ----
DDDD 06  3  2   10.000 20.000
DDDD        3   30.000 40.000 45.000
DDDD
----|----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
DDDD aa  3  c  val.111val.222val.333val.444val.555val.666val.777val.888val.999
DDDD        c  val.111val.222val.333val.444val.555val.666val.777val.888val.999
----|----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
         1         2         3         4         5         6         7         8
         0         0         0         0         0         0         0         0


       TYPE
       ----
DDDD 07  4 020.000
DDDD
----|----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
DDDD aa  4 nnn.nnn
----|----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
         1         2         3         4         5         6         7         8
         0         0         0         0         0         0         0         0
```

Table 4.1

PAAVE Program File References

FORTRAN UNIT ##	FILE NAME	USE	CONTENTS	FORMAT
5	PARFIL	Inp	Parameter Specifications	See Parameter Specs
6	MSGFIL	Out	Program Processing Monitor	132-Col Max
8	INPFIL	Inp	Raw Data Input File	Any Std FORTRAN Fmt
9	WRTFIL	Out	PAA Output	80-Col Max
11	SAVFIL	I/O	Dichotomized Data Storage	Unformatted Binary
12	SIMFIL	Out	Bootstrap Resampling Vectors	(25I3)
13	TREFIL	Out	PAA Summary Trees	(1I3,2I3,4I3,8I3/ 16I3/32I3)

Parameter Specification Via PROMPT

The PROMPT program is provided as an aid for the creation of the parameter specification file ("PARFIL"). The program executes independently of the PAAVE program and solicits all specifications for the analysis from the user at an interactive terminal. The information supplied is echoed back to the terminal and then is output to a file as a set of card images that represents the properly formatted PARFIL information. Internal program documentation lists the FORTRAN I/O units that are used; these can be easily modified by the user if necessary.

V.

BOOTSTRAP RESAMPLING

Sampling Algorithm

Bootstrap resampling is an alternative cross-validation procedure recently developed by Efron (1979, 1982). In return for (often substantial) computational efforts, the bootstrap provides the analyst with freedom from the constraints of a prespecified, possibly inappropriate parametric model. It is particularly well-suited for use with Predictive Attribute Analysis because of its nonparametric derivation, lack of restrictive distributional assumptions, and potential range of application. Efron (1982, p.58+), in fact, presents an application of the bootstrap to a decision-tree classification problem similar to PAAs.

Bootstrap resampling provides the capability for generating a set of sampling distributions for an unknown population for which a sample is available. The sampling distribution of various characteristics (not necessarily formal statistics like mean or variance) of the composite set of these resamplings can then be obtained and studied. The properties of the sampling method lead us to expect that, for a reasonably large number of samples, the distribution of sample characteristics will be similar to that which would have been obtained by sampling directly from the (unknown) population. The distribution of cases in the original sample need not be representative (even proportionally) of the population, but the assumption is made that every important type of case found in the population is found at least once in the sample.

The bootstrap procedure is implemented in the computer program as an outer loop containing the PAA processing code as a subset. For a specified number of repetitions (maximum 200, typically 100), a random sample of size N (where N is the number of cases under analysis) is drawn <u>with replacement</u> from that data set. The PAA is then conducted to completion for that sample.

Operationally, each validation sample is constructed by randomly selecting case-index integers N times with replacement. A vector of the resulting case selection frequencies (typically 0 or 1 or 2 or 3) is then used to control the number of times each case is read into the analysis. Each element of the vector represents the number of times the corresponding case is to be used. Use of this algorithm allows (1) relatively efficient FORTRAN sequential data input from the existing unformatted binary data file, and (2) easy reproduction of particular samples using only the N-element sampling vector, which is automatically output to a file by the program.

Processing Options

The only user-selectable parameter for the bootstrap resampling procedure is the number of replications to be run. Efron and Gong (1983) suggest that 100 replications is often an adequate number. The program has a limit of 200 replications (alterable in the FORTRAN source code), chosen to accommodate local processing time and resource considerations. Our

experience has been that nothing of consequence about a particular PAA is learned in 200 replications that was not seen in 100 replications.

Program Output

The PAAVE program has a number of output options for bootstrap-related processing. These allow flexibility for controlling analysis-related output and for saving replication-by-replication data files.

The summary-level option for <u>analysis output</u> is often the most practical for PAA validation analyses. This level of output provides only the skeletal ('unqualified') tree of relationships, certainly not appropriate for the interpretation of single-run PAAs. But when results are examined in the context of the series of resamplings, the instabilities that could at best be only inferred from a single run (even viewing all the available node-level information) become clearly displayed. Node-level (standard) output is, of course, available and certainly can provide useful insights and suggest alternative analyses to the program user.

There are two ancillary <u>output files</u> available at the conclusion of a bootstrap run; these are provided to facilitate further analysis of the information generated by the validation runs. They contain the vectors for reproducing the samples used at each replication and the indices of the selected predictor variables at each node.

Post-Processing of Output

The types of post-processing that we have found useful are (1) the display/analysis of the different branching sequences, and (2) the display/analysis of the membership of the terminal subgroups defined by the PAAs. We defer here to the Technical Report for examples of these supplemental analyses; they include, for instance, the graphic displays of the PAA trees and the analyses for the goodness-of-fit of the population PAA to the sample PAAs.

Efforts in these directions are provided for in the program by the availability of "TREFIL", the set of selected predictor variables in the PAA tree for each replication, and "SIMFIL", the vector of reread counts for each case for each replication.

VI.

REFERENCES

Efron, B. (1979).
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Annals of Statistics, 7, 1-26.

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MacNaughton-Smith, P. (1963).
The classification of individuals by the possession of attributes associated with a criterion.
Biometrics, 19-2, 364-366.

MacNaughton-Smith, P. (1965).
Some Statistical and Other Numerical Techniques for Classifying Individuals.
London: HMSO.

Nie, N.H. (1975).
Statistical Package for the Social Sciences.
New York: McGraw-Hill.

VII.

APPENDICES

A-1. FORTRAN Program Listing

```
C>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>
C>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>      M A N A G E
C>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>
C>>
C>>
C>> PROGRAM:  "NFW/BJS/PAA/ MANAGE "              UPDATE:         1/20/85
C>>            SPERRY 1100 VERSION
C>>
C>>
C>> PROGRAMMER:  NEWTON WALKER
C>>              ...  BUREAU OF RESEARCH & EVALUATION, OPARSS
C>>              ...  NYS DIVISION OF CRIMINAL JUSTICE SERVICES
C>>              ...  EXECUTIVE PARK TOWER, STUYVESANT PLAZA
C>>              ...  ALBANY  NEW YORK 12203
C>>
C>> FUNCTION:  DRIVER PROGRAM FOR PREDICTIVE-ATTRIBUTE-ANALYSIS ROUTINES
C>>
C>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>
C>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>
C>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>
C>>
C>>
C>>
C========================================================================
C==                                                                     =
C==                                                                     =
C==                    ***********************************              =
C==*****************   GENERAL PROGRAM DOCUMENTATION   *****************=
C==                    ***********************************              =
C==                                                                     =
C==                                                                     =
C==                                                                     =
C==   PROGRAM MODULES:                                                  =
C==   ================                                                  =
C==                                                                     =
C==      DICHOT :  DICHOTOMIZATION                                      =
C==      DUMPER :  PROGRAM DUMPS                                        =
C==      MANAGE :  MAIN ROUTINE                                         =
C==      PAAPER :  PAA PROCESSING CONTROL                               =
C==      READER :  DATA INPUT                                           =
C==      SIFTER :  MAX-VALUE SELECTION                                  =
C==      SIMMER :  BOOTSTRAP RESAMPLING CONTROL                         =
C==      STATIS :  CALCULATION OF STATISTICS                            =
C==      TABLER :  CONSTRUCTION OF 2X2 TABLES                           =
C==      WRITER :  OUTPUT CONTROL                                       =
C==                                                                     =
C==                                                                     =
C==   RELATED PROGRAM:                                                  =
C==   ================                                                  =
C==                                                                     =
C==      PROMPT :  INTERACTIVE PARAMETER SPECIFICATION                  =
C==                                                                     =
C==                                                                     =
C==   PROGRAM LIMITATIONS:                                              =
C==   ====================                                              =
C==                                                                     =
C==      MAX CASES .......  "UNLIMITED"  FOR NORMAL PROCESSING          =
C==                           10000      FOR SIMULATION MODE            =
C==      MAX INDEP VARS .. 49                                           =
```

```
C==      MAX DEP VARS .... 1                                                =
C==      MAX PAA LEVELS .. 5  (64 TERMINAL SUBGROUPS, 32 SPLITS)            =
C==                                                                         =
C==                                                                         =
C==   PROGRAM FILE REFERENCES:                                              =
C==   ========================                                              =
C==                                                                         =
C==    UNIT      NAME       USE              CONTENTS                       =
C==    ----     ------     -----     ------------------------------         =
C==      5      PARFIL      INP      PARAMETER SPECIFICATIONS               =
C==      6      MSGFIL      OUT      PROGRAM PROCESSING MONITOR             =
C==      8      INPFIL      INP      RAW DATA INPUT FILE                    =
C==      9      WRTFIL      OUT      FORMAL PAA OUTPUT (8.5X11)             =
C==     11      SAVFIL      I/O      DICHOTOMIZED DATA STORAGE              =
C==     12      SIMFIL      OUT      BOOTSTRAP RESAMPLING VECTORS           =
C==     13      TREFIL      OUT      PAA SUMMARY TREES                      =
C==                                                                         =
C==                                                                         =
C==                                                                         =
C==                                                                         =
C==   PROGRAM OPERATIONAL-MODE OPTIONS:                                     =
C==   =================================                                     =
C==                                                                         =
C==      MODE: GENERAL PROGRAM FUNCTIONS                                    =
C==           = 0 ..... TEST-MODE         ... << NO PROCESSING >>           =
C==           = 1 ..... DICHOT-MODE       ... DICHOTOMIZE DATA ONLY         =
C==           = 2 ..... PAA-MODE          ... NORMAL PAA PROCESSING MODE    =
C==           = 3 ..... SIMULATION-MODE   ... REPEATED SAMPLING RUNS        =
C==                                                                         =
C==     IMODE: BATCH/INTERACTIVE OPERATION                                  =
C==           =  0 .... BATCH-MODE OPERATION                                =
C==           = +1 .... INTERACTIVE-MODE: NOT IMPLEMENTED - USE PROMPT      =
C==                                                                         =
C==     TMODE: PRINT TRACE OF EXECUTION                                     =
C==           =  0 .... NORMAL PROGRAM OPERATION                            =
C==           = +1 .... TRACE-MODE: PROGRAM RUN TRACED ON "MSGFIL"          =
C==           = +2 .... TRACE-MODE:  ABOVE PLUS SUPPLEMENTAL INFO           =
C==           = +3 .... TRACE-MODE:   ABOVE PLUS DATA DUMPS                 =
C==                                                                         =
C==     RMODE: INTERNAL READ-LEVEL SELECTOR                                 =
C==           = -1 .... READ PARAMETER CARDS                                =
C==           =  0 .... READ RAW DATA                                       =
C==           = +1 .... (RE)READ DICHOTOMIZED DATA (BINARY FORMAT)          =
C==                                                                         =
C==     DMODE: DICHOTOMIZATION FUNCTIONS                                    =
C==           = 0 ..... NO DICHOTOMIZATION REQUESTED                        =
C==           = 1 ..... DICHOTOMIZE RAW DATA (AS SPECIFIED)                 =
C==                                                                         =
C==     WMODE: OUTPUT PRINT SELECTION                                       =
C==           = 0 ..... MINIMUM  : SUMMARY OUTPUT ONLY                      =
C==           = 1 ..... NORMAL   : LEVEL-BY-LEVEL OUTPUT                    =
C==           = 2 ..... EXTENDED: NOT IMPLEMENTED                           =
C==                                                                         =
C==     PMODE: PLOT SELECTION                                               =
C==           = 0 ..... NO PLOTS GENERATED                                  =
C==           = 1 ..... PLOT 2X2 TABLES: NOT IMPLEMENTED                    =
C==                                                                         =
C==     SMODE: SIMULATION MODE FOR BOOTSTRAP RESAMPLING                     =
C==             (ALSO SET VIA "MODE=3" SPECIFICATION...)                    =
C==           = 0 ..... SINGLE ANALYSIS ON INPUT DATA                       =
```

```
C==           = 1 ..... MULTIPLE ANALYSES ON SAMPLED DATA                   =
C==                                                                         =
C==                                                                         =
C==                                                                         =
C==                                                                         =
C==   PROGRAM PARAMETER INPUT INFORMATION:                                  =
C==   ====================================                                  =
C==                                                                         =
C==    CARD   REQUIRED?   INFORMATION                         FORMAT        =
C==    ----   ---------   -------------------------------    ---------      =
C==                                                                         =
C==     1     REQUIRED                                        'PPPP',       =
C==                       RUN TITLE (3 80-COLUMN CARDS)       3(18A4)       =
C==                                                                         =
C==     2     REQUIRED                                        'PPPP',       =
C==                       NUMBER OF CASES                     I5,           =
C==                       NUMBER OF VARIABLES                 I3,           =
C==                       PROGRAM MODE SPECIFICATIONS:        7I3           =
C==                        MODE  : GENERAL PROGRAM MODE                     =
C==                       (IMODE : INTERACTIVE MODE)                        =
C==                        TMODE : TRACE MODE                               =
C==                        DMODE : DICHOTOMIZATION MODE                     =
C==                        WMODE : WRITTEN OUTPUT MODE                      =
C==                       (PMODE : PLOT MODE)                               =
C==                        SMODE : SIMULATION MODE                          =
C==                                                                         =
C==     3     REQUIRED                                        'PPPP',       =
C==                       INPUT DATA FORMAT                   18A4          =
C==                                                                         =
C==     4     REQUIRED                                        'PPPP',       =
C==                       OUTPUT DATA FORMAT                  18A4          =
C==                                                                         =
C==     5     REQUIRED                                        'PPPP',       =
C==                       MAXIMUM LEVEL OF PAA PROCESSING     I3,           =
C==                          MAX=5                                          =
C==                       STATISTICAL MEASURE TO BE USED      I3,           =
C==                          1=LAMBDA     2=UNCERT                          =
C==                          3=PHI        4=CHI-SQ                          =
C==                       DEPENDENT VARIABLE #                I3,           =
C==                       SELECTION VECTOR FOR INDEP VARS     50I1          =
C==                          0=IGNORE     1=USE                             =
C==                                                                         =
C==     6     REQUIRED                                        'PPPP',       =
C==                       BRANCH-TERMINATION OPTIONS:         6I1,          =
C==                         APPLY MIN-CELL-SIZE CRITERION                   =
C==                           "    MIN-CELL-%        "                      =
C==                           "    MIN-SUBGRP-N      "                      =
C==                           "    MIN-SUBGRP-%      "                      =
C==                           "    MIN-SUBGRP-RATIO  "                      =
C==                           "    MIN-STAT-VALUE    "                      =
C==                       TERMINATION-CRITERION VALUES:       6F7.3,        =
C==                       FORCE INDEP VAR SELECTION?          1X,I1         =
C==                          0=NO         1=YES                             =
C==                                                                         =
C==     7     OPTIONAL                                        'PPPP',       =
C==              *<4>*    INDEX VECTOR OF VARS TO FORCE       5(32I2)       =
C==                                                                         =
C==     8     OPTIONAL                                        'SSSS',       =
C==              *<1>*    NUMBER OF SAMPLES TO TAKE           1X,I3         =
C==                                                                         =
```

```
C==       9    OPTIONAL                                          'DDDD',      =
C==                *<2>*    INDEX OF VAR TO DICHOTOMIZE           I3,          =
C==                         TYPE OF DICHOTOMIZATION               I3,          =
C==                         DICHOT PARAMETERS                     *<3>*        =
C==                                                                            =
C==      10    OPTIONAL                                          'DDDD'       =
C==                *<2>*    END-OF-FILE SPECIFICATION                          =
C==                                                                            =
C==                                                                            =
C==                                                                            =
C==        NOTES:  *<1>*: REQUIRED IF SIMULATION RUNS REQUESTED                =
C==        ------  *<2>*: REQUIRED IF DICHOTOMIZATION REQUESTED                =
C==                *<3>*: FORMAT DEPENDS ON TYPE OF DICHOTOMIZATION            =
C==                *<4>*: REQUIRED IF FORCED-VAR SELECTION REQUESTED           =
C==                                                                            =
C==                                                                            =
C==                                                                            =
C==                                                                            =
C==                                                                            =
C==                                                                            =
C==                                                                            =
C==     S A M P L E    P A R A M E T E R    S P E C I F I C A T I O N S       =
C==     ================================================================       =
C==                                                                            =
C==                                                                            =
C%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
C%%% TITLE %%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
CPPP ==========================================================================
CPPP =======              THREE LINES OF TITLE TEXT                    =======
CPPP ==========================================================================
C%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
C%%% NNNNN  PPP  M  I  T  D  W  P  S     <== MODES %%%%%%%%%%%%%%%%%%%%%%%%%%%%
CPPP   500   11  2  0  0  1  1  0  0
C%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
C%%% INPUT FORMAT %%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
CPPP (11F3.0)
C%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
C%%% OUTPUT FORMAT %%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
CPPP (11F3.0)
C%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
C%%% MXLEV STAT  DEP  INDEX-OF-INDEP-VARS %%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
CPPP     3    4   11  11111111110
C%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
C%%% IIIIII  VALUES...              <==  TERMINATION CRITERIA  (OPT) %%
CPPP 000001  XXX.XXX
C%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
C%%% NNN                            <==   BOOTSTRAP SIMULATION  (OPT) %%
CSSS  50
C%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
C%%% DICHOTOMIZATION PARAMETERS %%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
CDDD  1  1   1.500
CDDD  2  1   1.500
CDDD  3  1   1.500
CDDD  4  1   1.500
CDDD  5  1   1.500
CDDD  6  1   1.500
CDDD  7  1   1.500
CDDD  8  1   1.500
CDDD  9  1   1.500
```

```
CDDD 10  1   1.500
CDDD 11  1   1.500
CDDD  0  0
C%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
C==                                                                            =
C==                                                                            =
C==                                                                            =
C==                                                                            =
C==                                                                            =
C==                                                                            =
C==                                                                            =
C==                                                                            =
C==                  ***********************************                       =
C==****************  ADDITIONAL TECHNICAL REFERENCES  *************************=
C==                  ***********************************                       =
C==                                                                            =
C==                                                                            =
C==       FURTHER DOCUMENTATION AND SUGGESTIONS FOR EFFECTIVE USE             =
C==    OF THIS PROGRAM, AND THE PAA METHODOLOGY IN GENERAL, CAN BE            =
C==    FOUND IN THE FOLLOWING ASSOCIATED DOCUMENTS:                            =
C==                                                                            =
C==        (1) PREDICTIVE ATTRIBUTE ANALYSIS WITH VALIDATION                   =
C==            EXTENSIONS:  USER'S GUIDE FOR THE PAAVE                         =
C==                         COMPUTER PROGRAM                                   =
C==                                                                            =
C==        (2) PREDICTIVE ATTRIBUTE ANALYSIS:  A TECHNICAL REPORT              =
C==            ON THE VALIDITY AND RELIABILITY OF THE METHOD                   =
C==                                                                            =
C==                                                                            =
C==                                                                            =
C==                                                                            =
C==      --------------------------------------------------------             =
C==       PLEASE REFER ANY QUESTIONS/COMMENTS/SUGGESTIONS TO:                 =
C==      --------------------------------------------------------             =
C==                                                                            =
C==       NEWTON WALKER,  BUREAU OF RESEARCH AND EVALUATION                   =
C==    OFFICE OF PROGRAM ANALYSIS, RESEARCH, AND STAT SERVICES                 =
C==     NEW YORK STATE DIVISION OF CRIMINAL JUSTICE SERVICES                   =
C==          EXECUTIVE PARK TOWER, STUYVESANT PLAZA                            =
C==              ALBANY,  NEW YORK    12203                                    =
C==                                                                            =
C==============================================================================
C
C
C
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C
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C
C
C
C
C
C==============================================================================
C==   PARAMETER DECLARATION
C==============================================================================
C
      IMPLICIT INTEGER (A-Z)
      INTEGER  N,P,PARFIL,MSGFIL,INPFIL,WRTFIL,MODE,DMODE,RMODE,WMODE,
     +         SMODE,SAVFIL,SIMFIL,TREFIL,RECNUM,TRACE
```

```
      INTEGER  DFLAG,DVAR,NCLUST,TABLE,STYPE,LEV,GRP
      INTEGER  INTERM(6)
      REAL     DATA,LAMBDA,PHI,CHISQ,UNCERT,
     +         MINCEL,MINCEP,MINSUB,MINSUP,MINRAT,MINSTA
C
      CHARACTER*4  ICARD,TITLE,IFORM,OFORM
C
      COMMON   /PARAMS/  N,P,RECNUM,TRACE,
     +                   PARFIL,MSGFIL,INPFIL,WRTFIL,SAVFIL,SIMFIL,
     +                   TREFIL,
     +                   MODE,IMODE,TMODE,RMODE,DMODE,WMODE,PMODE,SMODE
     +         /CHARAC/  TITLE(3,18),IFORM(18),OFORM(18)
     +         /DATAS/   DATA(21)
     +         /DICHOS/  DFLAG(21),
     +                   DVAR,
     +                   DCUTPT(21),
     +                   DMIN(2,21),DMAX(2,21),
     +                   NCLUST(2,21),DVAL(2,21)
     +         /TABLES/  TABLE(32,50,2,2),MAXLEV,LEV,GRP,DEP,INDSEL(50),
     +                   GRPSEL(63),IGUIDE(63),ITERM(63),TERFLG(9),
     +                   MINCEL,MINCEP,MINSUB,MINSUP,MINRAT,MINSTA,INDEX
     +         /STATS/   STYPE,
     +                   A(50),B(50),C(50),D(50),
     +                   P1(50),R2(50),C1(50),C2(50),T(50),
     +                   LAMBDA(50),PHI(50),CHISQ(50),UNCERT(50)
     +         /SIMS/    BOOTS,BOOT,SIMSEL(7),CASEL(10000)
C------------------------------------------------------------
C--   DEFAULT FILE ASSIGNMENTS
C------------------------------------------------------------
      PARFIL= 5
      MSGFIL= 6
      INPFIL= 8
      WRTFIL= 9
      SAVFIL= 11
      SIMFIL= 12
      TREFIL= 13
C------------------------------------------------------------
C--   PRINT HEADER
C------------------------------------------------------------
C
      WRITE (MSGFIL,21)
      WRITE (WRTFIL,21)
   21 FORMAT ('1'/
     +         ' ',79('*')/
     +         ' ',79('*')/
     +         ' ',79('*')/
     +         ' ', 7('*'),T74, 7('*')/
     +         ' ', 3('*'),T12,
     +         'P R E D I C T I V E   A T T R I B U T E   ',
     +               'A N A L Y S I S',T78,
     +            3('*')/
     +         ' ', 7('*'),T74, 7('*')/
     +         ' ',79('*')/
     +         ' ',79('*')/
     +         ' ',79('*')///)
C
C======================================================================
C==   PROGRAM DEBUGGING SPECIFICATIONS
C======================================================================
C
```

```
C     IF (TRACE.EQ.1)  CALL DUMPER(0)
C
C======================================================================
C==   READ GLOBAL PARAMETERS (FROM "PARFIL") & ECHO (TO "MSGFIL")
C======================================================================
C----------------------------------------------------------------------
      WRITE (MSGFIL,10)
   10 FORMAT ('0>>>>>>>  PARAMETER SPECIFICATIONS:'///)
C----------------------------------------------------------------------
      RECNUM= 0
      READ (PARFIL,11,END=9100,ERR=9100)  ICARD,TITLE
      RECNUM= RECNUM+3
   11 FORMAT (A4,1X,18A4/5X,18A4/5X,18A4)
      WRITE (MSGFIL,31)  ICARD,TITLE
   31 FORMAT ('0',T11,'CARD #1: ',A4//
     +         ' ',T16,'RUN TITLE: '///T11,18A4/T11,18A4/T11,18A4///)
      IF (ICARD.NE.'PPPP')  GOTO 9100
C----------------------------------------------------------------------
      READ (PARFIL,12,END=9100,ERR=9100)
     +     ICARD,N,P,MODE,IMODE,TMODE,DMODE,WMODE,PMODE,SMODE
      RECNUM= RECNUM+1
   12 FORMAT (A4,1X,2I5,7I3)
      IF (MODE.EQ.3)  SMODE= 1
      TRACE= TMODE
      WRITE(MSGFIL,32)ICARD,N,P,MODE,IMODE,TMODE,DMODE,WMODE,PMODE,SMODE
   32 FORMAT ('0',T11,'CARD #2: ',A4//
     +              T16,'NUMBER OF CASES: ',T40,I5/
     +              T16,'NUMBER OF VARIABLES: ',T40,I5//
     +              T16,'PROGRAM MODE: ',T40,I3/
     +              T16,'INTERACTIVE MODE:',T40,I3/
     +              T16,'TRACE MODE:',T40,I3/
     +              T16,'DICHOTOMIZATION MODE:',T40,I3/
     +              T16,'WRITE MODE:',T40,I3/
     +              T16,'PLOT MODE:',T40,I3/
     +              T16,'SIMULATION MODE:',T40,I3//)
      IF (ICARD.NE.'PPPP')  GOTO 9100
C----------------------------------------------------------------------
      READ (PARFIL,13,END=9100,ERR=9100)  ICARD,IFORM
      RECNUM= RECNUM+1
   13 FORMAT (A4,1X,18A4)
      WRITE (MSGFIL,33)  ICARD,IFORM
   33 FORMAT ('0',T11,'CARD #3: ',A4//
     +              T16,'INPUT FORMAT: ',T40,18A4//)
      IF (ICARD.NE.'PPPP')  GOTO 9100
C----------------------------------------------------------------------
      READ (PARFIL,14,END=9100,ERR=9100)  ICARD,OFORM
      RECNUM= RECNUM+1
   14 FORMAT (A4,1X,18A4)
      WRITE (MSGFIL,34)  ICARD,OFORM
   34 FORMAT ('0',T11,'CARD #4: ',A4//
     +              T16,'OUTPUT FORMAT: ',T40,18A4//)
      IF (ICARD.NE.'PPPP')  GOTO 9100
C----------------------------------------------------------------------
      READ (PARFIL,15,END=9100,ERR=9100)  ICARD,MAXLEV,STYPE,DEP,
     +                                    (INDSEL(J),J=1,50)
      RECNUM= RECNUM+1
   15 FORMAT (A4,1X,3I3,2X,50I1)
      WRITE (MSGFIL,35)  ICARD,MAXLEV,STYPE,DEP,(INDSEL(J),J=1,P)
   35 FORMAT ('0',T11,'CARD #5: ',A4//
     +              T16,'MAX LEVEL OF PROCESSING: ',T40,I5/
```

```
     +              T16,'STATISTICAL CRITERION: ',T40,I5/
     +              T16,'DEPENDENT VARIABLE: ',T40,I5//
     +              T16,'SELECTION VECTOR FOR INDEPENDENT VARIABLES: ',
     +              T65,50I1//)
      IF (ICARD.NE.'PPPP')  GOTO 9100
C-----------------------------------------------------------------------
      READ (PARFIL,16,END=9100,ERR=9100)  ICARD,
     +                                    (INTERM(J),J=1,6),
     +                                    MINCEL,MINCEP,
     +                                    MINSUB,MINSUP,
     +                                    MINRAT,MINSTA,FFLAG
      RECNUM= RECNUM+1
   16 FORMAT (A4,1X,6I1,2X,6F7.3,1X,I1)
C-----------------------------------------------------------------
C--   DEFAULT MINIMUM VALUES FOR CELL SIZES, %S, AND RATIOS
C-----------------------------------------------------------------
      IF (INTERM(1).EQ.0)        MINCEL=   0.000
      IF (INTERM(2).EQ.0)        MINCEP=   0.000
      IF (INTERM(3).EQ.0)        MINSUB=   0.000
      IF (INTERM(4).EQ.0)        MINSUP=   0.000
      IF (INTERM(5).EQ.0)        MINRAT=   0.000
C
      IF (INTERM(1).EQ.1)        MINCEL=   5.000
      IF (INTERM(2).EQ.1)        MINCEP=    .001
      IF (INTERM(3).EQ.1)        MINSUB=  10.000
      IF (INTERM(4).EQ.1)        MINSUP=    .001
      IF (INTERM(5).EQ.1)        MINRAT=    .1
C-----------------------------------------------------------------
C--   DEFAULT MINIMUM VALUES FOR STATISTICS
C-----------------------------------------------------------------
      IF (INTERM(6).EQ.0)        MINSTA=   0.000
      IF (INTERM(6).NE.1)   GOTO 1600
C
      IF (STYPE.EQ.1)            MINSTA=    .01
      IF (STYPE.EQ.2)            MINSTA=    .01
      IF (STYPE.EQ.3)            MINSTA=    .01
      IF (STYPE.EQ.4)            MINSTA=   3.84146
C
 1600 CONTINUE
C-----------------------------------------------------------------
      WRITE (MSGFIL,36)  ICARD,
     +                   INTERM(1),MINCEL, INTERM(2),MINCEP,
     +                   INTERM(3),MINSUB, INTERM(4),MINSUP,
     +                   INTERM(5),MINRAT, INTERM(6),MINSTA
   36 FORMAT ('1',T11,'CARD #6: ',A4//
     +              T16,'APPLY BRANCH TERMINATION CRITERION? ',
     +              T59,'N/Y',T72,'VALUE'//
     +              T16,'  MINIMUM CELL SIZE ...............: ',T60,I1,
     +                                                     T70,F7.3/
     +              T16,'  MINIMUM CELL/TOTAL PERCENT ......: ',T60,I1,
     +                                                     T70,F7.3/
     +              T16,'  MINIMUM SUBGROUP SIZE ...........: ',T60,I1,
     +                                                     T70,F7.3/
     +              T16,'  MINIMUM SUBGROUP/TOTAL PERCENT .: ',T60,I1,
     +                                                     T70,F7.3/
     +              T16,'  MINIMUM A:B SUBGRP RATIO ........: ',T60,I1,
     +                                                     T70,F7.3/
     +              T16,'  MINIMUM VALUE OF STATISTIC ......: ',T60,I1,
     +                                                     T70,F7.3//)
      IF (ICARD.NE.'PPPP')  GOTO 9100
```

```
C-----------------------------------------------------------------------
      IF (FFLAG.EQ.0)  GOTO 1700
      READ (PARFIL,17,END=9100,ERR=9100)  ICARD,
     +                                    (IGUIDE(J),J=1,63)
      RECNUM= RECNUM+1
   17 FORMAT (A4,1X,I2/5X,2I2/5X,4I2/5X,8I2/5X,16I2)
      WRITE (MSGFIL,37)  ICARD,(IGUIDE(J),J=1,63)
   37 FORMAT ('0',T11,'CARD #7: ',A4//
     +              T16,'SELECTION VECTOR FOR VARIABLES TO BE FORCED: '/
     +              T16,'  LEVEL= 1 ..............................: ',
     +              T40,I2/
     +              T16,'  LEVEL= 2 ..............................: ',
     +              T40,2I2/
     +              T16,'  LEVEL= 3 ..............................: ',
     +              T40,4I2/
     +              T16,'  LEVEL= 4 ..............................: ',
     +              T40,8I2/
     +              T16,'  LEVEL= 5 ..............................: ',
     +              T40,16I2//)
      IF (ICARD.NE.'PPPP')  GOTO 9100
C
      DO 50  I=1,63
   50   IGUIDE(I)= -(IGUIDE(I))
C-----------------------------------------------------------------------
 1700 CONTINUE
      IF (SMODE.EQ.0)  GOTO 1800
      READ (PARFIL,18,END=9100,ERR=9100)  ICARD,BOOTS,
     +                                    (SIMSEL(J),J=1,7)
      RECNUM= RECNUM+1
   18 FORMAT (A4,1X,I3,2X,7I1)
      WRITE (MSGFIL,38)  ICARD,BOOTS,(SIMSEL(J),J=1,7)
   38 FORMAT ('0',T11,'CARD #8: ',A4//
     +              T16,'NUMBER OF SAMPLES TO DRAW: ',T50,I3//
     +              T16,'SELECTION VECTOR FOR SIMULATION OUTPUT SAVED: ',
     +              T70,7I1///)
      IF (ICARD.NE.'SSSS')  GOTO 9100
C-----------------------------------------------------------------
 1800 CONTINUE
      IF (TRACE.GE.2)
     +   WRITE (MSGFIL,22)  PARFIL,MSGFIL,INPFIL,WRTFIL,SAVFIL,SIMFIL,
     +                      TREFIL
   22 FORMAT ('0'//' >>>>>>>  SYSTEM FILES REFERENCED:'//
     +        ' ',T16,  'PARAMETER INPUT: ',T40,'#',I2/
     +        ' ',T16,  'MESSAGE REPORTS: ',T40,'#',I2/
     +        ' ',T16,  'RAW DATA INPUT : ',T40,'#',I2/
     +        ' ',T16,  'ANALYSIS OUTPUT: ',T40,'#',I2/
     +        ' ',T16,  'SAVE DICHO DATA: ',T40,'#',I2/
     +        ' ',T16,  'SAVE SAMP VCTRS: ',T40,'#',I2/
     +        ' ',T16,  'SAVE TREE VCTRS: ',T40,'#',I2//)
C-----------------------------------------------------------------
C
      WRITE (WRTFIL,23)  TITLE
   23 FORMAT (' '//////////T10,18A4/T10,18A4/T10,18A4)
C
C-----------------------------------------------------------------
C     SET UP DICHOTOMIZATION PARAMETERS  (IF REQUESTED)
C-----------------------------------------------------------------
      IF (DMODE.EQ.0)  GOTO 1999
C
      WRITE (MSGFIL,39)
```

```
   39  FORMAT ('1>>>>>>>  DICHOTOMIZATION SPECIFICATIONS:'//)
C
      REK= RECNUM
      RECNUM= 0
C     WRITE (MSGFIL,399) REK
C 399  FORMAT ('0 +*+*+*+*+*+  REK = ',I7)
      CALL DICHOT(REK)
C-------------------------------------------------------------
C     SET UP PARAMETERS FOR SIMULATION (IF REQUESTED)
C-------------------------------------------------------------
C
      IF (SMODE.EQ.0)  GOTO 1900
C
      CALL SIMMER
      GOTO 9900
C
C-------------------------------------------------------------
C     CONTINUE TO TYPE OF PROCESSING MODE SELECTED
C-------------------------------------------------------------
 1900 CONTINUE
 1999 JUMPER=MODE+1
      GOTO (9900,1000,2000,3000),JUMPER
C=======================================================================
C==   MODE = 0 :  TEST MODE -- NO PROCESSING
C=======================================================================
C
      GOTO 9900
C
C=======================================================================
C==   MODE = 1 :  DICHOTOMIZATION ONLY  (READ,DICHOT,WRITE)
C=======================================================================
C
 1000 CONTINUE
C
C=======================================================================
C==   MODE = 2 :  NORMAL PAA PROCESSING MODE
C=======================================================================
C
 2000 CONTINUE
      CALL PAAPER
      GOTO 9900
C
C=======================================================================
C==   MODE = 3 :  SIMULATION MODE
C=======================================================================
C
 3000 CONTINUE
      CALL SIMMER
      GOTO 9900
C
C=======================================================================
C==   ERROR CONTROL
C=======================================================================
C
 9000 CONTINUE
 9100 WRITE (MSGFIL,91)
   91  FORMAT ('1'/
     +          ' #######   ERROR IN PARAMETER CARD ENTRY: MANAGE')
      CALL DUMPER(0)
      GOTO 9999
C
C=======================================================================
C==   PROGRAM TERMINATION
C=======================================================================
C
 9900 CONTINUE
C
C----- DEBUG DUMP STATISTICS
C
C     CALL DUMPER(0)
C
      WRITE (MSGFIL,95)
   95  FORMAT ('1>>>>>>>  END OF PROGRAM EXECUTION.'/)
C
 9999 STOP
C-----*--1---------2---------3---------4---------5---------6---------7--
      END

E>
```

```
      SUBROUTINE READER
C>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>
C>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>      R E A D E R
C>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>
C>>
C>>
C>> PROGRAM:  "NFW/BJS/PAA/ READER "              UPDATE:          1/20/85
C>>           SPERRY 1100 VERSION
C>>
C>> PROGRAMMER:  NEWTON WALKER
C>>              ...  BUREAU OF RESEARCH & EVALUATION, OPARSS
C>>              ...  NYS DIVISION OF CRIMINAL JUSTICE SERVICES
C>>              ...  EXECUTIVE PARK TOWER, STUYVESANT PLAZA
C>>              ...  ALBANY  NEW YORK 12203
C>>
C>> FUNCTION:  READ DATA FILE; OPTIONALLY RECODE AND WRITE TO FILE
C>>
C>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>
C>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>
C>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>
C>>
C>>
C=======================================================================
C==   PARAMETER DECLARATION
C=======================================================================
C     IMPLICIT INTEGER (A-Z)
      INTEGER  N,P,PARFIL,MSGFIL,INPFIL,WRTFIL,MODE,DMODE,RMODE,WMODE,
     +         SAVFIL,SIMFIL,TREFIL,RECNUM,TRACE
      INTEGER  DFLAG,DVAR,JUMPER,TABLE,LEV,GRP
      REAL     DATA
C
      CHARACTER*4  TITLE,IFORM,OFORM
C
      COMMON   /PARAMS/  N,P,RECNUM,TRACE,
     +                   PARFIL,MSGFIL,INPFIL,WRTFIL,SAVFIL,SIMFIL,
     +                   TREFIL,
     +                   MODE,IMODE,TMODE,RMODE,DMODE,WMODE,PMODE,SMODE
     +         /CHARAC/  TITLE(3,18),IFORM(18),OFORM(18)
     +         /DATAS/   DATA(21)
     +         /DICHOS/  DFLAG(21),
     +                   DVAR,
     +                   DCUTPT(21),
     +                   DMIN(2,21),DMAX(2,21),
     +                   NCLUST(2,21),DVAL(2,21)
     +         /TABLES/  TABLE(32,50,2,2),MAXLEV,LEV,GRP,DEP,INDSEL(50),
     +                   GRPSEL(63),IGUIDE(63),ITERM(63),TERFLG(9),
     +                   MINCEL,MINCEP,MINSUB,MINSUP,MINRAT,MINSTA,INDEX
     +         /SIMS/    BOOTS,BOOT,SIMSEL(7),CASEL(10000)
C
C=======================================================================
C==   NORMAL MODE       :  LEVEL=0     : READ, DICHOT, TABLE, SAVE(BINARY)
C==                        LEVEL=1..MAX: REREAD(BINARY), TABLE
C==   SIMULATION MODE   :  READ, DICHOT, SAVE(BINARY), ...
C==                        ... (RE)READ UNDER CONTROL OF CASEL, TABLE
C=======================================================================
C
C=======================================================================
C==   IF LEVEL GT 0, REREAD IN BINARY FROM "SAVFIL"
C=======================================================================
```

```
C
      IF (RMODE.EQ.1 .AND. SMODE.EQ.0)  GOTO 2000
      IF (RMODE.EQ.1 .AND. SMODE.EQ.1)  GOTO 3000
C
C======================================================================
C==   ON 1ST PASS READ DATA RECORDS BY CASE (RECODE & SAVE IF REQUESTED)
C======================================================================
C
      IF (RECNUM.LE.1 .AND. TRACE.GE.1)  WRITE (MSGFIL,21) RMODE
   21 FORMAT ('0>>>>>>>  SUBROUTINE READER:  RMODE=',I3)
C
      DO 1000  I=1,N
C                     PRINT 9191, I
        READ (INPFIL,IFORM,END=9100,ERR=9100)  (DATA(K),K=1,P)
        RECNUM = RECNUM + 1
C                WRITE(WRTFIL,OFORM)                      (DATA(K),K=1,P)
        DO 100  J=1,P
          JUMPER= DFLAG(J)+1
          DVAR= J
C                     PRINT 9191, I,J,DFLAG(J),JUMPER
C9191            FORMAT (' ***     CASE, VAR, DFLAG(J), JUMPER : ',4I7)
C
          DMODE= 2
          GOTO (900,500,600,700,800), JUMPER
C-------------------------------------------------------------
C--   DICHOT:  CUTPOINT
C-------------------------------------------------------------
  500     CONTINUE
            CALL DICHOT(RECNUM)
          GOTO 900
C-------------------------------------------------------------
C--   DICHOT:  LIMITS
C-------------------------------------------------------------
  600     CONTINUE
            CALL DICHOT(RECNUM)
          GOTO 900
C-------------------------------------------------------------
C--   DICHOT:  CLUSTERS
C-------------------------------------------------------------
  700     CONTINUE
            CALL DICHOT(RECNUM)
          GOTO 900
C-------------------------------------------------------------
C--   DICHOT:  CRITICAL VALUE
C-------------------------------------------------------------
  800     CONTINUE
            CALL DICHOT(RECNUM)
          GOTO 900
C-------------------------------------------------------------
C--
C-------------------------------------------------------------
  900     CONTINUE
  100   CONTINUE
C-------------------------------------------------------------
C--   UPDATE CONTINGENCY TABLES  (UNLESS SMODE=1 OR MODE<2)
C-------------------------------------------------------------
        IF (SMODE.EQ.0  .AND.  MODE.GE.2)  CALL TABLER
C-------------------------------------------------------------
C--   WRITE DICHOTOMIZED CASE TO "WRTFIL"  (IF WMODE=3)
C-------------------------------------------------------------
```

```
        IF (WMODE.EQ.3)  WRITE (WRTFIL,OFORM)  (DATA(J),J=1,P)
C-------------------------------------------------------------
C--   WRITE CASE TO "SAVFIL"  <UNFORMATTED BINARY>
C-------------------------------------------------------------
        WRITE (SAVFIL)  (DATA(J),J=1,P)
C-------------------------------------------------------------
C       WRITE (MSGFIL,9191)  (DATA(J),J=1,P)
C9191    FORMAT (' => ',21F4.0)
C-------------------------------------------------------------
 1000   CONTINUE
C
      GOTO 9999
C
C======================================================================
C==   (RE)READ FROM "SAVFIL"
C======================================================================
C
 2000 CONTINUE
C
      REWIND SAVFIL
      RECNUM=0
      IF (RECNUM.LE.1 .AND. TRACE.GE.1)  WRITE (MSGFIL,21) RMODE
C
      DO 2500  I=1,N
        READ (SAVFIL)  (DATA(J),J=1,P)
        RECNUM= RECNUM+1
        CALL TABLER
 2500   CONTINUE
      GOTO 9999
C
C======================================================================
C==   (RE)READ UNDER CONTROL OF BOOTSTRAP SIMULATION PROCEDURE
C======================================================================
C
 3000 CONTINUE
C
      REWIND SAVFIL
      RECNUM= 0
C
      DO 3500  I=1,N
        IF (CASEL(I).EQ.0)  GOTO 3500
          READ (SAVFIL)  (DATA(J),J=1,P)
          DO 3600  K=1,CASEL(I)
            RECNUM= RECNUM+1
            CALL TABLER
 3600       CONTINUE
 3500   CONTINUE
C
      IF (RECNUM.NE.N)  GOTO 9300
C
      GOTO 9999
C
C======================================================================
C==   ERROR CONTROL
C======================================================================
C
 9000 CONTINUE
 9100 WRITE (MSGFIL,91)
   91 FORMAT ('1'/
     +            ' #######   ERROR IN READER ')
```

```
      GOTO 9999
 9300 WRITE (MSGFIL,93)  RECNUM,N
   93  FORMAT ('1'/
     +          ' #######   ERROR IN READER WITHIN SIMULATIONS: ',
     +          ' RECNUM = ',I7,' DOES NOT EQUAL SAMPLE SIZE OF ',I7)
      GOTO 9999
C-----*--1---------2---------3---------4---------5---------6---------7--
 9999 RETURN
      END
```

```
      SUBROUTINE  DICHOT(REK)
C>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>
C>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>        D I C H O T
C>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>
C>>
C>>
C>> PROGRAM:  "NFW/BJS/PAA/ DICHOT "                 UPDATE:          1/20/85
C>>              SPERRY 1100 VERSION
C>>
C>> PROGRAMMER:  NEWTON WALKER
C>>               ...  BUREAU OF RESEARCH & EVALUATION, OPARSS
C>>               ...  NYS DIVISION OF CRIMINAL JUSTICE SERVICES
C>>               ...  EXECUTIVE PARK TOWER, STUYVESANT PLAZA
C>>               ...  ALBANY  NEW YORK 12203
C>>
C>> FUNCTION:  DICHOTOMIZATION FOR SELECTED VARIABLES;
C>>              (1)- SPECIFICATION OF PARAMETERS,
C>>              (2)- DICHOTOMIZATION BY MODE.
C>>
C>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>
C>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>
C>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>
C=======================================================================
C==   PARAMETER SPECIFICATION
C=======================================================================
      IMPLICIT INTEGER (A-Z)
      INTEGER  N,P,PARFIL,MSGFIL,INPFIL,WRTFIL,MODE,DMODE,RMODE,WMODE,
     +         SAVFIL,SIMFIL,TREFIL,RECNUM,TRACE
      INTEGER  DFLAG,DVAR,DTYPE
      REAL     DATA,DCFLAG,DCUTPT,DVAL,DMIN,DMAX
C
      CHARACTER*4  ICARD,TITLE
C
      COMMON   /PARAMS/  N,P,RECNUM,TRACE,
     +                   PARFIL,MSGFIL,INPFIL,WRTFIL,SAVFIL,SIMFIL,
     +                   TREFIL,
     +                   MODE,IMODE,TMODE,RMODE,DMODE,WMODE,PMODE,SMODE
     +         /CHARAC/  TITLE(3,18)
     +         /DATAS/   DATA(21)
     +         /DICHOS/  DFLAG(21),
     +                   DVAR,
     +                   DCUTPT(21),
     +                   DMIN(2,21),DMAX(2,21),
     +                   NCLUST(2,21),DVAL(2,21)
C-------------------------------------------------------------
C--   MODE SPECIFICATION
C-------------------------------------------------------------
      GOTO (1000,2000), DMODE
C
C=======================================================================
C==   DMODE 1 :  READ PARAMETERS FOR DICHOTOMIZATION
C=======================================================================
C
 1000 CONTINUE
      IF (RECNUM.LE.1 .AND. TRACE.GE.1)  WRITE (MSGFIL,20) DMODE
   20  FORMAT ('0>>>>>>>  SUBROUTINE DICHOT:  DMODE=',I3/)
C-------------------------------------------------------------
C--   READ PARAMETER CARD FOR DICHOTOMIZATION TYPE
C-------------------------------------------------------------
```

```
 1001 CONTINUE
      REK=REK+1
      READ (PARFIL'REK,11,ERR=9100)  ICARD,DVAR,DTYPE
   11  FORMAT (A4,1X,2I3)
      IF (DTYPE .EQ. 0)  GOTO 9999
C     IF (TRACE.EQ.1)  WRITE (MSGFIL,21)  ICARD,DVAR,DTYPE,REK
C  21  FORMAT ('0',T11,A4,2I3,T60,'<RECORD#',I2,'>')
C
      DFLAG(DVAR)= -1
      IF (DTYPE .EQ. 1)  GOTO 1100
      IF (DTYPE .EQ. 2)  GOTO 1200
      IF (DTYPE .EQ. 3)  GOTO 1300
      IF (DTYPE .EQ. 4)  GOTO 1400
      GOTO 1900
C-------------------------------------------------------------
C--   DTYPE = 1 :   CUTPOINT SPECIFIED
C-------------------------------------------------------------
 1100 CONTINUE
      DFLAG(DVAR)= 1
      READ (PARFIL'REK,12)  DCUTPT(DVAR)
   12  FORMAT (11X,F10.3)
       WRITE (MSGFIL,22)  DVAR,DCUTPT(DVAR)
   22  FORMAT (' ',T11,' VARIABLE:',I3,'      CUTPOINT:',F10.3)
      GOTO 1001
C-------------------------------------------------------------
C--   DTYPE = 2 :   LIMITS  SPECIFIED
C-------------------------------------------------------------
 1200 CONTINUE
      DFLAG(DVAR)= 2
      READ (PARFIL'REK,13)  DMIN(1,DVAR),DMAX(1,DVAR),
     +                      DMIN(2,DVAR),DMAX(2,DVAR)
      WRITE (MSGFIL,23)  DVAR,DMIN(1,DVAR),DMAX(1,DVAR),
     +                   DMIN(2,DVAR),DMAX(2,DVAR)
   23  FORMAT (' ',T16,' VARIABLE:',I3,'      RANGE #1:',2F7.3,
     +                     '     RANGE #2:',2F7.3)
   13  FORMAT (11X,4F7.3)
      GOTO 1001
C-------------------------------------------------------------
C--   DTYPE = 3 :   CLUSTERS SPECIFIED    (2-CARDS PER VAR)
C-------------------------------------------------------------
 1300 CONTINUE
      DFLAG(DVAR)= 3
      READ (PARFIL'REK,14)  NCLST1
   14  FORMAT (11X,I3)
      READ (PARFIL'REK,16)  (DVAL(1,K),K=1,NCLST1)
   16  FORMAT (15X,9F7.3)
      REK=REK+1
      READ (PARFIL'REK,14)  NCLST2
      READ (PARFIL'REK,16)  (DVAL(2,K),K=1,NCLST2)
      WRITE(MSGFIL,24)  DVAR,(DVAL(1,J),J=1,NCLST1)
   24  FORMAT (' ',T16,' VARIABLE:',I3,'      CLSTR #1:',9F7.3)
      WRITE(MSGFIL,25)  (DVAL(2,J),J=1,NCLST2)
   25  FORMAT (' ',T16,'             ',3X,'      CLSTR #2:',9F7.3)
      GOTO 1001
C-------------------------------------------------------------
C--   DTYPE = 4 :   CRITICAL VALUE SPECIFIED
C-------------------------------------------------------------
 1400 CONTINUE
      DFLAG(DVAR)= 4
      READ (PARFIL'REK,15)  CRTVAL
```

```
   15  FORMAT (11X,F7.3)
      WRITE (MSGFIL,26)  DVAR,CRTVAL
   26  FORMAT (' ',T16,' VARIABLE:',I3,'      CRIT VAL:',F7.3)
      GOTO 1001
C-------------------------------------------------------------
 1900 GOTO 1001
 1999 GOTO 9999
C
C=================================================================
C==   DMODE 2 :  DICHOTOMIZATION OF DATA ON INPUT
C=================================================================
C
 2000 CONTINUE
      IF (RECNUM.LE.1 .AND. TRACE.GE.1)  WRITE (MSGFIL,41) DMODE
   41 FORMAT ('0>>>>>>>  SUBROUTINE DICHOT:  DMODE=',I3/)
C-------------------------------------------------------------
C--   RECODE VARIABLES AS SPECIFIED, FOR EACH MODE
C-------------------------------------------------------------
        JUMPER=DFLAG(DVAR)+2
        GOTO (2100,2200,2300,2400,2500), JUMPER
C-------------------------------------------------------------
C--   ERROR :  DICHOTOMIZATION REQUESTED BUT NOT DEFINED
C-------------------------------------------------------------
 2100   CONTINUE
        STOP
C-------------------------------------------------------------
C--   BYPASS :  NO DICHOTOMIZATION REQUESTED
C-------------------------------------------------------------
 2200   CONTINUE
        GOTO 2900
C-------------------------------------------------------------
C--   PROCESS :  CUTPOINT DICHOTOMIZATION REQUESTED
C-------------------------------------------------------------
 2300   CONTINUE
C         PRINT 9191, DVAR,DCUTPT(DVAR),DATA(DVAR)
C9191       FORMAT ('      ***  DVAR, DCUTPT, DATA : ',40X,I7,2F10.3)
        DCFLAG= 0
        IF ( DATA(DVAR) .GE. DCUTPT(DVAR) )  DCFLAG=2.
        IF ( DATA(DVAR) .LT. DCUTPT(DVAR) )  DCFLAG=1.
        DATA(DVAR)= DCFLAG
        GOTO 2900
C-------------------------------------------------------------
C--   PROCESS :  GROUP LIMITS SPECIFIED
C-------------------------------------------------------------
 2400   CONTINUE
        GOTO 2900
C-------------------------------------------------------------
C--   PROCESS :  GROUP CLUSTERS SPECIFIED
C-------------------------------------------------------------
 2500   CONTINUE
      DO 2510  K=1,NCLST1
        IF      ((DATA(DVAR).GT.DVAL(1,K)-.00001)
     +    .AND. (DATA(DVAR).LT.DVAL(1,K)+.00001))  DCFLAG= 2.
        IF      ((DATA(DVAR).GT.DVAL(2,K)-.00001)
     +    .AND. (DATA(DVAR).LT.DVAL(2,K)+.00001))  DCFLAG= 2.
 2510   CONTINUE
      DO 2520  K=1,NCLST2
        IF      ((DATA(DVAR).GT.DVAL(1,K)-.00001)
     +    .AND. (DATA(DVAR).LT.DVAL(1,K)+.00001))  DCFLAG= 1.
        IF      ((DATA(DVAR).GT.DVAL(2,K)-.00001)
```

```
     +     .AND. (DATA(DVAR).LT.DVAL(2,K)+.00001))  DCFLAG= 1.
 2520   CONTINUE
       DATA(DVAR)= DCFLAG
         GOTO 2900
C-------------------------------------------------------------
C--    PROCESS :  CRITICAL VALUE SPECIFIED
C-------------------------------------------------------------
 2600   CONTINUE
        DCFLAG= 1.
          IF ( (DATA(DVAR) .GT. CRTVAL-.00001)
     +    .AND.(DATA(DVAR) .LT. CRTVAL+.00001))  DCFLAG= 2.
        DATA(DVAR)= DCFLAG
        GOTO 2900
C-------------------------------------------------------------
 2900 CONTINUE
C-------------------------------------------------------------
      GOTO 9999
C
C=====================================================================
C==    ERROR CONTROL
C=====================================================================
C
 9000 CONTINUE
 9100 WRITE (MSGFIL,91)
   91  FORMAT ('1'/
     +          ' #######   ERROR/EOF  IN PARAMETER CARD ENTRY: DICHOT')
C-----*--1---------2---------3---------4---------5---------6---------7--
 9999 RETURN
      END
```

```
      SUBROUTINE PAAPER
C>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>
C>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>     P A A P E R
C>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>
C>>
C>>
C>> PROGRAM:  "NFW/BJS/PAA/ PAAPER "             UPDATE:        1/20/85
C>>            SPERRY 1100 VERSION
C>>
C>>
C>> PROGRAMMER:  NEWTON WALKER
C>>                ...  BUREAU OF RESEARCH & EVALUATION, OPARSS
C>>                ...  NYS DIVISION OF CRIMINAL JUSTICE SERVICES
C>>                ...  EXECUTIVE PARK TOWER, STUYVESANT PLAZA
C>>                ...  ALBANY  NEW YORK 12203
C>>
C>> FUNCTION:  PAA PROCESSING CONTROLLER
C>>
C>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>
C>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>
C>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>
C>>
C>>
C=====================================================================
C==    PARAMETER DECLARATION
C=====================================================================
      IMPLICIT INTEGER (A-Z)
      INTEGER  N,P,PARFIL,MSGFIL,INPFIL,WRTFIL,MODE,DMODE,RMODE,WMODE,
     +         SAVFIL,SIMFIL,TREFIL,RECNUM,TRACE
      INTEGER  LEV,GRP,LEVGRP,IGUIDE
      REAL     DATA
      REAL     LAMBDA,PHI,CHISQ,UNCERT
C
      CHARACTER*4  TITLE,IFORM,OFORM
C
      COMMON   /PARAMS/  N,P,RECNUM,TRACE,
     +                   PARFIL,MSGFIL,INPFIL,WRTFIL,SAVFIL,SIMFIL,
     +                   TREFIL,
     +                   MODE,IMODE,TMODE,RMODE,DMODE,WMODE,PMODE,SMODE
     +         /CHARAC/  TITLE(3,18),IFORM(18),OFORM(18)
     +         /DATAS/   DATA(21)
     +         /DICHOS/  DFLAG(21),DVAR,
     +                   DCUTPT(21),
     +                   DMIN(2,21),DMAX(2,21),
     +                   NCLUST(2,21),DVAL(2,21)
     +         /TABLES/  TABLE(32,50,2,2),MAXLEV,LEV,GRP,DEP,INDSEL(50),
     +                   GRPSEL(63),IGUIDE(63),ITERM(63),TERFLG(9),
     +                   MINCEL,MINCEP,MINSUB,MINSUP,MINRAT,MINSTA,INDEX
     +         /STATS/   STYPE,
     +                   A(50),B(50),C(50),D(50),
     +                   R1(50),R2(50),C1(50),C2(50),T(50),
     +                   LAMBDA(50),PHI(50),CHISQ(50),UNCERT(50)
C
C=====================================================================
C==    INITIALIZATION
C=====================================================================
C
      IF (MAXLEV.GT.5)  MAXLEV=5
      IF (SMODE.NE.1)  RMODE= 0
```

```
      LEV= -1
C
C=========================================================================
C==   LOOP FOR EACH LEVEL OF PAA PROCESSING
C=========================================================================
C
 1000 CONTINUE
C
        LEV= LEV+1
C
        IF (TRACE.GE.1)  WRITE (MSGFIL,21)  LEV
   21    FORMAT ('1>>>>>>>  SUBROUTINE PAAPER:  LEVEL=',I3)
C
        NGRPS= 2**(LEV)
        IF (NGRPS.LT.1)  NGRPS= 1
C
C-----------------------------------------------------------------
C--   INITIALIZE VALUES
C-----------------------------------------------------------------
C
      NMISS= 0
C
      DO 110  J=1,63
        ITERM(J) = 0
  110   CONTINUE
C
C-----------------------------------------------------------------
C--   ZERO TABLES
C-----------------------------------------------------------------
      DO 1500  T1=1,16
        DO 1500  T2=1,50
          DO 1500  T3=1,2
            DO 1500  T4=1,2
 1500          TABLE(T1,T2,T3,T4)= 0
C-----------------------------------------------------------------
C--   FIRST READ FROM RAW DATA "INPFIL"; ELSE FROM "SAVFIL"
C-----------------------------------------------------------------
        IF (LEV.GT.0 .OR. SMODE.EQ.1)  RMODE=1
C-----------------------------------------------------------------
C--   READ DATA (DICHOTOMIZE IF NECESSARY); INCREMENT TABLES
C-----------------------------------------------------------------
        CALL READER
C
C=========================================================================
C==   LOOP FOR EACH GROUP WITHIN PAA LEVEL
C=========================================================================
C
        DO 2000  G=1,NGRPS
          GRP= G
          LEVGRP= (2**LEV-1)+GRP
C-----------------------------------------------------------------
C--   RESET ALL BRANCH TERMINATION FLAGS
C-----------------------------------------------------------------
          DO 1200  J=1,9
 1200       TERFLG(J)= 0
          TERSUM= 0
C-----------------------------------------------------------------
C--   CONTINUE TO WRITER IF BRANCH ALREADY TERMINATED
C-----------------------------------------------------------------
          LSTGRP= LEVGRP
```

```
            DO 1100  I=1,LEV
              LSTGRP= LSTGRP/2
                IF (ITERM(LSTGRP) .EQ. 1)  GOTO 1900
 1100           CONTINUE
C-----------------------------------------------------------------
C--   COMPUTE STATISTICS FOR 2X2 CONTINGENCY TABLES
C-----------------------------------------------------------------
            CALL STATIS
C-----------------------------------------------------------------
C--   OUTPUT TABLES AND STATISTICS
C-----------------------------------------------------------------
C           IF (TRACE.EQ.1)  CALL DUMPER(4)
C
C=================================================================
C==   SELECTION AND ADMISSIBILITY CHECKS FOR INDEP VARIABLE
C=================================================================
C
C-----------------------------------------------------------------
C--   SORT VECTOR OF STATISTICS FOR MAX VALUE
C-----------------------------------------------------------------
            IF (STYPE.EQ.1)  CALL SIFTER(LAMBDA,P,MAX,INDEX)
            IF (STYPE.EQ.2)  CALL SIFTER(UNCERT,P,MAX,INDEX)
            IF (STYPE.EQ.3)  CALL SIFTER(PHI,P,MAX,INDEX)
            IF (STYPE.EQ.4)  CALL SIFTER(CHISQ,P,MAX,INDEX)
C-----------------------------------------------------------------
C--   GROSS ERROR CHECKS
C-----------------------------------------------------------------
C           IF ((LEV+1).EQ.MAXLEV)  GOTO 1999
            IF (INDEX.LT.0 .OR. INDEX.GT.P)  GOTO 9100
            IF (TERFLG(9).EQ.1)  GOTO 2350
C-----------------------------------------------------------------
C--   INITIAL CHOICE:  INDEP VAR WITH MAX VALUE OF STAT
C-----------------------------------------------------------------
 1999       CONTINUE
C-----------------------------------------------------------------
C--   OPTION 1:  FORCE A PARTICULAR VARIABLE?
C-----------------------------------------------------------------
            IF (IGUIDE(LEVGRP).LT.0)  INDEX= IABS(IGUIDE(LEVGRP))
C-----------------------------------------------------------------
C--   ADMISSIBILITY CHECK 1:  PREVIOUS APPEARANCE IN BRANCH?
C-----------------------------------------------------------------
         IF (LEV.EQ.1)  GOTO 1800
 2001    CONTINUE
            LSTGRP= LEVGRP
            DO 2100  I=1,LEV
              LSTGRP= LSTGRP/2
C           WRITE (MSGFIL,9019) I,LSTL,LSTG,LSTGRP,IGUIDE(LSTGRP)
C9019       FORMAT ('0<*><*><*> I,LSTL,LSTG,LSTGRP,IGUIDE  =',4I5)
                IF (IGUIDE(LSTGRP).NE.INDEX)  GOTO 2100
C-----------------------------------------------------------------
C--                 ... YES, SO RESIFT
C-----------------------------------------------------------------
 2200           CONTINUE
                INDSEL(INDEX)= -INDSEL(INDEX)
C
                IF (STYPE.EQ.1)  CALL SIFTER(LAMBDA,50,MAX,INDEX)
                IF (STYPE.EQ.2)  CALL SIFTER(UNCERT,50,MAX,INDEX)
                IF (STYPE.EQ.3)  CALL SIFTER(PHI,50,MAX,INDEX)
                IF (STYPE.EQ.4)  CALL SIFTER(CHISQ,50,MAX,INDEX)
C
```

```
      GOTO 2001
C
C-------------------------------------------------------------
 2100       CONTINUE
C-------------------------------------------------------------
C--                   ... NO, SO CONTINUE
C-------------------------------------------------------------
 1800     CONTINUE
          GRPSEL(LEVGRP)= INDEX
          IGUIDE(LEVGRP)= INDEX
C                WRITE (MSGFIL,9091) L,GRP,GRPSEL(LEVGRP),IGUIDE(LEVGRP)
C9091     FORMAT ('0<+><+><+> L,GRP,GRPSEL(LEVGRP),IGUIDE(LEVGRP) =',4I5)
C
          DO 2300  J=1,P
            IF (INDSEL(J).EQ.-1)  INDSEL(J)=1
 2300       CONTINUE
C
C=============================================================
C==   BRANCH TERMINATION CHECKS
C=============================================================
C
C-------------------------------------------------------------
C--   ... FOR STATISTICS
C-------------------------------------------------------------
        IF (STYPE.EQ.1 .AND. LAMBDA(INDEX).LT.MINSTA)
     +    TERFLG(1)= 1
C
        IF (STYPE.EQ.2 .AND. UNCERT(INDEX).LT.MINSTA)
     +    TERFLG(1)= 1
C
        IF (STYPE.EQ.3 .AND. PHI(INDEX).LT.MINSTA)
     +    TERFLG(1)= 1
C
        IF (STYPE.EQ.4 .AND. CHISQ(INDEX).LT.MINSTA)
     +    TERFLG(1)= 1
C-------------------------------------------------------------
C--   ... FOR TABLE CELL COUNTS        (%S CHECKED IN WRITER)
C-------------------------------------------------------------
      IF (A(INDEX) .LT. MINCEL)  TERFLG(2)= 1
      IF (B(INDEX) .LT. MINCEL)  TERFLG(2)= 1
      IF (C(INDEX) .LT. MINCEL)  TERFLG(2)= 1
      IF (D(INDEX) .LT. MINCEL)  TERFLG(2)= 1
C-------------------------------------------------------------
C--   ... FOR SUBGROUP COUNTS/RATIOS  (%S CHECKED IN WRITER)
C-------------------------------------------------------------
      IF (C1(INDEX) .LT. MINSUB)  TERFLG(4)= 1
      IF (C2(INDEX) .LT. MINSUB)  TERFLG(4)= 1
      IF (C1(INDEX)*C2(INDEX) .LT. .001)  GOTO 2350
       IF (MIN(C1(INDEX)/C2(INDEX),C2(INDEX)/C1(INDEX)) .LT. MINRAT)
     +     TERFLG(6)= 1
C-------------------------------------------------------------
 2350 CONTINUE
C-------------------------------------------------------------
C--   SET TERSUM FLAG IF ANY TERMINATION FLAGS ARE SET
C-------------------------------------------------------------
      DO 2400  I=1,9
 2400   TERSUM= TERSUM+TERFLG(I)
      IF (TERSUM.NE.0)  ITERM(LEVGRP)= 1
C
C=============================================================
C==   WRITE 2X2 TABLE & SUPPLEMENTARY INFO TO WRTFIL
C=============================================================
C
          WINDEX= 1
          IF (TERSUM.NE.0)  WINDEX= 2
          IF (WMODE.GT.0)  CALL WRITER(WINDEX)
C
          IF (TRACE.GE.2)  CALL DUMPER(4)
C
C=============================================================
C==   PRINT GRAPHICAL REPRESENTATION OF 2X2 TABLES
C=============================================================
C
C         IF (PMODE.EQ.1)  CALL KIGRAF
C
C=============================================================
C
      GOTO 2000
C
C=============================================================
C==   WRITE MESSAGE IF NODE IS ABSENT
C=============================================================
 1900   CONTINUE
        WINDEX= 3
        IF (WMODE.GT.0)  CALL WRITER(WINDEX)
C-------------------------------------------------------------
C--   CONTINUE AT NEXT GROUP ...
C-------------------------------------------------------------
 2000     CONTINUE
C-------------------------------------------------------------
C--   CONTINUE AT NEXT LEVEL ...
C-------------------------------------------------------------
        IF (LEV.LT.MAXLEV)  GOTO 1000
C-------------------------------------------------------------
C--                              ... ELSE DONE PROCESSING
C-------------------------------------------------------------
C
C-------------------------------------------------------------
C--   WRITE PAA PREDICTION "TREE"  TO WRTFIL AND TREFIL
C-------------------------------------------------------------
      WINDEX= 4
      IF (WMODE.GE.0)  CALL WRITER(WINDEX)
      GOTO 9999
C-------------------------------------------------------------
C--   WRITE PAA SUMMARY :  ( NOT IMPLEMENTED )
C-------------------------------------------------------------
C     WINDEX= 5
C     IF (WMODE.GE.0)  CALL WRITER(WINDEX)
C     GOTO 9999
C=========================================================================
C==   ERROR CONTROL
C=========================================================================
C
 9000 CONTINUE
 9100 WRITE (MSGFIL,91)
   91  FORMAT ('1'/
     +          ' #######   ERROR IN PAAPER:  STATISTICS FOR ALL TABLES',
     +                                             ' = ZERO')
C     WINDEX= 2
C     CALL WRITER(WINDEX)
```

```
C      DO 100  J=1,P
C        IF (DATA(J).NE. 1.0 .OR. DATA(J) .NE. 2.0)  GOTO 9999
C 100    CONTINUE
C------------------------------------------------------------
C--    DEFINE SUBGROUP FOR CASE
C------------------------------------------------------------
       LSTPNT= POINT
       DO 1000  L=1,LEV
         IF (GRPSEL(LSTPNT).EQ.0)  GOTO 9999
C                          ... COMPUTE ACTUAL TREE POSITION & SAVE
           POINT= (2*LSTPNT) + (IFIX(DATA(GRPSEL(LSTPNT)))-1)
           LSTPNT= POINT
C                          ... SHIFT LEFT INTO (1..16) RANGE
           POINT= POINT-(2**L-1)
C      IF(RECNUM.EQ.10)WRITE(MSGFIL,8998)L,LSTPNT,GRPSEL(LSTPNT),POINT
C8998                  FORMAT('0#             L=',I5/
C    +                        ' #        LSTPNT=',I5/
C    +                        ' # GRPSEL(LSTPNT)=',I5/
C    +                        ' #         POINT=',I5/)
 1000      CONTINUE
 1900 CONTINUE
C------------------------------------------------------------
C--    FOR EACH REMAINING INDEP VAR  (=TABLE) ...
C------------------------------------------------------------
           DO 3000  I=1,P
             IF (INDSEL(I).EQ.0)  GOTO 3000
             NTABLE= NTABLE+1
C
             A=IFIX(DATA(DEP))
             B=IFIX(DATA(I))
C
             QFLAG= 0
               IF (.NOT.(A.EQ.1 .OR. A.EQ.2))  QFLAG= 1
               IF (.NOT.(B.EQ.1 .OR. B.EQ.2))  QFLAG= 1
             IF (QFLAG.NE.0)  GOTO 9999
C
C      IF (RECNUM.EQ.1)
C    +     WRITE(MSGFIL,9119)L,NG,LG,I,INDSEL(I),GRP,LEV,
C    +                       GRPSEL(LG),DEP,
C    +                       POINT,NTABLE,A,B
C9119        FORMAT('0'9X,'  L,NG,LG,I,INDSEL(I),GRP,LEV,',
C    +                      'GRPSEL(LG),DEP,'
C    +                      'POINT,NTABLE,A,B'/
C    +              T10,13I5)
C
             TABLE(POINT,NTABLE,A,B)
     +            = TABLE(POINT,NTABLE,A,B) + 1
C
 3000        CONTINUE
C------------------------------------------------------------
       GOTO 9999
C
C=====================================================================
C==    ERROR CONTROL
C=====================================================================
C
 9000 CONTINUE
 9100 WRITE (MSGFIL,91)
   91  FORMAT ('1'/
                 ' #######    ERROR IN TABLER    #######')
C-----*--1---------2---------3---------4---------5---------6---------7--
 9999 RETURN
      END
```

```
      SUBROUTINE STATIS
C>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>
C>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>          S T A T I S
C>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>
C>>
C>>
C>> PROGRAM:  "NEW/BJS/PAA/ STATIS "              UPDATE:           1/20/85
C>>            SPERRY 1100 VERSION
C>>
C>>
C>> PROGRAMMER:  NEWTON WALKER
C>>                 ...  BUREAU OF RESEARCH & EVALUATION, OPARSS
C>>                 ...  NYS DIVISION OF CRIMINAL JUSTICE SERVICES
C>>                 ...  EXECUTIVE PARK TOWER, STUYVESANT PLAZA
C>>                 ...  ALBANY  NEW YORK 12203
C>>
C>> FUNCTION:  COMPUTE SELECTED STATISTICS FOR 2X2 CONTINGENCY TABLES
C>>
C>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>
C>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>
C>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>
C>>
C>>
C======================================================================
C==   PARAMETER DECLARATION
C======================================================================
      IMPLICIT REAL (A-Z)
      INTEGER  N,P,PARFIL,MSGFIL,INPFIL,WRTFIL,MODE,DMODE,RMODE,WMODE,
     +         SAVFIL,SIMFIL,TREFIL,RECNUM,TRACE
      INTEGER  TABLE,J,JJ,INDSEL,GRPSEL,STYPE,LEV,GRP
      INTEGER  INDEX
      REAL     DATA,CHISQ,LAMBDA,PHI,UNCERT
C
      CHARACTER*4  TITLE
C
      COMMON   /PARAMS/  N,P,RECNUM,TRACE,
     +                   PARFIL,MSGFIL,INPFIL,WRTFIL,SAVFIL,SIMFIL,
     +                   TREFIL,
     +                   MODE,IMODE,TMODE,RMODE,DMODE,WMODE,PMODE,SMODE
     +         /CHARAC/  TITLE(3,18)
     +         /DATAS/   DATA(21)
     +         /TABLES/  TABLE(32,50,2,2),MAXLEV,LEV,GRP,DEP,INDSEL(50),
     +                   GRPSEL(63),IGUIDE(63),ITERM(63),TERFLG(9),
     +                   MINCEL,MINCEP,MINSUB,MINSUP,MINRAT,MINSTA,INDEX
     +         /STATS/   STYPE,
     +                   A(50),B(50),C(50),D(50),
     +                   R1(50),R2(50),C1(50),C2(50),T(50),
     +                   LAMBDA(50),PHI(50),CHISQ(50),UNCERT(50)
C
C======================================================================
C==   EMPTY ALL STATISTIC ARRAYS
C======================================================================
C
      DO 50  J=1,P
        LAMBDA(J)= 0.0
        PHI(J)= 0.0
        CHISQ(J)= 0.0
        UNCERT(J)= 0.0
   50   CONTINUE
```

```
C
C=====================================================================
C==   COMPUTE SELECTED STATISTICS FOR EACH 2X2 TABLE
C=====================================================================
C
      IF (TRACE.GE.1)  WRITE (MSGFIL,21)  STYPE
   21  FORMAT ('0>>>>>>>  SUBROUTINE STATIS:  STYPE= ',I3)
C
      JJ=0
C
      DO 100  J=1,P
        IF (INDSEL(J).EQ.0)  GOTO 100
        JJ=JJ+1
C
        A(JJ)   = FLOAT(TABLE(GRP,JJ,1,1))
        B(JJ)   = FLOAT(TABLE(GRP,JJ,2,1))
        C(JJ)   = FLOAT(TABLE(GRP,JJ,1,2))
        D(JJ)   = FLOAT(TABLE(GRP,JJ,2,2))
C
        R1(JJ)  =A(JJ)+B(JJ)
        R2(JJ)  =C(JJ)+D(JJ)
        C1(JJ)  =A(JJ)+C(JJ)
        C2(JJ)  =B(JJ)+D(JJ)
        T(JJ)   =R1(JJ)+R2(JJ)
C
C       WRITE (MSGFIL,9119)  A(JJ),B(JJ),C(JJ),D(JJ),R1(JJ),R2(JJ),
C    +                       C1(JJ),C2(JJ),T(JJ)
C9119  FORMAT ('0',7X,'  A ,B ,C ,D ,R1 ,R2 ,C1 ,C2 ,T '//
C    +               9F10.3)
C
C----------------------------------------------------------------
C--    IF ANY TABLE MARGINAL = 0,  DO NOT CALCULATE STATS
C----------------------------------------------------------------
C
        NULFLG= R1(JJ)*R2(JJ)*C1(JJ)*C2(JJ)
        IF (NULFLG .LT. .001)  GOTO 100
C
C----------------------------------------------------------------
C--    LAMBDA STATISTIC                       <STYPE=1>
C----------------------------------------------------------------
C
        MAXC1=A(JJ)
        IF (C(JJ).GT.A(JJ))  MAXC1=C(JJ)
        MAXC2=B(JJ)
        IF (D(JJ).GT.B(JJ))  MAXC2=D(JJ)
        MAXR=R1(JJ)
        IF (R2(JJ).GT.R1(JJ))  MAXR=R2(JJ)
        LAMBDA(J) = (MAXC1+MAXC2-MAXR)/(T(JJ)-MAXR)
C
C----------------------------------------------------------------
C--    PHI STATISTIC                          <STYPE=3>
C----------------------------------------------------------------
C
        PHI(J) = SQRT(1-T(JJ)/(R1(JJ)*R2(JJ))
     +          *((A(JJ)*C(JJ)/C1(JJ))+(B(JJ)*D(JJ)/C2(JJ))))
C
C----------------------------------------------------------------
C--    CHI-SQUARE STATISTIC                   <STYPE=4>
C----------------------------------------------------------------
C
        CHISQ(J) = PHI(J)*PHI(J)*T(JJ)
C
C----------------------------------------------------------------
C--    UNCERTAINTY COEFFICIENT        <STYPE=2>
C----------------------------------------------------------------
C
        IF (A(JJ)*B(JJ)*C(JJ)*D(JJ) .LT. 0.000001)  GOTO 100
C
        UOFY=(C1(JJ)/T(JJ))*ALOG(C1(JJ)/T(JJ))+(C2(JJ)/T(JJ))
     +      *ALOG(C2(JJ)/T(JJ))
        UOFY=-UOFY
        UOFYGX=(A(JJ)/T(JJ))*ALOG(A(JJ)/R1(JJ))+(C(JJ)/T(JJ))
     +         *ALOG(C(JJ)/R2(JJ))
        UOFYGX=UOFYGX+(B(JJ)/T(JJ))*ALOG(B(JJ)/R1(JJ))+(D(JJ)/T(JJ))
     +         *ALOG(D(JJ)/R2(JJ))
        UOFYGX=-UOFYGX
        UNCERT(J) = (UOFY-UOFYGX)/UOFY
C
  100   CONTINUE
C
C=====================================================================
C==    WRITE STATISTICS TO 'MSGFIL'
C=====================================================================
C
C       WRITE (MSGFIL,30)
C  30   FORMAT ('0')
C
C       WRITE (MSGFIL,31)  LAMBDA
C  31   FORMAT ('0'//' STATISTIC: LAMBDA '//,5(/T10,10F7.3))
C
C=====================================================================
C==    WRITE TABLES & STATISTICS TO WRTFIL    (NOT IMPLEMENTED)
C=====================================================================
C
C       WINDEX=1
C       CALL WRITER(WINDEX)
C
        GOTO 9999
C
C=====================================================================
C==    ERROR CONTROL
C=====================================================================
C
 9000 CONTINUE
 9100 WRITE (MSGFIL,91)
   91  FORMAT ('1'/
     +         ' #######   ERROR IN STATIS')
C-----*--1---------2---------3---------4---------5---------6---------7--
 9999 RETURN
      END
```

```
      SUBROUTINE SIFTER(VECTOR,LENGTH,MAX,INDEXX)
C>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>
C>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>       S I F T E R
C>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>
C>>
C>>
C>> PROGRAM:  "NFW/BJS/PAA/ SIFTER "                UPDATE:          1/20/85
C>>           SPERRY 1100 VERSION
C>>
C>>
C>> PROGRAMMER:  NEWTON WALKER
C>>                ...  BUREAU OF RESEARCH & EVALUATION, OPARSS
C>>                ...  NYS DIVISION OF CRIMINAL JUSTICE SERVICES
C>>                ...  EXECUTIVE PARK TOWER, STUYVESANT PLAZA
C>>                ...  ALBANY  NEW YORK 12203
C>>
C>> FUNCTION:  FINDS THE MAXIMUM VALUE (AND INDEX) OF A REAL VECTOR
C>>
C>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>
C>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>
C>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>
C>>
C>>
C=======================================================================
C==   PARAMETER DECLARATION
C=======================================================================
C
      IMPLICIT INTEGER (A-Z)
      INTEGER  N,P,PARFIL,MSGFIL,INPFIL,WRTFIL,MODE,DMODE,RMODE,WMODE,
     +         SAVFIL,SIMFIL,TREFIL,RECNUM,TRACE
      INTEGER  LENGTH,INDEX,INDEXX
      REAL     VECTOR(50),MAX
C
      CHARACTER*4  TITLE
C
      COMMON   /PARAMS/  N,P,RECNUM,TRACE,
     +                   PARFIL,MSGFIL,INPFIL,WRTFIL,SAVFIL,SIMFIL,
     +                   TREFIL,
     +                   MODE,IMODE,TMODE,RMODE,DMODE,WMODE,PMODE,SMODE
     +         /CHARAC/  TITLE(3,18)
     +         /TABLES/  TABLE(32,50,2,2),MAXLEV,LEV,GRP,DEP,INDSEL(50),
     +                   GRPSEL(63),IGUIDE(63),ITERM(63),TERFLG(5),
     +                   MINCEL,MINCEP,MINSUB,MINSUP,MINRAT,MINSTA,INDEX
C
C=======================================================================
C==   PRINT ACKNOWLEDGEMENT
C=======================================================================
C
      IF (TRACE.GE.1)  WRITE (MSGFIL,21)
   21 FORMAT ('0>>>>>>>  SUBROUTINE SIFTER: ')
C
C=======================================================================
C==   SIFT THROUGH VECTOR TO FIND MAX VALUE; RETAIN INDEX OF THIS VALUE
C=======================================================================
C
C
      MAX= VECTOR(1)
      INDEX= 1
C
```

```
      DO 100  I=2,LENGTH
        IF (INDSEL(I).LE.0)     GOTO 100
          IF (VECTOR(I).LT.MAX)  GOTO 100
            MAX= VECTOR(I)
            INDEX= I
  100       CONTINUE
C
      IF (MAX .LT. 0.0000001)  TERFLG(9)= 1
      IF (MAX .LT. 0.0000001)  INDEX= 0
C
      INDEXX= INDEX
C
C
C=======================================================================
C==   PRINT ACKNOWLEDGEMENT
C=======================================================================
C
      IF (TRACE.GE.2)  WRITE (MSGFIL,32)  VECTOR,MAX,INDEX
   32  FORMAT ('0<><><><><><><>  VECTOR:'/20X,5(/10F7.3)//
     +           ' <><><><><><><>  MAX:',F7.3,'        INDEX:',I3)
C
      GOTO 9999
C
C=======================================================================
C==   ERROR CONTROL
C=======================================================================
C
 9000 CONTINUE
 9100 WRITE (MSGFIL,91)
   91  FORMAT ('1'/
     +           ' #######   ERROR IN SIFTER   #######')
C-----*--1---------2---------3---------4---------5---------6---------7--
 9999 RETURN
      END
```

```
      SUBROUTINE WRITER(WINDEX)
C>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>
C>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>      W R I T E R
C>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>
C>>
C>>
C>> PROGRAM:  "NFW/BJS/PAA/ WRITER "                  UPDATE:         1/20/85
C>>           SPERRY 1100 VERSION
C>>
C>>
C>> PROGRAMMER:  NEWTON WALKER
C>>                ...  BUREAU OF RESEARCH & EVALUATION, OPARSS
C>>                ...  NYS DIVISION OF CRIMINAL JUSTICE SERVICES
C>>                ...  EXECUTIVE PARK TOWER, STUYVESANT PLAZA
C>>                ...  ALBANY  NEW YORK 12203
C>>
C>> FUNCTION:  80-COL-PAGE FORMATTED OUTPUT FOR SELECTED PAA RESULTS
C>>
C>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>
C>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>
C>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>
C>>
C>>
C=======================================================================
C==   PARAMETER DECLARATION
C=======================================================================
C
      IMPLICIT REAL    (A-Z)
      INTEGER  WINDEX
      INTEGER  INDX,L,POINT,LEVGRP,INDEX,NGRPS
      INTEGER  N,P,PARFIL,MSGFIL,INPFIL,WRTFIL,MODE,DMODE,RMODE,WMODE,
     +         SAVFIL,SIMFIL,TREFIL,RECNUM,TRACE
      INTEGER  TABLE,I,J,DEP,INDSEL,GRPSEL,STYPE,LEV,GRP
      REAL     APCT(50),BPCT(50),CPCT(50),DPCT(50),
     +         R1PCT(50),R2PCT(50),C1PCT(50),C2PCT(50),TPCT
C
      CHARACTER*4  TITLE,IFORM,OFORM
      CHARACTER*4  STEXT(4,2),TTEXT(51),TEXBUF(63)
C
      COMMON   /PARAMS/  N,P,RECNUM,TRACE,
     +                   PARFIL,MSGFIL,INPFIL,WRTFIL,SAVFIL,SIMFIL,
     +                   TREFIL,
     +                   MODE,IMODE,TMODE,RMODE,DMODE,WMODE,PMODE,SMODE
     +         /TABLES/  TABLE(32,50,2,2),MAXLEV,LEV,GRP,DEP,INDSEL(50),
     +                   GRPSEL(63),IGUIDE(63),ITERM(63),TERFLG(9),
     +                   MINCEL,MINCEP,MINSUB,MINSUP,MINRAT,MINSTA,INDEX
     +         /STATS/   STYPE,
     +                   A(50),B(50),C(50),D(50),
     +                   R1(50),R2(50),C1(50),C2(50),T(50),
     +                   LAMBDA(50),PHI(50),CHISQ(50),UNCERT(50)
     +         /CHARAC/  TITLE(3,18),IFORM(18),OFORM(18)
     +         /SIMS/    BOOTS,BOOT,SIMSEL(7),CASEL(10000)
C
      DATA ((STEXT(I,J),J=1,2),I=1,4) /'LAMB','DA  ',
     +                                 'UNCE','RT  ',
     +                                 'PHI ','    ',
     +                                 'CHI-','SQ  '/
C
      DATA (TTEXT(I),I=1,51) /' -  ',' 1  ',' 2  ',' 3  ',' 4  ',
```

```
     +                         ' 5  ',' 6  ',' 7  ',' 8  ',' 9  ',
     +                         '10  ','11  ','12  ','13  ','14  ',
     +                         '15  ','16  ','17  ','18  ','19  ',
     +                         '20  ','21  ','22  ','23  ','24  ',
     +                         '25  ','26  ','27  ','28  ','29  ',
     +                         '30  ','31  ','32  ','33  ','34  ',
     +                         '35  ','36  ','37  ','38  ','39  ',
     +                         '40  ','41  ','42  ','43  ','44  ',
     +                         '45  ','46  ','47  ','48  ','49  ',
     +                         '50  '/
C
C=========================================================================
C==   PRINT HEADER & TITLE BLOCK
C=========================================================================
C
      IF (TRACE .GE. 1)  WRITE (MSGFIL,21)  WINDEX
   21  FORMAT ('0>>>>>>>  SUBROUTINE WRITER:  WINDEX=',I2)
C
      WRITE (WRTFIL,101)
  101  FORMAT ('1',
     +          '< PREDICTIVE ATTRIBUTE ANALYSIS >',
     +          T58,'<VERS:84.2S><NYS*DCJS>'//
     +          79('*')/)
C
      WRITE (WRTFIL,102)  TITLE
  102  FORMAT (3(' ',T5,18A4/)/79('*')//)
C
      IF (SMODE.EQ.1)  WRITE (WRTFIL,103)  BOOT
  103                  FORMAT (' ',T54,'BOOTSTRAP SAMPLE ',I3/)
C
      IF (SMODE.NE.1)  WRITE (WRTFIL,104)
  104                  FORMAT (' '/)
C
C=========================================================================
C==   CASE= 1 :  PRINT CONTINGENCY TABLES & ASSOCIATED STATISTICS
C=========================================================================
C
 1000 IF (WINDEX .NE. 1 .AND. WINDEX .NE. 2)  GOTO 3000
C
      WRITE (WRTFIL,1001)  LEV,GRP
 1001  FORMAT (' ',
     +           T5,'CONTINGENCY TABLE ANALYSIS',
     +          T55,'LEVEL=',I2,'  GROUP=',I3/
     +          ' ',79('=')///)
C
      L= LEV+1
      LEVGRP= (2**LEV-1)+GRP
      INDX= GRPSEL(LEVGRP)
C-------------------------------------------------------------
C--   CALCULATE TABLE PERCENTAGE VALUES
C-------------------------------------------------------------
      DO 1150  I=1,P
        IF (INDSEL(I) .EQ. 0)  GOTO 1150
        IF (T(I) .NE. 0.0)  GOTO 1110
          APCT(I)= 0.
          BPCT(I)= 0.
          CPCT(I)= 0.
          DPCT(I)= 0.
          R1PCT(I)=0.
          R2PCT(I)=0.
```

```
          C1PCT(I)=0.
          C2PCT(I)=0.
          TPCT= 0.
        GOTO 1125
 1110   CONTINUE
         APCT(I)= 100* A(I)/T(I)
         BPCT(I)= 100* B(I)/T(I)
         CPCT(I)= 100* C(I)/T(I)
         DPCT(I)= 100* D(I)/T(I)
         R1PCT(I)= 100* R1(I)/T(I)
         R2PCT(I)= 100* R2(I)/T(I)
         C1PCT(I)= 100* C1(I)/T(I)
         C2PCT(I)= 100* C2(I)/T(I)
         TPCT= 100* T(I)/T(I)
 1125   CONTINUE
C-------------------------------------------------------------
C--   PERFORM BRANCH TERMINATION CHECKS
C-------------------------------------------------------------
          IF (APCT(I) .LT. MINCEP)  TERFLG(2)= 1
          IF (BPCT(I) .LT. MINCEP)  TERFLG(2)= 1
          IF (CPCT(I) .LT. MINCEP)  TERFLG(2)= 1
          IF (DPCT(I) .LT. MINCEP)  TERFLG(2)= 1
          IF (C1PCT(I) .LT. MINSUP)  TERFLG(4)= 1
          IF (C2PCT(I) .LT. MINSUP)  TERFLG(4)= 1
C
          IF (T(INDX) .EQ. 0)        TERFLG(9)= 1
C
C-------------------------------------------------------------
 1150   CONTINUE
C
C=============================================================
C==   WRITE SELECTED STATISTIC PLUS DEP VAR MARGINALS
C=============================================================
C
      IF (TERFLG(9) .EQ. 1)  GOTO 2000
C
        WRITE (WRTFIL,1910)  (STEXT(STYPE,J),J=1,2)
 1910    FORMAT (' ',T5,'INDEP',T13,'        ',T22,2A4,
     +            T42,'INDEP',T53,'SUBGROUP  COMPOSITION'/
     +            ' ',T5,'VAR #',T13,'STATUS',T22,'STATISTIC',
     +            T42,'VAR #',T52,'-0-     -1-     -%0-    -%1-'/
     +            ' ',T5,'-----',T13,'------',T22,'---------',
     +            T42,'-----',T50,27('-')/)
      GOTO (1200,1300,1400,1500),STYPE
C-------------------------------------------------------------
C--                                       ... FOR LAMBDA
C-------------------------------------------------------------
 1200 CONTINUE
C
      DO 1210  J=1,P
        IF (INDSEL(J) .EQ. 0)  GOTO 1210
        WRITE (WRTFIL,1221)  J,LAMBDA(J),J,R1(J),R2(J),R1PCT(J),R2PCT(J)
 1221 FORMAT(' ',T8,I2,T13, T22,F9.3,T45,I2,T50,F5.0,F7.0,T63,F7.1,F7.1)
 1210   CONTINUE
C
      GOTO 1600
C-------------------------------------------------------------
C--                                       ... FOR UNCERT
C-------------------------------------------------------------
 1300 CONTINUE
```

CONTINUED

1 OF 2

```
C
      DO 1310  J=1,P
        IF (INDSEL(J) .EQ. 0)  GOTO 1310
        WRITE (WRTFIL,1321)  J,UNCERT(J),J,R1(J),R2(J),R1PCT(J),R2PCT(J)
 1321 FORMAT(' ',T8,I2,T13, T22,F9.3,T45,I2,T50,F5.0,F7.0,T63,F7.1,F7.1)
 1310   CONTINUE
C
      GOTO 1600
C-------------------------------------------------------------------
C--                                        ... FOR PHI
C-------------------------------------------------------------------
 1400 CONTINUE
C
      DO 1410  J=1,P
         IF (INDSEL(J) .EQ. 0)  GOTO 1410
        WRITE (WRTFIL,1421)  J,PHI(J),J,R1(J),R2(J),R1PCT(J),R2PCT(J)
 1421 FORMAT(' ',T8,I2,T13, T22,F9.3,T45,I2,T50,F5.0,F7.0,T63,F7.1,F7.1)
 1410   CONTINUE
C
      GOTO 1600
C-------------------------------------------------------------------
C--                                        ... FOR CHISQ
C-------------------------------------------------------------------
 1500 CONTINUE
C
      DO 1510  J=1,P
         IF (INDSEL(J) .EQ. 0)  GOTO 1410
        WRITE (WRTFIL,1521)  J,CHISQ(J),J,R1(J),R2(J),R1PCT(J),R2PCT(J)
 1521 FORMAT(' ',T8,I2,T13, T22,F9.3,T45,I2,T50,F5.0,F7.0,T63,F7.1,F7.1)
 1510   CONTINUE
C
      GOTO 1600
C-------------------------------------------------------------------
C
 1600 CONTINUE
C
      WRITE (WRTFIL,1101)  LEV,GRP,DEP,DEP
 1101  FORMAT (' ',/////
     +          T5,'CONTINGENCY TABLE ANALYSIS',
     +         T55,'LEVEL=',I2,'   GROUP=',I3/
     +         ' ',79('=')///
     +         T 9,'F R E Q U E N C I E S',
     +         T53,'P E R C E N T A G E S'/
     +         ' ',35('-'),T46,35('-')//
     +         T16,'CRITERION #',I2,T60,'CRITERION #',I2//
     +         T19,'-0-',T26,'-1-',T63,'-0-',T70,'-1-'/)
C-----------------------------------------------------------------
C--   WRITE CONTINGENCY TABLES WITH MARGINALS
C-----------------------------------------------------------------
      WRITE (WRTFIL,1102)  A(INDX),B(INDX),R1(INDX),
     +                     APCT(INDX),BPCT(INDX),R1PCT(INDX)
 1102  FORMAT (' ',
     +         'PREDICTOR -0-',
     +         2F7.0,1X,F7.0,
     +         T46,'PREDICTOR -0-',
     +         2F7.1,1X,F7.1)
      WRITE (WRTFIL,1103)  INDX,C(INDX),D(INDX),R2(INDX),
     +                     INDX,CPCT(INDX),DPCT(INDX),R2PCT(INDX)
 1103  FORMAT (' ',
     +         T4,'#',I3,'     -1-',2F7.0,1X,F7.0,
```

```
     +         T48,'#',I3,'     -1-',2F7.1,1X,F7.1)
      WRITE (WRTFIL,1104)  C1(INDX),C2(INDX),T(INDX),
     +                     C1PCT(INDX),C2PCT(INDX),TPCT
 1104  FORMAT ('0',
     +         T15,2F7.0,1X,F7.0, T59,2F7.1,1X,F7.1//
     +         ' ',79('-')/////)
      IF (WINDEX .EQ. 1)  GOTO 9999
C
C
C=========================================================================
C==   CASE= 2 :   BRANCH TERMINATES AT PRESENT NODE
C=========================================================================
C
 2000 IF (WINDEX .NE. 2)  GOTO 3000
C
      WRITE (WRTFIL,2110)
 2110  FORMAT ('  ///,39(' -')//
     +         T25,'CURRENT PAA BRANCH TERMINATES'//,39(' -')//
     +         T5,'THE FOLLOWING TEST CONDITION(S) HAVE NOT BEEN MET:'/)
C-------------------------------------------------------------------
C--   PRINT INFORMATION ABOUT CONDITIONAL TEST(S) VIOLATED
C-------------------------------------------------------------------
C
C-------------------------------------------------------------------
C--                                        ... FOR STATISTICS
C-------------------------------------------------------------------
      IF ((TERFLG(1) .EQ. 1) .AND. (STYPE .EQ. 1))
     +   WRITE (WRTFIL,2121)  (STEXT(STYPE,J),J=1,2),LAMBDA(INDEX),
     +    MINSTA
 2121  FORMAT ('0 *  THE OBSERVED ',2A4,' STATISTIC OF        ',F7.3/
     +         '             WAS LESS THAN THE SPECIFIED MINIMUM OF ',F7.3)
C
      IF ((TERFLG(1) .EQ. 1) .AND. (STYPE .EQ. 2))
     +   WRITE (WRTFIL,2122)  (STEXT(STYPE,J),J=1,2),UNCERT(INDEX),
     +    MINSTA
 2122  FORMAT ('0 *  THE OBSERVED ',2A4,' STATISTIC OF        ',F7.3/
     +         '             WAS LESS THAN THE SPECIFIED MINIMUM OF ',F7.3)
C
      IF ((TERFLG(1) .EQ. 1) .AND. (STYPE .EQ. 3))
     +   WRITE (WRTFIL,2123)  (STEXT(STYPE,J),J=1,2),PHI(INDEX),
     +    MINSTA
 2123  FORMAT ('0 *  THE OBSERVED ',2A4,' STATISTIC OF        ',F7.3/
     +         '             WAS LESS THAN THE SPECIFIED MINIMUM OF ',F7.3)
C
      IF ((TERFLG(1) .EQ. 1) .AND. (STYPE .EQ. 4))
     +   WRITE (WRTFIL,2124)  (STEXT(STYPE,J),J=1,2),CHISQ(INDEX),
     +    MINSTA
 2124  FORMAT ('0 *  THE OBSERVED ',2A4,' STATISTIC OF        ',F7.3/
     +         '             WAS LESS THAN THE SPECIFIED MINIMUM OF ',F7.3)
C-------------------------------------------------------------------
C--                                        ... FOR TABLE CELL COUNTS
C-------------------------------------------------------------------
      IF (TERFLG(2) .EQ. 1)
     +   WRITE (WRTFIL,2131)  MINCEL
 2131  FORMAT ('0 *  THE SELECTED CONTINGENCY TABLE (ABOVE)'/
     +   '         CONTAINS A CELL WITH LESS THAN THE MINIMUM OF ',F7.3)
C-------------------------------------------------------------------
      IF (TERFLG(3) .EQ. 1)
     +   WRITE (WRTFIL,2132)  MINCEP
 2132  FORMAT ('0 *  THE SELECTED CONTINGENCY TABLE (ABOVE)'/
```

```
     +  '       CONTAINS A CELL WITH LESS THAN THE MINIMUM % OF ',F7.3)
C---------------------------------------------------------------
C--                                  ... FOR SUBGROUP COUNTS
C---------------------------------------------------------------
      IF (TERFLG(4) .EQ. 1)
     +   WRITE (WRTFIL,2141)  MINSUB
 2141  FORMAT ('0 *  THE SELECTED CONTINGENCY TABLE (ABOVE)'/
     +  '       CONTAINS A SUBGROUP WITH LESS THAN THE MINIMUM OF ',F7.3)
C---------------------------------------------------------------
      IF (TERFLG(5) .EQ. 1)
     +   WRITE (WRTFIL,2142)  MINSUP
 2142  FORMAT ('0 *  THE SELECTED CONTINGENCY TABLE (ABOVE)'/
     +'      CONTAINS A SUBGROUP WITH LESS THAN THE MINIMUM % OF ',F7.3)
C---------------------------------------------------------------
      IF (TERFLG(6) .EQ. 1)
     +   WRITE (WRTFIL,2151)  MINRAT
 2151  FORMAT ('0 *  THE SELECTED CONTINGENCY TABLE (ABOVE)'/
     +T7,'CONTAINS SUBGROUPS WITH LESS THAN THE MINIMUM RATIO OF ',F7.3)
C---------------------------------------------------------------
C                                    ... FOR NULL STATISTICS
C---------------------------------------------------------------
      IF (TERFLG(9) .EQ. 1)
     +  WRITE (WRTFIL,2161)
 2161    FORMAT ('0 *  STATISTICS FOR ALL CONTINGENCY TABLES ',
     +          'AT THIS NODE ARE ZERO ')
C---------------------------------------------------------------
      WRITE (WRTFIL,2190)
 2190  FORMAT (' '//,39(' -'))
C
C=====================================================================
C==    CASE= 3 :    BRANCH TERMINATED AT PREVIOUS NODE
C=====================================================================
C
 3000 IF (WINDEX .NE. 3)  GOTO 4000
C
      WRITE (WRTFIL,3105)  LEV,GRP
 3105  FORMAT ('0',
     +            T10,'CONTINGENCY TABLE ANALYSIS',
     +            T60,'LEVEL=',I2,'  GROUP=',I3/
     +            T10,'==========================',
     +            T60,'========  =========='/////)
C
      WRITE (WRTFIL,3110)
 3110  FORMAT (' '///,39(' -')//
     +            T19,'CURRENT PAA BRANCH PREVIOUSLY TERMINATED'//,
     +            39(' -')//)
C
C=====================================================================
C==    CASE= 4 :    WRITE COMPLETED PAA TREE
C=====================================================================
C
 4000 IF (WINDEX .NE. 4)  GOTO 5000
C
      WRITE (WRTFIL,4105)
 4105  FORMAT ('0',
     +            T10,'P A A   P R O C E S S I N G   T R E E   F O R   ',
     +                'P R E D I C T O R S'/
     +            T10,'================================================',
     +                '=================='/////)
C---------------------------------------------------------------
C--    LOAD PRINT BUFFER WITH INDICES OF VARIABLES
C---------------------------------------------------------------
C
      NGRPS= 2**(MAXLEV+1) - 1
C
        DO 4050  J=1,63
          TEXBUF(J)= '    '
 4050     CONTINUE
C
      DO 4100  J=1,NGRPS
        POINT= GRPSEL(J)+1
        TEXBUF(J)= TTEXT(POINT)
          IF (ITERM(J) .NE. 0)  TEXBUF(J)= TTEXT( )
 4100   CONTINUE
C
C---------------------------------------------------------------
C--.   WRITE PRINT BUFFER IN TREE FORMAT
C---------------------------------------------------------------
        WRITE (WRTFIL,4121)  (TEXBUF(J),J=1,31)
 4121    FORMAT (//////////
     +            T41,A2///
     +            T21,A2,  T61,A2///
     +            T11,A2,  T31,A2,  T51,A2,  T71,A2///
     +            T6 ,A2,  T16,A2,  T26,A2,  T36,A2,  T46,A2,  T56,A2,
     +            T66,A2,  T76,A2,///
     +            T3 ,A2,  T8 ,A2,  T13,A2,  T18,A2,  T23,A2,  T28,A2,
     +            T33,A2,  T38,A2,  T43,A2,  T48,A2,  T53,A2,  T58,A2,
     +            T63,A2,  T68,A2,  T73,A2,  T78,A2//)
        WRITE (WRTFIL,4122)  (TEXBUF(J),J=32,62,2)
 4122    FORMAT (T2 ,A2,  T7 ,A2,  T12,A2,  T17,A2,  T22,A2,  T27,A2,
     +            T32,A2,  T37,A2,  T42,A2,  T47,A2,  T52,A2,  T57,A2,
     +            T62,A2,  T67,A2,  T72,A2,  T77,A2)
        WRITE (WRTFIL,4123)  (TEXBUF(J),J=33,63,2)
 4123    FORMAT (T4 ,A2,  T9 ,A2,  T14,A2,  T19,A2,  T24,A2,  T29,A2,
     +            T34,A2,  T39,A2,  T44,A2,  T49,A2,  T54,A2,  T59,A2,
     +            T64,A2,  T69,A2,  T74,A2,  T79,A2)
C
C---------------------------------------------------------------
C--        WRITE PAA PREDICTION TREE VECTOR TO "TREFIL"
C---------------------------------------------------------------
C
      WRITE (TREFIL,5110)  (GRPSEL(J),J=1,NGRPS)
 5110  FORMAT (1I3,2I3,4I3,8I3/16I3/32I3)
C
C---------------------------------------------------------------
C
      GOTO 9999
C
C
C=====================================================================
C==    CASE= 5 :    WRITE SUMMARY TABLE   ( NOT IMPLEMENTED )
C=====================================================================
C
 5000 IF (WINDEX .NE. 5)  GOTO 9999
C
C     WRITE (WRTFIL,5105)  LEV,GRP
C5105  FORMAT ('0',
C    +            T30,'P A A   S U M M A R Y   T A B L E',
C    +            T30,'================================='/////)
C
```

```
C
C-------------------------------------------------------------
C
      GOTO 9999
C
C===========================================================================
C==   ERROR CONTROL
C===========================================================================
C
 9000 CONTINUE
 9100 WRITE (MSGFIL,91)
   91  FORMAT ('1'/
     +           ' #######   ERROR IN WRITER   #######')
C-----*--1---------2---------3---------4---------5---------6---------7--
 9999 RETURN
      END
```

```
      SUBROUTINE DUMPER(DMPSEL)
C>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>
C>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>      D U M P E R
C>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>
C>>
C>>
C>> PROGRAM:  "NFW/BJS/PAA/ DUMPER "              UPDATE:           1/20/85
C>>           SPERRY 1100 VERSION
C>>
C>>
C>> PROGRAMMER:  NEWTON WALKER
C>>              ...  BUREAU OF RESEARCH & EVALUATION, OPARSS
C>>              ...  NYS DIVISION OF CRIMINAL JUSTICE SERVICES
C>>              ...  EXECUTIVE PARK TOWER, STUYVESANT PLAZA
C>>              ...  ALBANY  NEW YORK 12203
C>>
C>> FUNCTION:  DUMP CONTENTS OF SELECTED VARIABLES, BY COMMON BLOCK
C>>
C>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>
C>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>
C>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>
C>>
C>>
C===========================================================================
C==   PARAMETER DECLARATION
C===========================================================================
      IMPLICIT INTEGER (A-Z)
      INTEGER  N,P,PARFIL,MSGFIL,INPFIL,WRTFIL,MODE,DMODE,RMODE,WMODE,
     +         SAVFIL,SIMFIL,TREFIL,RECNUM,TRACE
      INTEGER  DFLAG,NCLUST,TABLE,LEV,GRP
      INTEGER  DMPSEL,STYPE
      REAL     DATA,DCUTPT,DMIN,DMAX,DVAL
      REAL     LAMBDA,PHI,CHISQ,UNCERT
C
      CHARACTER*4  TITLE,IFORM,OFORM
C
      COMMON   /PARAMS/  N,P,RECNUM,TRACE,
     +                   PARFIL,MSGFIL,INPFIL,WRTFIL,SAVFIL,SIMFIL,
     +                   TREFIL,
     +                   MODE,IMODE,TMODE,RMODE,DMODE,WMODE,PMODE,SMODE
     +         /CHARAC/  TITLE(3,18),IFORM(18),OFORM(18)
     +         /DATAS/   DATA(21)
     +         /DICHOS/  DFLAG(21),DVAR,
     +                   DCUTPT(21),
     +                   DMIN(2,21),DMAX(2,21),
     +                   NCLUST(2,21),DVAL(2,21)
     +         /TABLES/  TABLE(32,50,2,2),MAXLEV,LEV,GRP,DEP,INDSEL(50),
     +                   GRPSEL(63),IGUIDE(63),ITERM(63),TERFLG(9),
     +                   MINCEL,MINCEP,MINSUB,MINSUP,MINRAT,MINSTA,INDEX
     +         /STATS/   STYPE,
     +                   A(50),B(50),C(50),D(50),
     +                   R1(50),R2(50),C1(50),C2(50),T(50),
     +                   LAMBDA(50),PHI(50),CHISQ(50),UNCERT(50)
C
C===========================================================================
C==   PRINT HEADER
C===========================================================================
C
   10  FORMAT ('1'/
```

```
     +         7X ,79('#')/
     +         7X ,79('#')/
     +         7X ,79('#')/
     +         7X , 7('#'),T80, 7('#')/
     +         7X , 3('#'),T18,
     +         '<<<<<<<<<<<<<<<<<<<<<<<  D U M P E R  >>>>>>>',
     +                '>>>>>>>>>>>>>>>>',T84,
     +              3('#')/
     +         7X , 7('#'),T80, 7('#')/
     +         7X ,79('#')/
     +         7X ,79('#')/
     +         7X ,79('#')///////)
C
C======================================================================
C==
C==   COMMON BLOCK:   PARAMS
C==
C==   VARIABLE LIST:  N,P,RECNUM,
C==                   PARFIL,MSGFIL,INPFIL,WRTFIL,SAVFIL,
C==                   IFORM,OFORM,
C==                   TITLE
C==
C======================================================================
C
 1000 IF (DMPSEL.GT.1)  GOTO 2000
C
      WRITE (MSGFIL,10)
      WRITE (MSGFIL,11)
   11  FORMAT (' ',33('>'),'  COMMON BLOCK :   PARAMS   ',33('<'),//)
C
      WRITE (MSGFIL,21)
     +                   N,P,RECNUM,
     +                   PARFIL,MSGFIL,INPFIL,WRTFIL,SAVFIL,
     +                   IFORM,OFORM,
     +                   TITLE
   21  FORMAT ('0  N,P,RECNUM'//1X,3I5///
     +         '   PARFIL,MSGFIL,INPFIL,WRTFIL,SAVFIL'//1X,5I5///
     +         '   IFORM,OFORM'//1X,18A4/1X,18A4///
     +         '   TITLE',/3(/1X,18A4)///)
C
C======================================================================
C==
C==   COMMON BLOCK:   DATAS
C==
C==   VARIABLE LIST:  DATA
C==
C======================================================================
C
 2000 IF (DMPSEL.GT.2)  GOTO 3000
C
      WRITE (MSGFIL,10)
      WRITE (MSGFIL,12)
   12  FORMAT (' ',33('>'),'  COMMON BLOCK :   DATAS    ',33('<'),//)
C
      WRITE (MSGFIL,22)
     +                    DATA
   22  FORMAT ('0  DATA'//1X,12F10.3///)
C
C======================================================================
C==
C==   COMMON BLOCK:   DICHOS
C==
C==   VARIABLE LIST:  DFLAG,
C==                   DCUTPT,
C==                   DMIN,DMAX,
C==                   NCLUST,DVAL
C==
C======================================================================
C
 3000 IF (DMPSEL.GT.3)  GOTO 4000
C
      WRITE (MSGFIL,10)
      WRITE (MSGFIL,13)
   13  FORMAT (' ',33('>'),'  COMMON BLOCK :   DICHOS   ',33('<'),//)
C
      WRITE (MSGFIL,23)
C    +                   DFLAG,
C    +                   DCUTPT,
C    +                   DMIN,DMAX,
C    +                   NCLUST,DVAL
   23  FORMAT ('0  DFLAG',//1X,12I5///
     +         '   DCUTPT'//1X,12F10.3///
     +         '   DMIN,DMAX',/2(/1X,12F10.3)///
     +         '   NCLUST,DVAL',/4(/1X,12I10)///)
C
C======================================================================
C==
C==   COMMON BLOCK:   TABLES
C==
C==   VARIABLE LIST:  TABLE
C==
C======================================================================
C
 4000 IF (DMPSEL.GT.4)  GOTO 5000
C
      NG= 2**(LEV)
      LEVGRP= (2**LEV-1)+GRP
C
      WRITE (MSGFIL,10)
      WRITE (MSGFIL,14)
   14  FORMAT (' ',33('>'),'  COMMON BLOCK :   TABLES   ',33('<'),///)
C
      WRITE (MSGFIL,24)
     +                   LEV,GRP,LEVGRP,MAXLEV,DEP,INDSEL,GRPSEL,
     +                   IGUIDE,ITERM,TERFLG,
     +                   ((((TABLE(I,J,K,L),L=1,2),K=1,2),J=1,50),I=1,NG)
   24  FORMAT ('0  LEV, GRP, LEVGRP, MAXLEV, DEP'//,7X,5I7///
     +         '   INDSEL'/,7X,5(/10I5)///
     +         '   GRPSEL'/,7X,/32I3,/31I3///
     +         '   IGUIDE'/,7X,/32I3,/31I3///
     +         '   ITERM '/,7X,/32I3,/31I3///
     +         '   TERFLG'//,9I3//////////
     +         '   TABLE'//10(/5(5X,4I5))///)
C
C======================================================================
C==
C==   COMMON BLOCK:   STATS
C==
C==   VARIABLE LIST:  STYPE,
C==                   LAMBDA,PHI,CHISQ,UNCERT
```

```
C==
C======================================================================
C
 5000 IF (DMPSEL.GT.5)  GOTO 6000
C
      WRITE (MSGFIL,10)
      WRITE (MSGFIL,15)
   15  FORMAT (' ',33('>'),'  COMMON BLOCK :   STATS    ',33('<'),//)
C
      WRITE (MSGFIL,25)
     +                    STYPE,
     +                    LAMBDA,PHI,CHISQ,UNCERT
   25  FORMAT ('0  STYPE'//1X,I5////
     +         '   LAMBDA'//5(1X,10F10.3/)///
     +         '   PHI'//5(1X,10F10.3/)///
     +         '   CHISQ'//5(1X,10F10.3/)///
     +         '   UNCERT'//5(1X,10F10.3/)////)
C
 6000 IF (DMPSEL.GT.6)  GOTO 7000
 7000 IF (DMPSEL.GT.7)  GOTO 8000
 8000 IF (DMPSEL.GT.8)  GOTO 9000
 9000 CONTINUE
C
C
C-----*--1---------2---------3---------4---------5---------6---------7--
C
      WRITE (MSGFIL,9010)
 9010  FORMAT ('1')
C
 9999 RETURN
      END
```

```
      SUBROUTINE SIMMER
C>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>
C>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>      S I M M E R
C>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>
C>>
C>>
C>> PROGRAM:   "NFW/BJS/PAA/ SIMMER "             UPDATE:          1/20/85
C>>              SPERRY 1100 VERSION
C>>
C>>
C>> PROGRAMMER:   NEWTON WALKER
C>>                ...  BUREAU OF RESEARCH & EVALUATION, OPARSS
C>>                ...  NYS DIVISION OF CRIMINAL JUSTICE SERVICES
C>>                ...  EXECUTIVE PARK TOWER, STUYVESANT PLAZA
C>>                ...  ALBANY  NEW YORK 12203
C>>
C>> FUNCTION:   "BOOTSTRAP" SIMULATION PROCESSING CONTROLLER
C>>
C>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>
C>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>
C>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>
C>>
C>>
C======================================================================
C==   PARAMETER DECLARATION
C======================================================================
C
      IMPLICIT INTEGER (A-Z)
      INTEGER  N,P,PARFIL,MSGFIL,INPFIL,WRTFIL,MODE,DMODE,RMODE,WMODE,
     +         SAVFIL,SIMFIL,TREFIL,RECNUM,TRACE
      INTEGER  TABLE,I,J,INDSEL,GRPSEL,STYPE,LEV,GRP
      INTEGER  CASEL
C
      CHARACTER*4  TITLE,IFORM,OFORM
C
      COMMON   /PARAMS/  N,P,RECNUM,TRACE,
     +                   PARFIL,MSGFIL,INPFIL,WRTFIL,SAVFIL,SIMFIL,
     +                   TREFIL,
     +                   MODE,IMODE,TMODE,RMODE,DMODE,WMODE,PMODE,SMODE
     +         /TABLES/  TABLE(32,50,2,2),MAXLEV,LEV,GRP,DEP,INDSEL(50),
     +                   GRPSEL(63),IGUIDE(63),ITERM(63),TERFLG(9).
     +                   MINCEL,MINCEP,MINSUB,MINSUP,MINRAT,MINSTA,INDEX
     +         /STATS/   STYPE,
     +                   A(50),B(50),C(50),D(50),
     +                   R1(50),R2(50),C1(50),C2(50),T(50),
     +                   LAMBDA(50),PHI(50),CHISQ(50),UNCERT(50)
     +         /CHARAC/  TITLE(3,18),IFORM(18),OFORM(18)
     +         /SIMS/    BOOTS,BOOT,SIMSEL(7),CASEL(10000)
C
C======================================================================
C==   INITIALIZE RANDOM NUMBER FUNCTION  -- PECULIAR TO SUNYA SPERRY
C==   ( THIS CODE GENERATES A NEW SEED FOR EACH PROGRAM RUN; OTHER )
C==   ( SPERRY INSTALLATIONS MAY USE DIFFERENT FUNCTION CALLS.     )
C==   ( NEITHER "RANNEW" NOR "RAN" ARE IN THE STANDARD FTN LIBRARY.)
C==   ( OTHER RANDOM NUMBER ROUTINES CAN BE FOUND IN THE IMSL LBRY.)
C==   (- NONSTANDARD FUNCTION REFERENCES ARE ON LINES 57, 58, 113 -)
C======================================================================
C
      EXTERNAL *RANNEW, *RAN
```

```
      CALL RANNEW (0.)
C
C======================================================================
C==   PROCEDURAL INITIALIZATION
C======================================================================
C
      WRITE (MSGFIL,21)
   21 FORMAT ('1>>>>>>>  S I M U L A T I O N   M O D E'///)
C
      IF (TRACE.GE.1)  WRITE (MSGFIL,22)
   22 FORMAT ('0>>>>>>>  SUBROUTINE SIMMER ')
C
      WRITE (MSGFIL,31)  BOOTS
   31 FORMAT ('0>>>>>>>  SIMMER :  # OF SAMPLES TO BE DRAWN = ',I3/)
C
C---------------------------------------------------------------------
C     SET UP "SIMFIL" AND INITIALIZE
C---------------------------------------------------------------------


C---------------------------------------------------------------------
C     SET BOOTSTRAP ALGORITHM PARAMETERS
C---------------------------------------------------------------------
      IF (BOOTS.GT.200)  BOOTS= 200
      IF (WMODE.EQ.1)    WMODE= 2
C---------------------------------------------------------------------
C     READ & DICHOTOMIZE & SAVE RAW DATA
C---------------------------------------------------------------------
         RMODE= 0
         CALL READER
         RMODE= 1
C
C======================================================================
C==   PROCESSING LOOP FOR EACH BOOTSTRAP REPLICATION
C======================================================================
C
      DO 5000  K=1,BOOTS
        BOOT= K
C
        IF (TRACE.GE.1)  WRITE (MSGFIL,41)  BOOT
        WRITE (SIMFIL,41)  BOOT
   41   FORMAT (' ((((((((((  BOOTSTRAP SAMPLE #',I3,'  ))))))))))')
C
C---------------------------------------------------------------------
C     INITIALIZE ARRAYS FOR EACH SAMPLE
C---------------------------------------------------------------------
        DO 500  J=1,N
          CASEL(J)= 0
  500   CONTINUE
C---------------------------------------------------------------------
C     SELECT SAMPLE ELEMENTS & SAVE IDENTIFICATION VECTOR
C---------------------------------------------------------------------
        DO 1000  I=1,N
          POINT= IFIX(RAN(JUNK)*(N-1)+1)
          CASEL(POINT)= CASEL(POINT)+1
 1000   CONTINUE
C
        WRITE (SIMFIL,1110)  (CASEL(I),I=1,N)
 1110   FORMAT (25I3)
C
C        IF (TRACE.GE.1)  WRITE (MSGFIL,1011)
C1011 FORMAT('0<* VECTOR OF CASE SELECTION COUNTS FOR EACH SAMPLE *>'/)
C        IF (TRACE.GE.1)  WRITE (MSGFIL,1012)
C1012 FORMAT(' <*              IS AVAILABLE ON SIMFIL              *>'/)
C
        IF (TRACE.LT.3)  GOTO 1100
          DO 1100  I=1,N
            WRITE (MSGFIL,1012)  I,CASEL(I)
 1012        FORMAT (' ',T10,I3,T20,50I2)
 1100       CONTINUE
C
C======================================================================
C==   REPEATED PAA-PROCESSING FOR EACH SAMPLE
C======================================================================
C
C
        CALL PAAPER
C
C---------------------------------------------------------------------
C     ACCUMULATE SAMPLE RESULTS TO "SIMFIL"
C---------------------------------------------------------------------
C
C
C======================================================================
C
 5000   CONTINUE
C
C
C======================================================================
C==   PROCESSING AND EVALUATION OF SAMPLING RESULTS
C======================================================================
C
       GOTO 9999
C
C======================================================================
C==   ERROR CONTROL
C======================================================================
C
 9000 CONTINUE
 9100 WRITE (MSGFIL,91)
   91  FORMAT ('1'/
     +            ' #######   ERROR IN SIMMER   #######')
C-----*--1---------2---------3---------4---------5---------6---------7--
 9999 RETURN
      END
```

```
C>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>
C>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>      P R O M P T
C>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>
C>>
C>>
C>> PROGRAM:  "NFW/BJS/PAA/ PROMPT "             UPDATE:   ( 1/20/85 )
C>>           SPERRY 1100 VERSION
C>>
C>>
C>> PROGRAMMER:  NEWTON WALKER
C>>               ...  BUREAU OF RESEARCH & EVALUATION, OPARSS
C>>               ...  NYS DIVISION OF CRIMINAL JUSTICE SERVICES
C>>               ...  EXECUTIVE PARK TOWER, STUYVESANT PLAZA
C>>               ...  ALBANY  NEW YORK 12203
C>>
C>> FUNCTION:  INTERACTIVE PARAMETER SPECIFICATION FOR PAA ANALYSIS
C>>
C>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>
C>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>
C>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>
C>>
C>>
C>>
C=========================================================================
C==                                                                     =
C==  FUNCTION :      THE PURPOSE OF THIS PROGRAM IS TO PROVIDE         =
C==  ==========     A MEANS FOR THE CREATION OF THE (FORMATTED)        =
C==                 PARAMETER-CARD FILE REQUIRED BY THE                 =
C==                 PAA PACKAGE.  EXECUTION IS INDEPENDENT OF ALL      =
C==                 OTHER ROUTINES IN THE PACKAGE.                      =
C==                                                                     =
C==                                                                     =
C==  PARAMETER SPECS ARE SOLICITED FROM:  UNIT #  5 (DEFAULT=TERMNL),  =
C==  ===============          WRITTEN TO:  UNIT # 15 .                 =
C==                                                                     =
C==                                                                     =
C==                                                                     =
C==  GENERAL PROGRAM PARAMETER INPUT INFORMATION:                       =
C==  ============================================                       =
C==                                                                     =
C==    CARD   REQUIRED?   INFORMATION                       FORMAT     =
C==    ----   ---------   ------------------------------   ---------  =
C==                                                                     =
C==      1    REQUIRED                                     'PPPP',     =
C==                       RUN TITLE (3 80-COLUMN CARDS)    3(18A4)     =
C==                                                                     =
C==      2    REQUIRED                                     'PPPP',     =
C==                       NUMBER OF CASES                  I6,         =
C==                       NUMBER OF VARIABLES              I5,         =
C==                       PROGRAM MODE SPECIFICATIONS:     7I3         =
C==                        MODE  : GENERAL PROGRAM MODE                =
C==                        IMODE : INTERACTIVE MODE                    =
C==                        TMODE : TRACE MODE                          =
C==                        DMODE : DICHOTOMIZATION MODE                =
C==                        WMODE : WRITTEN OUTPUT MODE                 =
C==                        PMODE : PLOT MODE                           =
C==                        SMODE : SIMULATION MODE                     =
C==                                                                     =
C==      3    REQUIRED                                     'PPPP',     =
```

```
C==                       INPUT DATA FORMAT                18A4          =
C==                                                                      =
C==     4    REQUIRED                                      'PPPP',       =
C==                       OUTPUT DATA FORMAT               18A4          =
C==                                                                      =
C==     5    REQUIRED                                      'PPPP',       =
C==                       MAXIMUM LEVEL OF PAA PROCESSING  I3,           =
C==                          MAX=5                                       =
C==                       STATISTICAL MEASURE TO BE USED   I3,           =
C==                          1=LAMBDA      2=UNCERT                      =
C==                          3=PHI         4=CHI-SQ                      =
C==                       DEPENDENT VARIABLE #             I3,           =
C==                       SELECTION VECTOR FOR INDEP VARS  50I1          =
C==                          0=IGNORE      1=USE                         =
C==                                                                      =
C==     6    REQUIRED                                      'PPPP',       =
C==                       BRANCH-TERMINATION OPTIONS:      6I1,          =
C==                         APPLY MIN-CELL-SIZE CRITERION                =
C==                           "    MIN-CELL-%        "                   =
C==                           "    MIN-SUBGRP-N      "                   =
C==                           "    MIN-SUBGRP-%      "                   =
C==                           "    MIN-SUBGRP-RATIO  "                   =
C==                           "    MIN-STAT-VALUE    "                   =
C==                       TERMINATION-CRITERION VALUES:    6F7.3,        =
C==                       FORCE INDEP VAR SELECTION?       I1            =
C==                                                                      =
C==     7    OPTIONAL                                      'PPPP',       =
C==             *<4>*     INDEX VECTOR OF VARS TO FORCE    5(32I2)       =
C==                                                                      =
C==     8    OPTIONAL                                      'SSSS',       =
C==             *<1>*     NUMBER OF SAMPLES TO TAKE                      =
C==                       SAVE VECTOR OF CASE-SAMPLED-INDICES?           =
C==                         "  ALL STATISTIC VALUES?                     =
C==                         "  ONLY STATS FOR SELECTED VARIABLES?        =
C==                         "  ALL NODE VARIABLES IN TREES               =
C==                         "  ALL SUBGROUP-SPLIT N'S                    =
C==                         "  ONLY TERMINAL SUBGROUP N'S                =
C==                                                                      =
C==     9    OPTIONAL                                      'DDDD',       =
C==             *<2>*     INDEX OF VAR TO DICHOTOMIZE      I3,           =
C==                       TYPE OF DICHOTOMIZATION          I3,           =
C==                       DICHOT PARAMETERS                *<3>*         =
C==                                                                      =
C==    10    OPTIONAL                                      'DDDD'        =
C==             *<2>*     END-OF-FILE SPECIFICATION                      =
C==                                                                      =
C==                                                                      =
C==                                                                      =
C==    NOTES:  *<1>*: REQUIRED IF SIMULATION RUNS REQUESTED              =
C==    ------  *<2>*: REQUIRED IF DICHOTOMIZATION REQUESTED              =
C==            *<3>*: FORMAT DEPENDS ON TYPE OF DICHOTOMIZATION          =
C==            *<4>*  REQUIRED IF FORCED-VAR SELECTION REQUESTED         =
C==                                                                      =
C==                                                                      =
C
C
C=========================================================================
C==  PARAMETER DECLARATION
C=========================================================================
C
```

```
      IMPLICIT INTEGER (A-Z)
      INTEGER  N,P,PARFIL,MODE,DMODE,RMODE,WMODE,
     +         KEYBRD,SCREEN,RECNUM
      INTEGER  DVAR,STYPE
      INTEGER  INTERM(6),INDSEL(50),IGUIDE(31)
      REAL     DCUTPT(21),DMIN(2,21),DMAX(2,21),DVAL(21),TEMP,
     +         MINCEL,MINCEP,MINSUB,MINSUP,MINRAT,MINSTA
C
      CHARACTER*4  TITLE(3,18),IFORM(18)
C
C
C------------------------------------------------------------
C--   DEFAULT FILE ASSIGNMENTS
C------------------------------------------------------------
      KEYBRD= 5
      SCREEN= 6
      PARFIL= 15
C------------------------------------------------------------
C--   PRINT HEADER
C------------------------------------------------------------
C
      WRITE (SCREEN,21)
   21 FORMAT ('1'/
     +        ' ',79('*')/
     +        ' ',79('*')/
     +        ' ',79('*')/
     +        ' ', 7('*'),T74, 7('*')/
     +        ' ', 3('*'),T12,
     +        'P R E D I C T I V E   A T T R I B U T E  ',
     +                'A N A L Y S I S',T78,
     +            3('*')/
     +        ' ', 7('*'),T74, 7('*')/
     +        ' ',79('*')/
     +        ' ',79('*')/
     +        ' ',79('*')///)
      WRITE (SCREEN,22)
   22 FORMAT (//' ***  PROMPTER:  INTERACTIVE PARAMETER SPECIFICATION '
     +            ///)
C
C=========================================================================
C==   PROMPT FOR PARAMETERS; SAVE; REFORMAT; WRITE TO PARFIL
C=========================================================================
C
C-----------------------------------------------------------------------
C     ENTER TITLE INFORMATION
C-----------------------------------------------------------------------
 1000 WRITE (SCREEN,110)
  110 FORMAT ('0>>>>>>>  ENTER:  TITLE   (3 LINES OF 72 COLS)'/)
C- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
      RECNUM= 0
      DO 150  I=1,3
  150   READ (KEYBRD,111,END=1000,ERR=9100)  (TITLE(I,J),J=1,18)
  111 FORMAT (18A4)
      RECNUM= RECNUM+3
C-   -   -   -   -   -   -   -   -   -   -   -   -   -   -   -   -   -
      WRITE (PARFIL,121)  ((TITLE(I,J),J=1,18),I=1,3)
        WRITE (SCREEN,11)
   11   FORMAT (' '/' PARAMETER CARD HAS BEEN CONSTRUCTED AS FOLLOWS:')
  125 WRITE (SCREEN,121)  ((TITLE(I,J),J=1,18),I=1,3)
  121 FORMAT ('PPPP',1X,18A4/'PPPP',1X,18A4/'PPPP',1X,18A4)
```

```
C------------------------------------------------------------------------
C     ENTER PAA PROCESSING PARAMETERS
C------------------------------------------------------------------------
 2000 WRITE (SCREEN,210)
  210  FORMAT ('0>>>>>>>  ENTER:  NUMBER OF CASES   (0=> READ-TO-EOF)'/)
C- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
      READ (KEYBRD,211,END=2000,ERR=9100)  N
  211  FORMAT ()
C------------------------------------------------------------------------
      WRITE (SCREEN,220)
  220  FORMAT ('0>>>>>>>  ENTER:  NUMBER OF VARIABLES'/)
C- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
      READ (KEYBRD,212,END=2000,ERR=9100)  P
  212  FORMAT ()
C------------------------------------------------------------------------
      WRITE (SCREEN,230)
  230  FORMAT ('0>>>>>>>  ENTER:  PROGRAM MODE   (2=NORM 3=BOOT) '/)
C- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
      READ (KEYBRD,213,END=2000,ERR=9100)  MODE
  213  FORMAT ()
      SMODE=0
      IF (MODE.EQ.3)  SMODE=1
C------------------------------------------------------------------------
      WRITE (SCREEN,240)
  240  FORMAT ('0>>>>>>>  ENTER:  TRACE MODE   (0=NONE,1=MIN) '/)
C- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
      READ (KEYBRD,214,END=2000,ERR=9100)  TMODE
  214  FORMAT ()
C------------------------------------------------------------------------
      WRITE (SCREEN,250)
  250  FORMAT ('0>>>>>>>  ENTER:  DICHOT MODE   (0=NO,1=YES) '/)
C- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
      READ (KEYBRD,215,END=2000,ERR=9100)  DMODE
  215  FORMAT ()
C------------------------------------------------------------------------
      WRITE (SCREEN,260)
  260  FORMAT ('0>>>>>>>  ENTER:  OUTPUT MODE   (0=MIN,1=NORM) '/)
C- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
      READ (KEYBRD,216,END=2000, ERR=9100)  WMODE
  216  FORMAT ()
C------------------------------------------------------------------------
C     DEFAULT MODE ASSIGNMENTS:
      IMODE=0
      RMODE=0
      PMODE=0
C-   -    -    -    -    -    -    -    -    -    -    -    -    -    -
      WRITE (PARFIL,222)  N,P,MODE,IMODE,TMODE,DMODE,WMODE,PMODE,SMODE
        WRITE (SCREEN,11)
      WRITE (SCREEN,222)  N,P,MODE,IMODE,TMODE,DMODE,WMODE,PMODE,SMODE
  222  FORMAT ('PPPP',1X,2I5,7I3)
      RECNUM= RECNUM+1
C
      WRITE(SCREEN,32)  N,P,MODE,IMODE,TMODE,DMODE,WMODE,PMODE,SMODE
   32  FORMAT ('0',T11,'CONTENTS OF CARD : '//
     +            T16,'NUMBER OF CASES: ',T40,I5/
     +            T16,'NUMBER OF VARIABLES: ',T40,I5//
     +            T16,'PROGRAM MODE: ',T40,I3/
     +            T15,'(INTERACTIVE MODE:',T40,I3,')'/
     +            T16,'TRACE MODE:',T40,I3/
     +            T16,'DICHOTOMIZATION MODE:',T40,I3/
     +            T16,'WRITE MODE:',T40,I3/
     +            T15,'(PLOT MODE:',T40,I3,')'/
     +            T15,'(SIMULATION MODE:',T40,I3,')'//)
C------------------------------------------------------------------------
C     ENTER FORMAT FOR INPUT DATA
C------------------------------------------------------------------------
 3000 WRITE (SCREEN,310)
  310  FORMAT ('0>>>>>>>  ENTER:  INPUT FORMAT   (REAL;WITH();72-COL)'/)
C- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
      READ (KEYBRD,311,END=3000,ERR=9100)  IFORM
  311  FORMAT (18A4)
      RECNUM= RECNUM+1
C-   -    -    -    -    -    -    -    -    -    -    -    -    -    -
      WRITE (PARFIL,131)  IFORM
        WRITE (SCREEN,11)
      WRITE (SCREEN,131)  IFORM
  131  FORMAT ('PPPP',1X,18A4)
C------------------------------------------------------------------------
C     WRITE DEFAULT FORMAT FOR OUTPUT  (NOT USED IN PROG)
C------------------------------------------------------------------------
      RECNUM= RECNUM+1
C-   -    -    -    -    -    -    -    -    -    -    -    -    -    -
      WRITE (PARFIL,131)  IFORM
C------------------------------------------------------------------------
C     ENTER PAA PROCESSING PARAMETERS
C------------------------------------------------------------------------
 4000 WRITE (SCREEN,410)
  410  FORMAT ('0>>>>>>>  ENTER:  MAX LEVEL OF PAA  (0=INITIAL XTABS)'/)
C- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
      READ (KEYBRD,411,END=4000,ERR=9100)  MAXLEV
  411  FORMAT ()
C------------------------------------------------------------------------
      WRITE (SCREEN,420)
  420  FORMAT ('0>>>>>>>  ENTER:  STATISTICAL CRITERION '/
     +        '                   1=LAMBDA 2=UNCERT 3=PHI 4=CHISQ '/)
C- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
      READ (KEYBRD,412,END=4000,ERR=9100)  STYPE
  412  FORMAT ()
C------------------------------------------------------------------------
      WRITE (SCREEN,430)
  430  FORMAT ('0>>>>>>>  ENTER:  INDEX # OF DEPENDENT VARIABLE '/)
C- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
      READ (KEYBRD,413,END=4000,ERR=9100)  DEP
  413  FORMAT ()
C------------------------------------------------------------------------
      WRITE (SCREEN,440)
  440  FORMAT ('0>>>>>>>  ENTER:  SELECTION VECTOR FOR INDEPENDENT VARS'
     +        /'                 (     AS A STRING OF 0"S AND 1"S ;    )'
     +        /'                 (          1=USE    0=IGNORE          )'
     +        /'                 (  EG:  1101 => (1,2,4=IND)(3=DEP)    )'
     +        //)
C- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
      READ (KEYBRD,414,END=4000,ERR=9100)  (INDSEL(J),J=1,P)
  414  FORMAT (50I1)
C-   -    -    -    -    -    -    -    -    -    -    -    -    -    -
      WRITE (PARFIL,141)  MAXLEV,STYPE,DEP,(INDSEL(J),J=1,P)
        WRITE (SCREEN,11)
      WRITE (SCREEN,141)  MAXLEV,STYPE,DEP,(INDSEL(J),J=1,P)
  141  FORMAT ('PPPP',1X,3I3,2X,50I1)
      RECNUM= RECNUM+1
```

```
C
      WRITE (SCREEN,35)  MAXLEV,STYPE,DEP,(INDSEL(J),J=1,P)
   35 FORMAT ('0',T11,'CONTENTS OF CARD : '//
     +            T16,'MAX LEVEL OF PROCESSING: ',T40,I5/
     +            T16,'STATISTICAL CRITERION: ',T40,I5/
     +            T16,'DEPENDENT VARIABLE: ',T40,I5//
     +            T16,'SELECTION VECTOR FOR INDEPENDENT VARIABLES: ',
     +            T65,50I1//)
C-----------------------------------------------------------------------
C     ENTER PAA PROCESSING PARAMETERS
C-----------------------------------------------------------------------
 5000 WRITE (SCREEN,500)
  500 FORMAT (///////'  D E F A U L T   M I N I M U M   V A L U E S  '//
     +      '    FOR STOPPING CRITERIA:                                 '/
     +      ' 1   CELL SIZE...............   5.000                      '/
     +      ' 2   CELL %-OF-TOTAL.........   0.001                      '/
     +      ' 3   SUBGRP SIZE.............  10.000                      '/
     +      ' 4   SUBGRP %-OF-TOT.........    .001                      '/
     +      ' 5   SUBGRP RATIO............     .1                       '//
     +      '    FOR SELECTED STATISTICAL CRITERIA:                     '/
     +      ' 6   LAMBDA..................   0.01                       '/
     +      ' 6   UNCERT..................   0.01                       '/
     +      ' 6   PHI.....................   0.01                       '/
     +      ' 6   CHISQ...................   3.84                       '//)
C
      MINCEL=5.000
      MINCEP=0.001
      MINSUB=10.00
      MINSUP=0.001
      MINRAT=0.100
      MINSTA=0.000
      IF (STYPE.EQ.1)  MINSTA=0.01
      IF (STYPE.EQ.2)  MINSTA=0.01
      IF (STYPE.EQ.3)  MINSTA=0.01
      IF (STYPE.EQ.4)  MINSTA=3.84
C
      WRITE (SCREEN,505)
  505 FORMAT ('0>>>>>>>  ENTER:  SELECTION VECTOR FOR STOP/STAT CHECKS'
     +        /'                  (       AS A STRING OF INTEGERS:       )'
     +        /'                  (    0=IGNORE   1=USE   2=NEW-VALUE    )'
     +        /'                  (  EG:   000001  => CHECK ONLY STAT    )'
     +        //)
C- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
      READ (KEYBRD,511,END=5000,ERR=9100)  (INTERM(J),J=1,6)
  511 FORMAT (6I1)
      DO 550  I = 1,6
        IF (INTERM(I).LT.2)  GOTO 550
          WRITE (SCREEN,551)  I
  551     FORMAT ('0>>>>>>>  ENTER NEW VALUE FOR (',I1,')' /)
          READ (KEYBRD,552)  TEMP
  552     FORMAT ()
          IF (I.EQ.1)  MINCEL=TEMP
          IF (I.EQ.2)  MINCEP=TEMP
          IF (I.EQ.3)  MINSUB=TEMP
          IF (I.EQ.4)  MINSUP=TEMP
          IF (I.EQ.5)  MINRAT=TEMP
          IF (I.EQ.6)  MINSTA=TEMP
  550   CONTINUE
C-   -   -   -   -   -   -   -   -   -   -   -   -   -   -   -   -   -   -
      WRITE (PARFIL,151)   (INTERM(J),J=1,6),
```

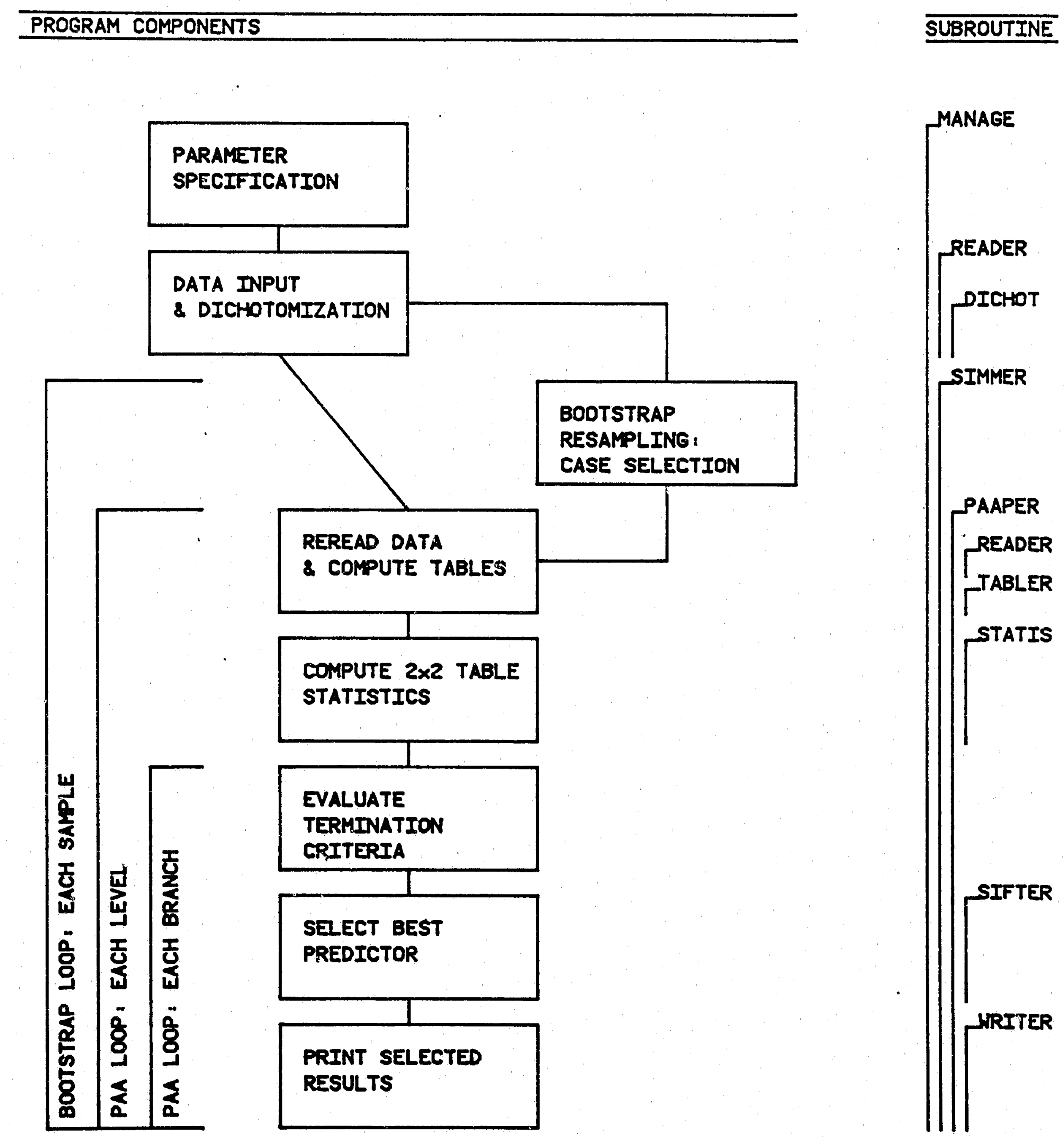
```
     +                               MINCEL,MINCEP,
     +                               MINSUB,MINSUP,
     +                               MINRAT,MINSTA
        WRITE (SCREEN,11)
      WRITE (SCREEN,151)   (INTERM(J),J=1,6),
     +                               MINCEL,MINCEP,
     +                               MINSUB,MINSUP,
     +                               MINRAT,MINSTA
  151 FORMAT ('PPPP',1X,6I1,2X,6F7.3)
      RECNUM= RECNUM+1
C
      WRITE (SCREEN,36)
     +                      INTERM(1),MINCEL, INTERM(2),MINCEP,
     +                      INTERM(3),MINSUB, INTERM(4),MINSUP,
     +                      INTERM(5),MINRAT, INTERM(6),MINSTA
   36 FORMAT ('0',T11,'CONTENTS OF CARD : '//
     +            T16,'APPLY BRANCH TERMINATION CRITERION? ',
     +            T59,'N/Y',T72,'VALUE'//
     +            T16,'  MINIMUM CELL SIZE ..............: ',T60,I1,
     +                                                      T70,F7.3/
     +            T16,'  MINIMUM CELL/TOTAL PERCENT .....: ',T60,I1,
     +                                                      T70,F7.3/
     +            T16,'  MINIMUM SUBGROUP SIZE ..........: ',T60,I1,
     +                                                      T70,F7.3/
     +            T16,'  MINIMUM SUBGROUP/TOTAL PERCENT .: ',T60,I1,
     +                                                      T70,F7.3/
     +            T16,'  MINIMUM A:B SUBGRP RATIO .......: ',T60,I1,
     +                                                      T70,F7.3/
     +            T16,'  MINIMUM VALUE OF STATISTIC .....: ',T60,I1,
     +                                                     T70,F7.3//)
C-----------------------------------------------------------------------
C     ENTER FORCE-VARIABLE PARAMETERS  (IF REQUESTED)
C-----------------------------------------------------------------------
 6000 IF (FFLAG.EQ.0)  GOTO 7000
C
      WRITE (SCREEN,605)
  605 FORMAT ('0>>>>>>>  ENTER:  SELECTION VECTOR FOR VARIABS TO FORCE'
     +        /'                 (  AS A STRING OF 00"S AND ##"S :   )'
     +        /'                 (     00=IGNORE  ##=FORCE-VAR       )'
     +        /'                 (            IN THE FORM:           )'
     +        /'                 (  LEVEL 0:  ##                     )'
     +        /'                 (  LEVEL 1:  ## ##                  )'
     +        /'                 (  LEVEL 2:  ## ## ## ##            )'
     +        /'                 (  LEVEL 3:  ## ## ## ## ## ## ## ##)'
     +        /'                 (  LEVEL 4:  ...                    )'
     +        //)
 - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
      READ (KEYBRD,611,END=6000,ERR=9100)  (IGUIDE(J),J=1,31)
  611 FORMAT (I2/I2,1X,I2/4(I2,1X)/8(I2,1X)/16(I2,1X))
      RECNUM= RECNUM+5
      WRITE (SCREEN,37)  (IGUIDE(J),J=1,31)
   37 FORMAT ('0',T11,'CARD : '//
     +            T16,'SELECTION VECTOR FOR VARIABLES TO BE FORCED: '/
     +            T16,'  LEVEL= 0 ..............................: ',
     +            T40,I2/
     +            T16,'  LEVEL= 1 ..............................: ',
     +            T40,2I2/
     +            T16,'  LEVEL= 2 ..............................: ',
     +            T40,4I2/
     +            T16,'  LEVEL= 3 ..............................: ',
```

```
     +             T40,8I2/
     +             T16,'  LEVEL= 4 ..................................: ',
     +             T40,16I2//)
C
C-----------------------------------------------------------------------
C     ENTER BOOTSTRAP RESAMPLING PARAMETERS  (IF REQUESTED)
C-----------------------------------------------------------------------
 7000 IF (SMODE.EQ.0)  GOTO 8000
C
      WRITE (SCREEN,710)
  710  FORMAT ('0>>>>>>>  ENTER:  NUMBER OF SAMPLES TO DRAW   '/)
C- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
      READ (KEYBRD,711,END=7000,ERR=9100)  BOOTS
  711  FORMAT ()
C-  -   -   -   -   -   -   -   -   -   -   -   -   -   -   -   -   -
      WRITE (PARFIL,731)  BOOTS
        WRITE (SCREEN,11)
      WRITE (SCREEN,731)  BOOTS
  731  FORMAT ('SSSS',1X,I3)
      RECNUM= RECNUM+1
C-----------------------------------------------------------------------
C     ENTER DICHOTOMIZATION PARAMETERS  (IF REQUESTED)
C-----------------------------------------------------------------------
 8000 IF (DMODE.EQ.0)  GOTO 9900
C
      WRITE (SCREEN,800)
  800  FORMAT (///////'  D I C H O T O M I Z A T I O N  :          '//
     +        '          TYPES AVAILABLE:  1) CUTPOINT        ' /
     +        '                            2) VALUE RANGES    ' /
     +        '                            3) VALUE CLUSTERS  ' /
     +        '                            4) CRITICAL VALUE  ' //)
C
      WRITE (SCREEN,305)
  805  FORMAT ('0>>>>>>>  ENTER:  INDEX# OF VARIABLE  &  TYPE OF DICHOT'
     +        /'                  (   SEPARATED BY AT LEAST 1 BLANK    )'
     +        /'                  (----    ENTER:  "Q" TO QUIT     ----)'
     +        /'                  (  EG:  3 1  =>  CUTPOINT FOR VAR-3 )'
     +        //)
C- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
      DO 850  I=1,P
C
        WRITE (SCREEN,851)
  851   FORMAT('0>>>>>>>  ENTER:  VAR-#,TYPE  /OR/   "Q" TO QUIT')
        READ (KEYBRD,852,END=8000,ERR=899)  DVAR, DTYPE
  852    FORMAT ()
C
        GOTO (860,870,880,890),DTYPE
C
  860    CONTINUE
           WRITE (SCREEN,861)  DVAR
  861       FORMAT ('0>>>>>>>  ENTER CUTPOINT FOR VARIABLE #',I2 )
           READ (KEYBRD,862,END=8000,ERR=9100)  DCUTPT(DVAR)
  862       FORMAT ()
           WRITE (PARFIL,863)  DVAR,DTYPE,DCUTPT(DVAR)
        WRITE (SCREEN,11)
           WRITE (SCREEN,863)  DVAR,DTYPE,DCUTPT(DVAR)
  863       FORMAT ('DDDD',1X,2I3,F7.3)
           RECNUM=RECNUM+1
           GOTO 850
C
  870    CONTINUE
           WRITE (SCREEN,871)  DVAR
  871       FORMAT('0>>>>>>>  ENTER 2 (LO,HI) RANGES FOR VARIABLE #',I2)
           READ (KEYBRD,872)  DMIN(1,DVAR),DMAX(1,DVAR),
     +                        DMIN(2,DVAR),DMAX(2,DVAR)
  872       FORMAT ()
           WRITE (PARFIL,873)  DVAR,DTYPE,DMIN(1,DVAR),DMAX(1,DVAR),
     +                                    DMIN(2,DVAR),DMAX(2,DVAR)
        WRITE (SCREEN,11)
           WRITE (SCREEN,873)  DVAR,DTYPE,DMIN(1,DVAR),DMAX(1,DVAR),
     +                                    DMIN(2,DVAR),DMAX(2,DVAR)
  873       FORMAT ('DDDD',1X,2I3,4F7.3)
           RECNUM=RECNUM+1
           GOTO 850
C
  880    CONTINUE
           WRITE (SCREEN,881)  DVAR
  881       FORMAT('0>>>>>>>  ENTER NUMBER OF VALUES (MAX=9) FOR GRP-1')
           READ (KEYBRD,882,END=8000,ERR=9100)  NCLST1
  882       FORMAT ()
           WRITE (SCREEN,883)  NCLST1,DVAR
  883       FORMAT('0>>>>>>>  ENTER ',I2,' VALUES FOR EACH GROUP, VAR #'
     +             ,I3)
           READ (KEYBRD,884,END=8000,ERR=9100)  (DVAL(J),J=1,NCLST1)
  884       FORMAT ()
        WRITE (SCREEN,11)
           WRITE (SCREEN,885)  DVAR,DTYPE,NCLST1,(DVAL(J),J=1,NCLST1)
           WRITE (PARFIL,885)  DVAR,DTYPE,NCLST1,(DVAL(J),J=1,NCLST1)
           WRITE (SCREEN,886)  DVAR
  886       FORMAT('0>>>>>>>  ENTER NUMBER OF VALUES (MAX=9) FOR GRP-2')
           READ (KEYBRD,887,END=8000,ERR=9100)  NCLST2
  887       FORMAT ()
           WRITE (SCREEN,888)  NCLST2,DVAR
  888       FORMAT('0>>>>>>>  ENTER ',I2,' VALUES FOR EACH GROUP, VAR #'
     +             ,I3)
           READ (KEYBRD,889,END=8000,ERR=9100)  (DVAL(J),J=1,NCLST2)
  889       FORMAT ()
           WRITE (PARFIL,885)  DVAR,DTYPE,NCLST1,(DVAL(J),J=1,NCLST1)
        WRITE (SCREEN,11)
           WRITE (SCREEN,885)  DVAR,DTYPE,NCLST2,(DVAL(J),J=1,NCLST2)
  885       FORMAT ('DDDD',1X,2I3,1X,I3,9F7.3)
           RECNUM=RECNUM+2
           GOTO 850
C
  890    CONTINUE
           WRITE (SCREEN,891)  DVAR
  891       FORMAT('0>>>>>>>  ENTER CRITICAL VALUE FOR VARIABLE #',I2)
           READ (KEYBRD,892,END=8000,ERR=9100)  CRTVAL
  892       FORMAT ()
           WRITE (PARFIL,893)  DVAR,DTYPE,CRTVAL
        WRITE (SCREEN,11)
           WRITE (SCREEN,893)  DVAR,DTYPE,CRTVAL
  893       FORMAT ('DDDD',1X,2I3,F7.3)
           RECNUM=RECNUM+1
           GOTO 850
C
  850   CONTINUE
C
  899 CONTINUE
C
```

```
           WRITE (PARFIL,894)
           RECNUM=RECNUM+1
        WRITE (SCREEN,11)
           WRITE (SCREEN,894)
  894       FORMAT ('DDDD 0 ' )
C
      GOTO 9900
C
C======================================================================
C==   ERROR CONTROL
C======================================================================
C
 9000 CONTINUE
 9100 WRITE (SCREEN,91)
   91  FORMAT (' '///
     +          ' ******* - ERROR IN PARAMETER CARD ENTRY - ******* '/
     +          ' ******* (SOME OUTPUT MAY BE SAVED ON #15) ******* '//
     +          ' *******     END OF PROGRAM EXECUTION!     ******* '//)
      GOTO 9999
C
C======================================================================
C==   PROGRAM TERMINATION
C======================================================================
C
 9900 CONTINUE
C
      WRITE (SCREEN,23)  RECNUM
   23  FORMAT ('0***  PROMPTER: '
     +        //'      A COPY OF THE PROPERLY-FORMATTED PARAMETER CARDS'
     +         /'         IS NOW AVAILABLE ON UNIT #15 :'
     +         /'      A TOTAL OF ',I2,' RECORDS (CARDS) WERE PRODUCED.'
     +        //'      MODIFICATIONS TO THIS FILE CAN BE MADE USING ANY'
     +         /'         AVAILABLE TEXT EDITOR.'//)
C
      WRITE (SCREEN,95)
   95  FORMAT ('0***  PROMPTER:  NORMAL END OF PROGRAM EXECUTION.'//)
C
 9999 STOP
C-----*--1---------2---------3---------4---------5---------6---------7--
      END
```

A-2. Abbreviated Program Flowchart

ABBREVIATED PAAVE FLOWCHART



A-3. Sample PAA 1 :

Analysis of Example Data (Technical Report, Chapter I)

.a Parameter Specifications

.b PAA Program Output

/DATA/PAA/TESTPAR/EXAMPLE/POP/CHISQ

```
 100     PPPP          A N A L Y S I S   O F   T. R.   E X A M P L E
 200     PPPP          ..........N = 10 .............P = 6 ...........
 300     PPPP          POPULATION RUN DATE: 09/10/84 ....STAT= CHISQ
 400     PPPP      10  5  2  0  0  1  1  0  0
 500     PPPP (1X,5F1.0)
 600     PPPP (         )
 700     PPPP   2  4  5  111100
 800     PPPP 000000
 900     DDDD  1  1  0.500
1000     DDDD  2  1  0.500
1100     DDDD  3  1  0.500
1200     DDDD  4  1  0.500
1300     DDDD  5  1  0.500
1400     DDDD  6  1  0.500
1500     DDDD  0  0
```

```
*******************************************************************************
*******************************************************************************
*******************************************************************************
*******                                                                 *******
***       P R E D I C T I V E    A T T R I B U T E    A N A L Y S I S       ***
*******                                                                 *******
*******************************************************************************
*******************************************************************************
*******************************************************************************


>>>>>>>  PARAMETER SPECIFICATIONS:


         CARD #1: PPPP

              RUN TITLE:

                  A N A L Y S I S   O F   T. R.   E X A M P L E
                  ........ N = 10 ............ P = 6 ...........
                  POPULATION RUN DATE: 09/10/84 ....STAT= CHISQ


         CARD #2: PPPP

              NUMBER OF CASES:              10
              NUMBER OF VARIABLES:           5

              PROGRAM MODE:                 2
              INTERACTIVE MODE:             0
              TRACE MODE:                   0
              DICHOTOMIZATION MODE:         1
              WRITE MODE:                   1
              PLOT MODE:                    0
              SIMULATION MODE:              0


         CARD #3: PPPP

              INPUT FORMAT:             (1X,5F1.0)


         CARD #4: PPPP

              OUTPUT FORMAT:            (          )


         CARD #5: PPPP

              MAX LEVEL OF PROCESSING:      2
              STATISTICAL CRITERION:        4
              DEPENDENT VARIABLE:           5

              SELECTION VECTOR FOR INDEPENDENT VARIABLES:      11110
```

CARD #6: PPPP

APPLY BRANCH TERMINATION CRITERION?	N/Y	VALUE
MINIMUM CELL SIZE ....:	0	0.000
MINIMUM CELL/TOTAL PERCENT ......:	0	0.000
MINIMUM SUBGROUP SIZE ....:	0	0.000
MINIMUM SUBGROUP/TOTAL PERCENT .:	0	0.000
MINIMUM A:B SUBGRP RATIO ....:	0	0.000
MINIMUM VALUE OF STATISTIC ......:	0	0.000

>>>>>>> DICHOTOMIZATION SPECIFICATIONS:

VARIABLE:	1	CUTPOINT:	0.500
VARIABLE:	2	CUTPOINT:	0.500
VARIABLE:	3	CUTPOINT:	0.500
VARIABLE:	4	CUTPOINT:	0.500
VARIABLE:	5	CUTPOINT:	0.500
VARIABLE:	6	CUTPOINT:	0.500

```
*****************************************************************
*****************************************************************
*****************************************************************
*******                                                   *******
***     P R E D I C T I V E   A T T R I B U T E   A N A L Y S I S     ***
*******                                                   *******
*****************************************************************
*****************************************************************
*****************************************************************
```

A N A L Y S I S   O F   T. R.   E X A M P L E

.... N = 10 .... P = 6 ....
POPULATION RUN DATE: 09/10/84 ....STAT= CHISQ

<PREDICTIVE ATTRIBUTE ANALYSIS> <VERS:84.02><NYS*DCJS>

A N A L Y S I S O F T. R. E X A M P L E
.... N = 10 .... P = 6 ....
POPULATION RUN DATE: 09/10/84 ....STAT= CHISQ

CONTINGENCY TABLE ANALYSIS — LEVEL= 0 GROUP= 1

INDEP VAR #	STATUS	CHI-SQ STATISTIC	INDEP VAR #	SUBGROUP COMPOSITION -0-	-1-	-%0-	-%1-
1		0.079	1	7.	3.	70.0	30.0
2		0.278	2	6.	4.	60.0	40.0
3		0.278	3	6.	4.	60.0	40.0
4		1.667	4	5.	5.	50.0	50.0

CONTINGENCY TABLE ANALYSIS — LEVEL= 0 GROUP= 1

F R E Q U E N C I E S

CRITERION # 5

		-0-	-1-	
PREDICTOR # 4	-0-	1.	4.	5.
	-1-	3.	2.	5.
		4.	6.	10.

P E R C E N T A G E S

CRITERION # 5

		-0-	-1-	
PREDICTOR # 4	-0-	10.0	40.0	50.0
	-1-	30.0	20.0	50.0
		40.0	60.0	100.0

****

A N A L Y S I S   O F   T. R.   E X A M P L E

.... N = 10 .... P = 6 ....

POPULATION RUN DATE: 09/10/84 ....STAT= CHISQ

****

CONTINGENCY TABLE ANALYSIS   LEVEL= 1 GROUP= 1

INDEP VAR #	STATUS	CHI-SQ STATISTIC	INDEP VAR #	SUBGROUP -0-	SUBGROUP -1-	COMPOSITION -%0-	COMPOSITION -%1-
1		1.375	1	3.	2.	60.0	40.0
2		1.375	2	3.	2.	60.0	40.0
3		0.333	3	3.	2.	60.0	40.0
4		0.000	4	5.	0.	100.0	0.0

CONTINGENCY TABLE ANALYSIS   LEVEL= 1 GROUP= 1

F R E Q U E N C I E S

CRITERION # 5		-0-	-1-	
PREDICTOR # 2	-0-	0.	3.	3.
	-1-	1.	1.	2.
		1.	4.	5.

P E R C E N T A G E S

CRITERION # 5		-0-	-1-	
PREDICTOR # 2	-0-	0.0	60.0	60.0
	-1-	20.0	20.0	40.0
		20.0	80.0	100.0

<PREDICTIVE ATTRIBUTE ANALYSIS> <VERS:84.02><NYS*DCJS>

A N A L Y S I S   O F   T. R.   E X A M P L E
N = 10 ... P = 6
POPULATION RUN DATE: 09/10/84 ....STAT= CHISQ

CONTINGENCY TABLE ANALYSIS LEVEL= 1 GROUP= 2

INDEP VAR #	STATUS	CHI-SQ STATISTIC	INDEP VAR #	SUBGROUP -0-	SUBGROUP -1-	COMPOSITION -%0-	COMPOSITION -%1-
1		1.375	1	4.	1.	80.0	20.0
2		0.139	2	3.	2.	60.0	40.0
3		2.222	3	3.	2.	60.0	40.0
4		0.000	4	0.	5.	0.0	100.0

CONTINGENCY TABLE ANALYSIS LEVEL= 1 GROUP= 2

F R E Q U E N C I E S

		CRITERION # 5 -0-	-1-	
PREDICTOR # 3	-0-	1.	2.	3.
	-1-	2.	0.	2.
		3.	2.	5.

P E R C E N T A G E S

		CRITERION # 5 -0-	-1-	
PREDICTOR # 3	-0-	20.0	40.0	60.0
	-1-	40.0	0.0	40.0
		60.0	40.0	100.0

<PREDICTIVE ATTRIBUTE ANALYSIS> <VERS:84.02><NYS*DCJS>

A N A L Y S I S   O F   T. R.   E X A M P L E
N = 10 ... P = 6
POPULATION RUN DATE: 09/10/84 ....STAT= CHISQ

CONTINGENCY TABLE ANALYSIS LEVEL= 2 GROUP= 1

CURRENT PAA BRANCH TERMINATES

THE FOLLOWING TEST CONDITION(S) HAVE NOT BEEN MET:

* STATISTICS FOR ALL CONTINGENCY TABLES AT THIS NODE ARE ZERO

<PREDICTIVE ATTRIBUTE ANALYSIS> <VERS:84.02><NYS*DCJS>

A N A L Y S I S O F T. R. E X A M P L E

N = 10 ... P = 5

POPULATION RUN DATE: 09/10/84 ....STAT= CHISQ

CONTINGENCY TABLE ANALYSIS — LEVEL= 2 GROUP= 2

CURRENT PAA BRANCH TERMINATES

THE FOLLOWING TEST CONDITION(S) HAVE NOT BEEN MET:

* STATISTICS FOR ALL CONTINGENCY TABLES AT THIS NODE ARE ZERO

<PREDICTIVE ATTRIBUTE ANALYSIS> <VERS:84.02><NYS*DCJS>

A N A L Y S I S O F T. R. E X A M P L E

N = 10 ... P = 6

POPULATION RUN DATE: 09/10/84 ....STAT= CHISQ

CONTINGENCY TABLE ANALYSIS — LEVEL= 2 GROUP= 3

INDEP VAR #	STATUS	CHI-SQ STATISTIC	INDEP VAR #	SUBGROUP -0-	SUBGROUP -1-	COMPOSITION -%0-	COMPOSITION -%1-
1		0.750	1	2.	1.	66.7	33.3
2		0.750	2	1.	2.	33.3	66.7
3		0.000	3	3.	0.	100.0	0.0
4		0.000	4	0.	3.	0.0	100.0

CONTINGENCY TABLE ANALYSIS — LEVEL= 2 GROUP= 3

F R E Q U E N C I E S

CRITERION # 5		-0-	-1-	
PREDICTOR # 2	-0-	0.	1.	1.
	-1-	1.	1.	2.
		1.	2.	3.

P E R C E N T A G E S

CRITERION # 5		-0-	-1-	
PREDICTOR # 2	-0-	0.0	33.3	33.3
	-1-	33.3	33.3	66.7
		33.3	66.7	100.0

<PREDICTIVE ATTRIBUTE ANALYSIS> <VERS:84.02><NYS*DCJS>

A N A L Y S I S   O F   T. R.   E X A M P L E
N = 10   P = 6
POPULATION RUN DATE: 09/10/84 ....STAT= CHISQ

CONTINGENCY TABLE ANALYSIS LEVEL= 2 GROUP= 4

CURRENT PAA BRANCH TERMINATES

THE FOLLOWING TEST CONDITION(S) HAVE NOT BEEN MET:

* STATISTICS FOR ALL CONTINGENCY TABLES AT THIS NODE ARE ZERO

<PREDICTIVE ATTRIBUTE ANALYSIS> <VERS:84.02><NYS*DCJS>

A N A L Y S I S   O F   T. R.   E X A M P L E
N = 10   P = 6
POPULATION RUN DATE: 09/10/84 ....STAT= CHISQ

P A A   P R O C E S S I N G   T R E E   F O R   P R E D I C T O R S

4

2   3

-   -   2   -

>>>>>>> END OF PROGRAM EXECUTION.

A-4. Sample PAA 2 :

Analysis of PROB80 Data (Technical Report, Chapter III)

.a Parameter Specifications for Standard Analysis

.b Parameter Specifications for Bootstrap Analysis

.c PAA Program Output for Standard Analysis

/DATA/PAA/TESTPAR/PROB80/POP/1/CHISQ

```
PPPP        P R O B 8 0  :    P O P U L A T I O N   A N A L Y S I S
PPPP
PPPP        REGION=NYC        STATISTIC=CHISQ       RUNDATE=1/29/84
PPPP  6078 14  2  0  0  1  1  0  0
PPPP (14F2.0)
PPPP (        )
PPPP   4  4 14  11111111111110
PPPP 000001
DDDD  1  1     .500
DDDD  2  1     .500
DDDD  3  1     .500
DDDD  4  1     .500
DDDD  5  1     .500
DDDD  6  1     .500
DDDD  7  1     .500
DDDD  8  1     .500
DDDD  9  1     .500
DDDD 10  1     .500
DDDD 11  1     .500
DDDD 12  1     .500
DDDD 13  1     .500
DDDD 14  1     .500
DDDD  0  0
```

/DATA/PAA/TESTPAR/PROB80/SIM/1/CHISQ

```
PPPP      P R O B 8 0  :    S I M U L A T I O N   A N A L Y S I S
PPPP
PPPP      REGION=NYC        STATISTIC=CHISQ        RUNDATE=3/06/84
PPPP  6078 14  2  0  0  1  0  0  1
PPPP (14F2.0)
PPPP (         )
PPPP    2  4 14   11111111111110
PPPP 000001
SSSS 100
DDDD  1  1     .500
DDDD  2  1     .500
DDDD  3  1     .500
DDDD  4  1     .500
DDDD  5  1     .500
DDDD  6  1     .500
DDDD  7  1     .500
DDDD  8  1     .500
DDDD  9  1     .500
DDDD 10  1     .500
DDDD 11  1     .500
DDDD 12  1     .500
DDDD 13  1     .500
DDDD 14  1     .500
DDDD  0  0
```

```
*******************************************************************************
*******************************************************************************
*******************************************************************************
*******                                                                 *******
***      P R E D I C T I V E    A T T R I B U T E    A N A L Y S I S        ***
*******                                                                 *******
*******************************************************************************
*******************************************************************************
*******************************************************************************
```

>>>>>>> PARAMETER SPECIFICATIONS:

CARD #1: PPPP

RUN TITLE:

P R O B 8 0 :   P O P U L A T I O N   A N A L Y S I S

REGION=NYC   STATISTIC=CHISQ   RUNDATE=1/29/84

CARD #2: PPPP

```
NUMBER OF CASES:          6078
NUMBER OF VARIABLES:        14

PROGRAM MODE:                2
INTERACTIVE MODE:            0
TRACE MODE:                  0
DICHOTOMIZATION MODE:        1
WRITE MODE:                  1
PLOT MODE:                   0
SIMULATION MODE:             0
```

CARD #3: PPPP

INPUT FORMAT: (14F2.0)

CARD #4: PPPP

OUTPUT FORMAT: (   )

CARD #5: PPPP

```
MAX LEVEL OF PROCESSING:    4
STATISTICAL CRITERION:      4
DEPENDENT VARIABLE:        14

SELECTION VECTOR FOR INDEPENDENT VARIABLES:      11111111111110
```

CARD #6: PPPP

APPLY BRANCH TERMINATION CRITERION?	N/Y	VALUE
MINIMUM CELL SIZE ....:	0	0.000
MINIMUM CELL/TOTAL PERCENT .....:	0	0.000
MINIMUM SUBGROUP SIZE ....:	0	0.000
MINIMUM SUBGROUP/TOTAL PERCENT .:	0	0.000
MINIMUM A:B SUBGRP RATIO ....:	0	0.000
MINIMUM VALUE OF STATISTIC .....:	1	3.841

>>>>>>> DICHOTOMIZATION SPECIFICATIONS:

VARIABLE:	1	CUTPOINT:	0.500
VARIABLE:	2	CUTPOINT:	0.500
VARIABLE:	3	CUTPOINT:	0.500
VARIABLE:	4	CUTPOINT:	0.500
VARIABLE:	5	CUTPOINT:	0.500
VARIABLE:	6	CUTPOINT:	0.500
VARIABLE:	7	CUTPOINT:	0.500
VARIABLE:	8	CUTPOINT:	0.500
VARIABLE:	9	CUTPOINT:	0.500
VARIABLE:	10	CUTPOINT:	0.500
VARIABLE:	11	CUTPOINT:	0.500
VARIABLE:	12	CUTPOINT:	0.500
VARIABLE:	13	CUTPOINT:	0.500
VARIABLE:	14	CUTPOINT:	0.500

PREDICTIVE ATTRIBUTE ANALYSIS

PROB80 : POPULATION ANALYSIS

REGION=NYC STATISTIC=CHISQ RUNDATE=1/29/84

<PREDICTIVE ATTRIBUTE ANALYSIS> <VERS:84.02><NYS*DCJS>

****

P R O B 8 0 : P O P U L A T I O N A N A L Y S I S

REGION=NYC STATISTIC=CHISQ RUNDATE=1/29/84

****

CONTINGENCY TABLE ANALYSIS LEVEL= 0 GROUP= 1

INDEP VAR #	STATUS	CHI-SQ STATISTIC	INDEP VAR #	SUBGROUP -0-	COMPOSITION -1-	-%0-	-%1-
1		47.005	1	392.	5686.	6.4	93.6
2		867.093	2	3890.	2188.	64.0	36.0
3		805.267	3	2500.	3578.	41.1	58.9
4		375.561	4	837.	5241.	13.8	86.2
5		85.072	5	2888.	3190.	47.5	52.5
6		38.206	6	5525.	553.	90.9	9.1
7		9.528	7	2734.	3344.	45.0	55.0
8		33.967	8	4097.	1981.	67.4	[illegible].6
9		9.366	9	5505.	573.	90.6	9.4
10		29.942	10	4494.	1584.	73.9	26.1
11		0.225	11	1909.	4169.	31.4	68.6
12		100.365	12	3625.	2453.	59.6	40.4
13		10.658	13	2847.	3231.	46.8	53.2

CONTINGENCY TABLE ANALYSIS LEVEL= 0 GROUP= 1

F R E Q U E N C I E S

		CRITERION #14 -0-	-1-	
PREDICTOR # 2	-0-	1271.	2619.	3890.
	-1-	1574.	614.	2188.
		2845.	3233.	6078.

P E R C E N T A G E S

		CRITERION #14 -0-	-1-	
PREDICTOR # 2	-0-	20.9	43.1	64.0
	-1-	25.9	10.1	36.0
		46.8	53.2	100.0

****

P R O B 8 0 : P O P U L A T I O N A N A L Y S I S

REGION=NYC STATISTIC=CHISQ RUNDATE=1/29/84

****

CONTINGENCY TABLE ANALYSIS LEVEL= 1 GROUP= 1

INDEP VAR #	STATUS	CHI-SQ STATISTIC
1		12.248
2		0.000
3		183.392
4		138.513
5		36.739
6		7.245
7		0.450
8		16.238
9		13.369
10		19.216
11		0.398
12		28.190
13		2.544

INDEP VAR #	SUBGROUP -0-	-1-	COMPOSITION -%0-	-%1-
1	187.	3703.	4.8	95.2
2	3890.	0.	100.0	0.0
3	2500.	1390.	64.3	35.7
4	837.	3053.	21.5	78.5
5	1747.	2143.	44.9	55.1
6	3692.	198.	94.9	5.1
7	1949.	1941.	50.1	49.9
8	2433.	1457.	62.5	37.5
9	3518.	372.	90.4	9.6
10	2805.	1085.	72.1	27.9
11	1186.	2704.	30.5	69.5
12	2052.	1838.	52.8	47.2
13	1750.	2140.	45.0	55.0

CONTINGENCY TABLE ANALYSIS LEVEL= 1 GROUP= 1

F R E Q U E N C I E S

CRITERION #14

		-0-	-1-	
PREDICTOR # 3	-0-	627.	1873.	2500.
	-1-	644.	746.	1390.
		1271.	2619.	3890.

P E R C E N T A G E S

CRITERION #14

		-0-	-1-	
PREDICTOR # 3	-0-	16.1	48.1	64.3
	-1-	16.6	19.2	35.7
		32.7	67.3	100.0

P R O B 8 0 : P O P U L A T I O N A N A L Y S I S

REGION=NYC STATISTIC=CHISQ RUNDATE=1/29/84

CONTINGENCY TABLE ANALYSIS — LEVEL= 1 GROUP= 2

INDEP VAR #	STATUS	CHI-SQ STATISTIC	INDEP VAR #	SUBGROUP -0-	SUBGROUP -1-	COMPOSITION -%0-	COMPOSITION -%1-
1		9.152	1	205.	1983.	9.4	90.6
2		0.000	2	0.	2188.	0.0	100.0
3		0.000	3	0.	2188.	0.0	100.0
4		0.000	4	0.	2188.	0.0	100.0
5		23.774	5	1141.	1047.	52.1	47.9
6		1.465	6	1833.	355.	83.8	16.2
7		7.875	7	785.	1403.	35.9	64.1
8		7.797	8	1664.	524.	76.1	23.9
9		0.793	9	1987.	201.	90.8	9.2
10		0.817	10	1689.	499.	77.2	22.8
11		9.904	11	723.	1465.	33.0	67.0
12		0.794	12	1573.	615.	71.9	28.1
13		1.270	13	1097.	1091.	50.1	49.9

CONTINGENCY TABLE ANALYSIS — LEVEL= 1 GROUP= 2

F R E Q U E N C I E S (CRITERION #14)

PREDICTOR # 5	-0-	-1-	
-0-	872.	269.	1141.
-1-	702.	345.	1047.
	1574.	614.	2188.

P E R C E N T A G E S (CRITERION #14)

PREDICTOR # 5	-0-	-1-	
-0-	39.9	12.3	52.1
-1-	32.1	15.8	47.9
	71.9	28.1	100.0

P R O B 8 0 : P O P U L A T I O N A N A L Y S I S

REGION=NYC STATISTIC=CHISQ RUNDATE=1/29/84

CONTINGENCY TABLE ANALYSIS — LEVEL= 2 GROUP= 1

INDEP VAR #	STATUS	CHI-SQ STATISTIC	INDEP VAR #	SUBGROUP -0-	SUBGROUP -1-	COMPOSITION -%0-	COMPOSITION -%1-
1		6.720	1	123.	2377.	4.9	95.1
2		0.000	2	2500.	0.	100.0	0.0
3		0.000	3	2500.	0.	100.0	0.0
4		58.035	4	837.	1663.	33.5	66.5
5		17.457	5	1085.	1415.	43.4	56.6
6		2.204	6	2412.	88.	96.5	3.5
7		0.290	7	1339.	1161.	53.6	46.4
8		14.948	8	1454.	1046.	58.2	41.8
9		11.502	9	2280.	220.	91.2	8.8
10		8.188	10	1757.	743.	70.3	29.7
11		0.926	11	716.	1784.	28.6	71.4
12		12.228	12	1169.	1331.	46.8	53.2
13		4.377	13	1142.	1358.	45.7	54.3

CONTINGENCY TABLE ANALYSIS — LEVEL= 2 GROUP= 1

F R E Q U E N C I E S (CRITERION #14)

PREDICTOR # 4	-0-	-1-	
-0-	132.	705.	837.
-1-	495.	1168.	1663.
	627.	1873.	2500.

P E R C E N T A G E S (CRITERION #14)

PREDICTOR # 4	-0-	-1-	
-0-	5.3	28.2	33.5
-1-	19.8	46.7	66.5
	25.1	74.9	100.0

P R O B 8 0 : P O P U L A T I O N A N A L Y S I S

REGION=NYC STATISTIC=CHISQ RUNDATE=1/29/84

CONTINGENCY TABLE ANALYSIS LEVEL= 2 GROUP= 2

INDEP VAR #	STATUS	CHI-SQ STATISTIC	INDEP VAR #	SUBGROUP -0-	SUBGROUP -1-	COMPOSITION -%0-	COMPOSITION -%1-
1		7.054	1	64.	1326.	4.6	95.4
2		0.000	2	1390.	0.	100.0	0.0
3		0.000	3	0.	1390.	0.0	100.0
4		0.000	4	0.	1390.	0.0	100.0
5		14.445	5	662.	728.	47.6	52.4
6		0.366	6	1280.	110.	92.1	7.9
7		2.430	7	610.	780.	43.9	56.1
8		0.798	8	979.	411.	70.4	29.6
9		1.285	9	1238.	152.	89.1	10.9
10		5.901	10	1048.	342.	75.4	24.6
11		1.496	11	470.	920.	33.8	66.2
12		0.779	12	883.	507.	63.5	36.5
13		0.218	13	608.	782.	43.7	56.3

CONTINGENCY TABLE ANALYSIS LEVEL= 2 GROUP= 2

F R E Q U E N C I E S

		CRITERION #14 -0-	CRITERION #14 -1-	
PREDICTOR # 5	-0-	342.	320.	662.
	-1-	302.	426.	728.
		644.	746.	1390.

P E R C E N T A G E S

		CRITERION #14 -0-	CRITERION #14 -1-	
PREDICTOR # 5	-0-	24.6	23.0	47.6
	-1-	21.7	30.6	52.4
		46.3	53.7	100.0

<PREDICTIVE ATTRIBUTE ANALYSIS> <VERS:84.02><NYS*DCJS>

P R O B 8 0 : P O P U L A T I O N A N A L Y S I S

REGION=NYC STATISTIC=CHISQ RUNDATE=1/29/84

CONTINGENCY TABLE ANALYSIS LEVEL= 2 GROUP= 3

INDEP VAR #	STATUS	CHI-SQ STATISTIC	INDEP VAR #	SUBGROUP -0-	SUBGROUP -1-	COMPOSITION -%0-	COMPOSITION -%1-
1		5.135	1	98.	1043.	8.6	91.4
2		0.000	2	0.	1141.	0.0	100.0
3		0.000	3	0.	1141.	0.0	100.0
4		0.000	4	0.	1141.	0.0	100.0
5		0.000	5	1141.	0.	100.0	0.0
6		14.534	6	786.	355.	68.9	31.1
7		9.782	7	436.	705.	38.2	61.8
8		8.789	8	818.	323.	71.7	28.3
9		1.713	9	1071.	70.	93.9	6.1
10		3.194	10	913.	228.	80.0	20.0
11		0.001	11	292.	849.	25.6	74.4
12		1.769	12	869.	272.	76.2	23.8
13		3.772	13	585.	556.	51.3	48.7

CONTINGENCY TABLE ANALYSIS LEVEL= 2 GROUP= 3

F R E Q U E N C I E S

		CRITERION #14 -0-	CRITERION #14 -1-	
PREDICTOR # 6	-0-	626.	160.	786.
	-1-	246.	109.	355.
		872.	269.	1141.

P E R C E N T A G E S

		CRITERION #14 -0-	CRITERION #14 -1-	
PREDICTOR # 6	-0-	54.9	14.0	68.9
	-1-	21.6	9.6	31.1
		76.4	23.6	100.0

<PREDICTIVE ATTRIBUTE ANALYSIS> <VERS:84.02><NYS*DCJS>

PROB80 : POPULATION ANALYSIS

REGION=NYC STATISTIC=CHISQ RUNDATE=1/29/84

CONTINGENCY TABLE ANALYSIS LEVEL= 2 GROUP= 4

INDEP VAR #	STATUS	CHI-SQ STATISTIC	INDEP VAR #	SUBGROUP -0-	COMPOSITION -1-	-%0-	-%1-
1		4.958	1	107.	940.	10.2	89.8
2		0.000	2	0.	1047.	0.0	100.0
3		0.000	3	0.	1047.	0.0	100.0
4		0.000	4	0.	1047.	0.0	100.0
5		0.000	5	0.	1047.	0.0	100.0
6		0.000	6	1047.	0.	100.0	0.0
7		0.311	7	349.	698.	33.3	66.7
8		0.042	8	846.	201.	80.8	19.2
9		0.685	9	916.	131.	87.5	12.5
10		0.633	10	776.	271.	74.1	25.9
11		9.426	11	431.	616.	41.2	58.8
12		2.815	12	704.	343.	67.2	32.8
13		0.187	13	512.	535.	48.9	51.1

CONTINGENCY TABLE ANALYSIS LEVEL= 2 GROUP= 4

FREQUENCIES

		CRITERION #14 -0-	-1-	
PREDICTOR # 11	-0-	266.	165.	431.
	-1-	436.	180.	616.
		702.	345.	1047.

PERCENTAGES

		CRITERION #14 -0-	-1-	
PREDICTOR # 11	-0-	25.4	15.8	41.2
	-1-	41.6	17.2	58.8
		67.0	33.0	100.0

<PREDICTIVE ATTRIBUTE ANALYSIS> <VERS:84.02><NYS*DCJS>

PROB80 : POPULATION ANALYSIS

REGION=NYC STATISTIC=CHISQ RUNDATE=1/29/84

CONTINGENCY TABLE ANALYSIS LEVEL= 3 GROUP= 1

INDEP VAR #	STATUS	CHI-SQ STATISTIC	INDEP VAR #	SUBGROUP -0-	COMPOSITION -1-	-%0-	-%1-
1		4.753	1	63.	774.	7.5	92.5
2		0.000	2	837.	0.	100.0	0.0
3		0.000	3	837.	0.	100.0	0.0
4		0.000	4	837.	0.	100.0	0.0
5		3.120	5	385.	452.	46.0	54.0
6		0.077	6	815.	22.	97.4	2.6
7		0.867	7	506.	331.	60.5	39.5
8		8.702	8	415.	422.	49.6	50.4
9		3.853	9	776.	61.	92.7	7.3
10		4.324	10	529.	308.	63.2	36.8
11		0.079	11	220.	617.	26.3	73.7
12		0.193	12	293.	544.	35.0	65.0
13		9.087	13	363.	474.	43.4	56.6

CONTINGENCY TABLE ANALYSIS LEVEL= 3 GROUP= 1

FREQUENCIES

		CRITERION #14 -0-	-1-	
PREDICTOR # 13	-0-	73.	290.	363.
	-1-	59.	415.	474.
		132.	705.	837.

PERCENTAGES

		CRITERION #14 -0-	-1-	
PREDICTOR # 13	-0-	8.7	34.6	43.4
	-1-	7.0	49.6	56.6
		15.8	84.2	100.0

<PREDICTIVE ATTRIBUTE ANALYSIS> <VERS:84.02><NYS*DCJS>

P R O B 8 0 : P O P U L A T I O N A N A L Y S I S

REGION=NYC STATISTIC=CHISQ RUNDATE=1/29/84

CONTINGENCY TABLE ANALYSIS LEVEL= 3 GROUP= 2

INDEP VAR #	STATUS	CHI-SQ STATISTIC
1		6.910
2		0.000
3		0.000
4		0.000
5		17.620
6		2.164
7		0.572
8		3.038
9		6.219
10		1.338
11		0.395
12		7.953
13		0.197

INDEP VAR #	SUBGROUP -0-	-1-	COMPOSITION -%0-	-%1-
1	60.	1603.	3.6	96.4
2	1663.	0.	100.0	0.0
3	1663.	0.	100.0	0.0
4	0.	1663.	0.0	100.0
5	700.	963.	42.1	57.9
6	1597.	66.	96.0	4.0
7	833.	830.	50.1	49.9
8	1039.	624.	62.5	37.5
9	1504.	159.	90.4	9.6
10	1228.	435.	73.8	26.2
11	496.	1167.	29.8	70.2
12	876.	787.	52.7	47.3
13	779.	884.	46.8	53.2

CONTINGENCY TABLE ANALYSIS LEVEL= 3 GROUP= 2

F R E Q U E N C I E S

		CRITERION #14 -0-	-1-	
PREDICTOR # 5	-0-	247.	453.	700.
	-1-	248.	715.	963.
		495.	1168.	1663.

P E R C E N T A G E S

		CRITERION #14 -0-	-1-	
PREDICTOR # 5	-0-	14.9	27.2	42.1
	-1-	14.9	43.0	57.9
		29.8	70.2	100.0

<PREDICTIVE ATTRIBUTE ANALYSIS> <VERS:84.02><NYS*DCJS>

P R O B 8 0 : P O P U L A T I O N A N A L Y S I S

REGION=NYC STATISTIC=CHISQ RUNDATE=1/29/84

CONTINGENCY TABLE ANALYSIS LEVEL= 3 GROUP= 3

INDEP VAR #	STATUS	CHI-SQ STATISTIC
1		3.636
2		0.000
3		0.000
4		0.000
5		0.000
6		0.349
7		0.317
8		0.214
9		0.256
10		2.981
11		1.303
12		0.021
13		0.032

INDEP VAR #	SUBGROUP -0-	-1-	COMPOSITION -%0-	-%1-
1	29.	633.	4.4	95.6
2	662.	0.	100.0	0.0
3	0.	662.	0.0	100.0
4	0.	662.	0.0	100.0
5	662.	0.	100.0	0.0
6	552.	110.	83.4	16.6
7	324.	338.	48.9	51.1
8	414.	248.	62.5	37.5
9	628.	34.	94.9	5.1
10	547.	115.	82.6	17.4
11	187.	475.	28.2	71.8
12	428.	234.	64.7	35.3
13	310.	352.	46.8	53.2

CONTINGENCY TABLE ANALYSIS LEVEL= 3 GROUP= 3

F R E Q U E N C I E S

		CRITERION #14 -0-	-1-	
PREDICTOR # 1	-0-	20.	9.	29.
	-1-	322.	311.	633.
		342.	320.	662.

P E R C E N T A G E S

		CRITERION #14 -0-	-1-	
PREDICTOR # 1	-0-	3.0	1.4	4.4
	-1-	48.6	47.0	95.6
		51.7	48.3	100.0

CURRENT PAA BRANCH TERMINATES

THE FOLLOWING TEST CONDITION(S) HAVE NOT BEEN MET:

* THE OBSERVED CHI-SQ STATISTIC OF 3.636
  WAS LESS THAN THE SPECIFIED MINIMUM OF 3.841

P R O B 8 0 : P O P U L A T I O N A N A L Y S I S

REGION=NYC STATISTIC=CHISQ RUNDATE=1/29/84

CONTINGENCY TABLE ANALYSIS LEVEL= 3 GROUP= 4

INDEP VAR #	STATUS	CHI-SQ STATISTIC	INDEP VAR #	SUBGROUP -0-	COMPOSITION -1-	-%0-	-%1-
1		3.714	1	35.	693.	4.8	95.2
2		0.000	2	728.	0.	100.0	0.0
3		0.000	3	0.	728.	0.0	100.0
4		0.000	4	0.	728.	0.0	100.0
5		0.000	5	0.	728.	0.0	100.0
6		0.000	6	728.	0.	100.0	0.0
7		1.284	7	286.	442.	39.3	60.7
8		0.012	8	565.	163.	77.6	22.4
9		3.412	9	610.	118.	83.8	16.2
10		1.003	10	501.	227.	68.8	31.2
11		0.004	11	283.	445.	38.9	61.1
12		0.943	12	455.	273.	62.5	37.5
13		0.267	13	298.	430.	40.9	59.1

CONTINGENCY TABLE ANALYSIS LEVEL= 3 GROUP= 4

F R E Q U E N C I E S

	CRITERION #14 -0-	-1-	
PREDICTOR # 1 -0-	20.	15.	35.
-1-	282.	411.	693.
	302.	426.	728.

P E R C E N T A G E S

	CRITERION #14 -0-	-1-	
PREDICTOR # 1 -0-	2.7	2.1	4.8
-1-	38.7	56.5	95.2
	41.5	58.5	100.0

CURRENT PAA BRANCH TERMINATES

THE FOLLOWING TEST CONDITION(S) HAVE NOT BEEN MET:

* THE OBSERVED CHI-SQ STATISTIC OF 3.714 WAS LESS THAN THE SPECIFIED MINIMUM OF 3.841

P R O B 8 0 : P O P U L A T I O N A N A L Y S I S

REGION=NYC STATISTIC=CHISQ RUNDATE=1/29/84

CONTINGENCY TABLE ANALYSIS LEVEL= 3 GROUP= 5

INDEP VAR #	STATUS	CHI-SQ STATISTIC	INDEP VAR #	SUBGROUP -0-	COMPOSITION -1-	-%0-	-%1-
1		6.762	1	64.	722.	8.1	91.9
2		0.000	2	0.	786.	0.0	100.0
3		0.000	3	0.	786.	0.0	100.0
4		0.000	4	0.	786.	0.0	100.0
5		0.000	5	786.	0.	100.0	0.0
6		0.000	6	786.	0.	100.0	0.0
7		2.640	7	384.	402.	48.9	51.1
8		2.617	8	487.	299.	62.0	38.0
9		2.712	9	740.	46.	94.1	5.9
10		3.720	10	730.	56.	92.9	7.1
11		0.328	11	265.	521.	33.7	66.3
12		0.130	12	531.	255.	67.6	32.4
13		0.516	13	452.	334.	57.5	42.5

CONTINGENCY TABLE ANALYSIS LEVEL= 3 GROUP= 5

F R E Q U E N C I E S

	CRITERION #14 -0-	-1-	
PREDICTOR # 1 -0-	59.	5.	64.
-1-	567.	155.	722.
	626.	160.	786.

P E R C E N T A G E S

	CRITERION #14 -0-	-1-	
PREDICTOR # 1 -0-	7.5	0.6	8.1
-1-	72.1	19.7	91.9
	79.6	20.4	100.0

<PREDICTIVE ATTRIBUTE ANALYSIS> <VERS:84.02><NYS*DCJS>

P R O B 8 0 : P O P U L A T I O N A N A L Y S I S

REGION=NYC STATISTIC=CHISQ RUNDATE=1/29/84

CONTINGENCY TABLE ANALYSIS LEVEL= 3 GROUP= 6

INDEP VAR #	STATUS	CHI-SQ STATISTIC	INDEP VAR #	SUBGROUP -0-	SUBGROUP -1-	COMPOSITION -%0-	COMPOSITION -%1-
1		0.317	1	34.	321.	9.6	90.4
2		0.000	2	0.	355.	0.0	100.0
3		0.000	3	0.	355.	0.0	100.0
4		0.000	4	0.	355.	0.0	100.0
5		0.000	5	355.	0.	100.0	0.0
6		0.000	6	0.	355.	0.0	100.0
7		1.666	7	52.	303.	14.6	85.4
8		1.179	8	331.	24.	93.2	6.8
9		0.029	9	331.	24.	93.2	6.8
10		1.790	10	183.	172.	51.5	48.5
11		2.593	11	27.	328.	7.6	92.4
12		0.177	12	338.	17.	95.2	4.8
13		1.322	13	133.	222.	37.5	62.5

CONTINGENCY TABLE ANALYSIS LEVEL= 3 GROUP= 6

F R E Q U E N C I E S

		CRITERION #14 -0-	CRITERION #14 -1-	
PREDICTOR # 11	-0-	15.	12.	27.
	-1-	231.	97.	328.
		246.	109.	355.

P E R C E N T A G E S

		CRITERION #14 -0-	CRITERION #14 -1-	
PREDICTOR # 11	-0-	4.2	3.4	7.6
	-1-	65.1	27.3	92.4
		69.3	30.7	100.0

CURRENT PAA BRANCH TERMINATES

THE FOLLOWING TEST CONDITION(S) HAVE NOT BEEN MET:

* THE OBSERVED CHI-SQ STATISTIC OF 2.593
  WAS LESS THAN THE SPECIFIED MINIMUM OF 3.841

<PREDICTIVE ATTRIBUTE ANALYSIS> <VERS:84.02><NYS*DCJS>

P R O B 8 0 : P O P U L A T I O N A N A L Y S I S

REGION=NYC STATISTIC=CHISQ RUNDATE=1/29/84

CONTINGENCY TABLE ANALYSIS LEVEL= 3 GROUP= 7

INDEP VAR #	STATUS	CHI-SQ STATISTIC	INDEP VAR #	SUBGROUP -0-	SUBGROUP -1-	COMPOSITION -%0-	COMPOSITION -%1-
1		6.186	1	56.	375.	13.0	87.0
2		0.000	2	0.	431.	0.0	100.0
3		0.000	3	0.	431.	0.0	100.0
4		0.000	4	0.	431.	0.0	100.0
5		0.000	5	0.	431.	0.0	100.0
6		0.000	6	431.	0.	100.0	0.0
7		2.554	7	129.	302.	29.9	70.1
8		0.724	8	399.	32.	92.6	7.4
9		2.318	9	336.	95.	78.0	22.0
10		0.000	10	431.	0.	100.0	0.0
11		0.000	11	431.	0.	100.0	0.0
12		1.016	12	274.	157.	63.6	36.4
13		0.348	13	196.	235.	45.5	54.5

CONTINGENCY TABLE ANALYSIS LEVEL= 3 GROUP= 7

F R E Q U E N C I E S

		CRITERION #14 -0-	CRITERION #14 -1-	
PREDICTOR # 1	-0-	43.	13.	56.
	-1-	223.	152.	375.
		266.	165.	431.

P E R C E N T A G E S

		CRITERION #14 -0-	CRITERION #14 -1-	
PREDICTOR # 1	-0-	10.0	3.0	13.0
	-1-	51.7	35.3	87.0
		61.7	38.3	100.0

<PREDICTIVE ATTRIBUTE ANALYSIS> <VERS:84.02><NYS*DCJS>

P R O B 8 0 : P O P U L A T I O N A N A L Y S I S

REGION=NYC STATISTIC=CHISQ RUNDATE=1/29/84

CONTINGENCY TABLE ANALYSIS LEVEL= 3 GROUP= 8

INDEP VAR #	STATUS	CHI-SQ STATISTIC	INDEP VAR #	SUBGROUP -0-	SUBGROUP -1-	COMPOSITION -%0-	COMPOSITION -%1-
1		0.871	1	51.	565.	8.3	91.7
2		0.000	2	0.	616.	0.0	100.0
3		0.000	3	0.	616.	0.0	100.0
4		0.000	4	0.	616.	0.0	100.0
5		0.000	5	0.	616.	0.0	100.0
6		0.000	6	616.	0.	100.0	0.0
7		0.760	7	220.	396.	35.7	64.3
8		1.244	8	447.	169.	72.6	27.4
9		0.329	9	580.	36.	94.2	5.8
10		0.738	10	345.	271.	56.0	44.0
11		0.000	11	0.	616.	0.0	100.0
12		1.188	12	430.	186.	69.8	30.2
13		0.087	13	316.	300.	51.3	48.7

CONTINGENCY TABLE ANALYSIS LEVEL= 3 GROUP= 8

F R E Q U E N C I E S

		CRITERION #14 -0-	CRITERION #14 -1-	
PREDICTOR # 8	-0-	322.	125.	447.
	-1-	114.	55.	169.
		436.	180.	616.

P E R C E N T A G E S

		CRITERION #14 -0-	CRITERION #14 -1-	
PREDICTOR # 8	-0-	52.3	20.3	72.6
	-1-	18.5	8.9	27.4
		70.8	29.2	100.0

CURRENT PAA BRANCH TERMINATES

THE FOLLOWING TEST CONDITION(S) HAVE NOT BEEN MET:

* THE OBSERVED CHI-SQ STATISTIC OF 1.244
  WAS LESS THAN THE SPECIFIED MINIMUM OF 3.841

<PREDICTIVE ATTRIBUTE ANALYSIS> <VERS:84.02><NYS*DCJS>

P R O B 8 0 : P O P U L A T I O N A N A L Y S I S

REGION=NYC STATISTIC=CHISQ RUNDATE=1/29/84

CONTINGENCY TABLE ANALYSIS LEVEL= 4 GROUP= 1

INDEP VAR #	STATUS	CHI-SQ STATISTIC	INDEP VAR #	SUBGROUP -0-	SUBGROUP -1-	COMPOSITION -%0-	COMPOSITION -%1-
1		3.589	1	12.	351.	3.3	96.7
2		0.000	2	363.	0.	100.0	0.0
3		0.000	3	363.	0.	100.0	0.0
4		0.000	4	363.	0.	100.0	0.0
5		2.341	5	165.	198.	45.5	54.5
6		2.059	6	355.	8.	97.8	2.2
7		0.009	7	227.	136.	62.5	37.5
8		4.839	8	182.	181.	50.1	49.9
9		1.991	9	333.	30.	91.7	8.3
10		0.945	10	236.	127.	65.0	35.0
11		0.044	11	93.	270.	25.6	74.4
12		0.307	12	100.	263.	27.5	72.5
13		0.000	13	363.	0.	100.0	0.0

CONTINGENCY TABLE ANALYSIS LEVEL= 4 GROUP= 1

F R E Q U E N C I E S

		CRITERION #14 -0-	CRITERION #14 -1-	
PREDICTOR # 8	-0-	45.	137.	182.
	-1-	28.	153.	181.
		73.	290.	363.

P E R C E N T A G E S

		CRITERION #14 -0-	CRITERION #14 -1-	
PREDICTOR # 8	-0-	12.4	37.7	50.1
	-1-	7.7	42.1	49.9
		20.1	79.9	100.0

<PREDICTIVE ATTRIBUTE ANALYSIS> <VERS:84.02><NYS*DCJS>

P R O B 8 0 : P O P U L A T I O N A N A L Y S I S

REGION=NYC STATISTIC=CHISQ RUNDATE=1/29/84

CONTINGENCY TABLE ANALYSIS LEVEL= 4 GROUP= 2

INDEP VAR #	STATUS	CHI-SQ STATISTIC	INDEP VAR #	SUBGROUP -0-	SUBGROUP -1-	COMPOSITION -%0-	COMPOSITION -%1-
1		4.363	1	51.	423.	10.8	89.2
2		0.000	2	474.	0.	100.0	0.0
3		0.000	3	474.	0.	100.0	0.0
4		0.000	4	474.	0.	100.0	0.0
5		1.018	5	220.	254.	46.4	53.6
6		1.068	6	460.	14.	97.0	3.0
7		2.623	7	279.	195.	58.9	41.1
8		3.793	8	233.	241.	49.2	50.8
9		1.452	9	443.	31.	93.5	6.5
10		3.497	10	293.	181.	61.8	38.2
11		0.474	11	127.	347.	26.8	73.2
12		0.328	12	193.	281.	40.7	59.3
13		0.000	13	0.	474.	0.0	100.0

CONTINGENCY TABLE ANALYSIS LEVEL= 4 GROUP= 2

F R E Q U E N C I E S — CRITERION #14

		-0-	-1-	
PREDICTOR # 1	-0-	11.	40.	51.
	-1-	48.	375.	423.
		59.	415.	474.

P E R C E N T A G E S — CRITERION #14

		-0-	-1-	
PREDICTOR # 1	-0-	2.3	8.4	10.8
	-1-	10.1	79.1	89.2
		12.4	87.6	100.0

<PREDICTIVE ATTRIBUTE ANALYSIS> <VERS:84.02><NYS*DCJS>

P R O B 8 0 : P O P U L A T I O N A N A L Y S I S

REGION=NYC STATISTIC=CHISQ RUNDATE=1/29/84

CONTINGENCY TABLE ANALYSIS LEVEL= 4 GROUP= 3

INDEP VAR #	STATUS	CHI-SQ STATISTIC	INDEP VAR #	SUBGROUP -0-	SUBGROUP -1-	COMPOSITION -%0-	COMPOSITION -%1-
1		4.372	1	19.	681.	2.7	97.3
2		0.000	2	700.	0.	100.0	0.0
3		0.000	3	700.	0.	100.0	0.0
4		0.000	4	0.	700.	0.0	100.0
5		0.000	5	700.	0.	100.0	0.0
6		0.215	6	634.	66.	90.6	9.4
7		0.318	7	418.	282.	59.7	40.3
8		5.614	8	360.	340.	51.4	48.6
9		0.867	9	657.	43.	93.9	6.1
10		0.462	10	609.	91.	87.0	13.0
11		1.040	11	154.	546.	22.0	78.0
12		5.280	12	387.	313.	55.3	44.7
13		1.343	13	342.	358.	48.9	51.1

CONTINGENCY TABLE ANALYSIS LEVEL= 4 GROUP= 3

F R E Q U E N C I E S — CRITERION #14

		-0-	-1-	
PREDICTOR # 8	-0-	142.	218.	360.
	-1-	105.	235.	340.
		247.	453.	700.

P E R C E N T A G E S — CRITERION #14

		-0-	-1-	
PREDICTOR # 8	-0-	20.3	31.1	51.4
	-1-	15.0	33.6	48.6
		35.3	64.7	100.0

P R O B 8 0 : P O P U L A T I O N A N A L Y S I S

REGION=NYC STATISTIC=CHISQ RUNDATE=1/29/84

CONTINGENCY TABLE ANALYSIS LEVEL= 4 GROUP= 4

INDEP VAR #	STATUS	CHI-SQ STATISTIC	INDEP VAR #	SUBGROUP -0-	SUBGROUP -1-	COMPOSITION -%0-	COMPOSITION -%1-
1		3.945	1	41.	922.	4.3	95.7
2		0.000	2	963.	0.	100.0	0.0
3		0.000	3	963.	0.	100.0	0.0
4		0.000	4	0.	963.	0.0	100.0
5		0.000	5	0.	963.	0.0	100.0
6		0.000	6	963.	0.	100.0	0.0
7		0.377	7	415.	548.	43.1	56.9
8		1.730	8	679.	284.	70.5	29.5
9		8.833	9	847.	116.	88.0	12.0
10		0.305	10	619.	344.	64.3	35.7
11		6.014	11	342.	621.	35.5	64.5
12		2.203	12	489.	474.	50.8	49.2
13		0.452	13	437.	526.	45.4	54.6

CONTINGENCY TABLE ANALYSIS LEVEL= 4 GROUP= 4

F R E Q U E N C I E S — P E R C E N T A G E S

		CRITERION #14 -0-	CRITERION #14 -1-		CRITERION #14 -0-	CRITERION #14 -1-	
PREDICTOR # 9	-0-	205.	642.	847.	21.3	66.7	88.0
	-1-	43.	73.	116.	4.5	7.6	12.0
		248.	715.	963.	25.8	74.2	100.0

P R O B 8 0 : P O P U L A T I O N A N A L Y S I S

REGION=NYC STATISTIC=CHISQ RUNDATE=1/29/84

CONTINGENCY TABLE ANALYSIS LEVEL= 4 GROUP= 5

INDEP VAR #	STATUS	CHI-SQ STATISTIC	INDEP VAR #	SUBGROUP -0-	SUBGROUP -1-	COMPOSITION -%0-	COMPOSITION -%1-
1		0.000	1	29.	0.	100.0	0.0
2		0.000	2	29.	0.	100.0	0.0
3		0.000	3	0.	29.	0.0	100.0
4		0.000	4	0.	29.	0.0	100.0
5		0.000	5	29.	0.	100.0	0.0
6		0.019	6	23.	6.	79.3	20.7
7		0.277	7	14.	15.	48.3	51.7
8		0.216	8	21.	8.	72.4	27.6
9		1.985	9	26.	3.	89.7	10.3
10		0.967	10	27.	2.	93.1	6.9
11		1.081	11	12.	17.	41.4	58.6
12		0.077	12	14.	15.	48.3	51.7
13		0.697	13	13.	16.	44.8	55.2

CONTINGENCY TABLE ANALYSIS LEVEL= 4 GROUP= 5

F R E Q U E N C I E S — P E R C E N T A G E S

		CRITERION #14 -0-	CRITERION #14 -1-		CRITERION #14 -0-	CRITERION #14 -1-	
PREDICTOR # 9	-0-	19.	7.	26.	65.5	24.1	89.7
	-1-	1.	2.	3.	3.4	6.9	10.3
		20.	9.	29.	69.0	31.0	100.0

CURRENT PAA BRANCH TERMINATES

THE FOLLOWING TEST CONDITION(S) HAVE NOT BEEN MET:

* THE OBSERVED CHI-SQ STATISTIC OF 1.985
  WAS LESS THAN THE SPECIFIED MINIMUM OF 3.841

<PREDICTIVE ATTRIBUTE ANALYSIS> <VERS:84.02><NYS*DCJS>

PROB80 : POPULATION ANALYSIS

REGION=NYC STATISTIC=CHISQ RUNDATE=1/29/84

CONTINGENCY TABLE ANALYSIS LEVEL= 4 GROUP= 6

INDEP VAR #	STATUS	CHI-SQ STATISTIC	INDEP VAR #	SUBGROUP -0-	SUBGROUP -1-	COMPOSITION -%0-	COMPOSITION -%1-
1		0.000	1	0.	633.	0.0	100.0
2		0.000	2	633.	0.	100.0	0.0
3		0.000	3	0.	633.	0.0	100.0
4		0.000	4	0.	633.	0.0	100.0
5		0.000	5	633.	0.	100.0	0.0
6		0.388	6	529.	104.	83.6	16.4
7		0.469	7	310.	323.	49.0	51.0
8		0.412	8	393.	240.	62.1	37.9
9		0.675	9	602.	31.	95.1	4.9
10		3.101	10	520.	113.	82.1	17.9
11		1.145	11	175.	458.	27.6	72.4
12		0.055	12	414.	219.	65.4	34.6
13		0.110	13	297.	336.	46.9	53.1

CONTINGENCY TABLE ANALYSIS LEVEL= 4 GROUP= 6

FREQUENCIES

		CRITERION #14 -0-	CRITERION #14 -1-	
PREDICTOR # 10	-0-	273.	247.	520.
	-1-	49.	64.	113.
		322.	311.	633.

PERCENTAGES

		CRITERION #14 -0-	CRITERION #14 -1-	
PREDICTOR # 10	-0-	43.1	39.0	82.1
	-1-	7.7	10.1	17.9
		50.9	49.1	100.0

CURRENT PAA BRANCH TERMINATES

THE FOLLOWING TEST CONDITION(S) HAVE NOT BEEN MET:

* THE OBSERVED CHI-SQ STATISTIC OF 3.101
  WAS LESS THAN THE SPECIFIED MINIMUM OF 3.841

<PREDICTIVE ATTRIBUTE ANALYSIS> <VERS:84.02><NYS*DCJS>

PROB80 : POPULATION ANALYSIS

REGION=NYC STATISTIC=CHISQ RUNDATE=1/29/84

CONTINGENCY TABLE ANALYSIS LEVEL= 4 GROUP= 7

INDEP VAR #	STATUS	CHI-SQ STATISTIC	INDEP VAR #	SUBGROUP -0-	SUBGROUP -1-	COMPOSITION -%0-	COMPOSITION -%1-
1		0.000	1	35.	0.	100.0	0.0
2		0.000	2	35.	0.	100.0	0.0
3		0.000	3	0.	35.	0.0	100.0
4		0.000	4	0.	35.	0.0	100.0
5		0.000	5	0.	35.	0.0	100.0
6		0.000	6	35.	0.	100.0	0.0
7		0.000	7	21.	14.	60.0	40.0
8		1.680	8	25.	10.	71.4	28.6
9		2.987	9	25.	10.	71.4	28.6
10		1.680	10	25.	10.	71.4	28.6
11		2.440	11	17.	18.	48.6	51.4
12		0.163	12	22.	13.	62.9	37.1
13		1.176	13	15.	20.	42.9	57.1

CONTINGENCY TABLE ANALYSIS LEVEL= 4 GROUP= 7

FREQUENCIES

		CRITERION #14 -0-	CRITERION #14 -1-	
PREDICTOR # 9	-0-	12.	13.	25.
	-1-	8.	2.	10.
		20.	15.	35.

PERCENTAGES

		CRITERION #14 -0-	CRITERION #14 -1-	
PREDICTOR # 9	-0-	34.3	37.1	71.4
	-1-	22.9	5.7	28.6
		57.1	42.9	100.0

CURRENT PAA BRANCH TERMINATES

THE FOLLOWING TEST CONDITION(S) HAVE NOT BEEN MET:

* THE OBSERVED CHI-SQ STATISTIC OF 2.987
  WAS LESS THAN THE SPECIFIED MINIMUM OF 3.841

<PREDICTIVE ATTRIBUTE ANALYSIS> <VERS:84.02><NYS*DCJS>

P R O B 8 0 : P O P U L A T I O N A N A L Y S I S

REGION=NYC STATISTIC=CHISQ RUNDATE=1/29/84

CONTINGENCY TABLE ANALYSIS LEVEL= 4 GROUP= 8

INDEP VAR #	STATUS	CHI-SQ STATISTIC
1		0.000
2		0.000
3		0.000
4		0.000
5		0.000
6		0.000
7		0.962
8		0.019
9		1.665
10		0.515
11		0.266
12		1.180
13		0.580

INDEP VAR #	SUBGROUP -0-	SUBGROUP -1-	COMPOSITION -%0-	COMPOSITION -%1-
1	0.	693.	0.0	100.0
2	693.	0.	100.0	0.0
3	0.	693.	0.0	100.0
4	0.	693.	0.0	100.0
5	0.	693.	0.0	100.0
6	693.	0.	100.0	0.0
7	265.	428.	38.2	61.8
8	540.	153.	77.9	22.1
9	585.	108.	84.4	15.6
10	476.	217.	68.7	31.3
11	266.	427.	38.4	61.6
12	433.	260.	62.5	37.5
13	283.	410.	40.8	59.2

CONTINGENCY TABLE ANALYSIS LEVEL= 4 GROUP= 8

F R E Q U E N C I E S

		CRITERION #14 -0-	CRITERION #14 -1-	
PREDICTOR # 9	-0-	232.	353.	585.
	-1-	50.	58.	108.
		282.	411.	693.

P E R C E N T A G E S

		CRITERION #14 -0-	CRITERION #14 -1-	
PREDICTOR # 9	-0-	33.5	50.9	84.4
	-1-	7.2	8.4	15.6
		40.7	59.3	100.0

CURRENT PAA BRANCH TERMINATES

THE FOLLOWING TEST CONDITION(S) HAVE NOT BEEN MET:

* THE OBSERVED CHI-SQ STATISTIC OF 1.665
WAS LESS THAN THE SPECIFIED MINIMUM OF 3.841

<PREDICTIVE ATTRIBUTE ANALYSIS> <VERS:84.02><NYS*DCJS>

P R O B 8 0 : P O P U L A T I O N A N A L Y S I S

REGION=NYC STATISTIC=CHISQ RUNDATE=1/29/84

CONTINGENCY TABLE ANALYSIS LEVEL= 4 GROUP= 9

INDEP VAR #	STATUS	CHI-SQ STATISTIC
1		0.000
2		0.000
3		0.000
4		0.000
5		0.000
6		0.000
7		1.364
8		1.756
9		0.279
10		0.460
11		2.390
12		1.402
13		0.276

INDEP VAR #	SUBGROUP -0-	SUBGROUP -1-	COMPOSITION -%0-	COMPOSITION -%1-
1	64.	0.	100.0	0.0
2	0.	64.	0.0	100.0
3	0.	64.	0.0	100.0
4	0.	64.	0.0	100.0
5	64.	0.	100.0	0.0
6	64.	0.	100.0	0.0
7	41.	23.	64.1	35.9
8	33.	31.	51.6	48.4
9	56.	8.	87.5	12.5
10	59.	5.	92.2	7.8
11	30.	34.	46.9	53.1
12	29.	35.	45.3	54.7
13	45.	19.	70.3	29.7

CONTINGENCY TABLE ANALYSIS LEVEL= 4 GROUP= 9

F R E Q U E N C I E S

		CRITERION #14 -0-	CRITERION #14 -1-	
PREDICTOR # 11	-0-	26.	4.	30.
	-1-	33.	1.	34.
		59.	5.	64.

P E R C E N T A G E S

		CRITERION #14 -0-	CRITERION #14 -1-	
PREDICTOR # 11	-0-	40.6	6.3	46.9
	-1-	51.6	1.6	53.1
		92.2	7.8	100.0

CURRENT PAA BRANCH TERMINATES

THE FOLLOWING TEST CONDITION(S) HAVE NOT BEEN MET:

* THE OBSERVED CHI-SQ STATISTIC OF 2.390
WAS LESS THAN THE SPECIFIED MINIMUM OF 3.841

<PREDICTIVE ATTRIBUTE ANALYSIS> <VERS:84.02><NYS*DCJS>

P R O B 8 0 : P O P U L A T I O N A N A L Y S I S

REGION=NYC STATISTIC=CHISQ RUNDATE=1/29/84

CONTINGENCY TABLE ANALYSIS LEVEL= 4 GROUP= 10

INDEP VAR #	STATUS	CHI-SQ STATISTIC	INDEP VAR #	SUBGROUP -0-	SUBGROUP -1-	COMPOSITION -%0-	COMPOSITION -%1-
1		0.000	1	0.	722.	0.0	100.0
2		0.000	2	0.	722.	0.0	100.0
3		0.000	3	0.	722.	0.0	100.0
4		0.000	4	0.	722.	0.0	100.0
5		0.000	5	722.	0.	100.0	0.0
6		0.000	6	722.	0.	100.0	0.0
7		1.451	7	343.	379.	47.5	52.5
8		1.503	8	454.	268.	62.9	37.1
9		2.348	9	684.	38.	94.7	5.3
10		4.582	10	671.	51.	92.9	7.1
11		0.243	11	235.	487.	32.5	67.5
12		0.059	12	502.	220.	69.5	30.5
13		0.188	13	407.	315.	56.4	43.6

CONTINGENCY TABLE ANALYSIS LEVEL= 4 GROUP= 10

F R E Q U E N C I E S — CRITERION #14

		-0-	-1-	
PREDICTOR # 10	-0-	533.	138.	671.
	-1-	34.	17.	51.
		567.	155.	722.

P E R C E N T A G E S — CRITERION #14

		-0-	-1-	
PREDICTOR # 10	-0-	73.8	19.1	92.9
	-1-	4.7	2.4	7.1
		78.5	21.5	100.0

<PREDICTIVE ATTRIBUTE ANALYSIS> <VERS:84.02><NYS*DCJS>

P R O B 8 0 : P O P U L A T I O N A N A L Y S I S

REGION=NYC STATISTIC=CHISQ RUNDATE=1/29/84

CONTINGENCY TABLE ANALYSIS LEVEL= 4 GROUP= 11

INDEP VAR #	STATUS	CHI-SQ STATISTIC	INDEP VAR #	SUBGROUP -0-	SUBGROUP -1-	COMPOSITION -%0-	COMPOSITION -%1-
1		0.010	1	7.	20.	25.9	74.1
2		0.000	2	0.	27.	0.0	100.0
3		0.000	3	0.	27.	0.0	100.0
4		0.000	4	0.	27.	0.0	100.0
5		0.000	5	27.	0.	100.0	0.0
6		0.000	6	0.	27.	0.0	100.0
7		10.800	7	9.	18.	33.3	66.7
8		3.757	8	23.	4.	85.2	14.8
9		0.831	9	26.	1.	96.3	3.7
10		0.000	10	27.	0.	100.0	0.0
11		0.000	11	27.	0.	100.0	0.0
12		0.010	12	20.	7.	74.1	25.9
13		2.700	13	18.	9.	66.7	33.3

CONTINGENCY TABLE ANALYSIS LEVEL= 4 GROUP= 11

F R E Q U E N C I E S — CRITERION #14

		-0-	-1-	
PREDICTOR # 7	-0-	9.	0.	9.
	-1-	6.	12.	18.
		15.	12.	27.

P E R C E N T A G E S — CRITERION #14

		-0-	-1-	
PREDICTOR # 7	-0-	33.3	0.0	33.3
	-1-	22.2	44.4	66.7
		55.6	44.4	100.0

P R O B 8 0 : P O P U L A T I O N A N A L Y S I S

REGION=NYC STATISTIC=CHISQ RUNDATE=1/29/84

CONTINGENCY TABLE ANALYSIS LEVEL= 4 GROUP= 12

INDEP VAR #	STATUS	CHI-SQ STATISTIC	INDEP VAR #	SUBGROUP -0-	SUBGROUP -1-	COMPOSITION -%0-	COMPOSITION -%1-
1		0.763	1	27.	301.	8.2	91.8
2		0.000	2	0.	328.	0.0	100.0
3		0.000	3	0.	328.	0.0	100.0
4		0.000	4	0.	328.	0.0	100.0
5		0.000	5	328.	0.	100.0	0.0
6		0.000	6	0.	328.	0.0	100.0
7		0.066	7	43.	285.	13.1	86.9
8		0.214	8	308.	20.	93.9	6.1
9		0.009	9	305.	23.	93.0	7.0
10		0.377	10	156.	172.	47.6	52.4
11		0.000	11	0.	328.	0.0	100.0
12		0.001	12	318.	10.	97.0	3.0
13		1.033	13	115.	213.	35.1	64.9

CONTINGENCY TABLE ANALYSIS LEVEL= 4 GROUP= 12

F R E Q U E N C I E S

CRITERION #14		-0-	-1-	
PREDICTOR # 13	-0-	85.	30.	115.
	-1-	146.	67.	213.
		231.	97.	328.

P E R C E N T A G E S

CRITERION #14		-0-	-1-	
PREDICTOR # 13	-0-	25.9	9.1	35.1
	-1-	44.5	20.4	64.9
		70.4	29.6	100.0

CURRENT PAA BRANCH TERMINATES

THE FOLLOWING TEST CONDITION(S) HAVE NOT BEEN MET:

* THE OBSERVED CHI-SQ STATISTIC OF 1.033
  WAS LESS THAN THE SPECIFIED MINIMUM OF 3.841

P R O B 8 0 : P O P U L A T I O N A N A L Y S I S

REGION=NYC STATISTIC=CHISQ RUNDATE=1/29/84

CONTINGENCY TABLE ANALYSIS LEVEL= 4 GROUP= 13

INDEP VAR #	STATUS	CHI-SQ STATISTIC	INDEP VAR #	SUBGROUP -0-	SUBGROUP -1-	COMPOSITION -%0-	COMPOSITION -%1-
1		0.000	1	56.	0.	100.0	0.0
2		0.000	2	0.	56.	0.0	100.0
3		0.000	3	0.	56.	0.0	100.0
4		0.000	4	0.	56.	0.0	100.0
5		0.000	5	0.	56.	0.0	100.0
6		0.000	6	56.	0.	100.0	0.0
7		0.100	7	28.	28.	50.0	50.0
8		2.822	8	48.	8.	85.7	14.3
9		0.310	9	38.	18.	67.9	32.1
10		0.000	10	56.	0.	100.0	0.0
11		0.000	11	56.	0.	100.0	0.0
12		0.835	12	32.	24.	57.1	42.9
13		1.142	13	23.	33.	41.1	58.9

CONTINGENCY TABLE ANALYSIS LEVEL= 4 GROUP= 13

F R E Q U E N C I E S

CRITERION #14		-0-	-1-	
PREDICTOR # 8	-0-	35.	13.	48.
	-1-	8.	0.	8.
		43.	13.	56.

P E R C E N T A G E S

CRITERION #14		-0-	-1-	
PREDICTOR # 8	-0-	62.5	23.2	85.7
	-1-	14.3	0.0	14.3
		76.8	23.2	100.0

CURRENT PAA BRANCH TERMINATES

THE FOLLOWING TEST CONDITION(S) HAVE NOT BEEN MET:

* THE OBSERVED CHI-SQ STATISTIC OF 2.822
  WAS LESS THAN THE SPECIFIED MINIMUM OF 3.841

<PREDICTIVE ATTRIBUTE ANALYSIS> <VERS:84.02><NYS*DCJS>

PROB80 : POPULATION ANALYSIS

REGION=NYC STATISTIC=CHISQ RUNDATE=1/29/84

CONTINGENCY TABLE ANALYSIS LEVEL= 4 GROUP= 14

INDEP VAR #	STATUS	CHI-SQ STATISTIC	INDEP VAR #	SUBGROUP -0-	SUBGROUP -1-	COMPOSITION -%0-	COMPOSITION -%1-
1		0.000	1	0.	375.	0.0	100.0
2		0.000	2	0.	375.	0.0	100.0
3		0.000	3	0.	375.	0.0	100.0
4		0.000	4	0.	375.	0.0	100.0
5		0.000	5	0.	375.	0.0	100.0
6		0.000	6	375.	0.	100.0	0.0
7		1.983	7	101.	274.	26.9	73.1
8		0.014	8	351.	24.	93.6	6.4
9		2.615	9	298.	77.	79.5	20.5
10		0.000	10	375.	0.	100.0	0.0
11		0.000	11	375.	0.	100.0	0.0
12		0.809	12	242.	133.	64.5	35.5
13		0.034	13	173.	202.	46.1	53.9

CONTINGENCY TABLE ANALYSIS LEVEL= 4 GROUP= 14

FREQUENCIES

CRITERION #14		-0-	-1-	
PREDICTOR # 9	-0-	171.	127.	298.
	-1-	52.	25.	77.
		223.	152.	375.

PERCENTAGES

CRITERION #14		-0-	-1-	
PREDICTOR # 9	-0-	45.6	33.9	79.5
	-1-	13.9	6.7	20.5
		59.5	40.5	100.0

CURRENT PAA BRANCH TERMINATES

THE FOLLOWING TEST CONDITION(S) HAVE NOT BEEN MET:

* THE OBSERVED CHI-SQ STATISTIC OF 2.615
  WAS LESS THAN THE SPECIFIED MINIMUM OF 3.841

<PREDICTIVE ATTRIBUTE ANALYSIS> <VERS:84.02><NYS*DCJS>

PROB80 : POPULATION ANALYSIS

REGION=NYC STATISTIC=CHISQ RUNDATE=1/29/84

CONTINGENCY TABLE ANALYSIS LEVEL= 4 GROUP= 15

INDEP VAR #	STATUS	CHI-SQ STATISTIC	INDEP VAR #	SUBGROUP -0-	SUBGROUP -1-	COMPOSITION -%0-	COMPOSITION -%1-
1		0.994	1	34.	413.	7.6	92.4
2		0.000	2	0.	447.	0.0	100.0
3		0.000	3	0.	447.	0.0	100.0
4		0.000	4	0.	447.	0.0	100.0
5		0.000	5	0.	447.	0.0	100.0
6		0.000	6	447.	0.	100.0	0.0
7		0.008	7	51.	396.	11.4	88.6
8		0.000	8	447.	0.	100.0	0.0
9		0.171	9	411.	36.	91.9	8.1
10		0.246	10	296.	151.	66.2	33.8
11		0.000	11	0.	447.	0.0	100.0
12		0.199	12	325.	122.	72.7	27.3
13		0.275	13	195.	252.	43.6	56.4

CONTINGENCY TABLE ANALYSIS LEVEL= 4 GROUP= 15

FREQUENCIES

CRITERION #14		-0-	-1-	
PREDICTOR # 1	-0-	27.	7.	34.
	-1-	295.	118.	413.
		322.	125.	447.

PERCENTAGES

CRITERION #14		-0-	-1-	
PREDICTOR # 1	-0-	6.0	1.6	7.6
	-1-	66.0	26.4	92.4
		72.0	28.0	100.0

CURRENT PAA BRANCH TERMINATES

THE FOLLOWING TEST CONDITION(S) HAVE NOT BEEN MET:

* THE OBSERVED CHI-SQ STATISTIC OF 0.994
  WAS LESS THAN THE SPECIFIED MINIMUM OF 3.841

<PREDICTIVE ATTRIBUTE ANALYSIS> <VERS:84.02><NYS*DCJS>

P R O B 8 0 : P O P U L A T I O N A N A L Y S I S

REGION=NYC STATISTIC=CHISQ RUNDATE=1/29/84

CONTINGENCY TABLE ANALYSIS LEVEL= 4 GROUP= 16

INDEP VAR #	STATUS	CHI-SQ STATISTIC
1		0.084
2		0.000
3		0.000
4		0.000
5		0.000
6		0.000
7		0.000
8		0.000
9		0.000
10		3.204
11		0.000
12		1.152
13		0.750

INDEP VAR #	SUBGROUP -0-	SUBGROUP -1-	COMPOSITION -%0-	COMPOSITION -%1-
1	17.	152.	10.1	89.9
2	0.	169.	0.0	100.0
3	0.	169.	0.0	100.0
4	0.	169.	0.0	100.0
5	0.	169.	0.0	100.0
6	169.	0.	100.0	0.0
7	169.	0.	100.0	0.0
8	0.	169.	0.0	100.0
9	169.	0.	100.0	0.0
10	49.	120.	29.0	71.0
11	0.	169.	0.0	100.0
12	105.	64.	62.1	37.9
13	121.	48.	71.6	28.4

CONTINGENCY TABLE ANALYSIS LEVEL= 4 GROUP= 16

F R E Q U E N C I E S

CRITERION #14		-0-	-1-	
PREDICTOR # 10	-0-	38.	11.	49.
	-1-	76.	44.	120.
		114.	55.	169.

P E R C E N T A G E S

CRITERION #14		-0-	-1-	
PREDICTOR # 10	-0-	22.5	6.5	29.0
	-1-	45.0	26.0	71.0
		67.5	32.5	100.0

CURRENT PAA BRANCH TERMINATES

THE FOLLOWING TEST CONDITION(S) HAVE NOT BEEN MET:

* THE OBSERVED CHI-SQ STATISTIC OF 3.204 WAS LESS THAN THE SPECIFIED MINIMUM OF 3.841

<PREDICTIVE ATTRIBUTE ANALYSIS> <VERS:84.02><NYS*DCJS>

P R O B 8 0 : P O P U L A T I O N A N A L Y S I S

REGION=NYC STATISTIC=CHISQ RUNDATE=1/29/84

P A A P R O C E S S I N G T R E E F O R P R E D I C T O R S

```
                              2
              3                               5
      4               5               6               11
  13      5       1       1       1      11       1       8
8   1   8   9   -   -   -   -   -  10   7   -   -   -   -   -
```

>>>>>>> END OF PROGRAM EXECUTION.

END