Statistical Evaluation of PACSTAT Random Number Generation Capabilities

G. F. Piepel
M. R. Toland
H. Harty

M. J. Budden
C. L. Bartley

May 1988

Prepared for the U.S. Department of Energy
under Contract DE-AC06-76RLO 1830

Pacific Northwest Laboratory
Operated for the U.S. Department of Energy
by Battelle Memorial Institute

DISCLAIMER

This report was prepared as an account of work sponsored by an agency of the United States Government. Neither the United States Government nor any agency thereof, nor Battelle Memorial Institute, nor any of their employees, makes any warranty, expressed or implied, or assumes any legal liability or responsibility for the accuracy, completeness, or usefulness of any information, apparatus, product, or process disclosed, or represents that its use would not infringe privately owned rights. Reference herein to any specific commercial product, process, or service by trade name, trademark, manufacturer, or otherwise does not necessarily constitute or imply its endorsement, recommendation, or favoring by the United States Government or any agency thereof, or Battelle Memorial Institute. The views and opinions of authors expressed herein do not necessarily state or reflect those of the United States Government or any agency thereof, or Battelle Memorial Institute.

PACIFIC NORTHWEST LABORATORY
operated by
BATTELLE MEMORIAL INSTITUTE
for the
UNITED STATES DEPARTMENT OF ENERGY
under Contract DE-AC06-76RLO 1830

Printed in the United States of America
Available from
National Technical Information Service
United States Department of Commerce
5285 Port Royal Road
Springfield, Virginia 22161

NTIS Price Codes
Microfiche A01

Printed Copy

Pages	Price Codes
001-025	A02
026-050	A03
051-075	A04
076-100	A05
101-125	A06
126-150	A07
151-175	A08
176-200	A09
201-225	A010
226-250	A011
251-275	A012
276-300	A013

STATISTICAL EVALUATION OF PACSTAT
RANDOM NUMBER GENERATION
CAPABILITIES

G. F. Piepel
M. R. Toland
H. Harty
M. J. Budden
C. L. Bartley

May 1988

Prepared for
the U.S. Department of Energy
under Contract DE-AC06-76RLO 1830

Pacific Northwest Laboratory
Richland, Washington 99352

SUMMARY

This report summarizes the work performed in verifying the general purpose Monte Carlo driver-program PACSTAT. The main objective of the work was to verify the performance of PACSTAT's random number generation capabilities. Secondary objectives were to document (using controlled configuration management procedures) changes made in PACSTAT at Pacific Northwest Laboratory, and to assure that PACSTAT input and output files satisfy quality assurance traceability constraints.

Upon receipt of the PRIME version of the PACSTAT code from the Basalt Waste Isolation Project, Pacific Northwest Laboratory staff converted the code to run on Digital Equipment Corporation (DEC) VAXs. The modifications to PACSTAT were implemented using the WITNESS configuration management system, with the modifications themselves intended to make the code as portable as possible. Certain modifications were made to make the PACSTAT input and output files conform to quality assurance traceability constraints.

The verification aspects of the work focused on checking PACSTAT's random number generation capabilities for the following distributions: uniform, normal, exponential, loguniform, lognormal, truncated exponential, truncated normal, and truncated lognormal. The highest level of effort went into checking the performance of the uniform random number generator (RNG), since it is used as the basis for generating random numbers from the other seven distributions. A variety of statistical tests and graphical methods were used to check the performance of the uniform RNG, with subsets of these techniques used to check the other distributions. Also, for each distribution, the programming was checked, and a few variates generated by PACSTAT were also computed by hand to check for agreement.

The verification investigations led to the discovery of several minor errors in PACSTAT. Upon correcting these, all eight RNGs appeared to perform adequately. The errors found (and corrected) were such that previous applications using PACSTAT may have been adversely affected. Actual impacts of the errors on previous applications depend on the specifics of each application.

The uniform RNG used by PACSTAT is a multiplicative congruential type with modulus $(2^{31})-1$ and multiplier 16807. Two comprehensive papers by Fishman and Moore (1982, 1986) consider the performance of various multipliers for uniform RNGs of this type. These papers indicate that the 16807 multiplier is a good one, but that better ones exist.

CONTENTS

SUMMARY	iii
1.0 INTRODUCTION	1.1
1.1 VERIFICATION OF PACSTAT RANDOM NUMBER GENERATORS	1.1
1.1.1 Three-Stage Testing	1.2
1.1.2 Statistical Tests for Evaluating Random Number Generators	1.3
1.2 PACSTAT MODIFICATIONS AND CONFIGURATION MANAGEMENT	1.3
1.3 QUALITY ASSURANCE CONSIDERATIONS	1.4
2.0 UNIFORM PSEUDO-RANDOM NUMBER GENERATOR	2.1
2.1 DESCRIPTION OF TESTS APPLIED TO THE UNIFORM RANDOM NUMBER GENERATOR	2.1
2.2 RESULTS OF TESTS ON THE UNIFORM RANDOM NUMBER GENERATOR	2.3
3.0 EXPONENTIAL AND NORMAL RANDOM NUMBER GENERATORS	3.1
3.1 TESTS APPLIED TO THE NORMAL AND EXPONENTIAL RANDOM NUMBER GENERATORS	3.1
3.2 RESULTS OF TESTS ON THE NORMAL AND EXPONENTIAL RANDOM NUMBER GENERATORS	3.3
4.0 REMAINING RANDOM NUMBER GENERATORS	4.1
4.1 TESTS ON THE REMAINING FIVE RANDOM NUMBER GENERATORS	4.1
4.2 RESULTS OF TESTS ON THE REMAINING RANDOM NUMBER GENERATORS ...	4.2
5.0 CORRECTIONS AND LITERATURE FINDINGS	5.1
5.1 CORRECTIONS	5.1
5.2 LITERATURE FINDINGS	5.3
6.0 QUALITY ASSURANCE AND CONFIGURATION CONTROL OF PACSTAT	6.1
6.1 CREATION OF PACSTAT VERSIONS A4 AND B4	6.2
6.2 QUALITY ASSURANCE RECOMMENDATIONS	6.6

7.0 GENERATION OF RANDOM NUMBERS FROM PACSTAT FOR STATISTICAL TESTS	7.1
REFERENCES	R.1
APPENDIX A - RANDOM NUMBER GENERATION IN PACSTAT	A.1
APPENDIX B - PACSTAT_A0.FOR (ORIGINAL INTERACTIVE VERSION, FORTRAN SOURCE FILE)	B.1
APPENDIX C - PACSTAT_B4.FOR (FINAL BATCH VERSION, FORTRAN SOURCE FILE)	C.1
APPENDIX D - PACSTAT UPDATE FILES	D.1
APPENDIX E - PACSTAT EXAMPLE INPUT	E.1
APPENDIX F - PACSTAT EXAMPLE OUTPUT	F.1
APPENDIX G - SOLN AND BLKDAT ROUTINES	G.1
APPENDIX H - EXAMPLE VAX/VMS COMMAND FILE USED TO OBTAIN 100 SETS OF 10,000 UNIFORM (0,1) VARIATES FROM PACSTAT	H.1
APPENDIX I - PROGRAM READ USED TO PREPARE PACSTAT OUTPUT FOR USE BY SAS FOR STATISTICAL TESTING PURPOSES	I.1

FIGURES

1.1	Three-Stage Testing of the Pseudo-Random Number Generators in PACSTAT	1.3
2.1	Histogram of 10,000 Random Variates from the PACSTAT Uniform (0,1) Random Number Generator	2.8
2.2	Theoretical Quantile-Quantile Plot of 10,000 Random Variates from the PACSTAT Uniform (0,1) Random Number Generator	2.8
3.1	Histogram of 500 Random Variates from the Exponential Distribution with Parameter $\theta = 1$	3.4
3.2	Theoretical Quantile-Quantile Plot of 500 Random Variates from the Exponential Distribution with Parameter $\theta = 1$	3.5
3.3	Histogram of 500 Random Variates from the Normal (0,1) Distribution	3.5
3.4	Theoretical Quantile-Quantile Plot of 500 Random Variates from the Normal (0,1) Distribution	3.6
4.1	Histogram of 500 Random Variates from the Loguniform Distribution Based on the Uniform (0,1)	4.2
4.2	Theoretical Quantile-Quantile Plot of 500 Random Variates from the Loguniform Distribution Based on the Uniform (0,1)	4.3
4.3	Histogram of 500 Random Variates from the Truncated Exponential Distribution	4.3
4.4	Theoretical Quantile-Quantile Plot of 500 Random Variates from the Truncated Exponential Distribution	4.4
4.5	Histogram of 500 Random Variates from the Lognormal Distribution Based on the Normal (0,1)	4.4
4.6	Theoretical Quantile-Quantile Plot of 500 Random Variates from the Lognormal Distribution Based on the Normal (0,1)	4.5
4.7	Histogram of 500 Random Variates from the Truncated Normal Distribution Based on the Normal (0,1)	4.6
4.8	Theoretical Quantile-Quantile Plot of 500 Random Variates from the Truncated Normal Distribution Based on the Normal (0,1)	4.7

4.9	Histogram of 500 Random Variates from the Truncated Lognormal Distribution Based on the Normal (0,1)	4.8
4.10	Theoretical Quantile-Quantile Plot of 500 Random Variates from the Truncated Lognormal Distribution Based on the Normal (0,1)	4.9

TABLES

2.1	Probabilities of Specified Numbers of Rejections Out of 91 Tests, Where the Probability of Incorrectly Rejecting on 1 Test is 0.10	2.5
2.2	Probabilities of Specified Numbers of Rejections Out of 91 Tests, Where the Probability of Incorrectly Rejecting on 1 Test is 0.05	2.6
2.3	Number of Rejections from Goodness-of-Fit, Independence and Uniformity Tests	2.7
3.1	Probabilities of Specified Numbers of Rejections Out of 100 Tests, Where the Probability of Incorrectly Rejecting on 1 Test is 0.10	3.2
3.2	Probabilities of Specified Numbers of Rejections Out of 100 Tests, Where the Probability of Incorrectly Rejecting on 1 Test is 0.05	3.3
3.3	Number of Rejections in Each Tail in Goodness-of-Fit Tests for the Exponential and Normal Random Number Generators in PACSTAT	3.4

1.0 INTRODUCTION

PACSTAT is a multipurpose "driver" routine that can be used to perform Monte Carlo simulations when connected to external deterministic codes. This report summarizes work performed at Pacific Northwest Laboratory (PNL) for the Basalt Waste Isolation Project (BWIP). The objectives of the work were

- to verify the random number generation capabilities of PACSTAT
- to document, via use of computer configuration management software, changes made to the PACSTAT code at PNL
- to assure that PACSTAT input and output files satisfy quality assurance traceability and reproducibility constraints.

Verifying the random number generation capabilities of PACSTAT was the primary objective of this work, with the other two aspects above relating to quality assurance goals.

Because PACSTAT is still "under development" and was not under formal configuration management at BWIP, it was not necessary to implement configuration management at PNL. The decision was made to do so as a means to document the changes made in PACSTAT at PNL. Changes were made to translate the original PRIME code to run on Digital Equipment Corporation (DEC) VAXs, and to correct errors found during verification efforts.

Although a user's guide for PACSTAT and a report on past verification efforts exist, they cannot be formally referenced. Appendix A gives a brief overview of the methods used in PACSTAT for generating random numbers, but this is not intended as comprehensive documentation of PACSTAT.

Sections 2.0 through 5.0 are devoted to the results of verification tests performed on PACSTAT's random number generation capabilities. Sections 6.0 and 7.0 and Appendices B through I relate to the quality assurance and configuration management aspects of the work.

1.1 VERIFICATION OF PACSTAT RANDOM NUMBER GENERATORS

The scope of work calls for verifying the eight continuous variable pseudo-random number generators in PACSTAT: uniform, normal, exponential,

loguniform, lognormal, truncated exponential, truncated normal, and truncated lognormal. PACSTAT also has the capability of generating pseudo-random variates from the discrete Bernoulli probability distribution and can generate stratified variates from the eight continuous distributions. These capabilities were not investigated.

The word "pseudo" in the term pseudo-random number refers to the fact that generators can only attempt to mimic random behavior. The generators themselves are mathematical procedures that produce values in a structured, functionally related way. Our task was to ensure that the pseudo-random number generators in PACSTAT are implemented correctly and that the pseudo-random variates they produce have the correct properties. For simplicity in the remainder of the report, we drop the term "pseudo" and refer to random number generators (RNGs) and random variates.

1.1.1 Three-Stage Testing

The testing of the RNGs in PACSTAT was carried out in three stages. First, the uniform RNG was tested. Then the exponential and normal RNGs were tested. Lastly, the loguniform, lognormal, truncated exponential, truncated normal, and truncated lognormal RNGs were tested.

The three-stage testing of the RNGs is illustrated in Figure 1.1, and was suggested by the mathematical relationships among the RNGs. Figure 1.1 shows that the uniform RNG is the parent generator for the other PACSTAT random number generators considered. The exponential, normal, and loguniform random number generators produce their respective variates by mathematically transforming uniform random variates. Similarly, the truncated exponential, truncated normal, lognormal, and truncated lognormal RNGs produce their respective variates by mathematically manipulating variates from the exponential and normal random number generators. From a theoretical point of view, if the uniform RNG works and the appropriate mathematical transformations are programmed properly, the other RNGs will also work. The relationships among the RNGs are described in Appendix A.

FIGURE 1.1. Three-Stage Testing of the Pseudo-Random Number Generators in PACSTAT

1.1.2 Statistical Tests for Evaluating Random Number Generators

There are a great number of statistical tests in the literature for assessing the properties of a sequence of random numbers. The initial test plan contained a "shopping list" of some of these tests. A subset of tests was selected from the shopping list for the final test plan. The subset of tests was chosen to investigate the most important properties of the random variates, and was commensurate with the budget, computer resources, and time available.

The three test stages were hierarchical in terms of the extensiveness of testing. The variates from the uniform RNG were tested using goodness-of-fit, graphical, independence, and uniformity tests. The exponential and normal RNGs were tested using goodness-of-fit and graphical tests, and the remaining RNGs were tested using graphical tests. Summary statistics (mean, standard deviation, minimum, and maximum) were computed and compared to theoretical values for all eight distributions. Also, programming checks of the mathematical transformations and hand calculation checks of a few variates were performed for all distributions.

1.2 PACSTAT MODIFICATIONS AND CONFIGURATION MANAGEMENT

The original version of PACSTAT was delivered to PNL by BWIP on magnetic tape. PACSTAT had been running on a PRIME-750, and was not under configuration

management. The PNL put PACSTAT under configuration management using the automated code version tracking tool, WITNESS, (Koontz and Stewart 1986) and proceeded to convert the code to run on the PNL VAX computer system. The PRIME-750 version was designated the A0 version, and had many system-dependent features. These dependencies were removed and replaced with ANSI standard FORTRAN-77 implementation of the same features, so that PACSTAT is portable to VAXs, CRAYs, CDCs, or other PRIMES. The final versions of PACSTAT used for verification were designated the A4 (interactive) and B4 (batch) versions. Additional details of the code conversion process, and the use of WITNESS to automatically track versions is contained in Section 6.0.

1.3 QUALITY ASSURANCE CONSIDERATIONS

All work on PACSTAT was performed according to procedures described in the Statement of Work SOW-L1E2 and the Engineering Physics Department Quality Assurance Plan EPD-163-2. Other than the configuration management of PACSTAT, the major quality assurance (QA) additions to PACSTAT were to improve the traceability of input and output files. Additional details of the QA aspects of this work can be found in Sections 6.0 and 7.0.

2.0 UNIFORM PSEUDO-RANDOM NUMBER GENERATOR

The uniform RNG in PACSTAT is a multiplicative congruential RNG with multiplier 16807 and modulus $(2^{**}31)-1$ (see Section A.1 of Appendix A). It produces pseudo-random variates which are uniformly distributed on the open interval (0,1). This particular RNG has been used in several computer programs, and its properties have been examined in the literature by Fishman and Moore (1982, 1986). Their results are given in Section 5.0.

2.1 DESCRIPTION OF TESTS APPLIED TO THE UNIFORM RANDOM NUMBER GENERATOR

To test the uniform RNG, 100 strings of 10,000 variates each were generated. These 100 strings of variates were subjected to a battery of tests which can be grouped into four main categories: goodness-of-fit, graphical, independence, and uniformity. The tests were two-sided tests done at the 0.10 level of significance. Two-sided (or two-tailed) refers to the two potential types of anomalies that can be detected by the tests. For example, with the goodness-of-fit and uniformity tests, a string of variates may appear nonuniformly distributed, or it may appear to be superuniformly distributed (more uniform than expected by chance). For the independence (randomness) test, the variates in a string may not be independent, or they may be more independent than expected by chance.

Although variates being "too random" or "too uniform" do not sound like anomalies or defects, such findings are indicative of functional or nonrandom behavior in the generator. For example, consider the outcomes of 100 tosses of a fair coin (i.e., one for which the probability of getting a head is 0.5). If all of the tosses each resulted in a head, then one would suspect either the fairness of the coin or the fairness of the toss. Likewise, if the first 50 tosses resulted in heads and the last 50 tosses resulted in tails, the outcomes would not be considered random outcomes from tossing a fair coin. These two cases are examples of one extreme, lack of randomness. At the other extreme, if every other toss resulted in a head, either the coin's fairness or the toss would be suspect. This is an example of "too much" randomness. If a fair coin is tossed so that the outcome is just as likely to be a head as it is a tail,

then one would expect the number of heads and tails in a row (size of runs) to be somewhere between the extremes given above.

A similar argument can be made for each of the other properties considered in this investigation. The uniform RNG can produce variates that are either not uniformly distributed or "too uniformly" distributed. For this reason two-sided tests were performed.

The goodness-of-fit tests used were the Kolmogorov-Smirnov, Cramer-von Mises, Kuiper, and Watson tests. The Kolmogorov-Smirnov and Cramer-von Mises tests are sensitive to shifts in location, while the Kuiper and Watson tests are sensitive to shifts in variance. Too many rejections in either or both tails means the variates do not come from a uniform (0,1) distribution, or come from a superuniform distribution. These goodness-of-fit tests are defined and compared by Stephens (1969, 1974).

The graphic tools employed were histograms and theoretical quantile-quantile plots. A histogram shows the distribution of values in a string of variates, and should approximate the true probability density function (pdf). For uniform data, the pdf is a rectangle on the open interval (0,1). A theoretical quantile-quantile plot graphs the quantiles of the hypothesized distribution versus the quantiles of a string of variates. When the data come from the hypothesized distribution, the plot looks like the plot of the line $y=x$. Theoretical quantile-quantile plots assess four areas: shift in location, shift in variance, symmetry, and lack-of-fit in the tails. The quantile-quantile plot is discussed by Chambers et al. (1983).

To test independence (randomness) of the variates, a runs test (Fishman and Moore 1982) was used to test the number of runs up (successively increasing variates) and the number of runs down (successively decreasing variates). Too many rejections in the lower tail indicates too much randomness and too many rejections in the upper tail indicates lack of randomness. In either case, departure from randomness probably is because of some functional behavior in the RNG.

Within each string of variates, uniformity on the unit line, unit square, and unit cube was tested (Fishman and Moore 1982) using the chi-square

goodness-of-fit test. For the one-dimensional (unit line) test, the interval (0,1) was divided into 1000 bins, and the counts of variates (of the 10,000 in a string) falling into each bin were obtained. For the two-dimensional test, the unit square was divided into $30 \times 30 = 900$ bins, with the counts of successive pairs of variates (from a string of 10,000) falling into each bin being obtained. The unit-cube was divided into $7 \times 7 \times 7 = 343$ bins, with the successive triples of variates used for the three-dimensional test. Too many rejections in the lower tail (for any test) indicates superuniformity (more uniform than expected by chance) which would be because of functional behavior. Too many rejections in the upper tail indicates the variates are not uniformly distributed.

Uniformity across strings of variates was also checked. Theoretically, the variates across strings should also be uniformly distributed. This was checked by performing tests on the means and variances of the strings. The individual string means and variances were checked for equality with their theoretical values. Then the variance of the string means was tested for equality with its theoretical value. These tests were performed at the 0.05 significance level.

2.2 RESULTS OF TESTS ON THE UNIFORM RANDOM NUMBER GENERATOR

This section summarizes the test results for the uniform random number generator. One hundred test statistics (corresponding to the 100 strings of 10,000 variates) were calculated for each test and compared against their corresponding distribution.

The tests for uniformity across strings of variates (discussed in Section 2.1) detected anomalous behavior beyond that expected by chance for the uniform random number generator in PACSTAT. It was found that only 91 distinct strings of variates had been generated because of some programming errors in PACSTAT. The errors and their corrections are discussed in Section 5.0. The long run time required by the SAS (1985a, 1985b) test software prevented the rerunning of the tests for 100 new strings. Hence, the remaining results in this section are for 91 strings of 10,000 variates.

In performing the tests, some rejections of the hypothesis that the variates have the property under consideration are expected to occur by chance alone. Tables 2.1 and 2.2 give the cumulative and individual probabilities for given numbers of rejections under the assumption that the property being tested (e.g., goodness-of-fit, uniformity, or independence) holds. Tables 2.1 and 2.2 are based on 91 independent tests instead of 100. These tables do not depend on the distribution (uniform, normal, exponential, etc.) being tested. The only assumptions used in constructing Tables 2.1 and 2.2 are that the 91 tests are independent and that the significance level of each test is 0.10 (for Table 2.1) or 0.05 (for Table 2). The probabilities in Tables 2.1 and 2.2 are theoretical probabilities calculated from the binomial $B(0.10, 91)$ and $B(0.05, 91)$ distributions, respectively.

From Table 2.1 it can be seen that, when the property being tested holds, there is an 92% chance of observing between 5 and 14 rejections out of 91 tests. Although Table 2.1 shows that it is possible to observe more rejections than 14 or fewer than 5, the probability of doing so when the property being tested is true is about 0.08. Therefore, if the total number of rejections in the goodness-of-fit, uniformity (on the unit line, unit square, or unit cube), or independence tests are between 5 and 14 inclusive, then there is no reason to suspect that the variates have properties different than desired. On the other hand, since there is only a 3.6% chance of observing more than 14 rejections and only a 4.4% chance of observing fewer than 5 rejections when the property holds, it is reasonable to decide (with an 8% chance of being wrong) that the variates being considered do not have the property (goodness-of-fit, uniformity, independence) being tested. It may seem incongruous that too few rejections is unacceptable, but there is very little chance of such a thing occurring when a large number of independent tests are performed on truly random data. The idea behind all the tests in this report is that if the property of interest holds, then the probability of finding something anomalous should be very small. Therefore, if something with very little chance of occurring happens, then it is concluded that an anomaly has been found.

Recall that the goodness-of-fit, uniformity, and independence tests are performed as two-tailed tests with 0.10 level of significance. However, in

TABLE 2.1. Probabilities of Specified Numbers of Rejections
Out of 91 Tests, Where the Probability of
Incorrectly Rejecting on 1 Test is 0.10

<u>Number of Rejections</u>	<u>Individual Probability</u>	<u>Cumulative Probability</u>
0	0.000069	0.000069
1	0.000693	0.000762
2	0.003466	0.004228
3	0.011425	0.015653
4	0.027928	0.043581
5	0.053995	0.097576
6	0.085991	0.183567
7	0.116020	0.299587
8	0.135357	0.434944
9	0.138699	0.573643
10	0.126370	0.700014
11	0.103394	0.803407
12	0.076588	0.879995
13	0.051713	0.931709
14	0.032013	0.963722
15	0.018259	0.981981
16	0.009637	0.991618
17	0.004724	0.996342
18	0.002158	0.998499
19	0.000921	0.999421
20	0.000368	0.999789
21	0.000138	0.999928
22	0.000049	0.999976
23	0.000016	0.999993
24	0.000005	0.999998
25	0.000002	0.999999
26	0.000000	1.000000

TABLE 2.2. Probabilities of Specified Numbers of Rejections
Out of 91 Tests, Where the Probability of
Incorrectly Rejecting on 1 Test is 0.05

<u>Number of Rejections</u>	<u>Individual Probability</u>	<u>Cumulative Probability</u>
0	0.009394	0.009394
1	0.044992	0.054386
2	0.106560	0.160946
3	0.166383	0.327330
4	0.192654	0.519984
5	0.176431	0.696415
6	0.133097	0.829512
7	0.085062	0.914574
8	0.047008	0.961582
9	0.022817	0.984399
10	0.009847	0.994246
11	0.003816	0.998062
12	0.001339	0.999401
13	0.000428	0.999829
14	0.000126	0.999955
15	0.000034	0.999989
16	0.000008	0.999997
17	0.000002	0.999999
18	0.000000	1.000000

addition to recording the total number of rejections, we record the number in each "tail" of the test. These one-tailed numbers of rejections are what would be obtained if two separate one-tailed tests were performed at the 0.05 significance level. Therefore, the probabilities in Table 2.2 can be used to assess the number of rejections in either the lower or upper tail of any test. From Table 2.2 it is seen that 2 to 8 rejections are acceptable (probability of 0.91 of being in this range).

Table 2.3 contains the observed number of rejections (out of 91 tests) in each tail of the one-, two- and three-dimensional uniformity tests, goodness-of-fit tests, and independence test.

TABLE 2.3. Number of Rejections from Goodness-of-Fit, Independence and Uniformity Tests

Test	Number of Rejections (out of 91)		Total
	Lower-Tail ^(a)	Upper-Tail ^(b)	
Goodness-of-Fit:			
Cramer-von Mises	4	4	8
Kolmogorov-Smirnov	7	5	12
Kuiper	5	3	8
Watson	4	4	8
Independence:			
Runs Test	6	5	11
Uniformity:			
One-dimensional	4	4	8
Two-dimensional	3	5	8
Three-dimensional	5	4	9

(a) Lower-tail rejections indicate that the variates: (i) fit the uniform distribution too well (goodness-of-fit test), (ii) were too random (independence test), or (iii) were too uniform (one-, two-, and three-dimensional uniformity tests).

(b) Upper-tail rejections indicate that the variates: (i) had a significant lack-of-fit from the uniform distribution (goodness-of-fit test), (ii) had a lack of randomness (independence test), or (iii) had a lack of uniformity (one-, two-, and three-dimensional uniformity tests).

The theoretical mean and variance of uniform (0,1) random variates are 0.5 and 0.08333333 respectively. The string means were assumed to be normally distributed, and when compared to 0.5 at the 0.05 significance level, three rejections occurred (which is in the acceptable range of rejections, based on Table 2.2). The string variances had a range of 0.08126699 to 0.08451434 and an average of 0.08343388. Based on these results, there is no evidence that the true mean and variance of the strings of variates are not 0.5 and 0.08333333 respectively.

Figures 2.1 and 2.2 are typical of the histograms and theoretical quantile-quantile plots produced from the strings of uniform (0,1) pseudo-random variates. In Figure 2.1, the true uniform probability density function is superimposed on the histogram for comparison purposes. The histogram compares very well with the theoretical density function given that some differences are

FIGURE 2.1. Histogram of 10,000 Random Variates from the PACSTAT Uniform (0,1) Random Number Generator. The straight line is the theoretical ideal.

FIGURE 2.2. Theoretical Quantile-Quantile Plot of 10,000 Random Variates from the PACSTAT Uniform (0,1) Random Number Generator. The straight line is the theoretical ideal.

anticipated because of chance and the choice of bin width for plotting the histogram. In the theoretical quantile-quantile plot (Figure 2.2) the dashed line is the plot of the ordered data versus the theoretical quantiles. The solid line is the expected line if the distribution of the data matches the hypothesized distribution. The two lines coincide almost exactly, showing the good performance of the uniform RNG.

Based on the above results, there is no evidence that the variates within a string are not a random sample from a uniform (0,1) distribution. In view of the probabilities in Tables 2.1 and 2.2, the numbers of rejections obtained with the tests are acceptable. Each string of variates appears to have the correct true mean and variance. The histograms and theoretical quantile-quantile plots also did not show anything anomalous in the strings of variates. Hence, provided the corrections noted in Section 5 are made in PACSTAT, it appears to satisfactorily produce pseudo-random uniform (0,1) variates. However, we briefly discuss in Section 5.0 the findings from a literature review that indicate a simple modification to the uniform random number generator used by PACSTAT would improve its performance.

undisturbed because of chance and the choice of bin width for plotting the histogram. In the theoretical quantile-quantile plot (Figure 3.2) the dashed line is the plot of the ordered data versus the theoretical quantiles. The solid line is the expected line if the distribution of the data matches the hypothesized distribution. The two lines coincide almost exactly, showing the good performance of the uniform RNG.

Based on the above results, there is no evidence that the variates within a string are not a random sample from a uniform (0,1) distribution. In view of the probabilities in Tables 2.1 and 2.2, the numbers of rejections obtained with the tests are acceptable. Each string of variates appears to have the correct true mean and variance. The histograms and theoretical quantile-quantile plots also did not show anything anomalous in the strings of variates. Hence, provided the corrections noted in Section 2 are made in RACSTAT, it appears to satisfactorily produce pseudo-random uniform (0,1) variates. However, we briefly discuss in Section 3.2 the findings from a literature review that indicate a single modification to the uniform random number generator used by RACSTAT would improve its performance.

3.0 EXPONENTIAL AND NORMAL RANDOM NUMBER GENERATORS

The second stage of testing the PACSTAT RNGs focused on variates from the exponential and normal distributions. Variates from these distributions are generated in PACSTAT from uniform (0,1) variates via the probability integral transformation method (see Appendix A). The transformation is theoretically exact for the exponential distribution, but involves a numerical approximation for the normal distribution.

3.1 TESTS APPLIED TO THE NORMAL AND EXPONENTIAL RANDOM NUMBER GENERATORS

In our tests, PACSTAT was used to produce variates from an exponential distribution with parameter $\theta = 1$ and a normal distribution with the mean equal to zero and the standard deviation equal to one. The goodness-of-fit tests and the plots used to examine the uniform (0,1) RNG were also used to check the exponential and normal RNGs. As for all distributions, summary statistics were computed for each string of variates for each distribution and were compared to theoretical values, and programming and hand calculation checks were made.

To test these two RNGs, 100 strings of 500 variates were generated from each distribution, and were subjected to the above mentioned tests. Only 500 variates were generated for these tests to reduce the long run times (8 to 12 hours) required to perform the statistical tests for 10,000 variates. Also, as discussed in Section 1.0, less extensive testing of the exponential and normal RNGs is required (because they are obtained using the uniform RNG, which was previously validated).

Prior to generating the 100 strings of 500 variates, the appropriate corrections (see Section 5.0) were made to the uniform RNG. Tables 3.1 and 3.2 correspond to Tables 2.1 and 2.2 except the probabilities are based on 100 independent tests instead of 91. From Tables 3.1 and 3.2 it is seen that 5 to 15 rejections are acceptable (probability of 0.94) when testing at a 0.10 significance level, and 2 to 8 rejections are acceptable (probability of 0.90) when testing at a 0.05 significance level.

TABLE 3.1. Probabilities of Specified Numbers of Rejections
Out of 100 Tests, Where the Probability of
Incorrectly Rejecting on 1 Test is 0.10

Number of Rejections	Individual Probability	Cumulative Probability
0	0.000027	0.000027
1	0.000295	0.000322
2	0.001623	0.001945
3	0.005892	0.007836
4	0.015875	0.023711
5	0.033866	0.057577
6	0.059579	0.117156
7	0.088895	0.206051
8	0.114823	0.320874
9	0.130416	0.451290
10	0.131865	0.583156
11	0.119878	0.703033
12	0.098788	0.801821
13	0.074302	0.876123
14	0.051304	0.927427
15	0.032682	0.960109
16	0.019292	0.979401
17	0.010592	0.989993
18	0.005427	0.995419
19	0.002602	0.998021
20	0.001171	0.999192
21	0.000496	0.999688
22	0.000198	0.999886
23	0.000075	0.999960
24	0.000027	0.999987
25	0.000009	0.999996
26	0.000003	0.999999
27	0.000001	1.000000
28	0.000000	1.000000

TABLE 3.2. Probabilities of Specified Numbers of Rejections
Out of 100 Tests, Where the Probability of
Incorrectly Rejecting on 1 Test is 0.05

Number of Rejections	Individual Probability	Cumulative Probability
0	0.005921	0.005921
1	0.031161	0.037081
2	0.081182	0.118263
3	0.139576	0.257839
4	0.178143	0.435981
5	0.180018	0.615999
6	0.150015	0.766014
7	0.106026	0.872040
8	0.064871	0.936910
9	0.034901	0.971812
10	0.016716	0.988528
11	0.007198	0.995726
12	0.002810	0.998536
13	0.001001	0.999537
14	0.000327	0.999864
15	0.000099	0.999963
16	0.000028	0.999991
17	0.000007	0.999998
18	0.000002	0.999999
19	0.000000	1.000000

3.2 RESULTS OF TESTS ON THE NORMAL AND EXPONENTIAL RANDOM NUMBER GENERATORS

Table 3.3 summarizes the results of the goodness-of-fit tests. Figures 3.1, 3.2, 3.3, and 3.4 show typical histograms and theoretical quantile-quantile plots for exponential and normal variates.

Table 3.3 gives no reason to question the fit of the exponential ($\theta = 1$) and normal (0,1) distributions to their corresponding sets of variates. Also, the comparison of string means and variances to theoretical values gave no reason to doubt the performance of the two RNGs. Figures 3.1 and 3.3 are

TABLE 3.3. Number of Rejections in Each Tail in Goodness-of-Fit Tests for the Exponential and Normal Random Number Generators in PACSTAT

Tests	Number of Rejections		Total
	Lower-Tail (a)	Upper-Tail (b)	
Exponential:			
Cramer-von Mises	5	4	9
Kolmogorov-Smirnov	5	6	11
Kuiper	6	5	11
Watson	5	5	10
Normal:			
Cramer-von Mises	5	4	9
Kolmogorov-Smirnov	5	5	10
Kuiper	6	4	10
Watson	5	5	10

- (a) Lower-tail rejections indicate that the RNG variates fit the distribution (normal or exponential) too well.
- (b) Upper-tail rejections indicate that the RNG variates do not fit the distribution (normal or exponential) of interest.

FIGURE 3.1. Histogram of 500 Random Variates from the Exponential Distribution with Parameter $\theta = 1$. The solid curve is the theoretical ideal.

FIGURE 3.2. Theoretical Quantile-Quantile Plot of 500 Random Variates from the Exponential Distribution with Parameter $\theta = 1$. The straight line is the theoretical ideal.

FIGURE 3.3. Histogram of 500 Random Variates from the Normal (D,1) Distribution. The solid curve is the theoretical ideal.

FIGURE 3.4. Theoretical Quantile-Quantile Plot of 500 Random Variates from the Normal (0,1) Distribution. The straight line is the theoretical ideal.

typical histograms of strings of 500 variates for these two RNGs. The distributions of the variates have the correct shapes. Figures 3.2 and 3.4 are the theoretical quantile-quantile plots for strings of 500 variates from the normal and exponential RNGs. The quantile-quantile plots do not indicate any lack-of-fit because of shifts in mean or variance, different tails, or symmetry.

Figure 3.2 needs some explanation. The dashed line follows the solid line out to a theoretical quantile value of about 3.5 then it appears to fall away. Fewer observations in the tail of the distribution account for this divergence. When the data come from a distribution whose density decreases to zero in the tails, the quantile-quantile plot will exhibit more variability in the tails (Chambers et al. 1983, p. 197).

The exponential and normal random number generators appear to work satisfactorily. Neither the goodness-of-fit tests, the plots, nor the summary statistics gave any indication that the variates did not have the desired distributions.

4.0 REMAINING RANDOM NUMBER GENERATORS

The five remaining PACSTAT random number generators were checked in the third stage of testing. PACSTAT was used to generate 100 strings of 500 variates for:

- the loguniform (common log) from a uniform (0,1)
- the truncated exponential from an exponential ($\theta = 1$) with limits 0.5 to 2.5
- the lognormal (natural log) from a normal (0,1)
- the truncated normal from a normal (0,1) with limits -1.5 to 1.5
- the truncated lognormal (natural log) from a normal (0,1) with limits -1.5 to 1.5.

4.1 TESTS ON THE REMAINING FIVE RANDOM NUMBER GENERATORS

For each of the 100 strings of each distribution, summary statistics were computed and compared to theoretical values. The programming of the mathematical transformations used to produce variates from the five distributions was checked. Hand calculation checks were performed for a few variates from each of the five distributions. Histograms and theoretical quantile-quantile plots were constructed for 10 strings of 500 variates for each distribution.

Extensive testing of the loguniform, lognormal, truncated normal, truncated lognormal, and truncated exponential RNGs is not required at this stage. In the case of the lognormal and loguniform RNGs, variates are generated by simple exponentiation of normal and uniform variates, respectively. In the case of the truncated distributions, variates are essentially generated by sampling from the parent distribution but from within a restricted range. Since results of the first two stages of testing gave no reason to doubt the performance of the uniform, exponential, and normal random number generators, the five derivative generators should, aside from programming errors, work properly. See Section 1.0 for additional discussion of the hierarchical nature of the testing.

4.2 RESULTS OF TESTS ON THE REMAINING RANDOM NUMBER GENERATORS

All five of the distributions mentioned above appeared to perform satisfactorily after some programming errors in PACSTAT were detected and corrected. The programming errors, which affected the generation of truncated normal and truncated lognormal variates, are discussed and corrections listed in Section 5.0. Figures 4.1 to 4.10 are typical of the histograms and theoretical quantile-quantile plots produced for strings of variates from each distribution. In the case of the loguniform, lognormal, and truncated lognormal distributions, the variates were back-transformed to uniform, normal, and truncated normal variates, respectively. Nothing atypical appeared in the plots.

FIGURE 4.1. Histogram of 500 Random Variates from the Loguniform Distribution Based on the Uniform (0,1). The solid curve is the theoretical ideal.

FIGURE 4.2. Theoretical Quantile-Quantile Plot of 500 Random Variates from the Loguniform Distribution Based on the Uniform (0,1). The straight line is the theoretical ideal.

FIGURE 4.3. Histogram of 500 Random Variates from the Truncated Exponential Distribution. Truncation limits are 0.5 and 2.5. The solid curve is the theoretical ideal.

FIGURE 4.4. Theoretical Quantile-Quantile Plot of 500 Random Variates from the Truncated Exponential Distribution. Truncation limits are 0.5 and 2.5. The straight line is the theoretical ideal.

FIGURE 4.5. Histogram of 500 Random Variates from the Lognormal Distribution Based on the Normal (0,1). The solid curve is the theoretical ideal.

FIGURE 4.6. Theoretical Quantile-Quantile Plot of 500 Random Variates from the Lognormal Distribution Based on the Normal (0,1). The straight line is the theoretical ideal.

FIGURE 4.7. Histogram of 500 Random Variates from the Truncated Normal Distribution Based on the Normal (0,1). Truncation limits are -1.5 and 1.5. The solid curve is the theoretical ideal.

FIGURE 4.8. Theoretical Quantile-Quantile Plot of 500 Random Variates from the Truncated Normal Distribution Based on the Normal (0,1). Truncation limits are -1.5 and 1.5. The straight line is the theoretical ideal.

FIGURE 4.9. Histogram of 500 Random Variates from the Truncated Lognormal Distribution Based on the Normal (0,1). The truncation limits are -1.5 and 1.5. The solid curve is the theoretical ideal.

FIGURE 4.10. Theoretical Quantile-Quantile Plot of 500 Random Variates from the Truncated Lognormal Distribution Based on the Normal (0,1). Truncation limits are -1.5 and 1.5. The straight line is the theoretical ideal.

FIGURE 4.10. Theoretical Quantile-Quantile Plot of 500 Random Variables from the Truncated Lognormal Distribution Based on the Normal (0,1). Truncation limits are -1.5 and 1.5. The straight line is the theoretical ideal.

5.0 CORRECTIONS AND LITERATURE FINDINGS

This section summarizes the corrections needed to make the RNGs in PACSTAT function as designed. Some minor errors were found that affected the uniform, truncated normal, and truncated lognormal RNGs. This section also contains a discussion of findings from a literature review.

5.1 CORRECTIONS

Two errors were found in the uniform RNG. First, the seeds were being read using single precision and then they were boosted to double precision. This caused the last 2 or 3 digits to be changed. The resulting seeds actually used were always even. Secondly, the range of permissible seed values was restricted to the closed interval $[2, 2E+09]$ instead of the (correct) closed interval $[1, (2^{31})-2]$. Values outside the interval $[2, 2E+09]$ were set equal to $2E+05$. The difference between the two intervals was the elimination of over 147 million permissible seed values. As the RNG started up, it iterated once and then checked the new seed, setting it to $2E+05$ if the new seed was outside the interval $[2, 2E+09]$. This process produced 10 identical strings of variates when the uniform RNG was being tested. Hence, only 91 distinct strings of variates were tested instead of 100. The first error was corrected by reading the input seed values in double precision and by eliminating the first call to the random number generator in the main module of PACSTAT. The specific corrections to the original version of PACSTAT (A0, contained in Appendix B) are:

Deleted

READ(IN,*,ERR=190) WD	PACSTAT.228
DSEED=DBLE(WD)	PACSTAT.230
A=U01(DSEED)	PACSTAT.231

Added

READ(IN,*,ERR=190) DSEED	HEID13.6
--------------------------	----------

The second error was corrected by extending the range of seed values to the permissible range. The specific corrections to the A0 version of PACSTAT are:

Deleted

IF((WD.LT.2.).OR.(WD.GT.2.E+9)) GO TO 19D	PACSTAT.229
IF((DSEED.LT.2.0D0).OR.(DSEED.GT.2.0E+9)) DSEED=2.0E+5	U01S.39
+NERATOR.'/1X,'(A REAL NUMBER BETWEEN 1.0 AND 2.0E+9)')	PACSTAT.335

Added

DOUBLE PRECISION MXSEED	HEIDI3.1
REAL*4 MNSEED	HEIDI3.2
REAL*8 MXSEED	HEIDI3.3
MNSEED=1.0	HEIDI3.4
MXSEED=(2.0**31)-2	HEIDI3.5
IF((DSEED.LT.MNSEED).OR.(DSEED.GT.MXSEED)) GO TO 190	HEIDI3.8
+NERATOR.'/1X,'(A REAL NUMBER BETWEEN 1.0 AND 2 ³¹ -2.)'	BCSFIX.36

It is recommended that line U01S.39 be replaced with a check on the correct limits for a seed value, with a flag being set and returned in the subroutine U01S argument list. Further, the calling routine would then have to check the flag and appropriately handle an out-of-range seed. Because all seeds provided to PACSTAT during our testing were in the correct range, the lack of a check as recommended did not affect our runs. D. W. Langford at Boeing Computer Services (BCS) mentioned that routines other than PACSTAT also access subroutine U01S, so any corrections should be made keeping all uses in mind. It was for this reason that the PNL staff did not implement a correction, but merely deleted the line U01S.39.

There were two typographical errors in the subroutine ALNORM which affected the truncated normal and truncated lognormal random number generators. The specific corrections to the A0 (original) version of PACSTAT are:

Deleted

+ (Z+3.980647794D-4 + 1.98615381364D0/	ALNORM.38
+ (Z+4.8385912808D0 + 15.1508972451D0/	ALNORM.40

Added

+ (Z+3.980647794D-4 + 1.98615381364D0/	HEIDI3.9
+ (Z+4.8385912808D0 - 15.1508972451D0/	HEIDI3.10

The A0 version of PACSTAT, the one received from BWIP, is listed in Appendix B. The line numbers listed above for deleted lines of code are from the A0 version. The B4 version of PACSTAT (Appendix C) implements the deletions and additions noted above.

With the above corrections, and based on the strings of variates produced and tested, the RNGs in PACSTAT appear to work as intended. However, the fact that errors were found and corrected raises the question of the impact on previous applications of PACSTAT. The errors in subroutine ALNORM affect the truncated normal and truncated lognormal RNGs, so any applications of PACSTAT which called these RNGs would be suspect and should be rerun. The errors in reading and checking seed values for the uniform RNG affect the output of all RNGs, since uniform variates are used by all RNGs. For applications where only one seed was used, the results are probably acceptable. For applications where more than one seed was used or where results were compared to other runs utilizing PACSTAT, the results should be considered faulty. In these latter cases, we recommend rerunning the application using the corrected version of PACSTAT.

5.2 LITERATURE FINDINGS

Fishman and Moore (1982) tested the uniform RNG used in PACSTAT along with 15 other such generators. The 16 uniform RNGs were all multiplicative congruential RNGs with modulus $(2^{31})-1$ (see Appendix A, Section A.1). The difference between the RNGs was the value of the multiplier used (PACSTAT uses 16807). Fishman and Moore generated 100 strings of 200,000 variates to test and compare the 16 generators/multipliers. In addition to the goodness-of-fit

tests, runs test, and tests of uniformity (on the unit line, unit square, and unit cube) used in our study, Fishman and Moore also performed several other tests, among them a test that uniformity on the unit line, unit square, and unit cube hold simultaneously. The generator with 16807 failed Fishman and Moore's test for two-dimensional uniformity and their simultaneous test for one-, two-, and three-dimensional uniformity. The fact that Fishman and Moore used strings of 200,000 variates where we only used 10,000 (because of computing limitations) may explain why they found problems that we did not. Another possible explanation is that their findings were due to chance, since some properties of an adequate RNG will occasionally seem invalid because of randomness.

In a recent paper, Fishman and Moore (1986) present the results of an exhaustive study of all possible multipliers for multiplicative congruential RNGs with modulus $(2^{31})-1$. Via several theoretical performance measures that characterize how well the RNG/multiplier "fills" k-dimensional unit cubes ($k=2, \dots, 6$), they recommend the five best multipliers. Fishman and Moore compare these five best multipliers to 16807 and to two other commonly used multipliers. They also perform the same statistical tests for the five best multipliers as in their 1982 article (again using 100 sets of 200,000 variates), concluding that the five multipliers show no empirical aberrations.

In comparing the statistical/empirical results of Fishman and Moore's 1982 and 1986 papers, only slight improvements in the five best multiplier results are seen relative to the 16807 multiplier results. However, the theoretical performance measures are clearly superior for the five new generators as compared to 16807. Since the statistical/empirical tests employed in this review are not designed to specifically test what Fishman and Moore's theoretical performance measures consider, it is not clear what the final evaluation should be.

In conclusion, the work of Fishman and Moore (1982, 1986) indicates that the PACSTAT random number generator could be improved theoretically by replacing the 16807 multiplier with one of their five best multipliers. However, it is not clear what the practical improvement would be. Our belief is that the current uniform random number generator in PACSTAT (which is used to generate

random numbers from all other distributions) is an adequate one, but there may be better ones. Changing the multiplier in the uniform random number generator in PACSTAT to one of the values recommended by Fishman and Moore would not require its retesting.

6.0 QUALITY ASSURANCE AND CONFIGURATION CONTROL OF PACSTAT

All work on PACSTAT was performed according to procedures described in the Statement of Work SOW-L1E2, and according to the Engineering Physics Department Quality Assurance (QA) Plan EPD-163-2. The operating environment for the computer work on PACSTAT was the PNL-BVAX (DEC VAX-11/780) running VMS-4.2. All files necessary to establish QA traceability are stored on DISK3 under the project name BWIP86. Additional files and backup files are stored on the user mountable disk labeled "BUDDEN", which is kept in the PNL-BVAX computer room. Tape copies of these files will be transmitted to BWIP at project completion. During FY86 through FY87 the following PNL staff members had access to the project and have established subdirectories under the main account [in brackets]

C. L. Bartley	[BWIP86.CLB]
M. J. Budden	[BWIP86.MJB]
H. Harty	[BWIP86.HH]
G. F. Piepel	[BWIP86.GFP]
M. R. Toland	[BWIP86.MRT]

The QA controlled version of PACSTAT used at the start of this work is called the A3 version and is stored in its own subdirectory, [BWIP86.PACSTAT.A3].

During the verification process several minor errors were uncovered in the A3 version of PACSTAT and were fixed. Additionally, changes were made to enhance the QA traceability by writing the input file back to a data echo file, and writing multiple title/comments cards to the output file and the data echo file. This unambiguously ties a particular input file to the respective output file. This final augmented version is designated A4 and is stored in its own subdirectory, [BWIP86.PACSTAT.A4].

The appropriate individual files on this subdirectory and their types are:

PACSTAT_A4.SRC	WITNESS Source File
PACSTAT_A4.FOR	FORTRAN Source File
PACSTAT_A4.LIS	FORTRAN Compiler Listing File
PACSTAT_A4.OPL	WITNESS Old Program Library
PACSTAT_A4.OLB	VAX Object Library (relocatable)
PACSTAT_A4.EXE	Executable Image File (absolute)
PACSTAT_A4.DXE	Debug Executable Image File (absolute)

The PACSTAT_A4.SRC file should also serve as an input file to the BWIP utility HISTORIAN so that the identical version of PACSTAT that PNL has verified can be installed on the BWIP PRIME, or the CRAY at Los Alamos National Laboratory (LANL).

6.1 CREATION OF PACSTAT VERSIONS A4 AND B4

The PACSTAT source code and ancillary records were received on March 17, 1986. The format was a 9-track, 1600-bpi, EBCDIC, 80-cpr tape. This tape was copied with the MYTAPE utility that allows foreign tapes to be read on the VAX 11/780. One file was copied from this tape. This file contained, in the following order:

1. source program of PACSTAT
2. subroutine SOLN - sample input
3. prime job control language
4. block data
5. subroutine SOLN - sample input
6. sample output
7. block data
8. user's notes - variable definitions and general information on PACSTAT code.

After a file was created on the VAX, the source code was identified and separated from the other records. The PACSTAT code was then put under configuration management using the utility WITNESS (Koontz and Stewart 1986).

WITNESS provides an automated and traceable means for installing, modifying, and documenting FORTRAN programs or other text files by assigning each line of source text a permanent unique identifier composed of a character string and an integer. WITNESS stores each line of text and its identifier in a program library. The program library can then be modified by referencing a line of text by its identifier. WITNESS allows the user to insert new lines and to delete existing lines. New lines are uniquely identified in the program library for future reference. Deleted lines remain in the program library (designated as inactive) and therefore may be restored. WITNESS keeps track of all changes to each line of text when they were made, and which "change ident" caused the change. All information may be retrieved by the "audit" feature. This unique and permanent identification of each line of text eliminates the possibility of the user accidentally destroying the integrity of the file (as sometimes happens with an interactive text editor). It also provides an orderly method of tracking code versions and identifying the various changes from version to version. This feature is indispensable for quality assurance, especially when multiple users require code modification privileges, as was the case for the FY86 work.

WITNESS is compatible with and provides most of the capabilities of Control Data Corporation's (CDC) UPDATE utility, which has been widely used for maintaining large simulation codes on CDC computers, and is similar to the HISTDRIAN utility offered by Opcode, Inc. (available on the LANL computer system). WITNESS was written by PNL to provide UPDATE capabilities on other machines, specifically DEC-VAX-11/780 and IBM systems.

The first step in the configuration control procedure for PACSTAT was to use WITNESS in the "creation run" mode. This step requires a WITNESS source file as input, which is identical to a FORTRAN source file, except for the presence of *DECK and *COMDECK cards that immediately precede subroutines and common blocks, respectively. The *DECK and *COMDECK cards provide the character part of the identifier for each line of FORTRAN source. WITNESS increments a counter for each card or record it encounters until it finds a new *DECK card. The counter provides the integer part of the unique identifier for each line of source. The identifier is written to the .FOR file into columns

81 to 96, which is then sent to the compiler. WITNESS also creates what is called a "Program Library" which contains all of the audit information as well as the identifiers. This is written to another file with the extension .OPL (Old Program Library) and is a random access formatted file that cannot be edited. The only means of changing the Old Program Library (OLDPL) is through the use of WITNESS so that the OLDPL becomes the primary archive file for maintaining versions of a code. The *DECK and *COMDECK cards were inserted in the the appropriate location in the PACSTAT FORTRAN source file and it was run through WITNESS. This created the A0 version of PACSTAT (listed in Appendix B). The A0 version of PACSTAT is essentially the version of PACSTAT that BWIP originally transferred to PNL, the only difference being the WITNESS generated "idents" in columns 81 to 96. Because of the system dependent features of PACSTAT, the A0 version would not compile on the PNL-VAX system computer. Thus, a series of changes were begun to convert PACSTAT into a VAX executable version, that was as much as possible, American National Standards Institute (ANSI) FORTRAN-77 compatible.

The initial set of updates (changes) consisted largely of deleting PRIME system-dependent functions and inserting coding to transform PACSTAT into WITNESS compatible form. All "\$Insert *<Common> COMDECK name" commands were replaced with "*Call COMDECK name," and three subroutine calls were commented out and new subroutines written. Specifically for our purposes, subroutine ASGVAX replaced subroutine ASG, subroutine IDVAX took the place of subroutine IDNUM, and subroutine RELEASE was modified. Subroutine VERSION was written to provide a banner page on the output file. VERSION's purpose was primarily for QA, providing traceability information on the version number of PACSTAT currently in use, update information, fixes and extensions, and applicable documentation.

The set of updates with the BCSFIX identifier was received from BCS during the PACSTAT conversion process, and included the addition of subroutine DISCLAIMER. This routine prints a verification/benchmarking disclaimer (required by the new QA procedures) and also makes some cosmetic changes to the output file. Coding with the "ECHO" identifier was added for the capability of having the input data echo to the output ECHO file (PACSTAT_A4.ECH). This

echoing of input data provides a good, traceable QA record of the input when running interactively, and unambiguously ties a particular input file to a specific output file. Included in this set of updates was the added feature of being able to run PACSTAT interactively or batch. The final set of updates with the identifier "HEIDI3" implement the corrections noted in Section 5.1. These updates modify PACSTAT to correct errors involving the generation of random numbers. This includes typographical errors detected in routine ALNORM as well as data overflow errors caused by using a single precision variable to handle the double precision random number seed in the PACSTAT routine.

The following seven steps describe exactly how the final version of PACSTAT (the A4 version) was created from the tape given PNL by BWIP.

1. The tape from D. Langford with PRIME-750 version of PACSTAT source and data tapes was received.
2. The PACSTAT source was edited, *DECK cards were put in appropriate places to create PACSTAT_AD.SRC. (Note that an EXTERNAL statement was added for BLKDAT.)
3. With the .SRC file from above as input, WITNESS was run in the creation mode, and it generated a file PACSTAT_A0.FOR ready to go to the FORTRAN compiler.
4. The .FOR file from 3 would not compile (PRIME system dependent constructs) so an update change file PACSTAT_A0.UPD was created to create a new PACSTAT_A1.FOR.
5. PACSTAT_A1.FOR compiled but had many different corrections. The PACSTAT_A2.FOR version was created from the A1 version by resequencing all cards, making the A2 version "clean."
6. Version A3 was created by taking the A2 version above and adding PACSTAT_A2.UPD, which contains an entire subroutine called VERSION. VERSION is used for tracking the various PACSTAT versions by writing important version information to the OUTPUT file. The B3 (batch version) was created the same way. The final versions capable of running on the VAX and satisfying acceptable traceability requirements are PACSTAT_A3.FOR and PACSTAT_B3.FOR.

7. PACSTAT_A3.UPD was used to change the A3 version into the final A4 version. Fixes included in this file were the changes to subroutine VERSION, the BCS fixes, a correction set called HEIDI which fixes some minor errors in the RNG; and some input echo fixes. The resulting interactive and batch versions are PACSTAT_A4.FOR and PACSTAT_B4.FOR.

A list of each of the .UPD update files described above is presented in Appendix D. All changes necessary to enable a person to go from the A0 version to the A4 or B4 version are contained in these files.

The final Configuration Controlled Code Versions are designated the A4 (interactive) and B4 (batch) versions, and contain the changes described above. A listing of the B4 version is provided in Appendix C. The character/integer identifiers in columns 81 to 96 of this file clearly show each change PNL has made to the original PACSTAT version. New sample input and output files are shown in Appendices E and F. All changes have been made upward compatible; this means that old PACSTAT input decks should still run on both the A4 and B4 versions. The new features of input are multiple title/comment cards on the input file for additional QA identification and a mode switch to indicate batch or interactive execution.

6.2 QUALITY ASSURANCE RECOMMENDATIONS

Based on the experience with PACSTAT there are two recommendations that we feel would improve the QA features of the code. First, we recommend that the current version and all subsequent versions be put under configuration management with HISTORIAN or WITNESS, as we have done at PNL. This will make transportation of the code to different machines easy, and traceable. It will save significant time in any further efforts on the code where quality assurance is required.

Secondly, we recommend that a concerted effort be made to remove all system-dependent features and make the code transportable between the VAX, PRIME, and LANL CRAY machines. Most of the system-dependent features have been

removed. Subroutine ASGVAX replaces subroutine ASG and will work on the PNL DEC VAX machine. It will probably work on the CRAY also, but this conjecture has not been tested.

Some system-dependent features still remain, but they could be easily changed. For instance, the date and time routines, and the run identification coding are system dependent and probably always will be. This feature can be made nearly transportable by requiring the user to specify as input data what machine he is running in. This information can then be used inside the code to branch to the proper system dependent calls, other calls being by-passed. This way the difference between truly system-dependent versions can be minimized. It would also be helpful if all the system-dependent features could be combined or organized into one or two subroutines.

7.0 GENERATION OF RANDOM NUMBERS FROM PACSTAT FOR STATISTICAL TESTS

The process for generating random numbers from PACSTAT for use in the statistical tests (see Sections 2.0 to 4.0) started with the creation of a new version of the SOLN routine to be linked with PACSTAT. The SOLN routine was originally intended to perform calculations on the variates generated with the RNGs, with the results of the calculations printed to both binary and formatted output files. The new version of SOLN provides data for the statistical tests by setting the output variable equal to the input data provided by the random number generator. The block data routine BLKDAT was also modified to reflect the number of solutions provided by SOLN, and provide internal documentation for the output files. Copies of BLKDAT and SOLN are included in Appendix G.

Next, VAX/VMS command files were built to run the PACSTAT program and merge the data provided by each run. A separate run of PACSTAT was made for each random number string that was generated by PACSTAT. All the runs for one type of distribution were contained in one command file. An annotated copy of the command file (for one run of PACSTAT) which generated 100 sets of 10,000 uniform variates is included in Appendix H. The initial seeds for the random number generator used in the command files, are themselves random numbers generated by SAS.

The output that resulted from the PACSTAT runs was not in a form immediately usable to the SAS procedures that performed the statistical tests. A short program was written to read the output file from PACSTAT; strip off the internal documentation and identifying numbers to each value in each random number string; and sort each random number string. The output of this program was used directly by the SAS procedures that performed the statistical tests. An example of the program that performed these functions for the uniform variates is provided in Appendix I.

REFERENCES

- Abramowitz, M. and Stegun, I. eds. (1974). Handbook of Mathematical Functions, 10th Printing, National Bureau of Standards, U.S. Department of Commerce.
- Chambers, J. M., W. S. Cleveland, B. Kleiner, and P. A. Tukey. 1983. Graphical Methods for Data Analysis, Duxbury Press, Boston, MA.
- Fishman, G. S. and L. R. Moore. 1982. "A Statistical Evaluation of Multiplicative Congruential Random Number Generators with Modulus $(2^{31}-1)$." Journal of the American Statistical Association 77(377):129-136.
- Fishman, G. S. and L. R. Moore, 1986. "An Exhaustive Analysis of Multiplicative Congruential Random Number Generators With Modulus $2^{31}-1$." SIAM J. Sci. Stat. Computing, 7:24-45.
- Koontz, A. S. and C. W. Stewart (1986). "WITNESS: A FORTRAN Utility for Maintenance and Modification of Text Files," BN-SA-2376, Battelle, Pacific Northwest Laboratories, Richland, Washington.
- Mood, A.M., F. A. Graybill, and D. C. Boes. (1974). Introduction to the Theory of Statistics, Third Edition, McGraw-Hill Book Company.
- SAS Institute Inc. 1985a. SAS User's Guide: Basics, Version 5 Edition. SAS Institute Inc., Cary, North Carolina.
- SAS Institute Inc. 1985b. SAS User's Guide: Statistics, Version 5 Edition. SAS Institute Inc., Cary, North Carolina.
- Stephens, M. A. 1969. "Use of Kolmogorov-Smirnov, Cramer-von Mises and Related Statistics without Extensive Tables." Journal of the Royal Statistical Society, Ser. B 32(1):115-122.
- Stephens, M. A. 1974. "EDF Statistics for Goodness of Fit and Some Comparisons." Journal of the American Statistical Association 69(347):730-737.

APPENDIX A

RANDOM NUMBER GENERATION IN PACSTAT

APPENDIX A

RANDDM NUMBER GENERATION IN PACSTAT

This appendix discusses the mathematical methods used to define the uniform, loguniform, exponential, truncated exponential, normal, truncated normal, lognormal, and truncated lognormal random number generators (RNG) in PACSTAT.^(a)

Considerable use is made of the "probability integral transform" method (Mood, Graybill, and Boes 1974, p. 202). The method states that for any random variable X having cumulative distribution $F(X)$, the transformation

$$F(X) = U$$

yields a random variable U having a uniform distribution on the interval $(0,1)$. Hence, given a random uniform variate u , a random variate x with cumulative distribution function F is given by

$$x = F^{-1}(u)$$

We now discuss the eight PACSTAT random number generators in turn.

A.1 GENERATION OF UNIFORM VARIATES

PACSTAT utilizes a multiplicative congruential generator with modulus $2^{31}-1$ and multiplier 16807 to produce uniform $(0,1)$ variates. It has the form

$$Z_i = 16807 Z_{i-1} \pmod{2^{31}-1} \quad (\text{A.1})$$

(a) This discussion is based on an August 1985 draft report, "Verification of PACSTAT Monte Carlo Routines", by P. W. Eslinger and D. W. Langford of Boeing Computer Services Richland, Incorporated.

with the normalization

$$U_i = \frac{Z_i}{2^{31}-1} \quad (\text{A.2})$$

producing uniform (0,1) variates. A seed Z_0 (1,2,..., $2^{31}-2$) is required to start the generator. Given a uniform (0,1) variate y from Equation (A.2), a uniform variate x on the interval (u_l, u_r) is calculated as

$$x = (u_r - u_l) y + u_l$$

The probability density function (pdf) for the uniform distribution is

$$f(x) = \begin{cases} \frac{1}{u_r - u_l} & u_l \leq x \leq u_r \\ 0 & \text{otherwise} \end{cases} \quad (\text{A.3})$$

A.2 GENERATION OF LOGUNIFORM VARIATES

Variates from a loguniform distribution can be generated using either the natural or common logarithm. The pdf is

$$f(x) = \begin{cases} \frac{\log_a(e)}{u_r - u_l} \frac{1}{x} & u_l \leq x \leq u_r \\ 0 & \text{otherwise} \end{cases} \quad (\text{A.4})$$

where a is 10 for the common logarithm, and e for the natural logarithm.

Variates from a loguniform distribution are obtained by first obtaining a uniform (u_l, u_r) variate y , and then transforming to a loguniform variate x via $x = a^y$.

A.3 GENERATION OF EXPONENTIAL VARIATES

The exponential distribution with parameter θ has pdf

$$f(x) = \begin{cases} e^{-\theta x} & x > 0 \\ 0 & \text{otherwise,} \end{cases} \quad (\text{A.5})$$

cumulative distribution function (cdf)

$$F(x) = \begin{cases} 1 - e^{-\theta x} & x > 0 \\ 0 & \text{otherwise,} \end{cases} \quad (\text{A.6})$$

and inverse cdf

$$F^{-1}(u) = -\log_e(1-u)/\theta \quad (\text{A.7})$$

The probability integral transform method is used to produce exponential variates x via

$$x = F^{-1}(u)$$

where u is a random uniform (0,1) variate, and F^{-1} is the inverse cdf from Equation (A.7).

A.4 GENERATION OF TRUNCATED EXPONENTIAL VARIATES

The truncated exponential distribution with parameter θ takes values in the interval (e_l, e_r) , where $e_l \geq 0$ and $e_r > e_l$. The truncated exponential has pdf

$$f(x) = \begin{cases} \frac{e^{-\theta x}}{e^{-\theta e_l} - e^{-\theta e_r}} & e_l \leq x \leq e_r \\ 0 & \text{otherwise} \end{cases} \quad (\text{A.8})$$

Variates from the truncated exponential are generated using the probability integral transform method. The first step is to compute the limits u_l and u_r

on a uniform distribution that corresponds to the exponential limits e_L and e_R . This is accomplished by solving $F(e_L) = u_L$ and $F(e_R) = u_R$, where F is given by (A.6):

$$u_L = 1 - e^{-\theta e_L} \quad \text{and} \quad u_R = 1 - e^{-\theta e_R} \quad (\text{A.9})$$

A truncated exponential variate is obtained by first generating a (u_L, u_R) uniform variate y , and then computing

$$x = -\log_e(1-y)/\theta \quad (\text{A.10})$$

A.5 GENERATION OF NORMAL VARIATES

The normal distribution with mean μ and standard deviation σ has pdf

$$f(x) = \frac{1}{\sqrt{2\pi} \sigma} \exp - \frac{(x-\mu)^2}{2\sigma^2} \quad -\infty \leq x \leq \infty \quad (\text{A.11})$$

Normal random variates are obtained via the probability integral transform method. An accurate numerical approximation (Abramowitz and Stegun 1974, Eq. 26.2.23, p. 933) for the inverse cdf is used, since an analytical closed form does not exist.

The PACSTAT method for generating normal variates has the following five steps:

1. Generate a variate, u , from the uniform (0,1) distribution.
2. If u is less than 0.5, the sign of the normal variate, x , will be positive. If u is greater than 0.5, set $u = 1-u$ and the sign of x will be negative.
3. Generate x from u using the following equations:

$$t = [-2 \ln(u)]^{1/2}$$

$$x = t - \frac{c_0 + c_1 t + c_2 t^2}{1 + d_1 t + d_2 t^2 + d_3 t^3}$$

where

$$\begin{aligned} c_0 &= 2.515517 & d_1 &= 1.432788 \\ c_1 &= 0.802853 & d_2 &= 0.189269 \\ c_2 &= 0.010328 & d_3 &= 0.001308 \end{aligned}$$

The absolute value of the error in x is less than $4.5\text{E-}04$.

4. Determine the sign of x from Step 2, the result is a variate from the normal distribution with mean 0 and standard deviation 1.
5. If a variate y from a normal distribution with mean μ and standard deviation σ is desired, use the expression $y = \sigma x + \mu$.

A.6 GENERATION OF TRUNCATED NORMAL VARIATES

A truncated normal distribution with parameters μ and σ takes values in the interval (n_l, n_r) . The pdf is

$$f(x) = \begin{cases} \frac{1}{\sqrt{2\pi}\sigma} \frac{\exp\left(-\frac{(x-\mu)^2}{2\sigma^2}\right)}{F\left(\frac{n_r-\mu}{\sigma}\right) - F\left(\frac{n_l-\mu}{\sigma}\right)} & n_l \leq x \leq n_r \\ 0 & \text{otherwise,} \end{cases} \quad (\text{A.12})$$

where F is the cdf of the nontruncated standard normal distribution (i.e., the normal distribution with $\mu = 0$ and $\sigma = 1$).

Truncated normal variates are generated via the probability integral transform method using the numerical approximation for the inverse cdf given in Section A.5. First, the uniform limits u_l and u_r corresponding to the truncated normal limits n_l and n_r are determined. This is accomplished by using the inverse cdf approximation of Section A.5 in a mixed Newton's and

bisection method to find the values u_L and u_R which satisfy $F[(n_L - \mu)/\sigma] = u_L$ and $F[(n_R - \mu)/\sigma] = u_R$. A truncated normal variate x is then calculated from a uniform $(0,1)$ variate using the inverse cdf approximation in Step 3 of Section A.5.

A.7 GENERATION OF LOGNORMAL VARIATES

Variates can be generated from a lognormal distribution for either common or natural logarithms. The pdf of the lognormal distribution with parameters μ and σ is

$$f(x) = \frac{\log_a(e)}{\sqrt{2\pi} \sigma x} \exp \left(- \frac{(\log_a(x) - \mu)^2}{2\sigma^2} \right) \quad x > 0 \quad (A.13)$$

where a is 10 for common logarithm and e for natural logarithm.

Lognormal variates x are generated by first generating a variate y from the normal distribution with mean μ and standard deviation σ , and then computing $x = a^y$.

A.8 GENERATION OF TRUNCATED LOGNORMAL VARIATES

A truncated lognormal distribution with parameters μ and σ takes values in the interval $(\ln_L, \ln_R)$. Truncated lognormal variates are generated by the following three steps:

1. Calculate the limits u_L and u_R for the uniform distribution corresponding to the lognormal truncation limits $\ln_L$ and $\ln_R$ (using a combined Newton and bisection method).
2. Calculate a truncated normal variate y from a uniform variate u on the interval (u_L, u_R) .
3. Transform the normal variate y to a lognormal (truncated) variate x via $x = a^y$ (where a is 10 for common logarithm and e for natural logarithm).

APPENDIX B

PACSTAT_AO.FOR (ORIGINAL INTERACTIVE VERSION,
FORTRAN SOURCE FILE)

FUNCTION ALNORM (X)	ALNORM	2
C	ALNORM	3
C ALGORITHM FROM APPL. STATIST. (1973) VOL. 22, NO. 3, PP 424-427.	ALNORM	4
C	ALNORM	5
C EVALUATES THE AREA UNDER A STANDARD NORMAL CURVE (MEAN = 0.0,	ALNORM	6
C STANDARD DEVIATION = 1.0), INTEGRATING FROM MINUS INFINITY TO X.	ALNORM	7
C A POLYNOMIAL METHOD IS USED.	ALNORM	8
C	ALNORM	9
REAL*8	ALNORM	10
+ A, Y, Z	ALNORM	11
LOGICAL	ALNORM	12
+ POSTIV	ALNORM	13
DATA	ALNORM	14
+ CON / 1.28 /,	ALNORM	15
+ UTZERO / 9.50 /	ALNORM	16
C	ALNORM	17
POSTIV=.TRUE.	ALNORM	18
IF (X.LT.0.0) POSTIV=.FALSE.	ALNORM	19
Z=DBLE(ABS(X))	ALNORM	20
C	ALNORM	21
IF (X.LT.UTZERO) GO TO 100	ALNORM	22
ALNORM=0.0	ALNORM	23
GO TO 130	ALNORM	24
100 CONTINUE	ALNORM	25
Y=0.500+Z*Z	ALNORM	26
IF (X.GT.CON) GO TO 110	ALNORM	27
C	ALNORM	28
A = 0.500 - Z * (0.398942280444D0 - 0.399903438504D0 * Y /	ALNORM	29
+ (Y + 5.75806480458D0 - 29.8213557808D0 /	ALNORM	30
+ (Y + 2.62433121679D0 + 48.6959930692D0 /	ALNORM	31
+ (Y + 5.92885724438D0))))	ALNORM	32
GO TO 120	ALNORM	33
C	ALNORM	34
110 CONTINUE	ALNORM	35
A = 0.398942280385 * DEXP(-Y) /	ALNORM	36
+ (Z - 3.8052D-8 + 1.00000015302D0 /	ALNORM	37
+ (Z + 3.980047794D-4 + 1.98615361364D0 /	ALNORM	38
+ (Z - 0.151679116835D0 + 5.29330324928D0 /	ALNORM	39
+ (Z + 4.8385912808D0 + 15.1500972451D0 /	ALNORM	40
+ (Z + 0.742380924027D0 + 30.789933034D0 /	ALNORM	41
+ (Z + 3.99019417011D0))))))	ALNORM	42
C	ALNORM	43
120 CONTINUE	ALNORM	44
ALNORM = SNGL(A)	ALNORM	45
130 CONTINUE	ALNORM	46
IF (POSTIV) ALNORM = 1.0-ALNORM	ALNORM	47
RETURN	ALNORM	48
END	ALNORM	49
SUBROUTINE ASG (ITYP,IERR,IFIL,NLEN,INF)	ASG	2
C	ASG	3
C ROUTINE FOR INTERACTIVE ASSIGNMENT OF FILES ON PRIME	ASG	4
C INPUT IS ITYP = 1 FOR WRITE FILE, 0 FOR READ ONLY	ASG	5
C = OTHER FOR READ/WRITE FILE (MUST BE EXISTING FILE)	ASG	6
C IERR = ERROR RETURN FLAG	ASG	7

C	IFIL = UNIT NUMBER TO USE	ASG	8
C	NLEN = DIMENSION OF INF	ASG	9
C	INF = NAME OF INPUT FILE (CHAR*4, DIMENSION = NLEN)	ASG	10
C		ASG	11
C	DESIGNED FOR PRIME 250 AND 750. FUNITS 1-4, 40-42, 51,	ASG	12
C	55 AND UNITS 21-28 ARE COMMITTED ON THESE MACHINES.	ASG	13
C		ASG	14
	\$INSERT SYSCOM>A\$KEYS	ASG	15
	\$INSERT *)COMMON>INOUT	ASG	16
	LOGICAL LOGIC	ASG	17
	CHARACTER*1	ASG	18
	+ ANS	ASG	19
	CHARACTER*4	ASG	20
	+ INF(NLEN)	ASG	21
	IERR=0	ASG	22
C		ASG	23
C	CHECK FOR FILE ALREADY OPEN ON THIS UNIT NUMBER	ASG	24
C		ASG	25
	REWIND (IFIL,ERR=100)	ASG	26
	WRITE (IOUT,500) IFIL,(INF(I),I=1,NLEN)	ASG	27
	GO TO 100	ASG	28
100	CONTINUE	ASG	29
	NML4=4*NLEN	ASG	30
C		ASG	31
C	CHECK FOR ALLOWABLE UNIT NUMBER. SET PRIME OFFSET.	ASG	32
C		ASG	33
	IF (IFIL.LE.4) GO TO 110	ASG	34
	IF ((IFIL.GE.21).AND.(IFIL.LE.28)) GO TO 110	ASG	35
	IF ((IFIL.GE.40).AND.(IFIL.LE.42)) GO TO 110	ASG	36
	IF ((IFIL.EQ.51).OR.(IFIL.EQ.55)) GO TO 110	ASG	37
	IF (IFIL.GT.127) GO TO 110	ASG	38
	GO TO 120	ASG	39
110	CONTINUE	ASG	40
	WRITE (IOUT,510) IFIL	ASG	41
120	CONTINUE	ASG	42
	IF (IFIL.LT.21) THEN	ASG	43
	IFUNIT=IFIL-4	ASG	44
	ELSE	ASG	45
	IFUNIT=IFIL-12	ASG	46
	ENDIF	ASG	47
C		ASG	48
C	CHECK TO SEE IF FILE ALREADY EXISTS	ASG	49
C		ASG	50
130	CONTINUE	ASG	51
	LOGIC = EXST\$A (INF,INTS(NML4))	ASG	52
C		ASG	53
C	READ ONLY OR READ/WRITE FILE	ASG	54
C	FILE MUST ALREADY EXIST	ASG	55
C		ASG	56
	IF (ITYP.NE.1) THEN	ASG	57
	IF (.NOT.LOGIC) THEN	ASG	58
140	CONTINUE	ASG	59
	WRITE (IOUT,520) (INF(I),I=1,NLEN)	ASG	60
	WRITE (IOUT,530)	ASG	61

READ (IN,540) ANS	ASG	62
IF ((ANS.NE.'Y').AND.(ANS.NE.'N')) THEN	ASG	63
IF ((ANS.NE.'y').AND.(ANS.NE.'n')) GO TO 140	ASG	64
ENDIF	ASG	65
IF ((ANS.EQ.'Y').OR.(ANS.EQ.'y')) THEN	ASG	66
WRITE (IOUT,550) IQB	ASG	67
READ (IN,560) (INF(I),I=1,NLEN)	ASG	68
GO TO 130	ASG	69
ELSE	ASG	70
GO TO 180	ASG	71
ENDIF	ASG	72
ELSE	ASG	73
IF (ITYP.EQ.0) THEN	ASG	74
LOGIC = OPEN\$(A\$READ+A\$SAMP,INF,INTS(NML4),INTS(IFUNIT))	ASG	75
ELSE	ASG	76
LOGIC = OPEN\$(A\$RDWR+A\$SAMP,INF,INTS(NML4),INTS(IFUNIT))	ASG	77
ENDIF	ASG	78
ENDIF	ASG	79
ELSE	ASG	80
C	ASG	81
WRITE ONLY FILE. CHECK WITH USER BEFORE	ASG	82
C	ASG	83
DELETING AN EXISTING FILE.	ASG	84
C	ASG	85
IF (LOGIC) THEN	ASG	86
150 CONTINUE	ASG	87
WRITE (IOUT,570) (INF(I),I=1,NLEN)	ASG	88
WRITE (IOUT,580) IQB	ASG	89
READ (IN,540) ANS	ASG	90
IF ((ANS.NE.'Y').AND.(ANS.NE.'N')) THEN	ASG	91
IF ((ANS.NE.'y').AND.(ANS.NE.'n')) GO TO 150	ASG	92
ENDIF	ASG	93
IF ((ANS.EQ.'N').OR.(ANS.EQ.'n')) THEN	ASG	94
160 CONTINUE	ASG	95
WRITE (IOUT,530) IQB	ASG	96
READ (IN,540) ANS	ASG	97
IF ((ANS.NE.'Y').AND.(ANS.NE.'N')) THEN	ASG	98
IF ((ANS.NE.'y').AND.(ANS.NE.'n')) GO TO 160	ASG	99
ENDIF	ASG	100
IF ((ANS.EQ.'N').OR.(ANS.EQ.'n')) GO TO 180	ASG	101
ANS='N'	ASG	102
ENDIF	ASG	103
IF ((ANS.EQ.'Y').OR.(ANS.EQ.'y')) THEN	ASG	104
LOGIC = DELETE\$(INF,INTS(NML4))	ASG	105
ELSE	ASG	106
WRITE (IOUT,550) IQB	ASG	107
READ (IN,560) (INF(I),I=1,NLEN)	ASG	108
GO TO 130	ASG	109
ENDIF	ASG	110
ENDIF	ASG	111
LOGIC = OPEN\$(A\$WRIT+A\$SAMP,INF,INTS(NML4),INTS(IFUNIT))	ASG	112
ENDIF	ASG	113
C	ASG	114
IF (LOGIC) RETURN	ASG	115
C	ASG	

170	CONTINUE	ASG	116
	WRITE (IOUT,500)	ASG	117
	WRITE (IOUT,530) IQ0	ASG	118
	READ (IN,540) ANS	ASG	119
	IF ((ANS.NE.'Y').AND.(ANS.NE.'N')) THEN	ASG	120
	IF ((ANS.NE.'y').AND.(ANS.NE.'n')) GO TO 170	ASG	121
	ENDIF	ASG	122
	IF ((ANS.EQ.'N').OR.(ANS.EQ.'n')) GO TO 180	ASG	123
	WRITE (IOUT,550) IQ0	ASG	124
	READ (IN,560) (INF(I),I=1,NLEN)	ASG	125
	GO TO 130	ASG	126
C		ASG	127
180	CONTINUE	ASG	128
	WRITE (IOUT,600)	ASG	129
	IERR=1	ASG	130
	RETURN	ASG	131
C		ASG	132
500	FORMAT (/1X,'FILE UNIT ',I5,' IS ALREADY ASSIGNED TO AN OPEN FILE.	ASG	133
	+ '/1X,'ATTEMPT TO ASSIGN FILE ',20A4)	ASG	134
510	FORMAT (/1X,'FILE UNIT ',I5,' IS IN POSSIBLE CONFLICT WITH PRIME SY	ASG	135
	+TEM UNITS'/)	ASG	136
520	FORMAT (/1X,'UNABLE TO LOCATE FILE ',20A4)	ASG	137
530	FORMAT (1X,'DO YOU WISH TO TRY AGAIN (Y/N)? ',A1)	ASG	138
540	FORMAT (A1)	ASG	139
550	FORMAT (1X,'ENTER FILE NAME ',A1)	ASG	140
560	FORMAT (20A4)	ASG	141
570	FORMAT (1X,'FILE ',20A4)	ASG	142
580	FORMAT (1X,'ALREADY EXISTS. ALL RIGHT TO DELETE (Y/N)? ',A1)	ASG	143
590	FORMAT (/1X,'FILE ASSIGNMENT UNSUCCESSFUL.')	ASG	144
600	FORMAT (1X,'PROGRAM ABORTED IN ROUTINE ASG.')	ASG	145
	END	ASG	146
	SUBROUTINE BERNLI (N,RNDVAL,RP1)	BERNLI	2
C		BERNLI	3
C	ROUTINE FOR TRANSFORMING A UNIFORMLY DISTRIBUTED DATA SET ON THE	BERNLI	4
C	INTERVAL 0,1 TO A BERNOULLI DISTRIBUTED DATA SET. INPUT VALUES	BERNLI	5
C	BECOME 0 IF THEY ARE LESS THAN RP1, AND 1 IF THEY ARE GREATER THAN	BERNLI	6
C	RP1.	BERNLI	7
C		BERNLI	8
C	N = NUMBER OF VALUES IN VECTOR RNDVAL.	BERNLI	9
C	RNDVAL = ON INPUT, VECTOR OF UNIFORMLY DISTRIBUTED VALUES.	BERNLI	10
C	ON OUTPUT, VECTOR OF BERNOULLI DISTRIBUTED VALUES.	BERNLI	11
C	RP1 = PROBABILITY OF THE ZERO STATE OCCURRING.	BERNLI	12
C		BERNLI	13
	DIMENSION	BERNLI	14
	+ RNDVAL(N)	BERNLI	15
C		BERNLI	16
C	BERNOULLI DISTRIBUTION	BERNLI	17
C		BERNLI	18
	DO 100 I=1,N	BERNLI	19
	RV=1.	BERNLI	20
	IF (RNDVAL(I).LT.RP1) RV=0.	BERNLI	21
	RNDVAL(I)=RV	BERNLI	22
100	CONTINUE	BERNLI	23
	RETURN	BERNLI	24

END	BERNLI	25
BLOCK DATA	BLKDAT	2
C	BLKDAT	3
C THIS BLOCK DATA CONTAINS THE PROBLEM DEFINITION FOR A PACSTAT	BLKDAT	4
C MONTE CARLO SIMULTAION RUN.	BLKDAT	5
C	BLKDAT	6
C THIS SAMPLE PROBLEM MODELS THE MASS STORAGE AND RELEASE RATE	BLKDAT	7
C (STEADY STATE) OF A CONTAMINANT, WHICH IS DIFFUSING INTO A BOUNDARY	BLKDAT	8
C LAYER AWAY FROM A SOLUBILITY LIMITED SOURCE. OUTSIDE THE BOUNDARY	BLKDAT	9
C LAYER, CONVECTION IS ASSUMED TO REMOVE THE CONTAMINANT AT A FAST	BLKDAT	10
C RATE. THE MODEL IS ONE DIMENSIONAL, CARTESIAN DIFFUSION, AND	BLKDAT	11
C OUTPUT VALUES ARE 'PER SQUARE METER' OF SOURCE ZONE.	BLKDAT	12
C	BLKDAT	13
\$INSERT SYSTEMS>UTIL>PACSTAT>COMMON>PPARA	BLKDAT	14
\$INSERT SYSTEMS>UTIL>PACSTAT>COMMON>PBLK1	BLKDAT	15
\$INSERT SYSTEMS>UTIL>PACSTAT>COMMON>PBLK2	BLKDAT	16
\$INSERT SYSTEMS>UTIL>PACSTAT>COMMON>PBLK3	BLKDAT	17
\$INSERT SYSTEMS>UTIL>FEMLIB>COMMON>IDCOM	BLKDAT	18
C	BLKDAT	19
C SET THE PROGRAM NAME AND VERSION NUMBER	BLKDAT	20
C	BLKDAT	21
DATA	BLKDAT	22
+ PRG/'DIF-STAT'/, VERNUM/1.0/	BLKDAT	23
C	BLKDAT	24
C SET THE PROBLEM TITLE	BLKDAT	25
C	BLKDAT	26
DATA	BLKDAT	27
+ TTLE/'MASS STORAGE AND RELEASE RATE INTO LAYER'/	BLKDAT	28
C	BLKDAT	29
C SET NUMBER OF SOLUTIONS AND THE PLOTTING LABEL	BLKDAT	30
C FOR THE OUTPUT VARIABLE FOR EACH SOLUTION.	BLKDAT	31
C	BLKDAT	32
DATA	BLKDAT	33
+ NSOLN/2/	BLKDAT	34
DATA	BLKDAT	35
+ PLABEL(1)/'MASS STORAGE IN LAYER, GM/M**2 '/,	BLKDAT	36
+ PLABEL(2)/'REL RATE (S.S.), GM/M**3-YR '/	BLKDAT	37
C	BLKDAT	38
C SET THE NUMBER OF INPUT VARIABLES AND	BLKDAT	39
C THEIR NAMES, CHARACTER*12.	BLKDAT	40
C	BLKDAT	41
DATA	BLKDAT	42
+ NVAR/4/	BLKDAT	43
DATA	BLKDAT	44
+ VLABEL(1)/'MOLEC DIFFSV'/, VLABEL(2)/'RETARDATION '/,	BLKDAT	45
+ VLABEL(3)/'LAYER WIDTH '/, VLABEL(4)/'SOLUBILITY '/	BLKDAT	46
C	BLKDAT	47
C SET THE UNITS FOR THE INPUT VARIABLES, CHARACTER*12	BLKDAT	48
C	BLKDAT	49
DATA	BLKDAT	50
+ VDIMEN(1)/'MET**2/YEAR '/, VDIMEN(2)/'UNITLESS '/,	BLKDAT	51
+ VDIMEN(3)/'METERS '/, VDIMEN(4)/'GM/MET**3 '/	BLKDAT	52
C	BLKDAT	53
C SET THE NUMBER OF PROBLEM CONSTANTS AND	BLKDAT	54

C	THE NAME AND UNITS FOR EACH CONSTANT.	BLKDAT	55
C		BLKDAT	56
	DATA	BLKDAT	57
	+ NCONST/2/	BLKDAT	58
	DATA	BLKDAT	59
	+ CLABEL(1)/'HALF LIFE '/,	BLKDAT	60
	+ CLABEL(2)/'POROSITY '/	BLKDAT	61
	DATA	BLKDAT	62
	+ CDIMEN(1)/'YEARS '/,	BLKDAT	63
	+ CDIMEN(2)/'UNITLESS '/	BLKDAT	64
C		BLKDAT	65
	END	BLKDAT	66
	BLOCK DATA	BLOCK	2
C		BLOCK	3
C	THIS BLOCK DATA CONTAINS THE PROBLEM DEFINITION FOR A PACSTAT	BLOCK	4
C	MONTE CARLO SIMULTATION RUN.	BLOCK	5
C		BLOCK	6
C	THIS SAMPLE PROBLEM MODELS THE MASS STORAGE AND RELEASE RATE	BLOCK	7
C	(STEADY STATE) OF A CONTAMINANT, WHICH IS DIFFUSING INTO A BOUNDARY	BLOCK	8
C	LAYER AWAY FROM A SOLUBILITY LIMITED SOURCE. OUTSIDE THE BOUNDARY	BLOCK	9
C	LAYER, CONVECTION IS ASSUMED TO REMOVE THE CONTAMINANT AT A FAST	BLOCK	10
C	RATE. THE MODEL IS ONE DIMENSIONAL, CARTESIAN DIFFUSION, AND	BLOCK	11
C	OUTPUT VALUES ARE 'PER SQUARE METER' OF SOURCE ZONE.	BLOCK	12
C		BLOCK	13
	#INSERT SYSTEMS>UTIL>PACSTAT>COMMON>PPARA	BLOCK	14
	#INSERT SYSTEMS>UTIL>PACSTAT>COMMON>PBLK1	BLOCK	15
	#INSERT SYSTEMS>UTIL>PACSTAT>COMMON>PBLK2	BLOCK	16
	#INSERT SYSTEMS>UTIL>PACSTAT>COMMON>PBLK3	BLOCK	17
	#INSERT SYSTEMS>UTIL>FEMLIB>COMMON>IDCOM	BLOCK	18
C		BLOCK	19
C	SET THE PROGRAM NAME AND VERSION NUMBER	BLOCK	20
C		BLOCK	21
	DATA	BLOCK	22
	+ PRG/'DIF-STAT'/, VERNUM/1.0/	BLOCK	23
C		BLOCK	24
C	SET THE PROBLEM TITLE	BLOCK	25
C		BLOCK	26
	DATA	BLOCK	27
	+ TITLE/'MASS STORAGE AND RELEASE RATE INTO LAYER'/	BLOCK	28
C		BLOCK	29
C	SET NUMBER OF SOLUTIONS AND THE PLOTTING LABEL	BLOCK	30
C	FOR THE OUTPUT VARIABLE FOR EACH SOLUTION.	BLOCK	31
C		BLOCK	32
	DATA	BLOCK	33
	+ NSOLN/2/	BLOCK	34
	DATA	BLOCK	35
	+ PLABEL(1)/'MASS STORAGE IN LAYER, GM/M**2 '/,	BLOCK	36
	+ PLABEL(2)/'REL RATE (S.S.), GM/M**3-YR '/	BLOCK	37
C		BLOCK	38
C	SET THE NUMBER OF INPUT VARIABLES AND	BLOCK	39
C	THEIR NAMES, CHARACTER*12.	BLOCK	40
C		BLOCK	41
	DATA	BLOCK	42
	+ NVAR/4/	BLOCK	43

DATA	BLOCK	44
+ VLABEL(1)/'MOLEC DIFFSV'/, VLABEL(2)/'RETARDATION '/,	BLOCK	45
+ VLABEL(3)/'LAYER WIDTH '/, VLABEL(4)/'SOLUBILITY '/	BLOCK	46
C	BLOCK	47
C SET THE UNITS FOR THE INPUT VARIABLES, CHARACTER*12	BLOCK	48
C	BLOCK	49
DATA	BLOCK	50
+ VDIMEN(1)/'MET**2/YEAR '/, VDIMEN(2)/'UNITLESS '/,	BLOCK	51
+ VDIMEN(3)/'METERS '/, VDIMEN(4)/'GM/MET**3 '/	BLOCK	52
C	BLOCK	53
C SET THE NUMBER OF PROBLEM CONSTANTS AND	BLOCK	54
C THE NAME AND UNITS FOR EACH CONSTANT.	BLOCK	55
C	BLOCK	56
DATA	BLOCK	57
+ NCONST/2/	BLOCK	58
DATA	BLOCK	59
+ CLABEL(1)/'HALF LIFE '/,	BLOCK	60
+ CLABEL(2)/'POROSITY '/	BLOCK	61
DATA	BLOCK	62
+ CDIMEN(1)/'YEARS '/,	BLOCK	63
+ CDIMEN(2)/'UNITLESS '/	BLOCK	64
C	BLOCK	65
END	BLOCK	66
-----	BLOCK	67
SAMPLE BLOCK DATA ROUTINE	BLOCK2	2
	BLOCK2	3
THIS IS A SAMPLE LISTING OF A BLOCK DATA ROUTINE. THIS ROUTINE	BLOCK2	4
DEFINES THE INPUT AND OUTPUT VARIABLES WHICH ARE USED BY THE MODEL	BLOCK2	5
BEING IMPLEMENTED.	BLOCK2	6
	BLOCK2	7
BLOCK DATA	BLOCK2	8
C	BLOCK2	9
C THIS BLOCK DATA CONTAINS THE PROBLEM DEFINITION FOR A PACSTAT	BLOCK2	10
C MONTE CARLO SIMULTAION RUN.	BLOCK2	11
C	BLOCK2	12
C THIS SAMPLE PROBLEM MODELS THE MASS STORAGE AND RELEASE RATE	BLOCK2	13
C (STEADY STATE) OF A CONTAMINANT, WHICH IS DIFFUSING INTO A BOUNDARY	BLOCK2	14
C LAYER AWAY FROM A SOLUBILITY LIMITED SOURCE. OUTSIDE THE BOUNDARY	BLOCK2	15
C LAYER, CONVECTION IS ASSUMED TO REMOVE THE CONTAMINANT AT A FAST	BLOCK2	16
C RATE. THE MODEL IS ONE DIMENSIONAL, CARTESIAN DIFFUSION, AND	BLOCK2	17
C OUTPUT VALUES ARE 'PER SQUARE METER' OF SOURCE ZONE.	BLOCK2	18
C	BLOCK2	19
\$INSERT SYSTEMS>UTIL>PACSTAT>COMMON>PPARA	BLOCK2	20
\$INSERT SYSTEMS>UTIL>PACSTAT>COMMON>PBLK1	BLOCK2	21
\$INSERT SYSTEMS>UTIL>PACSTAT>COMMON>PBLK2	BLOCK2	22
\$INSERT SYSTEMS>UTIL>PACSTAT>COMMON>PBLK3	BLOCK2	23
\$INSERT SYSTEMS>UTIL>FEMLIB>COMMON>IDCOM	BLOCK2	24
C	BLOCK2	25
C SET THE PROGRAM NAME AND VERSION NUMBER	BLOCK2	26
C	BLOCK2	27
DATA	BLOCK2	28
+ PRG/'DIF-STAT'/, VERNUM/1.0/	BLOCK2	29
C	BLOCK2	30
C SET THE PROBLEM TITLE	BLOCK2	31

C	DATA	BLOCK2	32
	+ TITLE/'MASS STORAGE AND RELEASE RATE INTO LAYER'/	BLOCK2	33
C		BLOCK2	34
C	SET NUMBER OF SOLUTIONS AND THE PLOTTING LABEL	BLOCK2	35
C	FOR THE OUTPUT VARIABLE FOR EACH SOLUTION.	BLOCK2	36
C		BLOCK2	37
	DATA	BLOCK2	38
	+ NSOLN/2/	BLOCK2	39
	DATA	BLOCK2	40
	+ PLABEL(1)/'MASS STORAGE IN LAYER, GM/M**2 '/,	BLOCK2	41
	+ PLABEL(2)/'REL RATE (S.S.), GM/M**3-YR '/	BLOCK2	42
C		BLOCK2	43
C	SET THE NUMBER OF INPUT VARIABLES AND	BLOCK2	44
C	THEIR NAMES, CHARACTER*12.	BLOCK2	45
C		BLOCK2	46
	DATA	BLOCK2	47
	+ NVAR/4/	BLOCK2	48
	DATA	BLOCK2	49
	+ VLABEL(1)/'MOLEC DIFFSV'/, VLABEL(2)/'RETARDATION '/,	BLOCK2	50
	+ VLABEL(3)/'LAYER WIDTH '/, VLABEL(4)/'SOLUBILITY '/	BLOCK2	51
C		BLOCK2	52
C	SET THE UNITS FOR THE INPUT VARIABLES, CHARACTER*12	BLOCK2	53
C		BLOCK2	54
	DATA	BLOCK2	55
	+ VDIMEN(1)/'MET**2/YEAR '/, VDIMEN(2)/'UNITLESS '/,	BLOCK2	56
	+ VDIMEN(3)/'METERS '/, VDIMEN(4)/'GM/MET**3 '/	BLOCK2	57
C		BLOCK2	58
C	SET THE NUMBER OF PROBLEM CONSTANTS AND	BLOCK2	59
C	THE NAME AND UNITS FOR EACH CONSTANT.	BLOCK2	60
C		BLOCK2	61
	DATA	BLOCK2	62
	+ NCONST/2/	BLOCK2	63
	DATA	BLOCK2	64
	+ CLABEL(1)/'HALF LIFE '/,	BLOCK2	65
	+ CLABEL(2)/'POROSITY '/	BLOCK2	66
	DATA	BLOCK2	67
	+ CDIMEN(1)/'YEARS '/,	BLOCK2	68
	+ CDIMEN(2)/'UNITLESS '/	BLOCK2	69
C		BLOCK2	70
	END	BLOCK2	71
		BLOCK2	72
		BLOCK2	73
		BLOCK2	74
	SUBROUTINE DATOUT (JONCE)	DATOUT	2
C		DATOUT	3
C	THIS ROUTINE CONTROLS THE PRINTING AND PLOTTING OF THE PACSTAT	DATOUT	4
C	OUTPUT (RESULTS) DATA.	DATOUT	5
C		DATOUT	6
C	JONCE IS A POINTER WHICH INDICATES IF THE DISPLA PLOTTING	DATOUT	7
C	PROCESSORS ARE EVER CALLED.	DATOUT	8
C		DATOUT	9
	\$INSERT *)COMMON>PPARA	DATOUT	10
	\$INSERT *)COMMON>PBLK1	DATOUT	11
	\$INSERT *)COMMON>PBLK3	DATOUT	12

\$INSERT *)COMMON>PBLK5	DATOUT	13
\$INSERT *)COMMON>PBLK6	DATOUT	14
\$INSERT *)COMMON>PBLK7	DATOUT	15
\$INSERT *)COMMON>PBLK9	DATOUT	16
\$INSERT *)COMMON>PBLK17	DATOUT	17
\$INSERT SYSTEMS>UTIL>USRLIB>COMMON>INOUT	DATOUT	18
CHARACTER*1	DATOUT	19
+ ANS	DATOUT	20
CHARACTER*32	DATOUT	21
+ NOPTN	DATOUT	22
DATA	DATOUT	23
+ NOPTN /' - ENTER A NEW PRINT INTERVAL - '/	DATOUT	24
C	DATOUT	25
IF ((NSAMC.LT.NSAM).AND.(NPRT.GT.1)) THEN	DATOUT	26
A=FLOAT(NPRT)/FLOAT(NSAM)	DATOUT	27
NPRT=IFIX(0.5+FLOAT(NSAMC)*A)	DATOUT	28
IF (NPRT.LT.1) NPRT=1	DATOUT	29
ENDIF	DATOUT	30
C	DATOUT	31
C SET CONFIDENCE LEVELS	DATOUT	32
C	DATOUT	33
ICC=1	DATOUT	34
C=FLOAT(NSAMC)	DATOUT	35
DO 100 I=1,NSAMC	DATOUT	36
CONF(I)=FLOAT(I)/C	DATOUT	37
100 CONTINUE	DATOUT	38
C	DATOUT	39
C ENTER SOLUTION TO CHOSE FROM	DATOUT	40
C	DATOUT	41
110 CONTINUE	DATOUT	42
WRITE (IOUT,500)	DATOUT	43
WRITE (IOUT,510) (I,PLABEL(I),I=1,NSOLN)	DATOUT	44
J=NSOLN+1	DATOUT	45
WRITE (IOUT,510) J,NOPTN	DATOUT	46
WRITE (IOUT,520) IQB	DATOUT	47
READ (IN,*,ERR=110) ISOLN	DATOUT	48
IF (ISOLN.EQ.0) RETURN	DATOUT	49
IF (ISOLN.LT.1) GO TO 110	DATOUT	50
IF (ISOLN.GT.NSOLN) THEN	DATOUT	51
120 CONTINUE	DATOUT	52
WRITE (IOUT,530) NPRT	DATOUT	53
READ (IN,*,ERR=120) NPRT	DATOUT	54
IF (NPRT.LT.1) NPRT=1	DATOUT	55
IF (NPRT.GT.NSAMC) NPRT=NSAMC	DATOUT	56
GO TO 110	DATOUT	57
ENDIF	DATOUT	58
C	DATOUT	59
C PROMPT FOR PROBABILITY/COMPLEMENTARY PROBABILITY	DATOUT	60
C	DATOUT	61
130 CONTINUE	DATOUT	62
WRITE (IOUT,540)	DATOUT	63
READ (IN,*,ERR=130) ICCD	DATOUT	64
IF ((ICCD.NE.1).AND.(ICCD.NE.2)) GO TO 130	DATOUT	65
C	DATOUT	66

C	TRANSFER SOLUTION TO PLOT/PRINT ARRAY	DATOUT	67
C		DATOUT	68
	IZE=0	DATOUT	69
	N=NSLOC(ISOLN)-1	DATOUT	70
	DO 140 I=1,NSAMC	DATOUT	71
	J=I+N	DATOUT	72
	RPLT(I)=RLTS(J)	DATOUT	73
	IF (RPLT(I).EQ.0.0) IZE=1	DATOUT	74
140	CONTINUE	DATOUT	75
	IF (RPLT(1).LT.0.0) IZE=0	DATOUT	76
C		DATOUT	77
	IF (ICC.NE.ICCD) THEN	DATOUT	78
	A=CONF(1)	DATOUT	79
	IF (ICC.EQ.2) A=CONF(NSAMC)	DATOUT	80
	DO 150 I=1,NSAMC	DATOUT	81
	CONF(I)=1.0-CONF(I)+A	DATOUT	82
150	CONTINUE	DATOUT	83
	ICC=ICCD	DATOUT	84
	ENDIF	DATOUT	85
C		DATOUT	86
C	PRINT RESULTS	DATOUT	87
C		DATOUT	88
C	OUTPUT DATA TABLE HEADERS	DATOUT	89
C		DATOUT	90
	WRITE (IOUT,550) PLABEL(ISOLN)	DATOUT	91
	IF (IDAT.GT.0) WRITE (IDAT,650) PLABEL(ISOLN)	DATOUT	92
	IF (IZE.EQ.1) THEN	DATOUT	93
	WRITE (IOUT,560)	DATOUT	94
	IF (IDAT.GT.0) WRITE (IDAT,560)	DATOUT	95
	ENDIF	DATOUT	96
	IF (ICCD.EQ.2) THEN	DATOUT	97
	WRITE (IOUT,570)	DATOUT	98
	IF (IDAT.GT.0) WRITE (IDAT,570)	DATOUT	99
	ELSE	DATOUT	100
	WRITE (IOUT,580)	DATOUT	101
	IF (IDAT.GT.0) WRITE (IDAT,580)	DATOUT	102
	ENDIF	DATOUT	103
C		DATOUT	104
C	FIRST DATA POINT, IF NOT PRINTED BY DEFAULT	DATOUT	105
C		DATOUT	106
	NSTRT=NPRT	DATOUT	107
	IF (NPRT.GT.1) THEN	DATOUT	108
	WRITE (IOUT,590) 1,RPLT(1),CONF(1)	DATOUT	109
	IF (IDAT.GT.0) WRITE (IDAT,590) 1,RPLT(1),CONF(1)	DATOUT	110
	IF (ICCD.EQ.2) NSTRT=NSTRT+1	DATOUT	111
	ENDIF	DATOUT	112
C		DATOUT	113
C	PRINTING LOOP	DATOUT	114
C		DATOUT	115
	J=0	DATOUT	116
	K=0	DATOUT	117
	DO 160 I=NSTRT,NSAMC,NPRT	DATOUT	118
	J=I	DATOUT	119
	IF ((RPLT(I).EQ.0.0).AND.(IZE.GT.0)) GO TO 160	DATOUT	120

WRITE (IOUT,590) I,RPLT(I),CONF(I)	DATOUT	121
IF (IDAT.GT.0) WRITE (IDAT,590) I,RPLT(I),CONF(I)	DATOUT	122
K=K+1	DATOUT	123
160 CONTINUE	DATOUT	124
C	DATOUT	125
C LAST DATA POINT, IF NOT PRINTED BY DEFAULT	DATOUT	126
C	DATOUT	127
IF (J.NE.NSAMC) THEN	DATOUT	128
WRITE (IOUT,590) NSAMC,RPLT(NSAMC),CONF(NSAMC)	DATOUT	129
IF (IDAT.GT.0) WRITE (IDAT,590) NSAMC,RPLT(NSAMC),CONF(NSAMC)	DATOUT	130
ENDIF	DATOUT	131
C	DATOUT	132
C WARNING IF ALL DATA POINTS ARE ZERO	DATOUT	133
C	DATOUT	134
IF (K.EQ.0) WRITE (IOUT,800) PLABEL(ISOLN)	DATOUT	135
C	DATOUT	136
C PLOT RESULTS	DATOUT	137
C	DATOUT	138
IF ((K.GT.0).AND.(NSAMC.GT.1)) THEN	DATOUT	139
170 CONTINUE	DATOUT	140
WRITE (IOUT,810) IQB	DATOUT	141
READ (IN,820) ANS	DATOUT	142
IF ((ANS.NE.'Y').AND.(ANS.NE.'N')) THEN	DATOUT	143
IF ((ANS.NE.'y').AND.(ANS.NE.'n')) GO TO 170	DATOUT	144
ENDIF	DATOUT	145
IF ((ANS.EQ.'Y').OR.(ANS.EQ.'y')) THEN	DATOUT	146
IF (JONCE.EQ.0) THEN	DATOUT	147
XL2=14.2	DATOUT	148
YL2=10.1	DATOUT	149
CALL PLINIT (XL2,YL2,IRUN)	DATOUT	150
XL=XL2-2.2	DATOUT	151
YL=YL2-2.8	DATOUT	152
ENDIF	DATOUT	153
CALL PPLT	DATOUT	154
JONCE=1	DATOUT	155
ENDIF	DATOUT	156
ENDIF	DATOUT	157
GO TO 110	DATOUT	158
C	DATOUT	159
500 FORMAT (/1X,'AVAILABLE VARIABLES ARE'/7X,'0) EXIT LIST')	DATOUT	160
510 FORMAT (3X,I5,') ',A32)	DATOUT	161
520 FORMAT (1X,'WHICH WOULD YOU LIKE (ENTER NUMBER)? ',A1)	DATOUT	162
530 FORMAT (1X,'THE CURRENT PRINT INTERVAL IS ',I5,'.'/1X,'ENTER THE D	DATOUT	163
+ESIRED VALUE.')	DATOUT	164
540 FORMAT (/1X,'WHICH WOULD YOU LIKE'/3X,'1) CUMULATIVE PROBABILITY'/	DATOUT	165
+3X,'2) COMPLEMENTARY CUMULATIVE PROBABILITY'/1X,'ENTER 1 OR 2')	DATOUT	166
550 FORMAT (///1X,'*--- OUTPUT CUMMULATIVE PROBABILITIES'/7X,'FOR STO	DATOUT	167
+CASTIC VARIABLE,',10X,A32)	DATOUT	168
560 FORMAT (/8X,'IN THE FOLLOWING TABLE, VALUES OF ZERO ARE OMITTED.')	DATOUT	169
570 FORMAT (//8X,'SAMPLE',6X,'VARIABLE',7X,'COMPLEMENTARY'/6X,'NUMBER'	DATOUT	170
+,8X,'VALUE',10X,'CONFIDENCE')	DATOUT	171
580 FORMAT (//8X,'SAMPLE',6X,'VARIABLE',8X,'CUMMULATIVE'/6X,'NUMBER',	DATOUT	172
+8X,'VALUE',10X,'CONFIDENCE')	DATOUT	173
590 FORMAT (1X,I10,5X,G12.4,5X,F11.5)	DATOUT	174

600 FORMAT (/1X,'ALL COMPUTED VALUES ARE ZERO FOR ',A32)	DATOUT	175
610 FORMAT (/1X,'WOULD YOU LIKE THE DATA PLOTTED (Y/N)? ',A1)	DATOUT	176
620 FORMAT (A1)	DATOUT	177
END	DATOUT	178
SUBROUTINE DATSET (IERR)	DATSET	2
C	DATSET	3
C THIS ROUTINE MOVES THE INPUT VARIABLES INTO ARRAY VINPT, AND	DATSET	4
C CALLS THE SOLUTION ROUTINE SOLN (IF NEEDED) TO COMPUTE THE	DATSET	5
C OUTPUT VALUES FOR EACH SAMPLE. THESE OUTPUT VALUES ARE MOVED	DATSET	6
C INTO ARRAY RLTS FOR LATER PROCESSING.	DATSET	7
C	DATSET	8
\$INSERT *)COMMON>PPARA	DATSET	9
\$INSERT *)COMMON>PBLK1	DATSET	10
\$INSERT *)COMMON>PBLK4	DATSET	11
\$INSERT *)COMMON>PBLK5	DATSET	12
\$INSERT *)COMMON>PBLK7	DATSET	13
\$INSERT *)COMMON>PBLK8	DATSET	14
\$INSERT *)COMMON>PBLK12	DATSET	15
\$INSERT *)COMMON>PBLK17	DATSET	16
C	DATSET	17
C	DATSET	18
IERR=0	DATSET	19
NUMERR=0	DATSET	20
DO 140 INDEX=1,NSAM	DATSET	21
NERR(INDEX)=0	DATSET	22
C	DATSET	23
C SAVE INPUT VALUES IN ARRAY VINPT	DATSET	24
C	DATSET	25
DO 100 I=1,NVAR	DATSET	26
J=NVLOC(I)+INDEX-1	DATSET	27
VINPT(I)=VAR(J)	DATSET	28
100 CONTINUE	DATSET	29
C	DATSET	30
C SOLUTION ROUTINE CALLED ONCE WHEN NSOLN=0	DATSET	31
C	DATSET	32
IF (NSOLN.GT.0) GO TO 110	DATSET	33
IF (INDEX.EQ.1) CALL SOLN (IERR)	DATSET	34
GO TO 140	DATSET	35
110 CONTINUE	DATSET	36
C	DATSET	37
C COMPUTE OUTPUT VARIABLES	DATSET	38
C	DATSET	39
CALL SOLN (IERR)	DATSET	40
IF (IERR.EQ.0) GO TO 120	DATSET	41
IF (IQUIT.GT.0) GO TO 150	DATSET	42
NUMERR=NUMERR+1	DATSET	43
NERR(INDEX)=INDEX	DATSET	44
IERR=0	DATSET	45
120 CONTINUE	DATSET	46
C	DATSET	47
C SAVE VALUES IN OUTPUT ARRAY	DATSET	48
C	DATSET	49
DO 130 I=1,NSOLN	DATSET	50
J=NSLOC(I)+INDEX-1	DATSET	51

RLTS(J)=VALU(I)	DATSET	52
130 CONTINUE	DATSET	53
140 CONTINUE	DATSET	54
RETURN	DATSET	55
C	DATSET	56
150 CONTINUE	DATSET	57
IERR=1	DATSET	58
NSAM=INDEX-1	DATSET	59
RETURN	DATSET	60
END	DATSET	61
SUBROUTINE DEXPF (N,RNDVAL,RP1)	DEXPF	2
C	DEXPF	3
C ROUTINE FOR TRANSFORMING A UNIFORMLY DISTRIBUTED DATA SET ON THE	DEXPF	4
C INTERVAL 0,1 TO AN EXPONENTIALLY DISTRIBUTED DATA SET.	DEXPF	5
C	DEXPF	6
C N = THE NUMBER OF ITEMS IN THE DATA SET.	DEXPF	7
C RNDVAL = VECTOR OF UNIFORMLY DISTRIBUTED VALUES ON INPUT. EACH	DEXPF	8
C VALUE MUST BE BETWEEN ZERO AND ONE.	DEXPF	9
C = VECTOR OF EXPONENTIALLY DISTRIBUTED VALUES ON OUTPUT.	DEXPF	10
C RP1 = MEAN VALUE FOR THE EXPONENTIAL DISTRIBUTION.	DEXPF	11
C	DEXPF	12
DIMENSION	DEXPF	13
+ RNDVAL(N)	DEXPF	14
C	DEXPF	15
C EXPONENTIAL DISTRIBUTION	DEXPF	16
C	DEXPF	17
DO 100 I=1,N	DEXPF	18
RV=1.0-RNDVAL(I)	DEXPF	19
IF (RV.LT.1.0E-21) RV=1.0E-21	DEXPF	20
RNDVAL(I)=-ALOG(RV)/RP1	DEXPF	21
100 CONTINUE	DEXPF	22
RETURN	DEXPF	23
END	DEXPF	24
SUBROUTINE DEXPFL (N,RNDVAL,RP1,AMIN,AMAX)	DEXPFL	2
C	DEXPFL	3
C ROUTINE FOR TRANSFORMING A UNIFORMLY DISTRIBUTED DATA SET ON THE	DEXPFL	4
C INTERVAL 0,1 TO AN EXPONENTIALLY DISTRIBUTED DATA SET, WITH THE	DEXPFL	5
C CONSTRAINT THAT ALL OUTPUT VALUES LIE BETWEEN SPECIFIED LIMITS.	DEXPFL	6
C	DEXPFL	7
C N = THE NUMBER OF ITEMS IN THE RANDOM VARIABLE VECTOR RNDVAL.	DEXPFL	8
C RNDVAL = ON INPUT, A VECTOR OF N RANDOM VALUES, UNIFORMLY	DEXPFL	9
C DISTRIBUTED, ON THE INTERVAL ZERO TO ONE.	DEXPFL	10
C = ON OUTPUT, A VECTOR OF N RANDOM VALUES, EXPONENTIALLY	DEXPFL	11
C DISTRIBUTED WITH 'MEAN' RP1, AND WITH VALUES BELOW AMIN	DEXPFL	12
C AND ABOVE AMAX DELETED FROM THE DISTRIBUTION.	DEXPFL	13
C RP1 = MEAN VALUE FOR THE DESIRED EXPONENTIAL DISTRIBUTION.	DEXPFL	14
C AMIN = MINIMUM LIMIT VALUE FOR THE OUTPUT DISTRIBUTION.	DEXPFL	15
C AMAX = MAXIMUM LIMIT VALUE FOR THE OUTPUT DISTRIBUTION.	DEXPFL	16
C	DEXPFL	17
C UMIN,UMAX = LIMITS ON THE UNIFORM DISTRIBUTION. THESE ARE	DEXPFL	18
C AVAILABLE TO THE USER THROUGH COMMON BLOCK ULIMITS.	DEXPFL	19
C	DEXPFL	20
\$INSERT *)COMMON>ULIMITS	DEXPFL	21
C	DEXPFL	22

	DIMENSION	DEXPFL	23
	+ RNDVAL(N)	DEXPFL	24
	DATA	DEXPFL	25
	+ IONE/1/	DEXPFL	26
C		DEXPFL	27
	IF (RP1.LT.0.) RP1=ABS(RP1)	DEXPFL	28
	IF (AMIN.LE.AMAX) GO TO 100	DEXPFL	29
	WD=AMIN	DEXPFL	30
	AMIN=AMAX	DEXPFL	31
	AMAX=WD	DEXPFL	32
100	CONTINUE	DEXPFL	33
	IF (AMIN.LT.AMAX) GO TO 110	DEXPFL	34
	AMIN=0.	DEXPFL	35
	AMAX=130.*RP1	DEXPFL	36
110	CONTINUE	DEXPFL	37
C		DEXPFL	38
C	UNIFORM DISTRIBUTION LIMITS	DEXPFL	39
C		DEXPFL	40
	UMIN=1.0-EXP(-RP1*AMIN)	DEXPFL	41
	UMAX=1.0-EXP(-RP1*AMAX)	DEXPFL	42
	RV=UMIN	DEXPFL	43
	CALL DEXPF (IONE,RV,RP1)	DEXPFL	44
	B=RV	DEXPFL	45
	RV=UMAX	DEXPFL	46
	CALL DEXPF (IONE,RV,RP1)	DEXPFL	47
	T=RV	DEXPFL	48
	IF (B.LE.T) GO TO 120	DEXPFL	49
	UMIN=1.0-UMIN	DEXPFL	50
	UMAX=1.0-UMAX	DEXPFL	51
120	CONTINUE	DEXPFL	52
C		DEXPFL	53
C	ADJUST UNIFORM DISTRIBUTION TO NEW LIMITS	DEXPFL	54
C		DEXPFL	55
	WD=UMAX-UMIN	DEXPFL	56
	DO 130 I=1,N	DEXPFL	57
	RNDVAL(I)=UMIN+RNDVAL(I)*WD	DEXPFL	58
130	CONTINUE	DEXPFL	59
C		DEXPFL	60
C	COMPUTE EXPONENTIAL DISTRIBUTION	DEXPFL	61
C		DEXPFL	62
	CALL DEXPF (N,RNDVAL,RP1)	DEXPFL	63
	RETURN	DEXPFL	64
	END	DEXPFL	65
	FUNCTION DNORM (RNDVAL,RP1,RP2)	DNORM	2
C		DNORM	3
C	ROUTINE FOR TRANSFORMING A SINGLE VALUE FROM A UNIFORMLY	DNORM	4
C	DISTRIBUTED DATA SET ON THE INTERVAL 0,1 TO A SINGLE VALUE IN A	DNORM	5
C	NORMALLY DISTRIBUTED DATA SET.	DNORM	6
C		DNORM	7
C	A POLYNOMIAL METHOD IS USED.	DNORM	8
C	REFERENCE ABRAMOWITZ & STEGUN, PAGE 933.	DNORM	9
C		DNORM	10
C	RNDVAL = INPUT RANDOM VALUE BETWEEN 0 AND 1.	DNORM	11
C	RP1 = MEAN VALUE FOR THE NORMAL DISTRIBUTION.	DNORM	12

C	RP2 = STANDARD DEVIATION FOR THE NORMAL DISTRIBUTION.	DNORM	13
C		DNORM	14
	LOGICAL	DNORM	15
	+ NEGTV	DNORM	16
	DATA	DNORM	17
	+ C0,C1,C2/2.515517,0.802853,0.010328/	DNORM	18
	DATA	DNORM	19
	+ D1,D2,D3/1.432788,0.189269,0.001308/	DNORM	20
C		DNORM	21
C	NORMAL DISTRIBUTION	DNORM	22
C		DNORM	23
	P=RNDVAL	DNORM	24
	NEGTIV=.TRUE.	DNORM	25
	IF (P.LT.0.5) GO TO 100	DNORM	26
	NEGTIV=.FALSE.	DNORM	27
	P=1.0-P	DNORM	28
100	CONTINUE	DNORM	29
	IF (ABS(P).LT.1.0E-21) P=1.0E-21	DNORM	30
C		DNORM	31
	T2=-2.0*ALOG(P)	DNORM	32
	T1=SQRT(T2)	DNORM	33
	T3=T1*T2	DNORM	34
C		DNORM	35
	XP=ABS(T1-(C0+C1*T1+C2*T2)/(1.0+D1*T1+D2*T2+D3*T3))	DNORM	36
C		DNORM	37
	IF (NEGTIV) XP=-XP	DNORM	38
C		DNORM	39
	DNORM=RP2*XP+RP1	DNORM	40
	RETURN	DNORM	41
	END	DNORM	42
	SUBROUTINE EXPECT	EXPECT	2
C		EXPECT	3
C	THIS ROUTINE COMPUTES THE EXPECTED MODE, MEAN, STANDARD	EXPECT	4
C	DEVIATION, AND MEDIAN FOR EACH INPUT DISTRIBUTION.	EXPECT	5
C		EXPECT	6
C	VINAVG = MEAN VALUES FOR THE INPUT DISTRIBUTIONS.	EXPECT	7
C	VINMED = MEDIAN VAULES FOR THE INPUT DISTRIBUTIONS.	EXPECT	8
C	VINSTD = STANDARD DEVIATIONS FOR THE INPUT DISTRIBUTIONS.	EXPECT	9
C	VINMOD = MODE OF INPUT DISTRIBUTION	EXPECT	10
C		EXPECT	11
	\$INSERT *)COMMON>PPARA	EXPECT	12
	\$INSERT *)COMMON>PBLK1	EXPECT	13
	\$INSERT *)COMMON>PBLK3	EXPECT	14
	\$INSERT *)COMMON>PBLK5	EXPECT	15
	\$INSERT *)COMMON>PBLK11	EXPECT	16
	\$INSERT *)COMMON>PBLK13	EXPECT	17
	\$INSERT *)COMMON>PBLK15	EXPECT	18
	\$INSERT SYSTEMS>UTIL>USRLIB>COMMON>INOUT	EXPECT	19
	REAL*8	EXPECT	20
	+ A,B,C,D,F,G	EXPECT	21
	DATA	EXPECT	22
	+ BASEXP/2.3025/, EMAX/5.E+1/, EMIN/2.E-2/	EXPECT	23
C		EXPECT	24
C	OMIT TABLE OF EXPECTED INPUT DISTRIBUTION PARAMETERS	EXPECT	25

C	IF ALL OF THE VARIABLES ARE CONSTANTS (NSTOC=1), ARE	EXPECT	26
C	ENDPOINT LIMITED, OR ARE READ FROM AN EXTERNAL FILE.	EXPECT	27
C	SET COUNTER 'LIMITS' TO INDICATE HOW MANY VARIABLES ARE	EXPECT	28
C	ENDPOINT LIMITED.	EXPECT	29
C		EXPECT	30
	LIMITS=0	EXPECT	31
	J=0	EXPECT	32
	DO 100 N=1,NVAR	EXPECT	33
	IF (ILIM(N).NE.0) LIMITS=LIMITS+1	EXPECT	34
	IF ((ILIM(N).NE.0).OR.(ITYPE(N).GT.8)) J=J+1	EXPECT	35
100	CONTINUE	EXPECT	36
	IF (LIMITS.EQ.NVAR) GO TO 240	EXPECT	37
	IF (J.EQ.NVAR) GO TO 200	EXPECT	38
	IF (NSTOC.EQ.1) GO TO 200	EXPECT	39
C		EXPECT	40
C	OUTPUT FILE UNIT	EXPECT	41
C		EXPECT	42
	III=IDAT	EXPECT	43
	IF (IDAT.EQ.0) III=IOUT	EXPECT	44
C		EXPECT	45
C	TABLE HEADER	EXPECT	46
C		EXPECT	47
	IF (III.GT.0) THEN	EXPECT	48
	WRITE (III,600)	EXPECT	49
	WRITE (III,510)	EXPECT	50
	ENDIF	EXPECT	51
C		EXPECT	52
C	INPUT VARIABLE EXPECTED STATISTICS. OMIT ANY VARIABLE	EXPECT	53
C	WHICH IS ENDPOINT LIMITED. INDICATED BY ILIM(N) > 0.	EXPECT	54
C		EXPECT	55
	DO 230 N=1,NVAR	EXPECT	56
	IF (ILIM(N).GT.0) GO TO 230	EXPECT	57
	A=0.	EXPECT	58
	B=0.	EXPECT	59
	C=0.	EXPECT	60
	D=0.	EXPECT	61
	IOMIT=0	EXPECT	62
	RP1=PAR(N,1)	EXPECT	63
	RP2=PAR(N,2)	EXPECT	64
C		EXPECT	65
C	DISTRIBUTION TYPE	EXPECT	66
C		EXPECT	67
	IF (ITYPE(N).GE.NTYPE) GO TO 230	EXPECT	68
	GO TO (110,120,130,140,180,190,200,230,230) ITYPE(N)	EXPECT	69
C		EXPECT	70
C	NORMAL DISTRIBUTION	EXPECT	71
C		EXPECT	72
110	CONTINUE	EXPECT	73
	A=DBLE(RP1)	EXPECT	74
	B=DBLE(RP2*RP2)	EXPECT	75
	C=DBLE(RP1)	EXPECT	76
	D=DBLE(RP1)	EXPECT	77
	GO TO 210	EXPECT	78
C		EXPECT	79

C	NATURAL LOGNORMAL DISTRIBUTION	EXPECT	80
C		EXPECT	81
120	CONTINUE	EXPECT	82
	A=0.0D0	EXPECT	83
	B=0.0D0	EXPECT	84
	G=DBLE(RP1+0.5*RP2*RP2)	EXPECT	85
	IF ((G.GE.EMIN).AND.(G.LE.EMAX)) THEN	EXPECT	86
	A=DEXP(G)	EXPECT	87
	B=DEXP(DBLE(2.0*(RP1+RP2*RP2))) - DBLE(A*A)	EXPECT	88
	ELSE	EXPECT	89
	IOMIT=1	EXPECT	90
	ENDIF	EXPECT	91
	C=DEXP(DBLE(RP1))	EXPECT	92
	D=0.0D0	EXPECT	93
	G=DBLE(RP1-RP2*RP2)	EXPECT	94
	IF ((G.GE.EMIN).AND.(G.LE.EMAX)) THEN	EXPECT	95
	D=DEXP(G)	EXPECT	96
	ELSE	EXPECT	97
	IOMIT=IOMIT+2	EXPECT	98
	ENDIF	EXPECT	99
	GO TO 210	EXPECT	100
C		EXPECT	101
C	COMMON LOGNORMAL DISTRIBUTION	EXPECT	102
C		EXPECT	103
130	CONTINUE	EXPECT	104
	A=0.0D0	EXPECT	105
	B=0.0D0	EXPECT	106
	G=DBLE(BASEXP*(RP1+0.5*BASEXP*RP2*RP2))	EXPECT	107
	IF ((G.GE.EMIN).AND.(G.LE.EMAX)) THEN	EXPECT	108
	A=DEXP(G)	EXPECT	109
	B=DEXP(DBLE(2.0*BASEXP*(RP1+BASEXP*RP2*RP2))) - DBLE(A*A)	EXPECT	110
	ELSE	EXPECT	111
	IOMIT=1	EXPECT	112
	ENDIF	EXPECT	113
	C=DEXP(DBLE(BASEXP*RP1))	EXPECT	114
	D=0.0D0	EXPECT	115
	G=DBLE(BASEXP*(RP1-RP2*RP2*BASEXP))	EXPECT	116
	IF ((G.GE.EMIN).AND.(G.LE.EMAX)) THEN	EXPECT	117
	D=DEXP(G)	EXPECT	118
	ELSE	EXPECT	119
	IOMIT=IOMIT+2	EXPECT	120
	ENDIF	EXPECT	121
	GO TO 210	EXPECT	122
C		EXPECT	123
C	NATURAL LOGUNIFORM DISTRIBUTION	EXPECT	124
C		EXPECT	125
140	CONTINUE	EXPECT	126
	IF (RP1.EQ.RP2) GO TO 150	EXPECT	127
	A=(DEXP(DBLE(RP2))-DEXP(DBLE(RP1)))/DBLE(RP2-RP1)	EXPECT	128
	B=(DEXP(DBLE(2.0*RP2))-DEXP(DBLE(2.0*RP1)))/DBLE(2.0*(RP2-RP1)	EXPECT	129
	) - DBLE(A*A)	EXPECT	130
	C=DEXP(0.5*DBLE((RP2+RP1)))	EXPECT	131
	D=DEXP(DBLE(RP1))	EXPECT	132
	GO TO 210	EXPECT	133

150	CONTINUE	EXPECT	134
	A=DEXP(DBLE(RP1))	EXPECT	135
	B=0.0D0	EXPECT	136
	C=A	EXPECT	137
	D=A	EXPECT	138
	GO TO 210	EXPECT	139
C		EXPECT	140
C	COMMON LOGUNIFORM DISTRIBUTION	EXPECT	141
C		EXPECT	142
160	CONTINUE	EXPECT	143
	IF (RP1.EQ.RP2) GO TO 170	EXPECT	144
	D=DEXP(DBLE(BASEXP*RP1))	EXPECT	145
	F=DEXP(DBLE(BASEXP*RP2))	EXPECT	146
	A=(F-D)/DBLE(BASEXP*(RP2-RP1))	EXPECT	147
	B=(F+F-D*D)/DBLE(2.0*BASEXP*(RP2-RP1)) - DBLE(A*A)	EXPECT	148
	C=DEXP(DBLE(0.5*BASEXP*(RP1+RP2)))	EXPECT	149
	GO TO 210	EXPECT	150
170	CONTINUE	EXPECT	151
	A=DEXP(DBLE(BASEXP*RP1))	EXPECT	152
	B=0.0D0	EXPECT	153
	C=A	EXPECT	154
	D=A	EXPECT	155
	GO TO 210	EXPECT	156
C		EXPECT	157
C	EXPONENTIAL DISTRIBUTION	EXPECT	158
C		EXPECT	159
180	CONTINUE	EXPECT	160
	A=DBLE(1.0/RP1)	EXPECT	161
	B=A*A	EXPECT	162
	C=A*DBLE(ALOG(2.0))	EXPECT	163
	D=0.0D0	EXPECT	164
	GO TO 210	EXPECT	165
C		EXPECT	166
C	UNIFORM DISTRIBUTION	EXPECT	167
C		EXPECT	168
190	CONTINUE	EXPECT	169
	A=DBLE(0.5*(RP1+RP2))	EXPECT	170
	B=DBLE((ABS(RP2-RP1)/3.464117))**2	EXPECT	171
	C=A	EXPECT	172
	D=A	EXPECT	173
	GO TO 210	EXPECT	174
C		EXPECT	175
C	BERNOULLI DISTRIBUTION	EXPECT	176
C		EXPECT	177
200	CONTINUE	EXPECT	178
	A=RP1*PAR(N,3)+RP2*(1.0-PAR(N,3))	EXPECT	179
	IOWIT=4	EXPECT	180
C		EXPECT	181
C	TRANSFER DATA TO ARRAYS AND PRINT	EXPECT	182
C		EXPECT	183
210	CONTINUE	EXPECT	184
	VINAVG(N)=SNGL(A)	EXPECT	185
	B=DSQRT(B)	EXPECT	186
	VINSTD(N)=SNGL(B)	EXPECT	187

VINMED(N)=SNGL(C)	EXPECT	188
VINMOD(N)=SNGL(D)	EXPECT	189
IF (IDMIT.NE.0) GO TO 220	EXPECT	190
WRITE (III,520) VLABEL(N),D,A,C,B	EXPECT	191
GO TO 230	EXPECT	192
220 CONTINUE	EXPECT	193
IF (IDMIT.EQ.1) WRITE (III,530) VLABEL(N),D,C	EXPECT	194
IF (IDMIT.EQ.2) WRITE (III,540) VLABEL(N),A,C,B	EXPECT	195
IF (IDMIT.EQ.3) WRITE (III,550) VLABEL(N),C	EXPECT	196
IF (IDMIT.EQ.4) WRITE (III,540) VLABEL(N),A	EXPECT	197
230 CONTINUE	EXPECT	198
IF (IDAT.GT.0) WRITE (III,560)	EXPECT	199
C	EXPECT	200
C PRINT EFFECTIVE DISTRIBUTION LIMITS	EXPECT	201
C	EXPECT	202
240 CONTINUE	EXPECT	203
IF (LIMITS.EQ.0) GO TO 260	EXPECT	204
WRITE (III,570)	EXPECT	205
DO 250 N=1,NVAR	EXPECT	206
IF (ILIM(N).EQ.0) GO TO 250	EXPECT	207
WRITE (III,580) VLABEL(N),VLIWT(N,1),VLIWT(N,2),RLIM(N,1),	EXPECT	208
RLIM(N,2)	EXPECT	209
250 CONTINUE	EXPECT	210
IF (IDAT.GT.0) WRITE (III,560)	EXPECT	211
260 CONTINUE	EXPECT	212
C	EXPECT	213
RETURN	EXPECT	214
500 FORMAT (/1X,'*--- EXPECTED INPUT VARIABLE STATISTICS')	EXPECT	215
510 FORMAT (/1X,'VARIABLE',T10,'MODE',T20,'MEAN',T37,'MEDIAN',T40,'ST	EXPECT	216
+ND DEV')	EXPECT	217
520 FORMAT (1X,A12,1X,1PE9.2,3(1X,E9.2))	EXPECT	218
530 FORMAT (1X,A12,1X,1PE9.2,11X,E9.2)	EXPECT	219
540 FORMAT (1X,A12,10X,3(1X,1PE9.2))	EXPECT	220
550 FORMAT (1X,A12,21X,1PE9.2)	EXPECT	221
560 FORMAT (/1X,'*-----')	EXPECT	222
570 FORMAT (/1X,'EFFECTIVE LIMITS ON THE INPUT DISTRIBUTION VARIABLES'	EXPECT	223
+ /4X,'VARIABLE',10X,'VARIABLE LIMITS',13X,'INTERVAL LIMITS'/22X,'LO	EXPECT	224
+WER',7X,'UPPER',10X,'LOWER',7X,'UPPER')	EXPECT	225
580 FORMAT (1X,A12,5X,1PE10.3,2X,E10.3,5X,0PF10.4,2X,F10.4)	EXPECT	226
END	EXPECT	227
SUBROUTINE IDNUM (IRUNID,USRNAM)	IDNUM	2
C	IDNUM	3
C THIS ROUTINE CREATES A UNIQUE RUN IDENTIFIER NUMBER, UTILIZING	IDNUM	4
C THE DATE AND TIME AT WHICH THIS ROUTINE IS CALLED. THE SYSTEM	IDNUM	5
C USER NAME IS ALSO PLACED INTO A CHARACTER VARIABLE. THIS	IDNUM	6
C INFORMATION IS USED TO INSURE TRACEABILITY AND ACCOUNTABILITY	IDNUM	7
C FOR DATA FILES FROM SIMULATION PROGRAMS.	IDNUM	8
C	IDNUM	9
C IRUNID = RUN IDENTIFIER, AS FOLLOWS:	IDNUM	10
C DIGITS 9-10 = MONTH OF CURRENT DATE.	IDNUM	11
C DIGITS 7-8 = DAY OF THE MONTH (1 TO 31).	IDNUM	12
C DIGITS 5-6 = CURRENT YEAR.	IDNUM	13
C DIGITS 3-4 = CURRENT HOUR (0 TO 23).	IDNUM	14
C DIGITS 1-2 = CURRENT MINUTE (0 TO 59).	IDNUM	15

C	USRNAM = 8 CHARACTER NAME OF THE CURRENT SYSTEM USER.	IDNUM	16
C		IDNUM	17
	INTEGER*4	IDNUM	18
	+ IRUNID, JMM, JDD, JYY,	IDNUM	19
	+ JHR, JMIN	IDNUM	20
C	LOCAL ARRAY FOR READING DATE AND TIME	IDNUM	21
	INTEGER*2	IDNUM	22
	+ LOCAL(15)	IDNUM	23
	CHARACTER*6	IDNUM	24
	+ ASDATE	IDNUM	25
	CHARACTER*8	IDNUM	26
	+ TIME, USRN, USRNAM	IDNUM	27
	CHARACTER*16	IDNUM	28
	+ DATE	IDNUM	29
	EQUIVALENCE	IDNUM	30
	+ (ASDATE, LOCAL(1)),	IDNUM	31
	+ (USRN, LOCAL(13))	IDNUM	32
C		IDNUM	33
C	GET CURRENT TIME AND DATE	IDNUM	34
C	TIMDAT RETURNING:	IDNUM	35
C	ASCII: LOCAL(1)=MM (MONTH)	IDNUM	36
C	LOCAL(2)=DD (DAY)	IDNUM	37
C	LOCAL(3)=YY (YEAR)	IDNUM	38
C	BINARY: LOCAL(4)=MINUTES	IDNUM	39
C	LOCAL(5)=SECONDS	IDNUM	40
C		IDNUM	41
	CALL TIMDAT (LOCAL(1),INTS(16))	IDNUM	42
	CALL DATESA (DATE)	IDNUM	43
	CALL TIMESA (TIME)	IDNUM	44
C		IDNUM	45
	READ (ASDATE,500) JMM, JDD, JYY	IDNUM	46
	JHR = LOCAL(4)/60	IDNUM	47
	JMIN = LOCAL(4)-JHR*60	IDNUM	48
	JMM=JMM+100000000	IDNUM	49
	JDD=JDD+1000000	IDNUM	50
	JYY=JYY+10000	IDNUM	51
	JHR=JHR+100	IDNUM	52
	IRUNID=JMM+JDD+JYY+JHR+JMIN	IDNUM	53
	USRNAM=USRN	IDNUM	54
C		IDNUM	55
	RETURN	IDNUM	56
	500 FORMAT (3I2)	IDNUM	57
	END	IDNUM	58
	SUBROUTINE IDPLT (IRUNID,XID,YID)	IDPLT	2
C		IDPLT	3
C	SUBROUTINE IDPLT TAGS A PLOT WITH AN INTEGER RUN ID IN A	IDPLT	4
C	USER-SPECIFIED LOCATION. THIS IS DONE IN TWO PARTS, AS	IDPLT	5
C	DISSPLA CANNOT HANDLE TEN DIGIT INTEGERS.	IDPLT	6
C		IDPLT	7
	DATA	IDPLT	8
	+ IDATE/10000/	IDPLT	9
C		IDPLT	10
C	MONTH/DAY/YR	IDPLT	11
C		IDPLT	12

IMDY=IRUNID/IDATE	IDPLT	13
IF (IMDY.GT.0) THEN	IDPLT	14
CALL INTNO (IMDY,XID,YID)	IDPLT	15
ELSE	IDPLT	16
CALL MESSAG ('0000',4,XID,YID)	IDPLT	17
ENDIF	IDPLT	18
C	IDPLT	19
C TIME OF DAY	IDPLT	20
C	IDPLT	21
ITME=IRUNID-IMDY*IDATE	IDPLT	22
DO 100 I=1,4	IDPLT	23
J=4-I	IDPLT	24
IF (J.GT.0) THEN	IDPLT	25
J=10**J	IDPLT	26
ELSE	IDPLT	27
J=1	IDPLT	28
ENDIF	IDPLT	29
IF (ITME.GE.J) GO TO 110	IDPLT	30
CALL MESSAG ('0',1,'ABUT','ABUT')	IDPLT	31
100 CONTINUE	IDPLT	32
GO TO 120	IDPLT	33
110 CONTINUE	IDPLT	34
CALL INTNO (ITME,'ABUT','ABUT')	IDPLT	35
C	IDPLT	36
120 CONTINUE	IDPLT	37
RETURN	IDPLT	38
END	IDPLT	39
SUBROUTINE IINPUT	IINPUT	2
C	IINPUT	3
C ROUTINE FOR INPUTTING DISTRIBUTION TYPES AND PARAMETERS	IINPUT	4
C FOR THE INPUT VARIABLES.	IINPUT	5
C	IINPUT	6
\$INSERT *)COMMON>PPARA	IINPUT	7
\$INSERT *)COMMON>PBLK1	IINPUT	8
\$INSERT *)COMMON>PBLK2	IINPUT	9
\$INSERT *)COMMON>PBLK3	IINPUT	10
\$INSERT *)COMMON>PBLK4	IINPUT	11
\$INSERT *)COMMON>PBLK5	IINPUT	12
\$INSERT *)COMMON>PBLK13	IINPUT	13
\$INSERT *)COMMON>PBLK14	IINPUT	14
\$INSERT *)COMMON>PBLK15	IINPUT	15
\$INSERT *)COMMON>PBLK17	IINPUT	16
\$INSERT *)COMMON>PBLK18	IINPUT	17
\$INSERT SYSTEMS>UTIL>RANDOM>COMMON>STRATI	IINPUT	18
\$INSERT SYSTEMS>UTIL>FEMLIB>COMMON>IDCOM	IINPUT	19
\$INSERT SYSTEMS>UTIL>USRLIB>COMMON>INOUT	IINPUT	20
CHARACTER*1	IINPUT	21
+ ANS	IINPUT	22
DATA	IINPUT	23
+ LABEL(1) /'NORMAL '//,	IINPUT	24
+ LABEL(2) /'NATURAL LOGNORMAL '//,	IINPUT	25
+ LABEL(3) /'COMMON LOGNORMAL '//,	IINPUT	26
+ LABEL(4) /'NATURAL LOGUNIFORM '//,	IINPUT	27
+ LABEL(5) /'COMMON LOGUNIFORM '//,	IINPUT	28

* LABEL(6) /'EXPONENTIAL' /,	IINPUT	29
* LABEL(7) /'UNIFORM' /,	IINPUT	30
* LABEL(8) /'BERNOULLI' /,	IINPUT	31
* LABEL(9) /'EXTERNAL CONF FUNCTN' /,	IINPUT	32
* LABEL(10) /'EXTERNAL DATA POINTS' /	IINPUT	33
DATA	IINPUT	34
* LABEL(NTYPE) /'CONSTANT' /	IINPUT	35
C	IINPUT	36
C -----	IINPUT	37
C - NOTE THE CODE IS SET UP SO THAT DISTRIBUTIONS ONE TO (NTYPE-1) -	IINPUT	38
C - ARE EXTENDED DISTRIBUTIONS, AND DISTRIBUTION (NTYPE) IS A -	IINPUT	39
C - CONSTANT VALUE. IF NEW DISTRIBUTIONS ARE REQUIRED, IT IS MOST -	IINPUT	40
C - EASILY INSERTED JUST BEFORE # NTYPE. SUBROUTINES -	IINPUT	41
C - EXPECT AND RNCS MUST ALSO BE MODIFIED IF NTYPE IS INCREASED. -	IINPUT	42
C - ROUTINE AND STATOT MUST ALSO BE MODIFIED IF THERE IS ANY -	IINPUT	43
C - CHANGE IN THE ORDERING OR TYPES OF THESE DISTRIBUTIONS. -	IINPUT	44
C -----	IINPUT	45
DATA	IINPUT	46
* NSTTL/0/,	IINPUT	47
* STTLE/' /	IINPUT	48
C	IINPUT	49
C COUNTER INITIALIZATION	IINPUT	50
C	IINPUT	51
DO 100 I=1,NVAR	IINPUT	52
NLIM(I,1)=0	IINPUT	53
NLIM(I,2)=0	IINPUT	54
100 CONTINUE	IINPUT	55
C	IINPUT	56
C PROMPT FOR SYSTEMS VARIABLE UPDATE,	IINPUT	57
C EXCEPT FIRST TIME THROUGH ROUTINE.	IINPUT	58
C	IINPUT	59
IUPDAT=0	IINPUT	60
NDIST=NTYPE	IINPUT	61
IF (ICNT.GT.1) THEN	IINPUT	62
110 CONTINUE	IINPUT	63
WRITE (IOUT,500) IQB	IINPUT	64
READ (IN,510) ANS	IINPUT	65
IF ((ANS.NE.'Y').AND.(ANS.NE.'N')) THEN	IINPUT	66
IF ((ANS.NE.'y').AND.(ANS.NE.'n')) GO TO 110	IINPUT	67
ENDIF	IINPUT	68
IF ((ANS.EQ.'N').OR.(ANS.EQ.'n')) GO TO 270	IINPUT	69
NDIST=NTYPE+1	IINPUT	70
ENDIF	IINPUT	71
IUPDAT=1	IINPUT	72
NSTOC=1	IINPUT	73
C	IINPUT	74
C LOOP UPDATES SYSTEM VARIABLES	IINPUT	75
C	IINPUT	76
WRITE (IOUT,520)	IINPUT	77
LPNT=1	IINPUT	78
N=0	IINPUT	79
120 CONTINUE	IINPUT	80
N=N+1	IINPUT	81
ILIM(N)=0	IINPUT	82

C		IINPUT	83
C	INPUTS DISTRIBUTIONS/PARAMETERS FOR SYSTEMS VARIABLES	IINPUT	84
C		IINPUT	85
130	CONTINUE	IINPUT	86
	WRITE (IOUT,530) N,VLABEL(N),VDIMEN(N)	IINPUT	87
	WRITE (IOUT,540) (I,LABEL(I),I=1,NTYPE)	IINPUT	88
	IF (ICNT.GT.1) WRITE (IOUT,550) NDIST	IINPUT	89
	WRITE (IOUT,560) IQB	IINPUT	90
	READ (IN,*,ERR=410) IT	IINPUT	91
	IF ((IT.LT.1).OR.(IT.GT.NDIST)) GO TO 410	IINPUT	92
	IF (IT.GT.NTYPE) GO TO 260	IINPUT	93
	WRITE (IOUT,570) LABEL(IT)	IINPUT	94
	ITYPE(N)=IT	IINPUT	95
C		IINPUT	96
C	NORMAL DISTRIBUTION	IINPUT	97
C		IINPUT	98
	IF (IT.NE.1) GO TO 150	IINPUT	99
	WRITE (IOUT,580) IQB	IINPUT	100
	READ (IN,*,ERR=410) PAR(N,1)	IINPUT	101
140	CONTINUE	IINPUT	102
	WRITE (IOUT,590) IQB	IINPUT	103
	READ (IN,*,ERR=410) PAR(N,2)	IINPUT	104
	IF (PAR(N,2).LT.0.) THEN	IINPUT	105
	WRITE (IOUT,600) PAR(N,2)	IINPUT	106
	GO TO 140	IINPUT	107
	ENDIF	IINPUT	108
	GO TO 250	IINPUT	109
C		IINPUT	110
C	LOGNORMAL DISTRIBUTIONS	IINPUT	111
C		IINPUT	112
150	CONTINUE	IINPUT	113
	IF ((IT.NE.2).AND.(IT.NE.3)) GO TO 180	IINPUT	114
160	CONTINUE	IINPUT	115
	WRITE (IOUT,610) IQB	IINPUT	116
	READ (IN,*,ERR=410) PAR(N,1)	IINPUT	117
	IF (PAR(N,1).LE.0.0) THEN	IINPUT	118
	WRITE (IOUT,600) PAR(N,1)	IINPUT	119
	GO TO 160	IINPUT	120
	ENDIF	IINPUT	121
	PAR(N,1)=ALOG(PAR(N,1))	IINPUT	122
	IF (IT.EQ.3) PAR(N,1)=PAR(N,1)/2.302585	IINPUT	123
170	CONTINUE	IINPUT	124
	WRITE (IOUT,620) PAR(N,1),IQB	IINPUT	125
	READ (IN,*,ERR=410) PAR(N,2)	IINPUT	126
	IF (PAR(N,2).LT.0.) THEN	IINPUT	127
	WRITE (IOUT,600) PAR(N,2)	IINPUT	128
	GO TO 170	IINPUT	129
	ENDIF	IINPUT	130
	GO TO 250	IINPUT	131
C		IINPUT	132
C	UNIFORM LOGNORMAL DISTRIBUTIONS	IINPUT	133
C		IINPUT	134
180	CONTINUE	IINPUT	135
	IF ((IT.NE.4).AND.(IT.NE.5)) GO TO 190	IINPUT	136

WRITE (IOUT,630)	IINPUT	137
READ (IN,*,ERR=410) PAR(N,1),PAR(N,2)	IINPUT	138
IF (PAR(N,1).GT.PAR(N,2)) THEN	IINPUT	139
C=PAR(N,1)	IINPUT	140
PAR(N,1)=PAR(N,2)	IINPUT	141
PAR(N,2)=C	IINPUT	142
ENDIF	IINPUT	143
GO TO 260	IINPUT	144
190 CONTINUE	IINPUT	145
C	IINPUT	146
C	IINPUT	147
C	IINPUT	148
IF (IT.NE.6) GO TO 210	IINPUT	149
200 CONTINUE	IINPUT	150
WRITE (IOUT,580)	IINPUT	151
READ (IN,*,ERR=410) PAR(N,1)	IINPUT	152
IF (PAR(N,1).LE.0.) THEN	IINPUT	153
WRITE (IOUT,600) PAR(N,1)	IINPUT	154
GO TO 200	IINPUT	155
ENDIF	IINPUT	156
PAR(N,1)=1.0/PAR(N,1)	IINPUT	157
GO TO 250	IINPUT	158
C	IINPUT	159
C	IINPUT	160
C	IINPUT	161
210 CONTINUE	IINPUT	162
IF (IT.NE.7) GO TO 220	IINPUT	163
WRITE (IOUT,640)	IINPUT	164
READ (IN,*,ERR=410) PAR(N,1),PAR(N,2)	IINPUT	165
IF (PAR(N,1).GT.PAR(N,2)) THEN	IINPUT	166
C=PAR(N,1)	IINPUT	167
PAR(N,1)=PAR(N,2)	IINPUT	168
PAR(N,2)=C	IINPUT	169
ENDIF	IINPUT	170
GO TO 280	IINPUT	171
C	IINPUT	172
C	IINPUT	173
C	IINPUT	174
220 CONTINUE	IINPUT	175
IF (IT.NE.8) GO TO 232	IINPUT	176
WRITE (IOUT,850)	IINPUT	177
READ (IN,*,ERR=410) PAR(N,1),PAR(N,2)	IINPUT	178
IF (PAR(N,1).GT.PAR(N,2)) THEN	IINPUT	179
C=PAR(N,1)	IINPUT	180
PAR(N,1)=PAR(N,2)	IINPUT	181
PAR(N,2)=C	IINPUT	182
ENDIF	IINPUT	183
230 CONTINUE	IINPUT	184
WRITE (IOUT,660)	IINPUT	185
READ (IN,*,ERR=410) PAR(N,3)	IINPUT	186
IF ((PAR(N,3).LT.0.0).OR.(PAR(N,3).GT.1.0)) GO TO 230	IINPUT	187
GO TO 260	IINPUT	188
C	IINPUT	189
C	IINPUT	190
EXTERNALLY DEFINED DATA POINTS OR CONFIDENCE FUNCTION		

C		IINPUT	191
	232 CONTINUE	IINPUT	192
	IF ((IT.NE.9).AND.(IT.NE.10)) GO TO 240	IINPUT	193
	IF (IT.EQ.9) WRITE (IOUT,670)	IINPUT	194
	IF (IT.EQ.10) WRITE (IOUT,680)	IINPUT	195
	READ (IN,690) (JJNF(I,N),I=1,NMLEN)	IINPUT	196
	GO TO 280	IINPUT	197
C		IINPUT	198
C	CONSTANT VALUE	IINPUT	199
C		IINPUT	200
	240 CONTINUE	IINPUT	201
	IF (IT.NE.NTYPE) GO TO 260	IINPUT	202
	WRITE (IOUT,700) IQB	IINPUT	203
	READ (IN,*,ERR=410) PAR(N,1)	IINPUT	204
	GO TO 280	IINPUT	205
C		IINPUT	206
C	SET UPPER/LOWER LIMITS ON DISTRIBUTION	IINPUT	207
C		IINPUT	208
	250 CONTINUE	IINPUT	209
	WRITE (IOUT,710) IQB	IINPUT	210
	READ (IN,510) ANS	IINPUT	211
	IF ((ANS.NE.'Y').AND.(ANS.NE.'N')) THEN	IINPUT	212
	IF ((ANS.NE.'y').AND.(ANS.NE.'n')) GO TO 250	IINPUT	213
	ENDIF	IINPUT	214
	IF ((ANS.EQ.'Y').OR.(ANS.EQ.'y')) THEN	IINPUT	215
	ILIM(N)=1	IINPUT	216
	WRITE (IOUT,720)	IINPUT	217
	READ (IN,*,ERR=410) VLI(N,1),VLI(N,2)	IINPUT	218
	IF (VLI(N,1).GT.VLI(N,2)) THEN	IINPUT	219
	C=VLI(N,1)	IINPUT	220
	VLI(N,1)=VLI(N,2)	IINPUT	221
	VLI(N,2)=C	IINPUT	222
	ENDIF	IINPUT	223
	ENDIF	IINPUT	224
C		IINPUT	225
C	NEXT VARIABLE	IINPUT	226
C		IINPUT	227
	260 CONTINUE	IINPUT	228
	IF (IT.NE.NTYPE) NSTOC=0	IINPUT	229
	IF (N.LT.NVAR) GO TO 120	IINPUT	230
C		IINPUT	231
C	OPTION TO SKIP THE UPDATING OF SYSTEM CONSTANTS	IINPUT	232
C		IINPUT	233
	270 CONTINUE	IINPUT	234
	IF (NCONST.LE.0) GO TO 310	IINPUT	235
	IF (ICNT.GT.1) THEN	IINPUT	236
	280 CONTINUE	IINPUT	237
	WRITE (IOUT,730) IQB	IINPUT	238
	READ (IN,510) ANS	IINPUT	239
	IF ((ANS.NE.'Y').AND.(ANS.NE.'N')) THEN	IINPUT	240
	IF ((ANS.NE.'y').AND.(ANS.NE.'n')) GO TO 280	IINPUT	241
	ENDIF	IINPUT	242
	IF ((ANS.EQ.'N').OR.(ANS.EQ.'n')) GO TO 310	IINPUT	243
	ENDIF	IINPUT	244

IUPDAT=1	IINPUT	245
C	IINPUT	246
C	IINPUT	247
C	IINPUT	248
LPNT=2	IINPUT	249
I=0	IINPUT	250
290 CONTINUE	IINPUT	251
I=I+1	IINPUT	252
300 CONTINUE	IINPUT	253
WRITE (IOUT,740) CLABEL(I),CDIMEN(I)	IINPUT	254
IF (ICNT.GT.1) WRITE (IOUT,750) CONST(I)	IINPUT	255
READ (IN,*,ERR=410) CONST(I)	IINPUT	256
IF (I.LT.NCONST) GO TO 290	IINPUT	257
310 CONTINUE	IINPUT	258
C	IINPUT	259
C	IINPUT	260
C	IINPUT	261
LPNT=3	IINPUT	262
320 CONTINUE	IINPUT	263
WRITE (IOUT,760) MAXSAM	IINPUT	264
READ (IN,*,ERR=410) NSAM	IINPUT	265
IF (NSAM.LT.1) GO TO 320	IINPUT	266
IF (NSAM.GT.MAXSAM) THEN	IINPUT	267
WRITE (IOUT,770) MAXSAM	IINPUT	268
GO TO 320	IINPUT	269
ENDIF	IINPUT	270
C	IINPUT	271
C	IINPUT	272
C	IINPUT	273
LPNT=4	IINPUT	274
330 CONTINUE	IINPUT	275
WRITE (IOUT,780)	IINPUT	276
READ (IN,*,ERR=410) NPRT	IINPUT	277
IF ((NPRT.LT.1).OR.(NPRT.GT.NSAM)) GO TO 410	IINPUT	278
C	IINPUT	279
C	IINPUT	280
C	IINPUT	281
C	IINPUT	282
C	IINPUT	283
LPNT=5	IINPUT	284
NLEVEL=1	IINPUT	285
IF (NSTOC.NE.0) GO TO 370	IINPUT	286
I=MAXLVS	IINPUT	287
IF (I.GT.MAXLEV) I=MAXLEV	IINPUT	288
340 CONTINUE	IINPUT	289
WRITE (IOUT,790) I	IINPUT	290
READ (IN,*,ERR=410) NLEVEL	IINPUT	291
IF ((NLEVEL.LT.1).OR.(NLEVEL.GT.I)) GO TO 340	IINPUT	292
IF (NLEVEL.GT.NSAM) THEN	IINPUT	293
WRITE (IOUT,800) NLEVEL,NSAM	IINPUT	294
GO TO 340	IINPUT	295
ENDIF	IINPUT	296
DO 360 N=1,NVAR	IINPUT	297
DO 350 I=1,NLEVEL	IINPUT	298

NPTSPL(I,N)=0	IINPUT	299
350 CONTINUE	IINPUT	300
360 CONTINUE	IINPUT	301
370 CONTINUE	IINPUT	302
C	IINPUT	303
C DATA ECHO	IINPUT	304
C	IINPUT	305
IF (IDAT.GT.0) THEN	IINPUT	306
IF (ICNT.GT.1) WRITE (IDAT,510)	IINPUT	307
WRITE (IDAT,810)	IINPUT	308
WRITE (IDAT,820) TITLE,JRNUM,STITLE,USRNAM,ICNT	IINPUT	309
DO 390 N=1,NVAR	IINPUT	310
IT=ITYPE(N)	IINPUT	311
WRITE (IDAT,830) VLABEL(N),VDIMEN(N),LABEL(IT)	IINPUT	312
IF (IT.EQ.1) WRITE (IDAT,840) PAR(N,1),PAR(N,2)	IINPUT	313
IF ((IT.EQ.2).OR.(IT.EQ.3)) WRITE (IDAT,850) PAR(N,1),PAR(N,2)	IINPUT	314
IF ((IT.EQ.4).OR.(IT.EQ.5)) WRITE (IDAT,860) PAR(N,1),PAR(N,2)	IINPUT	315
IF (IT.NE.0) GO TO 380	IINPUT	316
C=1.0/PAR(N,1)	IINPUT	317
WRITE (IDAT,870) C	IINPUT	318
380 CONTINUE	IINPUT	319
IF (IT.EQ.7) WRITE (IDAT,880) PAR(N,1),PAR(N,2)	IINPUT	320
IF (IT.EQ.8) WRITE (IDAT,890) PAR(N,1),PAR(N,2),PAR(N,3)	IINPUT	321
IF (IT.EQ.9) WRITE (IDAT,900) (JJNF(I,N),I=1,NMLEN)	IINPUT	322
IF (IT.EQ.10) WRITE (IDAT,910) (JJNF(I,N),I=1,NMLEN)	IINPUT	323
IF (IT.EQ.NTYPE) WRITE (IDAT,920) PAR(N,1)	IINPUT	324
IF (ILIM(N).GT.0) WRITE (IDAT,930) VLIM(N,1),VLIM(N,2)	IINPUT	325
390 CONTINUE	IINPUT	326
WRITE (IDAT,940)	IINPUT	327
DO 400 I=1,NCONST	IINPUT	328
WRITE (IDAT,950) CLABEL(I),CDIMEN(I),CONST(I)	IINPUT	329
400 CONTINUE	IINPUT	330
WRITE (IDAT,960) NSAM,NPRT	IINPUT	331
IF (NLEVEL.GT.1) THEN	IINPUT	332
WRITE (IDAT,970) NLEVEL	IINPUT	333
ELSE	IINPUT	334
WRITE (IDAT,980)	IINPUT	335
ENDIF	IINPUT	336
ENDIF	IINPUT	337
C	IINPUT	338
RETURN	IINPUT	339
C	IINPUT	340
C WRITE WARNS OF ERROR ON INPUT	IINPUT	341
C	IINPUT	342
410 CONTINUE	IINPUT	343
WRITE (IDAT,990)	IINPUT	344
GO TO (130,300,320,330,340), LPNT	IINPUT	345
C	IINPUT	346
500 FORMAT (/1X,'WOULD YOU LIKE TO UPDATE THE SYSTEM VARIABLES (Y/N)?'	IINPUT	347
+ ,1X,A1)	IINPUT	348
510 FORMAT (A1)	IINPUT	349
520 FORMAT (/1X,'INPUT OF DISTRIBUTION TYPES AND PARAMETERS')	IINPUT	350
530 FORMAT (/1X,I4,' ' ,A12,' (' ,A12,') DISTRIBUTION')	IINPUT	351
540 FORMAT (0X,I2,' ' ,A20)	IINPUT	352

550 FORMAT (8X,I2,') PREVIOUSLY DEFINED DISTRIBUTION.')	INPUT	353
560 FORMAT (1X,'ENTER THE NUMBER FOR THE DESIRED DISTRIBUTION. ',A1)	INPUT	354
570 FORMAT (1X,'DISTRIBUTION TYPE IS ',A20)	INPUT	355
580 FORMAT (1X,'ENTER THE MEAN OF THE DISTRIBUTION. ',A1)	INPUT	356
590 FORMAT (1X,'ENTER THE STANDARD DEVIATION. ',T30,A1)	INPUT	357
600 FORMAT (/1X,'** ENTERED VALUE OF ',1PE12.4,' IS OUT OF RANGE.')	INPUT	358
610 FORMAT (1X,'ENTER THE MEDIAN VALUE FOR THE DISTRIBUTION. ',A1)	INPUT	359
620 FORMAT (1X,'THE MEAN OF THE UNDERLYING NORMAL DISTRIBUTION IS ',1P	INPUT	360
+E12.4/1X,'ENTER THE STANDARD DEVIATION OF THIS NORMAL DISTRIBUTION	INPUT	361
+ ',A1)	INPUT	362
630 FORMAT (1X,'ENTER THE MINIMUM AND MAXIMUM EXPONENTS FOR THE DISTRI	INPUT	363
+BUTION. ')	INPUT	364
640 FORMAT (1X,'ENTER THE LOWER AND UPPER ENDPOINTS FOR THE UNIFORM DI	INPUT	365
+STRIBUTION. ')	INPUT	366
650 FORMAT (1X,'ENTER THE LOWER AND UPPER VALUES FOR THE BERNOULLI DIS	INPUT	367
+TRIBUTION. ')	INPUT	368
660 FORMAT (1X,'ENTER THE PROBABILITY 0,1 OF THE LOWER VALUE OCCURIN	INPUT	369
+G. ')	INPUT	370
670 FORMAT (/1X,'THE CONFIDENCE FUNCTION WILL BE READ FROM AN EXTERNAL	INPUT	371
+ FILE. '/1X,'ENTER THE NAME OF THE FILE CONTAINING THE CUMULATIVE'	INPUT	372
+ /1X,'CONFIDENCE FUNCTION DATA FOR THIS VARIABLE. ')	INPUT	373
680 FORMAT (/1X,'THE DATA POINTS WILL BE READ FROM AN EXTERNAL FILE. '/	INPUT	374
+1X,'ENTER THE NAME OF THE FILE CONTAINING'/1X,'THE DATA POINTS FOR	INPUT	375
+ THIS INPUT VARIABLE. ')	INPUT	376
690 FORMAT (20A4)	INPUT	377
700 FORMAT (1X,'ENTER THE VALUE FOR THE VARIABLE. ',A1)	INPUT	378
710 FORMAT (1X,'WOULD YOU LIKE A LOWER AND AN UPPER'/1X,'BOUND ENFORCE	INPUT	379
+D ON THIS VARIABLE (Y/N)? ',A1)	INPUT	380
720 FORMAT (1X,'ENTER THE VALUES FOR THE LOWER AND UPPER BOUNDS. ')	INPUT	381
730 FORMAT (/1X,'WOULD YOU LIKE TO UPDATE THE SYSTEM CONSTANTS (Y/N)?'	INPUT	382
+ ,1X,A1)	INPUT	383
740 FORMAT (/1X,'ENTER THE VALUE FOR ',A12,2X,'(' ,A12,')')	INPUT	384
750 FORMAT (6X,'(CURRENT VALUE IS ',1PE12.5,')')	INPUT	385
760 FORMAT (/1X,'ENTER THE NUMBER OF SAMPLES TO TAKE (MAX =',I5,')').')	INPUT	386
770 FORMAT (/1X,'** ERROR ** ENTERED VALUE EXCEEDS PROGRAM LIMIT OF ',	INPUT	387
+I5)	INPUT	388
780 FORMAT (/1X,'ENTER THE PRINT INTERVAL FOR OUTPUT DATA. ',A1)	INPUT	389
790 FORMAT (/1X,'ENTER THE NUMBER OF INTERVALS FOR STRATIFIED SAMPLING	INPUT	390
+ (MAX=',I5,')'). ')	INPUT	391
800 FORMAT (1X,I5,' INTERVALS IS TOO MANY, ONLY ',I5,' SAMPLES CHOSEN.	INPUT	392
+')	INPUT	393
810 FORMAT (/1X,'-----	INPUT	394
+-----')	INPUT	395
820 FORMAT (/1X,A40,9X,'RUN I.D. ',I10/1X,A40,9X,'USER NAME',4X,A8/5	INPUT	396
+0X,'DATA SET NUMBER ',I5///1X,'*--- ECHO OF INPUT DATA')	INPUT	397
830 FORMAT (/1X,A12,' (' ,A12,')'/15X,'DISTRIBUTION IS ',A20)	INPUT	398
840 FORMAT (17X,'MEAN VALUE = ',T35,1PE12.4/17X,'STND DEVIATION = ',T3	INPUT	399
+5,E12.4)	INPUT	400
850 FORMAT (17X,'CONSTANTS FOR THE UNDERLYING NORMAL DISTRIBUTION ARE'	INPUT	401
+ /17X,'MEAN VALUE = ',T35,1PE12.4/17X,'STND DEVIATION = ',T35,E12.4)	INPUT	402
860 FORMAT (17X,'MIN, MAX EXPONENTS FOR THE UNDERLYING'/17X,'UNIFORM D	INPUT	403
+ISTRIBUITON ARE'/17X,'MIN = ',1PE12.4,', MAX = ',E12.4)	INPUT	404
870 FORMAT (17X,'MEAN VALUE IS',T35,1PE12.4)	INPUT	405
880 FORMAT (17X,'LOWER ENDPOINT = ',T35,1PE12.4/17X,'UPPER ENDPOINT = ',	INPUT	406

+T35,E12.4)	IINPUT	407
890 FORMAT (17X,'LOWER VALUE =' ,T35,1PE12.4/17X,'UPPER VALUE =' ,T35,E1	IINPUT	408
+2.4/17X,'LOW VALUE PROB =' ,T35,E12.4)	IINPUT	409
900 FORMAT (17X,'THE CONFIDENCE FUNCTION WILL BE READ AS A PIECE WISE'	IINPUT	410
+ /17X,'CONTINUOUS DATA FUNCTION FROM THE EXTERNAL FILE: '/18X,20A4)	IINPUT	411
910 FORMAT (17X,'THE RANDOM DATA POINTS WILL BE READ'/17X,'FROM THE EX	IINPUT	412
+TERNAL FILE: '/18X,20A4)	IINPUT	413
920 FORMAT (17X,'CONSTANT VALUE =' ,T35,1PE12.4)	IINPUT	414
930 FORMAT (17X,'LOWER BOUND =' ,T35,1PE12.4/17X,'UPPER BOUND =' ,T35,E1	IINPUT	415
+2.4)	IINPUT	416
940 FORMAT (/)	IINPUT	417
950 FORMAT (1X,'VALUE FOR ' ,A12,2X,'(' ,A12,') IS ' ,1PE12.4)	IINPUT	418
960 FORMAT (/1X,'NUMBER OF SAMPLES IS ' ,I8/1X,'PRINT INTERVAL IS ' ,4X,	IINPUT	419
+I8)	IINPUT	420
970 FORMAT (1X,'STRATIFIED SAMPLING CHOSEN, USING ' ,I5,' LEVELS.')	IINPUT	421
980 FORMAT (1X,'STRATIFIED SAMPLING NOT CHOSEN.')	IINPUT	422
990 FORMAT (/1X,'***** ERROR ON INPUT, TRY AGAIN *****')	IINPUT	423
END	IINPUT	424
EAT PACSTAT.LOAD	JCLPRIM	2
COMO PACSTAT.LOAD	JCLPRIM	3
DATE	JCLPRIM	4
SEG	JCLPRIM	5
LOAD	JCLPRIM	6
#PACSTAT	JCLPRIM	7
LOAD *>B.>B_PACSTAT	JCLPRIM	8
LOAD *>B.>B_DATOUT	JCLPRIM	9
LOAD *>B.>B_DATSET	JCLPRIM	10
LOAD *>B.>B_EXPECT	JCLPRIM	11
LOAD *>B.>B_IINPUT	JCLPRIM	12
LOAD *>B.>B_PPLT	JCLPRIM	13
LOAD *>B.>B_R1DAT	JCLPRIM	14
LOAD *>B.>B_R2DAT	JCLPRIM	15
LOAD *>B.>B_REQRDR	JCLPRIM	16
LOAD *>B.>B_RNGS	JCLPRIM	17
LOAD *>B.>B_STATOT	JCLPRIM	18
LOAD *>B.>B_VARSET	JCLPRIM	19
LOAD *>B.>B_WRSTOC	JCLPRIM	20
LOAD SYSTEMS>UTIL>RANDOM>B.>B_ALNORM	JCLPRIM	21
LOAD SYSTEMS>UTIL>RANDOM>B.>B_BERNLI	JCLPRIM	22
LOAD SYSTEMS>UTIL>RANDOM>B.>B_DEXPFL	JCLPRIM	23
LOAD SYSTEMS>UTIL>RANDOM>B.>B_DEXPFL	JCLPRIM	24
LOAD SYSTEMS>UTIL>RANDOM>B.>B_DNORM	JCLPRIM	25
LOAD SYSTEMS>UTIL>RANDOM>B.>B_LNNORM	JCLPRIM	26
LOAD SYSTEMS>UTIL>RANDOM>B.>B_LNNORM	JCLPRIM	27
LOAD SYSTEMS>UTIL>RANDOM>B.>B_LNUNIF	JCLPRIM	28
LOAD SYSTEMS>UTIL>RANDOM>B.>B_LOGNORM	JCLPRIM	29
LOAD SYSTEMS>UTIL>RANDOM>B.>B_LOGNORM	JCLPRIM	30
LOAD SYSTEMS>UTIL>RANDOM>B.>B_LOGUNIF	JCLPRIM	31
LOAD SYSTEMS>UTIL>RANDOM>B.>B_NORMAL	JCLPRIM	32
LOAD SYSTEMS>UTIL>RANDOM>B.>B_NORMALL	JCLPRIM	33
LOAD SYSTEMS>UTIL>RANDOM>B.>B_STATS	JCLPRIM	34
LOAD SYSTEMS>UTIL>RANDOM>B.>B_U01	JCLPRIM	35
LOAD SYSTEMS>UTIL>RANDOM>B.>B_U01S	JCLPRIM	36
LOAD SYSTEMS>UTIL>RANDOM>B.>B_XUDIST	JCLPRIM	37

LOAD SYSTEMS>UTIL>FEMLIB>B.>B_WHEADR	JCLPRIM	38
LOAD SYSTEMS>UTIL>USRLIB>B.>B_ASG	JCLPRIM	39
LOAD SYSTEMS>UTIL>USRLIB>B.>B_IDNUM	JCLPRIM	40
LOAD SYSTEMS>UTIL>USRLIB>B.>B_IDPLT	JCLPRIM	41
LOAD SYSTEMS>UTIL>USRLIB>B.>B_PLINIT	JCLPRIM	42
LOAD SYSTEMS>UTIL>USRLIB>B.>B_QSORT	JCLPRIM	43
LOAD SYSTEMS>UTIL>USRLIB>B.>B_RELAS	JCLPRIM	44
LOAD SYSTEMS>UTIL>USRLIB>B.>B_SORT	JCLPRIM	45
LOAD *>B.>B_SOLN	JCLPRIM	46
F/LOAD *>B.>B_BLKDAT	JCLPRIM	47
LI YDISSPLA_9.0	JCLPRIM	48
LI VAPPLB	JCLPRIM	49
LI	JCLPRIM	50
ST 177774	JCLPRIM	51
SAVE	JCLPRIM	52
MAP 3	JCLPRIM	53
QUIT	JCLPRIM	54
COMO -E	JCLPRIM	55
SUBROUTINE LNNORM (N,RNDVAL,RP1,RP2)	LNNORM	2
C	LNNORM	3
C ROUTINE FOR TRANSFORMING A UNIFORMLY DISTRIBUTED DATA SET ON THE	LNNORM	4
C INTERVAL 0,1 TO A NATURAL LOGNORMALLY DISTRIBUTED DATA SET.	LNNORM	5
C	LNNORM	6
C N = THE NUMBER OF ITEMS IN THE DATA SET	LNNORM	7
C RNDVAL = VECTOR OF UNIFORMLY DISTRIBUTED VALUES ON INPUT. EACH	LNNORM	8
C VALUE MUST BE BETWEEN ZERO AND ONE.	LNNORM	9
C = VECTOR OF LOGNORMALLY DISTRIBUTED VALUES ON OUTPUT.	LNNORM	10
C RP1 = MEAN VALUE FOR THE UNDERLYING NORMAL DISTRIBUTION.	LNNORM	11
C RP2 = STANDARD DEVIATION FOR THE UNDERLYING NORMAL DISTRIBUTION.	LNNORM	12
C	LNNORM	13
DIMENSION	LNNORM	14
* RNDVAL(N)	LNNORM	15
C	LNNORM	16
C NATURAL LOGNORMAL DISTRIBUTION	LNNORM	17
C	LNNORM	18
DO 100 I=1,N	LNNORM	19
RV=RNDVAL(I)	LNNORM	20
RV=DNORM (RV,RP1,RP2)	LNNORM	21
RNDVAL(I)=EXP(RV)	LNNORM	22
100 CONTINUE	LNNORM	23
RETURN	LNNORM	24
END	LNNORM	25
SUBROUTINE LNNORML (N,RNDVAL,RP1,RP2,AMIN,AMAX)	LNNORML	2
C	LNNORML	3
C ROUTINE FOR TRANSFORMING A UNIFORMLY DISTRIBUTED DATA SET ON THE	LNNORML	4
C INTERVAL 0,1 TO A NATURAL LOGNORMALLY DISTRIBUTED DATA SET, WITH	LNNORML	5
C THE CONSTRAINT THAT ALL OUTPUT VALUES LIE BETWEEN SPECIFIED LIMITS.	LNNORML	6
C	LNNORML	7
C N = THE NUMBER OF DATA VALUES IN VECTOR RNDVAL.	LNNORML	8
C RNDVAL = ON INPUT, THE VECTOR OF UNIFORMLY DISTRIBUTED VALUES.	LNNORML	9
C = ON OUTPUT, THE VECTOR OF LOGNORMALLY DISTRIBUTED VALUES.	LNNORML	10
C RP1 = MEAN VALUE FOR THE DESIRED UNDERLYING NORMAL DISTRIBUTION.	LNNORML	11
C RP2 = STAND. DEV FOR THE DESIRED UNDERLYING NORMAL DISTRIBUTION.	LNNORML	12
C AMIN = MINIMUM LIMIT VALUE FOR THE LOGNORMALLY DISTRIBUTED DATA.	LNNORML	13

C	AMAX = MAXIMUM LIMIT VALUE FOR THE LOGNORMALLY DISTRIBUTED DATA.	LNNORMAL	14
C		LNNORMAL	15
C	UMIN,UMAX = THE LIMIT VALUES ON THE UNIFORM DISTRIBUTION. THESE	LNNORMAL	16
C	ARE AVAILABLE TO THE USER THROUGH COMMON BLOCK ULIMITS.	LNNORMAL	17
C		LNNORMAL	18
C	\$INSERT *)COMMON>ULIMITS	LNNORMAL	19
C		LNNORMAL	20
	DIMENSION	LNNORMAL	21
	+ RNDVAL(N)	LNNORMAL	22
C		LNNORMAL	23
	IF (AMIN.GT.AMAX) THEN	LNNORMAL	24
	A=AMIN	LNNORMAL	25
	AMIN=AMAX	LNNORMAL	26
	AMAX=A	LNNORMAL	27
	ENDIF	LNNORMAL	28
C		LNNORMAL	29
C	COMPUTE LOGARITHMS OF THE CHOSEN LIMITS	LNNORMAL	30
C		LNNORMAL	31
	BMIN=ALOG(AMIN)	LNNORMAL	32
	BMAX=ALOG(AMAX)	LNNORMAL	33
C		LNNORMAL	34
C	DO COMPUTATIONS ON A LOG SCALE	LNNORMAL	35
C		LNNORMAL	36
	CALL NORMALL (N,RNDVAL,RP1,RP2,BMIN,BMAX)	LNNORMAL	37
C		LNNORMAL	38
C	TRANSFORM NORMAL DISTRIBUTION TO LOGNORMAL	LNNORMAL	39
C		LNNORMAL	40
	DO 100 I=1,N	LNNORMAL	41
	RNDVAL(I)=EXP(RNDVAL(I))	LNNORMAL	42
	100 CONTINUE	LNNORMAL	43
C		LNNORMAL	44
	RETURN	LNNORMAL	45
	END	LNNORMAL	46
	SUBROUTINE LNUNIF (N,RNDVAL,RP1,RP2)	LNUNIF	2
C		LNUNIF	3
C	ROUTINE FOR TRANSFORMING A UNIFORMLY DISTRIBUTED DATA SET ON THE	LNUNIF	4
C	INTERVAL 0,1 TO A NATURAL LOGUNIFORMLY DISTRIBUTED DATA SET.	LNUNIF	5
C		LNUNIF	6
C	N = THE NUMBER OF ITEMS IN THE DATA SET.	LNUNIF	7
C	RNDVAL = VECTOR OF UNIFORMLY DISTRIBUTED VALUES ON INPUT. EACH	LNUNIF	8
C	VALUE MUST BE BETWEEN ZERO AND ONE.	LNUNIF	9
C	= VECTOR OF LOGUNIFORMLY DISTRIBUTED VALUES ON OUTPUT.	LNUNIF	10
C	RP1 = MINIMUM EXPONENT (BASE E) FOR THE OUTPUT DISTRIBUTION.	LNUNIF	11
C	RP2 = MAXIMUM EXPONENT (BASE E) FOR THE OUTPUT DISTRIBUTION.	LNUNIF	12
C		LNUNIF	13
	DIMENSION	LNUNIF	14
	+ RNDVAL(N)	LNUNIF	15
C		LNUNIF	16
C	NATURAL LOGUNIFORM DISTRIBUTION	LNUNIF	17
C		LNUNIF	18
	DO 100 I=1,N	LNUNIF	19
	RV=RP1+(RP2-RP1)*RNDVAL(I)	LNUNIF	20
	RNDVAL(I)=EXP(RV)	LNUNIF	21
	100 CONTINUE	LNUNIF	22

RETURN	LNUNIF	23
END	LNUNIF	24
SUBROUTINE LOGNORM (N,RNDVAL,RP1,RP2)	LOGNORM	2
C	LOGNORM	3
C ROUTINE FOR TRANSFORMING A UNIFORMLY DISTRIBUTED DATA SET ON THE	LOGNORM	4
C INTERVAL 0,1 TO A COMMON LOGNORMALLY DISTRIBUTED DATA SET.	LOGNORM	5
C	LOGNORM	6
C N = THE NUMBER OF ITEMS IN THE DATA SET.	LOGNORM	7
C RNDVAL = VECTOR OF UNIFORMLY DISTRIBUTED VALUES ON INPUT. EACH	LOGNORM	8
C VALUE MUST BE BETWEEN ZERO AND ONE.	LOGNORM	9
C = VECTOR OF COMMON LOGNORMALLY DISTRIBUTED VALUES ON OUTPUT.	LOGNORM	10
C RP1 = MEAN VALUE FOR THE UNDERLYING NORMAL DISTRIBUTION.	LOGNORM	11
C RP2 = STANDARD DEVIATION FOR THE UNDERLYING NORMAL DISTRIBUTION.	LOGNORM	12
C	LOGNORM	13
DIMENSION	LOGNORM	14
+ RNDVAL(N)	LOGNORM	15
C	LOGNORM	16
DATA BASEXP/2.3025851/	LOGNORM	17
C	LOGNORM	18
COMMON LOGNORMAL DISTRIBUTION	LOGNORM	19
C	LOGNORM	20
DO 100 I=1,N	LOGNORM	21
RV=RNDVAL(I)	LOGNORM	22
RV=DNORM (RV,RP1,RP2)	LOGNORM	23
RNDVAL(I)=EXP(BASEXP*RV)	LOGNORM	24
100 CONTINUE	LOGNORM	25
RETURN	LOGNORM	26
END	LOGNORM	27
SUBROUTINE LOGNORML (N,RNDVAL,RP1,RP2,AMIN,AMAX)	LOGNORML	2
C	LOGNORML	3
C ROUTINE FOR TRANSFORMING A UNIFORMLY DISTRIBUTED DATA SET ON THE	LOGNORML	4
C INTERVAL 0,1 TO A COMMON LOGNORMALLY DISTRIBUTED DATA SET, WITH	LOGNORML	5
C THE CONSTRAINT THAT ALL OUTPUT VALUES LIE BETWEEN SPECIFIED LIMITS.	LOGNORML	6
C	LOGNORML	7
C N = THE NUMBER OF DATA VALUES IN VECTOR RNDVAL.	LOGNORML	8
C RNDVAL = ON INPUT, THE VECTOR OF UNIFORMLY DISTRIBUTED VALUES.	LOGNORML	9
C = ON OUTPUT, THE VECTOR OF LOGNORMALLY DISTRIBUTED VALUES.	LOGNORML	10
C RP1 = MEAN VALUE FOR THE DESIRED UNDERLYING NORMAL DISTRIBUTION.	LOGNORML	11
C RP2 = STAND. DEV FOR THE DESIRED UNDERLYING NORMAL DISTRIBUTION.	LOGNORML	12
C AMIN = MINIMUM LIMIT VALUE FOR THE LOGNORMALLY DISTRIBUTED DATA.	LOGNORML	13
C AMAX = MAXIMUM LIMIT VALUE FOR THE LOGNORMALLY DISTRIBUTED DATA.	LOGNORML	14
C	LOGNORML	15
C UMIN,UMAX = THE LIMIT VALUES ON THE UNIFORM DISTRIBUTION. THESE	LOGNORML	16
C ARE AVAILABLE TO THE USER THROUGH COMMON BLOCK ULIMITS.	LOGNORML	17
C	LOGNORML	18
\$INSERT *)COMMON)ULIMITS	LOGNORML	19
C	LOGNORML	20
DIMENSION	LOGNORML	21
+ RNDVAL(N)	LOGNORML	22
DATA	LOGNORML	23
+ BASEXP/2.3025851/	LOGNORML	24
C	LOGNORML	25
IF (AMIN.LE.AMAX) GO TO 100	LOGNORML	26
A=AMIN	LOGNORML	27

AMIN=AMAX	LOGNORMAL	28
AMAX=A	LOGNORMAL	29
100 CONTINUE	LOGNORMAL	30
C	LOGNORMAL	31
C COMPUTE LOGARITHMS OF THE CHOSEN LIMITS	LOGNORMAL	32
C	LOGNORMAL	33
BMIN=ALOG10(AMIN)	LOGNORMAL	34
BMAX=ALOG10(AMAX)	LOGNORMAL	35
C	LOGNORMAL	36
C DO COMPUTATIONS ON A LOG SCALE	LOGNORMAL	37
C	LOGNORMAL	38
CALL NORMALL (N,RNDVAL,RP1,RP2,BMIN,BMAX)	LOGNORMAL	39
C	LOGNORMAL	40
C TRANSFORM NORMAL DISTRIBUTION TO LOGNORMAL	LOGNORMAL	41
C	LOGNORMAL	42
DO 110 I=1,N	LOGNORMAL	43
RNDVAL(I)=EXP(BASEXP*RNDVAL(I))	LOGNORMAL	44
110 CONTINUE	LOGNORMAL	45
C	LOGNORMAL	46
RETURN	LOGNORMAL	47
END	LOGNORMAL	48
SUBROUTINE LOGUNIF (N,RNDVAL,RP1,RP2)	LOGUNIF	2
C	LOGUNIF	3
C ROUTINE FOR TRANSFORMING A UNIFORMLY DISTRIBUTED DATA SET ON THE	LOGUNIF	4
C INTERVAL TO A COMMON LOGUNIFORMLY DISTRIBUTED DATA SET.	LOGUNIF	5
C	LOGUNIF	6
C N = THE NUMBER OF ITEMS IN THE DATA SET.	LOGUNIF	7
C RNDVAL = VECTOR OF UNIFORMLY DISTRIBUTED VALUES ON INPUT. EACH	LOGUNIF	8
C VALUE MUST BE BETWEEN ZERO AND ONE.	LOGUNIF	9
C = VECTOR OF LOGUNIFORMLY DISTRIBUTED VALUES ON OUTPUT.	LOGUNIF	10
C RP1 = MINIMUM EXPONENT (BASE 10) FOR THE OUTPUT DISTRIBUTION.	LOGUNIF	11
C RP2 = MAXIMUM EXPONENT (BASE 10) FOR THE OUTPUT DISTRIBUTION.	LOGUNIF	12
C	LOGUNIF	13
DIMENSION	LOGUNIF	14
+ RNDVAL(N)	LOGUNIF	15
C	LOGUNIF	16
DATA BASEXP/2.3025851/	LOGUNIF	17
C	LOGUNIF	18
C COMMON LOGUNIFORM DISTRIBUTION	LOGUNIF	19
C	LOGUNIF	20
DO 100 I=1,N	LOGUNIF	21
RV=RP1+(RP2-RP1)*RNDVAL(I)	LOGUNIF	22
RNDVAL(I)=EXP(BASEXP*RV)	LOGUNIF	23
100 CONTINUE	LOGUNIF	24
RETURN	LOGUNIF	25
END	LOGUNIF	26
USER MANUAL FOR THE MONTE CARLO DRIVER ROUTINES 'PACSTAT'	MANUAL	2
-----	MANUAL	3
	MANUAL	4
THIS IS A BRIEF DOCUMENT DESCRIBING THE MONTE CARLO DRIVER ROUTINES	MANUAL	5
WHICH ARE REFERED TO AS PACSTAT. THESE ROUTINES ARE DESIGNED TO	MANUAL	6
ALLOW A PROGRAMMER TO SET UP A MONTE CARLO SIMULATION OF A PHYSICAL	MANUAL	7
PROCESS IN A MINIMUM AMOUNT OF TIME.	MANUAL	8
	MANUAL	9

THE USER MUST DEFINE A SET OF INPUT AND OUTPUT VARIABLES, AND SUPPLY A ROUTINE (OR SET OF ROUTINES) WHICH DEFINE THE PHYSICAL PROCESS BEING MODELLED. THE MONTE CARLO DRIVER ROUTINES PROMPT THE USER FOR A STOCHASTIC DEFINITION OF EACH INPUT VARIABLE, AND THEN RUN THE PHYSICAL MODEL A NUMBER OF TIMES.

FOR EACH RUN, THE INPUT VARIABLES WILL BE SAMPLED FROM THEIR DEFINED DISTRIBUTIONS. THE OUTPUT VARIABLES FOR EACH SAMPLE ARE STORED, AND A CRUDE STATISTICAL ANALYSIS IS PERFORMED ON THESE OUTPUT DISTRIBUTIONS. TABLES OF CONFIDENCE VALUES VERSUS DATA VALUES ARE ALSO SET UP FOR CHOSEN OUTPUT VARIABLES. THIS DATA MAY BE PLOTTED, AND/OR WRITTEN TO AN OUTPUT BINARY FILE FOR LATER PROCESSING.

PROGRAMMING INFORMATION

PACSTAT IS WRITTEN USING THE FORTRAN 77 STANDARD. AN EFFORT WAS MADE TO GENERATE CODING WHICH WOULD BE AS EASY TO CONVERT TO OTHER MACHINES AS POSSIBLE. THE ORIGINAL CODE WAS DEVELOPED ON A PRIME 750

THREE ROUTINES WILL REQUIRE SOME MACHINE/INSTALLATION DEPENDENT CODING. THESE ARE (1) ASG, WHICH OPENS DATA FILES DURING PROGRAM EXECUTION, (2) RELEAS, WHICH CLOSES DATA FILES DURING PROGRAM EXECUTION, AND (3) IDNUM, WHICH BUILDS A UNIQUE, TEN DIGIT RUN IDENTIFIER FOR IDENTIFYING EACH RUN OF THE PROGRAM. THIS RUN IDENTIFIER IS IMPORTANT, AS IT IS WRITTEN TO THE FILE HEADER OF ALL PACSTAT OUTPUT FILES, AND CAN BE USED FOR IDENTIFYING DATA FILES.

THE PROGRAM WAS DESIGNED AROUND THE DISSPLA GRAPHICS SOFTWARE PACKAGE, FROM INTEGRATED SOFTWARE SYSTEMS CORPORATION, SAN DIEGO, CALIFORNIA, 92121. IF THE GRAPHICS CALLS CANNOT BE SATISFIED BY THE SYSTEM, THE DISSPLA SUBROUTINE DONEPL, AND THE PACSTAT ROUTINES PPLT AND PLINIT, MUST BE COMMENTED OUT OR REPLACED BY DUMMY ROUTINES. ALL OF THE CALLS TO DISSPLA, AND TO PACSTAT ROUTINE IDPLT, WILL THEN BE REMOVED FROM THE PROGRAM. THE PLOTTING CAPABILITY WILL ALSO BE GONE.

PACSTAT IS INTENDED TO RUN INTERACTIVELY, WITH THE USER DEFINING THE REQUIRED VARIABLE DISTRIBUTIONS DURING THE PROGRAM EXECUTION. THE INPUT AND OUTPUT LOGICAL UNIT NUMBER FOR THIS USER INTERACTION ARE STORED IN VARIABLES 'IN' AND 'IOUT.' THESE ARE SET AT THE TOP OF THE MAIN ROUTINE. ALSO SET HERE ARE THE LOGICAL UNIT NUMBERS FOR THE TWO OUTPUT FILES, PRINTED AND BINARY (IDAT AND IDATB), AND A UNIT NUMBER FOR ANY INPUT FILES WHICH MAY BE NEEDED (INFIL).

INPUT/OUTPUT VARIABLE DEFINITION

THE INPUT AND OUTPUT VARIABLES MUST BE DEFINED BY THE USER AS THE FIRST STEP IN SETTING UP PACSTAT TO RUN. THIS IS DONE BY DATA STATEMENTS IN A BLOCK DATA ROUTINE. THIS BLOCK DATA WAS ORIGINALLY NAMED BLKDAT, BUT AS IT IS NEVER 'CALLED', THE NAME IS NOT IMPORTANT.

A SAMPLE COPY OF THE BLOCK DATA ROUTINE IS ENCLOSED WITH THIS DOCUMENT. THE VARIABLES WHICH MUST BE DEFINED BY THIS ROUTINE ARE LISTED BELOW. THESE VARIABLES ARE CONTAINED IN COMMON BLOCKS IDCOW, PBLK1, PBLK2, AND PBLK3.

PRG = A CHARACTER*8 PROGRAM NAME IDENTIFIER.
VERNUM = THE PROGRAM VERSION NUMBER (FLOATING POINT).

THESE ARE BOTH PRINTED TO THE PACSTAT OUTPUT FILES. THEY ARE

MANUAL	10
MANUAL	11
MANUAL	12
MANUAL	13
MANUAL	14
MANUAL	15
MANUAL	16
MANUAL	17
MANUAL	18
MANUAL	19
MANUAL	20
MANUAL	21
MANUAL	22
MANUAL	23
MANUAL	24
MANUAL	25
MANUAL	26
MANUAL	27
MANUAL	28
MANUAL	29
MANUAL	30
MANUAL	31
MANUAL	32
MANUAL	33
MANUAL	34
MANUAL	35
MANUAL	36
MANUAL	37
MANUAL	38
MANUAL	39
MANUAL	40
MANUAL	41
MANUAL	42
MANUAL	43
MANUAL	44
MANUAL	45
MANUAL	46
MANUAL	47
MANUAL	48
MANUAL	49
MANUAL	50
MANUAL	51
MANUAL	52
MANUAL	53
MANUAL	54
MANUAL	55
MANUAL	56
MANUAL	57
MANUAL	58
MANUAL	59
MANUAL	60
MANUAL	61
MANUAL	62
MANUAL	63

USEFUL WHEN SEVERAL DIFFERENT MODELS ARE BEING EXAMINED WITH THE MONTE CARLO TECHNIQUE (EACH MODEL REQUIRING A DIFFERENT PROGRAM NAME), AND WHEN A SINGLE MODEL IS BEING REFINED (REQUIRING NEW VERSION NUMBERS). THESE LABELS ARE IMPORTANT TOOLS IN TRACING A DATA SET TO ITS SOURCE PROGRAM.	MANUAL	64
	MANUAL	65
	MANUAL	66
	MANUAL	67
	MANUAL	68
	MANUAL	69
NSOLN = THE NUMBER OF OUTPUT (SOLUTION) VARIABLES. THIS MAY BE SET TO ZERO, IF ONLY THE INPUT VARIABLE ARE OF INTEREST. WHEN SET TO ZERO, THE SOLUTION ROUTINE (SOLN) MUST STILL BE PRESENT, BUT IS ONLY CALLED ONCE AT THE BEGINNING OF THE SIMULATION.	MANUAL	70
	MANUAL	71
	MANUAL	72
	MANUAL	73
	MANUAL	74
PLABEL(1...NSOLN) = A CHARACTER*32 LABEL IDENTIFIER FOR EACH OF THE OUTPUT VARIABLES.	MANUAL	75
	MANUAL	76
TITLE = A CHARACTER*40 PROBLEM TITLE. THIS WILL BE WRITTEN TO THE OUTPUT FILES AS AN IDENTIFIER.	MANUAL	77
	MANUAL	78
	MANUAL	79
NVAR = NUMBER OF INPUT VARIABLES.	MANUAL	80
VLABEL(1...NVAR) = A CHARACTER*12 LABEL IDENTIFIER FOR EACH OF THE INPUT VARIABLES.	MANUAL	81
	MANUAL	82
VDIMEN(1...NVAR) = A CHARACTER*12 LABEL SHOWING THE UNITS FOR EACH OF THE INPUT VARIABLES.	MANUAL	83
	MANUAL	84
	MANUAL	85
NCONST = THE NUMBER OF PROBLEM CONSTANTS (NON-STOCHASTIC 'PARAMETERS').	MANUAL	86
	MANUAL	87
CLABEL(1...NCONST) = A CHARACTER*12 LABEL IDENTIFIER FOR EACH OF THE PROBLEM CONSTANTS.	MANUAL	88
	MANUAL	89
CDIMEN(1...NCONST) = A CHARACTER*12 LABEL SHOWING THE UNITS FOR EACH OF THE PROBLEM CONSTANTS.	MANUAL	90
	MANUAL	91
	MANUAL	92
THE CHARACTER VARIABLES ARE NOT IMPORTANT TO NUMERIC SUCCESS OF THE PROGRAM. HOWEVER, THEY ARE USED IN THE INPUT AND OUTPUT PROMPTS, AND IN THE PRINTED OUTPUT. THIS MAKES IT EASIER FOR THE USER TO INSURE CORRECT DATA ON INPUT. IT ALSO INSURES BETTER QUALITY CONTROL ON THE DATA, AS ALL OF THE DATA VALUES ON THE PRINTOUT ARE LABELLED WITH BOTH A NAME AND DIMENSIONS.	MANUAL	93
	MANUAL	94
	MANUAL	95
	MANUAL	96
	MANUAL	97
	MANUAL	98
THE PROBLEM CONSTANTS ARE DESIGNED TO ALLOW PARAMETERS WHICH ARE NOT TO BE MODELLED STOCHASTICALLY, BUT MAY BE CHANGED FROM RUN TO RUN. THIS LETS THE USER CHANGE THESE PARAMETERS DURING THE EXECUTION, RATHER THAN BY RE-COMPILING THE SOURCE CODE. ALSO, THE CONSTANTS ARE WRITTEN TO THE OUTPUT PRINT FILE, AND BECOME A PART OF THE WRITTEN DOCUMENTATION FOR THE RUN.	MANUAL	99
	MANUAL	100
	MANUAL	101
	MANUAL	102
	MANUAL	103
	MANUAL	104
	MANUAL	105
PROBLEM SOLUTION ROUTINES	MANUAL	106
-----	MANUAL	107
THE DRIVER ROUTINES WILL LOOP ON THE NUMBER OF SAMPLES TO BE RUN. FOR EACH SAMPLE, EACH OF THE INPUT VARIABLES IS COMPUTED FROM A USER DEFINED DISTRIBUTION. THEN THE SUBROUTINE SOLN IS CALLED TO COMPUTE THE OUTPUT VARIABLES ('SOLUTIONS') FROM THE INPUT VARIABLES.	MANUAL	108
	MANUAL	109
	MANUAL	110
	MANUAL	111
THE ROUTINE SOLN MUST BE CODED FOR THE PROBLEM AT HAND. IT IS USED TO INTERFACE THE MONTE CARLO DRIVER ROUTINES TO THE MODELLING CODE. THE INPUT DATA IS TAKEN FROM ARRAY VINPT, AND PLACED INTO THE INPUT VARIABLES FOR THE NUMERIC MODEL BEING SIMULATED. THE MODEL IS EXECUTED, AND THE OUTPUT DATA IS PLACED INTO ARRAY VALU, TO BE RETURNED TO THE MONTE CARLO DRIVER ROUTINES FOR STORAGE AND SUBSEQUENT ANALYSIS.	MANUAL	112
	MANUAL	113
	MANUAL	114
	MANUAL	115
	MANUAL	116
	MANUAL	117

IT IS IMPORTANT TO CORRECTLY IDENTIFY THE INPUT AND OUTPUT	MANUAL	118
VARIABLES (VINPT(1), VINPT(2), ETC...) WITH THE PHYSICAL QUANTITIES	MANUAL	119
FOR WHICH EACH VARIABLE STANDS.	MANUAL	120
	MANUAL	121
THE ROUTINE SOLN MUST CONCERN ITSELF WITH THE VARIABLES LISTED BELOW.	MANUAL	122
THESE VARIABLES ARE CONTAINED IN COMMON BLOCKS PBLK4, PBLK5 AND INOUT.	MANUAL	123
	MANUAL	124
IDAT = FILE UNIT NUMBER FOR OUTPUT PRINT FILE. OUTPUT	MANUAL	125
FILE HAS NOT BEEN OPENED IF IDAT IS ZERO.	MANUAL	126
IOUT = FILE UNIT NUMBER FOR THE USERS TERMINAL (FOR	MANUAL	127
PRINTING ANY ERROR/DIAGNOSTIC MESSAGES).	MANUAL	128
	MANUAL	129
ICNT = DATA SET NUMBER FOR THIS RUN. AFTER A PROCESS HAS	MANUAL	130
BEEN SIMULATED, THE DRIVER CODE ALLOWS THE USER	MANUAL	131
THE OPTION OF RE-RUNNING THE SIMULATION, WITHOUT	MANUAL	132
TERMINATING THE PROGRAM EXECUTION. BOTH RUNS ARE	MANUAL	133
IDENTIFIED BY THE SAME RUN ID. ONLY THE DATA	MANUAL	134
DATA SET NUMBER UNIQUELY IDENTIFIES THE DATA.	MANUAL	135
INDEX = THE SAMPLE NUMBER WHICH IS CURRENTLY BEING	MANUAL	136
SIMULATED. NOTE THAT, IF THE SOLUTION ROUTINES	MANUAL	137
NEED INITIALIZATION ONLY ONCE FOR ALL THE RUNS	MANUAL	138
BEING MADE, THIS MUST BE DONE ONLY WHEN INDEX = 1.	MANUAL	139
	MANUAL	140
CONST(1...NCONST) = THE CONSTANTS WHICH HAVE BEEN DEFINED.	MANUAL	141
VALU(1...NSOLN) = THE OUTPUT RESULTS FOR THE PROCESS MODEL. THE	MANUAL	142
ROUTINE SOLN MUST SET EACH OUTPUT VARIABLE OF THE	MANUAL	143
MODEL INTO THE APPROPRIATE ITEM IN THIS ARRAY.	MANUAL	144
VINPT(1...NVAR) = THESE ARE THE INPUT RANDOM VARIABLES FOR THE	MANUAL	145
CURRENT SAMPLE. THE INPUT VARIABLES TO THE	MANUAL	146
PROCESS BEING MODELLED MUST BE SET TO THE	MANUAL	147
CORRESPONDING VALUES IN ARRAY VINPT.	MANUAL	148
	MANUAL	149
EXTERNAL INPUT VARIABLE DEFINITION	MANUAL	150
-----	MANUAL	151
PACSTAT ALLOWS TWO OPTIONS FOR DEFINING RANDOM INPUT VARIABLES	MANUAL	152
EXTERNALLY TO THE PROGRAM. THESE MAY BE USEFUL IF A DESIRED DISTRIBUTION	MANUAL	153
IS NOT PART OF THE SOFTWARE, OR IF 'CORRELATED' DATA SETS ARE	MANUAL	154
REQUIRED.	MANUAL	155
THE FIRST OPTION ALLOWS THE USER TO DEFINE A CUMULATIVE CONFIDENCE	MANUAL	156
FUNCTION TO BE USED IN COMPUTING INPUT VARIABLES. THIS FUNCTION MUST BE	MANUAL	157
APPROXIMATED AS A PIECE WISE LINEAR FUNCTION, DEFINED BY DATA POINTS IN	MANUAL	158
AN EXTERNAL DATA FILE. EACH LINE OF THE FILE CONTAINS ONE DATA POINT	MANUAL	159
(TWO NUMBERS) OF THE FUNCTION. THE FIRST NUMBER ON EACH LINE MUST BE	MANUAL	160
THE DESIRED VARIABLE VALUE, AND THE SECOND NUMBER MUST BE THE CONFIDENCE	MANUAL	161
LEVEL (ZERO TO ONE) CORRESPONDING TO THAT VARIABLE VALUE. THESE MUST BE	MANUAL	162
IN ASCENDING ORDER IN THE INPUT FILE.	MANUAL	163
WHEN THIS OPTION IS USED, PACSTAT FIRST COMPUTES A SET OF RANDOM	MANUAL	164
NUMBERS ('CONFIDENCE LEVELS') ON THE INTERVAL 0,1 . THESE ARE USED IN	MANUAL	165
CONJUNCTION WITH THE DEFINED CUMULATIVE CONFIDENCE FUNCTION TO COMPUTE	MANUAL	166
VARIABLE VALUES CORRESPONDING TO EACH CONFIDENCE LEVEL. THESE NUMBERS	MANUAL	167
WILL BE COMPUTED IN A RANDOM ORDER. CONFIDENCE LEVELS LESS THAN ONE OR	MANUAL	168
GREATER THAN ZERO ARE IGNORED. IF THE ENTIRE CONFIDENCE INTERVAL 0,1	MANUAL	169
IS NOT COVERED BY THE FUNCTION, RANDOMLY GENERATED CONFIDENCE VALUES	MANUAL	170
OUTSIDE OF THE INTERVAL WILL RETURN WITH THE APPROPRIATE END POINT	MANUAL	171

VALUE.

THE SECOND OPTION ALLOWS THE USER TO ENTER RANDOM DATA POINTS DIRECTLY. THESE DATA POINTS MUST BE WRITTEN IN AN EXTERNAL FILE, ONE POINT PER LINE. PACSTAT WILL READ THESE DATA VALUES, AND USE THEM DIRECTLY, IN ORDER, IN THE MONTE CARLO RUNS TO BE MADE. IF THERE ARE FEWER DATA POINTS IN THIS FILE THAN SAMPLES DESIRED, THE DATA WHICH IS PRESENT IS REPEATED, IN ORDER, A SUFFICIENT NUMBER OF TIMES TO CREATE ENOUGH DATA.

BOTH OPTIONS REQUIRE THE USER TO ENTER THE FILE NAME WHERE THE DATA IS STORED. THESE NAMES ARE STORED UNTIL THE DATA IS NEEDED. EACH FILE IS OPENED, READ, AND CLOSED INDEPENDENTLY. THIS ALLOWS THE USER TO USE THE SAME FILE FOR SEVERAL DIFFERENT INPUT VARIABLES. ALL OF THE EXTERNAL FILES, USED FOR INPUT VARIABLE DEFINITION, ARE READ FREE FORM.

PROGRAM EXECUTION

THIS IS A BRIEF LIST OF THE PROGRAM PROMPTS AND APPROPRIATE USER RESPONSES.

SEG #PACSTAT

THIS COMMAND EXECUTES THE CODE '#PACSTAT' ON THE PRIMOS OPERATING SYSTEMS.

** MONTE CARLO SIMULATION **

DIF-STAT 2.1
(PACSTAT 1.0)

SIMPLE DIFFUSION RELEASE MODEL

THESE PRINTOUTS IDENTIFY THE SOURCE CODE NAME, VERSION NUMBER, AND THE TITLE OF THE PROBLEM BEING SIMULATED. THE CODE NAME AND VERSION NUMBER (VARIABLES PRG AND VERNUM, SET IN BLOCK DATA) ARE ECHOED HERE, ALONG WITH THE DRIVER CODE NAME (PACSTAT) AND VERSION NUMBER.

ENTER OUTPUT DATA FILE NAME.
(ENTER 'NONE' TO OMIT)

ENTER THE NAME OF THE OUTPUT FILE FOR THE PRINTED OUTPUT. THIS FILE WILL CONTAIN ALL OF THE INPUT DATA ECHO AND OUTPUT DIAGNOSTICS. BY ENTERING 'NONE', THIS OUTPUT WILL BE DIVERTED TO THE USER'S TERMINAL, RATHER THAN TO AN OUTPUT FILE.

ENTER BINARY DATA OUTPUT FILE NAME
(ENTER 'NONE' TO OMIT)

ENTER THE NAME OF THE OUTPUT BINARY FILE. THIS FILE WILL CONTAIN BOTH THE INPUT AND OUTPUT VARIABLE VALUES FOR EACH SAMPLE TAKEN, AS WELL AS THE PROBLEM TITLES AND LABELS, AND THE VALUES OF THE PROBLEM CONSTANTS. IT CAN BE READ LATER FOR POST PROCESSING THE DATA (E.G. PLOTTING). BY ENTERING 'NONE', THIS FILE WILL NOT BE CREATED.

THIS FILE IS WRITTEN PRIOR TO THE SORTING OF THE DATA. (THE

MANUAL	172
MANUAL	173
MANUAL	174
MANUAL	175
MANUAL	176
MANUAL	177
MANUAL	178
MANUAL	179
MANUAL	180
MANUAL	181
MANUAL	182
MANUAL	183
MANUAL	184
MANUAL	185
MANUAL	186
MANUAL	187
MANUAL	188
MANUAL	189
MANUAL	190
MANUAL	191
MANUAL	192
MANUAL	193
MANUAL	194
MANUAL	195
MANUAL	196
MANUAL	197
MANUAL	198
MANUAL	199
MANUAL	200
MANUAL	201
MANUAL	202
MANUAL	203
MANUAL	204
MANUAL	205
MANUAL	206
MANUAL	207
MANUAL	208
MANUAL	209
MANUAL	210
MANUAL	211
MANUAL	212
MANUAL	213
MANUAL	214
MANUAL	215
MANUAL	216
MANUAL	217
MANUAL	218
MANUAL	219
MANUAL	220
MANUAL	221
MANUAL	222
MANUAL	223
MANUAL	224
MANUAL	225

SORTING IS A NECESSARY PART OF A MONTE CARLO SIMULATION.) THIS ALLOWS THE USER TO DIRECTLY CORRELATE THE INPUT AND OUTPUT VALUES FOR EACH SAMPLE. ANY SAMPLES WHICH FAIL DURING THE RUN WILL BE MOVED TO THE END OF THE OUTPUT ARRAYS, WHICH EASES THE HANDLING AND EXAMINATION OF BOTH THE SUCCESSFUL AND UNSUCCESS- FUL SAMPLE DATA VALUES.	MANUAL . 226
	MANUAL . 227
	MANUAL . 228
	MANUAL . 229
	MANUAL . 230
	MANUAL . 231
	MANUAL . 232
ENTER LABEL FOR THIS RUN (MAX 40 CHARACTERS)	MANUAL . 233
	MANUAL . 234
THIS IS A CHARACTER LABEL FOR THE CURRENT RUN. IT HELPS TO IDENTIFY THE INPUT DATA SET. TOGETHER, THE PROBLEM TITLE AND THIS LABEL REPRESENT THE DATA SET TITLE. THE PROBLEM TITLE IS USED AS THE PLOT TITLE, WHILE THIS LABEL IS USED AS A SUB-TITLE ON THE PLOT.	MANUAL . 235
	MANUAL . 236
	MANUAL . 237
	MANUAL . 238
	MANUAL . 239
	MANUAL . 240
WOULD YOU LIKE TO CONTINUE OR QUIT IF AN ERROR IS ENCOUNTERED IN THE SOLUTION ROUTINE (C/Q)?	MANUAL . 241
	MANUAL . 242
	MANUAL . 243
ON OCCASION, THE MODEL BEING ANALYSED MAY FAIL FOR A RANGE OF INPUT VARIABLE VALUES, AND IT MAY NOT BE EVIDENT BEFOREHAND WHAT VALUES OF THOSE VARIABLES WILL CAUSE MODEL FAILURE. HOWEVER, IT IS A SIMPLE MATTER TO HAVE THE SOLUTION ROUTINE RETURN WITH AN ERROR POINTER SET WHEN THIS OCCURS. THIS IS POINTER IERR IN THE CALL LIST OF ROUTINE SOLN.	MANUAL . 244
	MANUAL . 245
	MANUAL . 246
	MANUAL . 247
	MANUAL . 248
	MANUAL . 249
FOR SOME PROBLEMS, IT IS DESIREABLE TO CONTINUE MODELLING WHEN AN ERROR OCCURS IN THE SOLUTION ROUTINE. ENTER A 'C' HERE TO ACTIVATE THIS OPTION. AT THE END OF THE RUN, THE SAMPLES IN ERROR WILL BE SORTED TO THE END OF THE DATA SETS, AND IGNORED IN ALL SUBSEQUENT ANALYSIS (PRINTING AND PLOTTING). NOTE THAT THE ENTIRE INPUT AND OUTPUT DATA ARRAYS ARE STILL PRINTED TO THE BINARY OUTPUT FILE, SO THAT ANALYSIS OF THE DATA IN ERROR MAY BE MADE.	MANUAL . 250
	MANUAL . 251
	MANUAL . 252
	MANUAL . 253
	MANUAL . 254
	MANUAL . 255
	MANUAL . 256
	MANUAL . 257
ENTER A 'Q' HERE IF YOU WOULD PREFER HAVING THE STOCHASTIC MODELLING STOPPED ON AN ERROR FROM THE SOLUTION ROUTINE.	MANUAL . 258
	MANUAL . 259
	MANUAL . 260
INPUT OF DISTRIBUTION TYPES AND PARAMETERS	MANUAL . 261
1) MOLEC DIFF (M**2/YR) DISTRIBUTION	MANUAL . 262
1) NORMAL	MANUAL . 263
2) NATURAL LOGNORMAL	MANUAL . 264
3) COMMON LOGNORMAL	MANUAL . 265
4) NATURAL LOGUNIFORM	MANUAL . 266
5) COMMON LOGUNIFORM	MANUAL . 267
6) EXPONENTIAL	MANUAL . 268
7) UNIFORM	MANUAL . 269
8) BERNOULLI	MANUAL . 270
9) EXTERNAL CONF FUNCTN	MANUAL . 271
10) EXTERNAL DATA POINTS	MANUAL . 272
11) CONSTANT	MANUAL . 273
ENTER THE NUMBER FOR THE DESIRED DISTRIBUTION.	MANUAL . 274
	MANUAL . 275
	MANUAL . 276
THIS PROMPT ASKS THE USER TO DEFINE THE DISTRIBUTION TYPE FOR THE INPUT VARIABLE NAMED 'MOLEC DIFF.' ENTER THE NUMBER CORRESPONDING TO THE DESIRED DISTRIBUTION. THE FOLLOWING	MANUAL . 277
	MANUAL . 278
	MANUAL . 279

PROMPTS WILL ASK FOR THE DEFINING PARAMETERS OF THE DISTRIBUTION WHICH IS CHOSEN, AND WILL VARY ACCORDINGLY.	MANUAL	280
	MANUAL	281
	MANUAL	282
DISTRIBUTION TYPE IS NORMAL	MANUAL	283
INPUT UNITS ARE M**2/YR	MANUAL	284
ENTER THE MEAN OF THE DISTRIBUTION.	MANUAL	285
	MANUAL	286
ENTER THE MEAN OF THE DESIRED NORMAL DISTRIBUTION.	MANUAL	287
	MANUAL	288
ENTER THE STANDARD DEVIATION.	MANUAL	289
	MANUAL	290
ENTER THE STANDARD DEVIATION OF THE DESIRED NORMAL DISTRIBUTION.	MANUAL	291
	MANUAL	292
WOULD YOU LIKE A LOWER AND AN UPPER	MANUAL	293
BOUND ENFORCED ON THIS VARIABLE (Y/N)?	MANUAL	294
	MANUAL	295
PACSTAT ALLOWS THE USER TO SET UPPER AND LOWER LIMITS ON THE DISTRIBUTION FOR THIS INPUT VARIABLE. THIS IS USEFUL WHEN A DISTRIBUTION TAIL EXTENDS TO AN UNREALISTIC VALUE (E.G., BELOW ZERO). IF 'Y' IS ENTERED HERE, THE USER WILL BE PROMPTED FOR THE UPPER AND LOWER LIMITS FOR USE ON THE INPUT VARIABLE. NOTE THAT DISTRIBUTIONS WHICH HAVE INHERENT ENDPOINTS (I.E. THE UNIFORM, LOGUNIFORM, AND CONSTANT DISTRIBUTIONS) WILL NOT GENERATE THIS PROMPT.	MANUAL	298
	MANUAL	297
	MANUAL	298
	MANUAL	299
	MANUAL	300
	MANUAL	301
	MANUAL	302
	MANUAL	303
	MANUAL	304
2) POROSITY (DIMENSIONLES) DISTRIBUTION	MANUAL	305
1) NORMAL	MANUAL	306
2) NATURAL LOGNORMAL	MANUAL	307
3) COMMON LOGNORMAL	MANUAL	308
4) NATURAL LOGUNIFORM	MANUAL	309
5) COMMON LOGUNIFORM	MANUAL	310
8) EXPONENTIAL	MANUAL	311
7) UNIFORM	MANUAL	312
8) BERNOULLI	MANUAL	313
9) EXTERNAL CONF FUNCTN	MANUAL	314
10) EXTERNAL DATA POINTS	MANUAL	315
11) CONSTANT	MANUAL	316
ENTER THE NUMBER FOR THE DESIRED DISTRIBUTION.	MANUAL	317
	MANUAL	318
THIS PROMPT IS REPEATED ONCE FOR EACH INPUT VARIABLE WHICH THE USER HAS DEFINED IN THE BLOCK DATA ROUTINE.	MANUAL	319
	MANUAL	320
	MANUAL	321
	MANUAL	322
ENTER THE VALUE FOR SCALE FACTOR (DIMENSIONLES),	MANUAL	323
	MANUAL	324
THIS IS A PROMPT FOR THE VALUE OF THE SYSTEM CONSTANT NAMED 'SCALE FACTOR'. THIS PROMPT WILL BE WRITTEN ONCE FOR EACH OF THE CONSTANTS WHICH THE USER HAS DEFINED IN THE BLOCK DATA ROUTINE.	MANUAL	325
	MANUAL	326
	MANUAL	327
	MANUAL	328
	MANUAL	329
ENTER THE NUMBER OF SAMPLES TO TAKE (MAX = 10000).	MANUAL	330
	MANUAL	331
ENTER THE NUMBER OF STOCHASTIC SAMPLES TO TAKE. THE MAXIMUM NUMBER OF SAMPLES MAY VARY, DEPENDING ON THE PROBLEM. THE	MANUAL	332
	MANUAL	333

MEMORY ALLOCATION TECHNIQUE ATTEMPTS TO PERMIT AS MANY SAMPLES AS POSSIBLE, WITHIN THE AVAILABLE SPACE. THE MAXIMUM VALUE PRINTED WITH THIS PROMPT WILL ALWAYS BE ENFORCED.	MANUAL	334
	MANUAL	335
	MANUAL	336
ENTER THE PRINT INTERVAL FOR OUTPUT DATA.	MANUAL	337
	MANUAL	338
	MANUAL	339
THE PRINT INTERVAL SETS THE NUMBER OF SAMPLES, FROM THE OUTPUT DATA SET, WHICH WILL BE PRINTED IN THE CONFIDENCE TABLES. THIS OUTPUT DATA IS USUALLY A LARGE DATA SET (E.G. 1000 VALUES).	MANUAL	340
THE CONFIDENCE TABLES WILL CONTAIN ONLY EVERY 'N-TH' DATA VALUE, WHEN N IS THE PRINT INTERVAL. THE SMALLEST AND LARGEST DATA VALUES WILL ALWAYS BE PRINTED, REGARDLESS OF THE PRINT INTERVAL.	MANUAL	341
	MANUAL	342
	MANUAL	343
	MANUAL	344
	MANUAL	345
	MANUAL	346
ENTER THE NUMBER OF INTERVALS FOR STRATIFIED SAMPLING (MAX= 100).	MANUAL	347
	MANUAL	348
STRATIFICATION DIVIDES THE VARIABLE DISTRIBUTIONS INTO A NUMBER OF INTERVALS OF EQUAL AREA. IT THEN FORCES THE SAME NUMBER OF SAMPLES TO BE CHOSEN FROM EACH INTERVAL. THIS CREATES A MORE UNIFORMLY DISTRIBUTED SET OF RANDOM VARIABLES FOR A GIVEN NUMBER OF SAMPLES.	MANUAL	349
	MANUAL	350
THE USER HERE MUST ENTER THE NUMBER OF INTERVALS DESIRED FOR STRATIFICATION. ENTERING A VALUE OF ONE WILL DEFEAT THE STRATIFICATION PROCEDURES. THIS PROMPT, AND STRATIFICATION, WILL BE OMITTED IF NONE OF THE INPUT VARIABLES ARE DISTRIBUTED.	MANUAL	351
	MANUAL	352
	MANUAL	353
	MANUAL	354
	MANUAL	355
	MANUAL	356
	MANUAL	357
	MANUAL	358
ENTER AN INITIAL SEED NUMBER FOR THE RANDOM NUMBER GENERATOR.	MANUAL	359
(A REAL, DOUBLE PRECISION NUMBER BETWEEN 1.0 AND 2.0E+9)	MANUAL	360
	MANUAL	361
THE PRINT RANDOM NUMBER GENERATOR REQUIRES AN SEED VALUE, WHICH MUST BE A DOUBLE PRECISION NUMBER BETWEEN 1. AND 2.0E+9. THIS ALLOWS THE USER TO CHANGE THE RANDOM SEQUENCE FROM RUN TO RUN.	MANUAL	362
	MANUAL	363
	MANUAL	364
	MANUAL	365
	MANUAL	366
	MANUAL	367
-----	MANUAL	368
THE MONTE CARLO SIMULATION IS RUN AT THIS POINT. THE INPUT VARIABLES ARE COMPUTED FROM THE DESIRED DISTRIBUTIONS, AND THE OUTPUT VARIABLES ARE COMPUTED IN THE ROUTINE SOLN. THIS SOLUTION ROUTINE IS CALLED ONCE FOR EACH SAMPLE DESIRED.	MANUAL	369
	MANUAL	370
	MANUAL	371
	MANUAL	372
CERTAIN RUN TIME DIAGNOSTICS MAY BE PRINTED TO THE USERS TERMINAL AT THIS POINT, DEPENDING ON THE NATURE OF THE PROBLEM.	MANUAL	373
	MANUAL	374
	MANUAL	375
-----	MANUAL	376
AVAILABLE SOLUTIONS ARE	MANUAL	377
0) EXIT LIST	MANUAL	378
1) TOTAL RELEASE (MG)	MANUAL	379
2) TRAVEL TIME (YRS)	MANUAL	380
3) - ENTER A NEW PRINT INTERVAL -	MANUAL	381
WHICH WOULD YOU LIKE (ENTER NUMBER)?	MANUAL	382
	MANUAL	383
	MANUAL	384
THIS PROMPT ASKS WHICH OUTPUT DATA VALUE THAT DATA SHOULD BE PRINTED AND/OR PLOTTED. ENTER THE NUMBER CORRESPONDING TO THE DESIRED OUTPUT VARIABLE. ENTER 0 TO EXIT THIS PART OF THE CODE.	MANUAL	385
	MANUAL	386
	MANUAL	387

THE LAST OPTION, A NEW PRINT INTERVAL, WILL ALWAYS FOLLOW THE
LAST AVAILABLE SOLUTION. THIS PERMITS THE USER TO CHANGE THE
PRINT INTERVAL WHICH WAS ENTERED EARLIER.

WHICH WOULD YOU LIKE

- 1) CUMULATIVE PROBABILITY
- 2) COMPLEMENTARY CUMULATIVE PROBABILITY

ENTER 1 OR 2

THE DATA MAY BE PRINTED AND/OR PLOTTED AS A FUNCTION OF EITHER
THE CUMULATIVE PROBABILITY, OR THE COMPLEMENTARY CUMULATIVE
PROBABILITY. ENTER THE VALUE CORRESPONDING TO THE DESIRED
DATA SET TYPE. A SAMPLE OUTPUT TABLE IS PRINTED BELOW.

**--- OUTPUT CUMULATIVE PROBABILITIES

FOR STOCHASTIC VARIABLE, TRAVEL TIME (YRS)

SAMPLE NUMBER	VARIABLE VALUE	CUMULATIVE CONFIDENCE
1	0.1718E-01	0.10000
2	0.7712E-01	0.20000
3	0.1895	0.30000
4	0.2822	0.40000
5	0.3484	0.50000
6	0.4288	0.60000
7	0.7398	0.70000
8	1.802	0.80000
9	1.883	0.90000
10	2.818	1.00000

WOULD YOU LIKE THE DATA PLOTTED (Y/N)?

THE PLOTTING OPTION ALLOWS ONE TO CREATE A PLOT OF THE DESIRED
OUTPUT VARIABLE (ABSCISSA) VERSUS THE CONFIDENCE LEVEL
(ORDINATE). IF CHOSEN, THE USER MUST DEFINE THE PLOTTING DEVICE
DEVICE (CURRENT TERMINAL) AND PAGE SIZE, PRIOR TO ONLY THE FIRST
PLOT.

AVAILABLE SOLUTIONS ARE

- 0) EXIT LIST
- 1) TOTAL RELEASE (MG)
- 2) TRAVEL TIME (YR)
- 3) - ENTER A NEW PRINT INTERVAL -

WHICH WOULD YOU LIKE (ENTER NUMBER)?

THIS PROMPT IS REPEATED UNTIL A ZERO IS ENTERED.

CREATE ANOTHER DATA SET (Y/N)?

BY ENTERING A 'Y' HERE, THE USER MAY RESTART THE MONTE CARLO
SIMULATION. THE PROGRAM WILL PROMPT FOR UPDATED PARAMETERS
FOR THE INPUT VARIABLES AND CONSTANTS. IF AN 'N' IS ENTERED,
THE PROGRAM EXECUTION IS ENDED.

MANUAL . 388
MANUAL . 389
MANUAL . 390
MANUAL . 391
MANUAL . 392
MANUAL . 393
MANUAL . 394
MANUAL . 395
MANUAL . 396
MANUAL . 397
MANUAL . 398
MANUAL . 399
MANUAL . 400
MANUAL . 401
MANUAL . 402
MANUAL . 403
MANUAL . 404
MANUAL . 405
MANUAL . 406
MANUAL . 407
MANUAL . 408
MANUAL . 409
MANUAL . 410
MANUAL . 411
MANUAL . 412
MANUAL . 413
MANUAL . 414
MANUAL . 415
MANUAL . 416
MANUAL . 417
MANUAL . 418
MANUAL . 419
MANUAL . 420
MANUAL . 421
MANUAL . 422
MANUAL . 423
MANUAL . 424
MANUAL . 425
MANUAL . 426
MANUAL . 427
MANUAL . 428
MANUAL . 429
MANUAL . 430
MANUAL . 431
MANUAL . 432
MANUAL . 433
MANUAL . 434
MANUAL . 435
MANUAL . 436
MANUAL . 437
MANUAL . 438
MANUAL . 439
MANUAL . 440
MANUAL . 441

WHEN A NEW DATA SET IS CREATED, THE PRINTED AND BINARY OUTPUT DATA ARE ADDED ON TO THE EXISTING DATA FILES. NEW FILES ARE NOT OPENED.

	MANUAL	442
	MANUAL	443
	MANUAL	444
	MANUAL	445
	MANUAL	446
	MANUAL	447

SUBROUTINE NORMAL (N,RNDVAL,RP1,RP2)	NORMAL	2
C	NORMAL	3
C ROUTINE FOR COMPUTING A NORMALLY DISTRIBUTED DATA SET FROM A	NORMAL	4
C UNIFORMLY DISTRIBUTED DATA SET ON THE INTERVAL 0,1 .	NORMAL	5
C	NORMAL	6
C N = THE NUMBER OF ITEMS IN THE DATA SET	NORMAL	7
C RNDVAL = VECTOR OF UNIFORMLY DISTRIBUTED VALUES ON INPUT. EACH	NORMAL	8
C VALUE MUST BE BETWEEN ZERO AND ONE.	NORMAL	9
C = VECTOR OF NORMALLY DISTRIBUTED VALUES ON OUTPUT.	NORMAL	10
C RP1 = MEAN VALUE FOR THE NORMAL DISTRIBUTION.	NORMAL	11
C RP2 = STANDARD DEVIATION FOR THE NORMAL DISTRIBUTION.	NORMAL	12
C	NORMAL	13
DIMENSION	NORMAL	14
+ RNDVAL(N)	NORMAL	15
C	NORMAL	16
C NORMAL DISTRIBUTION	NORMAL	17
C	NORMAL	18
DO 110 I=1,N	NORMAL	19
RV=RNDVAL(I)	NORMAL	20
RNDVAL(I)=DNORM(RV,RP1,RP2)	NORMAL	21
110 CONTINUE	NORMAL	22
C	NORMAL	23
RETURN	NORMAL	24
END	NORMAL	25
SUBROUTINE NORMALL (N,RNDVAL,RP1,RP2,AMIN,AMAX)	NORMAL	2
C	NORMAL	3
C ROUTINE FOR TRANSFORMING A UNIFORMLY DISTRIBUTED DATA SET ON THE	NORMAL	4
C INTERVAL 0,1 TO A NORMALLY DISTRIBUTED DATA SET, WITH THE	NORMAL	5
C CONSTRAINT THAT ALL OUTPUT VALUES LIE BETWEEN SPECIFIED LIMITS.	NORMAL	6
C	NORMAL	7
C RP1 = MEAN VALUE FOR THE DESIRED NORMAL DISTRIBUTION.	NORMAL	8
C RP2 = STANDARD DEV FOR THE DESIRED NORMAL DISTRIBUTION.	NORMAL	9
C AMIN = MINIMUM LIMIT VALUE FOR THE NORMALLY DISTRIBUTED DATA.	NORMAL	10
C AMAX = MAXIMUM LIMIT VALUE FOR THE NORMALLY DISTRIBUTED DATA.	NORMAL	11
C N = THE NUMBER OF DATA VALUES IN VECTOR RNDVAL.	NORMAL	12
C RNDVAL = ON INPUT, THE VECTOR OF UNIFORMLY DISTRIBUTED VALUES.	NORMAL	13
C = ON OUTPUT, THE VECTOR OF NORMALLY DISTRIBUTED VALUES.	NORMAL	14
C	NORMAL	15
C NOTE THAT THE NORMAL DISTRIBUTION GENERATOR, DNORM, MUST BE A ONE	NORMAL	16
C TO ONE TRANSFORMATION BETWEEN THE UNIFORM AND NORMAL DISTRIBUTIONS.	NORMAL	17
C EACH MEAN OF THE UNIFORM DISTRIBUTION (0.5) MUST TRANSFORM TO THE	NORMAL	18
C MEAN OF THE NORMAL DISTRIBUTION (RP1).	NORMAL	19
C	NORMAL	20
C UMIN,UMAX = THE LIMIT VALUES ON THE UNIFORM DISTRIBUTION. THESE	NORMAL	21
C ARE AVAILABLE TO THE USER THROUGH COMMON BLOCK ULIMITS.	NORMAL	22
C	NORMAL	23
\$INSERT *\$COMMON\$ULIMITS	NORMAL	24
C	NORMAL	25

	DIMENSION	NORMALL	26
	+ RLIW(2), RNDVAL(N)	NORMALL	27
	DATA	NORMALL	28
	+ EPS2/0.0E0/	NORMALL	29
C		NORMALL	30
	IF (AMIN.LE.AMAX) GO TO 100	NORMALL	31
	RV=AMIN	NORMALL	32
	AMIN=AMAX	NORMALL	33
	AMAX=RV	NORMALL	34
	100 CONTINUE	NORMALL	35
C		NORMALL	36
C	SET DEFAULTS	NORMALL	37
C		NORMALL	38
	RLIW(1)=0.0	NORMALL	39
	RLIW(2)=1.0	NORMALL	40
	ZB=DNORM(RLIW(1),RP1,RP2)	NORMALL	41
	ZT=DNORM(RLIW(2),RP1,RP2)	NORMALL	42
	INVR=0	NORMALL	43
	IF (ZB.LE.ZT) GO TO 110	NORMALL	44
	RV=ZT	NORMALL	45
	ZT=ZB	NORMALL	46
	ZB=RV	NORMALL	47
	INVR=1	NORMALL	48
	110 CONTINUE	NORMALL	49
C		NORMALL	50
C	LOOP ON THE LOWER AND UPPER LIMITS	NORMALL	51
C		NORMALL	52
	ST=RP1+RP2	NORMALL	53
	SB=RP1-RP2	NORMALL	54
	DO 150 I=1,2	NORMALL	55
	ENDPNT=AMIN	NORMALL	56
	IF (I.EQ.2) ENDPNT=AMAX	NORMALL	57
C		NORMALL	58
C	CHECK FOR ENDPOINT WITHIN DISTRIBUTION LIMITS	NORMALL	59
C		NORMALL	60
	IF ((ENDPNT.LT.ZT).OR.(ENDPNT.LT.ZB)) GO TO 120	NORMALL	61
	RV=1.	NORMALL	62
	IF (INVR.GT.0) RV=0.	NORMALL	63
	GO TO 140	NORMALL	64
120	CONTINUE	NORMALL	65
	IF ((ENDPNT.GT.ZT).OR.(ENDPNT.GT.ZB)) GO TO 130	NORMALL	66
	RV=0.	NORMALL	67
	IF (INVR.GT.0) RV=1.	NORMALL	68
	GO TO 140	NORMALL	69
130	CONTINUE	NORMALL	70
C		NORMALL	71
C	FIND DISTANCE FROM MEAN VALUE, IN STND DEVIATIONS,	NORMALL	72
C	AND COMPUTE INTERVAL LIMIT FOR THIS ENDPOINT.	NORMALL	73
C		NORMALL	74
	RV=(ENDPNT-RP1)/RP2	NORMALL	75
	RV = ALNORM (RV)	NORMALL	76
C		NORMALL	77
140	CONTINUE	NORMALL	78
	RLIW(I)=RV	NORMALL	79

150 CONTINUE	NORMAL	80	
IF (INVR.EQ.0) GO TO 160	NORMAL	81	
RLIM(1)=1.0-RLIM(1)	NORMAL	82	
RLIM(2)=1.0-RLIM(2)	NORMAL	83	
160 CONTINUE	NORMAL	84	
C	NORMAL	85	
C SORT ENDPOINT LIMITS	NORMAL	86	
C	NORMAL	87	
UMIN=RLIM(1)	NORMAL	88	
UMAX=RLIM(2)	NORMAL	89	
IF (UMIN.LE.UMAX) GO TO 170	NORMAL	90	
A=UMIN	NORMAL	91	
UMIN=UMAX	NORMAL	92	
UMAX=A	NORMAL	93	
170 CONTINUE	NORMAL	94	
C	NORMAL	95	
C TRANSFORM UNIFORM DISTRIBUTION TO WITHIN LIMITS,	NORMAL	96	
C AND THEN TRANSFORM TO A NORMAL DISTRIBUTION.	NORMAL	97	
C	NORMAL	98	
DO 180 I=1,N	NORMAL	99	
RV=UMIN+RNDVAL(I)*(UMAX-UMIN)	NORMAL	100	
RNDVAL(I)=DNORM(RV,RP1,RP2)	NORMAL	101	
180 CONTINUE	NORMAL	102	
C	NORMAL	103	
RETURN	NORMAL	104	
END	NORMAL	105	
-----		OUTPUT	2
SAMPLE OUTPUT PRINT FILE		OUTPUT	3
THIS IS A SAMPLE OUTPUT PRINT FILE. THIS FILE WAS CREATED BY THE		OUTPUT	4
MONTE CARLO TEST CASE DEFINED BY THE BLOCK DATA AND SOLUTION ROUTINES		OUTPUT	5
LISTED ABOVE.		OUTPUT	6
-----		OUTPUT	7
MASS STORAGE AND RELEASE RATE INTO LAYER		OUTPUT	8
CARBON-14	RUN I.D. 312861320	OUTPUT	9
	USER NAME LANGFORD	OUTPUT	10
	DATA SET NUMBER 1	OUTPUT	11
**** ECHO OF INPUT DATA		OUTPUT	12
MOLEC DIFFSV (MET**2/YEAR)		OUTPUT	13
DISTRIBUTION IS COMMON LOGUNIFORM		OUTPUT	14
MIN, MAX EXPONENTS FOR THE UNDERLYING		OUTPUT	15
UNIFORM DISTRIBUTION ARE		OUTPUT	16
MIN = -3.0000E+00, MAX = -2.0000E+00		OUTPUT	17
RETARDATION (UNITLESS)		OUTPUT	18
DISTRIBUTION IS CONSTANT		OUTPUT	19
CONSTANT VALUE = 1.0000E+00		OUTPUT	20
		OUTPUT	21
		OUTPUT	22
		OUTPUT	23
		OUTPUT	24
		OUTPUT	25
		OUTPUT	26
		OUTPUT	27
		OUTPUT	28
		OUTPUT	29

LAYER WIDTH (METERS)	OUTPUT	30
DISTRIBUTION IS UNIFORM	OUTPUT	31
LOWER ENDPOINT = 1.5000E-01	OUTPUT	32
UPPER ENDPOINT = 4.5000E-01	OUTPUT	33
	OUTPUT	34
SOLUBILITY (CM/MET**3)	OUTPUT	35
DISTRIBUTION IS COMMON LOGNORMAL	OUTPUT	36
CONSTANTS FOR THE UNDERLYING NORMAL DISTRIBUTION ARE	OUTPUT	37
MEAN VALUE = -1.5017E+00	OUTPUT	38
STND DEVIATION = 5.0000E-01	OUTPUT	39
	OUTPUT	40
	OUTPUT	41
VALUE FOR HALF LIFE (YEARS) IS 5.7300E+03	OUTPUT	42
VALUE FOR POROSITY (UNITLESS) IS 1.0000E-02	OUTPUT	43
	OUTPUT	44
	OUTPUT	45
NUMBER OF SAMPLES IS 1000	OUTPUT	46
PRINT INTERVAL IS 100	OUTPUT	47
STRATIFIED SAMPLING CHOSEN, USING 10 LEVELS.	OUTPUT	48
	OUTPUT	49
	OUTPUT	50
**--- EXPECTED INPUT VARIABLE STATISTICS	OUTPUT	51
	OUTPUT	52
	OUTPUT	53
VARIABLE MODE MEAN MEDIAN STND DEV	OUTPUT	54
MOLEC DIFFSV 1.00E-03 3.91E-03 3.10E-03 2.49E-03	OUTPUT	55
LAYER WIDTH 3.00E-01 3.00E-01 3.00E-01 8.66E-02	OUTPUT	56
SOLUBILITY 3.15E-02	OUTPUT	57
	OUTPUT	58
**-----	OUTPUT	59
	OUTPUT	60
ONE DIMENSIONAL DIFFUSIONAL RELEASE INTO A BOUNDARY	OUTPUT	61
LAYER OVER A SOLUBILITY LIMITED SOURCE ZONE.	OUTPUT	62
	OUTPUT	63
	OUTPUT	64
**--- SAMPLE DIAGNOSTICS, INPUT DISTRIBUTIONS	OUTPUT	65
	OUTPUT	66
	OUTPUT	67
MIN MAX MEAN MEDIAN STND DEV S	OUTPUT	68
MOLEC DIFFSV 1.002E-03 9.999E-03 3.800E-03 3.182E-03 2.482E-03 -2.	OUTPUT	69
RETARDATION 1.000E+00 1.000E+00 1.000E+00 1.000E+00 0.000E-01 0.	OUTPUT	70
LAYER WIDTH 1.505E-01 4.497E-01 2.999E-01 3.001E-01 8.668E-02 1.	OUTPUT	71
SOLUBILITY 1.150E-03 1.019E+00 8.472E-02 3.154E-02 1.150E-01 -2.	OUTPUT	72
	OUTPUT	73
**--- MAXIMUM LIKELIHOOD ESTIMATORS FOR INPUT DISTRIBUTIONS	OUTPUT	74
COMPUTED VALUES EXPECTED VALUES	OUTPUT	75
VARIABLE PARAMETER 1 PARAMETER 2 PARAMETER 1 PARAMETER 2	OUTPUT	76
MOLEC DIFFSV -2.999E+00 -2.000E+00 -3.000E+00 -2.000E+00	OUTPUT	77
RETARDATION 1.000E+00 1.000E+00	OUTPUT	78
LAYER WIDTH 1.505E-01 4.497E-01 1.500E-01 4.500E-01	OUTPUT	79
SOLUBILITY -1.498E+00 5.056E-01 -1.502E+00 5.000E-01	OUTPUT	80
	OUTPUT	81
	OUTPUT	82
**--- SAMPLE DIAGNOSTICS, OUTPUT DISTRIBUTIONS	OUTPUT	83

	MIN	MAX	MEAN	MEDIAN	STND DEV	S	OUTPUT	
MASS STORAGE IN LAYER, GM/M**2							OUTPUT	84
1.703E-03 9.243E-00 2.652E-01 9.448E-02 6.376E-01 -1.							OUTPUT	85
REL RATE (S.S.), GM/M**3-YR							OUTPUT	86
1.895E-08 7.897E-05 2.327E-06 9.610E-07 4.638E-06 -9.							OUTPUT	87
							OUTPUT	88
							OUTPUT	89
							OUTPUT	90
							OUTPUT	91
							OUTPUT	92
							OUTPUT	93
							OUTPUT	94
							OUTPUT	95
							OUTPUT	96
							OUTPUT	97
							OUTPUT	98
							OUTPUT	99
							OUTPUT	100
							OUTPUT	101
							OUTPUT	102
							OUTPUT	103
							OUTPUT	104
							OUTPUT	105
							OUTPUT	106
							OUTPUT	107
							OUTPUT	108
							OUTPUT	109
							OUTPUT	110
							OUTPUT	111
							OUTPUT	112
							OUTPUT	113
							OUTPUT	114
							OUTPUT	115
							OUTPUT	116
							OUTPUT	117
							OUTPUT	118
							OUTPUT	119
							OUTPUT	120
							OUTPUT	121
							OUTPUT	122
							OUTPUT	123
							OUTPUT	124
							OUTPUT	125
							OUTPUT	126
							OUTPUT	127
							OUTPUT	128
							OUTPUT	129
							OUTPUT	130
							OUTPUT	131
							OUTPUT	132
							OUTPUT	133
							OUTPUT	134
							OUTPUT	135
							OUTPUT	136
							OUTPUT	137

STRATIFIED SAMPLING DIAGNOSTICS

VARIABLE	NUMBER OF SAMPLES CHOSEN FROM EACH LEVEL										OUTPUT	
MOLEC DIFFSV	100	100	100	100	100	100	100	100	100	100	OUTPUT	96
LAYER WIDTH	100	100	100	100	100	100	100	100	100	100	OUTPUT	97
SOLUBILITY	100	100	100	100	100	100	100	100	100	100	OUTPUT	98
											OUTPUT	99
											OUTPUT	100
											OUTPUT	101
											OUTPUT	102
											OUTPUT	103
											OUTPUT	104
											OUTPUT	105
											OUTPUT	106
											OUTPUT	107
											OUTPUT	108
											OUTPUT	109
											OUTPUT	110
											OUTPUT	111
											OUTPUT	112
											OUTPUT	113
											OUTPUT	114
											OUTPUT	115
											OUTPUT	116
											OUTPUT	117
											OUTPUT	118
											OUTPUT	119
											OUTPUT	120
											OUTPUT	121
											OUTPUT	122
											OUTPUT	123
											OUTPUT	124
											OUTPUT	125
											OUTPUT	126
											OUTPUT	127
											OUTPUT	128
											OUTPUT	129
											OUTPUT	130
											OUTPUT	131
											OUTPUT	132
											OUTPUT	133
											OUTPUT	134
											OUTPUT	135
											OUTPUT	136
											OUTPUT	137

**--- OUTPUT CUMULATIVE PROBABILITIES

FOR STOCHASTIC VARIABLE, MASS STORAGE IN LAYER, GM/M**2

SAMPLE NUMBER	VARIABLE VALUE	CUMULATIVE CONFIDENCE	OUTPUT	
1	0.1703E-02	0.00100	OUTPUT	108
100	0.1329E-01	0.10000	OUTPUT	109
200	0.2506E-01	0.20000	OUTPUT	110
300	0.4262E-01	0.30000	OUTPUT	111
400	0.6627E-01	0.40000	OUTPUT	112
500	0.9429E-01	0.50000	OUTPUT	113
600	0.1363	0.60000	OUTPUT	114
700	0.2023	0.70000	OUTPUT	115
800	0.3012	0.80000	OUTPUT	116
900	0.6061	0.90000	OUTPUT	117
1000	9.243	1.00000	OUTPUT	118
			OUTPUT	119
			OUTPUT	120
			OUTPUT	121
			OUTPUT	122
			OUTPUT	123
			OUTPUT	124
			OUTPUT	125
			OUTPUT	126
			OUTPUT	127
			OUTPUT	128
			OUTPUT	129
			OUTPUT	130
			OUTPUT	131
			OUTPUT	132
			OUTPUT	133
			OUTPUT	134
			OUTPUT	135
			OUTPUT	136
			OUTPUT	137

**--- OUTPUT CUMULATIVE PROBABILITIES

FOR STOCHASTIC VARIABLE, REL RATE (S.S.), GM/M**3-YR

SAMPLE NUMBER	VARIABLE VALUE	CUMULATIVE CONFIDENCE	OUTPUT	
1	0.1895E-07	0.00100	OUTPUT	128
100	0.1803E-06	0.10000	OUTPUT	129
200	0.3112E-06	0.20000	OUTPUT	130
300	0.4996E-06	0.30000	OUTPUT	131
400	0.7125E-06	0.40000	OUTPUT	132
500	0.9606E-06	0.50000	OUTPUT	133
600	0.1358E-05	0.60000	OUTPUT	134
700	0.1974E-05	0.70000	OUTPUT	135
800	0.2901E-05	0.80000	OUTPUT	136
900	0.5024E-05	0.90000	OUTPUT	137

1000	0.7897E-04	1.00000	OUTPUT	138
VARIABLE LIST FOR THE MONTE CARLO DRIVER ROUTINES 'PACSTAT'.			OUTPUT	139
-----			OUTPUT	140
THE FOLLOWING IS A LIST OF VARIABLES FOR THE PACSTAT MONTE CARLO			OUTPUT	141
DRIVER ROUTINES. NOTE THAT ONLY COMMON BLOCKS PBLK1 THROUGH PBLK6 ARE			OUTPUT	142
NEEDED BY THE USER DEFINABLE ROUTINES SOLN (SOLUTION COMPUTATION) AND			OUTPUT	143
BLKDAT (BLOCK DATA DEFINING THE PROBLEM).			OUTPUT	144
THIS LIST IS CURRENT AS OF MARCH 5, 1988.			OUTPUT	145
PARAMETER BLOCK PPARA			OUTPUT	146
-----			OUTPUT	147
ISIZE = MAXIMUM DATA SET SIZE. THIS SETS THE DIMENSIONS OF THE			OUTPUT	148
LARGE ARRAYS FOR STORING INPUT AND OUTPUT VARIABLES.			OUTPUT	149
MAXCNT = MAXIMUM NUMBER OF CONSTANTS A PROBLEM MAY CONTAIN.			OUTPUT	150
MAXDST = MAXIMUM NUMBER OF DATA POINTS FOR A USER DEFINED CUMULATIVE			OUTPUT	151
DISTRIBUTION FUNCTION.			OUTPUT	152
MAXLEV = MAXIMUM NUMBER OF LEVELS FOR STRATIFICATION.			OUTPUT	153
MAXNS = THE MAXIMUM NUMBER OF MONTE CARLO SAMPLES WHICH ARE ALLOWED			OUTPUT	154
PER RUN OF THE DRIVER CODE.			OUTPUT	155
MAXSOL = MAXIMUM NUMBER OF 'SOLUTIONS' (OUTPUT VARIABLES) ALLOWED.			OUTPUT	156
MAXVAR = MAXIMUM NUMBER OF INPUT VARIABLES A PROBLEM MAY CONTAIN.			OUTPUT	157
NMLEN = MAXIMUM FILE NAME LENGTH (NUMBER OF CHAR*4 WORDS).			OUTPUT	158
NTYPE = MAXIMUM NUMBER OF DISTRIBUTION TYPES PRESENT. IF THIS			OUTPUT	159
PROGRAM LIMIT IS CHANGED, THE ACCOMPANYING LIST OF			OUTPUT	160
DISTRIBUTIONS MUST ALSO BE UPGRADED. THIS WILL OCCUR IN			OUTPUT	161
ROUTINES IINPUT, EXPECT, STATDT, AND RNGS.			OUTPUT	162
COMMON BLOCK PBLK1			OUTPUT	163
-----			OUTPUT	164
NCONST = NUMBER OF CONSTANTS FOR THE CURRENTLY DEFINED PROBLEM.			OUTPUT	165
(BLKDAT)			OUTPUT	166
NSOLN = NUMBER OF SOLUTIONS FOR THE CURRENTLY DEFINED PROBLEM.			OUTPUT	167
(BLKDAT)			OUTPUT	168
NVAR = NUMBER OF INPUT VARIABLES FOR THE CURRENTLY DEFINED PROBLEM.			OUTPUT	169
(BLKDAT)			OUTPUT	170
COMMON BLOCK PBLK2			OUTPUT	171
-----			OUTPUT	172
NSTTL = NUMBER OF CHARACTERS IN THE PLOTTING SUB-TITLE. (PACSTAT)			OUTPUT	173
NTTL = NUMBER OF CHARACTERS IN THE PLOTTING TITLE. (PACSTAT)			OUTPUT	174
STTL = PLOTTING SUB-TITLE, UP TO 40 CHARACTERS. (PACSTAT)			OUTPUT	175
TTITLE = PLOTTING TITLE, UP TO 40 CHARACTERS. (BLKDAT)			OUTPUT	176
COMMON BLOCK PBLK3			OUTPUT	177
-----			OUTPUT	178
CLABEL = LABELS FOR THE SYSTEM CONSTANTS FOR THE CURRENTLY DEFINED			OUTPUT	179
PROBLEM, UP TO 12 CHARACTERS. (BLKDAT)			OUTPUT	180
CDIMEN = LABELS FOR THE UNITS OF THE SYSTEM CONSTANTS, UP TO 12			OUTPUT	181
CHARACTERS. (BLKDAT)			OUTPUT	182
PLABEL = LABELS FOR THE SOLUTIONS OF THE CURRENTLY DEFINED PROBLEM, UP			OUTPUT	183
TO 32 CHARACTERS. (BLKDAT)			OUTPUT	184
VLABEL = LABELS FOR THE INPUT VARIABLES FOR THE CURRENTLY DEFINED			OUTPUT	185
			OUTPUT	186
			OUTPUT	187
			OUTPUT	188
			OUTPUT	189
			OUTPUT	190
			OUTPUT	191

PROBLEM, UP TO 12 CHARACTERS. (BLKDAT)	OUTPUT	192
VDIMEN = LABELS FOR THE UNITS OF THE INPUT VARIABLES FOR THE CURRENTLY	OUTPUT	193
DEFINED PROBLEM, UP TO 12 CHARACTERS. (BLKDAT)	OUTPUT	194
COMMON BLOCK PBLK4	OUTPUT	195
-----	OUTPUT	196
CONST = VALUES FOR THE SYSTEM CONSTANTS. (IINPUT)	OUTPUT	197
VALU = ARRAY FOR TEMPORARY STORAGE OF THE SOLUTION VALUES, FOR	OUTPUT	198
TRANSFER FROM SUBROUTINE SOLN TO THE MAIN ROUTINE. (SOLN)	OUTPUT	199
VINPT = ARRAY FOR TEMPORARY STORAGE OF THE INPUT VARIABLE VALUES,	OUTPUT	200
FOR TRANSFER TO SUBROUTINE SOLN. (DATSET)	OUTPUT	201
COMMON BLOCK PBLK5	OUTPUT	202
-----	OUTPUT	203
ICNT = ITERATION COUNTER. (PACSTAT)	OUTPUT	204
IDAT = PRINTED OUTPUT FILE, LOGICAL UNIT NUMBER. (PACSTAT)	OUTPUT	205
INDEX = THE SAMPLE NUMBER OF THE CURRENT SAMPLE. (DATSET)	OUTPUT	206
COMMON BLOCK PBLK6	OUTPUT	207
-----	OUTPUT	208
CONF = ARRAY OF CONFIDENCE VALUES CORRESPONDING TO THE OUTPUT	OUTPUT	209
SOLUTION VALUES (AFTER SORTING). THIS IS ALSO USED IN	OUTPUT	210
DUMMY VARIABLES TRANSFERS OF DATA IN ROUTINES VARSET AND	OUTPUT	211
STATOT, TO AVOID PAGE FAULTING ERRORS ON VIRTUAL MEMORY	OUTPUT	212
MACHINES (SEE COMMENTS, MAIN ROUTINE). (DATOUT, VARSET,	OUTPUT	213
STATOT).	OUTPUT	214
RPLT = ARRAY OF SOLUTION VALUES TO BE PLOTTED AND/OR PRINTED. THIS	OUTPUT	215
DATA IS TRANSFERED FROM THE SOLUTION ARRAY RLTS. (PACSTAT)	OUTPUT	216
COMMON BLOCKS PBLK7A, PBLK7B	OUTPUT	217
-----	OUTPUT	218
NSLOC = THE LOCATION OF THE STARTING DATA ITEM IN ARRAY RLTS, FOR	OUTPUT	219
THE DATA SETS FOR EACH OF THE OUTPUT (SOLUTION) VARIABLES.	OUTPUT	220
(PACSTAT)	OUTPUT	221
RLTS = ARRAY FOR STORING THE OUTPUT SOLUTION VALUES, SO THAT STATI-	OUTPUT	222
STICAL DIAGNOSTICS MAY BE DONE ON THOSE VALUES. (DATSET)	OUTPUT	223
COMMON BLOCKS PBLK8A, PBLK8B	OUTPUT	224
-----	OUTPUT	225
NVLOC = THE LOCATION OF THE STARTING DATA ITEM IN ARRAY RLTS, FOR	OUTPUT	226
THE DATA SETS FOR EACH OF THE INPUT VARIABLES. (PACSTAT)	OUTPUT	227
VAR = ARRAY TO STORE THE RANDOMLY GENERATED INPUT VARIABLE VALUES,	OUTPUT	228
SO THAT STATISTICAL DIAGNOSTICS MAY BE DONE ON THOSE VALUES.	OUTPUT	229
(VARSET)	OUTPUT	230
COMMON BLOCK PBLK9	OUTPUT	231
-----	OUTPUT	232
IRUN = 0/1 STORED/INTERACTIVE GRAPHICS POINTER. (PLINIT)	OUTPUT	233
XL = X PLOT SIZE, IN INCHES. (PACSTAT, PLINIT)	OUTPUT	234
XL2 = X PAGE SIZE, IN INCHES. (PACSTAT, PLINIT)	OUTPUT	235
YL = Y PLOT SIZE, IN INCHES. (PACSTAT, PLINIT)	OUTPUT	236
YL2 = Y PAGE SIZE, IN INCHES. (PACSTAT, PLINIT)	OUTPUT	237
COMMON BLOCK PBLK10	OUTPUT	238
-----	OUTPUT	239
	OUTPUT	240
	OUTPUT	241
	OUTPUT	242
	OUTPUT	243
	OUTPUT	244
	OUTPUT	245

-----	OUTPUT	248
FAVG = AVERAGES FOR THE COMPUTED SOLUTION DISTRIBUTIONS. (STATS)	OUTPUT	247
FMAX = MAXIMUMS FOR THE COMPUTED SOLUTION DISTRIBUTIONS. (STATS)	OUTPUT	248
FMED = MEDIAN VALUES FOR THE COMPUTED SOLUTIONS DISTRIBUTION. (STATOT)	OUTPUT	249
FMIN = MINIMUMS FOR THE COMPUTED SOLUTION DISTRIBUTIONS. (STATS)	OUTPUT	250
FSKW = SKEWNESS VALUES FOR THE COMPUTED SOLUTION DISTRIBUTIONS. (STATS)	OUTPUT	251
FSTD = STANDARD DEVIATION VALUES FOR THE COMPUTED SOLUTION DISTRIBUTIONS. (STATS)	OUTPUT	252
VAVG = AVERAGES FOR THE INPUT RANDOM VARIABLE DISTRIBUTIONS. (STATS)	OUTPUT	253
VMAX = MAXIMUMS FOR THE INPUT RANDOM VARIABLE DISTRIBUTIONS. (STATS)	OUTPUT	254
VMED = MEDIAN VALUES FOR THE INPUT RANDOM VARIABLE DISTRIBUTIONS. (STATOT)	OUTPUT	255
VMIN = MINIMUMS FOR THE INPUT RANDOM VARIABLE DISTRIBUTIONS. (STATS)	OUTPUT	256
VSKW = SKEWNESS VALUES FOR THE INPUT RANDOM VARIABLE DISTRIBUTIONS. (STATS)	OUTPUT	257
VSTD = STANDARD DEVIATION VALUES FOR THE INPUT RANDOM VARIABLE DISTRIBUTIONS. (STATS)	OUTPUT	258
COMMON BLOCK PBLK11	OUTPUT	259
-----	OUTPUT	260
VINAVG = EXPECTED MEAN VALUES FOR THE INPUT DISTRIBUTIONS. (EXPECT)	OUTPUT	261
VINMED = EXPECTED MEDIAN VALES FOR THE INPUT DISTRIBUTIONS. (EXPECT)	OUTPUT	262
VINMOD = EXPECTED MODE FOR THE INPUT DISTRIBUTION. (EXPECT)	OUTPUT	263
VINSTD = EXPECTED STANDARD DEVIATIONS FOR THE INPUT DISTRIBUTIONS. (EXPECT)	OUTPUT	264
COMMON BLOCK PBLK12	OUTPUT	265
-----	OUTPUT	266
NERR = AN ERROR POINTER, INDICATING WHICH SAMPLES RETURNED WITH AN ERROR POINTER. (DATSET)	OUTPUT	267
NUMERR = THE NUMBER OF SAMPLES WHICH ERROR TERMINATE. (DATSET)	OUTPUT	268
COMMON BLOCK PBLK13	OUTPUT	269
-----	OUTPUT	270
NLEVEL = THE NUMBER OF LEVELS OF STRATIFICATION TO USE. MAY BE REDUCED BY ROUTINE U01S. (IINPUT)	OUTPUT	271
NPTSPL = THIS COUNTS THE NUMBER OF SAMPLES, FOR EACH INPUT VARIABLE, WHICH HAVE BEEN TAKEN FROM EACH STRATIFICATION LEVEL. (RNGS, IINPUT)	OUTPUT	272
NSTOC = 0/1 POINTER INDICATES IF ALL OF THE VARIABLES ARE CONSTANT, OR IF AT LEAST ONE IS STOCATICALLY MODELLED. THIS IMPACTS STRATIFICATION AND DIAGNOSTICS. (IINPUT)	OUTPUT	273
COMMON BLOCK PBLK14	OUTPUT	274
-----	OUTPUT	275
LABEL = A CHARACTER*20 ARRAY CONTAINING THE DISTRIBUTION TYPE NAMES. THIS IS SET VIA A DATA STATEMENT. (IINPUT)	OUTPUT	276
COMMON BLOCK PBLK15	OUTPUT	277
-----	OUTPUT	278
	OUTPUT	279
	OUTPUT	280
	OUTPUT	281
	OUTPUT	282
	OUTPUT	283
	OUTPUT	284
	OUTPUT	285
	OUTPUT	286
	OUTPUT	287
	OUTPUT	288
	OUTPUT	289
	OUTPUT	290
	OUTPUT	291
	OUTPUT	292
	OUTPUT	293
	OUTPUT	294
	OUTPUT	295
	OUTPUT	296
	OUTPUT	297
	OUTPUT	298
	OUTPUT	299

-----	OUTPUT	300
ILIM = 0/1 POINTER INDICATES IF THE CORRESPONDING VARIABLE HAS	OUTPUT	301
ENFORCED UPPER AND LOWER LIMITS ON ITS DISTRIBUTION.	OUTPUT	302
(IINPUT)	OUTPUT	303
ITYPE = INDICATES THE DISTRIBUTION TYPE FOR THE CORRESPONDING	OUTPUT	304
INPUT VARIABLE. (IINPUT)	OUTPUT	305
NLIM = DIAGNOSTIC WHICH INDICATES HOW MANY OF THE RANDOM SAMPLE	OUTPUT	306
VALUES FOR THE INPUT VARIABLES WERE ABOVE OR BELOW THE USER	OUTPUT	307
SELECTED DISTRIBUTION LIMITS. (RNGS)	OUTPUT	308
PAR = ARRAY WHICH HOLDS THE DEFINING PARAMETERS FOR THE DISTRI-	OUTPUT	309
BUTIONS FOR EACH VARIABLE. (IINPUT)	OUTPUT	310
RLIM = CONTAINS VALUES OF THE RANDOM VARIABLE ON THE INTERVAL 0,1	OUTPUT	311
WHICH TRANSFORM TO THE LOWER AND UPPER LIMITS FOR EACH	OUTPUT	312
LIMITED DISTRIBUTION. (RNGS)	OUTPUT	313
VLIM = DESIRED LIMITS ON THE DISTRIBUTION FOR EACH INPUT VARIABLE.	OUTPUT	314
THESE ARE ONLY ACTIVATED UPON USER REQUEST, FOR THE NORMAL,	OUTPUT	315
LOGNORMAL, AND EXPONENTIAL DISTRIBUTIONS. (IINPUT)	OUTPUT	316
VLIMT = EFFECTIVE ENDPOINT LIMITS ON THE DISTRIBUTION FOR EACH INPUT	OUTPUT	317
VARIABLE. (RNGS)	OUTPUT	318
	OUTPUT	319
COMMON BLOCK PBLK16	OUTPUT	320
-----	OUTPUT	321
DSEED = THE RANDOM NUMBER SEED VALUE. REAL*8. (PACSTAT, U01)	OUTPUT	322
	OUTPUT	323
COMMON BLOCK PBLK17	OUTPUT	324
-----	OUTPUT	325
ICCD = 0/1 POINTER TO INDICATE IF CUMMULATIVE OR COMPLEMENTARY	OUTPUT	326
CUMMULATIVE PROBABILITIES ARE TO BE PLOTTED/PRINTED.	OUTPUT	327
(DATOUT)	OUTPUT	328
ISOLN = OUTPUT DATA VARIABLE ('SOLUTION') NUMBER FOR PLOTTING	OUTPUT	329
AND/OR PRINTING. (DATOUT)	OUTPUT	330
IQUIT = 0/1 POINTER TO INDICATE IF THE SAMPLING SHOULD STOP OR	OUTPUT	331
CONTINUE WHEN AN ERROR IS FLAGGED IN THE USER SUPPLIED	OUTPUT	332
SOLUTION ROUTINE, SOLN. (PACSTAT)	OUTPUT	333
IUPDAT = 0/1 POINTER INDICATES IF THE INPUT STOCHASTIC PARAMETERS	OUTPUT	334
(VARIABLES OR CONSTANTS) HAVE BEEN UPDATED SINCE THE LAST	OUTPUT	335
ITERATION OF RUNS. ONLY USED WHEN MULTIPLE 'RUNS' ARE MADE	OUTPUT	336
IN A SINGLE EXECUTION OF THE PROGRAM. (IINPUT)	OUTPUT	337
MAXSAM = THE MAXIMUM NUMBER OF STOCHASTIC SAMPLES WHICH MAY BE TAKEN,	OUTPUT	338
GIVEN THE NUMBER OF INPUT AND OUTPUT VARIABLES, AND THE ARRAY	OUTPUT	339
SIZES (ISIZE). (PACSTAT)	OUTPUT	340
NPRT = PRINT INTERVAL FOR THE OUTPUT DATA. (DATOUT, IINPUT,	OUTPUT	341
PACSTAT)	OUTPUT	342
NSAM = THE NUMBER OF SAMPLES FOR THE CURRENT RUN. (IINPUT, PACSTAT)	OUTPUT	343
NSAMC = THE NUMBER OF SAMPLES WHICH RAN WITHOUT ERROR FAILURE.	OUTPUT	344
(PACSTAT)	OUTPUT	345
	OUTPUT	346
COMMON PBLK18	OUTPUT	347
-----	OUTPUT	348
JJNF = A LIST OF FILE NAMES FOR DATA WHICH IS TO BE READ FROM	OUTPUT	349
EXTERNAL FILES. (IINPUT)	OUTPUT	350
INFIL = FILE UNIT NUMBER FOR DATA TO BE READ FROM EXTERNAL	OUTPUT	351
FILES. (PACSTAT)	OUTPUT	352
IUDIST = THE NUMBER OF DISCRETE POINTS DEFINING A CUMMULATIVE	OUTPUT	353

	CONFIDENCE FUNCTION, WHEN THAT FUNCTION IS READ FROM	OUTPUT	354
	AN EXTERNAL FILE. (R2DAT)	OUTPUT	355
UDIST(*,1)	= THE LIST OF VARIABLE VALUES FOR THE CUMULATIVE	OUTPUT	356
	CONFIDENCE FUNCTION READ FROM AN EXTERNAL FILE.	OUTPUT	357
	(R2DAT)	OUTPUT	358
UDIST(*,2)	= THE LIST OF CONFIDENCE LEVELS FOR THE CUMULATIVE	OUTPUT	359
	CONFIDENCE FUNCTIONS READ FROM AN EXTERNAL FILE.	OUTPUT	360
	(R2DAT)	OUTPUT	361
		OUTPUT	362
COMMON IDCOM		OUTPUT	363
-----		OUTPUT	364
JRUNID	= RUN IDENTIFIER OF THE CURRENT RUN. (IDNUM)	OUTPUT	365
FL	= FILE TYPE IDENTIFIER FOR THE OUTPUT BINARY FILES.	OUTPUT	366
	(PACSTAT).	OUTPUT	367
FLT(MAXSRC)	= FILE TRACEBACK ON BINARY I/O FILES. (RHEADR, NOT	OUTPUT	368
	USED BY PACSTAT)	OUTPUT	369
NRUNID(MAXSRC)	= FILE TRACEBACK IDENTIFIERS. (RHEADR, NOT USED BY	OUTPUT	370
	PACSTAT)	OUTPUT	371
NSRC	= NUMBER OF TRACEBACK FILES ON BINARY I/O FILES.	OUTPUT	372
	(RHEADR, NOT USED BY PACSTAT)	OUTPUT	373
PRG	= MONTE CARLO SIMULATION PROGRAM NAME. (BLKDAT)	OUTPUT	374
PRGT(MAXSRC)	= SOURCE CODE NAMES OF TRACEBACK FILES. (RHEADR, NOT	OUTPUT	375
	USED BY PACSTAT)	OUTPUT	376
TITLE(20)	= TITLE FOR BINARY I/O FILE HEADER. (PACSTAT)	OUTPUT	377
USRNAM	= NAME OF CURRENT PROGRAM USER. (IDNUM)	OUTPUT	378
USRNMT(MAXSRC)	= USER NAME ON TRACEBACK FILES. (RHEADR, NOT USED BY	OUTPUT	379
	PACSTAT)	OUTPUT	380
VERNUM	= VERSION NUMBER OF MONTE CARLO SIMULATION PROGRAM.	OUTPUT	381
	(BLKDAT)	OUTPUT	382
		OUTPUT	383
COMMON BLOCK INOUT		OUTPUT	384
-----		OUTPUT	385
IN	= LOGICAL UNIT NUMBER FOR TERMINAL INPUT. (PACSTAT)	OUTPUT	386
IOUT	= LOGICAL UNIT NUMBER FOR TERMINAL OUTPUT. (PACSTAT)	OUTPUT	387
IQB	= CARRIAGE RETURN SUPPRESSION CHARACTER (CHARACTER*1). NOT	OUTPUT	388
	AVAILABLE OF THE PRIME 750 FORTRAN.	OUTPUT	389
		OUTPUT	390
COMMON BLOCK STRATI		OUTPUT	391
-----		OUTPUT	392
MAXLEV	= THE MAXIMUM NUMBER OF STARTIFICATION LEVELS WHICH MAY BE	OUTPUT	393
	HANDLED BY THE UNIFORM DISTRIBUTION ROUTINE U01S.	OUTPUT	394
NSPL	= A COUNTER WHICH SHOWS THE NUMBER OF POINTS TAKEN FROM EACH	OUTPUT	395
	LEVEL OF STRATIFICATION. IT IS UPDATED EACH TIME A NEW,	OUTPUT	396
	STARTIFIED UNIFORM DISTRIBUTION IS CREATED. (U01S)	OUTPUT	397
		OUTPUT	398
COMMON BLOCK ULIMITS		OUTPUT	399
-----		OUTPUT	400
UMIN	= THE LOWER LIMIT ON THE INTERVAL 0,1 FOR GENERATING ENDPOINT	OUTPUT	401
	LIMITED RANDOM DISTRIBUTIONS. (DEXPFL, NORMALL, LNNORML,	OUTPUT	402
	LOGNORML)	OUTPUT	403
UMAX	= THE UPPER LIMIT ON THE INTERVAL 0,1 FOR GENERATING ENDPOINT	OUTPUT	404
	LIMITED RANDOM DISTRIBUTIONS. (DEXPFL, NORMALL, LNNORML,	OUTPUT	405
	LOGNORML)	OUTPUT	406
		OUTPUT	407

PROGRAM PACSTAT	PACSTAT	2
C	PACSTAT	3
C PROGRAM CONTAINS BLOCK STRUCTURING FOR PERFORMING A MONTE CARLO	PACSTAT	4
C SIMULATION. AN OUTPUT VARIABLE (OR SEVERAL OUTPUT VARIABLES) IS	PACSTAT	5
C IS COMPUTED FROM SEVERAL INPUT VARIABLES. THE INPUT VARIABLES CAN	PACSTAT	6
C TAKE ON ANY OF EIGHT DIFFERENT DISTRIBUTION TYPES, WHICH THE USER	PACSTAT	7
C CHOOSES (ROUTINE IINPUT). THE USER MUST ALSO SPECIFY THE DEFINING	PACSTAT	8
C PARAMETERS OF THE DISTRIBUTION FOR EACH INPUT VARIABLE.	PACSTAT	9
C A PRINTOUT OF A CHOSEN OUTPUT VARIABLE IS GIVEN WITH DIAGNOSTICS	PACSTAT	10
C ON BOTH THE OUTPUT AND INPUT DISTRIBUTIONS. THIS IS DIRECTED TO	PACSTAT	11
C AN OPTIONAL, FORMATTED OUTPUT FILE. OUTPUT MAY ALSO BE WRITTEN	PACSTAT	12
C TO A BINARY OUTPUT FILE, FOR POST PROCESSING.	PACSTAT	13
C -----	PACSTAT	14
C	PACSTAT	15
C THE ROUTINE BLKDAT AND SOLN MUST BE PROVIDED BY THE USER.	PACSTAT	16
C INPUT AND OUTPUT VARIABLE NAMES AND DIMENSIONS (UNITS) ARE SET	PACSTAT	17
C IN BLOCK DATA (ROUTINE BLKDAT). THE VALUE OF NVAR SETS THE	PACSTAT	18
C NUMBER OF INPUT VARIABLES. THE VALUE OF NSOLN SETS THE NUMBER	PACSTAT	19
C OF AVAILABLE SOLUTIONS. IF THESE EXCEED PROGRAM LIMITS, AN	PACSTAT	20
C ERROR WILL BE PRINTED AND THE RUN TERMINATED.	PACSTAT	21
C SEVERAL USER DEFINABLE CONSTANTS ARE PERMITTED. THE NUMBER OF	PACSTAT	22
C CONSTANTS IS SET IN BLOCK DATA AS VARIABLE NCONST. THE NAMES	PACSTAT	23
C AND DIMENSIONS OF EACH CONSTANT MUST ALSO BE SET IN BLOCK DATA.	PACSTAT	24
C ONE MUST NOT CHOSE MORE CONSTANTS THAN THE PROGRAM IS DIMENSIONED	PACSTAT	25
C TO ACCOMMODATE. MCONST = ZERO IS PERMITTED.	PACSTAT	26
C MULTIPLE SOLUTIONS FOR ANY GIVEN PROBLEM ARE ALLOWED. ALL OF	PACSTAT	27
C THE SOLUTIONS MUST BE COMPUTED IN ROUTINE SOLN. ROUTINE SOLN IS	PACSTAT	28
C CALLED ONCE FOR EACH RANDOM SAMPLE. IT TAKES THE INPUT VALUES FROM	PACSTAT	29
C ARRAY VINPT(1...NVAR) (COMMON BLOCK PBLK4). OUTPUT VALUES MUST	PACSTAT	30
C BE STORED IN ARRAY VALU(1...NSOLN) (COMMON BLOCK PBLK4) FOR RETURN	PACSTAT	31
C TO THE CALLING ROUTINES. THESE OUTPUT VALUES ARE MOVED TO ARRAY	PACSTAT	32
C RLTS FOR LONG TERM STORAGE, AND THE TO ARRAY RPLT (ROUTINE DATOUT)	PACSTAT	33
C FOR PLOTTING AND DIAGNOSTICS. ONLY ONE SOLUTION MAY BE PLOTTED/	PACSTAT	34
C PRINTED AT A TIME.	PACSTAT	35
C	PACSTAT	36
C -----	PACSTAT	37
C MACHINE DEPENDENT CODING FOR THIS PROGRAM IS RESTRICTED TO	PACSTAT	38
C ROUTINES ASG, RELEAS (OPENING AND CLOSING FILES, AND IDNUM	PACSTAT	39
C (FILE IDENTIFIERS).	PACSTAT	40
C -----	PACSTAT	41
C THE RANDOM NUMBER GENERATOR, U01(DSEED), IS A FORTRAN CODED	PACSTAT	42
C ROUTINE. IT IS ONLY CALLED FROM THE MAIN ROUTINE AND IN ROUTINE	PACSTAT	43
C U01S. THE SEED, DSEED, IS A DOUBLE PRECISION REAL NUMBER, AND	PACSTAT	44
C IS THE ONLY ITEM IN COMMON BLOCK PBLK16.	PACSTAT	45
C -----	PACSTAT	46
C THE PARAMETER ISIZE SETS THE MAXIMUM NUMBER OF RANDOM SAMPLES	PACSTAT	47
C WHICH MAY BE USED. THE PARAMETER MAXNS SETS THE MAXIMUM NUMBER OF	PACSTAT	48
C SAMPLES PER INPUT/OUTPUT VARIABLE WHICH MAY BE COMPUTED. THIS	PACSTAT	49
C REQUIRES THAT MAXNS MUST BE LESS THAN OR EQUAL TO ISIZE. NOTE THAT	PACSTAT	50
C SOME TRANSFERING OF RANDOM ARRAYS IS DONE IN ROUTINES VARSET AND	PACSTAT	51
C STATOT, WHICH IS ONLY NECESSARY ON VIRTUAL MEMORY COMPUTERS, WHERE	PACSTAT	52
C THE PARAMETER ISIZE EXCEEDS THE PAGE SIZE. ALSO, IF MAXNS EXCEEDS	PACSTAT	53
C HALF THE PAGE SIZE, THE COMMON BLOCK PBLK6 MAY NEED TO BE CHANGED.	PACSTAT	54
C -----	PACSTAT	55

C	PRG AND VERNUM ARE THE PROGRAM NAME AND VERSION NUMBER FOR THE	PACSTAT	56
C	MONTE CARLO SIMULATION PROGRAM, AND ARE SET IN BLOCK DATA.	PACSTAT	57
C	PRGI AND VERNMI ARE THE PROGRAM NAME AND VERSION NUMBER FOR THE	PACSTAT	58
C	MONTE CARLO DRIVER SOFTWARE, AND ARE SET IN THE MAIN ROUTINE.	PACSTAT	59
C	-----	PACSTAT	60
C		PACSTAT	61
	\$INSERT *)COMMON>PPARA	PACSTAT	62
	\$INSERT *)COMMON>PBLK1	PACSTAT	63
	\$INSERT *)COMMON>PBLK2	PACSTAT	64
	\$INSERT *)COMMON>PBLK5	PACSTAT	65
	\$INSERT *)COMMON>PBLK7	PACSTAT	66
	\$INSERT *)COMMON>PBLK8	PACSTAT	67
	\$INSERT *)COMMON>PBLK12	PACSTAT	68
	\$INSERT *)COMMON>PBLK16	PACSTAT	69
	\$INSERT *)COMMON>PBLK17	PACSTAT	70
	\$INSERT *)COMMON>PBLK18	PACSTAT	71
	\$INSERT SYSTEMS>UTIL>FEMLIB>COMMON>IDCOM	PACSTAT	72
	\$INSERT SYSTEMS>UTIL>USRLIB>COMMON>INOUT	PACSTAT	73
	CHARACTER*1	PACSTAT	74
	+ ANS	PACSTAT	75
	CHARACTER*4	PACSTAT	76
	+ INF(NMLEN)	PACSTAT	77
	CHARACTER*8	PACSTAT	78
	+ PRGI	PACSTAT	79
	DATA	PACSTAT	80
	+ TITLE/20*' '/	PACSTAT	81
	DATA	PACSTAT	82
	+ PRGI/'PACSTAT '/, VERNMI/1.0/	PACSTAT	83
	DATA	PACSTAT	84
	+ IQB/' '/	PACSTAT	85
C	CARRIAGE RETURN SUPPRESS IQB NOT AVAILABE ON PRIME	PACSTAT	86
C		PACSTAT	87
	ICNT=0	PACSTAT	88
	JONCE=0	PACSTAT	89
	NSRC=0	PACSTAT	90
C		PACSTAT	91
C	SET INPUT/OUTPUT UNITS	PACSTAT	92
C		PACSTAT	93
	IN=1	PACSTAT	94
	IOUT=1	PACSTAT	95
	IDAT=12	PACSTAT	96
	IDATB=13	PACSTAT	97
	INFIL=35	PACSTAT	98
C		PACSTAT	99
C	PRINT PROGRAM NAME AND VERSION NUMBER	PACSTAT	100
C		PACSTAT	101
	WRITE (IOUT,500) PRG,VERNUM	PACSTAT	102
	WRITE (IOUT,510) PRGI,VERNMI	PACSTAT	103
C		PACSTAT	104
C	ERROR CHECK NUMBER OF SOLUTIONS, VARIABLES, CONSTANTS	PACSTAT	105
C		PACSTAT	106
	IF ((NVAR.GT.MAXVAR).OR.(NVAR.LT.1)) THEN	PACSTAT	107
	WRITE (IOUT,520) NVAR,MAXVAR	PACSTAT	108
	GO TO 240	PACSTAT	109

ENDIF	PACSTAT	110
IF (NSOLN.GT.MAXSOL) THEN	PACSTAT	111
WRITE (IOUT,530) NSOLN,MAXSOL	PACSTAT	112
GO TO 240	PACSTAT	113
ENDIF	PACSTAT	114
IF (NSOLN.LT.0) NSOLN=0	PACSTAT	115
IF ((NCONST.GT.MAXCNT).OR.(NCONST.LT.0)) THEN	PACSTAT	116
WRITE (IOUT,540) NCONST,MAXCNT	PACSTAT	117
GO TO 240	PACSTAT	118
ENDIF	PACSTAT	119
C	PACSTAT	120
C	PACSTAT	121
C	PACSTAT	122
C	PACSTAT	123
MAXSAM=ISIZE/NSOLN	PACSTAT	124
I=ISIZE/NVAR	PACSTAT	125
IF (I.LT.MAXSAM) MAXSAM=I	PACSTAT	126
IF (MAXSAM.GT.MAXNS) MAXSAM=MAXNS	PACSTAT	127
C	PACSTAT	128
C	PACSTAT	129
C	PACSTAT	130
IERR=0	PACSTAT	131
WRITE (IOUT,550) TITLE	PACSTAT	132
WRITE (IOUT,560)	PACSTAT	133
READ (IN,570) (INF(I),I=1,NMLEN)	PACSTAT	134
IF (INF(1).NE.'NONE') THEN	PACSTAT	135
I=1	PACSTAT	136
CALL ASG (I,IERR,IDAT,NMLEN,INF)	PACSTAT	137
IF (IERR.GT.0) GO TO 240	PACSTAT	138
ELSE	PACSTAT	139
IDAT=0	PACSTAT	140
ENDIF	PACSTAT	141
C	PACSTAT	142
C	PACSTAT	143
C	PACSTAT	144
WRITE (IOUT,580)	PACSTAT	145
READ (IN,570) (INF(I),I=1,NMLEN)	PACSTAT	146
IF ((INF(1).EQ.'NONE').OR.(INF(1).EQ.'NONE')) GO TO 100	PACSTAT	147
I=1	PACSTAT	148
CALL ASG (I,IERR,IDATB,NMLEN,INF)	PACSTAT	149
IF (IERR.NE.0) GO TO 230	PACSTAT	150
GO TO 110	PACSTAT	151
100 CONTINUE	PACSTAT	152
IDATB=0	PACSTAT	153
110 CONTINUE	PACSTAT	154
C	PACSTAT	155
C	PACSTAT	156
C	PACSTAT	157
CALL IDNUM (JRUNID,USRNAM)	PACSTAT	158
C	PACSTAT	159
C	PACSTAT	160
C	PACSTAT	161
WRITE (IOUT,590)	PACSTAT	162
READ (IN,600) STITLE	PACSTAT	163

C		PACSTAT	164
C	COUNT NUMBER OF CHARACTERS IN THE PROBLEM TITLES	PACSTAT	165
C		PACSTAT	166
	K=41	PACSTAT	167
120	CONTINUE	PACSTAT	168
	K=K-1	PACSTAT	169
	IF ((TTLE(K:K).EQ.' ').AND.(K.GT.1)) GO TO 120	PACSTAT	170
	IF ((TTLE(1:1).EQ.' ').AND.(K.EQ.1)) K=1	PACSTAT	171
	NTTL=K	PACSTAT	172
	K=41	PACSTAT	173
130	CONTINUE	PACSTAT	174
	K=K-1	PACSTAT	175
	IF ((STTLE(K:K).EQ.' ').AND.(K.GT.1)) GO TO 130	PACSTAT	176
	IF ((STTLE(1:1).EQ.' ').AND.(K.EQ.1)) K=0	PACSTAT	177
	NSTTL=K	PACSTAT	178
C		PACSTAT	179
C	CREATE TITLE FOR THIS RUN	PACSTAT	180
C		PACSTAT	181
	DO 140 I=1,10	PACSTAT	182
	J=I+10	PACSTAT	183
	I2=4*I	PACSTAT	184
	I1=I2-3	PACSTAT	185
	TITLE(I)=TTLE(I1:I2)	PACSTAT	186
	TITLE(J)=STTLE(I1:I2)	PACSTAT	187
140	CONTINUE	PACSTAT	188
C		PACSTAT	189
C	OPTION TO TERMINATE OR CONTINUE ON SOLUTION ERROR	PACSTAT	190
C		PACSTAT	191
150	CONTINUE	PACSTAT	192
	IQUIT=0	PACSTAT	193
	IF (NSOLN.GT.0) THEN	PACSTAT	194
	WRITE (IOUT,010)	PACSTAT	195
	READ (IN,020) ANS	PACSTAT	196
	IF ((ANS.NE.'C').AND.(ANS.NE.'Q')) THEN	PACSTAT	197
	IF ((ANS.NE.'c').AND.(ANS.NE.'q')) GO TO 150	PACSTAT	198
	ENDIF	PACSTAT	199
	IF ((ANS.EQ.'Q').OR.(ANS.EQ.'q')) IQUIT=1	PACSTAT	200
	ENDIF	PACSTAT	201
C		PACSTAT	202
C	TOP OF ITERATION (DATA SET) LOOP	PACSTAT	203
C		PACSTAT	204
160	CONTINUE	PACSTAT	205
	ICNT=ICNT+1	PACSTAT	206
C		PACSTAT	207
C	READ INPUT DATA	PACSTAT	208
C		PACSTAT	209
	CALL IINPUT	PACSTAT	210
C		PACSTAT	211
C	SET DATA ARRAY LOCATION POINTERS	PACSTAT	212
C		PACSTAT	213
	DO 170 I=1,NVAR	PACSTAT	214
	NVLOC(I)=(I-1)*NSAM+1	PACSTAT	215
170	CONTINUE	PACSTAT	216
	IF (NSOLN.GT.0) THEN	PACSTAT	217

DO 180 I=1,NSOLN	PACSTAT	218
NSLOC(I)=(I-1)*NSAM+1	PACSTAT	219
180 CONTINUE	PACSTAT	220
ENDIF	PACSTAT	221
C	PACSTAT	222
C USER ENTERS SEED FOR RANDOM NUMBER GENERATOR	PACSTAT	223
C	PACSTAT	224
190 CONTINUE	PACSTAT	225
IF (ICNT.LT.2) THEN	PACSTAT	226
WRITE (IOUT,630)	PACSTAT	227
READ (IN,*,ERR=190) WD	PACSTAT	228
IF ((WD.LT.2.).OR.(WD.GT.2.E+9)) GO TO 190	PACSTAT	229
DSEED=DBLE(WD)	PACSTAT	230
A=L01 (DSEED)	PACSTAT	231
ENDIF	PACSTAT	232
C	PACSTAT	233
C-----	PACSTAT	234
C	PACSTAT	235
C SET INPUT VARIABLE ARRAYS	PACSTAT	236
C	PACSTAT	237
CALL VARSET (IERR)	PACSTAT	238
IF (IERR.NE.0) THEN	PACSTAT	239
WRITE (IOUT,640)	PACSTAT	240
IF (IDAT.GT.0) WRITE (IDAT,640)	PACSTAT	241
GO TO 220	PACSTAT	242
ENDIF	PACSTAT	243
C	PACSTAT	244
C-----	PACSTAT	245
C	PACSTAT	246
C COMPUTE AND PRINT THEORETICAL DISTRIBUTION SPECS	PACSTAT	247
C	PACSTAT	248
CALL EXPECT	PACSTAT	249
C	PACSTAT	250
C-----	PACSTAT	251
C	PACSTAT	252
C COMPUTE OUTPUT VARIABLE VALUES	PACSTAT	253
C	PACSTAT	254
CALL DATSET (IERR)	PACSTAT	255
IF (IERR.NE.0) GO TO 200	PACSTAT	256
NSAMC=NSAM-NUMERR	PACSTAT	257
C	PACSTAT	258
C CHECK FOR GOOD SOLUTIONS	PACSTAT	259
C	PACSTAT	260
IF (NUMERR.EQ.NSAM) THEN	PACSTAT	261
WRITE (IOUT,650)	PACSTAT	262
I=NSOLN	PACSTAT	263
NSOLN=0	PACSTAT	264
CALL STATOT	PACSTAT	265
NSOLN=I	PACSTAT	266
GO TO 220	PACSTAT	267
ENDIF	PACSTAT	268
C	PACSTAT	269
C RE-ORDER AROUND ANY BAD SOLUTIONS WHICH WERE FOUND	PACSTAT	270
C	PACSTAT	271

NSAMC=NSAM	PACSTAT . 272
IF (NUMERR.GT.0) CALL REDORDR	PACSTAT . 273
GO TO 210	PACSTAT . 274
C	PACSTAT . 275
C-----	PACSTAT . 276
C	PACSTAT . 277
C SALVAGE GOOD DATA ON ERROR STOP	PACSTAT . 278
C	PACSTAT . 279
200 CONTINUE	PACSTAT . 280
A=FLOAT(NPRT)/FLOAT(NSAM)	PACSTAT . 281
NSAMC=NSAM	PACSTAT . 282
WRITE (IOUT,860) INDEX	PACSTAT . 283
IF (IDAT.GT.0) WRITE (IDAT,860) INDEX	PACSTAT . 284
IF (NSAM.LT.1) GO TO 220	PACSTAT . 285
WRITE (IOUT,870)	PACSTAT . 286
IF (IDAT.GT.0) WRITE (IDAT,870)	PACSTAT . 287
NPRT=INT(FLOAT(NSAM)*A)	PACSTAT . 288
IF (NPRT.LE.0) NPRT=1	PACSTAT . 289
210 CONTINUE	PACSTAT . 290
C	PACSTAT . 291
C WRITE BINARY OUTPUT FILE HEADER, ON FIRST ITERATION ONLY	PACSTAT . 292
C	PACSTAT . 293
IF (ICNT.EQ.1) THEN	PACSTAT . 294
IHEADR=1	PACSTAT . 295
FL='STDCAST '	PACSTAT . 296
IF (IDATB.GT.0) CALL WRSTOC (IDATB,IHEADR)	PACSTAT . 297
ENDIF	PACSTAT . 298
C	PACSTAT . 299
C WRITE DATA TO BINARY OUTPUT FILE	PACSTAT . 300
C	PACSTAT . 301
IHEADR=0	PACSTAT . 302
IF (IDATB.GT.0) CALL WRSTOC (IDATB,IHEADR)	PACSTAT . 303
C	PACSTAT . 304
C CHECK OUTPUT STATISTICS	PACSTAT . 305
C ** THIS ROUTINE SORTS INPUT AND OUTPUT VARIABLES	PACSTAT . 306
C ** IN ASCENDING ORDER (TO COMPUTE MEDIAN)	PACSTAT . 307
C	PACSTAT . 308
CALL STATOT	PACSTAT . 309
C	PACSTAT . 310
C PRINT/PLOT OUTPUT DATA	PACSTAT . 311
C	PACSTAT . 312
IF (NSOLN.GT.0) CALL DATOUT (JONCE)	PACSTAT . 313
C	PACSTAT . 314
C ANOTHER RUN OR STOP	PACSTAT . 315
C	PACSTAT . 316
220 CONTINUE	PACSTAT . 317
WRITE (IOUT,880) IQB	PACSTAT . 318
READ (IN,820) ANS	PACSTAT . 319
IF ((ANS.NE.'Y').AND.(ANS.NE.'N')) THEN	PACSTAT . 320
IF ((ANS.NE.'y').AND.(ANS.NE.'n')) GO TO 220	PACSTAT . 321
ENDIF	PACSTAT . 322
IF ((ANS.EQ.'Y').OR.(ANS.EQ.'y')) GO TO 160	PACSTAT . 323
C	PACSTAT . 324
C END OF PROGRAM	PACSTAT . 325

C	IF (JONCE.GT.0) CALL DONEPL	PACSTAT	326
	IF (IDATB.GT.0) CALL RELEAS (IDATB)	PACSTAT	327
230	CONTINUE	PACSTAT	328
	IF (IDAT.GT.0) CALL RELEAS (IDAT)	PACSTAT	329
240	CONTINUE	PACSTAT	330
	STOP	PACSTAT	331
C		PACSTAT	332
		PACSTAT	333
500	FORMAT (/1X,'** MONTE CARLO SIMULATION **'/5X,' ',A8,1X,F4.1,' ')	PACSTAT	334
510	FORMAT (5X,'(',A8,1X,F4.1,')')	PACSTAT	335
520	FORMAT (/1X,'ERROR, THE NUMBER OF INPUT VARIABLES =',I5,' EXCEEDS	PACSTAT	336
	+ THE'/1X,'PROGRAM LIMIT OF ',I3,', OR IS LESS THAN ONE.'/1X,'PROGR	PACSTAT	337
	+AM STOP.')	PACSTAT	338
530	FORMAT (/1X,'ERROR, THE NUMBER OF AVAILABLE SOLUTIONS =',I5,' EXC	PACSTAT	339
	+EEDS PROGRAM LIMIT OF ',I3,.'/1X,'PROGRAM STOP.')	PACSTAT	340
540	FORMAT (/1X,'ERROR, NUMBER OF CONSTANTS =',I5,' EXCEEDS PROGRAM L	PACSTAT	341
	+IMIT OF ',I3,.'/1X,'PROGRAM STOP.')	PACSTAT	342
550	FORMAT (/1X,A40)	PACSTAT	343
560	FORMAT (/1X,'ENTER THE NAME FOR THE DIAGNOSTIC DATA ECHO FILE.'/1X,	PACSTAT	344
	+,'(''NONE'' TO OMIT)')	PACSTAT	345
570	FORMAT (20A4)	PACSTAT	346
580	FORMAT (/1X,'ENTER THE NAME FOR THE BINARY OUTPUT DATA FILE.'/1X,	PACSTAT	347
	+(''NONE'' TO OMIT)')	PACSTAT	348
590	FORMAT (/1X,'ENTER LABEL FOR THIS RUN (MAX 40 CHARACTERS)')	PACSTAT	349
600	FORMAT (A40)	PACSTAT	350
610	FORMAT (/1X,'WOULD YOU LIKE TO CONTINUE OR QUIT IF AN ERROR'/1X,'I	PACSTAT	351
	+S ENCOUNTERED IN THE SOLUTION ROUTINE (C/Q)? ')	PACSTAT	352
620	FORMAT (A1)	PACSTAT	353
630	FORMAT (/1X,'ENTER AN INITIAL SEED NUMBER FOR THE RANDOM NUMBER GE	PACSTAT	354
	+NERATOR.'/1X,'(A REAL NUMBER BETWEEN 1.0 AND 2.0E+9)')	PACSTAT	355
640	FORMAT (/1X,'** ERROR COMPUTING INPUT DISTRIBUTION DATA. THIS ITE	PACSTAT	356
	+RATION WAS'/4X,'ABORTED DUE TO AN INABILITY TO COMPUTE AND/OR READ	PACSTAT	357
	+ THE DESIRED'/4X,'RANDOM SAMPLES.')	PACSTAT	358
650	FORMAT (/1X,'*** ERROR, NO SUCCESSFUL SAMPLES WERE COMPUTED.'/5X,'	PACSTAT	359
	+THE INPUT VARIABLE STATISTICS WILL BE EXAMINED, '/5X,'BUT THE OUTPU	PACSTAT	360
	+T DATA WILL BE IGNORED, AND THE BINARY'/5X,'OUTPUT FILE RECORD WIL	PACSTAT	361
	+L NOT BE WRITTEN.')	PACSTAT	362
660	FORMAT (///5X,'--- ERROR ABORT, SAMPLE NUMBER ',I5)	PACSTAT	363
670	FORMAT (5X,'--- PROCEDURE WILL CONTINUE WITH REDUCED SAMPLE SPACE.	PACSTAT	364
	+')	PACSTAT	365
680	FORMAT (/1X,'CREATE ANOTHER DATA SET (Y/N)? ',A1)	PACSTAT	366
	END	PACSTAT	367
	SUBROUTINE PLINIT (XL2,YL2,IRUN)	PLINIT	2
C		PLINIT	3
C	ROUTINE FOR CHOSING INTERACTIVE/NON-INTERACTIVE PLOTTING,	PLINIT	4
C	SETTING PAGE SIZE, AND INITIALIZING PLOTTING PACKAGE.	PLINIT	5
C	XL2,YL2 = PAGE SIZE (INCHES, INITIALIZED BY CALLING ROUTINE)	PLINIT	6
C	IRUN = 1/0 INTERACTIVE/NON-INTERACTIVE PLOTTING	PLINIT	7
C		PLINIT	8
	\$INSERT *)COMMON>INOUT	PLINIT	9
C		PLINIT	10
	CHARACTER*1	PLINIT	11
	+ ANS	PLINIT	12
C		PLINIT	13

C	INTER/NON-INTERACTIVE PLOTTING	PLINIT	14
C		PLINIT	15
	IRUN=1	PLINIT	16
100	CONTINUE	PLINIT	17
	WRITE (IOUT,500)	PLINIT	18
	READ (IN,*,ERR=100) KDEV	PLINIT	19
	IF ((KDEV.LT.0).OR.(KDEV.GT.5)) GO TO 100	PLINIT	20
C		PLINIT	21
C	INIT PAGE SIZE (XL2,YL2). ALLOW USER MODIFICATION.	PLINIT	22
C		PLINIT	23
	IF (XL2.LE.0.) XL2=14.2	PLINIT	24
	IF (YL2.LE.0.) YL2=10.1	PLINIT	25
110	CONTINUE	PLINIT	26
	WRITE (IOUT,510) XL2,YL2,IQB	PLINIT	27
	READ (IN,520) ANS	PLINIT	28
	IF ((ANS.NE.'Y').AND.(ANS.NE.'N')) THEN	PLINIT	29
	IF ((ANS.NE.'y').AND.(ANS.NE.'n')) GO TO 110	PLINIT	30
	ENDIF	PLINIT	31
	IF ((ANS.EQ.'Y').OR.(ANS.EQ.'y')) THEN	PLINIT	32
120	CONTINUE	PLINIT	33
	WRITE (IOUT,530)	PLINIT	34
	READ (IN,*,ERR=120) XL2,YL2	PLINIT	35
	IF (XL2.LT.0.) XL2=0.	PLINIT	36
	IF (YL2.LT.0.) YL2=0.	PLINIT	37
	ENDIF	PLINIT	38
C		PLINIT	39
C	GRAPHICS INITIALIZATIONS	PLINIT	40
C		PLINIT	41
	KDEV=KDEV+1	PLINIT	42
	GO TO (130,140,150,160,170,180), KDEV	PLINIT	43
C		PLINIT	44
130	CONTINUE	PLINIT	45
	CALL COMPRS	PLINIT	46
	IRUN=0	PLINIT	47
	GO TO 490	PLINIT	48
C		PLINIT	49
140	CONTINUE	PLINIT	50
	CALL TK4014 (120,0)	PLINIT	51
	GO TO 490	PLINIT	52
C		PLINIT	53
150	CONTINUE	PLINIT	54
	CALL TK4025	PLINIT	55
	GO TO 490	PLINIT	56
C		PLINIT	57
160	CONTINUE	PLINIT	58
	CALL TK4054 (120,0)	PLINIT	59
	GO TO 490	PLINIT	60
C		PLINIT	61
170	CONTINUE	PLINIT	62
	CALL REGIS (1,0)	PLINIT	63
	GO TO 490	PLINIT	64
C		PLINIT	65
180	CONTINUE	PLINIT	66
	CALL SLNRVT (120)	PLINIT	67

GO TO 490	PLINIT	68
C	PLINIT	69
C	PLINIT	70
C	PLINIT	71
C	PLINIT	72
490 CONTINUE	PLINIT	73
RETURN	PLINIT	74
500 FORMAT (/1X,'-- DEVICE MENU --'/2X,'0) COMPRESSED GRAPHICS',T20,	PLINIT	75
+ '1) TEKTRONIX 4014',T54,'2) TEKTRONIX 4025'/2X,'3) TEKTRONIX 4054'	PLINIT	76
+ ,T20,'4) VT-100',T54,'5) SELANAR'	PLINIT	77
+ //1X,'ENTER THE NUMBER CORRESPONDING TO THE DESIRED TERMINAL.')	PLINIT	78
510 FORMAT (/1X,'CURRENT PAGE SIZE IS ',F8.1,' BY ',F8.1/1X,'WOULD YOU	PLINIT	79
+ LIKE TO MODIFY PAGE SIZE (Y/N)? ',A1)	PLINIT	80
520 FORMAT (A1)	PLINIT	81
530 FORMAT (1X,'ENTER NEW X AND Y PAGE SIZE DIMENSIONS (INCHES).')	PLINIT	82
END	PLINIT	83
SUBROUTINE PPLT	PPLT	2
C	PPLT	3
C THIS ROUTINE GENERATES THE OUTPUT DATA PLOT FOR MONTE CARLO	PPLT	4
C SIMULATIONS DRIVEN BY PACSTAT. THE DEFAULT PLOT IS CARTESIAN ON	PPLT	5
C THE VERTICAL AXIS, AND LOGARITHMIC ON THE HORIZONTAL AXIS.	PPLT	6
C THE VERTICAL AXIS REPRESENTS THE CONFIDENCE LEVEL, USING ARRAY	PPLT	7
C CONF FOR Y LOCATIONS. THIS DATA IS ALLOWED TO VARY FROM 0.0 TO	PPLT	8
C 1.0.	PPLT	9
C THE HORIZONTAL AXIS PLOTS THE DATA VALUES IN ARRAY RPLT. THE	PPLT	10
C DEFAULT X AXIS IS LOGARITHMIC, BUT THIS MAY BE CHANGED IF THE DATA	PPLT	11
C MINIMUM IS BELOW ZERO, OR IF THIS DATA COVERS LESS THAN TWO FULL	PPLT	12
C ORDERS OF MAGNITUDE. THE DATA VALUES IN ARRAY RPLT MUST BE SORTED	PPLT	13
C IN ASCENDING ORDER PRIOR TO CALLING THIS ROUTINE.	PPLT	14
C	PPLT	15
\$INSERT *)COMMON>PPARA	PPLT	16
\$INSERT *)COMMON>PBLK2	PPLT	17
\$INSERT *)COMMON>PBLK3	PPLT	18
\$INSERT *)COMMON>PBLK5	PPLT	19
\$INSERT *)COMMON>PBLK6	PPLT	20
\$INSERT *)COMMON>PBLK9	PPLT	21
\$INSERT *)COMMON>PBLK17	PPLT	22
\$INSERT SYSTEMS>UTIL>FEMLIB>COMMON>IDCOM	PPLT	23
\$INSERT SYSTEMS>UTIL>USRLIB>COMMON>INOUT	PPLT	24
CHARACTER*1	PPLT	25
+ ANS	PPLT	26
CHARACTER*24	PPLT	27
+ CPD	PPLT	28
CHARACTER*28	PPLT	29
+ CCPD	PPLT	30
DATA	PPLT	31
+ HGT /0.23/,	PPLT	32
+ MAXNC /20/,	PPLT	33
+ CPD /'CUMULATIVE PROBABILITY '/,	PPLT	34
+ CCPD /'COMPLEMENTARY PROBABILITY '/	PPLT	35
C	PPLT	36
C SET DEFAULT PLOT RANGE	PPLT	37
C	PPLT	38
XMN=RPLT(1)	PPLT	39

	XMAX=RPLT(NSAMC)	PPLT	40
C		PPLT	41
C	OMIT PLOT IF X RANGE IS ZERO	PPLT	42
C		PPLT	43
	IF (XMIN.GE.XMAX) THEN	PPLT	44
	WRITE (IOUT,500) PLABEL(ISOLN)	PPLT	45
	RETURN	PPLT	46
	ENDIF	PPLT	47
C		PPLT	48
C	SUB-PLOTTING OPTION	PPLT	49
C		PPLT	50
100	CONTINUE	PPLT	51
	WRITE (IOUT,510) XMIN,XMAX	PPLT	52
	READ (IN,520) ANS	PPLT	53
	IF ((ANS.NE.'Y').AND.(ANS.NE.'N')) THEN	PPLT	54
	IF ((ANS.NE.'y').AND.(ANS.NE.'n')) GO TO 100	PPLT	55
	ENDIF	PPLT	56
	IF ((ANS.EQ.'Y').OR.(ANS.EQ.'y')) THEN	PPLT	57
110	CONTINUE	PPLT	58
	WRITE (IOUT,530)	PPLT	59
	READ (IN,*,ERR=110) C1,C2	PPLT	60
	IF (C1.GT.C2) THEN	PPLT	61
	A=C1	PPLT	62
	C1=C2	PPLT	63
	C2=A	PPLT	64
	ENDIF	PPLT	65
	IF (C1.GE.C2) THEN	PPLT	66
	WRITE (IOUT,540)	PPLT	67
	GO TO 100	PPLT	68
	ENDIF	PPLT	69
	IF ((C1.GE.XMAX).OR.(C2.LE.XMIN)) THEN	PPLT	70
	WRITE (IOUT,550)	PPLT	71
	GO TO 100	PPLT	72
	ENDIF	PPLT	73
	XMIN=C1	PPLT	74
	XMAX=C2	PPLT	75
	ENDIF	PPLT	76
C		PPLT	77
C	INITIALIZE DATA	PPLT	78
C		PPLT	79
	LOGAXS=1	PPLT	80
	NCYC=0	PPLT	81
C		PPLT	82
C	CARTESIAN AXES IF ALL DATA IS LESS THAN 0.	PPLT	83
C		PPLT	84
	IF (XMAX.LE.0.) GO TO 150	PPLT	85
C		PPLT	86
C	COMPUTE UPPER LOG AXIS EXPONENT	PPLT	87
C		PPLT	88
	A=ALOG10(0.9999*XMAX)	PPLT	89
	I=INT(A)	PPLT	90
	IF (A.GT.0.) I=I+1	PPLT	91
	XMAXL=10.0**I	PPLT	92
C		PPLT	93

C	CHECK FOR X MINIMUM LESS THAN ZERO	PPLT	94
C		PPLT	95
	IF (XMIN.LE.0.0) THEN	PPLT	96
120	CONTINUE	PPLT	97
	WRITE (IOUT,560)	PPLT	98
	READ (IN,520) ANS	PPLT	99
	IF ((ANS.NE.'Y').AND.(ANS.NE.'N')) THEN	PPLT	100
	IF ((ANS.NE.'y').AND.(ANS.NE.'n')) GO TO 120	PPLT	101
	ENDIF	PPLT	102
	IF ((ANS.EQ.'Y').OR.(ANS.EQ.'y')) GO TO 150	PPLT	103
	K=0	PPLT	104
130	CONTINUE	PPLT	105
	K=K+1	PPLT	106
	IF (RPLT(K).LE.0.0) GO TO 130	PPLT	107
	XMIN=RPLT(K)	PPLT	108
	ENDIF	PPLT	109
C		PPLT	110
C	COMPUTE LOWER LOG AXIS EXPONENT	PPLT	111
C		PPLT	112
	A=ALOG10(1.0001*XMIN)	PPLT	113
	J=INT(A)	PPLT	114
	IF (A.LT.0.0) J=J-1	PPLT	115
	XMINL=10.0**J	PPLT	116
	NCYC=I-J	PPLT	117
C		PPLT	118
C	OPTION FOR CARTESIAN AXES IF LESS THAN THREE LOG CYCLES	PPLT	119
C		PPLT	120
	IF (NCYC.LT.3) THEN	PPLT	121
140	CONTINUE	PPLT	122
	WRITE (IOUT,570)	PPLT	123
	READ (IN,520) ANS	PPLT	124
	IF ((ANS.NE.'Y').AND.(ANS.NE.'N')) THEN	PPLT	125
	IF ((ANS.NE.'y').AND.(ANS.NE.'n')) GO TO 140	PPLT	126
	ENDIF	PPLT	127
	IF ((ANS.EQ.'Y').OR.(ANS.EQ.'y')) GO TO 150	PPLT	128
	ENDIF	PPLT	129
C		PPLT	130
C	ENFORCE UPPER LIMIT ON NUMBER OF LOG CYCLES, X AXIS	PPLT	131
C		PPLT	132
	IF (NCYC.GT.MAXNC) THEN	PPLT	133
	NCYC=MAXNC	PPLT	134
	J=I-NCYC	PPLT	135
	XMINL=10.0**J	PPLT	136
	ENDIF	PPLT	137
C		PPLT	138
C	SET LOG AXIS MIN AND MAX	PPLT	139
C		PPLT	140
	XMAX=XMAXL	PPLT	141
	XMIN=XMINL	PPLT	142
	GO TO 160	PPLT	143
C		PPLT	144
C	SET CARTESIAN AXES	PPLT	145
C		PPLT	146
150	CONTINUE	PPLT	147

LOGAXS=0	PPLT	148
C	PPLT	149
C FIND START, END INDECES OF PLOTTING ARRAYS	PPLT	150
C	PPLT	151
160 CONTINUE	PPLT	152
ISTR=1	PPLT	153
IEND=NSAMC	PPLT	154
DO 170 I=1,NSAMC	PPLT	155
ISTR=I	PPLT	156
IF (RPLT(I).GE.XMIN) GO TO 180	PPLT	157
170 CONTINUE	PPLT	158
GO TO 210	PPLT	159
180 CONTINUE	PPLT	160
DO 190 I=ISTR,NSAMC	PPLT	161
IF (RPLT(I).LE.XMAX) GO TO 190	PPLT	162
IEND=I-1	PPLT	163
GO TO 200	PPLT	164
190 CONTINUE	PPLT	165
IEND=NSAMC	PPLT	166
200 CONTINUE	PPLT	167
NPNTS=IEND-ISTR+1	PPLT	168
IF (NPNTS.GT.1) GO TO 220	PPLT	169
C	PPLT	170
C ERROR IF TOO FEW POINTS ARE IN THE CHOSEN RANGE.	PPLT	171
C	PPLT	172
210 CONTINUE	PPLT	173
ISTR=1	PPLT	174
XMIN=RPLT(1)	PPLT	175
XMAX=RPLT(NSAMC)	PPLT	176
IF (XMIN.LE.0.0) LOGAXS=0	PPLT	177
220 CONTINUE	PPLT	178
C	PPLT	179
C GRAPHICS	PPLT	180
C	PPLT	181
CALL PAGE (XL2,YL2)	PPLT	182
CALL AREA2D (XL,YL)	PPLT	183
CALL HEIGHT (HGT)	PPLT	184
IF (NTTL.GT.0) THEN	PPLT	185
N=1	PPLT	186
IF (NSTTL.GT.0) N=2	PPLT	187
CALL HEADIN (TTLE,NTTL,1.5,N)	PPLT	188
IF (NSTTL.GT.0) CALL HEADIN (STTLE,NSTTL,1.0,N)	PPLT	189
ENDIF	PPLT	190
CALL XNAME (PLABEL(150LN),32)	PPLT	191
C	PPLT	192
C SET UP Y AXIS LIMITS	PPLT	193
C	PPLT	194
YMIN=CONF(1)	PPLT	195
YMAX=CONF(NSAMC)	PPLT	196
IF (YMIN.GT.YMAX) THEN	PPLT	197
A=YMIN	PPLT	198
YMIN=YMAX	PPLT	199
YMAX=A	PPLT	200
ENDIF	PPLT	201

YMIN=FLOAT(INT(YMIN))	PPLT	202
YMAX=FLOAT(INT(YMAX)+1)	PPLT	203
IF (YMAX.GT.1.0) YMAX=1.0	PPLT	204
C	PPLT	205
C SEMI-LOG AXES	PPLT	206
C	PPLT	207
IF (LOGAXS.EQ.0) GO TO 230	PPLT	208
XN=XL/FLOAT(NCYC)	PPLT	209
YN=(YMAX-YMIN)/YL	PPLT	210
CALL YNAME (1H,0)	PPLT	211
CALL XLOG (XMIN,XN,YMIN,YN)	PPLT	212
IF (ICCD.EQ.1) THEN	PPLT	213
CALL YGRAXS (YMIN,'SCALE',YMAX,YL,CPD,22,0.,0.)	PPLT	214
ELSE	PPLT	215
CALL YGRAXS (YMIN,'SCALE',YMAX,YL,CCPD,25,0.,0.)	PPLT	216
ENDIF	PPLT	217
GO TO 240	PPLT	218
C	PPLT	219
C CARTESIAN AXES	PPLT	220
C	PPLT	221
230 CONTINUE	PPLT	222
IF (ICCD.EQ.1) THEN	PPLT	223
CALL YNAME (CPD,22)	PPLT	224
ELSE	PPLT	225
CALL YNAME (CCPD,25)	PPLT	226
ENDIF	PPLT	227
CALL GRAF (XMIN,'SCALE',XMAX,YMIN,'SCALE',YMAX)	PPLT	228
240 CONTINUE	PPLT	229
C	PPLT	230
C PLOT DATA	PPLT	231
C	PPLT	232
I=1	PPLT	233
CALL CURVE (RPLT(ISTRT),CONF(ISTRT),NPNTS,I)	PPLT	234
C	PPLT	235
C LABEL PLOT	PPLT	236
C	PPLT	237
XID=-0.70	PPLT	238
YID=YL+0.80	PPLT	239
CALL INTND (ICNT,XID,YID)	PPLT	240
CALL HEIGHT (0.13)	PPLT	241
XID=XL-0.40	PPLT	242
YID=YL+1.45	PPLT	243
CALL IDPLT (JRUNID,XID,YID)	PPLT	244
C	PPLT	245
C END PLOT	PPLT	246
C	PPLT	247
N=0	PPLT	248
CALL ENDPL (N)	PPLT	249
IF (IRUN.EQ.1) CALL ERASE	PPLT	250
C	PPLT	251
RETURN	PPLT	252
C	PPLT	253
500 FORMAT (//1X,'*** ERROR *** MIN AND MAX VALUES FROM SOLUTION ',15	PPLT	254
+X,A32,' ARE EQUAL.'/5X,'NO PLOT WILL BE MADE OF THIS DATA.')	PPLT	255

510 FORMAT (/1X,'DATA MINIMUM = ',1PE11.3/1X,'DATA MAXIMUM = ',E11.3/ +1X,'WOULD YOU LIKE A SUB-PLOT ON THE DATA AXIS (Y/N)?')	PPLT	256
520 FORMAT (A1)	PPLT	257
530 FORMAT (/1X,'ENTER THE MIN AND MAX DATA VALUES FOR PLOTTING.')	PPLT	258
540 FORMAT (/1X,'* ERROR, ENTERED XMIN IS LESS THAN ENTERED XMAX.')	PPLT	259
550 FORMAT (/1X,'* ERROR, ENTERED XMIN AND XMAX ARE OUT OF THE RANGE 0 +F THE DATA.')	PPLT	260
560 FORMAT (//1X,'THE MINIMUM DATA VALUE IS LESS THAN ZERO.'/1X,'WOULD + YOU PREFER A CARTESIAN AXIS ON THE DATA PLOT ABSCISSA (Y/N)?')	PPLT	261
570 FORMAT (//1X,'THERE ARE LESS THAN TWO FULL LOGARITHM CYCLES ON THE + OUTPUT DATA.'/1X,'WOULD YOU PREFER A CARTESIAN AXIS ON THE DATA P +LOT ABSCISSA (Y/N)?')	PPLT	262
END	PPLT	263
SUBROUTINE PQSORT (N,IFIN,I1,A)	PPLT	264
C	PQSORT	265
C THIS SUBROUTINE IMPLEMENTS THE QUICK SORT (PARTITIONING)	PQSORT	266
C ALGORITHM ON THE CURRENT PARTITION OF THE ARRAY A. AN EXTENSIVE	PQSORT	267
C EFFORT IS MADE TO FIND A GOOD MEDIAN VALUE, AND TO CHECK FOR ALL	PQSORT	268
C INPUT VALUES BEING EQUAL, OR BEING OF ONLY TWO VALUES. THIS	PQSORT	269
C SPEEDS EXECUTION IN CERTAIN CASES WHICH ARE LIKELY TO ARISE IN	PQSORT	270
C SOME SPECIFIC USES OF THIS QUICK SORT ROUTINE.	PQSORT	271
C	PQSORT	272
C A = INPUT ARRAY TO SORT.	PQSORT	273
C AMED = MEDIAN VALUE USED FOR PARTITIONING.	PQSORT	274
C I1 = LOWER INDEX OF QUICK SORTER SEARCH.	PQSORT	275
C ON RETURN, THIS INDICATES THE INDEX IN ARRAY A OF THE	PQSORT	276
C NEW PARTITION LOCATION.	PQSORT	277
C I2 = UPPER INDEX OF QUICK SORTER SEARCH.	PQSORT	278
C IFIN = POINTER INDICATES THIS PARTITION IS COMPLETELY SORTED.	PQSORT	279
C IM = INDECEES OF THREE MEDIAN VALUES (LESS THAN MAXIMUM AND	PQSORT	280
C GREATER THAN MINIMUM) IN ARRAY A, FOR SELECTING A 'GOOD'	PQSORT	281
C MEDIAN FOR ARRAY PARTITIONING.	PQSORT	282
C IMED = INDEX OF THE MEDIAN VALUE IN ARRAY A.	PQSORT	283
C N = NUMBER OF ITEMS IN ARRAY A.	PQSORT	284
C	PQSORT	285
C DIMENSION	PQSORT	286
+ A(N), IM(3)	PQSORT	287
C	PQSORT	288
C CHECK ARRAY SIZE FOR BEING SMALL	PQSORT	289
C	PQSORT	290
IF (N.GT.10) GO TO 100	PQSORT	291
CALL SORT (N,A)	PQSORT	292
GO TO 200	PQSORT	293
100 CONTINUE	PQSORT	294
IFIN=0	PQSORT	295
C	PQSORT	296
C SEARCH FOR THREE MEDIAN VALUES	PQSORT	297
C	PQSORT	298
K=N/5	PQSORT	299
110 CONTINUE	PQSORT	300
IMIN=1	PQSORT	301
IMAX=1	PQSORT	302
AMIN=A(1)	PQSORT	303
AMAX=AMIN	PQSORT	304

J=0	PQSORT	43
DO 100 I=K,N,K	PQSORT	44
B=A(I)	PQSORT	45
IF (B.LE.AMAX) GO TO 130	PQSORT	46
AMAX=B	PQSORT	47
IF (A(IMAX).LE.AMIN) GO TO 120	PQSORT	48
J=J+1	PQSORT	49
IM(J)=IMAX	PQSORT	50
IF (J.EQ.3) GO TO 190	PQSORT	51
120 CONTINUE	PQSORT	52
IMAX=I	PQSORT	53
GO TO 100	PQSORT	54
130 CONTINUE	PQSORT	55
IF (B.GE.AMIN) GO TO 150	PQSORT	56
AMIN=B	PQSORT	57
IF (A(IMIN).GE.AMAX) GO TO 140	PQSORT	58
J=J+1	PQSORT	59
IM(J)=IMIN	PQSORT	60
IF (J.EQ.3) GO TO 190	PQSORT	61
140 CONTINUE	PQSORT	62
IMIN=I	PQSORT	63
GO TO 100	PQSORT	64
150 CONTINUE	PQSORT	65
IF ((B.LE.AMIN).OR.(B.GE.AMAX)) GO TO 160	PQSORT	66
J=J+1	PQSORT	67
IM(J)=I	PQSORT	68
IF (J.EQ.3) GO TO 190	PQSORT	69
160 CONTINUE	PQSORT	70
C	PQSORT	71
C THREE MEDIAN VALUES NOT FOUND, REDUCE	PQSORT	72
C INCREMENT AND TRY AGAIN.	PQSORT	73
C	PQSORT	74
IF (K.GT.1) THEN	PQSORT	75
K=K/5	PQSORT	76
IF (K.LT.1) K=1	PQSORT	77
GO TO 110	PQSORT	78
ENDIF	PQSORT	79
C	PQSORT	80
C LESS THAN THREE MEDIANS IN ENTIRE DATA SET.	PQSORT	81
C CHECK FOR ALL EQUAL VALUES. IF ONE OR TWO	PQSORT	82
C MEDIAN VALUES, USE ARBITRARY ONE OF THOSE.	PQSORT	83
C	PQSORT	84
IF (AMIN.GE.AMAX) GO TO 200	PQSORT	85
IF (J.NE.0) THEN	PQSORT	86
IMED=IM(1)	PQSORT	87
GO TO 230	PQSORT	88
ENDIF	PQSORT	89
C	PQSORT	90
C SORTER FOR A TWO LEVEL ARRAY (ONLY TWO VALUES)	PQSORT	91
C	PQSORT	92
I1=0	PQSORT	93
I2=N+1	PQSORT	94
C	PQSORT	95
AMED=0.5*(AMIN+AMAX)	PQSORT	96

170	CONTINUE	PQSORT	97
	I1=I1+1	PQSORT	98
	IF (I1.EQ.I2) GO TO 280	PQSORT	99
	IF (A(I1).LE.AMED) GO TO 170	PQSORT	100
C		PQSORT	101
180	CONTINUE	PQSORT	102
	I2=I2-1	PQSORT	103
	IF (I1.EQ.I2) GO TO 280	PQSORT	104
	IF (A(I2).GE.AMED) GO TO 180	PQSORT	105
C		PQSORT	106
	B=A(I1)	PQSORT	107
	A(I1)=A(I2)	PQSORT	108
	A(I2)=B	PQSORT	109
	GO TO 170	PQSORT	110
C		PQSORT	111
C		PQSORT	112
C	FIND THE MIDDLE OF THE THREE MEDIAN VALUES FOUND	PQSORT	113
C		PQSORT	114
190	CONTINUE	PQSORT	115
	IF (A(IM(1)).GT.A(IM(3))) THEN	PQSORT	116
	IF (A(IM(2)).GT.A(IM(1))) GO TO 200	PQSORT	117
	IF (A(IM(2)).GT.A(IM(3))) GO TO 210	PQSORT	118
	GO TO 220	PQSORT	119
	ELSE	PQSORT	120
	IF (A(IM(2)).GT.A(IM(3))) GO TO 220	PQSORT	121
	IF (A(IM(2)).GT.A(IM(1))) GO TO 210	PQSORT	122
	ENDIF	PQSORT	123
200	CONTINUE	PQSORT	124
	IMED=IM(1)	PQSORT	125
	GO TO 230	PQSORT	126
210	CONTINUE	PQSORT	127
	IMED=IM(2)	PQSORT	128
	GO TO 230	PQSORT	129
220	CONTINUE	PQSORT	130
	IMED=IM(3)	PQSORT	131
230	CONTINUE	PQSORT	132
	AMED=A(IMED)	PQSORT	133
C		PQSORT	134
C	START QUICK SORT PARTITIONING	PQSORT	135
C		PQSORT	136
	I1=0	PQSORT	137
	I2=N+1	PQSORT	138
C		PQSORT	139
240	CONTINUE	PQSORT	140
	I1=I1+1	PQSORT	141
	IF (A(I1).LE.AMED) GO TO 240	PQSORT	142
C		PQSORT	143
250	CONTINUE	PQSORT	144
	I2=I2-1	PQSORT	145
	IF (A(I2).GE.AMED) GO TO 250	PQSORT	146
	IF (I1.GE.I2) GO TO 260	PQSORT	147
C		PQSORT	148
	B=A(I1)	PQSORT	149
	A(I1)=A(I2)	PQSORT	150

A(I2)=B	PQSORT	151
GO TO 240	PQSORT	152
C	PQSORT	153
C	PQSORT	154
C	PQSORT	155
C	PQSORT	156
260 CONTINUE	PQSORT	157
IF (I1.GT.IMED) I1=I1-1	PQSORT	158
IF (I1.EQ.IMED) GO TO 270	PQSORT	159
B=A(I1)	PQSORT	160
A(I1)=A(IMED)	PQSORT	161
A(IMED)=B	PQSORT	162
270 CONTINUE	PQSORT	163
RETURN	PQSORT	164
C	PQSORT	165
C	PQSORT	166
C	PQSORT	167
280 CONTINUE	PQSORT	168
IFIN=1	PQSORT	169
RETURN	PQSORT	170
END	PQSORT	171
SUBROUTINE QSORT (N,A)	QSORT	2
C	QSORT	3
C	QSORT	4
C	QSORT	5
C	QSORT	6
C	QSORT	7
C	QSORT	8
C	QSORT	9
C	QSORT	10
C	QSORT	11
C	QSORT	12
C	QSORT	13
C	QSORT	14
C	QSORT	15
C	QSORT	16
C	QSORT	17
C	QSORT	18
C	QSORT	19
C	QSORT	20
C	QSORT	21
C	QSORT	22
C	QSORT	23
C	QSORT	24
C	QSORT	25
C	QSORT	26
C	QSORT	27
C	QSORT	28
C	QSORT	29
C	QSORT	30
C	QSORT	31
C	QSORT	32
C	QSORT	33
C	QSORT	34

100 CONTINUE	QSORT	35
M=IU(NS)-IL(NS)+1	QSORT	36
CALL PQSORT (M,IFIN,IC,A(IL(NS)))	QSORT	37
C	QSORT	38
IF (IFIN.EQ.0) GO TO 110	QSORT	39
NS=NS-1	QSORT	40
IF (NS.LE.0) RETURN	QSORT	41
GO TO 100	QSORT	42
110 CONTINUE	QSORT	43
C	QSORT	44
IC=IC+IL(NS)-1	QSORT	45
K=NS+1	QSORT	46
C	QSORT	47
IF (K.LE.MAXSTK) GO TO 120	QSORT	48
M=IC-IL(NS)	QSORT	49
CALL SORT (M,A(IL(NS)))	QSORT	50
IC=IC+1	QSORT	51
M=IU(NS)-IC+1	QSORT	52
CALL SORT (M,A(IC))	QSORT	53
NS=NS-1	QSORT	54
GO TO 100	QSORT	55
120 CONTINUE	QSORT	56
C	QSORT	57
IL(K)=IL(NS)	QSORT	58
IU(K)=IC-1	QSORT	59
IL(NS)=IC+1	QSORT	60
NS=K	QSORT	61
GO TO 100	QSORT	62
END	QSORT	63
C	QSORT	64
C	QSORT	65
C	QSORT	66
SUBROUTINE RIDAT (IERR,N,NSAM,RNDVAL)	RIDAT	2
C	RIDAT	3
C	RIDAT	4
C	RIDAT	5
C	RIDAT	6
C	RIDAT	7
C	RIDAT	8
C	RIDAT	9
C	RIDAT	10
C	RIDAT	11
C	RIDAT	12
C	RIDAT	13
C	RIDAT	14
C	RIDAT	15
C	RIDAT	16
C	RIDAT	17
C	RIDAT	18
C	RIDAT	19
C	RIDAT	20
C	RIDAT	21
C	RIDAT	22
C	RIDAT	23

```

100 CONTINUE
    M=IU(NS)-IL(NS)+1
    CALL PQSORT (M,IFIN,IC,A(IL(NS)))
C
    IF (IFIN.EQ.0) GO TO 110
        NS=NS-1
        IF (NS.LE.0) RETURN
        GO TO 100
110 CONTINUE
C
    IC=IC+IL(NS)-1
    K=NS+1
C
    IF (K.LE.MAXSTK) GO TO 120
        M=IC-IL(NS)
        CALL SORT (M,A(IL(NS)))
        IC=IC+1
        M=IU(NS)-IC+1
        CALL SORT (M,A(IC))
        NS=NS-1
        GO TO 100
120 CONTINUE
C
    IL(K)=IL(NS)
    IU(K)=IC-1
    IL(NS)=IC+1
    NS=K
    GO TO 100
    END
C
C -----
C
    SUBROUTINE RIDAT (IERR,N,NSAM,RNDVAL)
C
C  ROUTINE TO READ RANDOM INPUT VARIABLE DATA FROM AN EXTERNAL FILE.
C
C  IERR  = ERROR FLAG.
C  IEXT  = EXTERNAL FILE UNIT NUMBER.
C  N      = VARIABLE NUMBER BEING READ.
C  NSAM  = NUMBER OF SAMPLES TO READ FROM THE FILE.
C  RNDVAL = ARRAY TO FILL WITH RANDOM VALUES
C
$INSERT *COMMON>PPARA
$INSERT *COMMON>PBLK3
$INSERT *COMMON>PBLK18
$INSERT SYSTEMS>UTIL>USRLIB>COMMON>INOUT
    DIMENSION
    +   RNDVAL(NSAM)
C
C
    I=1
100 CONTINUE
    READ (INFIL,*,END=110,ERR=150) RNDVAL(I)
    I=I+1

```

IF (I.LE.NSAM) GO TO 100	R1DAT	24
RETURN	R1DAT	25
C	R1DAT	26
C	R1DAT	27
C	R1DAT	28
110 CONTINUE	R1DAT	29
IF (I.GT.1) GO TO 120	R1DAT	30
WRITE (IOUT,500)	R1DAT	31
GO TO 100	R1DAT	32
120 CONTINUE	R1DAT	33
I=I-1	R1DAT	34
WRITE (IOUT,510) I	R1DAT	35
WRITE (IOUT,520) VLABEL(N), (JJNF(J,N),J=1,NMLEN)	R1DAT	36
WRITE (IOUT,530) NSAM	R1DAT	37
K=I	R1DAT	38
130 CONTINUE	R1DAT	39
J=K+1	R1DAT	40
K=J+I-1	R1DAT	41
IF (K.GT.NSAM) K=NSAM	R1DAT	42
DO 140 L=J,K	R1DAT	43
M=L-J+1	R1DAT	44
RNDVAL(L)=RNDVAL(M)	R1DAT	45
140 CONTINUE	R1DAT	46
IF (K.LT.NSAM) GO TO 130	R1DAT	47
RETURN	R1DAT	48
C	R1DAT	49
C	R1DAT	50
C	R1DAT	51
150 CONTINUE	R1DAT	52
WRITE (IOUT,540) I	R1DAT	53
180 CONTINUE	R1DAT	54
WRITE (IOUT,550)	R1DAT	55
WRITE (IOUT,520) VLABEL(N), (JJNF(J,N),N=1,NMLEN)	R1DAT	56
IERR=1	R1DAT	57
RETURN	R1DAT	58
C	R1DAT	59
500 FORMAT (/1X,'** ERROR, END OF FILE ENCOUNTERED WHILE READING RANDO	R1DAT	60
+M DATA POINTS'/4X,'FROM AN EXTERNAL FILE. NO USABLE DATA WAS FOUN	R1DAT	61
+D ON THIS FILE.')	R1DAT	62
510 FORMAT (/1X,'** WARNING, END OF FILE ENCOUNTERED AFTER READING ',I	R1DAT	63
+5,' DATA VALUES'/4X,'FROM THE EXTERNAL FILE (DATA VALUES READ FROM	R1DAT	64
+ AN EXTERNAL FILE).')	R1DAT	65
520 FORMAT (4X,'DATA WAS BEING READ FOR INPUT VARIABLE ',A12,'.'/4X,'A	R1DAT	66
+ND WAS BEING READ FROM EXTERNAL FILE:.'/4X,20A4)	R1DAT	67
530 FORMAT (4X,'THE ENTERED DATA WILL BE DUPLICATED A SUFFICIENT NUMBE	R1DAT	68
+R OF '/4X,'TIMES TO CREATE THE REQUIRED ',I5,' SAMPLE VALUES.')	R1DAT	69
540 FORMAT (/1X,'** ERROR ENCOUNTERED WHILE READING RANDOM DATA POINTS	R1DAT	70
+ FROM AN'/4X,'EXTERNAL DATA FILE. THIS ERROR OCCURRED ON THE ',I5	R1DAT	71
+', '-TH'/4X,'LINE OF THE FILE.')	R1DAT	72
550 FORMAT (4X,'RUN TERMINATED FROM ROUTINE RDDAT.')	R1DAT	73
END	R1DAT	74
SUBROUTINE R2DAT (IERR,N)	R2DAT	2
C	R2DAT	3
C THIS ROUTINE READS THE USER DEFINABLE CONFIDENCE FUNCTION FOR THE	R2DAT	4

C	PROGRAM PACSTAT.	R2DAT	5
C		R2DAT	6
	\$INSERT *>COMMON>PPARA	R2DAT	7
	\$INSERT *>COMMON>PBLK3	R2DAT	8
	\$INSERT *>COMMON>PBLK18	R2DAT	9
	\$INSERT SYSTEMS>UTIL>USRLIB>COMMON>INOUT	R2DAT	10
C		R2DAT	11
C	UDIST(I,1) = I-TH VALUE OF THE CUMULATIVE DISTRIBUTION FUNCTION.	R2DAT	12
C	UDIST(I,2) = I-TH VALUE OF THE CONFIDENCE LEVEL (ZERO TO ONE).	R2DAT	13
C		R2DAT	14
	IPRT=0	R2DAT	15
C		R2DAT	16
	DO 100 I=1,MAXDST	R2DAT	17
	K=I	R2DAT	18
	READ (INFIL,*,END=110,ERR=150) UDIST(I,1), UDIST(I,2)	R2DAT	19
100	CONTINUE	R2DAT	20
	IUDIST=MAXDST	R2DAT	21
	WRITE (IOUT,500) IUDIST	R2DAT	22
	WRITE (IOUT,510) VLABEL(N), (JJNF(J,N),J=1,NMLEN)	R2DAT	23
	IPRT=1	R2DAT	24
	GO TO 120	R2DAT	25
C		R2DAT	26
110	CONTINUE	R2DAT	27
	IUDIST=K-1	R2DAT	28
	WRITE (IOUT,520) VLABEL(N),IUDIST	R2DAT	29
C		R2DAT	30
C	CHECK FOR STRICTLY INCREASING FUNCTIONS AND	R2DAT	31
C	A PROPER INTERVAL IN THE CONFIDENCE LEVEL.	R2DAT	32
C		R2DAT	33
120	CONTINUE	R2DAT	34
	IF (IUDIST.LT.2) THEN	R2DAT	35
	WRITE (IOUT,530)	R2DAT	36
	GO TO 100	R2DAT	37
	ENDIF	R2DAT	38
	L=0	R2DAT	39
	K=IUDIST-1	R2DAT	40
	DO 140 I=1,K	R2DAT	41
	IF ((UDIST(I,2).LT.0.).OR.(UDIST(I,2).GT.1.0)) L=1	R2DAT	42
	J=I+1	R2DAT	43
	IF (UDIST(I,1).LE.UDIST(J,1)) GO TO 130	R2DAT	44
	WRITE (IOUT,540) I,J	R2DAT	45
	GO TO 100	R2DAT	46
130	CONTINUE	R2DAT	47
	IF (UDIST(I,2).LE.UDIST(J,2)) GO TO 140	R2DAT	48
	WRITE (IOUT,540) I,J	R2DAT	49
	GO TO 100	R2DAT	50
140	CONTINUE	R2DAT	51
	IF (L.NE.0) WRITE (IOUT,550) VLABEL(N), (JJNF(J,N),J=1,NMLEN)	R2DAT	52
	RETURN	R2DAT	53
C		R2DAT	54
C	ERROR	R2DAT	55
C		R2DAT	56
150	CONTINUE	R2DAT	57
	WRITE (IOUT,560) I	R2DAT	58

160	CONTINUE	R2DAT	59
	WRITE (IOUT,570)	R2DAT	60
	IF (IPRT.EQ.0) WRITE (IOUT,510) VLABEL(N),(JJNF(J,N),J=1,NMLEN)	R2DAT	61
	IERR=1	R2DAT	62
	RETURN	R2DAT	63
C		R2DAT	64
500	FORMAT (/1X,'** WARNING, ',I5,' DATA POINTS (THE MAXIMUM ALLOWED) W	R2DAT	65
	+ERE READ'/4X,'FROM AN EXTERNAL FILE, DEFINING THE CUMMULATIVE CONF	R2DAT	66
	+IDENCE'/4X,'FUNCTION, BUT THE END OF FILE WAS NOT ENCOUNTERED. TH	R2DAT	67
	+IS'/4X,'MAY SKEW THE RESULTS.')	R2DAT	68
510	FORMAT (4X,'DATA WAS BEING READ FOR INPUT VARIABLE ',A12,'.'/4X,'A	R2DAT	69
	+ND WAS READ FROM FILE: '/4X,20A4)	R2DAT	70
520	FORMAT (/1X,'FOR THE INPUT VARIABLE ',A12,' ',I4,' DATA POINTS WE	R2DAT	71
	+RE'/1X,'READ FROM AN EXTERNAL FILE, DEFINING A CUMMULATIVE CONFIDE	R2DAT	72
	+NCE CURVE.')	R2DAT	73
530	FORMAT (/1X,'** ERROR, ONLY ONE DATA POINT WAS FOUND ON THE EXTERN	R2DAT	74
	+AL FILE'/4X,'CONTAINING THE CUMMULATIVE CONFIDENCE FUNCTION DATA S	R2DAT	75
	+ET. '/4X,'THIS IS INSUFFICIENT TO DEFINE A CONFIDENCE FUNCTION.')	R2DAT	76
540	FORMAT (/1X,'** ERROR, THE INPUT CUMMULATIVE DISTRIBUTION FUNCTION	R2DAT	77
	+ IS NOT'/4X,'A STRICTLY INCREASING FUNCTION AT INDECES ',I4,' & ',I	R2DAT	78
	+4,'.')	R2DAT	79
550	FORMAT (/1X,'** WARNING, CONFIDENCE VALUES LESS THAN ZERO OR GREAT	R2DAT	80
	+ER THAN ONE'/4X,'HAVE BEEN ENTERED VIA AN EXTERNAL FILE FOR RANDOM	R2DAT	81
	+ INPUT'/4X,'VARIABLE ',A12,'. THESE VALUES WILL BE IGNORED BY THE	R2DAT	82
	+ '/4X,'STOCHASTIC GENERATORS. THIS DATA WAS READ FROM FILE: '/4X,20A	R2DAT	83
	+4)	R2DAT	84
560	FORMAT (/1X,'** ERROR ENCOUNTERED WHILE READING THE USER DEFINED C	R2DAT	85
	+UMMULATIVE'/4X,'CONFIDENCE FUNCTION FROM AN EXTERNAL FILE. THIS E	R2DAT	86
	+RROR'/4X,'OCCURED WHILE READING THE ',I4,'-TH DATA POINT.')	R2DAT	87
570	FORMAT (4X,'ERROR TERMINATION FROM ROUTINE R2DAT.')	R2DAT	88
	END	R2DAT	89
	SUBROUTINE RELEAS (IFIL)	RELEAS	2
C		RELEAS	3
C	ROUTINE FOR INTERACTIVE CLOSURE OF FILES	RELEAS	4
C		RELEAS	5
	\$INSERT SYSCOM)ASKEYS	RELEAS	6
	\$INSERT *)COMMON>INOUT	RELEAS	7
	LOGICAL LOGIC	RELEAS	8
C		RELEAS	9
	IF (IFIL.LT.21) THEN	RELEAS	10
	IFUNIT=IFIL-4	RELEAS	11
	ELSE	RELEAS	12
	IFUNIT=IFIL-12	RELEAS	13
	ENDIF	RELEAS	14
	LOGIC = CLOS\$(INTS(IFUNIT))	RELEAS	15
	IF (.NOT.LOGIC) WRITE (IOUT,500) IFIL	RELEAS	16
	RETURN	RELEAS	17
500	FORMAT (/1X,'CLOSURE OF UNIT NO',I5,' UNSUCCESSFUL.')	RELEAS	18
	END	RELEAS	19
	SUBROUTINE REDRDR	REDRDR	2
C		REDRDR	3
C	THIS ROUTINE MOVES THE INPUT AND OUTPUT VARIABLES IN THE ARRAYS	REDRDR	4
C	VAR AND RLTS, IN ORDER TO PLACE ANY 'FAILED' SOLUTIONS AT THE	REDRDR	5
C	END OF THE ARRAYS. THE CURRENT MONTE CARLO SAMPLING SCHEME	REDRDR	6

C	REQUIRES THAT ALL SUCCESSFUL SAMPLES BE LISTED CONTIGUOUSLY IN THE	REORDR	7
C	OUTPUT ARRAYS. HOWEVER, IT MAY OFTEN BE DESIRED TO SAVE THE FAILED	REORDR	8
C	SAMPLES FOR LATER ANALYSIS.	REORDR	9
C	ARRAY CONF IS USED HERE AS TEMPORARY STORAGE OF THE FAILED	REORDR	10
C	SAMPLE VALUES.	REORDR	11
C		REORDR	12
	\$INSERT *)COMMON>PPARA	REORDR	13
	\$INSERT *)COMMON>PELK1	REORDR	14
	\$INSERT *)COMMON>PELK5	REORDR	15
	\$INSERT *)COMMON>PELK6	REORDR	16
	\$INSERT *)COMMON>PELK7	REORDR	17
	\$INSERT *)COMMON>PELK8	REORDR	18
	\$INSERT *)COMMON>PELK12	REORDR	19
	\$INSERT *)COMMON>PELK17	REORDR	20
	\$INSERT SYSTEMS>UTIL>USRLIB>COMMON>INOUT	REORDR	21
C		REORDR	22
C	LOOP MOVES SAMPLES WHICH FAILED TO THE END OF EACH LIST	REORDR	23
C		REORDR	24
	NSAMC=NSAM-NUMERR	REORDR	25
	IF (NSAMC.EQ.0) THEN	REORDR	26
	WRITE (IOUT,500) NSAM	REORDR	27
	IF (IDAT.GT.0) WRITE (IOUT,500) NSAM	REORDR	28
	GO TO 200	REORDR	29
	ENDIF	REORDR	30
	IF (NUMERR.EQ.0) GO TO 200	REORDR	31
C		REORDR	32
C	ADJUST INPUT VARIABLE LIST	REORDR	33
C		REORDR	34
	IF (NVAR.LT.1) GO TO 140	REORDR	35
	DO 130 I=1,NVAR	REORDR	36
	NF=0	REORDR	37
	N0=NVLOC(I)-1	REORDR	38
	DO 110 J=1,NSAM	REORDR	39
	N1=N0+J	REORDR	40
	IF (NERR(J).EQ.0) GO TO 100	REORDR	41
	NF=NF+1	REORDR	42
	CONF(NF)=VAR(N1)	REORDR	43
	GO TO 110	REORDR	44
100	CONTINUE	REORDR	45
	N2=N1-NF	REORDR	46
	VAR(N2)=VAR(N1)	REORDR	47
110	CONTINUE	REORDR	48
	N0=NVLOC(I)+NSAMC-1	REORDR	49
	DO 120 J=1,NUMERR	REORDR	50
	K=N0+J	REORDR	51
	VAR(K)=CONF(J)	REORDR	52
120	CONTINUE	REORDR	53
130	CONTINUE	REORDR	54
140	CONTINUE	REORDR	55
C		REORDR	56
C	ADJUST OUTPUT VARIABLE LIST	REORDR	57
C		REORDR	58
	IF (NSOLN.LT.1) GO TO 190	REORDR	59
	DO 180 I=1,NSOLN	REORDR	60

NF=0	REORDR	81
N0=NSLOC(I)-1	REORDR	82
DO 100 J=1,NSAM	REORDR	83
N1=N0+J	REORDR	84
IF (NERR(J).EQ.0) GO TO 150	REORDR	85
NF=NF+1	REORDR	86
CONF(NF)=RLTS(N1)	REORDR	87
GO TO 100	REORDR	88
150 CONTINUE	REORDR	89
N2=N1-NF	REORDR	90
RLTS(N2)=RLTS(N1)	REORDR	91
160 CONTINUE	REORDR	92
N0=NSLOC(I)+NSAMC-1	REORDR	93
DO 170 J=1,NUMERR	REORDR	94
K=N0+J	REORDR	95
RLTS(K)=CONF(J)	REORDR	96
170 CONTINUE	REORDR	97
180 CONTINUE	REORDR	98
190 CONTINUE	REORDR	99
C	REORDR	100
C PRINT ECHO OF FAILED SAMPLES	REORDR	101
C	REORDR	102
IF (NSAMC.EQ.NSAM) GO TO 200	REORDR	103
WRITE (IOUT,510) NSAMC,NSAM	REORDR	104
IF (IDAT.GT.0) WRITE (IDAT,510) NSAMC,NSAM	REORDR	105
200 CONTINUE	REORDR	106
C	REORDR	107
RETURN	REORDR	108
500 FORMAT (/1X,'** ALL ',I0,' SAMPLES FAILED IN THIS RUN **')	REORDR	109
510 FORMAT (/1X,'** ',I5,' ERROR FREE SAMPLES WERE FOUND OUT OF ',I5,'	REORDR	110
* TOTAL SAMPLES COMPUTED **')	REORDR	111
END	REORDR	112
SUBROUTINE RNGS (IERR,N,NSAM,RNDVAL)	RNGS	2
C	RNGS	3
C SUBROUTINE FOR COMPUTING A RANDOM DISTRIBUTION GIVEN THE	RNGS	4
C DISTRIBUTION TYPE IT, THE DEFINING PARAMETERS RP1, RP2,	RNGS	5
C AND RP3.	RNGS	6
C FOR LIMITED DISTRIBUTIONS, THIS ROUTINE ALSO SETS THE EFFECTIVE	RNGS	7
C LOWER AND UPPER LIMITS (VLIMIT) ON THE INPUT STOCHASTIC VARIABLE.	RNGS	8
C THE VARIABLES UMIN AND UMAX, RETURNED FROM THE DISTRIBUTION	RNGS	9
C GENERATING ROUTINES, ARE USED FOR THIS.	RNGS	10
C	RNGS	11
C N = INPUT VARIABLE NUMBER	RNGS	12
C NSAM = NUMBER OF SAMPLES TO GENERATE	RNGS	13
C RNDVAL = OUTPUT VECTOR FOR THE DISTRIBUTION GENERATED	RNGS	14
C	RNGS	15
\$INSERT *)COMMON>PPARA	RNGS	16
\$INSERT *)COMMON>PBLK13	RNGS	17
\$INSERT *)COMMON>PBLK15	RNGS	18
\$INSERT *)COMMON>PBLK16	RNGS	19
\$INSERT *)COMMON>PBLK18	RNGS	20
\$INSERT SYSTEMS>UTIL>RANDOM>COMMON>STRATI	RNGS	21
\$INSERT SYSTEMS>UTIL>RANDOM>COMMON>ULIMITS	RNGS	22
C	RNGS	23

	DIMENSION	RNGS	24
	+ RNDVAL (NSAM)	RNGS	25
	DATA	RNGS	26
	+ IONE/1/	RNGS	27
C		RNGS	28
	RP1=PAR(N,1)	RNGS	29
	RP2=PAR(N,2)	RNGS	30
	RP3=PAR(N,3)	RNGS	31
C		RNGS	32
	IT=ITYPE(N)	RNGS	33
	AMIN=VLIM(N,1)	RNGS	34
	AMAX=VLIM(N,2)	RNGS	35
C		RNGS	36
C	OPEN EXTERNAL FILE FOR EXTERNALLY DEFINED DISTRIBUTIONS.	RNGS	37
C		RNGS	38
	IF ((IT.NE.9).AND.(IT.NE.10)) GO TO 100	RNGS	39
	I=0	RNGS	40
	CALL ASQ (I,IERR,INFIL,NMLEN,JJNF(1,N))	RNGS	41
	IF (IERR.NE.0) RETURN	RNGS	42
C		RNGS	43
C	PERFORM DATA POINT READ AT THIS POINT	RNGS	44
C		RNGS	45
	IF (IT.EQ.9) GO TO 100	RNGS	46
	CALL RIDAT (IERR,N,NSAM,RNDVAL)	RNGS	47
	CALL RELEAS (INFIL)	RNGS	48
	RETURN	RNGS	49
	100 CONTINUE	RNGS	50
C		RNGS	51
C	COMPUTE BASE UNIFORM DISTRIBUTION	RNGS	52
C		RNGS	53
	CALL U01S (NSAM,RNDVAL,DSEED,NLEVEL)	RNGS	54
C		RNGS	55
C	SAVE STRATIFICATION DIAGNOSTICS	RNGS	56
C		RNGS	57
	DO 110 I=1,NLEVEL	RNGS	58
	NPTSPL(I,N)=NSPL(I)	RNGS	59
	110 CONTINUE	RNGS	60
C		RNGS	61
C	CHOOSE DISTRIBUTION	RNGS	62
C		RNGS	63
	GO TO (120,130,140,150,160,170,180,200,220,230,240), IT	RNGS	64
C		RNGS	65
C	NORMAL DISTRIBUTION	RNGS	66
C		RNGS	67
	120 CONTINUE	RNGS	68
	IF (ILIM(N).EQ.0) THEN	RNGS	69
	CALL NORMAL (NSAM,RNDVAL,RP1,RP2)	RNGS	70
	RETURN	RNGS	71
	ELSE	RNGS	72
	CALL NORMAL (NSAM,RNDVAL,RP1,RP2,AMIN,AMAX)	RNGS	73
	RLIM(N,1)=UMIN	RNGS	74
	RLIM(N,2)=UMAX	RNGS	75
	CALL NORMAL (IONE,UMIN,RP1,RP2)	RNGS	76
	CALL NORMAL (IONE,UMAX,RP1,RP2)	RNGS	77

IF (UMIN.GT.UMAX) THEN	RNGS	78
WD=UMIN	RNGS	79
UMIN=UMAX	RNGS	80
UMAX=WD	RNGS	81
ENDIF	RNGS	82
VLIMT(N,1)=UMIN	RNGS	83
VLIMT(N,2)=UMAX	RNGS	84
GO TO 280	RNGS	85
ENDIF	RNGS	86
C	RNGS	87
C NATURAL LOGNORMAL DISTRIBUTION	RNGS	88
C	RNGS	89
130 CONTINUE	RNGS	90
IF (ILIM(N).EQ.0) THEN	RNGS	91
CALL LNNORM (NSAM,RNDVAL,RP1,RP2)	RNGS	92
RETURN	RNGS	93
ELSE	RNGS	94
CALL LNNORM (NSAM,RNDVAL,RP1,RP2,AMIN,AMAX)	RNGS	95
RLIM(N,1)=UMIN	RNGS	96
RLIM(N,2)=UMAX	RNGS	97
CALL LNNORM (IONE,UMIN,RP1,RP2)	RNGS	98
CALL LNNORM (IONE,UMAX,RP1,RP2)	RNGS	99
IF (UMIN.GT.UMAX) THEN	RNGS	100
WD=UMIN	RNGS	101
UMIN=UMAX	RNGS	102
UMAX=WD	RNGS	103
ENDIF	RNGS	104
; ; * V L I M T (N , 1) = U M I N		
VLIMT(N,2)=UMAX	RNGS	106
GO TO 280	RNGS	107
ENDIF	RNGS	108
C	RNGS	109
C COMMON LOGNORMAL DISTRIBUTION	RNGS	110
C	RNGS	111
140 CONTINUE	RNGS	112
IF (ILIM(N).EQ.0) THEN	RNGS	113
CALL LOGNORM (NSAM,RNDVAL,RP1,RP2)	RNGS	114
RETURN	RNGS	115
ELSE	RNGS	116
CALL LOGNORM (NSAM,RNDVAL,RP1,RP2,AMIN,AMAX)	RNGS	117
RLIM(N,1)=UMIN	RNGS	118
RLIM(N,2)=UMAX	RNGS	119
CALL LOGNORM (IONE,UMIN,RP1,RP2)	RNGS	120
CALL LOGNORM (IONE,UMAX,RP1,RP2)	RNGS	121
IF (UMIN.GT.UMAX) THEN	RNGS	122
WD=UMIN	RNGS	123
UMIN=UMAX	RNGS	124
UMAX=WD	RNGS	125
ENDIF	RNGS	126
VLIMT(N,1)=UMIN	RNGS	127
VLIMT(N,2)=UMAX	RNGS	128
GO TO 280	RNGS	129
ENDIF	RNGS	130
C	RNGS	131

C	NATURAL LOGUNIFORM DISTRIBUTION	RNGS	132
C		RNGS	133
150	CONTINUE	RNGS	134
	CALL LNUNIF (NSAM,RNDVAL,RP1,RP2)	RNGS	135
	RETURN	RNGS	136
C		RNGS	137
C	COMMON LOGUNIFORM DISTRIBUTION	RNGS	138
C		RNGS	139
160	CONTINUE	RNGS	140
	CALL LOGUNIF (NSAM,RNDVAL,RP1,RP2)	RNGS	141
	RETURN	RNGS	142
C		RNGS	143
C	EXPONENTIAL DISTRIBUTION	RNGS	144
C		RNGS	145
170	CONTINUE	RNGS	146
	IF (ILIM(N).EQ.0) THEN	RNGS	147
	CALL DEXPF (NSAM,RNDVAL,RP1)	RNGS	148
	RETURN	RNGS	149
	ELSE	RNGS	150
	CALL DEXPFL (NSAM,RNDVAL,RP1,AMIN,AMAX)	RNGS	151
	RLIM(N,1)=UMIN	RNGS	152
	RLIM(N,2)=UMAX	RNGS	153
	CALL DEXPF (IONE,UMIN,RP1)	RNGS	154
	CALL DEXPF (IONE,UMAX,RP1)	RNGS	155
	IF (UMIN.GT.UMAX) THEN	RNGS	156
	WD=UMIN	RNGS	157
	UMIN=UMAX	RNGS	158
	UMAX=WD	RNGS	159
	ENDIF	RNGS	160
	VLIM(N,1)=UMIN	RNGS	161
	VLIM(N,2)=UMAX	RNGS	162
	GO TO 280	RNGS	163
	ENDIF	RNGS	164
C		RNGS	165
C	UNIFORM DISTRIBUTION	RNGS	166
C		RNGS	167
180	CONTINUE	RNGS	168
	DO 190 I=1,NSAM	RNGS	169
	RNDVAL(I)=RP1+RNDVAL(I)*(RP2-RP1)	RNGS	170
190	CONTINUE	RNGS	171
	RETURN	RNGS	172
C		RNGS	173
C	BERNOULLI DISTRIBUTION	RNGS	174
C		RNGS	175
200	CONTINUE	RNGS	176
	CALL BERNLI (NSAM,RNDVAL,RP3)	RNGS	177
	DO 210 I=1,NSAM	RNGS	178
	RV=RP1	RNGS	179
	IF (RNDVAL(I).GT.0.) RV=RP2	RNGS	180
	RNDVAL(I)=RV	RNGS	181
210	CONTINUE	RNGS	182
	RETURN	RNGS	183
C		RNGS	184
C	CONFIDENCE FUNCTION ON EXTERNAL FILE	RNGS	185

C		RNGS	188
220	CONTINUE	RNGS	187
	CALL R2DAT (IERR,N)	RNGS	188
	CALL XUDIST (NSAM,RNDVAL,IUDIST,UDIST(1,1),UDIST(1,2))	RNGS	189
	CALL RELEAS (INFIL)	RNGS	190
	RETURN	RNGS	191
C		RNGS	192
C	DATA POINTS ON AN EXTERNAL FILE (DUMMY STATEMENT)	RNGS	193
C		RNGS	194
230	CONTINUE	RNGS	195
	RETURN	RNGS	196
C		RNGS	197
C	DISCRETE DISTRIBUTION	RNGS	198
C		RNGS	199
240	CONTINUE	RNGS	200
	DO 250 I=1,NSAM	RNGS	201
	RNDVAL(I)=RP1	RNGS	202
250	CONTINUE	RNGS	203
	RETURN	RNGS	204
C		RNGS	205
C	ENFORCE UPPER/LOWER LIMITS FOR END POINT LIMITING	RNGS	206
C		RNGS	207
260	CONTINUE	RNGS	208
	NLIM(N,1)=0	RNGS	209
	NLIM(N,2)=0	RNGS	210
	DO 280 I=1,NSAM	RNGS	211
	A=RNDVAL(I)	RNGS	212
	IF (A.GE.AMIN) GO TO 270	RNGS	213
	RNDVAL(I)=AMIN	RNGS	214
	NLIM(N,1)=NLIM(N,1)+1	RNGS	215
	GO TO 280	RNGS	216
270	CONTINUE	RNGS	217
	IF (A.LE.AMAX) GO TO 280	RNGS	218
	RNDVAL(I)=AMAX	RNGS	219
	NLIM(N,2)=NLIM(N,2)+1	RNGS	220
280	CONTINUE	RNGS	221
	RETURN	RNGS	222
	END	RNGS	223
	SUBROUTINE SOLN (IERR)	SOLN	2
C		SOLN	3
C	THIS SAMPLE PROBLEM MODELS THE MASS STORAGE AND RELEASE RATE	SOLN	4
C	(STEADY STATE) OF A CONTAMINANT, WHICH IS DIFFUSING INTO A BOUNDARY	SOLN	5
C	LAYER AWAY FROM A SOLUBILITY LIMITED SOURCE. OUTSIDE THE BOUNDARY	SOLN	6
C	LAYER, CONVECTION IS ASSUMED TO REMOVE THE CONTAMINANT AT A FAST	SOLN	7
C	RATE. THE MODEL IS ONE DIMENSIONAL, CARTESIAN DIFFUSION, AND	SOLN	8
C	OUTPUT VALUES ARE 'PER SQUARE METER' OF SOURCE ZONE.	SOLN	9
C		SOLN	10
C	INPUT VARIABLES/DATA	SOLN	11
C	ICNT = DATA SET NUMBER (# OF INPUT VARIABLE UPDATES)	SOLN	12
C	IERR = ERROR POINTER	SOLN	13
C	INDEX = SAMPLE NUMBER OF CURRENT RUN	SOLN	14
C		SOLN	15
C	VINPT(1) = MOLECULAR DIFFUSIVITY, MET**2/YEAR	SOLN	16
C	VINPT(2) = RETARDATION FACTOR	SOLN	17

C	VINPT(3) = LAYER WIDTH, MET	SOLN	18
C	VINPT(4) = SOLUBILITY, GM/MET**3	SOLN	19
C		SOLN	20
C	CONSTANTS	SOLN	21
C	CONST(1) = HALF LIFE, YEARS.	SOLN	22
C	CONST(2) = POROSITY	SOLN	23
C		SOLN	24
C	OUTPUT VARIABLES	SOLN	25
C	VALU(1) = TOTAL MASS CONTAINMENT, GMS/MET**2	SOLN	26
C	VALU(2) = MAXIMUM RELEASE RATE, GM/MET**2-YEAR	SOLN	27
C		SOLN	28
	\$INSERT SYSTEMS>UTIL>PACSTAT>COMMON>PPARA	SOLN	29
	\$INSERT SYSTEMS>UTIL>PACSTAT>COMMON>PBLK4	SOLN	30
	\$INSERT SYSTEMS>UTIL>PACSTAT>COMMON>PBLK5	SOLN	31
	\$INSERT SYSTEMS>UTIL>USRLIB>COMMON>INOUT	SOLN	32
	DATA	SOLN	33
	+ BETA /1.0 /,	SOLN	34
	+ E /2.718/	SOLN	35
C		SOLN	36
	IERR=0	SOLN	37
	IF (INDEX.GT.1) GO TO 100	SOLN	38
	WRITE (IDUT,500)	SOLN	39
	IF (IDAT.GT.0) WRITE (IDAT,500)	SOLN	40
	BETA=ALOG(2.0)/CONST(1)	SOLN	41
	100 CONTINUE	SOLN	42
C		SOLN	43
	PSI=VINPT(3)*SQRT(BETA*VINPT(2)/VINPT(1))	SOLN	44
C		SOLN	45
	A=EXP(-2.0*PSI)	SOLN	46
C		SOLN	47
	VALU(1)=CONST(2)*VINPT(4)*(-2.0*EXP(-PSI)+A+E)/(PSI*(1.0-A))	SOLN	48
C		SOLN	49
	VALU(2)=-CONST(2)*VINPT(4)*VINPT(1)*PSI*(A-E)/(1.0-A)	SOLN	50
C		SOLN	51
	RETURN	SOLN	52
	500 FORMAT (/1X,'ONE DIMENSIONAL DIFFUSIONAL RELEASE INTO A BOUNDARY'/	SOLN	53
	+1X,'LAYER OVER A SOLUBILITY LIMITED SOURCE ZONE.')	SOLN	54
	END	SOLN	55
	-----	SOLN2	2
	SAMPLE SOLUTION SUBROUTINE	SOLN2	3
		SOLN2	4
	THIS IS A SAMPLE SOLUTION ROUTINE FOR PACSTAT. IT USES THE SAME	SOLN2	5
	INPUT AND OUTPUT VARIABLES AS DOES THE BLOCK DATA ROUTINE ABOVE.	SOLN2	6
		SOLN2	7
	SUBROUTINE SOLN (IERR)	SOLN2	8
C		SOLN2	9
C	THIS SAMPLE PROBLEM MODELS THE MASS STORAGE AND RELEASE RATE	SOLN2	10
C	(STEADY STATE) OF A CONTAMINANT, WHICH IS DIFFUSING INTO A BOUNDARY	SOLN2	11
C	LAYER AWAY FROM A SOLUBILITY LIMITED SOURCE. OUTSIDE THE BOUNDARY	SOLN2	12
C	LAYER, CONVECTION IS ASSUMED TO REMOVE THE CONTAMINANT AT A FAST	SOLN2	13
C	RATE. THE MODEL IS ONE DIMENSIONAL, CARTESIAN DIFFUSION, AND	SOLN2	14
C	OUTPUT VALUES ARE 'PER SQUARE METER' OF SOURCE ZONE.	SOLN2	15
C		SOLN2	16
C	INPUT VARIABLES/DATA	SOLN2	17

C	ICNT	= DATA SET NUMBER (# OF INPUT VARIABLE UPDATES)	SOLN2	18
C	IERR	= ERROR POINTER	SOLN2	19
C	INDEX	= SAMPLE NUMBER OF CURRENT RUN	SOLN2	20
C			SOLN2	21
C	VINPT(1)	= MOLECULAR DIFFUSIVITY, MET**2/YEAR	SOLN2	22
C	VINPT(2)	= RETARDATION FACTOR	SOLN2	23
C	VINPT(3)	= LAYER WIDTH, MET	SOLN2	24
C	VINPT(4)	= SOLUBILITY, GM/MET**3	SOLN2	25
C			SOLN2	26
C	CONSTANTS		SOLN2	27
C	CONST(1)	= HALF LIFE, YEARS.	SOLN2	28
C	CONST(2)	= POROSITY	SOLN2	29
C			SOLN2	30
C	OUTPUT VARIABLES		SOLN2	31
C	VALU(1)	= TOTAL MASS CONTAINMENT, GMS/MET**2	SOLN2	32
C	VALU(2)	= MAXIMUM RELEASE RATE, GM/MET**2-YEAR	SOLN2	33
C			SOLN2	34
	\$INSERT SYSTEMS\UTIL\PACSTAT\COMMON\PPARA		SOLN2	35
	\$INSERT SYSTEMS\UTIL\PACSTAT\COMMON\PELK4		SOLN2	36
	\$INSERT SYSTEMS\UTIL\PACSTAT\COMMON\PELK5		SOLN2	37
	\$INSERT SYSTEMS\UTIL\USRLIB\COMMON\INOUT		SOLN2	38
	DATA		SOLN2	39
	+ BETA /1.0 /,		SOLN2	40
	+ E /2.718/		SOLN2	41
C			SOLN2	42
	IERR=0		SOLN2	43
	IF (INDEX.GT.1) GO TO 100		SOLN2	44
	WRITE (IOUT,500)		SOLN2	45
	IF (IDAT.GT.0) WRITE (IDAT,500)		SOLN2	46
	BETA=ALOG(2.0)/CONST(1)		SOLN2	47
	100 CONTINUE		SOLN2	48
C			SOLN2	49
	PSI=VINPT(3)*SQRT(BETA*VINPT(2)/VINPT(1))		SOLN2	50
C			SOLN2	51
	A=EXP(-2.0*PSI)		SOLN2	52
C			SOLN2	53
	VALU(1)=CONST(2)*VINPT(4)*(-2.0*EXP(-PSI)+A+E)/(PSI*(1.0-A))		SOLN2	54
C			SOLN2	55
	VALU(2)=-CONST(2)*VINPT(4)*VINPT(1)*PSI*(A-E)/(1.0-A)		SOLN2	56
C			SOLN2	57
	RETURN		SOLN2	58
	500 FORMAT (/1X,'ONE DIMENSIONAL DIFFUSIONAL RELEASE INTO A BOUNDARY'/		SOLN2	59
	+1X,'LAYER OVER A SOLUBILITY LIMITED SOURCE ZONE.')		SOLN2	60
	END		SOLN2	61
			SOLN2	62
	SUBROUTINE SORT (N,A)		SORT	2
C			SORT	3
C	SORT IS A SIMPLE SHELL SORT.		SORT	4
C	ITEMS ARE SORTED IN ASCENDING ORDER.		SORT	5
C			SORT	6
C	A IS THE ARRAY OF ITEMS TO SORT.		SORT	7
C	N IS THE NUMBER OF ITEMS IN ARRAY A.		SORT	8
C			SORT	9
	DIMENSION		SORT	10

\$INSERT *>COMMON>PELK5	STATOT	22
\$INSERT *>COMMON>PELK6	STATOT	23
\$INSERT *>COMMON>PELK7	STATOT	24
\$INSERT *>COMMON>PELK8	STATOT	25
\$INSERT *>COMMON>PELK10	STATOT	26
\$INSERT *>COMMON>PELK13	STATOT	27
\$INSERT *>COMMON>PELK16	STATOT	28
\$INSERT *>COMMON>PELK17	STATOT	29
\$INSERT SYSTEMS>UTIL>USRLIB>COMMON>INOUT	STATOT	30
REAL*8	STATOT	31
+ A,B,BASEXP	STATOT	32
DIMENSION	STATOT	33
+ RD(2), RM(2)	STATOT	34
CHARACTER*1	STATOT	35
+ ANS	STATOT	36
DATA	STATOT	37
+ BASEXP/2.303D0/	STATOT	38
C	STATOT	39
C SET OUTPUT UNIT NUMBER	STATOT	40
C	STATOT	41
III=IDAT	STATOT	42
IF (IOAT.EQ.0) III=IOUT	STATOT	43
C	STATOT	44
C ***** INPUT DISTRIBUTIONS *****	STATOT	45
C	STATOT	46
IF (NVAR.LT.1) GO TO 140	STATOT	47
DO 130 N=1,NVAR	STATOT	48
N1=NVLOC(N)-1	STATOT	49
DO 100 J=1,NSAMC	STATOT	50
K=J+N1	STATOT	51
CONF(J)=VAR(K)	STATOT	52
100 CONTINUE	STATOT	53
CALL STATS (NSAMC,CONF,VMIN(N),VMAX(N),VAVG(N),VSTD(N),VSKW(N))	STATOT	54
C	STATOT	55
C INPUT VARIABLE SORT AND MEDIAN COMPUTATION	STATOT	56
C	STATOT	57
VMED(N)=0.	STATOT	58
CALL QSORT (NSAMC,CONF)	STATOT	59
IF (NSAMC.LT.10) GO TO 110	STATOT	60
I=NSAMC/2	STATOT	61
J=I	STATOT	62
IF (MOD(NSAMC,2).EQ.0) J=J+1	STATOT	63
VMED(N)=(CONF(I)+CONF(J))/2.0	STATOT	64
110 CONTINUE	STATOT	65
DO 120 J=1,NSAMC	STATOT	66
K=N1+J	STATOT	67
VAR(K)=CONF(J)	STATOT	68
120 CONTINUE	STATOT	69
130 CONTINUE	STATOT	70
140 CONTINUE	STATOT	71
C	STATOT	72
C ***** OUTPUT DISTRIBUTIONS *****	STATOT	73
C	STATOT	74
IF (NSOLN.LT.1) GO TO 190	STATOT	75

DO 100 N=1, NSOLN	STATOT	76
FAVG(N)=RLTS(NSLOC(N))	STATOT	77
FMED(N)=0.0	STATOT	78
FSTD(N)=0.0	STATOT	79
FSKW(N)=0.0	STATOT	80
IF (NSAMC.LE.1) GO TO 180	STATOT	81
C	STATOT	82
N1=NSLOC(N)-1	STATOT	83
DO 150 J=1, NSAMC	STATOT	84
K=J+N1	STATOT	85
CONF(J)=RLTS(K)	STATOT	86
150 CONTINUE	STATOT	87
CALL STATS (NSAMC,CONF,FMIN(N),FMAX(N),FAVG(N),FSTD(N),FSKW(N))	STATOT	88
C	STATOT	89
C OUTPUT VARIABLE SORT AND MEDIAN COMPUTATION	STATOT	90
C	STATOT	91
CALL QSORT (NSAMC,CONF)	STATOT	92
IF (NSAMC.LT.10) GO TO 180	STATOT	93
I=NSAMC/2	STATOT	94
J=I	STATOT	95
IF (MOD(NSAMC,2).EQ.0) J=J+1	STATOT	96
FMED(N)=(CONF(I)+CONF(J))/2.0	STATOT	97
180 CONTINUE	STATOT	98
DO 170 J=1, NSAMC	STATOT	99
K=N1+J	STATOT	100
RLTS(K)=CONF(J)	STATOT	101
170 CONTINUE	STATOT	102
180 CONTINUE	STATOT	103
190 CONTINUE	STATOT	104
C	STATOT	105
C PRINT VALUES TO OUTPUT FILE OR USER'S TERMINAL	STATOT	106
C	STATOT	107
C INPUT VARIABLE STATISTICS	STATOT	108
C	STATOT	109
IF (NVAR.LT.1) GO TO 330	STATOT	110
IEXT=1	STATOT	111
WRITE (III,500)	STATOT	112
WRITE (III,510)	STATOT	113
DO 200 N=1, NVAR	STATOT	114
WRITE (III,520) VLABEL(N),VWIN(N),VMAX(N),VAVG(N),VMED(N),	STATOT	115
+ VSTD(N),VSKW(N)	STATOT	116
IF ((ITYPE(N).NE.9).AND.(ITYPE(N).NE.10)) IEXT=0	STATOT	117
200 CONTINUE	STATOT	118
C	STATOT	119
C COMPUTE MAXIMUM LIKELIHOOD ESTIMATORS FOR INPUT	STATOT	120
C VARIABLES (ONLY FOR INTERNALLY DEFINED VARIABLES).	STATOT	121
C	STATOT	122
IF (IEXT.EQ.1) GO TO 330	STATOT	123
WRITE (III,530)	STATOT	124
ISTAR=0	STATOT	125
DO 320 N=1, NVAR	STATOT	126
ANS=' '	STATOT	127
IF (ILIM(N).NE.0) THEN	STATOT	128
ANS='*'	STATOT	129

	ISTAR=1	STATOT	130
	ENDIF	STATOT	131
	N1=NVL0C(N)	STATOT	132
	N2=N1+NSAMC-1	STATOT	133
	N3=N1-1	STATOT	134
	RM(1)=PAR(N,1)	STATOT	135
	RM(2)=PAR(N,2)	STATOT	136
	GO TO (210,220,220,250,250,260,270,280,320,320,300), ITYPE(N)	STATOT	137
C		STATOT	138
C	NORMAL	STATOT	139
C		STATOT	140
210	CONTINUE	STATOT	141
	RD(1)=VAVG(N)	STATOT	142
	RD(2)=VSTD(N)	STATOT	143
	I=2	STATOT	144
	GO TO 310	STATOT	145
C		STATOT	146
C	LOGNORMAL	STATOT	147
C		STATOT	148
220	CONTINUE	STATOT	149
	A=1.0D0	STATOT	150
	IF (ITYPE(N).EQ.3) A=BASEXP	STATOT	151
	B=0.0D0	STATOT	152
	DO 230 K=1,NSAMC	STATOT	153
	J=K+N3	STATOT	154
	B=B+DBLE(ALOG(VAR(J)))/A	STATOT	155
230	CONTINUE	STATOT	158
	RD(1)=SNGL(B)/FLOAT(NSAMC)	STATOT	157
	B=0.0D0	STATOT	158
	DO 240 K=1,NSAMC	STATOT	159
	J=K+N3	STATOT	160
	B=B+DBLE((ALOG(VAR(J))/A-RD(1))**2)	STATOT	161
240	CONTINUE	STATOT	162
	RD(2)=SQRT(SNGL(B)/FLOAT(NSAMC))	STATOT	163
	I=2	STATOT	164
	GO TO 310	STATOT	165
C		STATOT	166
C	LOGUNIFORM	STATOT	167
C		STATOT	168
250	CONTINUE	STATOT	169
	A=1.0D0	STATOT	170
	IF (ITYPE(N).EQ.5) A=BASEXP	STATOT	171
	RD(1)=ALOG(VAR(N1))/SNGL(A)	STATOT	172
	RD(2)=ALOG(VAR(N2))/SNGL(A)	STATOT	173
	I=2	STATOT	174
	GO TO 310	STATOT	175
C		STATOT	176
C	EXPONENTIAL	STATOT	177
C		STATOT	178
260	CONTINUE	STATOT	179
	RD(1)=VAVG(N)	STATOT	180
	RM(1)=1.0/PAR(N,1)	STATOT	181
	I=1	STATOT	182
	GO TO 310	STATOT	183

C		STATOT	184
C	UNIFORM	STATOT	185
C		STATOT	186
270	CONTINUE	STATOT	187
	J=NVLDC(N)	STATOT	188
	RD(1)=VAR(N1)	STATOT	189
	RD(2)=VAR(N2)	STATOT	190
	I=2	STATOT	191
	GO TO 310	STATOT	192
C		STATOT	193
C	BERNOULLI	STATOT	194
C		STATOT	195
280	CONTINUE	STATOT	196
	RM(1)=PAR(N,3)	STATOT	197
	IF ((VAR(N1).EQ.VAR(N2)).OR.(NSAMC.LT.2)) THEN	STATOT	198
	RD(1)=0.0	STATOT	199
	I=1	STATOT	200
	GO TO 310	STATOT	201
	ENDIF	STATOT	202
	A=VAR(N1)	STATOT	203
	K=0	STATOT	204
290	CONTINUE	STATOT	205
	K=K+1	STATOT	206
	J=N3+K	STATOT	207
	IF (A.GE.VAR(J)) GO TO 290	STATOT	208
	RD(1)=(FLOAT(K)-0.5)/FLOAT(NSAMC)	STATOT	209
	I=1	STATOT	210
	GO TO 310	STATOT	211
C		STATOT	212
C	CONSTANT	STATOT	213
C		STATOT	214
300	CONTINUE	STATOT	215
	RD(1)=VAR(N1)	STATOT	216
	I=1	STATOT	217
C		STATOT	218
310	CONTINUE	STATOT	219
	IF (I.GT.1) THEN	STATOT	220
	WRITE (III,540) VLABEL(N),ANS,RD(1),RD(2),RM(1),RM(2)	STATOT	221
	ELSE	STATOT	222
	WRITE (III,550) VLABEL(N),ANS,RD(1),RM(1)	STATOT	223
	ENDIF	STATOT	224
320	CONTINUE	STATOT	225
	IF (ISTAR.NE.0) WRITE (III,560)	STATOT	226
330	CONTINUE	STATOT	227
C		STATOT	228
C	OUTPUT VARIABLE STATISTICS	STATOT	229
C		STATOT	230
	IF (NSOLN.LT.1) GO TO 350	STATOT	231
	WRITE (III,570)	STATOT	232
	WRITE (III,510)	STATOT	233
	DO 340 N=1,NSOLN	STATOT	234
	WRITE (III,580) PLABEL(N)	STATOT	235
	WRITE (III,590) FMIN(N),FMAX(N),FAVG(N),FMED(N),FSTD(N),FSKW(N)	STATOT	236
340	CONTINUE	STATOT	237

350	CONTINUE	STATOT	238
C		STATOT	239
C	PRINT NUMBER OF RANDOM SAMPLES REJECTED DUE TO LIMITS	STATOT	240
C		STATOT	241
	IF (NVAR.LT.1) GO TO 420	STATOT	242
	DO 380 N=1,NVAR	STATOT	243
	IF (ILIM(N).EQ.0) GO TO 380	STATOT	244
	IF ((NLIM(N,1).EQ.0).AND.(NLIM(N,2).EQ.0)) GO TO 380	STATOT	245
	WRITE (IOUT,800) VLABEL(N)	STATOT	246
	IF (IDAT.NE.0) WRITE (IDAT,800) VLABEL(N)	STATOT	247
	IF (NLIM(N,1).EQ.0) GO TO 360	STATOT	248
	WRITE (IOUT,810) NLIM(N,1)	STATOT	249
	IF (IDAT.NE.0) WRITE (IDAT,810) NLIM(N,1)	STATOT	250
360	CONTINUE	STATOT	251
	IF (NLIM(N,2).EQ.0) GO TO 370	STATOT	252
	WRITE (IOUT,820) NLIM(N,2)	STATOT	253
	IF (IDAT.NE.0) WRITE (IDAT,820) NLIM(N,2)	STATOT	254
370	CONTINUE	STATOT	255
380	CONTINUE	STATOT	256
C		STATOT	257
C	STRATIFIED SAMPLING DIAGNOSTICS	STATOT	258
C		STATOT	259
	IF ((NLEVEL.LT.2).OR.(IDAT.EQ.0)) GO TO 410	STATOT	260
	WRITE (IDAT,830)	STATOT	261
	DO 400 N=1,NVAR	STATOT	262
	IF (ITYPE(N).EQ.NTYPE) GO TO 400	STATOT	263
	IF (ITYPE(N).EQ.10) GO TO 400	STATOT	264
	K=NLEVEL	STATOT	265
	IF (K.GT.10) K=10	STATOT	266
	WRITE (IDAT,840) VLABEL(N),(NPTSPL(I,N),I=1,K)	STATOT	267
	IF (K.EQ.NLEVEL) GO TO 400	STATOT	268
390	CONTINUE	STATOT	269
	J=K+1	STATOT	270
	K=K+10	STATOT	271
	IF (K.GT.NLEVEL) K=NLEVEL	STATOT	272
	WRITE (IDAT,850) (NPTSPL(I,N),I=J,K)	STATOT	273
	IF (K.LT.NLEVEL) GO TO 390	STATOT	274
400	CONTINUE	STATOT	275
410	CONTINUE	STATOT	276
C		STATOT	277
420	CONTINUE	STATOT	278
	RETURN	STATOT	279
500	FORMAT (//1X,'**--- SAMPLE DIAGNOSTICS, INPUT DISTRIBUTIONS')	STATOT	280
510	FORMAT (/T19,'MIN',T30,'MAX',T40,'MEAN',T51,'MEDIAN',T61,'STND DEV +',T72,'SKEWNESS')	STATOT	281
520	FORMAT (1X,A12,1X,1PE10.3,5(1X,E10.3))	STATOT	282
530	FORMAT (//1X,'**--- MAXIMUM LIKELIHOOD ESTIMATORS FOR INPUT DISTRI BUTIONS'/T24,'COMPUTED VALUES',T52,'EXPECTED VALUES'/3X,'VARIABLE' +',T20,'PARAMETER 1',T33,'PARAMETER 2',T48,'PARAMETER 1',T61,'PARAME TER 2')	STATOT	283
540	FORMAT (1X,A12,3X,A1,T20,1PE10.3,3X,E10.3,T48,E10.3,T61,E10.3)	STATOT	284
550	FORMAT (1X,A12,3X,A1,T20,1PE10.3,T48,E10.3)	STATOT	285
560	FORMAT (T33,'* INDICATES ENDPOINT LIMITING MAY MOVE THE '/T35,'DIS +TRIBUTION AWAY FROM THE EXPECTED VALUES.')	STATOT	286
		STATOT	287
		STATOT	288
		STATOT	289
		STATOT	290
		STATOT	291

570 FORMAT (//1X,'*--- SAMPLE DIAGNOSTICS, OUTPUT DISTRIBUTIONS')	STATOT	292
580 FORMAT (1X,A32)	STATOT	293
590 FORMAT (1X,13X,1PE10.3,5(1X,E10.3))	STATOT	294
600 FORMAT (//3X,'FOR THE DISTRIBUTION IN ',A12)	STATOT	295
610 FORMAT (3X,I6,' RANDOM SAMPLES WERE BELOW THE LOWER LIMIT, AND SET	STATOT	296
+ TO THAT LIMIT.')	STATOT	297
620 FORMAT (3X,I6,' RANDOM SAMPLES WERE ABOVE THE UPPER LIMIT, AND SET	STATOT	298
+ TO THAT LIMIT.')	STATOT	299
630 FORMAT (///7X,'STRATIFIED SAMPLING DIAGNOSTICS'//1X,'VARIABLE',17X	STATOT	300
+, 'NUMBER OF SAMPLES CHOSEN FROM EACH LEVEL')	STATOT	301
640 FORMAT (1X,A12,2X,10(1X,I5))	STATOT	302
650 FORMAT (15X,10(1X,I5))	STATOT	303
END	STATOT	304
SUBROUTINE STATS (N,RNDVAL,AMIN,AMAX,AMEAN,STDEV,SKEN)	STATS	2
C	STATS	3
C THIS ROUTINE COMPUTES THE MINIMUM, MAXIMUM, MEAN, STANDARD	STATS	4
C DEVIATION, AND SKEWNESS FOR THE DATA SET STORED IN VECTOR RNDVAL.	STATS	5
C	STATS	6
REAL*8	STATS	7
+ A,AVG,B,BSAM,C,CSAM,D,BASEXP	STATS	8
DIMENSION	STATS	9
+ RNDVAL(N)	STATS	10
DATA	STATS	11
+ BASEXP/2.303D0/	STATS	12
C	STATS	13
C	STATS	14
BSAM=DBLE(FLOAT(N))	STATS	15
CSAM=BSAM+1.0D0	STATS	16
C	STATS	17
AMEAN=RNDVAL(1)	STATS	18
STDEV=0.0	STATS	19
SKEN=0.0	STATS	20
IF (N.LE.1) GO TO 490	STATS	21
C	STATS	22
C COMPUTE AVERAGE, MIN AND MAX VALUE	STATS	23
C	STATS	24
AMAX=RNDVAL(1)	STATS	25
AMIN=AMAX	STATS	26
AVG=DBLE(AMAX)	STATS	27
DO 100 I=2,N	STATS	28
RV=RNDVAL(I)	STATS	29
AVG=AVG+DBLE(RV)	STATS	30
IF (RV.LT.AMIN) AMIN=RV	STATS	31
IF (RV.GT.AMAX) AMAX=RV	STATS	32
100 CONTINUE	STATS	33
AVG=AVG/BSAM	STATS	34
AMEAN=SNGL(AVG)	STATS	35
C	STATS	36
C COMPUTE STAND DEV AND SKEWNESS	STATS	37
C	STATS	38
B=0.0D0	STATS	39
C=0.0D0	STATS	40
DO 110 I=1,N	STATS	41
A=AVG-DBLE(RNDVAL(I))	STATS	42

B=B+A*A	STATS	43
C=C+A*A*A	STATS	44
110 CONTINUE	STATS	45
STDEV=SNGL(DSQRT(B/CSAM))	STATS	46
SKEW=SNGL((DABS(C/CSAM))*0.3333333D0)	STATS	47
IF (C.LT.0.0D0) SKEW=-SKEW	STATS	48
C	STATS	49
490 CONTINUE	STATS	50
RETURN	STATS	51
END	STATS	52
REAL FUNCTION U01(DSEED)	U01	2
C*	U01	3
C*	U01	4
C* PURPOSE:	U01	5
C*	U01	6
C* THIS FUNCTION GENERATES A REAL*4 RANDOM UNIFORM(0,1) VARIATE	U01	7
C* GIVEN AN INITIAL VALUE OF THE SEED, DSEED. THE INPUT SEED	U01	8
C* IS UPDATED TO A NEW SEED USING A LINEAR CONGRUENTIAL METHOD.	U01	9
C*	U01	10
C* CURRENT USAGE IS FOR THE PRIME 760, 32 BIT WORD LENGTH.	U01	11
C*	U01	12
C* DSEED = REAL*8 SEED FOR RANDOM NUMBER GENERATOR. MUST BE BETWEEN	U01	13
C* ONE AND TWO TO THE THIRTY FIRST POWER.	U01	14
C*	U01	15
C* REFERENCE:	U01	16
C*	U01	17
C* LEWIS, GOODMAN, AND MILLER (1969). "A PSEUDO-RANDOM NUMBER	U01	18
C* GENERATOR FOR THE SYSTEM/360" IBM SYSTEMS JOURNAL, VOL. 8,	U01	19
C* NO. 2, PP. 138-145.	U01	20
C*	U01	21
C*	U01	22
REAL*8 B, M, DSEED	U01	23
C	U01	24
DATA B / 16807.0D+00 /	U01	25
DATA M / 2147483647.0D+00 /	U01	26
C	U01	27
DSEED = DINT(DMOD(B*DSEED,M))	U01	28
C	U01	29
U01 = SNGL(DSEED/M)	U01	30
C	U01	31
RETURN	U01	32
END	U01	33
SUBROUTINE U01S (N,RNDVAL,DSEED,NLEVEL)	U01S	2
C	U01S	3
C THIS ROUTINE COMPUTES A VECTOR OF RANDOMLY GENERATED NUMBERS ON	U01S	4
C THE INTERVAL 0,1 , WITH STRATIFICATION. STRATIFICATION IS IGNORED	U01S	5
C IF ONLY ONE LEVEL IS REQUESTED.	U01S	6
C STRATIFICATION IS 'CHECKED', BUT NOT ACTED UPON UNTIL AT LEAST	U01S	7
C HALF OF THE CHOSEN LEVELS ARE FULL. THIS MAKES THE ROUTINE RUN	U01S	8
C MODERATELY FAST FOR THE MAJORITY OF THE TIME, SLOWING TO ENSURE	U01S	9
C STRATIFICATION ONLY ON THE LAST FEW DATA POINTS COLLECTED.	U01S	10
C	U01S	11
C DSEED = REAL*8 SEED FOR RANDOM NUMBER GENERATOR. MUST BE BETWEEN	U01S	12
C ONE AND TWO TO THE THIRTY FIRST POWER.	U01S	13

C	N	= THE NUMBER OF RANDOM VALUES TO GENERATE.	U01S	14
C	NLEVEL	= THE NUMBER OF LEVELS OF STRATIFICATION DESIRED.	U01S	15
C	RNDVAL	= THE RETURNED VECTOR OF RANDOM VALUES.	U01S	16
C			U01S	17
C	MAXLEV	= MAX LEVELS OF STRATIFICATION PERMITTED. A PARAMETER	U01S	18
C		SET IN COMMON BLOCK (INSERT) STRATI.	U01S	19
C	NFULL	= COUNTER OF THE NUMBER OF FILLED LEVELS.	U01S	20
C	NL	= LEVEL POINTER FOR STRATIFIED SAMPLING.	U01S	21
C	NLIMIT	= NUMBER OF POINTS PER LEVEL.	U01S	22
C		THIS IS DECREMENTED BY ONE WHEN NFULL REACHES THE	U01S	23
C		REMAINDER TERM MOD(N,NLEVEL) = NXCESS.	U01S	24
C	NSPL(NL)	= CURRENT NUMBER OF SAMPLE POINTS TAKEN FROM LEVEL NL.	U01S	25
C		AVAILABLE TO THE USER THROUGH COMMON BLOCK STRATI.	U01S	26
C	NXCESS	= NUMBER OF EXCESS POINTS TO BE DISTRIBUTED AMONG THE	U01S	27
C		NLEVEL STRATIFICATION LEVELS.	U01S	28
C			U01S	29
	\$INSERT *)COMMON)STRATI		U01S	30
C			U01S	31
	DOUBLE PRECISION		U01S	32
	+ DSEED		U01S	33
	DIMENSION		U01S	34
	+ RNDVAL(N)		U01S	35
C			U01S	36
C		CHECK USER INPUT, SET POINTERS	U01S	37
C			U01S	38
	IF ((DSEED.LT.2.0D0).OR.(DSEED.GT.2.0E+9)) DSEED=2.0E+6		U01S	39
	IF (NLEVEL.GT.MAXLEV) NLEVEL=MAXLEV		U01S	40
	IF (NLEVEL.GT.N) NLEVEL=N		U01S	41
	NLIMIT=N/NLEVEL		U01S	42
	NXCESS=MOD(N,NLEVEL)		U01S	43
	IF (NXCESS.GT.0) NLIMIT=NLIMIT+1		U01S	44
	NFULL=0		U01S	45
	DO 100 I=1,NLEVEL		U01S	46
	NSPL(I)=0		U01S	47
	100 CONTINUE		U01S	48
C			U01S	49
C		LOOP ON THE RANDOM NUMBERS TO GENERATE	U01S	50
C			U01S	51
	DO 100 I=1,N		U01S	52
	110 CONTINUE		U01S	53
	A=U01(DSEED)		U01S	54
	IF (NLEVEL.EQ.1) GO TO 170		U01S	55
C			U01S	56
C		IF OVER HALF OF THE LEVELS ARE FULL,	U01S	57
C		GO TO A DIFFERENT ALGORITHM	U01S	58
C			U01S	59
	IF (NFULL.GT.NLEVEL/2) GO TO 120		U01S	60
C			U01S	61
C		-----	U01S	62
C		FAST ALGORITHM. COMPUTE RANDOM NUMBER, AND CHECK IF	U01S	63
C		ITS LEVEL OF STRATIFICATION IS ALREADY FULL. GET NEW	U01S	64
C		RANDOM NUMBER IF THAT LEVEL IS FULL.	U01S	65
C			U01S	66
	NL=IFIX(A*FLOAT(NLEVEL))+1		U01S	67

IF (NSPL(NL).GE.NLIMIT) GO TO 110	U01S	88
C	U01S	89
C INCREMENT COUNTER AND SAVE VALUE	U01S	90
C	U01S	91
GO TO 150	U01S	92
C	U01S	93
C-----	U01S	94
C ***** ALGORITHM FOR OVER HALF THE LEVELS FULL *****	U01S	95
C	U01S	96
C SLOW ALGORITHM. RANDOMLY LOCATES AN EMPTY STRATIFICATION	U01S	97
C LEVEL AND FORCES NEW RANDOM NUMBER TO BE IN THAT LEVEL.	U01S	98
C	U01S	99
120 CONTINUE	U01S	100
C	U01S	101
C FIND A LEVEL AT RANDOM WHICH IS NOT FILLED	U01S	102
C	U01S	103
M=IFIX(A*FLOAT(NLEVEL-NFULL))+1	U01S	104
NL=0	U01S	105
DO 130 J=1,NLEVEL	U01S	106
K=J	U01S	107
IF (NSPL(J).LT.NLIMIT) NL=NL+1	U01S	108
IF (NL.EQ.M) GO TO 140	U01S	109
130 CONTINUE	U01S	110
STOP 'U01S'	U01S	111
140 CONTINUE	U01S	112
NL=K	U01S	113
C	U01S	114
C COMPUTE ENDPOINTS FOR THAT LEVEL AND	U01S	115
C FIND A RANDOM VALUE WITHIN THAT LEVEL.	U01S	116
C	U01S	117
B=FLOAT(NL-1)/FLOAT(NLEVEL)	U01S	118
T=FLOAT(NL)/FLOAT(NLEVEL)	U01S	119
A=B+U01(DSEED)*(T-B)	U01S	120
C-----	U01S	121
C	U01S	122
C INCREMENT # ITEMS IN CURRENT LEVEL, CURRENT VARIABLE	U01S	123
C	U01S	124
150 CONTINUE	U01S	125
NSPL(NL)=NSPL(NL)+1	U01S	126
C	U01S	127
C CHECK TO SEE IF # ITEMS THIS LEVEL HAS REACHED LIMIT	U01S	128
C	U01S	129
IF (NSPL(NL).LT.NLIMIT) GO TO 170	U01S	130
C	U01S	131
C INCREMENT # FULL LEVELS COUNTER	U01S	132
C	U01S	133
NFULL=NFULL+1	U01S	134
C	U01S	135
C IF # FULL LEVELS = NUMBER OF EXCESS LEVELS, MUST	U01S	136
C DECREMENT PERMISSABLE LEVEL SIZE, AND RE-COUNT	U01S	137
C THE NUMBER OF FULL LEVELS.	U01S	138
C	U01S	139
IF (NFULL.NE.NXCESS) GO TO 170	U01S	140
NLIMIT=NLIMIT-1	U01S	141

DO 100 J=1,NLEVEL	U01S	122
IF (NSPL(J).EQ.NLIMIT) NFULL=NFULL+1	U01S	123
100 CONTINUE	U01S	124
C	U01S	125
C SET THE RANDOM VARIABLE INTO THE OUTPUT ARRAY	U01S	126
C	U01S	127
170 CONTINUE	U01S	128
RNDVAL(I)=A	U01S	129
180 CONTINUE	U01S	130
RETURN	U01S	131
END	U01S	132
SUBROUTINE VARSET (IERR)	VARSET	2
C	VARSET	3
C THIS ROUTINE COMPUTES THE RANDOM INPUT VARIABLES VALUES FROM	VARSET	4
C THE SPECIFIED DISTRIBUTIONS.	VARSET	5
C	VARSET	6
C NOTE THE RANDOM DATA IS FIRST PLACED INTO ARRAY CONF BY THE	VARSET	7
C RANDOM NUMBER GENERATOR ROUTINES. THE DATA IS THEN MOVED INTO	VARSET	8
C THE STORAGE ARRAY VAR. THIS TECHNIQUE IS REQUIRED BY VIRTUAL	VARSET	9
C MEMORY COMPUTERS, TO ENSURE PROPER PAGING OF THE DATA, WHEN THE	VARSET	10
C PARAMETER ISIZE EXCEEDS THE PAGE SIZE.	VARSET	11
C	VARSET	12
\$INSERT *)COMMON>PPARA	VARSET	13
\$INSERT *)COMMON>PBLK1	VARSET	14
\$INSERT *)COMMON>PBLK6	VARSET	15
\$INSERT *)COMMON>PBLK8	VARSET	16
\$INSERT *)COMMON>PBLK17	VARSET	17
C	VARSET	18
C LOOP ON THE NUMBER OF VARIABLES	VARSET	19
C COMPUTE A RANDOM SAMPLE SET FOR EACH VARIABLE	VARSET	20
C	VARSET	21
IERR=0	VARSET	22
DO 110 N=1,NVAR	VARSET	23
CALL RMGS (IERR,N,NSAM,CONF)	VARSET	24
IF (IERR.NE.0) RETURN	VARSET	25
J=NVLOC(N)-1	VARSET	26
DO 100 I=1,NSAM	VARSET	27
K=I+J	VARSET	28
VAR(K)=CONF(I)	VARSET	29
100 CONTINUE	VARSET	30
110 CONTINUE	VARSET	31
RETURN	VARSET	32
END	VARSET	33
SUBROUTINE WHEADR (IFLO,IERR)	WHEADR	2
C	WHEADR	3
C THIS ROUTINE WRITES FILE HEADER RECORD(S) TO THE BINARY DATA	WHEADR	4
C FILES ASSOCIATED WITH THE MAGNUM AND CHAINT PROGRAMS. THE FIRST	WHEADR	5
C RECORD CONTAINS INFORMATION CONCERNING THE IDENTITY OF THE CURRENT	WHEADR	6
C FILE. THE SECOND RECORD, IF NEEDED, CONTAINS A BRIEF SUMMARY OF	WHEADR	7
C THE FILES WHICH WERE USED AS SOURCE DATA FOR THE RUN WHICH CREATED	WHEADR	8
C THE CURRENT FILE.	WHEADR	9
C	WHEADR	10
C--CONTROL DATA	WHEADR	11
C IFLO = OUTPUT FILE UNIT NUMBER	WHEADR	12

C	IERR = ERROR POINTER, = 0 FOR SUCCESSFUL HEADER WRITE	WHEADR	13
C		WHEADR	14
C	--HEADER RECORD INFORMATION	WHEADR	15
C	NSRC = NUMBER OF FILE TRACEBACK RECORDS	WHEADR	16
C	JRUNID = IDENTIFIER (DATE/TIME) OF SOURCE RUN	WHEADR	17
C	USRNAM = NAME OF USER WHO INITIATED SOURCE RUN (CHAR*8)	WHEADR	18
C	PRG = NAME OF SOURCE PROGRAM (CHAR*8)	WHEADR	19
C	FL = FILE TYPE NAME (CHAR*8)	WHEADR	20
C	VERNUM = VERSION NUMBER OF SOURCE PROGRAM	WHEADR	21
C	TITLE = TITLE FROM SOURCE RUN (CHAR*80)	WHEADR	22
C		WHEADR	23
C	--TRACEBACK RECORD INFORMATION (OMIT IF NSRC=0)	WHEADR	24
C	NRUNID(I) = IDENTIFIER OF INPUT FILE I	WHEADR	25
C	FLT(I) = FILE TYPE OF INPUT FILE I (CHAR*8)	WHEADR	26
C	PRGT(I) = SOURCE PROGRAM OF INPUT FILE I (CHAR*8)	WHEADR	27
C	USRNMT(I) = SOURCE PROGRAM USER (CHAR*8)	WHEADR	28
C		WHEADR	29
	\$INSERT SYSTEMS>UTIL>FEMLIB>COMMON>IDCOM	WHEADR	30
	\$INSERT SYSTEMS>UTIL>USRLIB>COMMON>INOUT	WHEADR	31
	IERR=0	WHEADR	32
	IF (NSRC.GT.MAXSRC) THEN	WHEADR	33
	WRITE (IOUT,500) NSRC,MAXSRC	WHEADR	34
	IERR=1	WHEADR	35
	RETURN	WHEADR	36
	ENDIF	WHEADR	37
C		WHEADR	38
C	INITIAL FILE HEADER	WHEADR	39
C		WHEADR	40
	WRITE (IFLD) NSRC,JRUNID,USRNAM,FL,PRG,VERNUM,(TITLE(I),I=1,20)	WHEADR	41
C		WHEADR	42
C	TRACEBACK HEADER	WHEADR	43
C		WHEADR	44
	IF (NSRC.GT.0) WRITE (IFLD) (NRUNID(I),FLT(I),PRGT(I),USRNMT(I),	WHEADR	45
	+ I=1,NSRC)	WHEADR	46
	RETURN	WHEADR	47
	500 FORMAT (/1X,'*** ERROR, ',15,' SOURCE FILES EXCEEDS PROGRAM MAXIMU	WHEADR	48
	+M OF ',13,'.'/5X,'ABORT IN ROUTINE WHEADR.')	WHEADR	49
	END	WHEADR	50
	SUBROUTINE WRSTOC (IDATB,IHEADR)	WRSTOC	2
C		WRSTOC	3
C	THIS ROUTINE WRITES THE BINARY FILE FOR PROGRAM PACSTAT. BOTH	WRSTOC	4
C	THE HEADER AND PACSTAT OUTPUT DATA ARE WRITTEN BY THIS CODE.	WRSTOC	5
C		WRSTOC	6
C	IDATB = BINARY FILE UNIT NUMBER	WRSTOC	7
C	IHEADR = 0 FOR DATA WRITE	WRSTOC	8
C	= 1 FOR HEADER WRITE	WRSTOC	9
C		WRSTOC	10
	\$INSERT *>COMMON>PPARA	WRSTOC	11
	\$INSERT *>COMMON>PBLK1	WRSTOC	12
	\$INSERT *>COMMON>PBLK2	WRSTOC	13
	\$INSERT *>COMMON>PBLK3	WRSTOC	14
	\$INSERT *>COMMON>PBLK4	WRSTOC	15
	\$INSERT *>COMMON>PBLK5	WRSTOC	16
	\$INSERT *>COMMON>PBLK7	WRSTOC	17

\$INSERT *)COMMON>PBLK8	WRSTOC	18
\$INSERT *)COMMON>PBLK16	WRSTOC	19
\$INSERT *)COMMON>PBLK17	WRSTOC	20
\$INSERT SYSTEMS>UTIL>FEMLIB>COMMON>IDCOM	WRSTOC	21
\$INSERT SYSTEMS>UTIL>USRLIB>COMMON>INOUT	WRSTOC	22
C	WRSTOC	23
C ERROR CHECK CALL PARAMETERS	WRSTOC	24
C	WRSTOC	25
IF ((IHEADR.LT.0).OR.(IHEADR.GT.1)) THEN	WRSTOC	26
WRITE (IOUT,500) IHEADR	WRSTOC	27
GO TO 110	WRSTOC	28
ENDIF	WRSTOC	29
IF (IDATB.LE.0) THEN	WRSTOC	30
WRITE (IOUT,510) IDATB	WRSTOC	31
GO TO 110	WRSTOC	32
ENDIF	WRSTOC	33
C	WRSTOC	34
C WRITE HEADER	WRSTOC	35
C	WRSTOC	36
IF (IHEADR.EQ.0) GO TO 100	WRSTOC	37
REWIND (IDATB)	WRSTOC	38
NSRC=0	WRSTOC	39
CALL WHEADR (IDATB,IERR)	WRSTOC	40
IF (IERR.NE.0) STOP	WRSTOC	41
I=0	WRSTOC	42
WRITE (IDATB) NSOLN,NVAR,NCONST,NTTL,NSTTL,I,I,I	WRSTOC	43
IF (NSOLN.GT.0) WRITE (IDATB) (PLABEL(I),I=1,NSOLN)	WRSTOC	44
IF (NVAR.GT.0) WRITE (IDATB) (VLABEL(I),VDIMEN(I),I=1,NVAR)	WRSTOC	45
IF (NCONST.GT.0) WRITE (IDATB) (CLABEL(I),CDIMEN(I),I=1,NCONST)	WRSTOC	46
RETURN	WRSTOC	47
C	WRSTOC	48
C WRITE FILE DATA	WRSTOC	49
C	WRSTOC	50
100 CONTINUE	WRSTOC	51
N1=NVAR*NSAM	WRSTOC	52
N2=NSOLN*NSAM	WRSTOC	53
I=0	WRSTOC	54
WRITE (IDATB) ICNT,NSAM,NSAMC,I,I,I	WRSTOC	55
IF (NCONST.GT.0) WRITE (IDATB) (CONST(I),I=1,NCONST)	WRSTOC	56
IF (NVAR.GT.0) THEN	WRSTOC	57
WRITE (IDATB) (ITYPE(I),PAR(I,1),PAR(I,2),PAR(I,3),I=1,NVAR)	WRSTOC	58
WRITE (IDATB) (VAR(I),I=1,N1)	WRSTOC	59
ENDIF	WRSTOC	60
IF (NSOLN.GT.0) WRITE (IDATB) (RLTS(I),I=1,N2)	WRSTOC	61
C	WRSTOC	62
RETURN	WRSTOC	63
C	WRSTOC	64
110 CONTINUE	WRSTOC	65
WRITE (IOUT,520)	WRSTOC	66
RETURN	WRSTOC	67
C	WRSTOC	68
500 FORMAT (/1X,'ERROR, BINARY FILE WRITE. IHEADR UNDEFINED, '=',I5)	WRSTOC	69
510 FORMAT (/1X,'ERROR, BINARY FILE WRITE. IDATB =',I5)	WRSTOC	70
520 FORMAT (1X,'ROUTINE WRSTOC.')	WRSTOC	71

END	WRSTOC	72
-----	WRSTOC	73
C	WRSTOC	74
SUBROUTINE XUDIST (N,RNDVAL,IUDIST,UDIST,VDIST)	XUDIST	2
C	XUDIST	3
C THIS ROUTINE TRANSFORMS A UNIFORM RANDOM DISTRIBUTION, ON THE	XUDIST	4
C INTERVAL 0,1 , TO A USER DEFINED DISTRIBUTION. THIS DISTRIBUTION	XUDIST	5
C IS DEFINED BY THE PIECEWISE LINEAR CUMULATIVE CONFIDENCE FUNCTION	XUDIST	6
C GIVEN BY DATA POINTS UDIST(I),VDIST(I).	XUDIST	7
C	XUDIST	8
C * WHILE INTENDED FOR USE WITH STOCHASTIC SIMULATORS, THIS *	XUDIST	9
C * ROUTINE IS NO MORE THAN A GENERAL PURPOSE INTERPOLATOR. *	XUDIST	10
C	XUDIST	11
C N = THE NUMBER OF DATA POINTS TO TRANSFORM.	XUDIST	12
C RNDVAL = ON INPUT, RNDVAL CONTAINS THE UNIFORMLY DISTRIBUTED DATA.	XUDIST	13
C = ON OUTPUT, RNDVAL CONTAINS THE TRANSFORMED RANDOM DATA.	XUDIST	14
C IUDIST = THE NUMBER OF DATA PAIRS IN THE ARRAYS UDIST AND VDIST.	XUDIST	15
C UDIST = THE OUTPUT DISTRIBUTION VALUE CORRESPONDING TO A GIVEN	XUDIST	16
C CONFIDENCE LEVEL.	XUDIST	17
C VDIST = THE CONFIDENCE VALUE CORRESPONDING TO A GIVEN VALUE OF	XUDIST	18
C THE OUTPUT DISTRIBUTION.	XUDIST	19
C	XUDIST	20
C NOTES:	XUDIST	21
C	XUDIST	22
C IF U .LT. UDIST(1) THEN FUDIST = VDIST(1)	XUDIST	23
C	XUDIST	24
C IF U .GT. UDIST(IUDIST) THEN FUDIST = VDIST(IUDIST)	XUDIST	25
C	XUDIST	26
C THAT IS, EXTREME VALUES ARE MOVED IN TO THE NEAREST POINT	XUDIST	27
C OF DEFINITION FOR THE DISTRIBUTION.	XUDIST	28
C	XUDIST	29
C DIMENSION	XUDIST	30
C + RNDVAL(N), UDIST(IUDIST), VDIST(IUDIST)	XUDIST	31
C	XUDIST	32
C DO 140 I=1,N	XUDIST	33
C U=RNDVAL(I)	XUDIST	34
C	XUDIST	35
C IF (U.GT.VDIST(1)) GO TO 100	XUDIST	36
C RNDVAL(I)=UDIST(1)	XUDIST	37
C GO TO 140	XUDIST	38
C 100 CONTINUE	XUDIST	39
C IF (U.LT.VDIST(IUDIST)) GO TO 110	XUDIST	40
C RNDVAL(I)=UDIST(IUDIST)	XUDIST	41
C GO TO 140	XUDIST	42
C 110 CONTINUE	XUDIST	43
C	XUDIST	44
C K=IUDIST-1	XUDIST	45
C DO 120 J=1,K	XUDIST	46
C IF ((VDIST(J).GT.U).OR.(VDIST(J+1).LE.U)) GO TO 120	XUDIST	47
C INDEX=J	XUDIST	48
C GO TO 130	XUDIST	49
C 120 CONTINUE	XUDIST	50
C 130 CONTINUE	XUDIST	51
C	XUDIST	52

DEL = (U-VDIST(INDEX)) / (VDIST(INDEX+1)-VDIST(INDEX))	XUDIST	.	53
RNDVAL(I) = UDIST(INDEX) + DEL*(UDIST(INDEX+1)-UDIST(INDEX))	XUDIST	.	54
140 CONTINUE	XUDIST	.	55
C	XUDIST	.	56
RETURN	XUDIST	.	57
END	XUDIST	.	58

APPENDIX C

PACSTAT_B4.FOR (FINAL BATCH VERSION,
FORTRAN SOURCE FILE)

FUNCTION ALNORM (X)	ALNORM	2
C	ALNORM	3
C ALGORITHM FROM APPL. STATIST. (1973) VOL. 22, NO. 3, PP 424-427.	ALNORM	4
C	ALNORM	5
C EVALUATES THE AREA UNDER A STANDARD NORMAL CURVE (MEAN = 0.0,	ALNORM	6
C STANDARD DEVIATION = 1.0), INTEGRATING FROM MINUS INFINITY TO X.	ALNORM	7
C A POLYNOMIAL METHOD IS USED.	ALNORM	8
C	ALNORM	9
REAL*8	ALNORM	10
+ A, Y, Z	ALNORM	11
LOGICAL	ALNORM	12
+ POSTIV	ALNORM	13
DATA	ALNORM	14
+ CON / 1.28 /,	ALNORM	15
+ UTZERO / 9.50 /	ALNORM	16
C	ALNORM	17
POSTIV=.TRUE.	ALNORM	18
IF (X.LT.0.0) POSTIV=.FALSE.	ALNORM	19
T = ABS(X)	ALNORM	20
Z = DBLE(T)	ALNORM	21
C	ALNORM	22
IF (T.LT.UTZERO) GO TO 100	ALNORM	23
ALNORM=0.0	ALNORM	24
GO TO 130	ALNORM	25
100 CONTINUE	ALNORM	26
Y=0.500*Z*Z	ALNORM	27
IF (T.GT.CON) GO TO 110	ALNORM	28
C	ALNORM	29
A = 0.500 - Z * (0.398942280444D0 - 0.399903438504D0 * Y /	ALNORM	30
+ (Y + 5.76885480458D0 - 29.8213557808D0 /	ALNORM	31
+ (Y + 2.62433121879D0 + 48.6959930692D0 /	ALNORM	32
+ (Y + 5.92885724438D0))))	ALNORM	33
GO TO 120	ALNORM	34
C	ALNORM	35
110 CONTINUE	ALNORM	36
A = 0.398942280385 * DEXP(-Y) /	ALNORM	37
+ (Z - 3.8052D-8 + 1.000000615302D0 /	ALNORM	38
+ (Z + 3.98064794D-4 + 1.98815381364D0 /	HEIDI3	9
+ (Z + 4.8385912808D0 - 15.1508972451D0 /	HEIDI3	10
+ (Z + 4.8385912808D0 + 15.1508972451D0 /	ALNORM	41
+ (Z + 0.742380924027D0 + 30.789933034D0 /	ALNORM	42
+ (Z + 3.99019417011D0))))))	ALNORM	43
C	ALNORM	44
120 CONTINUE	ALNORM	45
ALNORM = SNGL(A)	ALNORM	46
130 CONTINUE	ALNORM	47
IF (POSTIV) ALNORM = 1.0-ALNORM	ALNORM	48
RETURN	ALNORM	49
END	ALNORM	50
SUBROUTINE ASG (ITYP,IERR,IFIL,NLEN,INF)	ASG	2
C	ASG	3
C ROUTINE FOR INTERACTIVE ASSIGNMENT OF FILES ON PRIME	ASG	4
C INPUT IS ITYP = 1 FOR WRITE FILE, 0 FOR READ ONLY	ASG	5
C = OTHER FOR READ/WRITE FILE (MUST BE EXISTING FILE)	ASG	6

C	IERR = ERROR RETURN FLAG	ASG	7
C	IFIL = UNIT NUMBER TO USE	ASG	8
C	NLEN = DIMENSION OF INF	ASG	9
C	INF = NAME OF INPUT FILE (CHAR*4, DIMENSION = NLEN)	ASG	10
C		ASG	11
C	DESIGNED FOR PRIME 250 AND 750. FUNITS 1-4, 40-42, 51,	ASG	12
C	55 AND UNITS 21-28 ARE COMMITTED ON THESE MACHINES.	ASG	13
C		ASG	14
	COMMON /INDUT/	INDUT	2
	+ IN, IOUT, IQB, IECHO	ECHO	88
	CHARACTER*1	INDUT	4
	+ IQB	INDUT	5
C		INDUT	6
C		INDUT	7
C		ASG	10
C	PRIME - \$INSERT SYSCOM>ASKEYS	ASG	17
	LOGICAL LOGIC	ASG	18
	CHARACTER*1	ASG	19
	+ ANS	ASG	20
	CHARACTER*4	ASG	21
	+ INF(NLEN)	ASG	22
	IERR=0	ASG	23
C		ASG	24
C	CHECK FOR FILE ALREADY OPEN ON THIS UNIT NUMBER	ASG	25
C		ASG	26
	REWIND (IFIL,ERR=100)	ASG	27
	WRITE (IOUT,500) IFIL,(INF(I),I=1,NLEN)	ASG	28
	GO TO 100	ASG	29
100	CONTINUE	ASG	30
	NML4=4*NLEN	ASG	31
C		ASG	32
C	CHECK FOR ALLOWABLE UNIT NUMBER. SET PRIME OFFSET.	ASG	33
C		ASG	34
	IF (IFIL.LE.4) GO TO 110	ASG	35
	IF ((IFIL.GE.21).AND.(IFIL.LE.28)) GO TO 110	ASG	36
	IF ((IFIL.GE.40).AND.(IFIL.LE.42)) GO TO 110	ASG	37
	IF ((IFIL.EQ.51).OR.(IFIL.EQ.55)) GO TO 110	ASG	38
	IF (IFIL.GT.127) GO TO 110	ASG	39
	GO TO 120	ASG	40
110	CONTINUE	ASG	41
	WRITE (IOUT,510) IFIL	ASG	42
120	CONTINUE	ASG	43
	IF (IFIL.LT.21) THEN	ASG	44
	IFUNIT=IFIL-4	ASG	45
	ELSE	ASG	46
	IFUNIT=IFIL-12	ASG	47
	ENDIF	ASG	48
C		ASG	49
C	CHECK TO SEE IF FILE ALREADY EXISTS	ASG	50
C		ASG	51
	130 CONTINUE	ASG	52
C	LOGIC = EXST\$A (INF,INTS(NML4))	ASG	53
C		ASG	54
C	READ ONLY OR READ/WRITE FILE	ASG	55

C	FILE MUST ALREADY EXIST	ASG	56
C		ASG	57
	IF (ITYP.NE.1) THEN	ASG	58
	IF (.NOT.LOGIC) THEN	ASG	59
140	CONTINUE	ASG	60
	WRITE (IOUT,520) (INF(I),I=1,NLEN)	ASG	61
	WRITE (IOUT,530)	ASG	62
	READ (IN,540) ANS	ASG	63
	WRITE (IECHO,540) ANS	ECHO	26
	IF ((ANS.NE.'Y').AND.(ANS.NE.'N')) THEN	ASG	64
	IF ((ANS.NE.'y').AND.(ANS.NE.'n')) GO TO 140	ASG	65
	ENDIF	ASG	66
	IF ((ANS.EQ.'Y').OR.(ANS.EQ.'y')) THEN	ASG	67
	WRITE (IOUT,550) IQB	ASG	68
	READ (IN,560) (INF(I),I=1,NLEN)	ASG	69
	WRITE (IECHO,550) (INF(I),I=1,NLEN)	ECHO	27
	GO TO 130	ASG	70
	ELSE	ASG	71
	GO TO 180	ASG	72
	ENDIF	ASG	73
	ELSE	ASG	74
	IF (ITYP.EQ.0) THEN	ASG	75
C	LOGIC = OPENS(A\$READ+A\$SAMP,INF,INTS(NML4),INTS(IFUNIT))	ASG	76
	ELSE	ASG	77
C	LOGIC = OPENS(A\$RDWR+A\$SAMP,INF,INTS(NML4),INTS(IFUNIT))	ASG	78
	ENDIF	ASG	79
	ENDIF	ASG	80
	ELSE	ASG	81
C		ASG	82
C	WRITE ONLY FILE. CHECK WITH USER BEFORE	ASG	83
C	DELETING AN EXISTING FILE.	ASG	84
C		ASG	85
	IF (LOGIC) THEN	ASG	86
150	CONTINUE	ASG	87
	WRITE (IOUT,570) (INF(I),I=1,NLEN)	ASG	88
	WRITE (IOUT,580) IQB	ASG	89
	READ (IN,540) ANS	ASG	90
	WRITE (IECHO,540) ANS	ECHO	28
	IF ((ANS.NE.'Y').AND.(ANS.NE.'N')) THEN	ASG	91
	IF ((ANS.NE.'y').AND.(ANS.NE.'n')) GO TO 150	ASG	92
	ENDIF	ASG	93
	IF ((ANS.EQ.'N').OR.(ANS.EQ.'n')) THEN	ASG	94
160	CONTINUE	ASG	95
	WRITE (IOUT,530) IQB	ASG	96
	READ (IN,540) ANS	ASG	97
	WRITE (IECHO,540) ANS	ECHO	29
	IF ((ANS.NE.'Y').AND.(ANS.NE.'N')) THEN	ASG	98
	IF ((ANS.NE.'y').AND.(ANS.NE.'n')) GO TO 160	ASG	99
	ENDIF	ASG	100
	IF ((ANS.EQ.'N').OR.(ANS.EQ.'n')) GO TO 180	ASG	101
	ANS='N'	ASG	102
	ENDIF	ASG	103
	IF ((ANS.EQ.'Y').OR.(ANS.EQ.'y')) THEN	ASG	104
C	LOGIC = DELES(A(INF,INTS(NML4)))	ASG	105

ELSE	ASG	106
WRITE (IOUT,550) IQB	ASG	107
READ (IN,560) (INF(I),I=1,NLEN)	ASG	108
WRITE (IECHO,560) (INF(I),I=1,NLEN)	ECHO	30
GO TO 130	ASG	109
ENDIF	ASG	110
ENDIF	ASG	111
C LOGIC= OPEN\$(A\$WRIT+ASAMF,INF,INTS(NML4),INTS(IFUNIT))	ASG	112
ENDIF	ASG	113
C	ASG	114
IF (LOGIC) RETURN	ASG	115
C	ASG	116
170 CONTINUE	ASG	117
WRITE (IOUT,590)	ASG	118
WRITE (IOUT,530) IQB	ASG	119
READ (IN,540) ANS	ASG	120
WRITE (IECHO,540)	ECHO	31
IF ((ANS.NE.'Y').AND.(ANS.NE.'N')) THEN	ASG	121
IF ((ANS.NE.'y').AND.(ANS.NE.'n')) GO TO 170	ASG	122
ENDIF	ASG	123
IF ((ANS.EQ.'N').OR.(ANS.EQ.'n')) GO TO 180	ASG	124
WRITE (IOUT,550) IQB	ASG	125
READ (IN,560) (INF(I),I=1,NLEN)	ASG	126
WRITE (IECHO,560) (INF(I),I=1,NLEN)	ECHO	32
GO TO 130	ASG	127
C	ASG	128
180 CONTINUE	ASG	129
WRITE (IOUT,600)	ASG	130
IERR=1	ASG	131
RETURN	ASG	132
C	ASG	133
500 FORMAT (/1X,'FILE UNIT ',I5,' IS ALREADY ASSIGNED TO AN OPEN FILE.	ASG	134
+ '/1X,'ATTEMPT TO ASSIGN FILE ',20A4)	ASG	135
510 FORMAT (/1X,'FILE UNIT',I5,' IS IN POSSIBLE CONFLICT WITH PRIME SY	ASG	136
+TEM UNITS'/)	ASG	137
520 FORMAT (/1X,'UNABLE TO LOCATE FILE ',20A4)	ASG	138
530 FORMAT (1X,'DO YOU WISH TO TRY AGAIN (Y/N)? ',A1)	ASG	139
540 FORMAT (A1)	ASG	140
550 FORMAT (1X,'ENTER FILE NAME ',A1)	ASG	141
560 FORMAT (20A4)	ASG	142
570 FORMAT (1X,'FILE ',20A4)	ASG	143
580 FORMAT (1X,'ALREADY EXISTS. ALL RIGHT TO DELETE (Y/N)? ',A1)	ASG	144
590 FORMAT (/1X,'FILE ASSIGNMENT UNSUCCESSFUL.')	ASG	145
600 FORMAT (1X,'PROGRAM ABORTED IN ROUTINE ASG.')	ASG	146
END	ASG	147
SUBROUTINE ASGVAX (NLEN,INF,IFLAG)	ECHO	33
C	ASGVAX	3
C THIS IS A SUBROUTINE THAT TAKES THE PLACE OF SUBROUTINE ASG	ASGVAX	4
C IN THE PRIME VERSION. IT BASICALLY OPENS NECESSARY FILES	ASGVAX	5
C TO READ AND WRITE AND SETS VARIABLE MODETYP WHICH DENOTES	ASGVAX	6
C WHETHER YOU WANT TO RUN IN BATCH OR INTERACTIVE MODE.	ASGVAX	7
C IT SHOULD TO BE NOTED THAT THIS ROUTINE IS ONLY TO BE USED ON	ASGVAX	8
C VAX SYSTEMS. AUTHOR: C.L. BARTLEY	ASGVAX	9
C	ASGVAX	10

COMMON /INOUT/	INOUT	2
+ IN, IOUT, IQB, IECHO	ECHO	86
CHARACTER*1	INOUT	4
+ IQB	INOUT	5
C	INOUT	6
C	INOUT	7
C	ASQVAX	12
CHARACTER *4 INF(NLEN)	ECHO	34
CHARACTER *40 FNAME	ECHO	35
DATA MODETYP /.FALSE./	BATCH	14
C	ASQVAX	14
LOGICAL MODETYP	ASQVAX	15
C	ASQVAX	16
WRITE(FNAME,100) (INF(I),I=1,NLEN)	ECHO	36
100 FORMAT(10A4)	ECHO	37
C	ECHO	38
C OPEN DATA ECHO FILE	ECHO	39
C	ECHO	40
C	ECHO	41
IF (IFLAG .EQ. 0) GO TO 500	ECHO	42
C	ECHO	43
IF (INF(1) .EQ. ' ') OPEN (UNIT=7,	ECHO	44
1 FILE = 'PACSTAT.ECH',TYPE='NEW',DISPOSE='SAVE')	ECHO	45
C	ECHO	46
IF (INF(1) .NE. ' ') OPEN (UNIT=7,	ECHO	47
1 FILE = FNAME,TYPE='NEW',DISPOSE='SAVE')	ECHO	48
C	ECHO	49
IF (IFLAG .EQ. 1) GO TO 1000	ECHO	50
C	ASQVAX	17
C UNITS 12 AND 13 NEED TO BE OPENED FOR BOTH MODES	ASQVAX	18
C	ASQVAX	19
500 CONTINUE	ECHO	51
OPEN (UNIT=12,FILE='PACSTAT.OUT',TYPE='NEW',	ASQVAX	20
1 DISPOSE='SAVE')	ASQVAX	21
C	ASQVAX	22
OPEN (UNIT=13,FILE='PACSTAT.BIN',TYPE='UNKNOWN',	ASQVAX	23
1 DISPOSE='SAVE',FORM='UNFORMATTED')	ASQVAX	24
C	ASQVAX	25
C IF MODETYP IS SET TO TRUE, THIS WILL BE AN INTERACTIVE RUN	ASQVAX	26
C	ASQVAX	27
IF (MODETYP) GO TO 1000	ASQVAX	28
C	ASQVAX	29
OPEN (UNIT=5,FILE='PACSTAT.INP',STATUS='OLD',READONLY)	ASQVAX	30
C	ASQVAX	31
1000 CONTINUE	ASQVAX	32
C	ASQVAX	33
IN = 5	ASQVAX	34
IOUT = 6	ASQVAX	35
IECHO = 7	ECHO	52
IDAT = 12	ASQVAX	36
IDATB = 13	ASQVAX	37
INFIL = 35	ASQVAX	38
IFLAG = IFLAG + 1	ECHO	53
C	ASQVAX	39

RETURN	ASGVAX	40
END	ASGVAX	41
SUBROUTINE BERNLI (N,RNDVAL,RP1)	BERNLI	2
C	BERNLI	3
C ROUTINE FOR TRANSFORMING A UNIFORMLY DISTRIBUTED DATA SET ON THE	BERNLI	4
C INTERVAL 0,1 TO A BERNOULLI DISTRIBUTED DATA SET. INPUT VALUES	BERNLI	5
C BECOME 0 IF THEY ARE LESS THAN RP1, AND 1 IF THEY ARE GREATER THAN	BERNLI	6
C RP1.	BERNLI	7
C	BERNLI	8
C N = NUMBER OF VALUES IN VECTOR RNDVAL.	BERNLI	9
C RNDVAL = ON INPUT, VECTOR OF UNIFORMLY DISTRIBUTED VALUES.	BERNLI	10
C ON OUTPUT, VECTOR OF BERNOULLI DISTRIBUTED VALUES.	BERNLI	11
C RP1 = PROBABILITY OF THE ZERO STATE OCCURRING.	BERNLI	12
C	BERNLI	13
DIMENSION	BERNLI	14
+ RNDVAL(N)	BERNLI	15
C	BERNLI	16
BERNOULLI DISTRIBUTION	BERNLI	17
C	BERNLI	18
DO 100 I=1,N	BERNLI	19
RV=1.	BERNLI	20
IF (RNDVAL(I).LT.RP1) RV=0.	BERNLI	21
RNDVAL(I)=RV	BERNLI	22
100 CONTINUE	BERNLI	23
RETURN	BERNLI	24
END	BERNLI	25
BLOCK DATA BLKDAT	BLKDAT	2
C	BLKDAT	3
C THIS BLOCK DATA CONTAINS THE PROBLEM DEFINITION FOR A PACSTAT	BLKDAT	4
C MONTE CARLO SIMULTAION RUN.	BLKDAT	5
C	BLKDAT	6
C THIS SAMPLE PROBLEM MODELS THE MASS STORAGE AND RELEASE RATE	BLKDAT	7
C (STEADY STATE) OF A CONTAMINANT, WHICH IS DIFFUSING INTO A BOUNDARY	BLKDAT	8
C LAYER AWAY FROM A SOLUBILITY LIMITED SOURCE. OUTSIDE THE BOUNDARY	BLKDAT	9
C LAYER, CONVECTION IS ASSUMED TO REMOVE THE CONTAMINANT AT A FAST	BLKDAT	10
C RATE. THE MODEL IS ONE DIMENSIONAL, CARTESIAN DIFFUSION, AND	BLKDAT	11
C OUTPUT VALUES ARE 'PER SQUARE METER' OF SOURCE ZONE.	BLKDAT	12
C	BLKDAT	13
PARAMETER ISIZE = 50000 ! MAX DATA SET SIZE	PPARA	2
PARAMETER MAXCNT = 10 ! MAX NUMBER OF CONSTANTS	PPARA	3
PARAMETER MAXDST = 100 ! MAX NUMBER OF INPUT DATA POINTS	PPARA	4
PARAMETER MAXLVS = 100 ! MAX LEVELS FOR STRATIFIED SAMPLING	PPARA	5
PARAMETER MAXNS = 10000 ! MAX NUMBER OF SAMPLES	PPARA	6
PARAMETER MAXSOL = 10 ! MAX NUMBER OF SOLUTIONS	PPARA	7
PARAMETER MAXVAR = 25 ! MAX NUMBER OF INPUT VARIABLES	PPARA	8
PARAMETER NMLEN = 10 ! FILE NAME LENGTH	PPARA	9
PARAMETER NTYPE = 11 ! NUMBER OF DISTRIBUTION TYPES	PPARA	10
C	PPARA	11
C	PPARA	12
COMMON /PBLK1/	PBLK1	2
+ NCONST, NSOLN, NVAR	PBLK1	3
C	PBLK1	4
C	PBLK1	5
COMMON /PBLK2/	PBLK2	2

+ NSTTL,	NTTL,	STITLE,	PBLK2	3
+ TTLE			PBLK2	4
CHARACTER*40			PBLK2	5
+ STITLE,	TTLE		PBLK2	6
C			PBLK2	7
C			PBLK2	8
COMMON /PBLK3/			PBLK3	2
+ CDIMEN(MAXCNT),	CLABEL(MAXCNT),	PLABEL(MAXSOL),	PBLK3	3
+ VDIMEN(MAXVAR),	VLABEL(MAXVAR)		PBLK3	4
CHARACTER*12			PBLK3	5
+ CDIMEN,	CLABEL,	VDIMEN,	PBLK3	6
+ VLABEL			PBLK3	7
CHARACTER*32			PBLK3	8
+ PLABEL			PBLK3	9
C			PBLK3	10
C			PBLK3	11
PARAMETER MAXSRC=15			IDCOM	2
COMMON /IDCOM/			IDCOM	3
+ JRUNID,	FL,	FLT(MAXSRC),	IDCOM	4
+ NRUNID(MAXSRC),	NSRC,	PRG,	IDCOM	5
+ PRGT(MAXSRC),	TITLE(20),	USRNAM,	IDCOM	6
+ USRNMT(MAXSRC),	VERNUM		IDCOM	7
CHARACTER*4			IDCOM	8
+ TITLE			IDCOM	9
CHARACTER*8			IDCOM	10
+ FL,	FLT,	PRG,	IDCOM	11
+ PRGT,	USRNAM,	USRNMT	IDCOM	12
C			IDCOM	13
C			IDCOM	14
C - PRIME - \$INSERT SYSTEMS>UTIL>PACSTAT>COMMON>PPARA			BLKDAT	19
C - PRIME - \$INSERT SYSTEMS>UTIL>PACSTAT>COMMON>PBLK1			BLKDAT	20
C - PRIME - \$INSERT SYSTEMS>UTIL>PACSTAT>COMMON>PBLK2			BLKDAT	21
C - PRIME - \$INSERT SYSTEMS>UTIL>PACSTAT>COMMON>PBLK3			BLKDAT	22
C - PRIME - \$INSERT SYSTEMS>UTIL>PACSTAT>COMMON>IDCOM			BLKDAT	23
C			BLKDAT	24
C SET THE PROGRAM NAME AND VERSION NUMBER			BLKDAT	25
C			BLKDAT	26
DATA			BLKDAT	27
+ PRG/'DIF-STAT',	VERNUM/1.0/		BLKDAT	28
C			BLKDAT	29
C SET THE PROBLEM TITLE			BLKDAT	30
C			BLKDAT	31
DATA			BLKDAT	32
+ TTLE/'MASS STORAGE AND RELEASE RATE INTO LAYER'/			BLKDAT	33
C			BLKDAT	34
C SET NUMBER OF SOLUTIONS AND THE PLOTTING LABEL			BLKDAT	35
C FOR THE OUTPUT VARIABLE FOR EACH SOLUTION.			BLKDAT	36
C			BLKDAT	37
DATA			BLKDAT	38
+ NSOLN/2/			BLKDAT	39
DATA			BLKDAT	40
+ PLABEL(1)/'MASS STORAGE IN LAYER, GM/M**2 '/,			BLKDAT	41
+ PLABEL(2)/'REL RATE (S.S.), GM/M**3-YR '/			BLKDAT	42
C			BLKDAT	43

C	SET THE NUMBER OF INPUT VARIABLES AND	BLKDAT	44
C	THEIR NAMES, CHARACTER*12.	BLKDAT	45
C		BLKDAT	46
	DATA	BLKDAT	47
	+ NVAR/4/	BLKDAT	48
	DATA	BLKDAT	49
	+ VLABEL(1)/'MOLEC DIFFSV'/, VLABEL(2)/'RETARDATION '/,	BLKDAT	50
	+ VLABEL(3)/'LAYER WIDTH '/, VLABEL(4)/'SOLUBILITY '/	BLKDAT	51
C		BLKDAT	52
C	SET THE UNITS FOR THE INPUT VARIABLES, CHARACTER*12	BLKDAT	53
C		BLKDAT	54
	DATA	BLKDAT	55
	+ VDIMEN(1)/'MET**2/YEAR '/, VDIMEN(2)/'UNITLESS '/,	BLKDAT	56
	+ VDIMEN(3)/'METERS '/, VDIMEN(4)/'GM/MET**3 '/	BLKDAT	57
C		BLKDAT	58
C	SET THE NUMBER OF PROBLEM CONSTANTS AND	BLKDAT	59
C	THE NAME AND UNITS FOR EACH CONSTANT.	BLKDAT	60
C		BLKDAT	61
	DATA	BLKDAT	62
	+ NCONST/2/	BLKDAT	63
	DATA	BLKDAT	64
	+ CLABEL(1)/'HALF LIFE '/,	BLKDAT	65
	+ CLABEL(2)/'POROSITY '/	BLKDAT	66
	DATA	BLKDAT	67
	+ CDIMEN(1)/'YEARS '/,	BLKDAT	68
	+ CDIMEN(2)/'UNITLESS '/	BLKDAT	69
C		BLKDAT	70
	END	BLKDAT	71
	SUBROUTINE DATOUT (JONCE)	DATOUT	2
C		DATOUT	3
C	THIS ROUTINE CONTROLS THE PRINTING AND PLOTTING OF THE PACSTAT	DATOUT	4
C	OUTPUT (RESULTS) DATA.	DATOUT	5
C		DATOUT	6
C	JONCE IS A POINTER WHICH INDICATES IF THE DISSPLA PLOTTING	DATOUT	7
C	PROCESSORS ARE EVER CALLED.	DATOUT	8
C		DATOUT	9
	PARAMETER ISIZE = 50000 ! MAX DATA SET SIZE	Ppara	2
	PARAMETER MAXCNT = 10 ! MAX NUMBER OF CONSTANTS	Ppara	3
	PARAMETER MAXDST = 100 ! MAX NUMBER OF INPUT DATA POINTS	Ppara	4
	PARAMETER MAXLVS = 100 ! MAX LEVELS FOR STRATIFIED SAMPLING	Ppara	5
	PARAMETER MAXNS = 10000 ! MAX NUMBER OF SAMPLES	Ppara	6
	PARAMETER MAXSOL = 10 ! MAX NUMBER OF SOLUTIONS	Ppara	7
	PARAMETER MAXVAR = 25 ! MAX NUMBER OF INPUT VARIABLES	Ppara	8
	PARAMETER NMLEN = 10 ! FILE NAME LENGTH	Ppara	9
	PARAMETER NTYPE = 11 ! NUMBER OF DISTRIBUTION TYPES	Ppara	10
C		Ppara	11
C		Ppara	12
	COMMON /PBLK1/	PBLK1	2
	+ NCONST, NSOLN, NVAR	PBLK1	3
C		PBLK1	4
C		PBLK1	5
	COMMON /PBLK3/	PBLK3	2
	+ CDIMEN(MAXCNT), CLABEL(MAXCNT), PLABEL(MAXSOL),	PBLK3	3
	+ VDIMEN(MAXVAR), VLABEL(MAXVAR)	PBLK3	4

	CHARACTER*12			PBLK3	5
	+ CDIMEN,	CLABEL,	VDIMEN,	PBLK3	6
	+ VLABEL			PBLK3	7
	CHARACTER*32			PBLK3	8
	+ PLABEL			PBLK3	9
C				PBLK3	10
C				PBLK3	11
	COMMON /PBLK5/			PBLK5	2
	+ ICNT,	IDAT,	INDEX	PBLK5	3
C				PBLK5	4
C				PBLK5	5
	COMMON /PBLK6/			PBLK6	2
	+ CONF(MAXNS),	RPLT(MAXNS)		PBLK6	3
C				PBLK6	4
C				PBLK6	5
	COMMON /PBLK7A/			PBLK7A	2
	+ NSLOC(MAXSOL)			PBLK7A	3
C				PBLK7A	4
C				PBLK7A	5
	COMMON /PBLK7B/			PBLK7B	2
	+ RLTS(ISIZE)			PBLK7B	3
C				PBLK7B	4
C				PBLK7B	5
	COMMON /PBLK9/			PBLK9	2
	+ IRUN,	XL,	XL2,	PBLK9	3
	+ YL,	YL2		PBLK9	4
C				PBLK9	5
C				PBLK9	6
	COMMON /PBLK17/			PBLK17	2
	+ ICCD,	IQUIT,	ISOLN,	PBLK17	3
	+ IUPDAT,	MAXSAM,	NPRT,	PBLK17	4
	+ NSAM,	NSAMC		PBLK17	5
C				PBLK17	6
C				PBLK17	7
	COMMON /INDUT/			INDUT	2
	+ IN, IOUT, IQB, IECHO			ECHO	85
	CHARACTER*1			INDUT	4
	+ IQB			INDUT	5
C				INDUT	6
C				INDUT	7
C				DATOUT	20
	CHARACTER*1			DATOUT	21
	+ ANS			DATOUT	22
	CHARACTER*32			DATOUT	23
	+ NOPTN			DATOUT	24
	DATA			DATOUT	25
	+ NOPTN '/' - ENTER A NEW PRINT INTERVAL - '/'			DATOUT	26
C				DATOUT	27
	IF ((NSAMC.LT.NSAM).AND.(NPRT.GT.1)) THEN			DATOUT	28
	A=FLOAT(NPRT)/FLOAT(NSAM)			DATOUT	29
	NPRT=IFIX(0.5+FLOAT(NSAMC)*A)			DATOUT	30
	IF (NPRT.LT.1) NPRT=1			DATOUT	31
	ENDIF			DATOUT	32
C				DATOUT	33

C	SET CONFIDENCE LEVELS	DATOUT	34
C		DATOUT	35
	ICC=1	DATOUT	36
	C=FLOAT(NSAMC)	DATOUT	37
	DO 100 I=1,NSAMC	DATOUT	38
	CONF(I)=FLOAT(I)/C	DATOUT	39
	100 CONTINUE	DATOUT	40
C		DATOUT	41
C	ENTER SOLUTION TO CHOSE FROM	DATOUT	42
C		DATOUT	43
	110 CONTINUE	DATOUT	44
	WRITE (IOUT,500)	DATOUT	45
	WRITE (IOUT,510) (I,PLABEL(I),I=1,NSOLN)	DATOUT	46
	J=NSOLN+1	DATOUT	47
	WRITE (IOUT,510) J,NOPTN	DATOUT	48
	WRITE (IOUT,520) IQB	DATOUT	49
	READ (IN,*,ERR=110) ISOLN	DATOUT	50
	WRITE (IECHO,*) ISOLN	ECHO	54
	IF (ISOLN.EQ.0) RETURN	DATOUT	51
	IF (ISOLN.LT.1) GO TO 110	DATOUT	52
	IF (ISOLN.GT.NSOLN) THEN	DATOUT	53
	120 CONTINUE	DATOUT	54
	WRITE (IOUT,530) NPRT	DATOUT	55
	READ (IN,*,ERR=120) NPRT	DATOUT	56
	WRITE (IECHO,*) NPRT	ECHO	56
	IF (NPRT.LT.1) NPRT=1	DATOUT	57
	IF (NPRT.GT.NSAMC) NPRT=NSAMC	DATOUT	58
	GO TO 110	DATOUT	59
	ENDIF	DATOUT	60
C		DATOUT	61
C	PROMPT FOR PROBABILITY/COMPLEMENTARY PROBABILITY	DATOUT	62
C		DATOUT	63
	130 CONTINUE	DATOUT	64
	WRITE (IOUT,540)	DATOUT	65
	READ (IN,*,ERR=130) ICCD	DATOUT	66
	WRITE (IECHO,*) ICCD	ECHO	66
	IF ((ICCD.NE.1).AND.(ICCD.NE.2)) GO TO 130	DATOUT	67
C		DATOUT	68
C	TRANSFER SOLUTION TO PLOT/PRINT ARRAY	DATOUT	69
C		DATOUT	70
	IZE=0	DATOUT	71
	N=NSLOC(ISOLN)-1	DATOUT	72
	DO 140 I=1,NSAMC	DATOUT	73
	J=I+N	DATOUT	74
	RPLT(I)=RLTS(J)	DATOUT	75
	IF (RPLT(I).EQ.0.0) IZE=1	DATOUT	76
	140 CONTINUE	DATOUT	77
	IF (RPLT(1).LT.0.0) IZE=0	DATOUT	78
C		DATOUT	79
	IF (ICC.NE.ICCD) THEN	DATOUT	80
	A=CONF(1)	DATOUT	81
	IF (ICC.EQ.2) A=CONF(NSAMC)	DATOUT	82
	DO 150 I=1,NSAMC	DATOUT	83
	CONF(I)=1.0-CONF(I)+A	DATOUT	84

160	CONTINUE	DATOUT	85
	ICC=ICCD	DATOUT	86
	ENDIF	DATOUT	87
C		DATOUT	88
C	PRINT RESULTS	DATOUT	89
C		DATOUT	90
C	OUTPUT DATA TABLE HEADERS	DATOUT	91
C		DATOUT	92
	WRITE (IOUT,550) PLABEL(ISOLN)	DATOUT	93
	IF (IDAT.GT.0) WRITE (IDAT,550) PLABEL(ISOLN)	DATOUT	94
	IF (IZE.EQ.1) THEN	DATOUT	95
	WRITE (IOUT,560)	DATOUT	96
	IF (IDAT.GT.0) WRITE (IDAT,560)	DATOUT	97
	ENDIF	DATOUT	98
	IF (ICCD.EQ.2) THEN	DATOUT	99
	WRITE (IOUT,570)	DATOUT	100
	IF (IDAT.GT.0) WRITE (IDAT,570)	DATOUT	101
	ELSE	DATOUT	102
	WRITE (IOUT,580)	DATOUT	103
	IF (IDAT.GT.0) WRITE (IDAT,580)	DATOUT	104
	ENDIF	DATOUT	105
C		DATOUT	106
C	FIRST DATA POINT, IF NOT PRINTED BY DEFAULT	DATOUT	107
C		DATOUT	108
	NSTRT=NPRT	DATOUT	109
	IF (NPRT.GT.1) THEN	DATOUT	110
	WRITE (IOUT,590) 1,RPLT(1),CONF(1)	DATOUT	111
	IF (IDAT.GT.0) WRITE (IDAT,590) 1,RPLT(1),CONF(1)	DATOUT	112
	IF (ICCD.EQ.2) NSTRT=NSTRT+1	DATOUT	113
	ENDIF	DATOUT	114
C		DATOUT	115
C	PRINTING LOOP	DATOUT	116
C		DATOUT	117
	J=0	DATOUT	118
	K=0	DATOUT	119
	DO 160 I=NSTRT,NSAMC,NPRT	DATOUT	120
	J=I	DATOUT	121
	IF ((RPLT(I).EQ.0.0).AND.(IZE.GT.0)) GO TO 160	DATOUT	122
	WRITE (IOUT,590) I,RPLT(I),CONF(I)	DATOUT	123
	IF (IDAT.GT.0) WRITE (IDAT,590) I,RPLT(I),CONF(I)	DATOUT	124
	K=K+1	DATOUT	125
	160 CONTINUE	DATOUT	126
C		DATOUT	127
C	LAST DATA POINT, IF NOT PRINTED BY DEFAULT	DATOUT	128
C		DATOUT	129
	IF (J.NE.NSAMC) THEN	DATOUT	130
	WRITE (IOUT,590) NSAMC,RPLT(NSAMC),CONF(NSAMC)	DATOUT	131
	IF (IDAT.GT.0) WRITE (IDAT,590) NSAMC,RPLT(NSAMC),CONF(NSAMC)	DATOUT	132
	ENDIF	DATOUT	133
C		DATOUT	134
C	WARNING IF ALL DATA POINTS ARE ZERO	DATOUT	135
C		DATOUT	136
	IF (K.EQ.0) WRITE (IOUT,600) PLABEL(ISOLN)	DATOUT	137
C		DATOUT	138

C	PLOT RESULTS	DATOUT	139
C		DATOUT	140
	IF ((K.GT.0).AND.(NSAMC.GT.1)) THEN	DATOUT	141
170	CONTINUE	DATOUT	142
	WRITE (IOUT,610) IQB	DATOUT	143
	READ (IN,620) ANS	DATOUT	144
	WRITE (IECHO,620) ANS	ECHO	57
	IF ((ANS.NE.'Y').AND.(ANS.NE.'N')) THEN	DATOUT	145
	IF ((ANS.NE.'y').AND.(ANS.NE.'n')) GO TO 170	DATOUT	146
	ENDIF	DATOUT	147
	IF ((ANS.EQ.'Y').OR.(ANS.EQ.'y')) THEN	DATOUT	148
	IF (JONCE.EQ.0) THEN	DATOUT	149
	XL2=14.2	DATOUT	150
	YL2=10.1	DATOUT	151
	CALL PLINIT (XL2,YL2,IRUN)	DATOUT	152
	XL=XL2-2.2	DATOUT	153
	YL=YL2-2.8	DATOUT	154
	ENDIF	DATOUT	155
	CALL PPLT	DATOUT	156
	JONCE=1	DATOUT	157
	ENDIF	DATOUT	158
	ENDIF	DATOUT	159
	GO TO 110	DATOUT	160
C		DATOUT	161
500	FORMAT (/1X,'AVAILABLE VARIABLES ARE'/7X,'0) EXIT LIST')	DATOUT	162
510	FORMAT (3X,I5,' ') ',A32)	DATOUT	163
520	FORMAT (1X,'WHICH WOULD YOU LIKE (ENTER NUMBER)? ',A1)	DATOUT	164
530	FORMAT (1X,'THE CURRENT PRINT INTERVAL IS ',I5,'.'/1X,'ENTER THE D	DATOUT	165
	+ESIRED VALUE.')	DATOUT	166
540	FORMAT (/1X,'WHICH WOULD YOU LIKE'/3X,'1) CUMULATIVE PROBABILITY'/	DATOUT	167
	+3X,'2) COMPLEMENTARY CUMULATIVE PROBABILITY'/1X,'ENTER 1 OR 2')	DATOUT	168
550	FORMAT (///1X,'*--- OUTPUT CUMULATIVE PROBABILITIES'/7X,'FOR STO	DATOUT	169
	+CASTIC VARIABLE,' ',10X,A32)	DATOUT	170
560	FORMAT (/8X,'IN THE FOLLOWING TABLE, VALUES OF ZERO ARE OMITTED.')	DATOUT	171
570	FORMAT (/6X,'SAMPLE',6X,'VARIABLE',7X,'COMPLEMENTARY'/6X,'NUMBER'	DATOUT	172
	+,8X,'VALUE',10X,'CONFIDENCE')	DATOUT	173
580	FORMAT (/6X,'SAMPLE',6X,'VARIABLE',8X,'CUMULATIVE'/8X,'NUMBER',	DATOUT	174
	+8X,'VALUE',10X,'CONFIDENCE')	DATOUT	175
590	FORMAT (1X,I10,5X,G12.4,5X,F11.5)	DATOUT	176
600	FORMAT (/1X,'ALL COMPUTED VALUES ARE ZERO FOR ',A32)	DATOUT	177
610	FORMAT (/1X,'WOULD YOU LIKE THE DATA PLOTTED (Y/N)? ',A1)	DATOUT	178
620	FORMAT (A1)	DATOUT	179
	END	DATOUT	180
	SUBROUTINE DATSET (IERR)	DATSET	2
C		DATSET	3
C	THIS ROUTINE MOVES THE INPUT VARIABLES INTO ARRAY VINPT, AND	DATSET	4
C	CALLS THE SOLUTION ROUTINE SOLN (IF NEEDED) TO COMPUTE THE	DATSET	5
C	OUTPUT VALUES FOR EACH SAMPLE. THESE OUTPUT VALUES ARE MOVED	DATSET	6
C	INTO ARRAY RLTS FOR LATER PROCESSING.	DATSET	7
C		DATSET	8
	PARAMETER ISIZE = 50000 ! MAX DATA SET SIZE	PPARA	2
	PARAMETER MAXCNT = 10 ! MAX NUMBER OF CONSTANTS	PPARA	3
	PARAMETER MAXDST = 100 ! MAX NUMBER OF INPUT DATA POINTS	PPARA	4
	PARAMETER MAXLVS = 100 ! MAX LEVELS FOR STRATIFIED SAMPLING	PPARA	5

PARAMETER MAXNS = 10000	! MAX NUMBER OF SAMPLES	PPARA	6
PARAMETER MAXSOL = 10	! MAX NUMBER OF SOLUTIONS	PPARA	7
PARAMETER MAXVAR = 25	! MAX NUMBER OF INPUT VARIABLES	PPARA	8
PARAMETER NMLEN = 10	! FILE NAME LENGTH	PPARA	9
PARAMETER NTYPE = 11	! NUMBER OF DISTRIBUTION TYPES	PPARA	10
C		PPARA	11
C		PPARA	12
COMMON /PBLK1/		PBLK1	2
+ NCONST,	NSOLN,	NVAR	
C		PBLK1	3
C		PBLK1	4
C		PBLK1	5
COMMON /PBLK4/		PBLK4	2
+ CONST(MAXCNT),	VALU(MAXSOL),	VINPT(MAXVAR)	
C		PBLK4	3
C		PBLK4	4
C		PBLK4	5
COMMON /PBLK5/		PBLK5	2
+ ICNT,	IDAT,	INDEX	
C		PBLK5	3
C		PBLK5	4
C		PBLK5	5
COMMON /PBLK7A/		PBLK7A	2
+ NSLOC(MAXSOL)			
C		PBLK7A	3
C		PBLK7A	4
C		PBLK7A	5
COMMON /PBLK7B/		PBLK7B	2
+ RLTS(ISIZE)			
C		PBLK7B	3
C		PBLK7B	4
C		PBLK7B	5
COMMON /PBLK8A/		PBLK8A	2
+ NVLOC(MAXVAR)			
C		PBLK8A	3
C		PBLK8A	4
C		PBLK8A	5
COMMON /PBLK8B/		PBLK8B	2
+ VAR(ISIZE)			
C		PBLK8B	3
C		PBLK8B	4
C		PBLK8B	5
COMMON /PBLK12/		PBLK12	2
+ NERR(MAXNS),	NUMERR		
C		PBLK12	3
C		PBLK12	4
C		PBLK12	5
COMMON /PBLK17/		PBLK17	2
+ ICCD,	IQUIT,	ISOLN,	
+ IUPDAT,	MAXSAM,	NPRT,	
+ NSAM,	NSAMC		
C		PBLK17	3
C		PBLK17	4
C		PBLK17	5
C		PBLK17	8
C		PBLK17	7
C		DATSET	19
C		DATSET	20
IERR=0		DATSET	21
NUMERR=0		DATSET	22
DO 140 INDEX=1,NSAM		DATSET	23
NERR(INDEX)=0		DATSET	24
C		DATSET	25
C	SAVE INPUT VALUES IN ARRAY VINPT	DATSET	26
C		DATSET	27

DO 100 I=1,NVAR	DATSET	28
J=NVLOC(I)+INDEX-1	DATSET	29
VINPT(I)=VAR(J)	DATSET	30
100 CONTINUE	DATSET	31
C	DATSET	32
C SOLUTION ROUTINE CALLED ONCE WHEN NSOLN=0	DATSET	33
C	DATSET	34
IF (NSOLN.GT.0) GO TO 110	DATSET	35
IF (INDEX.EQ.1) CALL SOLN (IERR)	DATSET	36
GO TO 140	DATSET	37
110 CONTINUE	DATSET	38
C	DATSET	39
C COMPUTE OUTPUT VARIABLES	DATSET	40
C	DATSET	41
CALL SOLN (IERR)	DATSET	42
IF (IERR.EQ.0) GO TO 120	DATSET	43
IF (IQUIT.GT.0) GO TO 150	DATSET	44
NUMERR=NUMERR+1	DATSET	45
NERR(INDEX)=INDEX	DATSET	46
IERR=0	DATSET	47
120 CONTINUE	DATSET	48
C	DATSET	49
C SAVE VALUES IN OUTPUT ARRAY	DATSET	50
C	DATSET	51
DO 130 I=1,NSOLN	DATSET	52
J=NSLOC(I)+INDEX-1	DATSET	53
RLTS(J)=VALU(I)	DATSET	54
130 CONTINUE	DATSET	55
140 CONTINUE	DATSET	56
RETURN	DATSET	57
C	DATSET	58
150 CONTINUE	DATSET	59
IERR=1	DATSET	60
NSAM=INDEX-1	DATSET	61
RETURN	DATSET	62
END	DATSET	63
SUBROUTINE DCLAIM (IOUT)	DCLAIM	2
C	DCLAIM	3
C THIS ROUTINE PRINTS A VERIFICATION/BENCHMARKING DISCLAIMER TO	DCLAIM	4
C LOGICAL UNIT IOUT.	DCLAIM	5
C	DCLAIM	6
WRITE (IOUT,500)	DCLAIM	7
C	DCLAIM	8
RETURN	DCLAIM	9
500 FORMAT (/1X,'Results from this code are based on the use of unveri	DCLAIM	10
+fied'1x,'software and are not for use in license related applicat	DCLAIM	11
+ions.'/)	DCLAIM	12
END	DCLAIM	13
SUBROUTINE DEXPF (N,RNDVAL,RP1)	DEXPF	2
C	DEXPF	3
C ROUTINE FOR TRANSFORMING A UNIFORMLY DISTRIBUTED DATA SET ON THE	DEXPF	4
C INTERVAL 0,1 TO AN EXPONENTIALLY DISTRIBUTED DATA SET.	DEXPF	5
C	DEXPF	6
C N = THE NUMBER OF ITEMS IN THE DATA SET.	DEXPF	7

C	RNDVAL = VECTOR OF UNIFORMLY DISTRIBUTED VALUES ON INPUT. EACH	DEXPF	8
C	VALUE MUST BE BETWEEN ZERO AND ONE.	DEXPF	9
C	= VECTOR OF EXPONENTIALLY DISTRIBUTED VALUES ON OUTPUT.	DEXPF	10
C	RP1 = MEAN VALUE FOR THE EXPONENTIAL DISTRIBUTION.	DEXPF	11
C		DEXPF	12
	DIMENSION	DEXPF	13
	+ RNDVAL(N)	DEXPF	14
C		DEXPF	15
C	EXPONENTIAL DISTRIBUTION	DEXPF	16
C		DEXPF	17
	DO 100 I=1,N	DEXPF	18
	RV=1.0-RNDVAL(I)	DEXPF	19
	IF (RV.LT.1.0E-21) RV=1.0E-21	DEXPF	20
	RNDVAL(I)=-ALOG(RV)/RP1	DEXPF	21
	100 CONTINUE	DEXPF	22
	RETURN	DEXPF	23
	END	DEXPF	24
	SUBROUTINE DEXPFL (N,RNDVAL,RP1,AMIN,AMAX)	DEXPFL	2
C		DEXPFL	3
C	ROUTINE FOR TRANSFORMING A UNIFORMLY DISTRIBUTED DATA SET ON THE	DEXPFL	4
C	INTERVAL 0,1 TO AN EXPONENTIALLY DISTRIBUTED DATA SET, WITH THE	DEXPFL	5
C	CONSTRAINT THAT ALL OUTPUT VALUES LIE BETWEEN SPECIFIED LIMITS.	DEXPFL	6
C		DEXPFL	7
C	N = THE NUMBER OF ITEMS IN THE RANDOM VARIABLE VECTOR RNDVAL.	DEXPFL	8
C	RNDVAL = ON INPUT, A VECTOR OF N RANDOM VALUES, UNIFORMLY	DEXPFL	9
C	DISTRIBUTED, ON THE INTERVAL ZERO TO ONE.	DEXPFL	10
C	= ON OUTPUT, A VECTOR OF N RANDOM VALUES, EXPONENTIALLY	DEXPFL	11
C	DISTRIBUTED WITH 'MEAN' RP1, AND WITH VALUES BELOW AMIN	DEXPFL	12
C	AND ABOVE AMAX DELETED FROM THE DISTRIBUTION.	DEXPFL	13
C	RP1 = MEAN VALUE FOR THE DESIRED EXPONENTIAL DISTRIBUTION.	DEXPFL	14
C	AMIN = MINIMUM LIMIT VALUE FOR THE OUTPUT DISTRIBUTION.	DEXPFL	15
C	AMAX = MAXIMUM LIMIT VALUE FOR THE OUTPUT DISTRIBUTION.	DEXPFL	16
C		DEXPFL	17
C	UMIN,UMAX = LIMITS ON THE UNIFORM DISTRIBUTION. THESE ARE	DEXPFL	18
C	AVAILABLE TO THE USER THROUGH COMMON BLOCK ULIMITS.	DEXPFL	19
C		DEXPFL	20
	COMMON /ULIMITS/	ULIMITS	2
	+ UMAX, UMIN	ULIMITS	3
C		ULIMITS	4
C		DEXPFL	22
	DIMENSION	DEXPFL	23
	+ RNDVAL(N)	DEXPFL	24
	DATA	DEXPFL	25
	+ IONE/1/	DEXPFL	26
C		DEXPFL	27
	IF (RP1.LT.0.) RP1=ABS(RP1)	DEXPFL	28
	IF (AMIN.LE.AMAX) GO TO 100	DEXPFL	29
	WD=AMIN	DEXPFL	30
	AMIN=AMAX	DEXPFL	31
	AMAX=WD	DEXPFL	32
	100 CONTINUE	DEXPFL	33
	IF (AMIN.LT.AMAX) GO TO 110	DEXPFL	34
	AMIN=0.	DEXPFL	35
	AMAX=130.*RP1	DEXPFL	36

110 CONTINUE	DEXPFL	37
C	DEXPFL	38
C UNIFORM DISTRIBUTION LIMITS	DEXPFL	39
C	DEXPFL	40
UMIN=1.0-EXP(-RP1*AMIN)	DEXPFL	41
UMAX=1.0-EXP(-RP1*AMAX)	DEXPFL	42
RV=UMIN	DEXPFL	43
CALL DEXPF (IONE,RV,RP1)	DEXPFL	44
B=RV	DEXPFL	45
RV=UMAX	DEXPFL	46
CALL DEXPF (IONE,RV,RP1)	DEXPFL	47
T=RV	DEXPFL	48
IF (B.LE.T) GO TO 120	DEXPFL	49
UMIN=1.0-UMIN	DEXPFL	50
UMAX=1.0-UMAX	DEXPFL	51
120 CONTINUE	DEXPFL	52
C	DEXPFL	53
C ADJUST UNIFORM DISTRIBUTION TO NEW LIMITS	DEXPFL	54
C	DEXPFL	55
WD=UMAX-UMIN	DEXPFL	56
DO 130 I=1,N	DEXPFL	57
RNDVAL(I)=UMIN+RNDVAL(I)*WD	DEXPFL	58
130 CONTINUE	DEXPFL	59
C	DEXPFL	60
C COMPUTE EXPONENTIAL DISTRIBUTION	DEXPFL	61
C	DEXPFL	62
CALL DEXPF (N,RNDVAL,RP1)	DEXPFL	63
RETURN	DEXPFL	64
END	DEXPFL	65
FUNCTION DNORM (RNDVAL,RP1,RP2)	DNORM	2
C	DNORM	3
C ROUTINE FOR TRANSFORMING A SINGLE VALUE FROM A UNIFORMLY	DNORM	4
C DISTRIBUTED DATA SET ON THE INTERVAL 0,1 TO A SINGLE VALUE IN A	DNORM	5
C NORMALLY DISTRIBUTED DATA SET.	DNORM	6
C	DNORM	7
C A POLYNOMIAL METHOD IS USED.	DNORM	8
C REFERENCE ABRAMOWITZ & STEGUN, PAGE 933.	DNORM	9
C	DNORM	10
C RNDVAL = INPUT RANDOM VALUE BETWEEN 0 AND 1.	DNORM	11
C RP1 = MEAN VALUE FOR THE NORMAL DISTRIBUTION.	DNORM	12
C RP2 = STANDARD DEVIATION FOR THE NORMAL DISTRIBUTION.	DNORM	13
C	DNORM	14
LOGICAL	DNORM	15
* NEGTV	DNORM	16
DATA	DNORM	17
* C0,C1,C2/2.515517,0.802853,0.010328/	DNORM	18
DATA	DNORM	19
* D1,D2,D3/1.432788,0.189269,0.001308/	DNORM	20
C	DNORM	21
C NORMAL DISTRIBUTION	DNORM	22
C	DNORM	23
P=RNDVAL	DNORM	24
NEGTV=.TRUE.	DNORM	25
IF (P.LT.0.5) GO TO 100	DNORM	26

NEGTV=.FALSE.	DNORM	27
P=1.0-P	DNORM	28
100 CONTINUE	DNORM	29
IF (ABS(P).LT.1.0E-21) P=1.0E-21	DNORM	30
C	DNORM	31
T2=-2.0*ALOG(P)	DNORM	32
T1=SQRT(T2)	DNORM	33
T3=T1*T2	DNORM	34
C	DNORM	35
XP=ABS(T1-(C0+C1*T1+C2*T2)/(1.0+D1*T1+D2*T2+D3*T3))	DNORM	36
C	DNORM	37
IF (NEGTV) XP=-XP	DNORM	38
C	DNORM	39
DNORM=RP2*XP+RP1	DNORM	40
RETURN	DNORM	41
END	DNORM	42
SUBROUTINE EXPECT	EXPECT	2
C	EXPECT	3
C THIS ROUTINE COMPUTES THE EXPECTED MODE, MEAN, STANDARD	EXPECT	4
C DEVIATION, AND MEDIAN FOR EACH INPUT DISTRIBUTION.	EXPECT	5
C	EXPECT	6
C VINAVG = MEAN VALUES FOR THE INPUT DISTRIBUTIONS.	EXPECT	7
C VINMED = MEDIAN VALES FOR THE INPUT DISTRIBUTIONS.	EXPECT	8
C VINSTD = STANDARD DEVIATIONS FOR THE INPUT DISTRIBUTIONS.	EXPECT	9
C VINMOD = MODE OF INPUT DISTRIBUTION	EXPECT	10
C	EXPECT	11
PARAMETER ISIZE = 50000 ! MAX DATA SET SIZE	PPARA	2
PARAMETER MAXCNT = 10 ! MAX NUMBER OF CONSTANTS	PPARA	3
PARAMETER MAXOST = 100 ! MAX NUMBER OF INPUT DATA POINTS	PPARA	4
PARAMETER MAXLYS = 100 ! MAX LEVELS FOR STRATIFIED SAMPLING	PPARA	5
PARAMETER MAXNS = 10000 ! MAX NUMBER OF SAMPLES	PPARA	6
PARAMETER MAXSOL = 10 ! MAX NUMBER OF SOLUTIONS	PPARA	7
PARAMETER MAXVAR = 25 ! MAX NUMBER OF INPUT VARIABLES	PPARA	8
PARAMETER NMLEN = 10 ! FILE NAME LENGTH	PPARA	9
PARAMETER NTYPE = 11 ! NUMBER OF DISTRIBUTION TYPES	PPARA	10
C	PPARA	11
C	PPARA	12
COMMON /PBLK1/	PBLK1	2
+ NCONST, NSOLN, NVAR	PBLK1	3
C	PBLK1	4
C	PBLK1	5
COMMON /PBLK3/	PBLK3	2
+ CDIMEN(MAXCNT), CLABEL(MAXCNT), PLABEL(MAXSOL),	PBLK3	3
+ VDIMEN(MAXVAR), VLABEL(MAXVAR)	PBLK3	4
CHARACTER*12	PBLK3	5
+ CDIMEN, CLABEL, VDIMEN,	PBLK3	6
+ VLABEL	PBLK3	7
CHARACTER*32	PBLK3	8
+ PLABEL	PBLK3	9
C	PBLK3	10
C	PBLK3	11
COMMON /PBLK5/	PBLK5	2
+ ICNT, IDAT, INDEX	PBLK5	3
C	PBLK5	4

C	COMMON /PBLK11/	PBLK6	6
	+ VINAVG(MAXVAR), VINMED(MAXVAR), VINMOD(MAXVAR),	PBLK11	2
	+ VINSTD(MAXVAR)	PBLK11	3
C		PBLK11	4
C		PBLK11	5
	COMMON /PBLK13/	PBLK11	6
	+ NLEVEL, NPTSPL(MAXLVS,MAXVAR),	PBLK13	2
	+ NSTOC	PBLK13	3
C		PBLK13	4
C		PBLK13	5
	COMMON /PBLK15/	PBLK13	6
	+ ILIM(MAXVAR), ITYPE(MAXVAR), NLIM(MAXVAR,2),	PBLK15	2
	+ PAR(MAXVAR,3), RLIM(MAXVAR,2), VLIM(MAXVAR,2),	PBLK15	3
	+ VLIMT(MAXVAR,2)	PBLK15	4
C		PBLK15	5
C		PBLK15	6
	COMMON /INOUT/	PBLK15	7
	+ IN, IOUT, IQB, IECHO	INOUT	2
	CHARACTER*1	ECHO	88
	+ IQB	INOUT	4
C		INOUT	5
C		INOUT	6
	REAL*8	INOUT	7
	+ A,B,C,D,F,G	EXPECT	20
	DATA	EXPECT	21
	+ BASEXP/2.3025/, EMAX/5.E-1/, EMIN/2.E-2/	EXPECT	22
C		EXPECT	23
C		EXPECT	24
	OUTPUT FILE UNIT	EXPECT	25
C		EXPECT	26
	III = IDAT	EXPECT	27
	IF (IDAT.EQ.0) III=IOUT	EXPECT	28
C		EXPECT	29
C	OMIT TABLE OF EXPECTED INPUT DISTRIBUTION PARAMETERS	EXPECT	30
C	IF ALL OF THE VARIABLES ARE CONSTANTS (NSTOC=1), ARE	EXPECT	31
C	ENDPOINT LIMITED, OR ARE READ FROM AN EXTERNAL FILE.	EXPECT	32
C	SET COUNTER 'LIMITS' TO INDICATE HOW MANY VARIABLES ARE	EXPECT	33
C	ENDPOINT LIMITED.	EXPECT	34
C		EXPECT	35
	LIMITS=0	EXPECT	36
	J=0	EXPECT	37
	DO 100 N=1,NVAR	EXPECT	38
	IF (ILIM(N).NE.0) LIMITS=LIMITS+1	EXPECT	39
	IF ((ILIM(N).NE.0).OR.(ITYPE(N).GT.0)) J=J+1	EXPECT	40
	100 CONTINUE	EXPECT	41
	IF (LIMITS.EQ.NVAR) GO TO 240	EXPECT	42
	IF (J.EQ.NVAR) GO TO 250	EXPECT	43
	IF (NSTOC.EQ.1) GO TO 260	EXPECT	44
C		EXPECT	45
C	TABLE HEADER	EXPECT	46
C		EXPECT	47
	IF (III.GT.0) THEN	EXPECT	48
	WRITE (III,500)	EXPECT	49
	WRITE (III,510)	EXPECT	50

ENDIF	EXPECT	51
C	EXPECT	52
C INPUT VARIABLE EXPECTED STATISTICS. OMIT ANY VARIABLE	EXPECT	53
C WHICH IS ENDPOINT LIMITED. INDICATED BY ILIM(N) > 0.	EXPECT	54
C	EXPECT	55
DO 230 N=1,NVAR	EXPECT	56
IF (ILIM(N).GT.0) GO TO 230	EXPECT	57
A=0.	EXPECT	58
B=0.	EXPECT	59
C=0.	EXPECT	60
D=0.	EXPECT	61
IOMIT=0	EXPECT	62
RP1=PAR(N,1)	EXPECT	63
RP2=PAR(N,2)	EXPECT	64
C	EXPECT	65
C DISTRIBUTION TYPE	EXPECT	66
C	EXPECT	67
IF (ITYPE(N).GE.NTYPE) GO TO 230	EXPECT	68
GO TO (110,120,130,140,160,180,190,200,230,230) ITYPE(N)	EXPECT	69
C	EXPECT	70
C NORMAL DISTRIBUTION	EXPECT	71
C	EXPECT	72
110 CONTINUE	EXPECT	73
A=DBLE(RP1)	EXPECT	74
B=DBLE(RP2+RP2)	EXPECT	75
C=DBLE(RP1)	EXPECT	76
D=DBLE(RP1)	EXPECT	77
GO TO 210	EXPECT	78
C	EXPECT	79
C NATURAL LOGNORMAL DISTRIBUTION	EXPECT	80
C	EXPECT	81
120 CONTINUE	EXPECT	82
A=0.000	EXPECT	83
B=0.000	EXPECT	84
G=DBLE(RP1+0.5*RP2+RP2)	EXPECT	85
IF ((G.GE.EMIN).AND.(G.LE.EMAX)) THEN	EXPECT	86
A=DEXP(G)	EXPECT	87
B=DEXP(DBLE(2.0*(RP1+RP2+RP2))) - DBLE(A+A)	EXPECT	88
ELSE	EXPECT	89
IOMIT=1	EXPECT	90
ENDIF	EXPECT	91
C=DEXP(DBLE(RP1))	EXPECT	92
D=0.000	EXPECT	93
G=DBLE(RP1-RP2+RP2)	EXPECT	94
IF ((G.GE.EMIN).AND.(G.LE.EMAX)) THEN	EXPECT	95
D=DEXP(G)	EXPECT	96
ELSE	EXPECT	97
IOMIT=IOMIT+2	EXPECT	98
ENDIF	EXPECT	99
GO TO 210	EXPECT	100
C	EXPECT	101
C COMMON LOGNORMAL DISTRIBUTION	EXPECT	102
C	EXPECT	103
130 CONTINUE	EXPECT	104

	A=0.000	EXPECT	105
	B=0.000	EXPECT	106
	G=DBLE(BASEXP*(RP1+0.5*BASEXP*RP2*RP2))	EXPECT	107
	IF ((G.GE.EMIN).AND.(G.LE.EMAX)) THEN	EXPECT	108
	A=DEXP(G)	EXPECT	109
	B=DEXP(DBLE(2.0*BASEXP*(RP1+BASEXP*RP2*RP2))) - DBLE(A*A)	EXPECT	110
	ELSE	EXPECT	111
	IOMIT=1	EXPECT	112
	ENDIF	EXPECT	113
	C=DEXP(DBLE(BASEXP*RP1))	EXPECT	114
	D=0.000	EXPECT	115
	G=DBLE(BASEXP*(RP1-RP2*RP2*BASEXP))	EXPECT	116
	IF ((G.GE.EMIN).AND.(G.LE.EMAX)) THEN	EXPECT	117
	D=DEXP(G)	EXPECT	118
	ELSE	EXPECT	119
	IOMIT=IOMIT+2	EXPECT	120
	ENDIF	EXPECT	121
	GO TO 210	EXPECT	122
C		EXPECT	123
C	NATURAL LOGUNIFORM DISTRIBUTION	EXPECT	124
C		EXPECT	125
140	CONTINUE	EXPECT	126
	IF (RP1.EQ.RP2) GO TO 150	EXPECT	127
	A=(DEXP(DBLE(RP2))-DEXP(DBLE(RP1)))/DBLE(RP2-RP1)	EXPECT	128
	B=(DEXP(DBLE(2.0*RP2))-DEXP(DBLE(2.0*RP1)))/DBLE(2.0*(RP2-RP1)	EXPECT	129
	) - DBLE(A*A)	EXPECT	130
	C=DEXP(0.5*DBLE((RP2+RP1)))	EXPECT	131
	D=DEXP(DBLE(RP1))	EXPECT	132
	GO TO 210	EXPECT	133
150	CONTINUE	EXPECT	134
	A=DEXP(DBLE(RP1))	EXPECT	135
	B=0.000	EXPECT	136
	C=A	EXPECT	137
	D=A	EXPECT	138
	GO TO 210	EXPECT	139
C		EXPECT	140
C	COMMON LOGUNIFORM DISTRIBUTION	EXPECT	141
C		EXPECT	142
160	CONTINUE	EXPECT	143
	IF (RP1.EQ.RP2) GO TO 170	EXPECT	144
	D=DEXP(DBLE(BASEXP*RP1))	EXPECT	145
	F=DEXP(DBLE(BASEXP*RP2))	EXPECT	146
	A=(F-D)/DBLE(BASEXP*(RP2-RP1))	EXPECT	147
	B=(F+F-D*D)/DBLE(2.0*BASEXP*(RP2-RP1)) - DBLE(A*A)	EXPECT	148
	C=DEXP(DBLE(0.5*BASEXP*(RP1+RP2)))	EXPECT	149
	GO TO 210	EXPECT	150
170	CONTINUE	EXPECT	151
	A=DEXP(DBLE(BASEXP*RP1))	EXPECT	152
	B=0.000	EXPECT	153
	C=A	EXPECT	154
	D=A	EXPECT	155
	GO TO 210	EXPECT	156
C		EXPECT	157
C	EXPONENTIAL DISTRIBUTION	EXPECT	158

C		EXPECT	159
180	CONTINUE	EXPECT	160
	A=DBLE(1.0/RP1)	EXPECT	161
	B=A*A	EXPECT	162
	C=A*DBLE(ALOG(2.0))	EXPECT	163
	D=0.0D0	EXPECT	164
	GO TO 210	EXPECT	165
C		EXPECT	166
C	UNIFORM DISTRIBUTION	EXPECT	167
C		EXPECT	168
190	CONTINUE	EXPECT	169
	A=DBLE(0.5*(RP1+RP2))	EXPECT	170
	B=DBLE((ABS(RP2-RP1)/3.464117))**2	EXPECT	171
	C=A	EXPECT	172
	D=A	EXPECT	173
	GO TO 210	EXPECT	174
C		EXPECT	175
C	BERNOULLI DISTRIBUTION	EXPECT	176
C		EXPECT	177
200	CONTINUE	EXPECT	178
	A=RP1*PAR(N,3)+RP2*(1.0-PAR(N,3))	EXPECT	179
	IOMIT=4	EXPECT	180
C		EXPECT	181
C	TRANSFER DATA TO ARRAYS AND PRINT	EXPECT	182
C		EXPECT	183
210	CONTINUE	EXPECT	184
	VINAVG(N)=SNGL(A)	EXPECT	185
	B=DSQRT(B)	EXPECT	186
	VINSTD(N)=SNGL(B)	EXPECT	187
	VINMED(N)=SNGL(C)	EXPECT	188
	VINMOD(N)=SNGL(D)	EXPECT	189
	IF (IOMIT.NE.0) GO TO 220	EXPECT	190
	WRITE (III,520) VLABEL(N),D,A,C,B	EXPECT	191
	GO TO 230	EXPECT	192
220	CONTINUE	EXPECT	193
	IF (IOMIT.EQ.1) WRITE (III,530) VLABEL(N),D,C	EXPECT	194
	IF (IOMIT.EQ.2) WRITE (III,540) VLABEL(N),A,C,B	EXPECT	195
	IF (IOMIT.EQ.3) WRITE (III,550) VLABEL(N),C	EXPECT	196
	IF (IOMIT.EQ.4) WRITE (III,540) VLABEL(N),A	EXPECT	197
230	CONTINUE	EXPECT	198
	IF (IDAT.GT.0) WRITE (III,560)	EXPECT	199
C		EXPECT	200
C	PRINT EFFECTIVE DISTRIBUTION LIMITS	EXPECT	201
C		EXPECT	202
240	CONTINUE	EXPECT	203
	IF (LIMITS.EQ.0) GO TO 260	EXPECT	204
	WRITE (III,570)	EXPECT	205
	DO 250 N=1,NVAR	EXPECT	206
	IF (ILIM(N).EQ.0) GO TO 250	EXPECT	207
	WRITE (III,580) VLABEL(N),VLIMT(N,1),VLIMT(N,2),RLIM(N,1),	EXPECT	208
	RLIM(N,2)	EXPECT	209
250	CONTINUE	EXPECT	210
	IF (IDAT.GT.0) WRITE (III,560)	EXPECT	211
260	CONTINUE	EXPECT	212

C		EXPECT	213
	RETURN	EXPECT	214
	500 FORMAT (//1X,'*--- EXPECTED INPUT VARIABLE STATISTICS')	EXPECT	215
	510 FORMAT (//1X,'VARIABLE',T10,'MODE',T20,'MEAN',T37,'MEDIAN',T40,'ST +NO DEV')	EXPECT	216
	520 FORMAT (1X,A12,1X,1PE9.2,3(1X,E9.2))	EXPECT	217
	530 FORMAT (1X,A12,1X,1PE9.2,11X,E9.2)	EXPECT	218
	540 FORMAT (1X,A12,10X,3(1X,1PE9.2))	EXPECT	219
	550 FORMAT (1X,A12,21X,1PE9.2)	EXPECT	220
	560 FORMAT (/1X,'*-----')	EXPECT	221
	570 FORMAT (/1X,'EFFECTIVE LIMITS ON THE INPUT DISTRIBUTION VARIABLES' +/4X,'VARIABLE',10X,'VARIABLE LIMITS',13X,'INTERVAL LIMITS'/22X,'LO +WER',7X,'UPPER',10X,'LOWER',7X,'UPPER')	EXPECT	222
	580 FORMAT (1X,A12,5X,1PE10.3,2X,E10.3,5X,0PF10.4,2X,F10.4)	EXPECT	223
	END	EXPECT	224
	SUBROUTINE IDNUM (IRUNID,USRNAM)	EXPECT	225
C		IDNUM	2
C	THIS ROUTINE CREATES A UNIQUE RUN IDENTIFIER NUMBER, UTILIZING	IDNUM	3
C	THE DATE AND TIME AT WHICH THIS ROUTINE IS CALLED. THE SYSTEM	IDNUM	4
C	USER NAME IS ALSO PLACED INTO A CHARACTER VARIABLE. THIS	IDNUM	5
C	INFORMATION IS USED TO INSURE TRACEABILITY AND ACCDUNTABILITY	IDNUM	6
C	FOR DATA FILES FROM SIMULATION PROGRAMS.	IDNUM	7
C		IDNUM	8
C	IRUNID = RUN IDENTIFIER, AS FOLLOWS:	IDNUM	9
C	DIGITS 9-10 = MONTH OF CURRENT DATE.	IDNUM	10
C	DIGITS 7-8 = DAY OF THE MONTH (1 TO 31).	IDNUM	11
C	DIGITS 5-6 = CURRENT YEAR.	IDNUM	12
C	DIGITS 3-4 = CURRENT HOUR (0 TO 23).	IDNUM	13
C	DIGITS 1-2 = CURRENT MINUTE (0 TO 59).	IDNUM	14
C	USRNAM = 8 CHARACTER NAME OF THE CURRENT SYSTEM USER.	IDNUM	15
C		IDNUM	16
	INTEGER*4	IDNUM	17
	+ IRUNID, JMM, JDD, JYY,	IDNUM	18
	+ JHR, JMIN	IDNUM	19
C	LOCAL ARRAY FOR READING DATE AND TIME	IDNUM	20
	INTEGER*2	IDNUM	21
	+ LOCAL(15)	IDNUM	22
	CHARACTER*8	IDNUM	23
	+ ASDATE	IDNUM	24
	CHARACTER*8	IDNUM	25
	+ TIME, USRN, USRNAM	IDNUM	26
	CHARACTER*16	IDNUM	27
	+ DATE	IDNUM	28
	EQUIVALENCE	IDNUM	29
	+ (ASDATE, LOCAL(1)),	IDNUM	30
	+ (USRN, LOCAL(13))	IDNUM	31
C		IDNUM	32
C	GET CURRENT TIME AND DATE	IDNUM	33
C	TIMDAT RETURNING:	IDNUM	34
C	ASCII: LOCAL(1)=MM (MONTH)	IDNUM	35
C	LOCAL(2)=DD (DAY)	IDNUM	36
C	LOCAL(3)=YY (YEAR)	IDNUM	37
C	BINARY: LOCAL(4)=MINUTES	IDNUM	38
C	LOCAL(5)=SECONDS	IDNUM	39
C		IDNUM	40

C		IDNUM	41
C	CALL TIMDAT (LOCAL(1),INTS(18))	IDNUM	42
C	CALL DATE\$A (DATE)	IDNUM	43
C	CALL TIME\$A (TIME)	IDNUM	44
C		IDNUM	45
	READ (ASDATE,600) JMM, JDD, JYY	IDNUM	46
	JHR = LOCAL(4)/60	IDNUM	47
	JMIN = LOCAL(4)-JHR*60	IDNUM	48
	JMM=JMM+100000000	IDNUM	49
	JDD=JDD+1000000	IDNUM	50
	JYY=JYY+10000	IDNUM	51
	JHR=JHR+100	IDNUM	52
	IRUNID=JMM+JDD+JYY+JHR+JMIN	IDNUM	53
	USRNAM=USRN	IDNUM	54
C		IDNUM	55
	RETURN	IDNUM	56
	600 FORMAT (3I2)	IDNUM	57
	END	IDNUM	58
	SUBROUTINE IDPLT (IRUNID,XID,YID)	IDPLT	2
C		IDPLT	3
C	SUBROUTINE IDPLT TAGS A PLOT WITH AN INTEGER RUN ID IN A	IDPLT	4
C	USER-SPECIFIED LOCATION. THIS IS DONE IN TWO PARTS, AS	IDPLT	5
C	DISSPLA CANNOT HANDLE TEN DIGIT INTEGERS.	IDPLT	6
C		IDPLT	7
	DATA	IDPLT	8
	+ IDATE/10000/	IDPLT	9
C		IDPLT	10
C	MONTH/DAY/YR	IDPLT	11
C		IDPLT	12
	IMDY=IRUNID/IDATE	IDPLT	13
	IF (IMDY.GT.0) THEN	IDPLT	14
	CALL INTNO (IMDY,XID,YID)	IDPLT	15
	ELSE	IDPLT	16
	CALL MESSAG ('0000',4,XID,YID)	IDPLT	17
	ENDIF	IDPLT	18
C		IDPLT	19
C	TIME OF DAY	IDPLT	20
C		IDPLT	21
	ITME=IRUNID-IMDY*IDATE	IDPLT	22
	DO 100 I=1,4	IDPLT	23
	J=4-I	IDPLT	24
	IF (J.GT.0) THEN	IDPLT	25
	J=10**J	IDPLT	26
	ELSE	IDPLT	27
	J=1	IDPLT	28
	ENDIF	IDPLT	29
	IF (ITME.GE.J) GO TO 110	IDPLT	30
	CALL MESSAG ('0',1,'ABUT','ABUT')	IDPLT	31
	100 CONTINUE	IDPLT	32
	GO TO 120	IDPLT	33
	110 CONTINUE	IDPLT	34
	CALL INTNO (ITME,'ABUT','ABUT')	IDPLT	35
C		IDPLT	36
	120 CONTINUE	IDPLT	37

RETURN	IDPLT	38
END	IDPLT	39
SUBROUTINE IDVAX (IRUNID,USRNAM)	IDVAX	2
C	IDVAX	3
C THIS ROUTINE IS THE VAX 11/780 EQUIVALENT OF THE PRIME 750	IDVAX	4
C PACSTAT IDNUM SUBROUTINE. IT'S PURPOSE IS THE SAME AS IDNUM,	IDVAX	5
C TO CREATE A UNIQUE RUN IDENTIFIER, UTILIZING THE DATE AND TIME	IDVAX	6
C SYSTEM'S LIBRARIES AT THE TIME THIS ROUTINE IS CALLED. THE	IDVAX	7
C SYSTEM USER NAME IS ALSO PLACED INTO A CHARACTER VARIABLE. THIS	IDVAX	8
C INFORMATION IS USED TO INSURE TRACEABILITY AND ACCOUNTABILITY FOR	IDVAX	9
C DATA FILES FROM SIMULATION RUNS. AUTHOR: C.L. BARTLEY	IDVAX	10
C	IDVAX	11
C	IDVAX	12
C	IDVAX	13
C IRUNID = RUN IDENTIFIER, AS FOLLOWS:	IDVAX	14
C DIGITS 9-10 = MONTH OF CURRENT DATE.	IDVAX	15
C DIGITS 7-8 = DAY OF THE MONTH (1 TO 31).	IDVAX	16
C DIGITS 6-6 = CURRENT YEAR.	IDVAX	17
C DIGITS 3-4 = CURRENT HOUR (0 TO 23).	IDVAX	18
C DIGITS 1-2 = CURRENT MINUTE (0 TO 59).	IDVAX	19
C USRNAM = 8 CHARACTER NAME OF THE CURRENT SYSTEM USER.	IDVAX	20
C	IDVAX	21
C INTEGER*4	IDVAX	22
+ IRUNID, JMM, JDD, JYY,	IDVAX	23
+ JHR, JMIN	IDVAX	24
C LOCAL ARRAY FOR READING DATE AND TIME	IDVAX	25
C INTEGER*2	IDVAX	26
+ LOCAL(15)	IDVAX	27
C CHARACTER*8	IDVAX	28
+ TIM, USRN, USRNAM	IDVAX	29
C CHARACTER*16	IDVAX	30
+ DATE	IDVAX	31
C EQUIVALENCE	IDVAX	32
+ (ASDATE, LOCAL(1)),	IDVAX	33
+ (USRN, LOCAL(13))	IDVAX	34
C	IDVAX	35
C GET CURRENT TIME AND DATE	IDVAX	36
C IDATE RETURNING:	IDVAX	37
C LOCAL(1)=MM (MONTH)	IDVAX	38
C LOCAL(2)=DD (DAY)	IDVAX	39
C LOCAL(3)=YY (YEAR)	IDVAX	40
C TIME RETURNING:	IDVAX	41
C JHR (4)=HOURS	IDVAX	42
C JMIN (5)=MINUTES	IDVAX	43
C	IDVAX	44
C	IDVAX	45
C CALL IDATE (LOCAL(1),LOCAL(2),LOCAL(3))	IDVAX	46
C	IDVAX	47
C JMM = LOCAL(1)	IDVAX	48
C JDD = LOCAL(2)	IDVAX	49
C JYY = LOCAL(3)	IDVAX	50
C CALL TIME (TIM)	IDVAX	51
C	IDVAX	52
C READ(TIM,500) JHR,JMIN	IDVAX	53

500	FORMAT(2(I2,1X))	IDVAX	54
	JMM=JMM+100000000	IDVAX	55
	JDD=JDD+1000000	IDVAX	56
	JYY=JYY+10000	IDVAX	57
	JHR=JHR+100	IDVAX	58
	JMIN=JMIN+1	IDVAX	59
	IRUNID=JMM+JDD+JYY+JHR+JMIN	IDVAX	60
	USRNAM=USRN	IDVAX	61
C		IDVAX	62
	RETURN	IDVAX	63
	END	IDVAX	64
	SUBROUTINE IINPUT	IINPUT	2
C		IINPUT	3
C	ROUTINE FOR INPUTTING DISTRIBUTION TYPES AND PARAMETERS	IINPUT	4
C	FOR THE INPUT VARIABLES.	IINPUT	5
C		IINPUT	6
	PARAMETER ISIZE = 60000 ! MAX DATA SET SIZE	PPARA	2
	PARAMETER MAXCNT = 10 ! MAX NUMBER OF CONSTANTS	PPARA	3
	PARAMETER MAXDST = 100 ! MAX NUMBER OF INPUT DATA POINTS	PPARA	4
	PARAMETER MAXLVS = 100 ! MAX LEVELS FOR STRATIFIED SAMPLING	PPARA	5
	PARAMETER MAXNS = 10000 ! MAX NUMBER OF SAMPLES	PPARA	6
	PARAMETER MAXSOL = 10 ! MAX NUMBER OF SOLUTIONS	PPARA	7
	PARAMETER MAXVAR = 25 ! MAX NUMBER OF INPUT VARIABLES	PPARA	8
	PARAMETER NMLEN = 10 ! FILE NAME LENGTH	PPARA	9
	PARAMETER NTYPE = 11 ! NUMBER OF DISTRIBUTION TYPES	PPARA	10
C		PPARA	11
C		PPARA	12
	COMMON /PBLK1/	PBLK1	2
	+ NCONST, NSOLN, NVAR	PBLK1	3
C		PBLK1	4
C		PBLK1	5
	COMMON /PBLK2/	PBLK2	2
	+ NSTTL, NTTL, STTLE,	PBLK2	3
	+ TTLE	PBLK2	4
	CHARACTER*40	PBLK2	5
	+ STTLE, TTLE	PBLK2	6
C		PBLK2	7
C		PBLK2	8
	COMMON /PBLK3/	PBLK3	2
	+ CDIMEN(MAXCNT), CLABEL(MAXCNT), PLABEL(MAXSOL),	PBLK3	3
	+ VDIMEN(MAXVAR), VLABEL(MAXVAR)	PBLK3	4
	CHARACTER*12	PBLK3	5
	+ CDIMEN, CLABEL, VDIMEN,	PBLK3	6
	+ VLABEL	PBLK3	7
	CHARACTER*32	PBLK3	8
	+ PLABEL	PBLK3	9
C		PBLK3	10
C		PBLK3	11
	COMMON /PBLK4/	PBLK4	2
	+ CONST(MAXCNT), VALU(MAXSOL), VINPT(MAXVAR)	PBLK4	3
C		PBLK4	4
C		PBLK4	5
	COMMON /PBLK5/	PBLK5	2
	+ ICNT, IDAT, INDEX	PBLK5	3

C		PBLK5	4
C		PBLK5	5
	COMMON /PBLK13/	PBLK13	2
	+ NLEVEL, NPTSPL(MAXLVS,MAXVAR),	PBLK13	3
	+ NSTOC	PBLK13	4
C		PBLK13	5
C		PBLK13	6
	COMMON /PBLK14/	PBLK14	2
	+ LABEL(NTYPE)	PBLK14	3
	CHARACTER*20	PBLK14	4
	+ LABEL	PBLK14	5
C		PBLK14	6
C		PBLK14	7
	COMMON /PBLK15/	PBLK15	2
	+ ILIM(MAXVAR), ITYPE(MAXVAR), NLIM(MAXVAR,2),	PBLK15	3
	+ PAR(MAXVAR,3), RLIM(MAXVAR,2), V LIM(MAXVAR,2),	PBLK15	4
	+ VLIMT(MAXVAR,2)	PBLK15	5
C		PBLK15	6
C		PBLK15	7
	COMMON /PBLK17/	PBLK17	2
	+ ICCD, IQUIT, ISOLN,	PBLK17	3
	+ IUPDAT, MAXSAM, NPRT,	PBLK17	4
	+ NSAM, NSAMC	PBLK17	5
C		PBLK17	6
C		PBLK17	7
	COMMON /PBLK18/	PBLK18	2
	+ JJNF(NMLEN,MAXVAR), INFIL, IUDIST,	PBLK18	3
	+ UDIST(MAXDST,2)	PBLK18	4
	CHARACTER*4	PBLK18	5
	+ JJNF	PBLK18	6
C		PBLK18	7
C		PBLK18	8
	PARAMETER MAXLEV=200 ! MAX LEVELS OF STRATIFICATION	STRATI	2
	COMMON /STRATI/	STRATI	3
	+ NSPL(MAXLEV)	STRATI	4
C		STRATI	5
C		STRATI	8
	PARAMETER MAXSRC=15	IDCOM	2
	COMMON /IDCOM/	IDCOM	3
	+ JRUNID, FL, FLT(MAXSRC),	IDCOM	4
	+ NRUNID(MAXSRC), NSRC, PRG,	IDCOM	5
	+ PRGT(MAXSRC), TITLE(20), USRNAM,	IDCOM	6
	+ USRNMT(MAXSRC), VERNUM	IDCOM	7
	CHARACTER*4	IDCOM	8
	+ TITLE	IDCOM	9
	CHARACTER*8	IDCOM	10
	+ FL, FLT, PRG,	IDCOM	11
	+ PRGT, USRNAM, USRNMT	IDCOM	12
C		IDCOM	13
C		IDCOM	14
	COMMON /INOUT/	INOUT	2
	+ IN, IOUT, IQB, IECHO	ECHO	88
	CHARACTER*1	INOUT	4
	+ IQB	INOUT	5

C		INPUT	6
C		INPUT	7
C		INPUT	21
	CHARACTER*1	INPUT	22
	+ ANS	INPUT	23
	DATA	INPUT	24
	+ LABEL(1) /'NORMAL' //	INPUT	25
	+ LABEL(2) /'NATURAL LOGNORMAL' //	INPUT	26
	+ LABEL(3) /'COMMON LOGNORMAL' //	INPUT	27
	+ LABEL(4) /'NATURAL LOGUNIFORM' //	INPUT	28
	+ LABEL(5) /'COMMON LOGUNIFORM' //	INPUT	29
	+ LABEL(6) /'EXPONENTIAL' //	INPUT	30
	+ LABEL(7) /'UNIFORM' //	INPUT	31
	+ LABEL(8) /'BERNOULLI' //	INPUT	32
	+ LABEL(9) /'EXTERNAL CONF FUNCTN' //	INPUT	33
	+ LABEL(10) /'EXTERNAL DATA POINTS' //	INPUT	34
	DATA	INPUT	35
	+ LABEL(NTYPE) /'CONSTANT' //	INPUT	36
C		INPUT	37
C		INPUT	38
C	- NOTE THE CODE IS SET UP SO THAT DISTRIBUTIONS ONE TO (NTYPE-1) -	INPUT	39
C	- ARE EXTENDED DISTRIBUTIONS, AND DISTRIBUTION (NTYPE) IS A -	INPUT	40
C	- CONSTANT VALUE. IF NEW DISTRIBUTIONS ARE REQUIRED, IT IS MOST -	INPUT	41
C	- EASILY INSERTED JUST BEFORE # NTYPE. SUBROUTINES -	INPUT	42
C	- EXPECT AND RNGS MUST ALSO BE MODIFIED IF NTYPE IS INCREASED. -	INPUT	43
C	- ROUTINE AND STATOT MUST ALSO BE MODIFIED IF THERE IS ANY -	INPUT	44
C	- CHANGE IN THE ORDERING OR TYPES OF THESE DISTRIBUTIONS. -	INPUT	45
C		INPUT	46
	DATA	INPUT	47
	+ NSTTL/0/,	INPUT	48
	+ STTL/' //	INPUT	49
C		INPUT	50
C	COUNTER INITIALIZATION	INPUT	51
C		INPUT	52
	DO 100 I=1,NVAR	INPUT	53
	NLIM(I,1)=0	INPUT	54
	NLIM(I,2)=0	INPUT	55
	100 CONTINUE	INPUT	56
C		INPUT	57
C	PROMPT FOR SYSTEMS VARIABLE UPDATE,	INPUT	58
C	EXCEPT FIRST TIME THROUGH ROUTINE.	INPUT	59
C		INPUT	60
	IUPDAT=0	INPUT	61
	NDIST=NTYPE	INPUT	62
	IF (ICNT.GT.1) THEN	INPUT	63
	110 CONTINUE	INPUT	64
	WRITE (IOUT,500) IQB	INPUT	65
	READ (IN,510) ANS	INPUT	66
	WRITE (IECHO,510) ANS	ECHO	58
	IF ((ANS.NE.'Y').AND.(ANS.NE.'N')) THEN	INPUT	67
	IF ((ANS.NE.'y').AND.(ANS.NE.'n')) GO TO 110	INPUT	68
	ENDIF	INPUT	69
	IF ((ANS.EQ.'N').OR.(ANS.EQ.'n')) GO TO 270	INPUT	70
	NDIST=NTYPE+1	INPUT	71

ENDIF	IINPUT	72
IUPDAT=1	IINPUT	73
NSTOC=1	IINPUT	74
C	IINPUT	75
C	IINPUT	76
C	IINPUT	77
WRITE (IOUT,520)	IINPUT	78
LPNT=1	IINPUT	79
N=0	IINPUT	80
120 CONTINUE	IINPUT	81
N=N+1	IINPUT	82
ILIM(N)=0	IINPUT	83
C	IINPUT	84
C	IINPUT	85
C	IINPUT	86
130 CONTINUE	IINPUT	87
WRITE (IOUT,530) N,VLABEL(N),VDIMEN(N)	IINPUT	88
WRITE (IOUT,540) (I,LABEL(I),I=1,NTYPE)	IINPUT	89
IF (ICNT.GT.1) WRITE (IOUT,550) NDIST	IINPUT	90
WRITE (IOUT,560) IQB	IINPUT	91
READ (IN,*,ERR=410) IT	IINPUT	92
WRITE (IECHO,*) IT	ECHO	59
IF ((IT.LT.1).OR.(IT.GT.NDIST)) GO TO 410	IINPUT	93
IF (IT.GT.NTYPE) GO TO 280	IINPUT	94
WRITE (IOUT,570) LABEL(IT)	IINPUT	95
ITYPE(N)=IT	IINPUT	96
C	IINPUT	97
C	IINPUT	98
C	IINPUT	99
IF (IT.NE.1) GO TO 150	IINPUT	100
WRITE (IOUT,580) IQB	IINPUT	101
READ (IN,*,ERR=410) PAR(N,1)	IINPUT	102
WRITE (IECHO,*) PAR(N,1)	ECHO	60
140 CONTINUE	IINPUT	103
WRITE (IOUT,590) IQB	IINPUT	104
READ (IN,*,ERR=410) PAR(N,2)	IINPUT	105
WRITE (IECHO,*) PAR(N,2)	ECHO	61
IF (PAR(N,2).LT.0.) THEN	IINPUT	106
WRITE (IOUT,600) PAR(N,2)	IINPUT	107
GO TO 140	IINPUT	108
ENDIF	IINPUT	109
GO TO 250	IINPUT	110
C	IINPUT	111
C	IINPUT	112
C	IINPUT	113
150 CONTINUE	IINPUT	114
IF ((IT.NE.2).AND.(IT.NE.3)) GO TO 180	IINPUT	115
160 CONTINUE	IINPUT	116
WRITE (IOUT,610) IQB	IINPUT	117
READ (IN,*,ERR=410) PAR(N,1)	IINPUT	118
WRITE (IECHO,*) PAR(N,1)	ECHO	82
IF (PAR(N,1).LE.0.0) THEN	IINPUT	119
WRITE (IOUT,600) PAR(N,1)	IINPUT	120
GO TO 160	IINPUT	121

ENDIF	IINPUT	122
PAR(N,1)=ALOG(PAR(N,1))	IINPUT	123
IF (IT.EQ.3) PAR(N,1)=PAR(N,1)/2.302585	IINPUT	124
170 CONTINUE	IINPUT	125
WRITE (IOUT,620) PAR(N,1),IQB	IINPUT	126
READ (IN,*,ERR=410) PAR(N,2)	IINPUT	127
WRITE (IECHO,*) PAR(N,2)	ECHO	83
IF (PAR(N,2).LT.0.) THEN	IINPUT	128
WRITE (IOUT,600) PAR(N,2)	IINPUT	129
GO TO 170	IINPUT	130
ENDIF	IINPUT	131
GO TO 250	IINPUT	132
C	IINPUT	133
C UNIFORM LOGNORMAL DISTRIBUTIONS	IINPUT	134
C	IINPUT	135
180 CONTINUE	IINPUT	136
IF ((IT.NE.4).AND.(IT.NE.5)) GO TO 190	IINPUT	137
WRITE (IOUT,630)	IINPUT	138
READ (IN,*,ERR=410) PAR(N,1),PAR(N,2)	IINPUT	139
WRITE (IECHO,*) PAR(N,1), PAR(N,2)	ECHO	84
IF (PAR(N,1).GT.PAR(N,2)) THEN	IINPUT	140
C=PAR(N,1)	IINPUT	141
PAR(N,1)=PAR(N,2)	IINPUT	142
PAR(N,2)=C	IINPUT	143
ENDIF	IINPUT	144
GO TO 280	IINPUT	145
190 CONTINUE	IINPUT	146
C	IINPUT	147
C EXPONENTIAL DISTRIBUTION	IINPUT	148
C	IINPUT	149
IF (IT.NE.8) GO TO 210	IINPUT	150
200 CONTINUE	IINPUT	151
WRITE (IOUT,600)	IINPUT	152
READ (IN,*,ERR=410) PAR(N,1)	IINPUT	153
WRITE (IECHO,*) PAR(N,1)	ECHO	85
IF (PAR(N,1).LE.0.) THEN	IINPUT	154
WRITE (IOUT,600) PAR(N,1)	IINPUT	155
GO TO 200	IINPUT	156
ENDIF	IINPUT	157
PAR(N,1)=1.0/PAR(N,1)	IINPUT	158
GO TO 250	IINPUT	159
C	IINPUT	160
C UNIFORM DISTRIBUTION	IINPUT	161
C	IINPUT	162
210 CONTINUE	IINPUT	163
IF (IT.NE.7) GO TO 220	IINPUT	164
WRITE (IOUT,640)	IINPUT	165
READ (IN,*,ERR=410) PAR(N,1),PAR(N,2)	IINPUT	166
WRITE (IECHO,*) PAR(N,1),PAR(N,2)	ECHO	86
IF (PAR(N,1).GT.PAR(N,2)) THEN	IINPUT	167
C=PAR(N,1)	IINPUT	168
PAR(N,1)=PAR(N,2)	IINPUT	169
PAR(N,2)=C	IINPUT	170
ENDIF	IINPUT	171

GO TO 260	IINPUT	172
C	IINPUT	173
C BERNOULLI DISTRIBUTION	IINPUT	174
C	IINPUT	175
220 CONTINUE	IINPUT	176
IF (IT.NE.0) GO TO 232	IINPUT	177
WRITE (IOUT,650)	IINPUT	178
READ (IN,*,ERR=410) PAR(N,1),PAR(N,2)	IINPUT	179
WRITE (IECHO,*) PAR(N,1),PAR(N,2)	ECHO	87
IF (PAR(N,1).GT.PAR(N,2)) THEN	IINPUT	180
C=PAR(N,1)	IINPUT	181
PAR(N,1)=PAR(N,2)	IINPUT	182
PAR(N,2)=C	IINPUT	183
ENDIF	IINPUT	184
230 CONTINUE	IINPUT	185
WRITE (IOUT,660)	IINPUT	186
READ (IN,*,ERR=410) PAR(N,3)	IINPUT	187
WRITE (IECHO,*) PAR(N,3)	ECHO	88
IF ((PAR(N,3).LT.0.0).OR.(PAR(N,3).GT.1.0)) GO TO 230	IINPUT	188
GO TO 260	IINPUT	189
C	IINPUT	190
C EXTERNALLY DEFINED DATA POINTS OR CONFIDENCE FUNCTION	IINPUT	191
C	IINPUT	192
232 CONTINUE	IINPUT	193
IF ((IT.NE.9).AND.(IT.NE.10)) GO TO 240	IINPUT	194
IF (IT.EQ.9) WRITE (IOUT,670)	IINPUT	195
IF (IT.EQ.10) WRITE (IOUT,680)	IINPUT	196
READ (IN,690) (JJNF(I,N),I=1,NMLEN)	IINPUT	197
WRITE (IECHO,690) (JJNF(I,N),I=1,NMLEN)	ECHO	89
GO TO 260	IINPUT	198
C	IINPUT	199
C CONSTANT VALUE	IINPUT	200
C	IINPUT	201
240 CONTINUE	IINPUT	202
IF (IT.NE.NTYPE) GO TO 260	IINPUT	203
WRITE (IOUT,700) IQB	IINPUT	204
READ (IN,*,ERR=410) PAR(N,1)	IINPUT	205
WRITE (IECHO,*) PAR(N,1)	ECHO	70
GO TO 260	IINPUT	206
C	IINPUT	207
C SET UPPER/LOWER LIMITS ON DISTRIBUTION	IINPUT	208
C	IINPUT	209
250 CONTINUE	IINPUT	210
WRITE (IOUT,710) IQB	IINPUT	211
READ (IN,510) ANS	IINPUT	212
WRITE (IECHO,510) ANS	ECHO	71
IF ((ANS.NE.'Y').AND.(ANS.NE.'N')) THEN	IINPUT	213
IF ((ANS.NE.'y').AND.(ANS.NE.'n')) GO TO 250	IINPUT	214
ENDIF	IINPUT	215
IF ((ANS.EQ.'Y').OR.(ANS.EQ.'y')) THEN	IINPUT	216
ILIM(N)=1	IINPUT	217
WRITE (IOUT,720)	IINPUT	218
READ (IN,*,ERR=410) V LIM(N,1),V LIM(N,2)	IINPUT	219
WRITE (IECHO,*) V LIM(N,1),V LIM(N,2)	ECHO	72

IF (VLIM(N,1).GT.VLIM(N,2)) THEN	IINPUT	220
C=VLIM(N,1)	IINPUT	221
VLIM(N,1)=VLIM(N,2)	IINPUT	222
VLIM(N,2)=C	IINPUT	223
ENDIF	IINPUT	224
ENDIF	IINPUT	225
C	IINPUT	226
C	IINPUT	227
C	IINPUT	228
260 CONTINUE	IINPUT	229
IF (IT.NE.NTYPE) NSTOC=0	IINPUT	230
IF (N.LT.NVAR) GO TO 120	IINPUT	231
C	IINPUT	232
C	IINPUT	233
C	IINPUT	234
270 CONTINUE	IINPUT	235
IF (NCONST.LE.0) GO TO 310	IINPUT	236
IF (ICNT.GT.1) THEN	IINPUT	237
280 CONTINUE	IINPUT	238
WRITE (IOUT,730) IQB	IINPUT	239
READ (IN,510) ANS	IINPUT	240
WRITE (IECHO,510) ANS	ECHO	73
IF ((ANS.NE.'Y').AND.(ANS.NE.'N')) THEN	IINPUT	241
IF ((ANS.NE.'y').AND.(ANS.NE.'n')) GO TO 280	IINPUT	242
ENDIF	IINPUT	243
IF ((ANS.EQ.'N').OR.(ANS.EQ.'n')) GO TO 310	IINPUT	244
ENDIF	IINPUT	245
IUPDAT=1	IINPUT	246
C	IINPUT	247
C	IINPUT	248
C	IINPUT	249
LPNT=2	IINPUT	250
I=0	IINPUT	251
290 CONTINUE	IINPUT	252
I=I+1	IINPUT	253
300 CONTINUE	IINPUT	254
WRITE (IOUT,740) CLABEL(I),CDIMEN(I)	IINPUT	255
IF (ICNT.GT.1) WRITE (IOUT,750) CONST(I)	IINPUT	256
READ (IN,*,ERR=410) CONST(I)	IINPUT	257
WRITE (IECHO,*,ERR=410) CONST(I)	ECHO	74
IF (I.LT.NCONST) GO TO 290	IINPUT	258
310 CONTINUE	IINPUT	259
C	IINPUT	260
C	IINPUT	261
C	IINPUT	262
LPNT=3	IINPUT	263
320 CONTINUE	IINPUT	264
WRITE (IOUT,760) MAXSAM	IINPUT	265
READ (IN,*,ERR=410) NSAM	IINPUT	266
WRITE (IECHO,*) NSAM	ECHO	75
IF (NSAM.LT.1) GO TO 320	IINPUT	267
IF (NSAM.GT.MAXSAM) THEN	IINPUT	268
WRITE (IOUT,770) MAXSAM	IINPUT	269
GO TO 320	IINPUT	270

ENDIF	IINPUT	271
C	IINPUT	272
C ENTER PRINT INTERVAL	IINPUT	273
C	IINPUT	274
LPNT=4	IINPUT	275
330 CONTINUE	IINPUT	276
WRITE (IOUT,780)	IINPUT	277
READ (IN,*,ERR=410) NPRT	IINPUT	278
WRITE (IECHO,*) NPRT	ECHO	78
IF ((NPRT.LT.1).OR.(NPRT.GT.NSAM)) GO TO 410	IINPUT	279
C	IINPUT	280
C ENTER THE NUMBER OF INTERVALS FOR STRATIFIED SAMPLING AND	IINPUT	281
C INITIALIZE SAMPLING ARRAYS. OMIT IF NO INPUT VARIABLES	IINPUT	282
C ARE DISTRIBUTED.	IINPUT	283
C	IINPUT	284
LPNT=6	IINPUT	285
NLEVEL=1	IINPUT	286
IF (NSTOC.NE.0) GO TO 370	IINPUT	287
I=MAXLVS	IINPUT	288
IF (I.GT.MAXLEV) I=MAXLEV	IINPUT	289
340 CONTINUE	IINPUT	290
WRITE (IOUT,790) I	IINPUT	291
READ (IN,*,ERR=410) NLEVEL	IINPUT	292
WRITE (IECHO,*) NLEVEL	ECHO	77
IF ((NLEVEL.LT.1).OR.(NLEVEL.GT.I)) GO TO 340	IINPUT	293
IF (NLEVEL.GT.NSAM) THEN	IINPUT	294
WRITE (IOUT,800) NLEVEL,NSAM	IINPUT	295
GO TO 340	IINPUT	296
ENDIF	IINPUT	297
DO 360 N=1,NVAR	IINPUT	298
DO 350 I=1,NLEVEL	IINPUT	299
NPTSPL(I,N)=0	IINPUT	300
350 CONTINUE	IINPUT	301
360 CONTINUE	IINPUT	302
370 CONTINUE	IINPUT	303
C	IINPUT	304
C DATA ECHO	IINPUT	305
C	IINPUT	306
IF (IDAT.GT.0) THEN	IINPUT	307
IF (ICNT.GT.1) WRITE (IDAT,510)	IINPUT	308
WRITE (IDAT,810)	IINPUT	309
WRITE (IDAT,820) PRG,VERNUM,JRUNID,TTLE,USRNAM,STILE,ICNT	BCSFIX	52
DO 390 N=1,NVAR	IINPUT	311
IT=ITYPE(N)	IINPUT	312
WRITE (IDAT,830) VLABEL(N),VDIMEN(N),LABEL(IT)	IINPUT	313
IF (IT.EQ.1) WRITE (IDAT,840) PAR(N,1),PAR(N,2)	IINPUT	314
IF ((IT.EQ.2).OR.(IT.EQ.3)) WRITE (IDAT,850) PAR(N,1),PAR(N,2)	IINPUT	315
IF ((IT.EQ.4).OR.(IT.EQ.5)) WRITE (IDAT,860) PAR(N,1),PAR(N,2)	IINPUT	316
IF (IT.NE.0) GO TO 380	IINPUT	317
C=1.0/PAR(N,1)	IINPUT	318
WRITE (IDAT,870) C	IINPUT	319
380 CONTINUE	IINPUT	320
IF (IT.EQ.7) WRITE (IDAT,880) PAR(N,1),PAR(N,2)	IINPUT	321
IF (IT.EQ.8) WRITE (IDAT,890) PAR(N,1),PAR(N,2),PAR(N,3)	IINPUT	322

IF (IT.EQ.9) WRITE (IDAT,900) (JJNF(I,N),I=1,NMLEN)	IINPUT	323
IF (IT.EQ.10) WRITE (IDAT,910) (JJNF(I,N),I=1,NMLEN)	IINPUT	324
IF (IT.EQ.NTYPE) WRITE (IDAT,920) PAR(N,1)	IINPUT	325
IF (ILIM(N).GT.0) WRITE (IDAT,930) V LIM(N,1),V LIM(N,2)	IINPUT	326
390 CONTINUE	IINPUT	327
WRITE (IDAT,940)	IINPUT	328
DO 400 I=1,NCONST	IINPUT	329
WRITE (IDAT,950) CLABEL(I),CDIMEN(I),CONST(I)	IINPUT	330
400 CONTINUE	IINPUT	331
WRITE (IDAT,960) NSAM,NPRT	IINPUT	332
IF (NLEVEL.GT.1) THEN	IINPUT	333
WRITE (IDAT,970) NLEVEL	IINPUT	334
ELSE	IINPUT	335
WRITE (IDAT,980)	IINPUT	336
ENDIF	IINPUT	337
ENDIF	IINPUT	338
C	IINPUT	339
RETURN	IINPUT	340
C	IINPUT	341
C WRITE WARNS OF ERROR ON INPUT	IINPUT	342
C	IINPUT	343
410 CONTINUE	IINPUT	344
WRITE (IDAT,990)	IINPUT	345
GO TO (130,300,320,330,340), LPNT	IINPUT	346
C	IINPUT	347
500 FORMAT (/1X,'WOULD YOU LIKE TO UPDATE THE SYSTEM VARIABLES (Y/N)?'	IINPUT	348
+ ,1X,A1)	IINPUT	349
510 FORMAT (A1)	IINPUT	350
520 FORMAT (/1X,'INPUT OF DISTRIBUTION TYPES AND PARAMETERS')	IINPUT	351
530 FORMAT (/1X,I4,') ',A12,' (',A12,') DISTRIBUTION')	IINPUT	352
540 FORMAT (8X,I2,') ',A20)	IINPUT	353
550 FORMAT (8X,I2,') PREVIOUSLY DEFINED DISTRIBUTION.')	IINPUT	354
560 FORMAT (1X,'ENTER THE NUMBER FOR THE DESIRED DISTRIBUTION. ',A1)	IINPUT	355
570 FORMAT (1X,'DISTRIBUTION TYPE IS ',A20)	IINPUT	356
580 FORMAT (1X,'ENTER THE MEAN OF THE DISTRIBUTION. ',A1)	IINPUT	357
590 FORMAT (1X,'ENTER THE STANDARD DEVIATION. ',T30,A1)	IINPUT	358
600 FORMAT (/1X,'** ENTERED VALUE OF ',1PE12.4,' IS OUT OF RANGE.')	IINPUT	359
610 FORMAT (1X,'ENTER THE MEDIAN VALUE FOR THE DISTRIBUTION. ',A1)	IINPUT	360
620 FORMAT (1X,'THE MEAN OF THE UNDERLYING NORMAL DISTRIBUTION IS ',1P	IINPUT	361
+E12.4/1X,'ENTER THE STANDARD DEVIATION OF THIS NORMAL DISTRIBUTION	IINPUT	362
+ . ',A1)	IINPUT	363
630 FORMAT (1X,'ENTER THE MINIMUM AND MAXIMUM EXPONENTS FOR THE DISTRI	IINPUT	364
+BUTION. ')	IINPUT	365
640 FORMAT (1X,'ENTER THE LOWER AND UPPER ENDPOINTS FOR THE UNIFORM DI	IINPUT	366
+STRIBUTION.')	IINPUT	367
650 FORMAT (1X,'ENTER THE LOWER AND UPPER VALUES FOR THE BERNDULLI DIS	IINPUT	368
+TRIBUTION.')	IINPUT	369
660 FORMAT (1X,'ENTER THE PROBABILITY 0,1 OF THE LOWER VALUE OCCURIN	IINPUT	370
+G.')	IINPUT	371
670 FORMAT (/1X,'THE CONFIDENCE FUNCTION WILL BE READ FROM AN EXTERNAL	IINPUT	372
+ FILE.'/1X,'ENTER THE NAME OF THE FILE CONTAINING THE CUMULATIVE'	IINPUT	373
+ /1X,'CONFIDENCE FUNCTION DATA FOR THIS VARIABLE.')	IINPUT	374
680 FORMAT (/1X,'THE DATA POINTS WILL BE READ FROM AN EXTERNAL FILE.')	IINPUT	375
+1X,'ENTER THE NAME OF THE FILE CONTAINING'/1X,'THE DATA POINTS FOR	IINPUT	376

<pre> + THIS INPUT VARIABLE.')</pre>	IINPUT	377
690 FORMAT (20A4)	IINPUT	378
700 FORMAT (1X,'ENTER THE VALUE FOR THE VARIABLE. ',A1)	IINPUT	379
710 FORMAT (1X,'WOULD YOU LIKE A LOWER AND AN UPPER'/1X,'BOUND ENFORCE	IINPUT	380
+D ON THIS VARIABLE (Y/N)? ',A1)	IINPUT	381
720 FORMAT (1X,'ENTER THE VALUES FOR THE LOWER AND UPPER BOUNDS.')	IINPUT	382
730 FORMAT (/1X,'WOULD YOU LIKE TO UPDATE THE SYSTEM CONSTANTS (Y/N)?'	IINPUT	383
+,1X,A1)	IINPUT	384
740 FORMAT (/1X,'ENTER THE VALUE FOR ',A12,2X,'(',A12,')')	IINPUT	385
750 FORMAT (5X,'(CURRENT VALUE IS ',1PE12.5,')')	IINPUT	386
760 FORMAT (///1X,'ENTER THE NUMBER OF SAMPLES TO TAKE (MAX =',I5,').')	IINPUT	387
770 FORMAT (/1X,'** ERROR ** ENTERED VALUE EXCEEDS PROGRAM LIMIT OF ',	IINPUT	388
+I5)	IINPUT	389
780 FORMAT (/1X,'ENTER THE PRINT INTERVAL FOR OUTPUT DATA. ',A1)	IINPUT	390
790 FORMAT (/1X,'ENTER THE NUMBER OF INTERVALS FOR STRATIFIED SAMPLING	IINPUT	391
+ (MAX=',I5,'). ')	IINPUT	392
800 FORMAT (1X,I5,' INTERVALS IS TOO MANY, ONLY ',I5,' SAMPLES CHOSEN.	IINPUT	393
+')	IINPUT	394
810 FORMAT (/1X,'-----	IINPUT	395
+-----')	IINPUT	396
820 FORMAT (/1X,A8,2X,['F5.2,']',T51,'RUN I.D. ',I10,/1X,A40,9X,'U	BCSFIX	53
+SER NAME',4X,A8/1X,A40,9X,'DATA SET NUMBER ',I5///1X,'TABLE 1.',3	BCSFIX	54
+X,'ECHO OF THE INPUT DATA')	BCSFIX	55
830 FORMAT (/5X,A12,' (',A12,')'/15X,'DISTRIBUTION IS ',A20)	BCSFIX	56
840 FORMAT (22X,'MEAN VALUE = ',T35,1PE12.4/17X,'STND DEVIATION = ',T3	BCSFIX	57
+5,E12.4)	BCSFIX	58
850 FORMAT (22X,'CONSTANTS FOR THE UNDERLYING NORMAL DISTRIBUTION ARE'	BCSFIX	59
+/17X,'MEAN VALUE = ',T35,1PE12.4/17X,'STND DEVIATION = ',T35,E12.4)	BCSFIX	60
860 FORMAT (22X,'MIN, MAX EXPONENTS FOR THE UNDERLYING'/17X,'UNIFORM D	BCSFIX	61
+ISTRIBUITON ARE'/17X,'MIN = ',1PE12.4,', MAX = ',E12.4)	BCSFIX	62
870 FORMAT (22X,'MEAN VALUE IS',T35,1PE12.4)	BCSFIX	63
880 FORMAT (22X,'LOWER ENDPOINT = ',T35,1PE12.4/17X,'UPPER ENDPOINT = ',	BCSFIX	64
+T35,E12.4)	BCSFIX	65
890 FORMAT (22X,'LOWER VALUE = ',T35,1PE12.4/17X,'UPPER VALUE = ',T35,E1	BCSFIX	66
+2.4/17X,'LOW VALUE PRDB = ',T35,E12.4)	BCSFIX	67
900 FORMAT (22X,'THE CONFIDENCE FUNCTION WILL BE READ AS A PIECE WISE'	BCSFIX	68
+/17X,'CONTINUOUS DATA FUNCTION FROM THE EXTERNAL FILE: '/18X,20A4)	BCSFIX	69
910 FORMAT (22X,'THE RANDOM DATA POINTS WILL BE READ'/17X,'FROM THE EX	BCSFIX	70
+TERNAL FILE: '/18X,20A4)	BCSFIX	71
920 FORMAT (22X,'CONSTANT VALUE = ',T35,1PE12.4)	BCSFIX	72
930 FORMAT (22X,'LOWER BOUND = ',T35,1PE12.4/17X,'UPPER BOUND = ',T35,E1	BCSFIX	73
+2.4)	BCSFIX	74
940 FORMAT (/)	BCSFIX	75
950 FORMAT (5X,'VALUE FOR ',A12,2X,'(',A12,') IS ',1PE12.4)	BCSFIX	76
960 FORMAT (///5X,'NUMBER OF SAMPLES IS ',I8/1X,'PRINT INTERVAL IS',4X,	BCSFIX	77
+I8)	BCSFIX	78
970 FORMAT (5X,'STRATIFIED SAMPLING CHOSEN, USING ',I5,' LEVELS.')	BCSFIX	79
980 FORMAT (5X,'STRATIFIED SAMPLING NOT CHOSEN.')	BCSFIX	80
990 FORMAT (/1X,'***** ERROR ON INPUT, TRY AGAIN *****/)	BCSFIX	81
END	IINPUT	425
SUBROUTINE LNNORM (N,RNDVAL,RP1,RP2)	LNNORM	2
C	LNNORM	3
C ROUTINE FOR TRANSFORMING A UNIFORMLY DISTRIBUTED DATA SET ON THE	LNNORM	4
C INTERVAL 0,1 TO A NATURAL LOGNORMALLY DISTRIBUTED DATA SET.	LNNORM	5

C		LNNORM	6
C	N = THE NUMBER OF ITEMS IN THE DATA SET	LNNORM	7
C	RNDVAL = VECTOR OF UNIFORMLY DISTRIBUTED VALUES ON INPUT. EACH	LNNORM	8
C	VALUE MUST BE BETWEEN ZERO AND ONE.	LNNORM	9
C	= VECTOR OF LOGNORMALLY DISTRIBUTED VALUES ON OUTPUT.	LNNORM	10
C	RP1 = MEAN VALUE FOR THE UNDERLYING NORMAL DISTRIBUTION.	LNNORM	11
C	RP2 = STANDARD DEVIATION FOR THE UNDERLYING NORMAL DISTRIBUTION.	LNNORM	12
C		LNNORM	13
	DIMENSION	LNNORM	14
	+ RNDVAL(N)	LNNORM	15
C		LNNORM	16
C	NATURAL LOGNORMAL DISTRIBUTION	LNNORM	17
C		LNNORM	18
	DO 100 I=1,N	LNNORM	19
	RV=RNDVAL(I)	LNNORM	20
	RV=DNORM (RV,RP1,RP2)	LNNORM	21
	RNDVAL(I)=EXP(RV)	LNNORM	22
	100 CONTINUE	LNNORM	23
	RETURN	LNNORM	24
	END	LNNORM	25
	SUBROUTINE LNNORML (N,RNDVAL,RP1,RP2,AMIN,AMAX)	LNNORML	2
C		LNNORML	3
C	ROUTINE FOR TRANSFORMING A UNIFORMLY DISTRIBUTED DATA SET ON THE	LNNORML	4
C	INTERVAL 0,1 TO A NATURAL LOGNORMALLY DISTRIBUTED DATA SET, WITH	LNNORML	5
C	THE CONSTRAINT THAT ALL OUTPUT VALUES LIE BETWEEN SPECIFIED LIMITS.	LNNORML	6
C		LNNORML	7
C	N = THE NUMBER OF DATA VALUES IN VECTOR RNDVAL.	LNNORML	8
C	RNDVAL = ON INPUT, THE VECTOR OF UNIFORMLY DISTRIBUTED VALUES.	LNNORML	9
C	= ON OUTPUT, THE VECTOR OF LOGNORMALLY DISTRIBUTED VALUES.	LNNORML	10
C	RP1 = MEAN VALUE FOR THE DESIRED UNDERLYING NORMAL DISTRIBUTION.	LNNORML	11
C	RP2 = STAND. DEV FOR THE DESIRED UNDERLYING NORMAL DISTRIBUTION.	LNNORML	12
C	AMIN = MINIMUM LIMIT VALUE FOR THE LOGNORMALLY DISTRIBUTED DATA.	LNNORML	13
C	AMAX = MAXIMUM LIMIT VALUE FOR THE LOGNORMALLY DISTRIBUTED DATA.	LNNORML	14
C		LNNORML	15
C	UMIN,UMAX = THE LIMIT VALUES ON THE UNIFORM DISTRIBUTION. THESE	LNNORML	16
C	ARE AVAILABLE TO THE USER THROUGH COMMON BLOCK ULIMITS.	LNNORML	17
C		LNNORML	18
	COMMON /ULIMITS/	ULIMITS	2
	+ UMAX, UMIN	ULIMITS	3
C		ULIMITS	4
C		LNNORML	20
	DIMENSION	LNNORML	21
	+ RNDVAL(N)	LNNORML	22
C		LNNORML	23
	IF (AMIN.GT.AMAX) THEN	LNNORML	24
	A=AMIN	LNNORML	25
	AMIN=AMAX	LNNORML	26
	AMAX=A	LNNORML	27
	ENDIF	LNNORML	28
C		LNNORML	29
C	COMPUTE LOGARITHMS OF THE CHOSEN LIMITS	LNNORML	30
C		LNNORML	31
	BMIN=ALOG(AMIN)	LNNORML	32
	BMAX=ALOG(AMAX)	LNNORML	33

C		LNNDRL	34
C	DO COMPUTATIONS ON A LOG SCALE	LNNDRL	35
C		LNNDRL	36
C	CALL NORMALL (N,RNDVAL,RP1,RP2,BMIN,BMAX)	LNNDRL	37
C		LNNDRL	38
C	TRANSFORM NORMAL DISTRIBUTION TO LOGNORMAL	LNNDRL	39
C		LNNDRL	40
C	DO 100 I=1,N	LNNDRL	41
C	RNDVAL(I)=EXP(RNDVAL(I))	LNNDRL	42
C	100 CONTINUE	LNNDRL	43
C		LNNDRL	44
C	RETURN	LNNDRL	45
C	END	LNNDRL	46
C	SUBROUTINE LNUNIF (N,RNDVAL,RP1,RP2)	LNUNIF	2
C		LNUNIF	3
C	ROUTINE FOR TRANSFORMING A UNIFORMLY DISTRIBUTED DATA SET ON THE	LNUNIF	4
C	INTERVAL 0,1 TO A NATURAL LOGUNIFORMLY DISTRIBUTED DATA SET.	LNUNIF	5
C		LNUNIF	6
C	N = THE NUMBER OF ITEMS IN THE DATA SET.	LNUNIF	7
C	RNDVAL = VECTOR OF UNIFORMLY DISTRIBUTED VALUES ON INPUT. EACH	LNUNIF	8
C	VALUE MUST BE BETWEEN ZERO AND ONE.	LNUNIF	9
C	= VECTOR OF LOGUNIFORMLY DISTRIBUTED VALUES ON OUTPUT.	LNUNIF	10
C	RP1 = MINIMUM EXPONENT (BASE E) FOR THE OUTPUT DISTRIBUTION.	LNUNIF	11
C	RP2 = MAXIMUM EXPONENT (BASE E) FOR THE OUTPUT DISTRIBUTION.	LNUNIF	12
C		LNUNIF	13
C	DIMENSION	LNUNIF	14
C	+ RNDVAL(N)	LNUNIF	15
C		LNUNIF	16
C	NATURAL LOGUNIFORM DISTRIBUTION	LNUNIF	17
C		LNUNIF	18
C	DO 100 I=1,N	LNUNIF	19
C	RV=RP1+(RP2-RP1)*RNDVAL(I)	LNUNIF	20
C	RNDVAL(I)=EXP(RV)	LNUNIF	21
C	100 CONTINUE	LNUNIF	22
C	RETURN	LNUNIF	23
C	END	LNUNIF	24
C	SUBROUTINE LOGNORM (N,RNDVAL,RP1,RP2)	LOGNORM	2
C		LOGNORM	3
C	ROUTINE FOR TRANSFORMING A UNIFORMLY DISTRIBUTED DATA SET ON THE	LOGNORM	4
C	INTERVAL 0,1 TO A COMMON LOGNORMALLY DISTRIBUTED DATA SET.	LOGNORM	5
C		LOGNORM	6
C	N = THE NUMBER OF ITEMS IN THE DATA SET.	LOGNORM	7
C	RNDVAL = VECTOR OF UNIFORMLY DISTRIBUTED VALUES ON INPUT. EACH	LOGNORM	8
C	VALUE MUST BE BETWEEN ZERO AND ONE.	LOGNORM	9
C	= VECTOR OF COMMON LOGNORMALLY DISTRIBUTED VALUES ON OUTPUT.	LOGNORM	10
C	RP1 = MEAN VALUE FOR THE UNDERLYING NORMAL DISTRIBUTION.	LOGNORM	11
C	RP2 = STANDARD DEVIATION FOR THE UNDERLYING NORMAL DISTRIBUTION.	LOGNORM	12
C		LOGNORM	13
C	DIMENSION	LOGNORM	14
C	+ RNDVAL(N)	LOGNORM	15
C		LOGNORM	16
C	DATA BASEXP/2.3025851/	LOGNORM	17
C		LOGNORM	18
C	COMMON LOGNORMAL DISTRIBUTION	LOGNORM	19

C		LOGNORM	20
	DO 100 I=1,N	LOGNORM	21
	RV=RNDVAL(I)	LOGNORM	22
	RV=DNORM (RV,RP1,RP2)	LOGNORM	23
	RNDVAL(I)=EXP(BASEXP*RV)	LOGNORM	24
	100 CONTINUE	LOGNORM	25
	RETURN	LOGNORM	26
	END	LOGNORM	27
	SUBROUTINE LOGNORML (N,RNDVAL,RP1,RP2,AMIN,AMAX)	LOGNORML	2
C		LOGNORML	3
C	ROUTINE FOR TRANSFORMING A UNIFORMLY DISTRIBUTED DATA SET ON THE	LOGNORML	4
C	INTERVAL 0,1 TO A COMMON LOGNORMALLY DISTRIBUTED DATA SET, WITH	LOGNORML	5
C	THE CONSTRAINT THAT ALL OUTPUT VALUES LIE BETWEEN SPECIFIED LIMITS.	LOGNORML	6
C		LOGNORML	7
C	N = THE NUMBER OF DATA VALUES IN VECTOR RNDVAL.	LOGNORML	8
C	RNDVAL = ON INPUT, THE VECTOR OF UNIFORMLY DISTRIBUTED VALUES.	LOGNORML	9
C	= ON OUTPUT, THE VECTOR OF LOGNORMALLY DISTRIBUTED VALUES.	LOGNORML	10
C	RP1 = MEAN VALUE FOR THE DESIRED UNDERLYING NORMAL DISTRIBUTION.	LOGNORML	11
C	RP2 = STAND. DEV FOR THE DESIRED UNDERLYING NORMAL DISTRIBUTION.	LOGNORML	12
C	AMIN = MINIMUM LIMIT VALUE FOR THE LOGNORMALLY DISTRIBUTED DATA.	LOGNORML	13
C	AMAX = MAXIMUM LIMIT VALUE FOR THE LOGNORMALLY DISTRIBUTED DATA.	LOGNORML	14
C		LOGNORML	15
C	UMIN,UMAX = THE LIMIT VALUES ON THE UNIFORM DISTRIBUTION. THESE	LOGNORML	16
C	ARE AVAILABLE TO THE USER THROUGH COMMON BLOCK ULIMITS.	LOGNORML	17
C		LOGNORML	18
	COMMON /ULIMITS/	ULIMITS	2
	+ UMAX, UMIN	ULIMITS	3
C		ULIMITS	4
C		LOGNORML	20
	DIMENSION	LOGNORML	21
	+ RNDVAL(N)	LOGNORML	22
	DATA	LOGNORML	23
	+ BASEXP/2.3025851/	LOGNORML	24
C		LOGNORML	25
	IF (AMIN.LE.AMAX) GO TO 100	LOGNORML	26
	A=AMIN	LOGNORML	27
	AMIN=AMAX	LOGNORML	28
	AMAX=A	LOGNORML	29
	100 CONTINUE	LOGNORML	30
C		LOGNORML	31
C	COMPUTE LOGARITHMS OF THE CHOSEN LIMITS	LOGNORML	32
C		LOGNORML	33
	BMIN=ALOG10(AMIN)	LOGNORML	34
	BMAX=ALOG10(AMAX)	LOGNORML	35
C		LOGNORML	36
C	DO COMPUTATIONS ON A LOG SCALE	LOGNORML	37
C		LOGNORML	38
	CALL NORMALL (N,RNDVAL,RP1,RP2,BMIN,BMAX)	LOGNORML	39
C		LOGNORML	40
C	TRANSFORM NORMAL DISTRIBUTION TO LOGNORMAL	LOGNORML	41
C		LOGNORML	42
	DO 110 I=1,N	LOGNORML	43
	RNDVAL(I)=EXP(BASEXP*RNDVAL(I))	LOGNORML	44
	110 CONTINUE	LOGNORML	45

C		LOGNORML	46
	RETURN	LOGNORML	47
	END	LOGNORML	48
	SUBROUTINE LOGUNIF (N,RNDVAL,RP1,RP2)	LOGUNIF	2
C		LOGUNIF	3
C	ROUTINE FOR TRANSFORMING A UNIFORMLY DISTRIBUTED DATA SET ON THE	LOGUNIF	4
C	INTERVAL TO A COMMON LOGUNIFORMLY DISTRIBUTED DATA SET.	LOGUNIF	5
C		LOGUNIF	6
C	N = THE NUMBER OF ITEMS IN THE DATA SET.	LOGUNIF	7
C	RNDVAL = VECTOR OF UNIFORMLY DISTRIBUTED VALUES ON INPUT. EACH	LOGUNIF	8
C	VALUE MUST BE BETWEEN ZERO AND ONE.	LOGUNIF	9
C	= VECTOR OF LOGUNIFORMLY DISTRIBUTED VALUES ON OUTPUT.	LOGUNIF	10
C	RP1 = MINIMUM EXPONENT (BASE 10) FOR THE OUTPUT DISTRIBUTION.	LOGUNIF	11
C	RP2 = MAXIMUM EXPONENT (BASE 10) FOR THE OUTPUT DISTRIBUTION.	LOGUNIF	12
C		LOGUNIF	13
	DIMENSION	LOGUNIF	14
	+ RNDVAL(N)	LOGUNIF	15
C		LOGUNIF	16
	DATA BASEXP/2.3025851/	LOGUNIF	17
C		LOGUNIF	18
C	COMMON LOGUNIFORM DISTRIBUTION	LOGUNIF	19
C		LOGUNIF	20
	DO 100 I=1,N	LOGUNIF	21
	RV=RP1+(RP2-RP1)*RNDVAL(I)	LOGUNIF	22
	RNDVAL(I)=EXP(BASEXP*RV)	LOGUNIF	23
100	CONTINUE	LOGUNIF	24
	RETURN	LOGUNIF	25
	END	LOGUNIF	26
	SUBROUTINE NORMAL (N,RNDVAL,RP1,RP2)	NORMAL	2
C		NORMAL	3
C	ROUTINE FOR COMPUTING A NORMALLY DISTRIBUTED DATA SET FROM A	NORMAL	4
C	UNIFORMLY DISTRIBUTED DATA SET ON THE INTERVAL 0,1 .	NORMAL	5
C		NORMAL	6
C	N = THE NUMBER OF ITEMS IN THE DATA SET	NORMAL	7
C	RNDVAL = VECTOR OF UNIFORMLY DISTRIBUTED VALUES ON INPUT. EACH	NORMAL	8
C	VALUE MUST BE BETWEEN ZERO AND ONE.	NORMAL	9
C	= VECTOR OF NORMALLY DISTRIBUTED VALUES ON OUTPUT.	NORMAL	10
C	RP1 = MEAN VALUE FOR THE NORMAL DISTRIBUTION.	NORMAL	11
C	RP2 = STANDARD DEVIATION FOR THE NORMAL DISTRIBUTION.	NORMAL	12
C		NORMAL	13
	DIMENSION	NORMAL	14
	+ RNDVAL(N)	NORMAL	15
C		NORMAL	16
C	NORMAL DISTRIBUTION	NORMAL	17
C		NORMAL	18
	DO 110 I=1,N	NORMAL	19
	RV=RNDVAL(I)	NORMAL	20
	RNDVAL(I)=DNORM(RV,RP1,RP2)	NORMAL	21
110	CONTINUE	NORMAL	22
C		NORMAL	23
	RETURN	NORMAL	24
	END	NORMAL	25
	SUBROUTINE NORMALL (N,RNDVAL,RP1,RP2,AMIN,AMAX)	NORMALL	2
C		NORMALL	3

C	ROUTINE FOR TRANSFORMING A UNIFORMLY DISTRIBUTED DATA SET ON THE	NORMALL	4
C	INTERVAL 0,1 TO A NORMALLY DISTRIBUTED DATA SET, WITH THE	NORMALL	5
C	CONSTRAINT THAT ALL OUTPUT VALUES LIE BETWEEN SPECIFIED LIMITS.	NORMALL	6
C		NORMALL	7
C	RP1 = MEAN VALUE FOR THE DESIRED NORMAL DISTRIBUTION.	NORMALL	8
C	RP2 = STANDARD DEV FOR THE DESIRED NORMAL DISTRIBUTION.	NORMALL	9
C	AMIN = MINIMUM LIMIT VALUE FOR THE NORMALLY DISTRIBUTED DATA.	NORMALL	10
C	AMAX = MAXIMUM LIMIT VALUE FOR THE NORMALLY DISTRIBUTED DATA.	NORMALL	11
C	N = THE NUMBER OF DATA VALUES IN VECTOR RNDVAL.	NORMALL	12
C	RNDVAL = ON INPUT, THE VECTOR OF UNIFORMLY DISTRIBUTED VALUES.	NORMALL	13
C	= ON OUTPUT, THE VECTOR OF NORMALLY DISTRIBUTED VALUES.	NORMALL	14
C		NORMALL	15
C	NOTE THAT THE NORMAL DISTRIBUTION GENERATOR, DNORM, MUST BE A ONE	NORMALL	16
C	TO ONE TRANSFORMATION BETWEEN THE UNIFORM AND NORMAL DISTRIBUTIONS.	NORMALL	17
C	EACH MEAN OF THE UNIFORM DISTRIBUTION (0.5) MUST TRANSFORM TO THE	NORMALL	18
C	MEAN OF THE NORMAL DISTRIBUTION (RP1).	NORMALL	19
C		NORMALL	20
C	UMIN,UMAX = THE LIMIT VALUES ON THE UNIFORM DISTRIBUTION. THESE	NORMALL	21
C	ARE AVAILABLE TO THE USER THROUGH COMMON BLOCK ULIMITS.	NORMALL	22
C		NORMALL	23
	COMMON /ULIMITS/	ULIMITS	2
	+ UMAX, UMIN	ULIMITS	3
C		ULIMITS	4
C		NORMALL	25
	DIMENSION	NORMALL	26
	+ RLIM(2), RNDVAL(N)	NORMALL	27
	DATA	NORMALL	28
	+ EPS2/0.0E0/	NORMALL	29
C		NORMALL	30
	IF (AMIN.LE.AMAX) GO TO 100	NORMALL	31
	RV=AMIN	NORMALL	32
	AMIN=AMAX	NORMALL	33
	AMAX=RV	NORMALL	34
	100 CONTINUE	NORMALL	35
C		NORMALL	36
C	SET DEFAULTS	NORMALL	37
C		NORMALL	38
	RLIM(1)=0.0	NORMALL	39
	RLIM(2)=1.0	NORMALL	40
	ZB=DNORM(RLIM(1),RP1,RP2)	NORMALL	41
	ZT=DNORM(RLIM(2),RP1,RP2)	NORMALL	42
	INVRS=0	NORMALL	43
	IF (ZB.LE.ZT) GO TO 110	NORMALL	44
	RV=ZT	NORMALL	45
	ZT=ZB	NORMALL	46
	ZB=RV	NORMALL	47
	INVRS=1	NORMALL	48
	110 CONTINUE	NORMALL	49
C		NORMALL	50
C	LOOP ON THE LOWER AND UPPER LIMITS	NORMALL	51
C		NORMALL	52
	ST=RP1+RP2	NORMALL	53
	SB=RP1-RP2	NORMALL	54
	DO 150 I=1,2	NORMALL	55

	ENDPNT=AMIN	NORMAL	56
	IF (I.EQ.2) ENDPNT=AMAX	NORMAL	57
C		NORMAL	58
C	CHECK FOR ENDPOINT WITHIN DISTRIBUTION LIMITS	NORMAL	59
C		NORMAL	60
	IF ((ENDPNT.LT.ZT).OR.(ENDPNT.LT.ZB)) GO TO 120	NORMAL	61
	RV=1.	NORMAL	62
	IF (INVRS.GT.0) RV=0.	NORMAL	63
	GO TO 140	NORMAL	64
120	CONTINUE	NORMAL	65
	IF ((ENDPNT.GT.ZT).OR.(ENDPNT.GT.ZB)) GO TO 130	NORMAL	66
	RV=0.	NORMAL	67
	IF (INVRS.GT.0) RV=1.	NORMAL	68
	GO TO 140	NORMAL	69
130	CONTINUE	NORMAL	70
C		NORMAL	71
C	FIND DISTANCE FROM MEAN VALUE, IN STND DEVIATIONS,	NORMAL	72
C	AND COMPUTE INTERVAL LIMIT FOR THIS ENDPOINT.	NORMAL	73
C		NORMAL	74
	RV=(ENDPNT-RP1)/RP2	NORMAL	75
	RV = ALNORM (RV)	NORMAL	76
C		NORMAL	77
140	CONTINUE	NORMAL	78
	RLIM(I)=RV	NORMAL	79
150	CONTINUE	NORMAL	80
	IF (INVRS.EQ.0) GO TO 160	NORMAL	81
	RLIM(1)=1.0-RLIM(1)	NORMAL	82
	RLIM(2)=1.0-RLIM(2)	NORMAL	83
160	CONTINUE	NORMAL	84
C		NORMAL	85
C	SORT ENDPOINT LIMITS	NORMAL	86
C		NORMAL	87
	UMIN=RLIM(1)	NORMAL	88
	UMAX=RLIM(2)	NORMAL	89
	IF (UMIN.LE.UMAX) GO TO 170	NORMAL	90
	A=UMIN	NORMAL	91
	UMIN=UMAX	NORMAL	92
	UMAX=A	NORMAL	93
170	CONTINUE	NORMAL	94
C		NORMAL	95
C	TRANSFORM UNIFORM DISTRIBUTION TO WITHIN LIMITS,	NORMAL	96
C	AND THEN TRANSFORM TO A NORMAL DISTRIBUTION.	NORMAL	97
C		NORMAL	98
	DO 180 I=1,N	NORMAL	99
	RV=UMIN+RNDVAL(I)*(UMAX-UMIN)	NORMAL	100
	RNDVAL(I)=DNORM(RV,RP1,RP2)	NORMAL	101
180	CONTINUE	NORMAL	102
C		NORMAL	103
	RETURN	NORMAL	104
	END	NORMAL	105
	PROGRAM PACSTAT	PACSTAT	2
	EXTERNAL BLKDAT	PACSTAT	3
C		PACSTAT	4
C	PROGRAM CONTAINS BLOCK STRUCTURING FOR PERFORMING A MONTE CARLO	PACSTAT	5

C	SIMULATION. AN OUTPUT VARIABLE (OR SEVERAL OUTPUT VALRIABLES) IS	PACSTAT	6
C	IS COMPUTED FROM SEVERAL INPUT VARIABLES. THE INPUT VARIABLES CAN	PACSTAT	7
C	TAKE ON ANY OF EIGHT DIFFERENT DISTRIBUTION TYPES, WHICH THE USER	PACSTAT	8
C	CHOOSES (ROUTINE IINPUT). THE USER MUST ALSO SPECIFY THE DEFINING	PACSTAT	9
C	PARAMETERS OF THE DISTRIBUTION FOR EACH INPUT VARIABLE.	PACSTAT	10
C	A PRINTOUT OF A CHOSEN OUTPUT VARIABLE IS GIVEN WITH DIAGNOSTICS	PACSTAT	11
C	ON BOTH THE OUTPUT AND INPUT DISTRIBUTIONS. THIS IS DIRECTED TO	PACSTAT	12
C	AN OPTIONAL, FORMATTED OUTPUT FILE. OUTPUT MAY ALSO BE WRITTEN	PACSTAT	13
C	TO A BINARY OUTPUT FILE, FOR POST PROCESSING.	PACSTAT	14
C	-----	PACSTAT	15
C		PACSTAT	16
C	THE ROUTINE BLKDAT AND SOLN MUST BE PROVIDED BY THE USER.	PACSTAT	17
C	INPUT AND OUTPUT VARIABLE NAMES AND DIMENSIONS (UNITS) ARE SET	PACSTAT	18
C	IN BLOCK DATA (ROUTINE BLKDAT). THE VALUE OF NVAR SETS THE	PACSTAT	19
C	NUMBER OF INPUT VARIABLES. THE VALUE OF NSOLN SETS THE NUMBER	PACSTAT	20
C	OF AVAILABLE SOLUTIONS. IF THESE EXCEED PROGRAM LIMITS, AN	PACSTAT	21
C	ERROR WILL BE PRINTED AND THE RUN TERMINATED.	PACSTAT	22
C	SEVERAL USER DEFINABLE CONSTANTS ARE PERMITTED. THE NUMBER OF	PACSTAT	23
C	CONSTANTS IS SET IN BLOCK DATA AS VARIABLE NCONST. THE NAMES	PACSTAT	24
C	AND DIMENSIONS OF EACH CONSTANT MUST ALSO BE SET IN BLOCK DATA.	PACSTAT	25
C	ONE MUST NOT CHOSE MORE CONSTANTS THAN THE PROGRAM IS DIMENSIONED	PACSTAT	26
C	TO ACCOMDDATE. NCONST = ZERO IS PERMITTED.	PACSTAT	27
C	MULTIPLE SOLUTIONS FOR ANY GIVEN PROBLEM ARE ALLOWED. ALL OF	PACSTAT	28
C	THE SOLUTIONS MUST BE COMPUTED IN ROUTINE SOLN. ROUTINE SOLN IS	PACSTAT	29
C	CALLED ONCE FOR EACH RANDOM SAMPLE. IT TAKES THE INPUT VALUES FROM	PACSTAT	30
C	ARRAY VINPT(1...NVAR) (COMMON BLOCK PBLK4). OUTPUT VALUES MUST	PACSTAT	31
C	BE STORED IN ARRAY VALU(1...NSOLN) (COMMON BLOCK PBLK4) FOR RETURN	PACSTAT	32
C	TO THE CALLING ROUTINES. THESE OUTPUT VALUES ARE MOVED TO ARRAY	PACSTAT	33
C	RLTS FOR LONG TERM STORAGE, AND THE TO ARRAY RPLT (ROUTINE DATOUT)	PACSTAT	34
C	FOR PLOTTING AND DIAGNOSTICS. ONLY ONE SOLUTION MAY BE PLOTTED/	PACSTAT	35
C	PRINTED AT A TIME.	PACSTAT	36
C		PACSTAT	37
C	-----	PACSTAT	38
C	MACHINE DEPENDENT CODING FOR THIS PROGRAM IS RESTRICTED TO	PACSTAT	39
C	ROUTINES ASG, RELEAS (OPENING AND CLOSING FILES, AND IDNUM	PACSTAT	40
C	(FILE IDENTIFIERS).	PACSTAT	41
C	-----	PACSTAT	42
C	THE RANDOM NUMBER GENERATOR, U01(DSEED), IS A FORTRAN CODED	PACSTAT	43
C	ROUTINE. IT IS ONLY CALLED FROM THE MAIN ROUTINE AND IN ROUTINE	PACSTAT	44
C	U01S. THE SEED, DSEED, IS A DOUBLE PRECISION REAL NUMBER, AND	PACSTAT	45
C	IS THE ONLY ITEM IN COMMON BLOCK PBLK16.	PACSTAT	46
C	-----	PACSTAT	47
C	THE PARAMETER ISIZE SETS THE MAXIMUM NUMBER OF RANDOM SAMPLES	PACSTAT	48
C	WHICH MAY BE USED. THE PARAMETER MAXNS SETS THE MAXIMUM NUMBER OF	PACSTAT	49
C	SAMPLES PER INPUT/OUTPUT VARIABLE WHICH MAY BE COMPUTED. THIS	PACSTAT	50
C	REQUIRES THAT MAXNS MUST BE LESS THAN OR EQUAL TO ISIZE. NOTE THAT	PACSTAT	51
C	SOME TRANSFERING OF RANDOM ARRAYS IS DONE IN ROUTINES VARSET AND	PACSTAT	52
C	STATOT, WHICH IS ONLY NECESSARY ON VIRTUAL MEMORY COMPUTERS, WHERE	PACSTAT	53
C	THE PARAMETER ISIZE EXCEEDS THE PAGE SIZE. ALSO, IF MAXNS EXCEEDS	PACSTAT	54
C	HALF THE PAGE SIZE, THE COMMON BLOCK PBLK6 MAY NEED TO BE CHANGED.	PACSTAT	55
C	-----	PACSTAT	56
C	PRG AND VERNUM ARE THE PROGRAM NAME AND VERSION NUMBER FOR THE	PACSTAT	57
C	MONTE CARLO SIMULATION PROGRAM, AND ARE SET IN BLOCK DATA.	PACSTAT	58
C	PRGI AND VERNMI ARE THE PROGRAM NAME AND VERSION NUMBER FOR THE	PACSTAT	59

C	MONTE CARLO DRIVER SOFTWARE, AND ARE SET IN THE MAIN ROUTINE.	PACSTAT	80
C	-----	PACSTAT	81
C		PACSTAT	82
	PARAMETER ISIZE = 50000 ! MAX DATA SET SIZE	PPARA	2
	PARAMETER MAXCNT = 10 ! MAX NUMBER OF CONSTANTS	PPARA	3
	PARAMETER MAXDST = 100 ! MAX NUMBER OF INPUT DATA POINTS	PPARA	4
	PARAMETER MAXLVS = 100 ! MAX LEVELS FOR STRATIFIED SAMPLING	PPARA	5
	PARAMETER MAXNS = 10000 ! MAX NUMBER OF SAMPLES	PPARA	8
	PARAMETER MAXSOL = 10 ! MAX NUMBER OF SOLUTIONS	PPARA	7
	PARAMETER MAXVAR = 25 ! MAX NUMBER OF INPUT VARIABLES	PPARA	8
	PARAMETER NMLEN = 10 ! FILE NAME LENGTH	PPARA	9
	PARAMETER NTYPE = 11 ! NUMBER OF DISTRIBUTION TYPES	PPARA	10
C		PPARA	11
C	COMMON /PBLK1/	PPARA	12
	+ NCONST, NSOLN, NVAR	PBLK1	2
C		PBLK1	3
C		PBLK1	4
	COMMON /PBLK2/	PBLK1	5
	+ NSTTL, NTTL, STTLE,	PBLK2	2
	+ TTLE	PBLK2	3
	CHARACTER*40	PBLK2	4
	+ STTLE, TTLE	PBLK2	5
C		PBLK2	6
C		PBLK2	7
	COMMON /PBLK5/	PBLK2	8
	+ ICNT, IDAT, INDEX	PBLK5	2
C		PBLK5	3
C		PBLK5	4
	COMMON /PBLK7A/	PBLK5	5
	+ NSLOC(MAXSOL)	PBLK7A	2
C		PBLK7A	3
C		PBLK7A	4
	COMMON /PBLK7B/	PBLK7A	5
	+ RLTS(ISIZE)	PBLK7B	2
C		PBLK7B	3
C		PBLK7B	4
	COMMON /PBLK8A/	PBLK7B	5
	+ NVLOC(MAXVAR)	PBLK8A	2
C		PBLK8A	3
C		PBLK8A	4
	COMMON /PBLK8B/	PBLK8A	5
	+ VAR(ISIZE)	PBLK8B	2
C		PBLK8B	3
C		PBLK8B	4
	COMMON /PBLK12/	PBLK8B	5
	+ NERR(MAXNS), NUMERR	PBLK12	2
C		PBLK12	3
C		PBLK12	4
	COMMON /PBLK16/	PBLK12	5
	+ DSEED	PBLK16	2
	REAL*8	PBLK16	3
	+ DSEED	PBLK16	4
C		PBLK16	5
		PBLK16	6

C	COMMON /PBLK17/	PBLK16	7
	+ ICCD, IQUIT, ISOLN,	PBLK17	2
	+ IUPDAT, MAXSAM, NPRT,	PBLK17	3
	+ NSAM, NSAMC	PBLK17	4
C		PBLK17	5
C		PBLK17	6
	COMMON /PBLK18/	PBLK17	7
	+ JJNF(NMLEN,MAXVAR), INFIL, IUDIST,	PBLK18	2
	+ UDIST(MAXDST,2)	PBLK18	3
	CHARACTER*4	PBLK18	4
	+ JJNF	PBLK18	5
C		PBLK18	6
C		PBLK18	7
	PARAMETER MAXSRC=15	PBLK18	8
	COMMON /IDCOM/	IDCOM	2
	+ JRUNID, FL, FLT(MAXSRC),	IDCOM	3
	+ NRUNID(MAXSRC), NSRC, PRG,	IDCOM	4
	+ PRGT(MAXSRC), TITLE(20), USRNM,	IDCOM	5
	+ USRNM1(MAXSRC), VERNUM	IDCOM	6
	CHARACTER*4	IDCOM	7
	+ TITLE	IDCOM	8
	CHARACTER*8	IDCOM	9
	+ FL, FLT, PRG,	IDCOM	10
	+ PRGT, USRNM, USRNM1	IDCOM	11
C		IDCOM	12
C		IDCOM	13
	COMMON /INOUT/	IDCOM	14
	+ IN, IOUT, IQB, IECHO	INOUT	2
	CHARACTER*1	ECHO	86
	+ IQB	INOUT	4
C		INOUT	5
C		INOUT	6
	CHARACTER*1	INOUT	7
	+ ANS	PACSTAT	77
	CHARACTER*4	PACSTAT	78
	+ INF(NMLEN)	PACSTAT	79
	CHARACTER*8	PACSTAT	80
	+ PRGI	PACSTAT	81
C	DOUBLE PRECISION MXSEED	PACSTAT	82
	DATA	HEIDI3	1
	+ TITLE/20*' '/	PACSTAT	83
	DATA	PACSTAT	84
	+ PRGI/'PACSTAT ', VERNMI/1.0/	PACSTAT	85
	DATA	PACSTAT	86
	+ IQB/' '/	PACSTAT	87
	REAL *4 MNSEED	PACSTAT	88
	REAL *8 MXSEED	HEIDI3	2
C		HEIDI3	3
C	SET VARIABLE MODEVAX TO TRUE FOR RUNNING ON THE VAX	ECHO	1
C		ECHO	2
	DATA MODEVAX /.FALSE./	ECHO	3
	LOGICAL MODEVAX	ECHO	4
	CHARACTER INREC*80	ECHO	5
		BATCH	1

C	CARRIAGE RETURN SUPPRESS IQB NOT AVAILABE ON PRIME	PACSTAT	89
C		PACSTAT	90
	ICNT=0	PACSTAT	91
	JONCE=0	PACSTAT	92
	NSRC=0	PACSTAT	93
	WNSEED=1.0	HEIDI3	4
	WXSEED=(2.0**31)-2.	HEIDI3	5
C		PACSTAT	94
C	SET INPUT/OUTPUT LOGICAL UNITS.	BCSFIX	1
C	IDAT = L.U. FOR PRINTED OUTPUT PROBLEM ECHO AND RESULTS	BCSFIX	2
C	IDATB = L.U. FOR BINARY OUTPUT RESULTS	BCSFIX	3
C	IN = L.U. TO READ DATA FROM THE USERS TERMINAL	BCSFIX	4
C	OUT = L.U. TO WRITE DATA TO THE USERS TERMINAL	BCSFIX	5
C		PACSTAT	98
	IN=5	PACSTAT	97
	IOUT=6	PACSTAT	98
	IECHO = 7	ECHO	6
	IDAT=12	PACSTAT	99
	IDATB=13	PACSTAT	100
	IFLAG = 0	ECHO	7
	CALL ASGVAX (NMLEN,INF,IFLAG)	ECHO	8
C		PACSTAT	103
C	PRINT BANNER PAGE	PACSTAT	104
C		PACSTAT	105
	CALL VERSION	PACSTAT	106
	KARD = 0	BATCH	2
50	CONTINUE	BATCH	3
	READ(IN,10000) INREC	BATCH	4
	KARD = KARD + 1	BATCH	5
	WRITE(IOUT,11000) INREC,KARD	BATCH	6
	WRITE(IDAT,11000) INREC,KARD	BATCH	7
	READ(INREC,10001) KIND	BATCH	8
	WRITE (IECHO,11000) INREC,KARD	ECHO	9
C		ECHO	10
	IF(KIND.EQ.4H****) GO TO 50	BATCH	9
	BACKSPACE IN	BATCH	10
C		PACSTAT	107
C	PRINT PROGRAM NAME AND VERSION NUMBER	PACSTAT	108
C		PACSTAT	109
	WRITE (IOUT,500) PRG,VERNUM	PACSTAT	110
	WRITE (IOUT,510) PRGI,VERNMI	PACSTAT	111
	CALL DCLAIM (IOUT)	BCSFIX	6
C		PACSTAT	112
C	ERROR CHECK NUMBER OF SOLUTIONS, VARIABLES, CONSTANTS	PACSTAT	113
C		PACSTAT	114
	IF ((NVAR.GT.MAXVAR).OR.(NVAR.LT.1)) THEN	PACSTAT	115
	WRITE (IOUT,520) NVAR,MAXVAR	PACSTAT	116
	GO TO 240	PACSTAT	117
	ENDIF	PACSTAT	118
	IF (NSOLN.GT.MAXSOL) THEN	PACSTAT	119
	WRITE (IOUT,530) NSOLN,MAXSOL	PACSTAT	120
	GO TO 240	PACSTAT	121
	ENDIF	PACSTAT	122
	IF (NSOLN.LT.0) NSOLN=0	PACSTAT	123

IF ((NCONST.GT.MAXCNT).OR.(NCONST.LT.0)) THEN	PACSTAT . 124
WRITE (IOUT,540) NCONST,MAXCNT	PACSTAT . 125
GO TO 240	PACSTAT . 126
ENDIF	PACSTAT . 127
C	PACSTAT . 128
C COMPUTE MAXIMUM NUMBER OF SAMPLES WITH CHOSEN	PACSTAT . 129
C NUMBER OF INPUT AND SOLUTION VARIABLES.	PACSTAT . 130
C	PACSTAT . 131
MAXSAM = ISIZE/NVAR	PACSTAT . 132
I = ISIZE	PACSTAT . 133
IF (NSOLN .GT. 0) I=ISIZE/NSOLN	PACSTAT . 134
IF (I .LT. MAXSAM) MAXSAM=I	PACSTAT . 135
IF (MAXSAM.GT.MAXNS) MAXSAM=MAXNS	PACSTAT . 136
C	PACSTAT . 137
C OPEN OUTPUT ECHO PRINT FILE (OPTIONAL)	PACSTAT . 138
C	PACSTAT . 139
IERR=0	PACSTAT . 140
WRITE (IOUT,550) TITLE	PACSTAT . 141
IF (MODEVAX) GO TO 65	ECHO . 11
WRITE (IOUT,560)	PACSTAT . 142
65 CONTINUE	ECHO . 12
WRITE (IOUT,565)	ECHO . 13
READ (IN,570) (INF(I),I=1,NMLEN)	PACSTAT . 143
CALL ASGVAX (NMLEN,INF,IFLAG)	ECHO . 14
WRITE (IECHO,570) (INF(I),I=1,NMLEN)	ECHO . 15
IF (INF(1).NE.'NONE') THEN	PACSTAT . 144
I=1	PACSTAT . 145
C - PRIME - CALL ASG (I,IERR,IDAT,NMLEN,INF)	PACSTAT . 146
IF (IERR.GT.0) GO TO 240	PACSTAT . 147
WRITE (IDAT,580) PRGI,VERNMI	BCSFIX . 7
CALL DCLAIM (IDAT)	BCSFIX . 8
ELSE	PACSTAT . 148
IDAT=0	PACSTAT . 149
ENDIF	PACSTAT . 150
C	PACSTAT . 151
C OPEN OUTPUT BINARY FILE (OPTIONAL)	PACSTAT . 152
C	PACSTAT . 153
IF (MODEVAX) GO TO 75	ECHO . 16
WRITE(IOUT,590)	BCSFIX . 9
READ (IN,570) (INF(I),I=1,NMLEN)	PACSTAT . 155
75 CONTINUE	ECHO . 17
WRITE (IOUT,595)	ECHO . 18
WRITE (IECHO,570) (INF(I),I=1,NMLEN)	ECHO . 19
IF ((INF(1).EQ.'NONE').OR.(INF(1).EQ.'NONE')) GO TO 100	PACSTAT . 156
I=1	PACSTAT . 157
C - PRIME - CALL ASG (I,IERR,IDATB,NMLEN,INF)	PACSTAT . 158
IF (IERR.NE.0) GO TO 230	PACSTAT . 159
GO TO 110	PACSTAT . 160
100 CONTINUE	PACSTAT . 161
IDATB=0	PACSTAT . 162
110 CONTINUE	PACSTAT . 163
C	PACSTAT . 164
C SET UNIQUE RUN IDENTIFIER	PACSTAT . 165
C	PACSTAT . 166

C	CALL IDNUM (JRUNID,USRNAM)	PACSTAT	187
C		PACSTAT	188
C	VAX EQUIVALENT CALL TO IDNUM	PACSTAT	189
C		PACSTAT	190
	CALL IDVAX (JRUNID,USRNAM)	PACSTAT	171
C		PACSTAT	172
C	ENTER LABEL FOR THIS RUN	PACSTAT	173
C		PACSTAT	174
	WRITE(IOUT,600)	BCSFIX	10
	READ(IN,610) STITLE	BCSFIX	11
	WRITE (IECHO,610) STITLE	ECHO	20
C		PACSTAT	177
C	COUNT NUMBER OF CHARACTERS IN THE PROBLEM TITLES	PACSTAT	178
C		PACSTAT	179
	K=41	PACSTAT	180
120	CONTINUE	PACSTAT	181
	K=K-1	PACSTAT	182
	IF ((TTITLE(K:K).EQ. ' ').AND. (K.GT.1)) GO TO 120	PACSTAT	183
	IF ((TTITLE(1:1).EQ. ' ').AND. (K.EQ.1)) K=1	PACSTAT	184
	NITL=K	PACSTAT	185
	K=41	PACSTAT	186
130	CONTINUE	PACSTAT	187
	K=K-1	PACSTAT	188
	IF ((STITLE(K:K).EQ. ' ').AND. (K.GT.1)) GO TO 130	PACSTAT	189
	IF ((STITLE(1:1).EQ. ' ').AND. (K.EQ.1)) K=0	PACSTAT	190
	NSTTL=K	PACSTAT	191
C		PACSTAT	192
C	CREATE TITLE FOR THIS RUN	PACSTAT	193
C		PACSTAT	194
	DO 140 I=1,10	PACSTAT	195
	J=I+10	PACSTAT	196
	I2=4*I	PACSTAT	197
	I1=I2-3	PACSTAT	198
	TITLE(I)=TTITLE(I1:I2)	PACSTAT	199
	TITLE(J)=STITLE(I1:I2)	PACSTAT	200
140	CONTINUE	PACSTAT	201
C		PACSTAT	202
C	OPTION TO TERMINATE OR CONTINUE ON SOLUTION ERROR	PACSTAT	203
C		PACSTAT	204
150	CONTINUE	PACSTAT	205
	IQUIT=0	PACSTAT	206
	IF (NSOLN.GT.0) THEN	PACSTAT	207
	WRITE (IOUT,620)	BCSFIX	12
	READ (IN,630) ANS	BCSFIX	13
	WRITE (IECHO,630) ANS	ECHO	21
	IF ((ANS.NE. 'C').AND. (ANS.NE. 'Q')) THEN	PACSTAT	210
	IF ((ANS.NE. 'c').AND. (ANS.NE. 'q')) GO TO 150	PACSTAT	211
	ENDIF	PACSTAT	212
	IF ((ANS.EQ. 'Q').OR. (ANS.EQ. 'q')) IQUIT=1	PACSTAT	213
	ENDIF	PACSTAT	214
C		PACSTAT	215
C	TOP OF ITERATION (DATA SET) LOOP	PACSTAT	216
C		PACSTAT	217
160	CONTINUE	PACSTAT	218

ICNT=ICNT+1	PACSTAT . 219
C	PACSTAT . 220
C READ INPUT DATA	PACSTAT . 221
C	PACSTAT . 222
C CALL INPUT	PACSTAT . 223
C	PACSTAT . 224
C SET DATA ARRAY LOCATION POINTERS	PACSTAT . 225
C	PACSTAT . 226
DO 170 I=1,NVAR	PACSTAT . 227
NVLOC(I)=(I-1)*NSAM+1	PACSTAT . 228
170 CONTINUE	PACSTAT . 229
IF (NSQLN.GT.0) THEN	PACSTAT . 230
DO 180 I=1,NSQLN	PACSTAT . 231
NSLOC(I)=(I-1)*NSAM+1	PACSTAT . 232
180 CONTINUE	PACSTAT . 233
ENDIF	PACSTAT . 234
C	PACSTAT . 235
C USER ENTERS SEED FOR RANDOM NUMBER GENERATOR	PACSTAT . 236
C	PACSTAT . 237
190 CONTINUE	PACSTAT . 238
IF (ICNT.LT.2) THEN	PACSTAT . 239
WRITE (IOUT,640)	BCSFIX . 14
READ(IN,*,ERR=190) DSEED	HEIDI3 . 6
WRITE(IECHO,*) DSEED	HEIDI3 . 7
IF ((DSEED .LT.MNSEED).OR.(DSEED.GT.MXSEED)) GO TO 190	HEIDI3 . 8
IF (IDAT.GT.0) WRITE (IDAT,650) DSEED	BCSFIX . 15
A=U01 (DSEED)	PACSTAT . 244
ENDIF	PACSTAT . 245
C	PACSTAT . 246
C-----	PACSTAT . 247
C	PACSTAT . 248
C SET INPUT VARIABLE ARRAYS	PACSTAT . 249
C	PACSTAT . 250
CALL VARSET (IERR)	PACSTAT . 251
IF (IERR.NE.0) THEN	PACSTAT . 252
WRITE (IOUT,660)	BCSFIX . 16
IF (IDAT.GT.0) WRITE (IDAT,660)	BCSFIX . 17
GO TO 220	PACSTAT . 255
ENDIF	PACSTAT . 256
C	PACSTAT . 263
C-----	PACSTAT . 264
C	PACSTAT . 265
C COMPUTE OUTPUT VARIABLE VALUES	PACSTAT . 266
C	PACSTAT . 267
CALL DATSET (IERR)	PACSTAT . 268
IF (IERR.NE.0) GO TO 200	PACSTAT . 269
NSAMC=NSAM-NUMERR	PACSTAT . 270
C	PACSTAT . 271
C CHECK FOR GOOD SOLUTIONS	PACSTAT . 272
C	PACSTAT . 273
IF (NUMERR.EQ.NSAM) THEN	PACSTAT . 274
WRITE (IOUT,670)	BCSFIX . 18
I=NSQLN	PACSTAT . 276
NSQLN=0	PACSTAT . 277

CALL STATOT	PACSTAT	278
NSOLN=I	PACSTAT	279
GO TO 220	PACSTAT	280
ENDIF	PACSTAT	281
C	PACSTAT	282
C RE-ORDER AROUND ANY BAD SOLUTIONS WHICH WERE FOUND	PACSTAT	283
C	PACSTAT	284
NSAMC=NSAM	PACSTAT	285
IF (NUMERR.GT.0) CALL REDRDR	PACSTAT	286
GO TO 210	PACSTAT	287
C	PACSTAT	288
C-----	PACSTAT	289
C	PACSTAT	290
C SALVAGE GOOD DATA ON ERROR STOP	PACSTAT	291
C	PACSTAT	292
200 CONTINUE	PACSTAT	293
A=FLOAT(NPRT)/FLOAT(NSAM)	PACSTAT	294
NSAMC=NSAM	PACSTAT	295
WRITE (IDUT,800) INDEX	BCSFIX	19
IF (IDAT.GT.0) WRITE (IDAT,800) INDEX	BCSFIX	20
IF (NSAM.LT.1) GO TO 220	PACSTAT	298
WRITE (IDUT,800)	BCSFIX	21
IF (IDAT.GT.0) WRITE (IDAT,800)	BCSFIX	22
NPRT=INT(FLOAT(NSAM)*A)	PACSTAT	301
IF (NPRT.LE.0) NPRT=1	PACSTAT	302
210 CONTINUE	PACSTAT	303
C	PACSTAT	304
C WRITE BINARY OUTPUT FILE HEADER, ON FIRST ITERATION ONLY	PACSTAT	305
C	PACSTAT	306
IF (ICNT.EQ.1) THEN	PACSTAT	307
IHEADR=1	PACSTAT	308
FL='STOCAST '	PACSTAT	309
IF (IDATB.GT.0) CALL WRSTOC (IDATB,IHEADR)	PACSTAT	310
ENDIF	PACSTAT	311
C	PACSTAT	312
C WRITE DATA TO BINARY OUTPUT FILE	PACSTAT	313
C	PACSTAT	314
IHEADR=0	PACSTAT	315
IF (IDATB.GT.0) CALL WRSTOC (IDATB,IHEADR)	PACSTAT	316
C	PACSTAT	317
C CHECK OUTPUT STATISTICS	PACSTAT	318
C ** THIS ROUTINE SORTS INPUT AND OUTPUT VARIABLES	PACSTAT	319
C ** IN ASCENDING ORDER (TO COMPUTE MEDIAN)	PACSTAT	320
C	PACSTAT	321
CALL STATOT	PACSTAT	322
C	PACSTAT	323
C PRINT/PLOT OUTPUT DATA	PACSTAT	324
C	PACSTAT	325
IF (NSOLN.GT.0) CALL DATOUT (JONCE)	PACSTAT	326
C	PACSTAT	327
C ANOTHER RUN OR STOP	PACSTAT	328
C	PACSTAT	329
220 CONTINUE	PACSTAT	330
WRITE (IDUT,700) IQB	BCSFIX	23

READ (IN,630) ANS	BCSFIX	24
WRITE (IECHO,630) ANS	ECHO	23
IF ((ANS.NE.'Y').AND.(ANS.NE.'N')) THEN	PACSTAT	333
IF ((ANS.NE.'y').AND.(ANS.NE.'n')) GO TO 220	PACSTAT	334
ENDIF	PACSTAT	335
IF ((ANS.EQ.'Y').OR.(ANS.EQ.'y')) GO TO 160	PACSTAT	336
C	PACSTAT	337
C	PACSTAT	338
C	PACSTAT	339
IF (JONCE.GT.0) CALL DONEPL	PACSTAT	340
IF (IDATB.GT.0) CALL RELEAS (IDATB)	PACSTAT	341
230 CONTINUE	PACSTAT	342
IF (IDAT.GT.0) CALL RELEAS (IDAT)	PACSTAT	343
240 CONTINUE	PACSTAT	344
STOP	PACSTAT	345
C	PACSTAT	346
500 FORMAT (/1X,'** MONTE CARLO SIMULATION **'/5X,' ',A8,1X,F4.1,' ')	PACSTAT	347
510 FORMAT (5X,'(',A8,1X,F4.1,')')	PACSTAT	348
520 FORMAT (/1X,'ERROR, THE NUMBER OF INPUT VARIABLES =' ,I5,' EXCEEDS	PACSTAT	349
+ THE'/1X,'PROGRAM LIMIT OF ',I3,', OR IS LESS THAN ONE.'/1X,'PROGR	PACSTAT	350
+AM STOP.')	PACSTAT	351
530 FORMAT (/1X,'ERROR, THE NUMBER OF AVAILABLE SOLUTIONS =' ,I5,' EXC	PACSTAT	352
+EEDS PROGRAM LIMIT OF ',I3,','/1X,'PROGRAM STOP.')	PACSTAT	353
540 FORMAT (/1X,'ERROR, NUMBER OF CONSTANTS =' ,I5,' EXCEEDS PROGRAM L	PACSTAT	354
+IMIT OF ',I3,','/1X,'PROGRAM STOP.')	PACSTAT	355
550 FORMAT (/1X,A40)	PACSTAT	356
560 FORMAT (/1X,'ENTER THE NAME FOR THE DIAGNOSTIC DATA ECHO FILE.'/1X	PACSTAT	357
+',(''NONE'' TO OMIT)')	PACSTAT	358
565 FORMAT(/1X,'ENTER THE NAME FOR THE DATA ECHO FILE.'/1X	ECHO	24
+',(''OR A CARRIAGE RETURN TO DEFAULT TO DATA FILE PACSTAT.ECH)')	ECHO	25
570 FORMAT (20A4)	PACSTAT	359
580 FORMAT (1H1,1X,'(',A8,1X,F5.2,')')	BCSFIX	25
590 FORMAT (/1X,'ENTER THE NAME FOR THE BINARY OUTPUT DATA FILE.'/1X,	BCSFIX	26
+',(''NONE'' TO OMIT)')	BCSFIX	27
595 FORMAT(/1X,'ENTER THE NAME FOR THE BINARY OUTPUT DATA FILE.'/1X,	BCSFIX	28
+',(''OR A CARRIAGE RETURN TO DEFAULT TO DATA FILE PACSTAT.BIN)')	BCSFIX	29
600 FORMAT (/1X,'ENTER LABEL FOR THIS RUN (MAX 40 CHARACTERS)')	BCSFIX	30
610 FORMAT (A40)	BCSFIX	31
620 FORMAT (/1X,'WOULD YOU LIKE TO CONTINUE OR QUIT IF AN ERROR'/1X,'I	BCSFIX	32
+S ENCOUNTERED IN THE SOLUTION ROUTINE (C/Q)? ')	BCSFIX	33
630 FORMAT (A1)	BCSFIX	34
640 FORMAT (/1X,'ENTER AN INITIAL SEED NUMBER FOR THE RANDOM NUMBER GE	BCSFIX	35
+NERATOR.'/1X,'(A REAL NUMBER BETWEEN 1.0 AND (2*31)-2.)')	BCSFIX	36
650 FORMAT (/5X,'INITIAL RANDOM SEED NUMBER IS ',1PD14.7)	BCSFIX	37
660 FORMAT (/1X,'** ERROR COMPUTING INPUT DISTRIBUTION DATA. THIS ITE	BCSFIX	38
+RATION WAS'/4X,'ABORTED DUE TO AN INABILITY TO COMPUTE AND/OR READ	BCSFIX	39
+ THE DESIRED'/4X,'RANDOM SAMPLES.')	BCSFIX	40
670 FORMAT (/1X,'*** ERROR, NO SUCCESSFUL SAMPLES WERE COMPUTED.'/5X,	BCSFIX	41
+THE INPUT VARIABLE STATISTICS WILL BE EXAMINED,'/5X,'BUT THE OUTPU	BCSFIX	42
+T DATA WILL BE IGNORED, AND THE BINARY'/5X,'OUTPUT FILE RECORD WIL	BCSFIX	43
+L NOT BE WRITTEN.')	BCSFIX	44
680 FORMAT (///5X,'--- ERROR ABORT, SAMPLE NUMBER ',I5)	BCSFIX	45
690 FORMAT (5X,'--- PROCEDURE WILL CONTINUE WITH REDUCED SAMPLE SPACE.	BCSFIX	46
+')	BCSFIX	47

```

700 FORMAT (/1X,'CREATE ANOTHER DATA SET (Y/N)? ',A1)
10000 FORMAT (A80)
10001 FORMAT (20A4)
11000 FORMAT (5X,A80,10X,I5)
      END
      SUBROUTINE PLINIT (XL2,YL2,IRUN)
C
C   ROUTINE FOR CHOSING INTERACTIVE/NON-INTERACTIVE PLOTTING,
C   SETTING PAGE SIZE, AND INITIALIZING PLOTTING PACKAGE.
C   XL2,YL2 = PAGE SIZE (INCHES, INITIALIZED BY CALLING ROUTINE)
C   IRUN   = 1/0 INTERACTIVE/NON-INTERACTIVE PLOTTING
C
      COMMON /INOUT/
      *   IN,   IOUT,   IQB,   IECHO
      CHARACTER*1
      *   IQB
C
C
C   CHARACTER*1
      *   ANS
C
C       INTER/NON-INTERACTIVE PLOTTING
C
      IRUN=1
100 CONTINUE
      WRITE (IOUT,600)
      READ (IN,*,ERR=100) KDEV
      WRITE (IECHO,*) KDEV
      IF ((KDEV.LT.0).OR.(KDEV.GT.5)) GO TO 100
C
C       INIT PAGE SIZE (XL2,YL2).  ALLOW USER MODIFICATION.
C
      IF (XL2.LE.0.) XL2=14.2
      IF (YL2.LE.0.) YL2=10.1
110 CONTINUE
      WRITE (IOUT,510) XL2,YL2,IQB
      READ (IN,520) ANS
      WRITE (IECHO,520) ANS
      IF ((ANS.NE.'Y').AND.(ANS.NE.'N')) THEN
        IF ((ANS.NE.'y').AND.(ANS.NE.'n')) GO TO 110
      ENDIF
      IF ((ANS.EQ.'Y').OR.(ANS.EQ.'y')) THEN
120 CONTINUE
        WRITE (IOUT,530)
        READ (IN,*,ERR=120) XL2,YL2
        WRITE (IECHO,*) XL2, YL2
        IF (XL2.LT.8.) XL2=8.
        IF (YL2.LT.6.) YL2=6.
      ENDIF
C
C       GRAPHICS INITIALIZATIONS
C
      KDEV=KDEV+1

```

```

BCSFIX . 48
BCSFIX . 49
BCSFIX . 50
BCSFIX . 51
PACSTAT . 300
PLINIT . 2
PLINIT . 3
PLINIT . 4
PLINIT . 5
PLINIT . 6
PLINIT . 7
PLINIT . 8
INOUT . 2
ECHO . 86
INOUT . 4
INOUT . 5
INOUT . 6
INOUT . 7
PLINIT . 10
PLINIT . 11
PLINIT . 12
PLINIT . 13
PLINIT . 14
PLINIT . 15
PLINIT . 16
PLINIT . 17
PLINIT . 18
PLINIT . 19
ECHO . 70
PLINIT . 20
PLINIT . 21
PLINIT . 22
PLINIT . 23
PLINIT . 24
PLINIT . 25
PLINIT . 26
PLINIT . 27
PLINIT . 28
ECHO . 79
PLINIT . 29
PLINIT . 30
PLINIT . 31
PLINIT . 32
PLINIT . 33
PLINIT . 34
PLINIT . 35
ECHO . 80
PLINIT . 36
PLINIT . 37
PLINIT . 38
PLINIT . 39
PLINIT . 40
PLINIT . 41
PLINIT . 42

```

GO TO (130,140,150,160,170,180), KDEV	PLINIT	43
C	PLINIT	44
130 CONTINUE	PLINIT	45
CALL COMPRS	PLINIT	46
IRUN=0	PLINIT	47
GO TO 490	PLINIT	48
C	PLINIT	49
140 CONTINUE	PLINIT	50
CALL TK4014 (120,0)	PLINIT	51
GO TO 490	PLINIT	52
C	PLINIT	53
150 CONTINUE	PLINIT	54
CALL TK4025	PLINIT	55
GO TO 490	PLINIT	56
C	PLINIT	57
160 CONTINUE	PLINIT	58
CALL TK4054 (120,0)	PLINIT	59
GO TO 490	PLINIT	60
C	PLINIT	61
170 CONTINUE	PLINIT	62
CALL REGIS (1,0)	PLINIT	63
GO TO 490	PLINIT	64
C	PLINIT	65
180 CONTINUE	PLINIT	66
CALL SLNRVT (120)	PLINIT	67
GO TO 490	PLINIT	68
C	PLINIT	69
C	PLINIT	70
C	PLINIT	71
C	PLINIT	72
490 CONTINUE	PLINIT	73
RETURN	PLINIT	74
500 FORMAT (/1X,'-- DEVICE MENU --'/2X,'0) COMPRESSED GRAPHICS',T20,	PLINIT	75
+ '1) TEKTRONIX 4014',T54,'2) TEKTRONIX 4025'/2X,'3) TEKTRONIX 4054'	PLINIT	76
+ ,T20,'4) VT-100',T54,'5) SELANAR'	PLINIT	77
+ //1X,'ENTER THE NUMBER CORRESPONDING TO THE DESIRED TERMINAL.')	PLINIT	78
510 FORMAT (/1X,'CURRENT PAGE SIZE IS ',F8.1,' BY ',F8.1/1X,'WOULD YOU	PLINIT	79
+ LIKE TO MODIFY PAGE SIZE (Y/N)? ',A1)	PLINIT	80
520 FORMAT (A1)	PLINIT	81
530 FORMAT (1X,'ENTER NEW X AND Y PAGE SIZE DIMENSIONS (INCHES).')	PLINIT	82
END	PLINIT	83
SUBROUTINE PPLT	PPLT	2
C	PPLT	3
C THIS ROUTINE GENERATES THE OUTPUT DATA PLOT FOR MONTE CARLO	PPLT	4
C SIMULATIONS DRIVEN BY PACSTAT. THE DEFAULT PLOT IS CARTESIAN ON	PPLT	5
C THE VERTICAL AXIS, AND LOGARITHMIC ON THE HORIZONTAL AXIS.	PPLT	6
C THE VERTICAL AXIS REPRESENTS THE CONFIDENCE LEVEL, USING ARRAY	PPLT	7
C CONF FOR Y LOCATIONS. THIS DATA IS ALLOWED TO VARY FROM 0.0 TO	PPLT	8
C 1.0.	PPLT	9
C THE HORIZONTAL AXIS PLOTS THE DATA VALUES IN ARRAY RPLT. THE	PPLT	10
C DEFAULT X AXIS IS LOGARITHMIC, BUT THIS MAY BE CHANGED IF THE DATA	PPLT	11
C MINIMUM IS BELOW ZERO, OR IF THIS DATA COVERS LESS THAN TWO FULL	PPLT	12
C ORDERS OF MAGNITUDE. THE DATA VALUES IN ARRAY RPLT MUST BE SORTED	PPLT	13
C IN ASCENDING ORDER PRIOR TO CALLING THIS ROUTINE.	PPLT	14

C	PARAMETER ISIZE = 50000 ! MAX DATA SET SIZE	PPLT	15
	PARAMETER MAXCNT = 10 ! MAX NUMBER OF CONSTANTS	PPARA	2
	PARAMETER MAXDST = 100 ! MAX NUMBER OF INPUT DATA POINTS	PPARA	3
	PARAMETER MAXLVS = 100 ! MAX LEVELS FOR STRATIFIED SAMPLING	PPARA	4
	PARAMETER MAXNS = 10000 ! MAX NUMBER OF SAMPLES	PPARA	5
	PARAMETER MAXSOL = 10 ! MAX NUMBER OF SOLUTIONS	PPARA	6
	PARAMETER MAXVAR = 25 ! MAX NUMBER OF INPUT VARIABLES	PPARA	7
	PARAMETER NMLEN = 10 ! FILE NAME LENGTH	PPARA	8
	PARAMETER NTYPE = 11 ! NUMBER OF DISTRIBUTION TYPES	PPARA	9
C		PPARA	10
C		PPARA	11
C	COMMON /PBLK2/	PPARA	12
	+ NSTTL, NTTL, STTL,	PBLK2	2
	+ TTLE	PBLK2	3
	CHARACTER*40	PBLK2	4
	+ STTLE, TTLE	PBLK2	5
C		PBLK2	6
C		PBLK2	7
C	COMMON /PBLK3/	PBLK2	8
	+ CDIMEN(MAXCNT), CLABEL(MAXCNT), PLABEL(MAXSOL),	PBLK3	2
	+ VDIMEN(MAXVAR), VLABEL(MAXVAR)	PBLK3	3
	CHARACTER*12	PBLK3	4
	+ CDIMEN, CLABEL, VDIMEN,	PBLK3	5
	+ VLABEL	PBLK3	6
	CHARACTER*32	PBLK3	7
	+ PLABEL	PBLK3	8
C		PBLK3	9
C		PBLK3	10
C	COMMON /PBLK5/	PBLK3	11
	+ ICNT, IDAT, INDEX	PBLK5	2
C		PBLK5	3
C		PBLK5	4
C	COMMON /PBLK6/	PBLK5	5
	+ CONF(MAXNS), RPLT(MAXNS)	PBLK6	2
C		PBLK6	3
C		PBLK6	4
C	COMMON /PBLK9/	PBLK6	5
	+ IRUN, XL, XL2,	PBLK9	2
	+ YL, YL2	PBLK9	3
C		PBLK9	4
C		PBLK9	5
C	COMMON /PBLK17/	PBLK9	6
	+ ICCD, IQUIT, ISOLN,	PBLK17	2
	+ IUPDAT, MAXSAM, NPRT,	PBLK17	3
	+ NSAM, NSAMC	PBLK17	4
C		PBLK17	5
C		PBLK17	6
C		PBLK17	7
	PARAMETER MAXSRC=15	IDCOM	2
	COMMON /IDCOM/	IDCOM	3
	+ JRUNID, FL, FLT(MAXSRC),	IDCOM	4
	+ NRUNID(MAXSRC), NSRC, PRG,	IDCOM	5
	+ PRGT(MAXSRC), TITLE(20), USRNAM,	IDCOM	6
	+ USRNMT(MAXSRC), VERNUM	IDCOM	7

CHARACTER*4	IDCOM	8
+ TITLE	IDCOM	9
CHARACTER*8	IDCOM	10
+ FL, FLT, PRG,	IDCOM	11
+ PRGT, USRNM, USRNMT	IDCOM	12
C	IDCOM	13
C	IDCOM	14
COMMON /INOUT/	INOUT	2
+ IN, IOUT, IQB, IECHO	ECHO	85
CHARACTER*1	INOUT	4
+ IQB	INOUT	5
C	INOUT	6
C	INOUT	7
C	PPLT	26
CHARACTER*1	PPLT	26
+ ANS	PPLT	27
CHARACTER*24	PPLT	28
+ CPD	PPLT	29
CHARACTER*28	PPLT	30
+ CCPD	PPLT	31
DATA	PPLT	32
+ HGT /0.23/,	PPLT	33
+ MAXNC /20/,	PPLT	34
+ CPD /'CUMULATIVE PROBABILITY '/,	PPLT	35
+ CCPD /'COMPLEMENTARY PROBABILITY '/	PPLT	36
C	PPLT	37
C SET DEFAULT PLOT RANGE	PPLT	38
C	PPLT	39
XMIN=RPLT(1)	PPLT	40
XMAX=RPLT(NSAMC)	PPLT	41
C	PPLT	42
C OMIT PLOT IF X RANGE IS ZERO	PPLT	43
C	PPLT	44
IF (XMIN.GE.XMAX) THEN	PPLT	45
WRITE (IOUT,500) LABEL(ISOLN)	PPLT	46
RETURN	PPLT	47
ENDIF	PPLT	48
C	PPLT	49
C SUB-PLOTTING OPTION	PPLT	50
C	PPLT	51
100 CONTINUE	PPLT	52
WRITE (IOUT,510) XMIN,XMAX	PPLT	53
READ (IN,520) ANS	PPLT	54
WRITE (IECHO,520) ANS	ECHO	81
IF ((ANS.NE.'Y').AND.(ANS.NE.'N')) THEN	PPLT	55
IF ((ANS.NE.'y').AND.(ANS.NE.'n')) GO TO 100	PPLT	56
ENDIF	PPLT	57
IF ((ANS.EQ.'Y').OR.(ANS.EQ.'y')) THEN	PPLT	58
110 CONTINUE	PPLT	59
WRITE (IOUT,530)	PPLT	60
READ (IN,*,ERR=110) C1,C2	PPLT	81
WRITE (IECHO,*) C1,C2	ECHO	82
IF (C1.GT.C2) THEN	PPLT	82
A=C1	PPLT	83

C1=C2	PPLT	54
C2=A	PPLT	55
ENDIF	PPLT	56
IF (C1.GE.C2) THEN	PPLT	57
WRITE (IOUT,540)	PPLT	58
GO TO 100	PPLT	59
ENDIF	PPLT	70
IF ((C1.GE.XMAX).OR.(C2.LE.XMIN)) THEN	PPLT	71
WRITE (IOUT,550)	PPLT	72
GO TO 100	PPLT	73
ENDIF	PPLT	74
XMIN=C1	PPLT	75
XMAX=C2	PPLT	76
ENDIF	PPLT	77
C	PPLT	78
C INITIALIZE DATA	PPLT	79
C	PPLT	80
LOGAXS=1	PPLT	81
NCYC=0	PPLT	82
C	PPLT	83
C CARTESIAN AXES IF ALL DATA IS LESS THAN 0.	PPLT	84
C	PPLT	85
IF (XMAX.LE.0.) GO TO 150	PPLT	86
C	PPLT	87
C COMPUTE UPPER LOG AXIS EXPONENT	PPLT	88
C	PPLT	89
A=ALOG10(0.9999*XMAX)	PPLT	90
I=INT(A)	PPLT	91
IF (A.GT.0.0) I=I+1	PPLT	92
XMAXL=10.0**I	PPLT	93
C	PPLT	94
C CHECK FOR X MINIMUM LESS THAN ZERO	PPLT	95
C	PPLT	96
IF (XMIN.LE.0.0) THEN	PPLT	97
120 CONTINUE	PPLT	98
WRITE (IOUT,560)	PPLT	99
READ (IN,520) ANS	PPLT	100
WRITE (IECHO,520) ANS	ECHO	83
IF ((ANS.NE.'Y').AND.(ANS.NE.'N')) THEN	PPLT	101
IF ((ANS.NE.'y').AND.(ANS.NE.'n')) GO TO 120	PPLT	102
ENDIF	PPLT	103
IF ((ANS.EQ.'Y').OR.(ANS.EQ.'y')) GO TO 150	PPLT	104
K=0	PPLT	105
130 CONTINUE	PPLT	106
K=K+1	PPLT	107
IF (RPLT(K).LE.0.0) GO TO 130	PPLT	108
XMIN=RPLT(K)	PPLT	109
ENDIF	PPLT	110
C	PPLT	111
C COMPUTE LOWER LOG AXIS EXPONENT	PPLT	112
C	PPLT	113
A=ALOG10(1.0001*XMIN)	PPLT	114
J=INT(A)	PPLT	115
IF (A.LT.0.0) J=J-1	PPLT	116

XMINL=10.0**J	PPLT	117
NCYC=I-J	PPLT	118
C	PPLT	119
C OPTION FOR CARTESIAN AXES IF LESS THAN THREE LOG CYCLES	PPLT	120
C	PPLT	121
IF (NCYC.LT.3) THEN	PPLT	122
140 CONTINUE	PPLT	123
WRITE (1OUT,570)	PPLT	124
READ (IN,520) ANS	PPLT	125
WRITE (IECHO,520) ANS	ECHO	84
IF ((ANS.NE.'Y').AND.(ANS.NE.'N')) THEN	PPLT	126
IF ((ANS.NE.'y').AND.(ANS.NE.'n')) GO TO 140	PPLT	127
ENDIF	PPLT	128
IF ((ANS.EQ.'Y').OR.(ANS.EQ.'y')) GO TO 150	PPLT	129
ENDIF	PPLT	130
C	PPLT	131
C ENFORCE UPPER LIMIT ON NUMBER OF LOG CYCLES, X AXIS	PPLT	132
C	PPLT	133
IF (NCYC.GT.MAXNC) THEN	PPLT	134
NCYC=MAXNC	PPLT	135
J=I-NCYC	PPLT	136
XMINL=10.0**J	PPLT	137
ENDIF	PPLT	138
C	PPLT	139
C SET LOG AXIS MIN AND MAX	PPLT	140
C	PPLT	141
XMAX=XMAXL	PPLT	142
XMIN=XMINL	PPLT	143
GO TO 160	PPLT	144
C	PPLT	145
C SET CARTESIAN AXES	PPLT	146
C	PPLT	147
150 CONTINUE	PPLT	148
LOGAXS=0	PPLT	149
C	PPLT	150
C FIND START, END INDECES OF PLOTTING ARRAYS	PPLT	151
C	PPLT	152
160 CONTINUE	PPLT	153
ISTR=1	PPLT	154
IEND=NSAMC	PPLT	155
DO 170 I=1,NSAMC	PPLT	156
ISTR=I	PPLT	157
IF (RPLT(I).GE.XMIN) GO TO 180	PPLT	158
170 CONTINUE	PPLT	159
GO TO 210	PPLT	160
180 CONTINUE	PPLT	161
DO 190 I=ISTR,NSAMC	PPLT	162
IF (RPLT(I).LE.XMAX) GO TO 190	PPLT	163
IEND=I-1	PPLT	164
GO TO 200	PPLT	165
190 CONTINUE	PPLT	166
IEND=NSAMC	PPLT	167
200 CONTINUE	PPLT	168
NPNTS=IEND-ISTR+1	PPLT	169

IF (NPNTS.GT.1) GO TO 220	PPLT	170
C	PPLT	171
C ERROR IF TOO FEW POINTS ARE IN THE CHOSEN RANGE.	PPLT	172
C	PPLT	173
210 CONTINUE	PPLT	174
ISTRT=1	PPLT	175
XMIN=RPLT(1)	PPLT	176
XMAX=RPLT(NSAMC)	PPLT	177
IF (XMIN.LE.0.0) LOGAXS=0	PPLT	178
220 CONTINUE	PPLT	179
C	PPLT	180
C GRAPHICS	PPLT	181
C	PPLT	182
CALL PAGE (XL2,YL2)	PPLT	183
CALL AREA2D (XL,YL)	PPLT	184
CALL HEIGHT (HGT)	PPLT	185
IF (NTTL.GT.0) THEN	PPLT	186
N=1	PPLT	187
IF (NSTTL.GT.0) N=2	PPLT	188
CALL HEADIN (TTLE,NTTL,1.5,N)	PPLT	189
IF (NSTTL.GT.0) CALL HEADIN (STTLE,NSTTL,1.0,N)	PPLT	190
ENDIF	PPLT	191
CALL XNAME (PLABEL(ISOLN),32)	PPLT	192
C	PPLT	193
C SET UP Y AXIS LIMITS	PPLT	194
C	PPLT	195
YMIN=CONF(1)	PPLT	196
YMAX=CONF(NSAMC)	PPLT	197
IF (YMIN.GT.YMAX) THEN	PPLT	198
A=YMIN	PPLT	199
YMIN=YMAX	PPLT	200
YMAX=A	PPLT	201
ENDIF	PPLT	202
YMIN=FLOAT(INT(YMIN))	PPLT	203
YMAX=FLOAT(INT(YMAX)+1)	PPLT	204
IF (YMAX.GT.1.0) YMAX=1.0	PPLT	205
C	PPLT	206
C SEMI-LOG AXES	PPLT	207
C	PPLT	208
IF (LOGAXS.EQ.0) GO TO 230	PPLT	209
XN=XL/FLOAT(NCYC)	PPLT	210
YN=(YMAX-YMIN)/YL	PPLT	211
CALL YNAME (1H,0)	PPLT	212
CALL XLOG (XMIN,XN,YMIN,YN)	PPLT	213
IF (ICCD.EQ.1) THEN	PPLT	214
CALL YGRAXS (YMIN,'SCALE',YMAX,YL,CPD,22,0.,0.)	PPLT	215
ELSE	PPLT	216
CALL YGRAXS (YMIN,'SCALE',YMAX,YL,CCPD,25,0.,0.)	PPLT	217
ENDIF	PPLT	218
GO TO 240	PPLT	219
C	PPLT	220
C CARTESIAN AXES	PPLT	221
C	PPLT	222
230 CONTINUE	PPLT	223

IF (ICCD.EQ.1) THEN	PPLT	224
CALL YNAME (CPD,22)	PPLT	225
ELSE	PPLT	226
CALL YNAME (CCPD,25)	PPLT	227
ENDIF	PPLT	228
CALL GRAF (XMIN,'SCALE',XMAX,YMIN,'SCALE',YMAX)	PPLT	229
240 CONTINUE	PPLT	230
C	PPLT	231
C PLOT DATA	PPLT	232
C	PPLT	233
I=1	PPLT	234
CALL CURVE (RPLT(ISTRT),CONF(ISTRT),NPNTS,I)	PPLT	235
C	PPLT	236
C LABEL PLOT	PPLT	237
C	PPLT	238
XID=-0.70	PPLT	239
YID=YL+0.80	PPLT	240
CALL INTNO (ICNT,XID,YID)	PPLT	241
CALL HEIGHT (0.13)	PPLT	242
XID=XL-0.40	PPLT	243
YID=YL+1.45	PPLT	244
CALL IDPLT (JRUNID,XID,YID)	PPLT	245
C	PPLT	246
C END PLOT	PPLT	247
C	PPLT	248
N=0	PPLT	249
CALL ENDPL (N)	PPLT	250
IF (IRUN.EQ.1) CALL ERASE	PPLT	251
C	PPLT	252
RETURN	PPLT	253
C	PPLT	254
500 FORMAT (/1X,'*** ERROR *** MIN AND MAX VALUES FROM SOLUTION ',15	PPLT	255
+X,A32,' ARE EQUAL. '/5X,'NO PLOT WILL BE MADE OF THIS DATA.')	PPLT	256
510 FORMAT (/1X,'DATA MINIMUM = ',1PE11.3/1X,'DATA MAXIMUM = ',E11.3/	PPLT	257
+1X,'WOULD YOU LIKE A SUB-PLOT ON THE DATA AXIS (Y/N)?')	PPLT	258
520 FORMAT (A1)	PPLT	259
530 FORMAT (/1X,'ENTER THE MIN AND MAX DATA VALUES FOR PLOTTING.')	PPLT	260
540 FORMAT (/1X,'* ERROR, ENTERED XMIN IS LESS THAN ENTERED XMAX.')	PPLT	261
550 FORMAT (/1X,'* ERROR, ENTERED XMIN AND XMAX ARE OUT OF THE RANGE 0	PPLT	262
+F THE DATA.')	PPLT	263
560 FORMAT (/1X,'THE MINIMUM DATA VALUE IS LESS THAN ZERO. '/1X,'WOULD	PPLT	264
+ YOU PREFER A CARTESIAN AXIS ON THE DATA PLOT ABSCISSA (Y/N)?')	PPLT	265
570 FORMAT (/1X,'THERE ARE LESS THAN TWO FULL LOGARITHM CYCLES ON THE	PPLT	266
+ OUTPUT DATA. '/1X,'WOULD YOU PREFER A CARTESIAN AXIS ON THE DATA P	PPLT	267
+LOT ABSCISSA (Y/N)?')	PPLT	268
END	PPLT	269
SUBROUTINE PQSORT (N,IFIN,I1,A)	PQSORT	2
C	PQSORT	3
C THIS SUBROUTINE IMPLEMENTS THE QUICK SORT (PARTITIONING)	PQSORT	4
C ALGORITHM ON THE CURRENT PARTITION OF THE ARRAY A. AN EXTENSIVE	PQSORT	5
C EFFORT IS MADE TO FIND A GOOD MEDIAN VALUE, AND TO CHECK FOR ALL	PQSORT	6
C INPUT VALUES BEING EQUAL, OR BEING OF ONLY TWO VALUES. THIS	PQSORT	7
C SPEEDS EXECUTION IN CERTAIN CASES WHICH ARE LIKELY TO ARISE IN	PQSORT	8
C SOME SPECIFIC USES OF THIS QUICK SORT ROUTINE.	PQSORT	9

C		PQSORT	10
C	A = INPUT ARRAY TO SORT.	PQSORT	11
C	AMED = MEDIAN VALUE USED FOR PARTITIONING.	PQSORT	12
C	I1 = LOWER INDEX OF QUICK SORTER SEARCH.	PQSORT	13
C	ON RETURN, THIS INDICATES THE INDEX IN ARRAY A OF THE	PQSORT	14
C	NEW PARTITION LOCATION.	PQSORT	16
C	I2 = UPPER INDEX OF QUICK SORTER SEARCH.	PQSORT	18
C	IFIN = POINTER INDICATES THIS PARTITION IS COMPLETELY SORTED.	PQSORT	17
C	IM = INDECES OF THREE MEDIAN VALUES (LESS THAN MAXIMUM AND	PQSORT	18
C	GREATER THAN MINIMUM) IN ARRAY A, FOR SELECTING A 'GOOD'	PQSORT	19
C	MEDIAN FOR ARRAY PARTITIONING.	PQSORT	20
C	IMED = INDEX OF THE MEDIAN VALUE IN ARRAY A.	PQSORT	21
C	N = NUMBER OF ITEMS IN ARRAY A.	PQSORT	22
C		PQSORT	23
	DIMENSION	PQSORT	24
	+ A(N), IM(3)	PQSORT	25
C		PQSORT	26
C	CHECK ARRAY SIZE FOR BEING SMALL	PQSORT	27
C		PQSORT	28
	IF (N.GT.10) GO TO 100	PQSORT	29
	CALL SORT (N,A)	PQSORT	30
	GO TO 280	PQSORT	31
100	CONTINUE	PQSORT	32
	IFIN=0	PQSORT	33
C		PQSORT	34
C	SEARCH FOR THREE MEDIAN VALUES	PQSORT	35
C		PQSORT	36
	K=N/5	PQSORT	37
110	CONTINUE	PQSORT	38
	IMIN=1	PQSORT	39
	IMAX=1	PQSORT	40
	AMIN=A(1)	PQSORT	41
	AMAX=AMIN	PQSORT	42
	J=0	PQSORT	43
	DO 160 I=K,N,K	PQSORT	44
	B=A(I)	PQSORT	45
	IF (B.LE.AMAX) GO TO 130	PQSORT	46
	AMAX=B	PQSORT	47
	IF (A(IMAX).LE.AMIN) GO TO 120	PQSORT	48
	J=J+1	PQSORT	49
	IM(J)=IMAX	PQSORT	50
	IF (J.EQ.3) GO TO 190	PQSORT	51
120	CONTINUE	PQSORT	52
	IMAX=I	PQSORT	53
	GO TO 160	PQSORT	54
130	CONTINUE	PQSORT	55
	IF (B.GE.AMIN) GO TO 150	PQSORT	56
	AMIN=B	PQSORT	57
	IF (A(IMIN).GE.AMAX) GO TO 140	PQSORT	58
	J=J+1	PQSORT	59
	IM(J)=IMIN	PQSORT	60
	IF (J.EQ.3) GO TO 190	PQSORT	61
140	CONTINUE	PQSORT	62
	IMIN=I	PQSORT	63

GO TO 160	PQSORT	64
150 CONTINUE	PQSORT	65
IF ((B.LE.AMIN).OR.(B.GE.AMAX)) GO TO 160	PQSORT	66
J=J+1	PQSORT	67
IM(J)=I	PQSORT	68
IF (J.EQ.3) GO TO 190	PQSORT	69
160 CONTINUE	PQSORT	70
C	PQSORT	71
C THREE MEDIAN VALUES NOT FOUND, REDUCE	PQSORT	72
C INCREMENT AND TRY AGAIN.	PQSORT	73
C	PQSORT	74
IF (K.GT.1) THEN	PQSORT	75
K=K/5	PQSORT	76
IF (K.LT.1) K=1	PQSORT	77
GO TO 110	PQSORT	78
ENDIF	PQSORT	79
C	PQSORT	80
C LESS THAN THREE MEDIANS IN ENTIRE DATA SET.	PQSORT	81
C CHECK FOR ALL EQUAL VALUES. IF ONE OR TWO	PQSORT	82
C MEDIAN VALUES, USE ARBITRARY ONE OF THOSE.	PQSORT	83
C	PQSORT	84
IF (AMIN.GE.AMAX) GO TO 200	PQSORT	85
IF (J.NE.0) THEN	PQSORT	86
IMED=IM(1)	PQSORT	87
GO TO 230	PQSORT	88
ENDIF	PQSORT	89
C	PQSORT	90
C SORTER FOR A TWO LEVEL ARRAY (ONLY TWO VALUES)	PQSORT	91
C	PQSORT	92
I1=0	PQSORT	93
I2=N+1	PQSORT	94
C	PQSORT	95
AMED=0.5*(AMIN+AMAX)	PQSORT	96
170 CONTINUE	PQSORT	97
I1=I1+1	PQSORT	98
IF (I1.EQ.I2) GO TO 200	PQSORT	99
IF (A(I1).LE.AMED) GO TO 170	PQSORT	100
C	PQSORT	101
180 CONTINUE	PQSORT	102
I2=I2-1	PQSORT	103
IF (I1.EQ.I2) GO TO 200	PQSORT	104
IF (A(I2).GE.AMED) GO TO 180	PQSORT	105
C	PQSORT	106
B=A(I1)	PQSORT	107
A(I1)=A(I2)	PQSORT	108
A(I2)=B	PQSORT	109
GO TO 170	PQSORT	110
C	PQSORT	111
C	PQSORT	112
C FIND THE MIDDLE OF THE THREE MEDIAN VALUES FOUND	PQSORT	113
C	PQSORT	114
190 CONTINUE	PQSORT	115
IF (A(IM(1)).GT.A(IM(3))) THEN	PQSORT	116
IF (A(IM(2)).GT.A(IM(1))) GO TO 200	PQSORT	117

IF (A(IM(2)).GT.A(IM(3))) GO TO 210	PQSORT . 118
GO TO 220	PQSORT . 119
ELSE	PQSORT . 120
IF (A(IM(2)).GT.A(IM(3))) GO TO 220	PQSORT . 121
IF (A(IM(2)).GT.A(IM(1))) GO TO 210	PQSORT . 122
ENDIF	PQSORT . 123
200 CONTINUE	PQSORT . 124
IMED=IM(1)	PQSORT . 125
GO TO 230	PQSORT . 126
210 CONTINUE	PQSORT . 127
IMED=IM(2)	PQSORT . 128
GO TO 230	PQSORT . 129
220 CONTINUE	PQSORT . 130
IMED=IM(3)	PQSORT . 131
230 CONTINUE	PQSORT . 132
AMED=A(IMED)	PQSORT . 133
C	PQSORT . 134
C START QUICK SORT PARTITIONING	PQSORT . 135
C	PQSORT . 136
I1=0	PQSORT . 137
I2=N+1	PQSORT . 138
C	PQSORT . 139
240 CONTINUE	PQSORT . 140
I1=I1+1	PQSORT . 141
IF (A(I1).LE.AMED) GO TO 240	PQSORT . 142
C	PQSORT . 143
250 CONTINUE	PQSORT . 144
I2=I2-1	PQSORT . 145
IF (A(I2).GE.AMED) GO TO 250	PQSORT . 146
IF (I1.GE.I2) GO TO 260	PQSORT . 147
C	PQSORT . 148
B=A(I1)	PQSORT . 149
A(I1)=A(I2)	PQSORT . 150
A(I2)=B	PQSORT . 151
GO TO 240	PQSORT . 152
C	PQSORT . 153
C BOTTOM OF PARTITIONING, INSERT THE MEDIAN VALUE	PQSORT . 154
C INTO THE CORRECT POSITION IN THE ARRAY A.	PQSORT . 155
C	PQSORT . 156
260 CONTINUE	PQSORT . 157
IF (I1.GT.IMED) I1=I1-1	PQSORT . 158
IF (I1.EQ.IMED) GO TO 270	PQSORT . 159
B=A(I1)	PQSORT . 160
A(I1)=A(IMED)	PQSORT . 161
A(IMED)=B	PQSORT . 162
270 CONTINUE	PQSORT . 163
RETURN	PQSORT . 164
C	PQSORT . 165
C SET FINISH MARKER AND RETURN	PQSORT . 166
C	PQSORT . 167
280 CONTINUE	PQSORT . 168
IFIN=1	PQSORT . 169
RETURN	PQSORT . 170
END	PQSORT . 171

SUBROUTINE QSORT (N,A)	QSORT	2
C	QSORT	3
C THIS IS A QUICK SORTING ALGORITHM. THIS PORTION OF THE ROUTINE	QSORT	4
C CONTROLS THE PARTITIONING OF THE ARRAY A. THE PARTIAL QUICK	QSORT	5
C SORTING ROUTINE PQSORT IS APPLIED RECURSIVELY TO EACH SECTION OF	QSORT	6
C THE INPUT ARRAY A.	QSORT	7
C THIS SORTING ROUTINE REQUIRES THE PRESENCE OF A SIMPLE SORTING	QSORT	8
C ROUTINE WHICH IS EFFICIENT FOR ARRAYS OF LESS THAN TEN ITEMS.	QSORT	9
C THIS SORTING ROUTINE IS CALLED BY THE NAME 'SORT', IN BOTH THIS	QSORT	10
C ROUTINE AND THE ROUTINE PQSORT.	QSORT	11
C NOTE THAT THE ALGORITHM MAY FAIL IF MAXSTK IS LESS THAN TWO.	QSORT	12
C	QSORT	13
C A = ARRAY TO BE SORTED.	QSORT	14
C N = NUMBER OF ITEMS IN ARRAY A.	QSORT	15
C IC = INDEX OF DIVIDER OF THE NEW PARTITIONS OF ARRAY A, AS	QSORT	16
C FOUND BY ROUTINE PQSORT.	QSORT	17
C IFIN = POINTER, INDICATES ROUTINE PQSORT HAS FINISHED SORTING THE	QSORT	18
C CURRENT PARTITION OF ARRAY A (RATHER THAN CREATING A NEW	QSORT	19
C PARTITIONING).	QSORT	20
C IL = STACK ARRAY, CONTAINS THE LOWER INDEX OF EACH PARTITION OF	QSORT	21
C THE INPUT ARRAY A.	QSORT	22
C IU = STACK ARRAY, CONTAINS THE UPPER INDEX OF EACH PARTITION OF	QSORT	23
C THE INPUT ARRAY A.	QSORT	24
C NS = STACK POINTER, LOCATES ACTIVE PARTITION OF ARRAY A.	QSORT	25
C	QSORT	26
PARAMETER MAXSTK=20	QSORT	27
DIMENSION	QSORT	28
+ A(N), IL(MAXSTK), IU(MAXSTK)	QSORT	29
C	QSORT	30
NS=1	QSORT	31
IL(1)=1	QSORT	32
IU(1)=N	QSORT	33
C	QSORT	34
100 CONTINUE	QSORT	35
M=IU(NS)-IL(NS)+1	QSORT	36
CALL PQSORT (M,IFIN,IC,A(IL(NS)))	QSORT	37
C	QSORT	38
IF (IFIN.EQ.0) GO TO 110	QSORT	39
NS=NS-1	QSORT	40
IF (NS.LE.0) RETURN	QSORT	41
GO TO 100	QSORT	42
110 CONTINUE	QSORT	43
C	QSORT	44
IC=IC+IL(NS)-1	QSORT	45
K=NS+1	QSORT	46
C	QSORT	47
IF (K.LE.MAXSTK) GO TO 120	QSORT	48
M=IC-IL(NS)	QSORT	49
CALL SORT (M,A(IL(NS)))	QSORT	50
IC=IC+1	QSORT	51
M=IU(NS)-IC+1	QSORT	52
CALL SORT (M,A(IC))	QSORT	53
NS=NS-1	QSORT	54
GO TO 100	QSORT	55

120	CONTINUE	QSORT	56
C		QSORT	57
	IL(K)=IL(NS)	QSORT	58
	IU(K)=IC-1	QSORT	59
	IL(NS)=IC+1	QSORT	60
	NS=K	QSORT	61
	GO TO 100	QSORT	62
	END	QSORT	63
C		QSORT	64
C	-----	QSORT	65
C		QSORT	66
	SUBROUTINE RIDAT (IERR,N,NSAM,RNDVAL)	RIDAT	2
C		RIDAT	3
C	ROUTINE TO READ RANDOM INPUT VARIABLE DATA FROM AN EXTERNAL FILE.	RIDAT	4
C		RIDAT	5
C	IERR = ERROR FLAG.	RIDAT	6
C	IEXT = EXTERNAL FILE UNIT NUMBER.	RIDAT	7
C	N = VARIABLE NUMBER BEING READ.	RIDAT	8
C	NSAM = NUMBER OF SAMPLES TO READ FROM THE FILE.	RIDAT	9
C	RNDVAL = ARRAY TO FILL WITH RANDOM VALUES	RIDAT	10
C		RIDAT	11
	PARAMETER ISIZE = 50000 ! MAX DATA SET SIZE	PPARA	2
	PARAMETER MAXCNT = 10 ! MAX NUMBER OF CONSTANTS	PPARA	3
	PARAMETER MAXDST = 100 ! MAX NUMBER OF INPUT DATA POINTS	PPARA	4
	PARAMETER MAXLVS = 100 ! MAX LEVELS FOR STRATIFIED SAMPLING	PPARA	5
	PARAMETER MAXNS = 10000 ! MAX NUMBER OF SAMPLES	PPARA	6
	PARAMETER MAXSOL = 10 ! MAX NUMBER OF SOLUTIONS	PPARA	7
	PARAMETER MAXVAR = 25 ! MAX NUMBER OF INPUT VARIABLES	PPARA	8
	PARAMETER NMLEN = 10 ! FILE NAME LENGTH	PPARA	9
	PARAMETER NTYPE = 11 ! NUMBER OF DISTRIBUTION TYPES	PPARA	10
C		PPARA	11
C		PPARA	12
	COMMON /PBLK3/	PBLK3	2
	+ CDIWMN(MAXCNT), CLABEL(MAXCNT), PLABEL(MAXSOL),	PBLK3	3
	+ VDIWMN(MAXVAR), VLABEL(MAXVAR)	PBLK3	4
	CHARACTER*12	PBLK3	5
	+ CDIWMN, CLABEL, VDIWMN,	PBLK3	6
	+ VLABEL	PBLK3	7
	CHARACTER*32	PBLK3	8
	+ PLABEL	PBLK3	9
C		PBLK3	10
C		PBLK3	11
	COMMON /PBLK18/	PBLK18	2
	+ JJNF(NMLEN,MAXVAR), INFIL, IUDIST,	PBLK18	3
	+ UDIST(MAXDST,2)	PBLK18	4
	CHARACTER*4	PBLK18	5
	+ JJNF	PBLK18	6
C		PBLK18	7
C		PBLK18	8
	COMMON /INOUT/	INOUT	2
	+ IN, IOUT, IQB, IECHO	ECHO	86
	CHARACTER*1	INOUT	4
	+ IQB	INOUT	5
C		INOUT	6

C		INOUT	7
	DIMENSION	R1DAT	16
	+ RNDVAL(NSAM)	R1DAT	17
C		R1DAT	18
C		R1DAT	19
	I=1	R1DAT	20
100	CONTINUE	R1DAT	21
	READ (INFIL,*,END=110,ERR=150) RNDVAL(I)	R1DAT	22
	I=I+1	R1DAT	23
	IF (I.LE.NSAM) GO TO 100	R1DAT	24
	RETURN	R1DAT	25
C		R1DAT	26
C	END OF FILE	R1DAT	27
C		R1DAT	28
110	CONTINUE	R1DAT	29
	IF (I.GT.1) GO TO 120	R1DAT	30
	WRITE (IOUT,500)	R1DAT	31
	GO TO 160	R1DAT	32
120	CONTINUE	R1DAT	33
	I=I-1	R1DAT	34
	WRITE (IOUT,510) I	R1DAT	35
	WRITE (IOUT,520) VLABEL(N), (JJNF(J,N),J=1,NMLEN)	R1DAT	36
	WRITE (IOUT,530) NSAM	R1DAT	37
	K=I	R1DAT	38
130	CONTINUE	R1DAT	39
	J=K+1	R1DAT	40
	K=J+I-1	R1DAT	41
	IF (K.GT.NSAM) K=NSAM	R1DAT	42
	DO 140 L=J,K	R1DAT	43
	W=L-J+1	R1DAT	44
	RNDVAL(L)=RNDVAL(W)	R1DAT	45
140	CONTINUE	R1DAT	46
	IF (K.LT.NSAM) GO TO 130	R1DAT	47
	RETURN	R1DAT	48
C		R1DAT	49
C	ERROR READING FILE	R1DAT	50
C		R1DAT	51
150	CONTINUE	R1DAT	52
	WRITE (IOUT,540) I	R1DAT	53
160	CONTINUE	R1DAT	54
	WRITE (IOUT,550)	R1DAT	55
	WRITE (IOUT,520) VLABEL(N), (JJNF(J,N),N=1,NMLEN)	R1DAT	56
	IERR=1	R1DAT	57
	RETURN	R1DAT	58
C		R1DAT	59
500	FORMAT (/1X,'** ERROR, END OF FILE ENCOUNTERED WHILE READING RANDO	R1DAT	60
	+M DATA POINTS'/4X,'FROM AN EXTERNAL FILE. NO USABLE DATA WAS FOUN	R1DAT	61
	+D ON THIS FILE.')	R1DAT	62
510	FORMAT (/1X,'** WARNING, END OF FILE ENCOUNTERED AFTER READING ',I	R1DAT	63
	+5,' DATA VALUES'/4X,'FROM THE EXTERNAL FILE (DATA VALUES READ FROM	R1DAT	64
	+ AN EXTERNAL FILE).')	R1DAT	65
520	FORMAT (4X,'DATA WAS BEING READ FOR INPUT VARIABLE ',A12,'.'/4X,'A	R1DAT	66
	+ND WAS BEING READ FROM EXTERNAL FILE:.'/4X,20A4)	R1DAT	67
530	FORMAT (4X,'THE ENTERED DATA WILL BE DUPLICATED A SUFFICIENT NUMBE	R1DAT	68

<pre> +R OF '/4X,'TIMES TO CREATE THE REQUIRED ',I5,' SAMPLE VALUES.') 540 FORMAT (/1X,'** ERROR ENCOUNTERED WHILE READING RANDOM DATA POINTS + FROM AN'/4X,'EXTERNAL DATA FILE. THIS ERROR OCCURRED ON THE ',I5 +,'-TH'/4X,'LINE OF THE FILE.') 550 FORMAT (4X,'RUN TERMINATED FROM ROUTINE RDDAT.') END SUBROUTINE R2DAT (IERR,N) C C THIS ROUTINE READS THE USER DEFINABLE CONFIDENCE FUNCTION FOR THE C PROGRAM PACSTAT. C PARAMETER ISIZE = 50000 ! MAX DATA SET SIZE PARAMETER MAXCNT = 10 ! MAX NUMBER OF CONSTANTS PARAMETER MAXDST = 100 ! MAX NUMBER OF INPUT DATA POINTS PARAMETER MAXLVS = 100 ! MAX LEVELS FOR STRATIFIED SAMPLING PARAMETER MAXNS = 10000 ! MAX NUMBER OF SAMPLES PARAMETER MAXSOL = 10 ! MAX NUMBER OF SOLUTIONS PARAMETER MAXVAR = 25 ! MAX NUMBER OF INPUT VARIABLES PARAMETER NMLEN = 10 ! FILE NAME LENGTH PARAMETER NTYPE = 11 ! NUMBER OF DISTRIBUTION TYPES C C COMMON /PBLK3/ + CDIMEN(MAXCNT), CLABEL(MAXCNT), PLABEL(MAXSOL), + VDIMEN(MAXVAR), VLABEL(MAXVAR) CHARACTER*12 + CDIMEN, CLABEL, VDIMEN, + VLABEL CHARACTER*32 + PLABEL C C COMMON /PBLK18/ + JJNF(NMLEN,MAXVAR), INFIL, IUDIST, + UDIST(MAXDST,2) CHARACTER*4 + JJNF C C COMMON /INOUT/ + IN, IOUT, IQB, IECHO CHARACTER*1 + IQB C C C C UDIST(I,1) = I-TH VALUE OF THE CUMULATIVE DISTRIBUTION FUNCTION. UDIST(I,2) = I-TH VALUE OF THE CONFIDENCE LEVEL (ZERO TO ONE). C IPRT=0 C DO 100 I=1,MAXDST K=I </pre>	<pre> R1DAT . 69 R1DAT . 70 R1DAT . 71 R1DAT . 72 R1DAT . 73 R1DAT . 74 R2DAT . 2 R2DAT . 3 R2DAT . 4 R2DAT . 5 R2DAT . 6 PPARA . 2 PPARA . 3 PPARA . 4 PPARA . 5 PPARA . 6 PPARA . 7 PPARA . 8 PPARA . 9 PPARA . 10 PPARA . 11 PPARA . 12 PBLK3 . 2 PBLK3 . 3 PBLK3 . 4 PBLK3 . 5 PBLK3 . 6 PBLK3 . 7 PBLK3 . 8 PBLK3 . 9 PBLK3 . 10 PBLK3 . 11 PBLK18 . 2 PBLK18 . 3 PBLK18 . 4 PBLK18 . 5 PBLK18 . 6 PBLK18 . 7 PBLK18 . 8 INOUT . 2 ECHO . 86 INOUT . 4 INOUT . 5 INOUT . 6 INOUT . 7 R2DAT . 11 R2DAT . 12 R2DAT . 13 R2DAT . 14 R2DAT . 15 R2DAT . 16 R2DAT . 17 R2DAT . 18 R2DAT . 19 </pre>
---	---

READ (INFIL,*,END=110,ERR=150) UDIST(I,1), UDIST(I,2)	R2DAT	20
100 CONTINUE	R2DAT	21
IUDIST=MAXDST	R2DAT	22
WRITE (IOUT,500) IUDIST	R2DAT	23
WRITE (IOUT,510) VLABEL(N), (JJNF(J,N), J=1,NMLEN)	R2DAT	24
IPRT=1	R2DAT	25
GO TO 120	R2DAT	26
C	R2DAT	27
110 CONTINUE	R2DAT	28
IUDIST=K-1	R2DAT	29
WRITE (IOUT,520) VLABEL(N), IUDIST	R2DAT	30
C	R2DAT	31
C CHECK FOR STRICTLY INCREASING FUNCTIONS AND	R2DAT	32
C A PROPER INTERVAL IN THE CONFIDENCE LEVEL.	R2DAT	33
C	R2DAT	34
120 CONTINUE	R2DAT	35
IF (IUDIST.LT.2) THEN	R2DAT	36
WRITE (IOUT,530)	R2DAT	37
GO TO 160	R2DAT	38
ENDIF	R2DAT	39
L=0	R2DAT	40
K=IUDIST-1	R2DAT	41
DO 140 I=1,K	R2DAT	42
IF ((UDIST(I,2).LT.0.).OR.(UDIST(I,2).GT.1.0)) L=1	R2DAT	43
J=I+1	R2DAT	44
IF (UDIST(I,1).LE.UDIST(J,1)) GO TO 130	R2DAT	45
WRITE (IOUT,540) I,J	R2DAT	46
GO TO 160	R2DAT	47
130 CONTINUE	R2DAT	48
IF (UDIST(I,2).LE.UDIST(J,2)) GO TO 140	R2DAT	49
WRITE (IOUT,540) I,J	R2DAT	50
GO TO 160	R2DAT	51
140 CONTINUE	R2DAT	52
IF (L.NE.0) WRITE (IOUT,550) VLABEL(N), (JJNF(J,N), J=1,NMLEN)	R2DAT	53
RETURN	R2DAT	54
C	R2DAT	55
C ERROR	R2DAT	56
C	R2DAT	57
150 CONTINUE	R2DAT	58
WRITE (IOUT,560) I	R2DAT	59
160 CONTINUE	R2DAT	60
WRITE (IOUT,570)	R2DAT	61
IF (IPRT.EQ.0) WRITE (IOUT,510) VLABEL(N), (JJNF(J,N), J=1,NMLEN)	R2DAT	62
IERR=1	R2DAT	63
RETURN	R2DAT	64
C	R2DAT	65
500 FORMAT (/1X,'** WARNING, ',I6,' DATA POINTS (THE MAXIMUM ALLOWED) W	R2DAT	66
ERE READ'/4X,'FROM AN EXTERNAL FILE, DEFINING THE CUMMULATIVE CONF	R2DAT	67
IDENCE'/4X,'FUNCTION, BUT THE END OF FILE WAS NOT ENCOUNTERED. TH	R2DAT	68
IS'/4X,'MAY SKEW THE RESULTS.')	R2DAT	69
510 FORMAT (4X,'DATA WAS BEING READ FOR INPUT VARIABLE ',A12,'.'/4X,'A	R2DAT	70
ND WAS READ FROM FILE: '/4X,20A4)	R2DAT	71
520 FORMAT (/1X,'FOR THE INPUT VARIABLE ',A12,' ',I4,' DATA POINTS WE	R2DAT	72
RE'/1X,'READ FROM AN EXTERNAL FILE, DEFINING A CUMMULATIVE CONFIDE	R2DAT	73

+NCE CURVE.')	R2DAT	74
530 FORMAT (/1X,'** ERROR, ONLY ONE DATA POINT WAS FOUND ON THE EXTERN	R2DAT	76
+AL FILE'/4X,'CONTAINING THE CUMMULATIVE CONFIDENCE FUNCTION DATA S	R2DAT	76
+ET.'/4X,'THIS IS INSUFFICIENT TO DEFINE A CONFIDENCE FUNCTION.')	R2DAT	77
540 FORMAT (/1X,'** ERROR, THE INPUT CUMMULATIVE DISTRIBUTION FUNCTION	R2DAT	78
+ IS NOT'/4X,'A STRICLY INCREASING FUNCTION AT INDECES ',I4,' & ',I	R2DAT	79
+4,'.')	R2DAT	80
550 FORMAT (/1X,'** WARNING, CONFIDENCE VALUES LESS THAN ZERO OR GREAT	R2DAT	81
+ER THAN ONE'/4X,'HAVE BEEN ENTERED VIA AN EXTERNAL FILE FOR RANDOM	R2DAT	82
+ INPUT'/4X,'VARIABLE ',A12,'. THESE VALUES WILL BE IGNORED BY THE	R2DAT	83
+ '/4X,'STOCHASTIC GENERATORS. THIS DATA WAS READ FROM FILE: '/4X,20A	R2DAT	84
+4)	R2DAT	85
560 FORMAT (/1X,'** ERROR ENCOUNTERED WHILE READING THE USER DEFINED C	R2DAT	86
+UMMULATIVE'/4X,'CONFIDENCE FUNCTION FROM AN EXTERNAL FILE. THIS E	R2DAT	87
+RROR'/4X,'OCCURED WHILE READING THE ',I4,'-TH DATA POINT.')	R2DAT	88
570 FORMAT (4X,'ERROR TERMINATION FROM ROUTINE R2DAT.')	R2DAT	89
END	R2DAT	90
SUBROUTINE RELEAS (IFIL)	RELEAS	2
C	RELEAS	3
C ROUTINE FOR INTERACTIVE CLOSURE OF FILES	RELEAS	4
C	RELEAS	5
COMMON /INOUT/	INOUT	2
+ IN, IOUT, IQB, IECHO	ECHO	86
CHARACTER*1	INOUT	4
+ IQB	INOUT	5
C	INOUT	6
C	INOUT	7
C - PRIME - \$INSERT SYSCOM>A\$KEYS	RELEAS	7
LOGICAL LOGIC	RELEAS	8
C	RELEAS	9
IF (IFIL.LT.21) THEN	RELEAS	10
IFUNIT=IFIL-4	RELEAS	11
ELSE	RELEAS	12
IFUNIT=IFIL-12	RELEAS	13
ENDIF	RELEAS	14
C LOGIC=CLOS\$(INTS(IFUNIT))	RELEAS	15
C	RELEAS	16
C CLOSING VAX OPEN STATEMENTS	RELEAS	17
C	RELEAS	18
CLOSE (UNIT=7)	ECHO	85
CLOSE (UNIT=12)	RELEAS	19
CLOSE (UNIT=13)	RELEAS	20
LOGIC = .TRUE.	RELEAS	21
IF (.NOT.LOGIC) WRITE (IOUT,500) IFIL	RELEAS	22
RETURN	RELEAS	23
500 FORMAT (/1X,'CLOSURE OF UNIT NO',I5,' UNSUCCESSFUL.')	RELEAS	24
END	RELEAS	25
SUBROUTINE REORDR	REORDR	2
C	REORDR	3
C THIS ROUTINE MOVES THE INPUT AND OUTPUT VARIABLES IN THE ARRAYS	REORDR	4
C VAR AND RLTS, IN ORDER TO PLACE ANY 'FAILED' SOLUTIONS AT THE	REORDR	5
C END OF THE ARRAYS. THE CURRENT MONTE CARLO SAMPLING SCHEME	REORDR	6
C REQUIRES THAT ALL SUCCESSFUL SAMPLES BE LISTED CONTIGUOUSLY IN THE	REORDR	7
C OUTPUT ARRAYS. HOWEVER, IT MAY OFTEN BE DESIRED TO SAVE THE FAILED	REORDR	8

C	SAMPLES FOR LATER ANALYSIS.	REORDR	9
C	ARRAY CONF IS USED HERE AS TEMPORARY STORAGE OF THE FAILED	REORDR	10
C	SAMPLE VALUES.	REORDR	11
C		REORDR	12
	PARAMETER ISIZE = 50000 ! MAX DATA SET SIZE	PPARA	2
	PARAMETER MAXCNT = 10 ! MAX NUMBER OF CONSTANTS	PPARA	3
	PARAMETER MAXDST = 100 ! MAX NUMBER OF INPUT DATA POINTS	PPARA	4
	PARAMETER MAXLVS = 100 ! MAX LEVELS FOR STRATIFIED SAMPLING	PPARA	5
	PARAMETER MAXNS = 10000 ! MAX NUMBER OF SAMPLES	PPARA	6
	PARAMETER MAXSOL = 10 ! MAX NUMBER OF SOLUTIONS	PPARA	7
	PARAMETER MAXVAR = 25 ! MAX NUMBER OF INPUT VARIABLES	PPARA	8
	PARAMETER NMLEN = 10 ! FILE NAME LENGTH	PPARA	9
	PARAMETER NTYPE = 11 ! NUMBER OF DISTRIBUTION TYPES	PPARA	10
C		PPARA	11
C		PPARA	12
	COMMON /PBLK1/	PBLK1	2
	+ NCONST, NSOLN, NVAR	PBLK1	3
C		PBLK1	4
C		PBLK1	5
	COMMON /PBLK5/	PBLK5	2
	+ ICNT, IDAT, INDEX	PBLK5	3
C		PBLK5	4
C		PBLK5	5
	COMMON /PBLK6/	PBLK6	2
	+ CONF(MAXNS), RPLT(MAXNS)	PBLK6	3
C		PBLK6	4
C		PBLK6	5
	COMMON /PBLK7A/	PBLK7A	2
	+ NSLOC(MAXSOL)	PBLK7A	3
C		PBLK7A	4
C		PBLK7A	5
	COMMON /PBLK7B/	PBLK7B	2
	+ RLTS(ISIZE)	PBLK7B	3
C		PBLK7B	4
C		PBLK7B	5
	COMMON /PBLK8A/	PBLK8A	2
	+ NVLOC(MAXVAR)	PBLK8A	3
C		PBLK8A	4
C		PBLK8A	5
	COMMON /PBLK8B/	PBLK8B	2
	+ VAR(ISIZE)	PBLK8B	3
C		PBLK8B	4
C		PBLK8B	5
	COMMON /PBLK12/	PBLK12	2
	+ NERR(MAXNS), NUMERR	PBLK12	3
C		PBLK12	4
C		PBLK12	5
	COMMON /PBLK17/	PBLK17	2
	+ ICCD, IQUIT, ISOLN,	PBLK17	3
	+ IUPDAT, MAXSAM, NPRT,	PBLK17	4
	+ NSAM, NSAMC	PBLK17	5
C		PBLK17	6
C		PBLK17	7
	COMMON /INOUT/	INOUT	2

+	IN, IOUT, IQB, IECHO	ECHO	86
	CHARACTER*1	INPUT	4
+	IQB	INPUT	5
C		INPUT	6
C		INPUT	7
C		REORDER	24
C	LOOP MOVES SAMPLES WHICH FAILED TO THE END OF EACH LIST	REORDER	25
C		REORDER	26
	NSAMC=NSAM-NUMERR	REORDER	27
	IF (NSAMC.EQ.0) THEN	BCSFIX	82
	WRITE (IOUT,500) NSAM	REORDER	29
	IF (IDAT.GT.0) WRITE (IOUT,500) NSAM	REORDER	30
	GO TO 200	REORDER	31
	ENDIF	REORDER	32
	IF (NUMERR.EQ.0) GO TO 200	REORDER	33
C		REORDER	34
C	ADJUST INPUT VARIABLE LIST	REORDER	35
C		REORDER	36
	IF (NVAR.LT.1) GO TO 140	REORDER	37
	DO 130 I=1,NVAR	REORDER	38
	NF=0	REORDER	39
	N0=NVLOC(I)-1	REORDER	40
	DO 110 J=1,NSAM	REORDER	41
	N1=N0+J	REORDER	42
	IF (NERR(J).EQ.0) GO TO 100	REORDER	43
	NF=NF+1	REORDER	44
	CONF(NF)=VAR(N1)	REORDER	45
	GO TO 110	REORDER	46
100	CONTINUE	REORDER	47
	N2=N1-NF	REORDER	48
	VAR(N2)=VAR(N1)	REORDER	49
110	CONTINUE	REORDER	50
	N0=NVLOC(I)+NSAMC-1	REORDER	51
	DO 120 J=1,NUMERR	REORDER	52
	K=N0+J	REORDER	53
	VAR(K)=CONF(J)	REORDER	54
120	CONTINUE	REORDER	55
130	CONTINUE	REORDER	56
140	CONTINUE	REORDER	57
C		REORDER	58
C	ADJUST OUTPUT VARIABLE LIST	REORDER	59
C		REORDER	60
	IF (NSOLN.LT.1) GO TO 190	REORDER	61
	DO 180 I=1,NSOLN	REORDER	62
	NF=0	REORDER	63
	N0=NSLOC(I)-1	REORDER	64
	DO 160 J=1,NSAM	REORDER	65
	N1=N0+J	REORDER	66
	IF (NERR(J).EQ.0) GO TO 150	REORDER	67
	NF=NF+1	REORDER	68
	CONF(NF)=RLTS(N1)	REORDER	69
	GO TO 160	REORDER	70
150	CONTINUE	REORDER	71
	N2=N1-NF	REORDER	72

RLTS(N2)=RLTS(N1)	REORDR	73
160 CONTINUE	REORDR	74
N0=NSLOC(I)+NSAMC-1	REORDR	75
DO 170 J=1,NUMERR	REORDR	76
K=N0+J	REORDR	77
RLTS(K)=CONF(J)	REORDR	78
170 CONTINUE	REORDR	79
180 CONTINUE	REORDR	80
190 CONTINUE	REORDR	81
C	REORDR	82
C PRINT ECHO OF FAILED SAMPLES	REORDR	83
C	REORDR	84
IF (NSAMC.EQ.NSAM) GO TO 200	REORDR	85
WRITE (IDUT,510) NSAMC,NSAM	REORDR	86
IF (IDAT.GT.0) WRITE (IDAT,510) NSAMC,NSAM	REORDR	87
200 CONTINUE	REORDR	88
C	REORDR	89
RETURN	REORDR	90
500 FORMAT (/1X,'** ALL ',I6,' SAMPLES FAILED IN THIS RUN **')	REORDR	91
510 FORMAT (/1X,'** ',I5,' ERROR FREE SAMPLES WERE FOUND OUT OF ',I5,'	REORDR	92
+ TOTAL SAMPLES COMPUTED **')	REORDR	93
END	REORDR	94
SUBROUTINE RNGS (IERR,N,NSAM,RNDVAL)	RNGS	2
C	RNGS	3
C SUBROUTINE FOR COMPUTING A RANDOM DISTRIBUTION GIVEN THE	RNGS	4
C DISTRIBUTION TYPE IT, THE DEFINING PARAMETERS RP1, RP2,	RNGS	5
C AND RP3.	RNGS	6
C FOR LIMITED DISTRIBUTIONS, THIS ROUTINE ALSO SETS THE EFFECTIVE	RNGS	7
C LOWER AND UPPER LIMITS (VLIMIT) ON THE INPUT STOCHASTIC VARIABLE.	RNGS	8
C THE VARIABLES UMIN AND UMAX, RETURNED FROM THE DISTRIBUTION	RNGS	9
C GENERATING ROUTINES, ARE USED FOR THIS.	RNGS	10
C	RNGS	11
C N = INPUT VARIABLE NUMBER	RNGS	12
C NSAM = NUMBER OF SAMPLES TO GENERATE	RNGS	13
C RNDVAL = OUTPUT VECTOR FOR THE DISTRIBUTION GENERATED	RNGS	14
C	RNGS	15
PARAMETER ISIZE = 50000 ! MAX DATA SET SIZE	PPARA	2
PARAMETER MAXCNT = 10 ! MAX NUMBER OF CONSTANTS	PPARA	3
PARAMETER MAXDST = 100 ! MAX NUMBER OF INPUT DATA POINTS	PPARA	4
PARAMETER MAXLVS = 100 ! MAX LEVELS FOR STRATIFIED SAMPLING	PPARA	5
PARAMETER MAXNS = 10000 ! MAX NUMBER OF SAMPLES	PPARA	6
PARAMETER MAXSOL = 10 ! MAX NUMBER OF SOLUTIONS	PPARA	7
PARAMETER MAXVAR = 25 ! MAX NUMBER OF INPUT VARIABLES	PPARA	8
PARAMETER NMLEN = 10 ! FILE NAME LENGTH	PPARA	9
PARAMETER NTYPE = 11 ! NUMBER OF DISTRIBUTION TYPES	PPARA	10
C	PPARA	11
C	PPARA	12
COMMON /PBLK13/	PBLK13	2
+ NLEVEL, NPTSPL(MAXLVS,MAXVAR),	PBLK13	3
+ NSTOC	PBLK13	4
C	PBLK13	5
C	PBLK13	6
COMMON /PBLK15/	PBLK15	2
+ ILIM(MAXVAR), ITYPE(MAXVAR), NLIM(MAXVAR,2),	PBLK15	3

	* PAR(MAXVAR,3),	RLIM(MAXVAR,2),	VLIM(MAXVAR,2),	PBLK16	4
	* VLIMT(MAXVAR,2)			PBLK16	5
C				PBLK16	6
C				PBLK16	7
	COMMON /PBLK16/			PBLK16	2
	* DSEED			PBLK16	3
	REAL*8			PBLK16	4
	* DSEED			PBLK16	5
C				PBLK16	6
C				PBLK16	7
	COMMON /PBLK18/			PBLK18	2
	* JJNF(NMLEN,MAXVAR), INFIL,	IUDIST,		PBLK18	3
	* UDIST(MAXDST,2)			PBLK18	4
	CHARACTER*4			PBLK18	5
	* JJNF			PBLK18	6
C				PBLK18	7
C				PBLK18	8
	PARAMETER MAXLEV=200	! MAX LEVELS OF STRATIFICATION		STRATI	2
	COMMON /STRATI/			STRATI	3
	* NSPL(MAXLEV)			STRATI	4
C				STRATI	5
C				STRATI	6
	COMMON /ULIMTS/			ULIMTS	2
	* UMAX,	UMIN		ULIMTS	3
C				ULIMTS	4
	COMMON /INOUT/			INOUT	2
	* IN, IOUT, IQB, IECHO			ECHO	66
	CHARACTER*1			INOUT	4
	* IQB			INOUT	5
C				INOUT	6
C				INOUT	7
C				RNGS	24
	DIMENSION			RNGS	25
	* RNDVAL (NSAM)			RNGS	26
	DATA			RNGS	27
	* IONE/1/			RNGS	28
C				RNGS	29
	RP1=PAR(N,1)			RNGS	30
	RP2=PAR(N,2)			RNGS	31
	RP3=PAR(N,3)			RNGS	32
C				RNGS	33
	IT=ITYPE(N)			RNGS	34
	AMIN=VLIM(N,1)			RNGS	35
	AMAX=VLIM(N,2)			RNGS	36
C				RNGS	37
C	OPEN EXTERNAL FILE FOR EXTERNALLY DEFINED DISTRIBUTIONS.			RNGS	38
C				RNGS	39
	IF ((IT.NE.9).AND.(IT.NE.10)) GO TO 100			RNGS	40
	I=0			RNGS	41
	CALL ASG (I,IERR,INFIL,NMLEN,JJNF(1,N))			RNGS	42
	IF (IERR.NE.0) RETURN			RNGS	43
C				RNGS	44
C	PERFORM DATA POINT READ AT THIS POINT			RNGS	45
C				RNGS	46

IF (IT.EQ.9) GO TO 100	RNGS	47
CALL RIDAT (IERR,N,NSAM,RNDVAL)	RNGS	48
CALL RELEAS (INFIL)	RNGS	49
RETURN	RNGS	50
100 CONTINUE	RNGS	51
C	RNGS	52
C COMPUTE BASE UNIFORM DISTRIBUTION	RNGS	53
C	RNGS	54
CALL U01S (NSAM,RNDVAL,DSEED,NLEVEL)	RNGS	55
C	RNGS	56
C SAVE STRATIFICATION DIAGNOSTICS	RNGS	57
C	RNGS	58
DO 110 I=1,NLEVEL	RNGS	59
NPTSPL(I,N)=NSPL(I)	RNGS	60
110 CONTINUE	RNGS	61
C	RNGS	62
C CHOSE DISTRIBUTION	RNGS	63
C	RNGS	64
GO TO (120,130,140,150,160,170,180,200,220,230,240), IT	RNGS	65
C	RNGS	66
C NORMAL DISTRIBUTION	RNGS	67
C	RNGS	68
120 CONTINUE	RNGS	69
IF (ILIM(N).EQ.0) THEN	RNGS	70
CALL NORMAL (NSAM,RNDVAL,RP1,RP2)	RNGS	71
RETURN	RNGS	72
ELSE	RNGS	73
CALL NORMALL (NSAM,RNDVAL,RP1,RP2,AMIN,AMAX)	RNGS	74
RLIM(N,1)=UMIN	RNGS	75
RLIM(N,2)=UMAX	RNGS	76
CALL NORMAL (IONE,UMIN,RP1,RP2)	RNGS	77
CALL NORMAL (IONE,UMAX,RP1,RP2)	RNGS	78
IF (UMIN.GT.UMAX) THEN	RNGS	79
WD=UMIN	RNGS	80
UMIN=UMAX	RNGS	81
UMAX=WD	RNGS	82
ENDIF	RNGS	83
VLIWT(N,1)=UMIN	RNGS	84
VLIWT(N,2)=UMAX	RNGS	85
GO TO 260	RNGS	86
ENDIF	RNGS	87
C	RNGS	88
C NATURAL LOGNORMAL DISTRIBUTION	RNGS	89
C	RNGS	90
130 CONTINUE	RNGS	91
IF (ILIM(N).EQ.0) THEN	RNGS	92
CALL LNNORM (NSAM,RNDVAL,RP1,RP2)	RNGS	93
RETURN	RNGS	94
ELSE	RNGS	95
CALL LNNORML (NSAM,RNDVAL,RP1,RP2,AMIN,AMAX)	RNGS	96
RLIM(N,1)=UMIN	RNGS	97
RLIM(N,2)=UMAX	RNGS	98
CALL LNNORM (IONE,UMIN,RP1,RP2)	RNGS	99
CALL LNNORM (IONE,UMAX,RP1,RP2)	RNGS	100

IF (UMIN.GT.UMAX) THEN	RNGS	101
WD=UMIN	RNGS	102
UMIN=UMAX	RNGS	103
UMAX=WD	RNGS	104
ENDIF	RNGS	105
VLIWT(N,1)=UMIN	RNGS	106
VLIWT(N,2)=UMAX	RNGS	107
GO TO 260	RNGS	108
ENDIF	RNGS	109
C	RNGS	110
C COMMON LOGNORMAL DISTRIBUTION	RNGS	111
C	RNGS	112
140 CONTINUE	RNGS	113
IF (ILIM(N).EQ.0) THEN	RNGS	114
CALL LOGNORM (NSAM,RNDVAL,RP1,RP2)	RNGS	115
RETURN	RNGS	116
ELSE	RNGS	117
CALL LOGNORML (NSAM,RNDVAL,RP1,RP2,AMIN,AMAX)	RNGS	118
RLIM(N,1)=UMIN	RNGS	119
RLIM(N,2)=UMAX	RNGS	120
CALL LOGNORM (IONE,UMIN,RP1,RP2)	RNGS	121
CALL LOGNORM (IONE,UMAX,RP1,RP2)	RNGS	122
IF (UMIN.GT.UMAX) THEN	RNGS	123
WD=UMIN	RNGS	124
UMIN=UMAX	RNGS	125
UMAX=WD	RNGS	126
ENDIF	RNGS	127
VLIWT(N,1)=UMIN	RNGS	128
VLIWT(N,2)=UMAX	RNGS	129
GO TO 260	RNGS	130
ENDIF	RNGS	131
C	RNGS	132
C NATURAL LOGUNIFORM DISTRIBUTION	RNGS	133
C	RNGS	134
150 CONTINUE	RNGS	135
CALL LNUNIF (NSAM,RNDVAL,RP1,RP2)	RNGS	136
RETURN	RNGS	137
C	RNGS	138
C COMMON LOGUNIFORM DISTRIBUTION	RNGS	139
C	RNGS	140
160 CONTINUE	RNGS	141
CALL LOGUNIF (NSAM,RNDVAL,RP1,RP2)	RNGS	142
RETURN	RNGS	143
C	RNGS	144
C EXPONENTIAL DISTRIBUTION	RNGS	145
C	RNGS	146
170 CONTINUE	RNGS	147
IF (ILIM(N).EQ.0) THEN	RNGS	148
CALL DEXP (NSAM,RNDVAL,RP1)	RNGS	149
RETURN	RNGS	150
ELSE	RNGS	151
CALL DEXPFL (NSAM,RNDVAL,RP1,AMIN,AMAX)	RNGS	152
RLIM(N,1)=UMIN	RNGS	153
RLIM(N,2)=UMAX	RNGS	154

CALL DEXPF (IDNE,UMIN,RP1)	RNGS	155
CALL DEXPF (IDNE,UMAX,RP1)	RNGS	156
IF (UMIN.GT.UMAX) THEN	RNGS	157
WD=UMIN	RNGS	158
UMIN=UMAX	RNGS	159
UMAX=WD	RNGS	160
ENDIF	RNGS	161
VLIMIT(N,1)=UMIN	RNGS	162
VLIMIT(N,2)=UMAX	RNGS	163
GO TO 260	RNGS	164
ENDIF	RNGS	165
C	RNGS	166
C UNIFORM DISTRIBUTION	RNGS	167
C	RNGS	168
180 CONTINUE	RNGS	169
DO 190 I=1,NSAM	RNGS	170
RNDVAL(I)=RP1+RNDVAL(I)*(RP2-RP1)	RNGS	171
190 CONTINUE	RNGS	172
RETURN	RNGS	173
C	RNGS	174
C BERNOULLI DISTRIBUTION	RNGS	175
C	RNGS	176
200 CONTINUE	RNGS	177
CALL BERNLI (NSAM,RNDVAL,RP3)	RNGS	178
DO 210 I=1,NSAM	RNGS	179
RV=RP1	RNGS	180
IF (RNDVAL(I).GT.0.) RV=RP2	RNGS	181
RNDVAL(I)=RV	RNGS	182
210 CONTINUE	RNGS	183
RETURN	RNGS	184
C	RNGS	185
C CONFIDENCE FUNCTION ON EXTERNAL FILE	RNGS	186
C	RNGS	187
220 CONTINUE	RNGS	188
CALL R2DAT (IERR,N)	RNGS	189
CALL XUDIST (NSAM,RNDVAL,IUDIST,UDIST(1,1),UDIST(1,2))	RNGS	190
CALL RELEAS (INFIL)	RNGS	191
RETURN	RNGS	192
C	RNGS	193
C DATA POINTS ON AN EXTERNAL FILE (DUMMY STATEMENT)	RNGS	194
C	RNGS	195
230 CONTINUE	RNGS	196
RETURN	RNGS	197
C	RNGS	198
C DISCRETE DISTRIBUTION	RNGS	199
C	RNGS	200
240 CONTINUE	RNGS	201
DO 250 I=1,NSAM	RNGS	202
RNDVAL(I)=RP1	RNGS	203
250 CONTINUE	RNGS	204
RETURN	RNGS	205
C	RNGS	206
C ENFORCE UPPER/LOWER LIMITS FOR END POINT LIMITING	RNGS	207
C	RNGS	208

200 CONTINUE	RNGS	209
NLIW(N,1)=0	RNGS	210
NLIW(N,2)=0	RNGS	211
DO 280 I=1,NSAM	RNGS	212
A=RNDVAL(I)	RNGS	213
IF (A.GE.AMIN) GO TO 270	RNGS	214
RNDVAL(I)=AMIN	RNGS	215
NLIW(N,1)=NLIW(N,1)+1	RNGS	216
GO TO 280	RNGS	217
270 CONTINUE	RNGS	218
IF (A.LE.AMAX) GO TO 280	RNGS	219
RNDVAL(I)=AMAX	RNGS	220
NLIW(N,2)=NLIW(N,2)+1	RNGS	221
280 CONTINUE	RNGS	222
RETURN	RNGS	223
END	RNGS	224
SUBROUTINE SOLN (IERR)	SOLN	2
C	SOLN	3
C THIS SAMPLE PROBLEM MODELS THE MASS STORAGE AND RELEASE RATE	SOLN	4
C (STEADY STATE) OF A CONTAMINANT, WHICH IS DIFFUSING INTO A BOUNDARY	SOLN	5
C LAYER AWAY FROM A SOLUBILITY LIMITED SOURCE. OUTSIDE THE BOUNDARY	SOLN	6
C LAYER, CONVECTION IS ASSUMED TO REMOVE THE CONTAMINANT AT A FAST	SOLN	7
C RATE. THE MODEL IS ONE DIMENSIONAL, CARTESIAN DIFFUSION, AND	SOLN	8
C OUTPUT VALUES ARE 'PER SQUARE METER' OF SOURCE ZONE.	SOLN	9
C	SOLN	10
C INPUT VARIABLES/DATA	SOLN	11
C ICNT = DATA SET NUMBER (# OF INPUT VARIABLE UPDATES)	SOLN	12
C IERR = ERROR POINTER	SOLN	13
C INDEX = SAMPLE NUMBER OF CURRENT RUN	SOLN	14
C	SOLN	15
C VINPT(1) = MOLECULAR DIFFUSIVITY, MET**2/YEAR	SOLN	16
C VINPT(2) = RETARDATION FACTOR	SOLN	17
C VINPT(3) = LAYER WIDTH, MET	SOLN	18
C VINPT(4) = SOLUBILITY, GM/MET**3	SOLN	19
C	SOLN	20
C CONSTANTS	SOLN	21
C CONST(1) = HALF LIFE, YEARS.	SOLN	22
C CONST(2) = POROSITY	SOLN	23
C	SOLN	24
C OUTPUT VARIABLES	SOLN	25
C VALU(1) = TOTAL MASS CONTAINMENT, GMS/MET**2	SOLN	26
C VALU(2) = MAXIMUM RELEASE RATE, GM/MET**2-YEAR	SOLN	27
C	SOLN	28
PARAMETER ISIZE = 50000 ! MAX DATA SET SIZE	PPARA	2
PARAMETER MAXCNT = 10 ! MAX NUMBER OF CONSTANTS	PPARA	3
PARAMETER MAXDST = 100 ! MAX NUMBER OF INPUT DATA POINTS	PPARA	4
PARAMETER MAXLVS = 100 ! MAX LEVELS FOR STRATIFIED SAMPLING	PPARA	5
PARAMETER MAXNS = 10000 ! MAX NUMBER OF SAMPLES	PPARA	6
PARAMETER MAXSQL = 10 ! MAX NUMBER OF SOLUTIONS	PPARA	7
PARAMETER MAXVAR = 25 ! MAX NUMBER OF INPUT VARIABLES	PPARA	8
PARAMETER NMLEN = 10 ! FILE NAME LENGTH	PPARA	9
PARAMETER NTYPE = 11 ! NUMBER OF DISTRIBUTION TYPES	PPARA	10
C	PPARA	11
C	PPARA	12

COMMON /PBLK4/	PBLK4	2
+ CONST(MAXCNT), VALU(MAXSOL), VINPT(MAXVAR)	PBLK4	3
C	PBLK4	4
C	PBLK4	5
COMMON /PBLK5/	PBLK5	2
+ ICNT, IDAT, INDEX	PBLK5	3
C	PBLK5	4
C	PBLK5	5
COMMON /INOUT/	INOUT	2
+ IN, IOUT, IQB, IECHO	ECHO	86
CHARACTER*1	INOUT	4
+ IQB	INOUT	5
C	INOUT	6
C	INOUT	7
DATA	SOLN	33
+ BETA /1.0 /,	SOLN	34
+ E /2.718/	SOLN	35
C	SOLN	36
IERR=0	SOLN	37
IF (INDEX.GT.1) GO TO 100	SOLN	38
WRITE (IOUT,500)	SOLN	39
IF (IDAT.GT.0) WRITE (IDAT,500)	SOLN	40
BETA=ALOG(2.0)/CONST(1)	SOLN	41
100 CONTINUE	SOLN	42
C	SOLN	43
PSI=VINPT(3)*SQRT(BETA*VINPT(2)/VINPT(1))	SOLN	44
C	SOLN	45
A=EXP(-2.0*PSI)	SOLN	46
C	SOLN	47
VALU(1)=CONST(2)*VINPT(4)*(-2.0*EXP(-PSI)+A+E)/(PSI*(1.0-A))	SOLN	48
C	SOLN	49
VALU(2)=-CONST(2)*VINPT(4)*VINPT(1)*PSI*(A-E)/(1.0-A)	SOLN	50
C	SOLN	51
RETURN	SOLN	52
500 FORMAT (/1X,'ONE DIMENSIONAL DIFFUSIONAL RELEASE INTO A BOUNDARY'/	SOLN	53
+1X,'LAYER OVER A SOLUBILITY LIMITED SOURCE ZONE.')	SOLN	54
END	SOLN	56
SUBROUTINE SORT (N,A)	SORT	2
C	SORT	3
C SORT IS A SIMPLE SHELL SORT.	SORT	4
C ITEMS ARE SORTED IN ASCENDING ORDER.	SORT	5
C	SORT	6
C A IS THE ARRAY OF ITEMS TO SORT.	SORT	7
C N IS THE NUMBER OF ITEMS IN ARRAY A.	SORT	8
C	SORT	9
DIMENSION	SORT	10
+ A(1)	SORT	11
IF (N.LT.2) RETURN	SORT	12
ID=N	SORT	13
100 CONTINUE	SORT	14
ID=ID/2	SORT	15
IB=1	SORT	16
GO TO 120	SORT	17
110 CONTINUE	SORT	18

IB=IB+1	SORT	19
IF (IB.LE.ID) GO TO 120	SORT	20
IF (ID.GT.1) GO TO 100	SORT	21
RETURN	SORT	22
120 CONTINUE	SORT	23
I=IB	SORT	24
130 CONTINUE	SORT	25
K=I+ID	SORT	26
IF (A(I).LE.A(K)) GO TO 160	SORT	27
T=A(K)	SORT	28
A(K)=A(I)	SORT	29
J=I	SORT	30
140 CONTINUE	SORT	31
K=J-ID	SORT	32
IF (K.LT.1) GO TO 150	SORT	33
IF (T.GT.A(K)) GO TO 150	SORT	34
A(J)=A(K)	SORT	35
J=K	SORT	36
GO TO 140	SORT	37
150 CONTINUE	SORT	38
A(J)=T	SORT	39
160 CONTINUE	SORT	40
I=I+ID	SORT	41
IF (I+ID.LE.N) GO TO 130	SORT	42
GO TO 110	SORT	43
END	SORT	44
SUBROUTINE STATOT	STATOT	2
C	STATOT	3
C THIS ROUTINE CALLS LIBRARY ROUTINE STATS TO COMPUTE THE MEAN,	STATOT	4
C MEDIAN, STANDARD DEVIATION, AND SKEWNESS FOR THE INPUT AND OUTPUT	STATOT	5
C VARIABLE DISTRIBUTIONS WHICH HAVE BEEN GENERATED. DIAGNOSTICS FOR	STATOT	6
C INPUT VARIABLE STRATIFICATION, AND MAXIMUM LIKELYHOOD ESTIMATORS	STATOT	7
C ARE ALSO GENERATED.	STATOT	8
C ALL OF THESE DIATNOSTICS ARE PRINTED TO THE OUTPUT PRINT FILE	STATOT	9
C OR USERS TERMINAL BY THIS ROUTINE.	STATOT	10
C DATA FOR STRATIFIED SAMPLING IS PRINTED ONLY WHEN MORE THAN	STATOT	11
C ONE LEVEL OF SAMPLING HAS BEEN CHOSEN.	STATOT	12
C THE DATA IN ARRAYS VAR AND RLTS ARE TRANSFERED TO ARRAY CONF	STATOT	13
C PRIOR TO CALL ROUTINE STATS. THIS AVOIDS A PRINE PAGING ERROR.	STATOT	14
C	STATOT	15
C **** THIS ROUTINE SDRTS THIS INPUT AND OUTPUT VARIABLE ARRAYS	STATOT	16
C **** IN ASCENDING ORDER, VIA A CALL TO SUBROUTINE QSORT.	STATOT	17
C	STATOT	18
PARAMETER ISIZE = 50000 ! MAX DATA SET SIZE	PPARA	2
PARAMETER MAXCNT = 10 ! MAX NUMBER OF CONSTANTS	PPARA	3
PARAMETER MAXDST = 100 ! MAX NUMBER OF INPUT DATA POINTS	PPARA	4
PARAMETER MAXLVS = 100 ! MAX LEVELS FOR STRATIFIED SAMPLING	PPARA	5
PARAMETER MAXNS = 10000 ! MAX NUMBER OF SAMPLES	PPARA	6
PARAMETER MAXSOL = 10 ! MAX NUMBER OF SOLUTIONS	PPARA	7
PARAMETER MAXVAR = 25 ! MAX NUMBER OF INPUT VARIABLES	PPARA	8
PARAMETER NMLEN = 10 ! FILE NAME LENGTH	PPARA	9
PARAMETER NTYPE = 11 ! NUMBER OF DISTRIBUTION TYPES	PPARA	10
C	PPARA	11
C	PPARA	12

	COMMON /PBLK1/			PBLK1	.	2
	+ NCONST,	NSOLN,	NVAR	PBLK1	.	3
C				PBLK1	.	4
C				PBLK1	.	5
	COMMON /PBLK3/			PBLK3	.	2
	+ CDIMEN(MAXCNT),	CLABEL (MAXCNT),	PLABEL (MAXSOL),	PBLK3	.	3
	+ VDIMEN(MAXVAR),	VLABEL (MAXVAR)		PBLK3	.	4
	CHARACTER*12			PBLK3	.	5
	+ CDIMEN,	CLABEL,	VDIMEN,	PBLK3	.	6
	+ VLABEL			PBLK3	.	7
	CHARACTER*32			PBLK3	.	8
	+ PLABEL			PBLK3	.	9
C				PBLK3	.	10
C				PBLK3	.	11
	COMMON /PBLK5/			PBLK5	.	2
	+ ICNT,	IDAT,	INDEX	PBLK5	.	3
C				PBLK5	.	4
C				PBLK5	.	5
	COMMON /PBLK6/			PBLK6	.	2
	+ CONF(MAXNS),	RPLT(MAXNS)		PBLK6	.	3
C				PBLK6	.	4
C				PBLK6	.	5
	COMMON /PBLK7A/			PBLK7A	.	2
	+ NSLOC(MAXSOL)			PBLK7A	.	3
C				PBLK7A	.	4
C				PBLK7A	.	5
	COMMON /PBLK7B/			PBLK7B	.	2
	+ RLTS(ISIZE)			PBLK7B	.	3
C				PBLK7B	.	4
C				PBLK7B	.	5
	COMMON /PBLK8A/			PBLK8A	.	2
	+ NVLOC(MAXVAR)			PBLK8A	.	3
C				PBLK8A	.	4
C				PBLK8A	.	5
	COMMON /PBLK8B/			PBLK8B	.	2
	+ VAR(ISIZE)			PBLK8B	.	3
C				PBLK8B	.	4
C				PBLK8B	.	5
	COMMON /PBLK10/			PBLK10	.	2
	+ FAVG(MAXSOL),	FMAX(MAXSOL),	FMED(MAXSOL),	PBLK10	.	3
	+ FMIN(MAXSOL),	FSKW(MAXSOL),	FSTD(MAXSOL),	PBLK10	.	4
	+ VAVG(MAXVAR),	VMAX(MAXVAR),	VMED(MAXVAR),	PBLK10	.	5
	+ VMIN(MAXVAR),	VSKW(MAXVAR),	VSTD(MAXVAR)	PBLK10	.	6
C				PBLK10	.	7
C				PBLK10	.	8
	COMMON /PBLK13/			PBLK13	.	2
	+ NLEVEL,	NPTSPL (MAXLVS, MAXVAR),		PBLK13	.	3
	+ NSTOC			PBLK13	.	4
C				PBLK13	.	5
C				PBLK13	.	6
	COMMON /PBLK15/			PBLK15	.	2
	+ ILIM(MAXVAR),	ITYPE(MAXVAR),	NLIM(MAXVAR, 2),	PBLK15	.	3
	+ PAR(MAXVAR, 3),	RLIM(MAXVAR, 2),	VLIM(MAXVAR, 2),	PBLK15	.	4
	+ VLIMT(MAXVAR, 2)			PBLK15	.	5

C		PBLK15	6
C		PBLK15	7
	COMMON /PBLK17/	PBLK17	2
	+ ICCD, IQUIT, ISOLN,	PBLK17	3
	+ IUPDAT, MAXSAM, NPRT,	PBLK17	4
	+ NSAM, NSAMC	PBLK17	5
C		PBLK17	6
C		PBLK17	7
	COMMON /INOUT/	INOUT	2
	+ IN, IOUT, IQB, IECHD	ECHD	86
	CHARACTER*1	INOUT	4
	+ IQB	INOUT	5
C		INOUT	6
C		INOUT	7
	REAL*8	STATOT	33
	+ A,B,BASEXP	STATOT	34
	DIMENSION	STATOT	35
	+ RD(2), RM(2)	STATOT	36
	CHARACTER*1	STATOT	37
	+ ANS	STATOT	38
	DATA	STATOT	39
	+ BASEXP/2.303D0/	STATOT	40
C		STATOT	41
C	SET OUTPUT UNIT NUMBER	STATOT	42
C		STATOT	43
	III=IDAT	STATOT	44
	IF (IDAT.EQ.0) III=IOUT	STATOT	45
C		BCSFIX	83
C	TABLE HEADER AND INPUT VARIABLE STATISTICS	BCSFIX	84
C		BCSFIX	85
	WRITE (III,500)	BCSFIX	86
	CALL EXPECT	BCSFIX	87
C		STATOT	46
C	***** INPUT DISTRIBUTIONS *****	STATOT	47
C		STATOT	48
	IF (NVAR.LT.1) GO TO 140	STATOT	49
	DO 130 N=1,NVAR	STATOT	50
	N1=NVLDC(N)-1	STATOT	51
	DO 100 J=1,NSAMC	STATOT	52
	K=J+N1	STATOT	53
	CONF(J)=VAR(K)	STATOT	54
100	CONTINUE	STATOT	55
	CALL STATS (NSAMC,CONF,VMIN(N),VMAX(N),VAVG(N),VSTD(N),VSKW(N))	STATOT	56
C		STATOT	57
C	INPUT VARIABLE SORT AND MEDIAN COMPUTATION	STATOT	58
C		STATOT	59
	VMED(N)=0.	STATOT	60
	CALL QSORT (NSAMC,CONF)	STATOT	61
	IF (NSAMC.LT.10) GO TO 110	STATOT	62
	I=NSAMC/2	STATOT	63
	J=I	STATOT	64
	IF (MOD(NSAMC,2).EQ.0) J=J+1	STATOT	65
	VMED(N)=(CONF(I)+CONF(J))/2.0	STATOT	66
110	CONTINUE	STATOT	67

DO 120 J=1,NSAMC	STATOT	68
K=N1+J	STATOT	69
VAR(X)=CONF(J)	STATOT	70
120 CONTINUE	STATOT	71
130 CONTINUE	STATOT	72
140 CONTINUE	STATOT	73
C	STATOT	74
C ***** OUTPUT DISTRIBUTIONS *****	STATOT	75
C	STATOT	76
IF (NSOLN.LT.1) GO TO 190	STATOT	77
DO 180 N=1,NSOLN	STATOT	78
FAVG(N)=RLTS(NSLOC(N))	STATOT	79
FMED(N)=0.0	STATOT	80
FSTD(N)=0.0	STATOT	81
FSKW(N)=0.0	STATOT	82
IF (NSAMC.LE.1) GO TO 180	STATOT	83
C	STATOT	84
N1=NSLOC(N)-1	STATOT	85
DO 150 J=1,NSAMC	STATOT	86
K=J+N1	STATOT	87
CONF(J)=RLTS(K)	STATOT	88
150 CONTINUE	STATOT	89
CALL STATS (NSAMC,CONF,FMIN(N),FMAX(N),FAVG(N),FSTD(N),FSKW(N))	STATOT	90
C	STATOT	91
C OUTPUT VARIABLE SORT AND MEDIAN COMPUTATION	STATOT	92
C	STATOT	93
CALL QSORT (NSAMC,CONF)	STATOT	94
IF (NSAMC.LT.10) GO TO 160	STATOT	95
I=NSAMC/2	STATOT	96
J=I	STATOT	97
IF (MOD(NSAMC,2).EQ.0) J=J+1	STATOT	98
FMED(N)=(CONF(I)+CONF(J))/2.0	STATOT	99
160 CONTINUE	STATOT	100
DO 170 J=1,NSAMC	STATOT	101
K=N1+J	STATOT	102
RLTS(K)=CONF(J)	STATOT	103
170 CONTINUE	STATOT	104
180 CONTINUE	STATOT	105
190 CONTINUE	STATOT	106
C	STATOT	107
C PRINT VALUES TO OUTPUT FILE OR USER'S TERMINAL	STATOT	108
C	STATOT	109
C INPUT VARIABLE STATISTICS	STATOT	110
C	STATOT	111
IF (NVAR.LT.1) GO TO 330	STATOT	112
IEXT=1	STATOT	113
WRITE (III,510)	BCSFIX	88
WRITE (III,520)	BCSFIX	89
DO 200 N=1,NVAR	STATOT	116
WRITE (III,530) VLABEL(N),VMIN(N),VMAX(N),VAVG(N),VMED(N),	BCSFIX	90
VSTD(N),VSKW(N)	STATOT	118
IF ((ITYPE(N).NE.9).AND.(ITYPE(N).NE.10)) IEXT=0	STATOT	119
200 CONTINUE	STATOT	120
C	STATOT	121

C	COMPUTE MAXIMUM LIKELIHOOD ESTIMATORS FOR INPUT	STATOT	122
C	VARIABLES (ONLY FOR INTERNALLY DEFINED VARIABLES).	STATOT	123
C		STATOT	124
	IF (IEXT.EQ.1) GO TO 330	STATOT	125
	WRITE (III,540)	BCSFIX	91
	ISTAR=0	STATOT	127
	DO 320 N=1,NVAR	STATOT	128
	ANS=' '	STATOT	129
	IF (ILIM(N).NE.0) THEN	STATOT	130
	ANS='*'	STATOT	131
	ISTAR=1	STATOT	132
	ENDIF	STATOT	133
	N1=NVL0C(N)	STATOT	134
	N2=N1+NSAMC-1	STATOT	135
	N3=N1-1	STATOT	136
	RM(1)=PAR(N,1)	STATOT	137
	RM(2)=PAR(N,2)	STATOT	138
	GO TO (210,220,220,250,250,260,270,280,320,320,300), ITYPE(N)	STATOT	139
C		STATOT	140
C	NORMAL	STATOT	141
C		STATOT	142
210	CONTINUE	STATOT	143
	RD(1)=VAVG(N)	STATOT	144
	RD(2)=VSTD(N)	STATOT	145
	I=2	STATOT	146
	GO TO 310	STATOT	147
C		STATOT	148
C	LOGNORMAL	STATOT	149
C		STATOT	150
220	CONTINUE	STATOT	151
	A=1.0D0	STATOT	152
	IF (ITYPE(N).EQ.3) A=BASEXP	STATOT	153
	B=0.0D0	STATOT	154
	DO 230 K=1,NSAMC	STATOT	155
	J=K+N3	STATOT	156
	B=B+DBLE(ALOG(VAR(J)))/A	STATOT	157
230	CONTINUE	STATOT	158
	RD(1)=SNGL(B)/FLOAT(NSAMC)	STATOT	159
	B=0.0D0	STATOT	160
	DO 240 K=1,NSAMC	STATOT	161
	J=K+N3	STATOT	162
	B=B+DBLE((ALOG(VAR(J)))/A-RD(1))**2)	STATOT	163
240	CONTINUE	STATOT	164
	RD(2)=SQRT(SNGL(B)/FLOAT(NSAMC))	STATOT	165
	I=2	STATOT	166
	GO TO 310	STATOT	167
C		STATOT	168
C	LOGUNIFORM	STATOT	169
C		STATOT	170
250	CONTINUE	STATOT	171
	A=1.0D0	STATOT	172
	IF (ITYPE(N).EQ.5) A=BASEXP	STATOT	173
	RD(1)=ALOG(VAR(N1))/SNGL(A)	STATOT	174
	RD(2)=ALOG(VAR(N2))/SNGL(A)	STATOT	175

	I=2	STATOT	178
	GO TO 310	STATOT	177
C		STATOT	178
C	EXPONENTIAL	STATOT	179
C		STATOT	180
260	CONTINUE	STATOT	181
	RD(1)=VAVG(N)	STATOT	182
	RM(1)=1.0/PAR(N,1)	STATOT	183
	I=1	STATOT	184
	GO TO 310	STATOT	185
C		STATOT	186
C	UNIFORM	STATOT	187
C		STATOT	188
270	CONTINUE	STATOT	189
	J=NVL0C(N)	STATOT	190
	RD(1)=VAR(N1)	STATOT	191
	RD(2)=VAR(N2)	STATOT	192
	I=2	STATOT	193
	GO TO 310	STATOT	194
C		STATOT	195
C	BERNOULLI	STATOT	198
C		STATOT	197
280	CONTINUE	STATOT	198
	RM(1)=PAR(N,3)	STATOT	199
	IF ((VAR(N1).EQ.VAR(N2)).OR.(NSAMC.LT.2)) THEN	STATOT	200
	RD(1)=0.0	STATOT	201
	I=1	STATOT	202
	GO TO 310	STATOT	203
	ENDIF	STATOT	204
	A=VAR(N1)	STATOT	205
	K=0	STATOT	206
290	CONTINUE	STATOT	207
	K=K+1	STATOT	208
	J=N3+K	STATOT	209
	IF (A.GE.VAR(J)) GO TO 290	STATOT	210
	RD(1)=(FLOAT(K)-0.5)/FLOAT(NSAMC)	STATOT	211
	I=1	STATOT	212
	GO TO 310	STATOT	213
C		STATOT	214
C	CONSTANT	STATOT	215
C		STATOT	216
300	CONTINUE	STATOT	217
	RD(1)=VAR(N1)	STATOT	218
	I=1	STATOT	219
C		STATOT	220
310	CONTINUE	STATOT	221
	IF (I.GT.1) THEN	STATOT	222
	WRITE (III,550) VLABEL(N),ANS,RD(1),RD(2),RM(1),RM(2)	BCSFIX	92
	ELSE	STATOT	224
	WRITE (III,560) VLABEL(N),ANS,RD(1),RM(1)	BCSFIX	93
	ENDIF	STATOT	226
320	CONTINUE	STATOT	227
	IF (ISTAR.NE.0) WRITE (III,570)	BCSFIX	94
330	CONTINUE	STATOT	229

C		BCSFIX	95
C	PRINT NUMBER OF RANDOM SAMPLES REJECTED DUE TO LIMITS	BCSFIX	96
C		BCSFIX	97
	IF (NVAR.LT.1) GO TO 400	BCSFIX	98
	DO 360 N=1,NVAR	BCSFIX	99
	IF (ILIM(N).EQ.0) GO TO 360	BCSFIX	100
	IF ((NLIM(N,1).EQ.0).AND.(NLIM(N,2).EQ.0)) GO TO 360	BCSFIX	101
	WRITE (IOUT,580) VLABEL(N)	BCSFIX	102
	IF (IDAT.NE.0) WRITE (IDAT,580) VLABEL(N)	BCSFIX	103
	IF (NLIM(N,1).EQ.0) GO TO 340	BCSFIX	104
	WRITE (IOUT,590) NLIM(N,1)	BCSFIX	105
	IF (IDAT.NE.0) WRITE (IDAT,590) NLIM(N,1)	BCSFIX	106
340	CONTINUE	BCSFIX	107
	IF (NLIM(N,2).EQ.0) GO TO 350	BCSFIX	108
	WRITE (IOUT,600) NLIM(N,2)	BCSFIX	109
	IF (IDAT.NE.0) WRITE (IDAT,600) NLIM(N,2)	BCSFIX	110
350	CONTINUE	BCSFIX	111
360	CONTINUE	BCSFIX	112
C		BCSFIX	113
C	STRATIFIED SAMPLING DIAGNOSTICS	BCSFIX	114
C		BCSFIX	115
	IF ((NLEVEL.LT.2).OR.(IDAT.EQ.0)) GO TO 390	BCSFIX	116
	WRITE (IDAT,610)	BCSFIX	117
	DO 380 N=1,NVAR	BCSFIX	118
	IF (ITYPE(N).EQ.NTYPE) GO TO 380	BCSFIX	119
	IF (ITYPE(N).EQ.10) GO TO 380	BCSFIX	120
	K=NLEVEL	BCSFIX	121
	IF (K.GT.10) K=10	BCSFIX	122
	WRITE (IDAT,620) VLABEL(N), (NPTSPL(I,N),I=1,K)	BCSFIX	123
	IF (K.EQ.NLEVEL) GO TO 380	BCSFIX	124
370	CONTINUE	BCSFIX	125
	J=K+1	BCSFIX	126
	K=K+10	BCSFIX	127
	IF (K.GT.NLEVEL) K=NLEVEL	BCSFIX	128
	WRITE (IDAT,630) (NPTSPL(I,N),I=J,K)	BCSFIX	129
	IF (K.LT.NLEVEL) GO TO 370	BCSFIX	130
380	CONTINUE	BCSFIX	131
390	CONTINUE	BCSFIX	132
C		BCSFIX	133
400	CONTINUE	BCSFIX	134
C		BCSFIX	135
C	OUTPUT VARIABLE STATISTICS	BCSFIX	136
C		BCSFIX	137
	IF (NSQLN.LT.1) GO TO 412	BCSFIX	138
	WRITE (III,640)	BCSFIX	139
	WRITE (III,520)	BCSFIX	140
	DO 410 N=1,NSQLN	BCSFIX	141
	WRITE (III,650) PLABEL(N)	BCSFIX	142
	WRITE (III,660) FMIN(N),FMAX(N),FAVG(N),FMED(N),FSTD(N),FSKW(N)	BCSFIX	143
410	CONTINUE	BCSFIX	144
412	CONTINUE	BCSFIX	145
C		BCSFIX	146
	RETURN	BCSFIX	147
500	FORMAT (1H1,1X,'TABLE 2. INPUT VARIABLE STATISTICS')	BCSFIX	148

510	FORMAT (/1X,'*--- SAMPLE DIAGNOSTICS, INPUT DISTRIBUTIONS')	BCSFIX	149
520	FORMAT (/T19,'MIN',T30,'MAX',T40,'MEAN',T61,'MEDIAN',T61,'STND DEV +',T72,'SKEWNESS')	BCSFIX	150
530	FORMAT (1X,A12,1X,1PE10.3,5(1X,E10.3))	BCSFIX	151
540	FORMAT (/1X,'*--- MAXIMUM LIKELIHOOD ESTIMATORS FOR INPUT DISTRI +BUTIONS'/T24,'COMPUTED VALUES',T52,'EXPECTED VALUES'/3X,'VARIABLE' +',T20,'PARAMETER 1',T33,'PARAMETER 2',T40,'PARAMETER 1',T61,'PARAME +TER 2')	BCSFIX	152
550	FORMAT (1X,A12,3X,A1,T20,1PE10.3,3X,E10.3,T40,E10.3,T61,E10.3)	BCSFIX	153
560	FORMAT (1X,A12,3X,A1,T20,1PE10.3,T40,E10.3)	BCSFIX	154
570	FORMAT (T33,'* INDICATES ENDPOINT LIMITING MAY MOVE THE '/T35,'DIS +TRIBUTION AWAY FROM THE EXPECTED VALUES.')	BCSFIX	155
580	FORMAT (/3X,'FOR THE DISTRIBUTION IN ',A12)	BCSFIX	156
590	FORMAT (3X,I6,' RANDOM SAMPLES WERE BELOW THE LOWER LIMIT, AND SET + TO THAT LIMIT.')	BCSFIX	157
600	FORMAT (3X,I6,' RANDOM SAMPLES WERE ABOVE THE UPPER LIMIT, AND SET + TO THAT LIMIT.')	BCSFIX	158
610	FORMAT (///7X,'STRATIFIED SAMPLING DIAGNOSTICS'//1X,'VARIABLE',17X +', 'NUMBER OF SAMPLES CHOSEN FROM EACH LEVEL')	BCSFIX	159
620	FORMAT (1X,A12,2X,10(1X,I5))	BCSFIX	160
630	FORMAT (15X,10(1X,I5))	BCSFIX	161
640	FORMAT (1H1,1X,'TABLE 3. OUTPUT VARIABLE STATISTICS '/1X,'*--- + SAMPLE DIAGNOSTICS, OUTPUT DISTRIBUTIONS')	BCSFIX	162
650	FORMAT (1X,A32)	BCSFIX	163
660	FORMAT (1X,13X,1PE10.3,5(1X,E10.3))	BCSFIX	164
	END	BCSFIX	165
	SUBROUTINE STATS (N,RNDVAL,AMIN,AMAX,AMEAN,STDEV,SKEW)	STATS	166
C		STATS	167
C	THIS ROUTINE COMPUTES THE MINIMUM, MAXIMUM, MEAN, STANDARD	STATS	168
C	DEVIATION, AND SKEWNESS FOR THE DATA SET STORED IN VECTOR RNDVAL.	STATS	169
C		STATS	170
	REAL*8	STATS	171
	+ A,AVG,B,BSAM,C,CSAM,D,BASEXP	STATS	172
	DIMENSION	STATS	173
	+ RNDVAL(N)	STATS	174
	DATA	STATS	175
	+ BASEXP/2.303D0/	STATS	176
C		STATS	177
C		STATS	178
	BSAM=DBLE(FLOAT(N))	STATS	179
	CSAM=BSAM+1.0D0	STATS	180
C		STATS	181
	AMEAN=RNDVAL(1)	STATS	182
	STDEV=0.0	STATS	183
	SKEW=0.0	STATS	184
	IF (N.LE.1) GO TO 490	STATS	185
C		STATS	186
C	COMPUTE AVERAGE, MIN AND MAX VALUE	STATS	187
C		STATS	188
	AMAX=RNDVAL(1)	STATS	189
	AMIN=AMAX	STATS	190
	AVG=DBLE(AMAX)	STATS	191
	DO 100 I=2,N	STATS	192
	RV=RNDVAL(I)	STATS	193

AVG=AVG+DBLE(RV)	STATS	30
IF (RV.LT.AMIN) AMIN=RV	STATS	31
IF (RV.GT.AMAX) AMAX=RV	STATS	32
100 CONTINUE	STATS	33
AVG=AVG/BSAM	STATS	34
AMEAN=SNGL(AVG)	STATS	35
C	STATS	36
C COMPUTE STAND DEV AND SKEWNESS	STATS	37
C	STATS	38
B=0.000	STATS	39
C=0.000	STATS	40
DO 110 I=1,N	STATS	41
A=AVG-DBLE(RNDVAL(I))	STATS	42
B=B+A*A	STATS	43
C=C+A*A*A	STATS	44
110 CONTINUE	STATS	45
STDEV=SNGL(DSQRT(B/CSAM))	STATS	46
SKEW=SNGL((DABS(C/CSAM))*0.333333300)	STATS	47
IF (C.LT.0.000) SKEW=-SKEW	STATS	48
C	STATS	49
490 CONTINUE	STATS	50
RETURN	STATS	51
END	STATS	52
REAL FUNCTION U01(DSEED)	U01	2
C*	U01	3
C*	U01	4
C* PURPOSE:	U01	5
C*	U01	6
C* THIS FUNCTION GENERATES A REAL*4 RANDOM UNIFORM(0,1) VARIATE	U01	7
C* GIVEN AN INITIAL VALUE OF THE SEED, DSEED. THE INPUT SEED	U01	8
C* IS UPDATED TO A NEW SEED USING A LINEAR CONGRUENTIAL METHOD.	U01	9
C*	U01	10
C* CURRENT USAGE IS FOR THE PRIME 750, 32 BIT WORD LENGTH.	U01	11
C*	U01	12
C* DSEED = REAL*8 SEED FOR RANDOM NUMBER GENERATOR. MUST BE BETWEEN	U01	13
C* ONE AND TWO TO THE THIRTY FIRST POWER.	U01	14
C*	U01	15
C* REFERENCE:	U01	16
C*	U01	17
C* LEWIS, GOODMAN, AND MILLER (1969). "A PSEUDO-RANDOM NUMBER	U01	18
C* GENERATOR FOR THE SYSTEM/360" IBM SYSTEMS JOURNAL, VOL. 8,	U01	19
C* NO. 2, PP. 136-145.	U01	20
C*	U01	21
C*	U01	22
C* REAL*8 B, M, DSEED	U01	23
C	U01	24
DATA B / 16807.00+00 /	U01	25
DATA M / 2147483647.00+00 /	U01	26
C	U01	27
DSEED = DINT(DMOD(B*DSEED,M))	U01	28
C	U01	29
U01 = SNGL(DSEED/M)	U01	30
C	U01	31
RETURN	U01	32

END	U01	33
SUBROUTINE U01S (N,RNDVAL,DSEED,NLEVEL)	U01S	2
C	U01S	3
C THIS ROUTINE COMPUTES A VECTOR OF RANDOMLY GENERATED NUMBERS ON	U01S	4
C THE INTERVAL 0,1 , WITH STRATIFICATION. STRATIFICATION IS IGNORED	U01S	5
C IF ONLY ONE LEVEL IS REQUESTED.	U01S	6
C STRATIFICATION IS 'CHECKED', BUT NOT ACTED UPON UNTIL AT LEAST	U01S	7
C HALF OF THE CHOSEN LEVELS ARE FULL. THIS MAKES THE ROUTINE RUN	U01S	8
C MODERATELY FAST FOR THE MAJORITY OF THE TIME, SLOWING TO ENSURE	U01S	9
C STRATIFICATION ONLY ON THE LAST FEW DATA POINTS COLLECTED.	U01S	10
C	U01S	11
C DSEED = REAL*8 SEED FOR RANDOM NUMBER GENERATOR. MUST BE BETWEEN	U01S	12
C ONE AND TWO TO THE THIRTY FIRST POWER.	U01S	13
C N = THE NUMBER OF RANDOM VALUES TO GENERATE.	U01S	14
C NLEVEL = THE NUMBER OF LEVELS OF STRATIFICATION DESIRED.	U01S	15
C RNDVAL = THE RETURNED VECTOR OF RANDOM VALUES.	U01S	16
C	U01S	17
C MAXLEV = MAX LEVELS OF STRATIFICATION PERMITTED. A PARAMETER	U01S	18
C SET IN COMMON BLOCK (INSERT) STRATI.	U01S	19
C NFULL = COUNTER OF THE NUMBER OF FILLED LEVELS.	U01S	20
C NL = LEVEL POINTER FOR STARTIFIED SAMPLING.	U01S	21
C NLIMIT = NUMBER OF POINTS PER LEVEL.	U01S	22
C THIS IS DECREMENTED BY ONE WHEN NFULL REACHES THE	U01S	23
C REMAINDER TERM MOD(N,NLEVEL) = NXCESS.	U01S	24
C NSPL(NL) = CURRENT NUMBER OF SAMPLE POINTS TAKEN FROM LEVEL NL.	U01S	25
C AVAILABLE TO THE USER THROUGH COMMON BLOCK STRATI.	U01S	26
C NXCESS = NUMBER OF EXCESS POINTS TO BE DISTRIBUTED AMONG THE	U01S	27
C NLEVEL STRATIFICATION LEVELS.	U01S	28
C	U01S	29
PARAMETER MAXLEV=200 ! MAX LEVELS OF STRATIFICATION	STRATI	2
COMMON /STRATI/	STRATI	3
* NSPL(MAXLEV)	STRATI	4
C	STRATI	5
C	STRATI	6
C	U01S	31
DOUBLE PRECISION	U01S	32
* DSEED	U01S	33
DIMENSION	U01S	34
* RNDVAL(N)	U01S	35
C	U01S	36
C CHECK USER INPUT, SET POINTERS	U01S	37
C	U01S	38
IF (NLEVEL.GT.MAXLEV) NLEVEL=MAXLEV	U01S	40
IF (NLEVEL.GT.N) NLEVEL=N	U01S	41
NLIMIT=N/NLEVEL	U01S	42
NXCESS=MOD(N,NLEVEL)	U01S	43
IF (NXCESS.GT.0) NLIMIT=NLIMIT+1	U01S	44
NFULL=0	U01S	45
DO 100 I=1,NLEVEL	U01S	46
NSPL(I)=0	U01S	47
100 CONTINUE	U01S	48
C	U01S	49
C LOOP ON THE RANDOM NUMBERS TO GENERATE	U01S	50
C	U01S	51

DO 100 I=1,N	U01S	52
110 CONTINUE	U01S	53
A=U01(DSEED)	U01S	54
IF (NLEVEL.EQ.1) GO TO 170	U01S	55
C	U01S	56
C IF OVER HALF OF THE LEVELS ARE FULL,	U01S	57
C GO TO A DIFFERENT ALGORITHM	U01S	58
C	U01S	59
IF (NFULL.GT.NLEVEL/2) GO TO 120	U01S	60
C	U01S	61
C-----	U01S	62
C FAST ALGORITHM. COMPUTE RANDOM NUMBER, AND CHECK IF	U01S	63
C ITS LEVEL OF STRATIFICATION IS ALREADY FULL. GET NEW	U01S	64
C RANDOM NUMBER IF THAT LEVEL IS FULL.	U01S	65
C	U01S	66
NL=IFIX(A*FLOAT(NLEVEL))+1	U01S	67
IF (NSPL(NL).GE.NLIMIT) GO TO 110	U01S	68
C	U01S	69
C INCREMENT COUNTER AND SAVE VALUE	U01S	70
C	U01S	71
GO TO 150	U01S	72
C	U01S	73
C-----	U01S	74
C **** ALGORITHM FOR OVER HALF THE LEVELS FULL ****	U01S	75
C	U01S	76
C SLOW ALGORITHM. RANDOMLY LOCATES AN EMPTY STRATIFICATION	U01S	77
C LEVEL AND FORCES NEW RANDOM NUMBER TO BE IN THAT LEVEL.	U01S	78
C	U01S	79
120 CONTINUE	U01S	80
C	U01S	81
C FIND A LEVEL AT RANDOM WHICH IS NOT FILLED	U01S	82
C	U01S	83
M=IFIX(A*FLOAT(NLEVEL-NFULL))+1	U01S	84
NL=0	U01S	85
DO 130 J=1,NLEVEL	U01S	86
K=J	U01S	87
IF (NSPL(J).LT.NLIMIT) NL=NL+1	U01S	88
IF (NL.EQ.M) GO TO 140	U01S	89
130 CONTINUE	U01S	90
STOP 'U01S'	U01S	91
140 CONTINUE	U01S	92
NL=K	U01S	93
C	U01S	94
C COMPUTE ENDPOINTS FOR THAT LEVEL AND	U01S	95
C FIND A RANDOM VALUE WITHIN THAT LEVEL.	U01S	96
C	U01S	97
B=FLOAT(NL-1)/FLOAT(NLEVEL)	U01S	98
T=FLOAT(NL)/FLOAT(NLEVEL)	U01S	99
A=B+U01(DSEED)*(T-B)	U01S	100
C-----	U01S	101
C	U01S	102
C INCREMENT # ITEMS IN CURRENT LEVEL, CURRENT VARIABLE	U01S	103
C	U01S	104
150 CONTINUE	U01S	105

	NSPL(NL)=NSPL(NL)+1	U01S	106
C		U01S	107
C	CHECK TO SEE IF # ITEMS THIS LEVEL HAS REACHED LIMIT	U01S	108
C		U01S	109
	IF (NSPL(NL).LT.NLIMIT) GO TO 170	U01S	110
C		U01S	111
C	INCREMENT # FULL LEVELS COUNTER	U01S	112
C		U01S	113
	NFULL=NFULL+1	U01S	114
C		U01S	115
C	IF # FULL LEVELS = NUMBER OF EXCESS LEVELS, MUST	U01S	116
C	DECREMENT PERMISSABLE LEVEL SIZE, AND RE-COUNT	U01S	117
C	THE NUMBER OF FULL LEVELS.	U01S	118
C		U01S	119
	IF (NFULL.NE.NXCESS) GO TO 170	U01S	120
	NLIMIT=NLIMIT-1	U01S	121
	DO 160 J=1,NLEVEL	U01S	122
	IF (NSPL(J).EQ.NLIMIT) NFULL=NFULL+1	U01S	123
160	CONTINUE	U01S	124
C		U01S	125
C	SET THE RANDOM VARIABLE INTO THE OUTPUT ARRAY	U01S	126
C		U01S	127
170	CONTINUE	U01S	128
	RNDVAL(I)=A	U01S	129
180	CONTINUE	U01S	130
	RETURN	U01S	131
	END	U01S	132
	SUBROUTINE VARSET (IERR)	VARSET	2
C		VARSET	3
C	THIS ROUTINE COMPUTES THE RANDOM INPUT VARIABLES VALUES FROM	VARSET	4
C	THE SPECIFIED DISTRIBUTIONS.	VARSET	5
C		VARSET	6
C	NOTE THE RANDOM DATA IS FIRST PLACED INTO ARRAY CONF BY THE	VARSET	7
C	RANDOM NUMBER GENERATOR ROUTINES. THE DATA IS THEN MOVED INTO	VARSET	8
C	THE STORAGE ARRAY VAR. THIS TECHNIQUE IS REQUIRED BY VIRTUAL	VARSET	9
C	MEMORY COMPUTERS, TO ENSURE PROPER PAGING OF THE DATA, WHEN THE	VARSET	10
C	PARAMETER ISIZE EXCEEDS THE PAGE SIZE.	VARSET	11
C		VARSET	12
	PARAMETER ISIZE = 50000 ! MAX DATA SET SIZE	PPARA	2
	PARAMETER MAXCNT = 10 ! MAX NUMBER OF CONSTANTS	PPARA	3
	PARAMETER MAXDST = 100 ! MAX NUMBER OF INPUT DATA POINTS	PPARA	4
	PARAMETER MAXLVS = 100 ! MAX LEVELS FOR STRATIFIED SAMPLING	PPARA	5
	PARAMETER MAXNS = 10000 ! MAX NUMBER OF SAMPLES	PPARA	6
	PARAMETER MAXSOL = 10 ! MAX NUMBER OF SOLUTIONS	PPARA	7
	PARAMETER MAXVAR = 25 ! MAX NUMBER OF INPUT VARIABLES	PPARA	8
	PARAMETER NMLEN = 10 ! FILE NAME LENGTH	PPARA	9
	PARAMETER NTYPE = 11 ! NUMBER OF DISTRIBUTION TYPES	PPARA	10
C		PPARA	11
C		PPARA	12
	COMMON /PBLK1/	PBLK1	2
	+ NCONST, NSOLN, NVAR	PBLK1	3
C		PBLK1	4
C		PBLK1	5
	COMMON /PBLK6/	PBLK6	2

<pre> + CONF(MAXNS), RPLT(MAXNS) C C COMMON /PBLK8A/ + NVLDC(MAXVAR) C C COMMON /PBLK8B/ + VAR(ISIZE) C C COMMON /PBLK17/ + ICCD, IQUIT, ISOLN, + IUPDAT, MAXSAM, NPRT, + NSAM, NSAMC C C C C LOOP ON THE NUMBER OF VARIABLES C COMPUTE A RANDOM SAMPLE SET FOR EACH VARIABLE C IERR=0 DO 110 N=1,NVAR CALL RNGS (IERR,N,NSAM,CONF) IF (IERR.NE.0) RETURN J=NVLDC(N)-1 DO 100 I=1,NSAM K=I+J VAR(K)=CONF(I) 100 CONTINUE 110 CONTINUE RETURN END SUBROUTINE VERSION C C THIS ROUTINE WAS WRITTEN PRIMARILY TO CREATE A BANNER PAGE FOR THE C PACSTAT CODE. IT WILL BE USED TO PROVIDE INFORMATION ON THE VERSION C NUMBER OF PACSTAT CURRENTLY IN USE, UPDATE INFORMATION, AND APPLICABL C DOCUMENTATION. AUTHOR: CL BARTLEY 4/15/86 C CHARACTER *1 STAR,MINUS C STAR = '*' MINUS = '-' C IDAT = 12 C C C C WRITE(IDAT,50) 50 FORMAT(/) C DO 150 J=1,5 WRITE(IDAT,100) (STAR,I=1,122) </pre>	<pre> PBLK6 . 3 PBLK6 . 4 PBLK6 . 5 PBLK8A . 2 PBLK8A . 3 PBLK8A . 4 PBLK8A . 5 PBLK8B . 2 PBLK8B . 3 PBLK8B . 4 PBLK8B . 5 PBLK17 . 2 PBLK17 . 3 PBLK17 . 4 PBLK17 . 5 PBLK17 . 6 PBLK17 . 7 VARSET . 19 VARSET . 20 VARSET . 21 VARSET . 22 VARSET . 23 VARSET . 24 VARSET . 25 VARSET . 26 VARSET . 27 VARSET . 28 VARSET . 29 VARSET . 30 VARSET . 31 VARSET . 32 VARSET . 33 VARSET . 34 VERSION . 2 VERSION . 3 VERSION . 4 VERSION . 5 VERSION . 6 VERSION . 7 VERSION . 8 VERSION . 9 VERSION . 10 VERSION . 11 VERSION . 12 VERSION . 13 VERSION . 14 VERSION . 15 VERSION . 16 VERSION . 17 VERSION . 18 VERSION . 19 VERSION . 20 VERSION . 21 VERSION . 22 </pre>
--	--

100	FORMAT(3(5X 122A1/))	VERSION	23
150	CONTINUE	VERSION	24
C		VERSION	25
	DO 250 J=1,2	VERSION	26
	WRITE(IDAT,200) (STAR,I=1,40)	VERSION	27
200	FORMAT(5X,20A1,82X,20A1/)	VERSION	28
250	CONTINUE	VERSION	29
C		VERSION	30
	WRITE(IDAT,300) (STAR,I=1,40)	VERSION	31
300	FORMAT(5X,20A1,34X,'P A C S T A T',35X,20A1)	VERSION	32
C		VERSION	33
	WRITE(IDAT,400) (STAR,I=1,40)	VERSION	34
400	FORMAT(/5X,20A1,23X,'CODE VERSION AND UPDATE INFORMATION',24X, 120A1)	VERSION	35
C		VERSION	36
	WRITE(IDAT,500) (STAR,I=1,40)	VERSION	37
500	FORMAT(/5X,20A1,22X,'WRITTEN FOR PRIME 750 BY D. LANGFORD', 124X,20A1)	VERSION	38
C		VERSION	39
	WRITE(IDAT,600) (STAR,I=1,40)	VERSION	40
600	FORMAT(/5X,20A1,11X,'CONVERTED TO VAX 11/780 BY C. BARTLEY AND ' 1'M. BUDDEN - 4/86',13X,20A1)	VERSION	41
C		VERSION	42
	WRITE(IDAT,700) (STAR,I=1,40)	VERSION	43
700	FORMAT(/5X,20A1,26X,'APPLICABLE DOCUMENTS TO FOLLOW',26X,20A1)	VERSION	44
C		VERSION	45
	WRITE(IDAT,800) (STAR,I=1,40)	VERSION	46
800	FORMAT(/5X,20A1,28X,'VAX VERSION NUMBER (B4)',28X,20A1)	VERSION	47
C		VERSION	48
	WRITE(IDAT,810) (STAR,I=1,40)	VERSION	49
810	FORMAT(/5X,20A1,5X,'DIR = [BWIP86.PACSTAT.B4]',52X,20A1)	VERSION	50
	WRITE(IDAT,820) (STAR,I=1,40)	VERSION	51
820	FORMAT(/5X,20A1,10X,'PACSTAT_B4.SRC WITNESS SOURCE FILE',34X, \$20A1)	VERSION	52
	WRITE(IDAT,830) (STAR,I=1,40)	VERSION	53
830	FORMAT(/5X,20A1,10X,'PACSTAT_B4.DPL WITNESS OLD PROGRAM LIBRAR \$Y',26X,20A1)	VERSION	54
	WRITE(IDAT,840) (STAR,I=1,40)	VERSION	55
840	FORMAT(/5X,20A1,10X,'PACSTAT_B4.OLB WITNESS OBJECT LIBRARY', \$31X,20A1)	VERSION	56
	WRITE(IDAT,850) (STAR,I=1,40)	VERSION	57
850	FORMAT(/5X,20A1,10X,'PACSTAT_B4.FOR WITNESS FORTRAN COMPILE \$FILE',23X,20A1)	VERSION	58
	WRITE(IDAT,860) (STAR,I=1,40)	VERSION	59
860	FORMAT(/5X,20A1,10X,'PACSTAT_B4.LIS WITNESS FORTRAN LIST FILE',36X, \$20A1)	VERSION	60
	WRITE(IDAT,810) (STAR,I=1,40)	VERSION	61
	DO 950 J=1,5	VERSION	62
	WRITE(IDAT,200) (STAR,I=1,40)	VERSION	63
950	CONTINUE	VERSION	64
C		VERSION	65
	DO 1050 J=1,5	VERSION	66
	WRITE(IDAT,100) (STAR,I=1,122)	VERSION	67
1050	CONTINUE	VERSION	68

WRITE(IDAT,1200)	VERSION . 77
1200 FORMAT(H1)	VERSION . 78
WRITE(IDAT,50)	VERSION . 79
C	VERSION . 80
DO 1250 J=1,5	VERSION . 81
WRITE(IDAT,100) (STAR,I=1,122)	VERSION . 82
1250 CONTINUE	VERSION . 83
C	VERSION . 84
DO 1300 J=1,2	VERSION . 85
WRITE(IDAT,200) (STAR,I=1,40)	VERSION . 86
1300 CONTINUE	VERSION . 87
C	VERSION . 88
WRITE(IDAT,1310) (STAR,I=1,20)	VERSION . 89
1310 FORMAT(5X,20A1,5X,'PRECEDING VERSION B3',T100,20A1/)	VERSION . 90
C	VERSION . 91
WRITE (IDAT,1350) (STAR,I=1,80)	VERSION . 92
1350 FORMAT(5X,20A1,5X,'THIS VERSION IS BATCH ONLY. HAS '	VERSION . 93
\$ ' COMMENTS AND MULTIPLE',T100,20A1/5X,20A1,5X,'TITLE CARDS ON'	VERSION . 94
\$ ' THE FIRST CARDS',T100,20A1)	VERSION . 95
C	VERSION . 96
WRITE (IDAT,1360)	VERSION . 97
WRITE(IDAT,1360) (STAR,I=1,40)	VERSION . 98
C	VERSION . 99
DO 1400 J=1,5	VERSION . 100
WRITE(IDAT,200) (STAR,I=1,40)	VERSION . 101
1400 CONTINUE	VERSION . 102
C	VERSION . 103
WRITE (IDAT,1450) (STAR,I=1,40)	VERSION . 104
1450 FORMAT (5X,20A1,5X,'CURRENT VERSION B4',T100,20A1/)	VERSION . 105
C	VERSION . 106
WRITE (IDAT,1500) (STAR,I=1,80)	VERSION . 107
1500 FORMAT(5X,20A1,5X,'VERSION B4 HAS ENHANCED FEATURES',T100,20A1,/	VERSION . 108
\$,5X,20A1,5X,'THE ADDED CAPABILITIES ARE:',T100,20A1/)	VERSION . 109
C	VERSION . 110
WRITE (IDAT,1600) (STAR,I=1,80)	VERSION . 111
1600 FORMAT(5X,20A1,5X,'1) SETTING VARIABLE MODETYP ALLOWS CODE TO'	VERSION . 112
\$' RUN',T100,20A1/5X,20A1,7X,' EITHER INTERACTIVE OR BATCH MODE',	VERSION . 113
1T100,20A1/)	VERSION . 114
C	VERSION . 115
WRITE (IDAT,1700) (STAR,I=1,80)	VERSION . 116
1700 FORMAT(5X,20A1,5X,'2) FOR QA PURPOSES CREATES A DEFAULT ECHO',	VERSION . 117
\$ ' FILE (PACSTAT.ECH)',T100,20A1/5X,20A1,9X,' IF A DATA FILE NAME',	VERSION . 118
1 ' IS NOT ENTERED',T100,20A1/)	VERSION . 119
C	VERSION . 120
WRITE (IDAT,1800) (STAR,I=1,80)	VERSION . 121
1800 FORMAT(5X,20A1,5X,'3) FIXES THAT ALLOW PACSTAT TO READ THE SEED',	VERSION . 122
\$ ' VALUE INTO',T100,20A1/5X,20A1,7X,' THE VARIABLE DSEED, A',	VERSION . 123
1 ' DOUBLE PRECISION VARIABLE',T100,20A1/)	VERSION . 124
C	VERSION . 125
DO 1900 J=1,3	VERSION . 126
WRITE (IDAT,200) (STAR,I=1,40)	VERSION . 127
1900 CONTINUE	VERSION . 128
C	VERSION . 129
DO 2000 J=1,5	VERSION . 130

WRITE(IDAT,100) (STAR,I=1,122)	VERSION	131
2000 CONTINUE	VERSION	132
C	VERSION	133
1300 FORMAT(5X,20A1,10X,'THESE CARDS ARE IDENTIFIED BY THE PATTERN'	VERSION	134
\$' "****" IN COLUMNS 1 - 4 OF EACH DATA CARD.')	VERSION	135
WRITE(IDAT,1200)	VERSION	136
RETURN	VERSION	137
END	VERSION	138
SUBROUTINE WHEADR (IFLD,IERR)	WHEADR	2
C	WHEADR	3
C THIS ROUTINE WRITES FILE HEADER RECORD(S) TO THE BINARY DATA	WHEADR	4
C FILES ASSOCIATED WITH THE MAGNUM AND CHAINT PROGRAMS. THE FIRST	WHEADR	5
C RECORD CONTAINS INFORMATION CONCERNING THE IDENTITY OF THE CURRENT	WHEADR	6
C FILE. THE SECOND RECORD, IF NEEDED, CONTAINS A BRIEF SUMMARY OF	WHEADR	7
C THE FILES WHICH WERE USED AS SOURCE DATA FOR THE RUN WHICH CREATED	WHEADR	8
C THE CURRENT FILE.	WHEADR	9
C	WHEADR	10
C--CONTROL DATA	WHEADR	11
C IFLD = OUTPUT FILE UNIT NUMBER	WHEADR	12
C IERR = ERROR POINTER, = 0 FOR SUCCESSFUL HEADER WRITE	WHEADR	13
C	WHEADR	14
C--HEADER RECORD INFORMATION	WHEADR	15
C NSRC = NUMBER OF FILE TRACEBACK RECORDS	WHEADR	16
C JRUNID = IDENTIFIER (DATE/TIME) OF SOURCE RUN	WHEADR	17
C USRNAM = NAME OF USER WHO INITIATED SOURCE RUN (CHAR*8)	WHEADR	18
C PRG = NAME OF SOURCE PROGRAM (CHAR*8)	WHEADR	19
C FL = FILE TYPE NAME (CHAR*8)	WHEADR	20
C VERNUM = VERSION NUMBER OF SOURCE PROGRAM	WHEADR	21
C TITLE = TITLE FROM SOURCE RUN (CHAR*80)	WHEADR	22
C	WHEADR	23
C--TRACEBACK RECORD INFORMATION (OMIT IF NSRC=0)	WHEADR	24
C NRUNID(I) = IDENTIFIER OF INPUT FILE I	WHEADR	25
C FLT(I) = FILE TYPE OF INPUT FILE I (CHAR*8)	WHEADR	26
C PRGT(I) = SOURCE PROGRAM OF INPUT FILE I (CHAR*8)	WHEADR	27
C USRNMT(I) = SOURCE PROGRAM USER (CHAR*8)	WHEADR	28
C	WHEADR	29
PARAMETER ISIZE = 50000 ! MAX DATA SET SIZE	PPARA	2
PARAMETER MAXCNT = 10 ! MAX NUMBER OF CONSTANTS	PPARA	3
PARAMETER MAXDST = 100 ! MAX NUMBER OF INPUT DATA POINTS	PPARA	4
PARAMETER MAXLVS = 100 ! MAX LEVELS FOR STRATIFIED SAMPLING	PPARA	5
PARAMETER MAXNS = 10000 ! MAX NUMBER OF SAMPLES	PPARA	6
PARAMETER MAXSOL = 10 ! MAX NUMBER OF SOLUTIONS	PPARA	7
PARAMETER MAXVAR = 25 ! MAX NUMBER OF INPUT VARIABLES	PPARA	8
PARAMETER NMLEN = 10 ! FILE NAME LENGTH	PPARA	9
PARAMETER NTYPE = 11 ! NUMBER OF DISTRIBUTION TYPES	PPARA	10
C	PPARA	11
C	PPARA	12
PARAMETER MAXSRC=15	IDCOM	2
COMMON /IDCOM/	IDCOM	3
+ JRUNID, FL, FLT(MAXSRC),	IDCOM	4
+ NRUNID(MAXSRC), NSRC, PRG,	IDCOM	5
+ PRGT(MAXSRC), TITLE(20), USRNAM,	IDCOM	6
+ USRNMT(MAXSRC), VERNUM	IDCOM	7
CHARACTER*4	IDCOM	8

* TITLE	IDCOM	9
CHARACTER*8	IDCOM	10
* FL,	IDCOM	11
* PRGT,	IDCOM	12
FLT,	IDCOM	13
USRNAM,	IDCOM	14
PRG,	INOUT	2
USRNMT	ECHO	86
C	INOUT	4
C	INOUT	5
COMMON /INOUT/	INOUT	6
* IN, IOUT, IQB, IECHO	INOUT	7
CHARACTER*1	WHEADR	33
* IQB	WHEADR	34
C	WHEADR	35
C	WHEADR	36
IERR=0	WHEADR	37
IF (NSRC.GT.MAXSRC) THEN	WHEADR	38
WRITE (IOUT,500) NSRC,MAXSRC	WHEADR	39
IERR=1	WHEADR	40
RETURN	WHEADR	41
ENDIF	WHEADR	42
C	WHEADR	43
C	WHEADR	44
C	WHEADR	45
INITIAL FILE HEADER	WHEADR	46
C	WHEADR	47
WRITE (IFLO) NSRC,JRUNID,USRNAM,FL,PRG,VERNUM,(TITLE(I),I=1,20)	WHEADR	48
C	WHEADR	49
C	WHEADR	50
C	WHEADR	51
TRACEBACK HEADER	WHEADR	52
C	WHEADR	53
IF (NSRC.GT.0) WRITE (IFLO) (NRUNID(I),FLT(I),PRGT(I),USRNMT(I),	WHEADR	54
* I=1,NSRC)	WHEADR	55
RETURN	WHEADR	56
500 FORMAT (/1X,'*** ERROR, 'I5,' SOURCE FILES EXCEEDS PROGRAM MAXIMU	WHEADR	57
*M OF 'I3,'.'/5X,'ABORT IN ROUTINE WHEADR.')	WHEADR	58
END	WHEADR	59
SUBROUTINE WRSTOC (IDATB,IHEADR)	WRSTOC	2
C	WRSTOC	3
C	WRSTOC	4
C	WRSTOC	5
C	WRSTOC	6
C	WRSTOC	7
C	WRSTOC	8
C	WRSTOC	9
C	WRSTOC	10
THIS ROUTINE WRITES THE BINARY FILE FOR PROGRAM PACSTAT. BOTH	PPARA	2
THE HEADER AND PACSTAT OUTPUT DATA ARE WRITTEN BY THIS CODE.	PPARA	3
C	PPARA	4
C	PPARA	5
C	PPARA	6
C	PPARA	7
C	PPARA	8
C	PPARA	9
C	PPARA	10
IDATB = BINARY FILE UNIT NUMBER	PPARA	11
C	PPARA	12
C	PPARA	13
IHEADR = 0 FOR DATA WRITE	PBLK1	2
C	PBLK1	3
C	PBLK1	4
= 1 FOR HEADER WRITE		
C		
PARAMETER ISIZE = 50000 ! MAX DATA SET SIZE		
PARAMETER MAXCNT = 10 ! MAX NUMBER OF CONSTANTS		
PARAMETER MAXDST = 100 ! MAX NUMBER OF INPUT DATA POINTS		
PARAMETER MAXLVS = 100 ! MAX LEVELS FOR STRATIFIED SAMPLING		
PARAMETER MAXNS = 10000 ! MAX NUMBER OF SAMPLES		
PARAMETER MAXSOL = 10 ! MAX NUMBER OF SOLUTIONS		
PARAMETER MAXVAR = 25 ! MAX NUMBER OF INPUT VARIABLES		
PARAMETER NWLEN = 10 ! FILE NAME LENGTH		
PARAMETER NTYPE = 11 ! NUMBER OF DISTRIBUTION TYPES		
C		
C		
COMMON /PBLK1/		
* NCONST,		
NSOLN,		
NVAR		
C		

C	COMMON /PBLK2/			PBLK1	5
	+ NSTTL,	NTTL,	STTL,	PBLK2	2
	+ TTLE			PBLK2	3
	CHARACTER*40			PBLK2	4
	+ STTLE,	TTLE		PBLK2	5
C				PBLK2	6
C				PBLK2	7
	COMMON /PBLK3/			PBLK2	8
	+ CDIMEN(MAXCNT),	CLABEL(MAXCNT),	PLABEL(MAXSOL),	PBLK3	2
	+ VDIMEN(MAXVAR),	VLABEL(MAXVAR)		PBLK3	3
	CHARACTER*12			PBLK3	4
	+ CDIMEN,	CLABEL,	VDIMEN,	PBLK3	5
	+ VLABEL			PBLK3	6
	CHARACTER*32			PBLK3	7
	+ PLABEL			PBLK3	8
C				PBLK3	9
C				PBLK3	10
	COMMON /PBLK4/			PBLK3	11
	+ CONST(MAXCNT),	VALU(MAXSOL),	VINPT(MAXVAR)	PBLK4	2
C				PBLK4	3
C				PBLK4	4
	COMMON /PBLK5/			PBLK4	5
	+ ICNT,	IDAT,	INDEX	PBLK5	2
C				PBLK5	3
C				PBLK5	4
	COMMON /PBLK7A/			PBLK5	5
	+ NSLOC(MAXSOL)			PBLK7A	2
C				PBLK7A	3
C				PBLK7A	4
	COMMON /PBLK7B/			PBLK7A	5
	+ RLTS(ISIZE)			PBLK7B	2
C				PBLK7B	3
C				PBLK7B	4
	COMMON /PBLK8A/			PBLK7B	5
	+ NVLOC(MAXVAR)			PBLK8A	2
C				PBLK8A	3
C				PBLK8A	4
	COMMON /PBLK8B/			PBLK8A	5
	+ VAR(ISIZE)			PBLK8B	2
C				PBLK8B	3
C				PBLK8B	4
	COMMON /PBLK15/			PBLK8B	5
	+ ILIM(MAXVAR),	ITYPE(MAXVAR),	NLIM(MAXVAR,2),	PBLK15	2
	+ PAR(MAXVAR,3),	RLIM(MAXVAR,2),	VLM(MAXVAR,2),	PBLK15	3
	+ VLIMT(MAXVAR,2)			PBLK15	4
C				PBLK15	5
C				PBLK15	6
	COMMON /PBLK17/			PBLK15	7
	+ ICCD,	IQUIT,	ISOLN,	PBLK17	2
	+ IUPDAT,	MAXSAM,	NPRT,	PBLK17	3
	+ NSAM,	NSAMC		PBLK17	4
C				PBLK17	5
C				PBLK17	6
				PBLK17	7

PARAMETER MAXSRC=15	IDCOM	2
COMMON /IDCOM/	IDCOM	3
+ JRUNID, FL, FLT(MAXSRC),	IDCOM	4
+ NRUNID(MAXSRC), NSRC, PRG,	IDCOM	6
+ PRGT(MAXSRC), TITLE(20), USRNM,	IDCOM	6
+ USRNMT(MAXSRC), VERNUM	IDCOM	7
CHARACTER*4	IDCOM	8
+ TITLE	IDCOM	9
CHARACTER*8	IDCOM	10
+ FL, FLT, PRG,	IDCOM	11
+ PRGT, USRNM, USRNMT	IDCOM	12
C	IDCOM	13
C	IDCOM	14
COMMON /INOUT/	INOUT	2
+ IN, IOUT, IQB, IECHO	ECHO	86
CHARACTER*1	INOUT	4
+ IQB	INOUT	5
C	INOUT	6
C	INOUT	7
C	WRSTOC	25
C	WRSTOC	26
C	WRSTOC	27
C	WRSTOC	28
C	WRSTOC	29
IF ((IHEADR.LT.0).OR.(IHEADR.GT.1)) THEN	WRSTOC	30
WRITE (IOUT,500) IHEADR	WRSTOC	31
GO TO 110	WRSTOC	32
ENDIF	WRSTOC	33
IF (IDATB.LE.0) THEN	WRSTOC	34
WRITE (IOUT,510) IDATB	WRSTOC	35
GO TO 110	WRSTOC	36
ENDIF	WRSTOC	37
C	WRSTOC	38
C	WRSTOC	39
C	WRSTOC	40
IF (IHEADR.EQ.0) GO TO 100	WRSTOC	41
REWIND (IDATB)	WRSTOC	42
NSRC=0	WRSTOC	43
CALL WHEADR (IDATB,IERR)	WRSTOC	44
IF (IERR.NE.0) STOP	WRSTOC	45
I=0	WRSTOC	46
WRITE (IDATB) NSOLN,NVAR,NCONST,NTTL,NSTTL,I,I,I	WRSTOC	47
IF (NSOLN.GT.0) WRITE (IDATB) (PLABEL(I),I=1,NSOLN)	WRSTOC	48
IF (NVAR.GT.0) WRITE (IDATB) (VLABEL(I),VDIMEN(I),I=1,NVAR)	WRSTOC	49
IF (NCONST.GT.0) WRITE (IDATB) (CLABEL(I),CDIMEN(I),I=1,NCONST)	WRSTOC	50
RETURN	WRSTOC	51
C	WRSTOC	52
C	WRSTOC	53
C	WRSTOC	54
100 CONTINUE	WRSTOC	55
N1=NVAR*NSAM	WRSTOC	56
N2=NSOLN*NSAM	WRSTOC	57
I=0	WRSTOC	58
WRITE (IDATB) ICNT,NSAM,NSAMC,I,I,I	WRSTOC	59
IF (NCONST.GT.0) WRITE (IDATB) (CONST(I),I=1,NCONST)		

IF (NVAR.GT.0) THEN	WRSTOC	60
WRITE (IDATB) (ITYPE(I),PAR(I,1),PAR(I,2),PAR(I,3),I=1,NVAR)	WRSTOC	81
WRITE (IDATB) (VAR(I),I=1,N1)	WRSTOC	62
ENDIF	WRSTOC	63
IF (NSOLN.GT.0) WRITE (IDATB) (RLTS(I),I=1,N2)	WRSTOC	64
C	WRSTOC	65
RETURN	WRSTOC	66
C	WRSTOC	67
110 CONTINUE	WRSTOC	68
WRITE (IDOUT,520)	WRSTOC	69
RETURN	WRSTOC	70
C	WRSTOC	71
500 FORMAT (/1X,'ERROR, BINARY FILE WRITE. IHEADR UNDEFINED, =',I6)	WRSTOC	72
510 FORMAT (/1X,'ERROR, BINARY FILE WRITE. IDATB =',I5)	WRSTOC	73
520 FORMAT (1X,'ROUTINE WRSTOC.')	WRSTOC	74
END	WRSTOC	75
SUBROUTINE XUDIST (N,RNDVAL,IUDIST,UDIST,VDIST)	XUDIST	2
C	XUDIST	3
C THIS ROUTINE TRANSFORMS A UNIFORM RANDOM DISTRIBUTION, ON THE	XUDIST	4
C INTERVAL 0,1 , TO A USER DEFINED DISTRIBUTION. THIS DISTRIBUTION	XUDIST	5
C IS DEFINED BY THE PIECEWISE LINEAR CUMMULATIVE CONFIDENCE FUNCTION	XUDIST	6
C GIVEN BY DATA POINTS UDIST(I),VDIST(I).	XUDIST	7
C	XUDIST	8
C * WHILE INTENDED FOR USE WITH STOCHASTIC SIMULATORS, THIS *	XUDIST	9
C * ROUTINE IS NO MORE THAN A GENERAL PURPOSE INTERPOLATOR. *	XUDIST	10
C	XUDIST	11
C N = THE NUMBER OF DATA POINTS TO TRANSFORM.	XUDIST	12
C RNDVAL = ON INPUT, RNDVAL CONTAINS THE UNIFORMLY DISTRIBUTED DATA.	XUDIST	13
C = ON OUTPUT, RNDVAL CONTAINS THE TRANSFORMED RANDOM DATA.	XUDIST	14
C IUDIST = THE NUMBER OF DATA PAIRS IN THE ARRAYS UDIST AND VDIST.	XUDIST	15
C UDIST = THE OUTPUT DISTRIBUTION VALUE CORRESPONDING TO A GIVEN	XUDIST	16
C CONFIDENCE LEVEL.	XUDIST	17
C VDIST = THE CONFIDENCE VALUE CORRESPONDING TO A GIVEN VALUE OF	XUDIST	18
C THE OUTPUT DISTRIBUTION.	XUDIST	19
C	XUDIST	20
C NOTES:	XUDIST	21
C	XUDIST	22
C IF U .LT. UDIST(1) THEN FUDIST = VDIST(1)	XUDIST	23
C	XUDIST	24
C IF U .GT. UDIST(IUDIST) THEN FUDIST = VDIST(IUDIST)	XUDIST	25
C	XUDIST	26
C THAT IS, EXTREME VALUES ARE MOVED IN TO THE NEAREST POINT	XUDIST	27
C OF DEFINITION FOR THE DISTRIBUTION.	XUDIST	28
C	XUDIST	29
C DIMENSION	XUDIST	30
+ RNDVAL(N), UDIST(IUDIST), VDIST(IUDIST)	XUDIST	31
C	XUDIST	32
DO 140 I=1,N	XUDIST	33
U=RNDVAL(I)	XUDIST	34
C	XUDIST	35
IF (U.GT.VDIST(1)) GO TO 100	XUDIST	36
RNDVAL(I)=UDIST(1)	XUDIST	37
GO TO 140	XUDIST	38
100 CONTINUE	XUDIST	39

IF (U.LT.VDIST(IUDIST)) GO TO 110	XUDIST . 40
RNDVAL(I)=UDIST(IUDIST)	XUDIST . 41
GO TO 140	XUDIST . 42
110 CONTINUE	XUDIST . 43
C	XUDIST . 44
K=IUDIST-1	XUDIST . 45
DO 120 J=1,K	XUDIST . 46
IF ((VDIST(J).GT.U).OR.(VDIST(J+1).LE.U)) GO TO 120	XUDIST . 47
INDEX=J	XUDIST . 48
GO TO 130	XUDIST . 49
120 CONTINUE	XUDIST . 50
130 CONTINUE	XUDIST . 51
C	XUDIST . 52
DEL = (U-VDIST(INDEX)) / (VDIST(INDEX+1)-VDIST(INDEX))	XUDIST . 53
RNDVAL(I) = UDIST(INDEX) + DEL*(UDIST(INDEX+1)-UDIST(INDEX))	XUDIST . 54
140 CONTINUE	XUDIST . 55
C	XUDIST . 56
RETURN	XUDIST . 57
END	XUDIST . 58

APPENDIX D

PACSTAT UPDATE FILES

PACSTAT_A0.UPD

```

*IDENT VAXFIX
*D PACSTAT.62,73
*CALL PPARA
*CALL PBLK1
*CALL PBLK2
*CALL PBLK5
*CALL PBLK7A
*CALL PBLK7B
*CALL PBLK8A
*CALL PBLK8B
*CALL PBLK12
*CALL PBLK16
*CALL PBLK17
*CALL PBLK18
*CALL IDCOM
*CALL INOUT
*D ASG.15,16
*CALL INOUT
C
C - PRIME - $INSERT SYSCOM>A$KEYS
*D DATOUT.10,18
*CALL PPARA
*CALL PBLK1
*CALL PBLK3
*CALL PBLK5
*CALL PBLK6
*CALL PBLK7A
*CALL PBLK7B
*CALL PBLK9
*CALL PBLK17
*CALL INOUT
C
*D DATSET.9,16
*CALL PPARA
*CALL PBLK1
*CALL PBLK4
*CALL PBLK5
*CALL PBLK7A
*CALL PBLK7B
*CALL PBLK8A
*CALL PBLK8B
*CALL PBLK12
*CALL PBLK17
*D OEXPFL.21
*CALL ULIMITS
*D EXPECT.12,19
*CALL PPARA
*CALL PBLK1
*CALL PBLK3
*CALL PBLK5
*CALL PBLK11
*CALL PBLK13

```



```

*CALL PBLK15
*CALL INOUT
*D INPUT.7,20
*CALL PPARA
*CALL PBLK1
*CALL PBLK2
*CALL PBLK3
*CALL PBLK4
*CALL PBLK5
*CALL PBLK13
*CALL PBLK14
*CALL PBLK15
*CALL PBLK17
*CALL PBLK18
*CALL STRATI
*CALL IDCOM
*CALL INOUT
C
*D LNNORMAL.19
*CALL ULIMITS
*D LOGNORMAL.19
*CALL ULIMITS
*D NORMALL.24
*CALL ULIMITS
*D PLINIT.9
*CALL INOUT
*D PPLT.16,24
*CALL PPARA
*CALL PBLK2
*CALL PBLK3
*CALL PBLK5
*CALL PBLK6
*CALL PBLK9
*CALL PBLK17
*CALL IDCOM
*CALL INOUT
C
*D R1DAT.12,15
*CALL PPARA
*CALL PBLK3
*CALL PBLK18
*CALL INOUT
*D R2DAT.7,10
*CALL PPARA
*CALL PBLK3
*CALL PBLK18
*CALL INOUT
C
*D RELEAS.6,7
*CALL INOUT
C - PRIME - $INSERT SYSCOM>A$KEYS
*D REORDR.13,21

```

PACSTAT_A0.UPD.2

```

*CALL PPARA
*CALL PBLK1
*CALL PBLK5
*CALL PBLK6
*CALL PBLK7A
*CALL PBLK7B
*CALL PBLK8A
*CALL PBLK8B
*CALL PBLK12
*CALL PBLK17
*CALL INOUT
*D RNGS.16,22
*CALL PPARA
*CALL PBLK13
*CALL PBLK15
*CALL PBLK16
*CALL PBLK18
*CALL STRATI
*CALL ULIMITS
*CALL INOUT
*D SOLN.29,32
*CALL PPARA
*CALL PBLK4
*CALL PBLK5
*CALL INOUT
*D STATOT.19,30
*CALL PPARA
*CALL PBLK1
*CALL PBLK3
*CALL PBLK5
*CALL PBLK6
*CALL PBLK7A
*CALL PBLK7B
*CALL PBLK8A
*CALL PBLK8B
*CALL PBLK10
*CALL PBLK13
*CALL PBLK15
*CALL PBLK17
*CALL INOUT
*D U01S.30
*CALL STRATI
*D VARSET.13,17
*CALL PPARA
*CALL PBLK1
*CALL PBLK6
*CALL PBLK8A
*CALL PBLK8B
*CALL PBLK17
*D WHEADR.30,31
*CALL PPARA
*CALL IDCOM

```

```

*CALL INOUT
*D WRSTOC.11,22
*CALL PPARA
*CALL PBLK1
*CALL PBLK2
*CALL PBLK3
*CALL PBLK4
*CALL PBLK5
*CALL PBLK7A
*CALL PBLK7B
*CALL PBLK8A
*CALL PBLK8B
*CALL PBLK15
*CALL PBLK17
*CALL IDCOM
*CALL INOUT
C
*PURDECK JCLPRIM
*PURDECK MANUAL
*PURDECK BLOCK
*PURDECK SOLN2
*PURDECK OUTPUT
*PURDECK BLOCK2
*D PPARA.2,10
    PARAMETER ISIZE = 50000      ! MAX DATA SET SIZE
    PARAMETER MAXCNT = 10        ! MAX NUMBER OF CONSTANTS
    PARAMETER MAXDST = 100       ! MAX NUMBER OF INPUT DATA POINTS
    PARAMETER MAXLVS = 100       ! MAX LEVELS FOR STRATIFIED SAMPLING
    PARAMETER MAXNS = 10000      ! MAX NUMBER OF SAMPLES
    PARAMETER MAXSOL = 10        ! MAX NUMBER OF SOLUTIONS
    PARAMETER MAXVAR = 25        ! MAX NUMBER OF INPUT VARIABLES
    PARAMETER NMLN = 10          ! FILE NAME LENGTH
    PARAMETER NTYPE = 11         ! NUMBER OF DISTRIBUTION TYPES
*D WRSTOC.73,74
*D BLKDAT.14,18
*CALL PPARA
*CALL PBLK1
*CALL PBLK2
*CALL PBLK3
*CALL IDCOM
C - PRIME - $INSERT SYSTEMS>UTIL>PACSTAT>COMMON>PPARA
C - PRIME - $INSERT SYSTEMS>UTIL>PACSTAT>COMMON>PBLK1
C - PRIME - $INSERT SYSTEMS>UTIL>PACSTAT>COMMON>PBLK2
C - PRIME - $INSERT SYSTEMS>UTIL>PACSTAT>COMMON>PBLK3
C - PRIME - $INSERT SYSTEMS>UTIL>PACSTAT>COMMON>IDCOM
*D EXPECT.40,44
*I EXPECT.23
C
C          OUTPUT FILE UNIT
C
C          III = IDAT
          IF (IDAT.EQ.0) III=IOUT

```

PACSTAT_A0.UPD.4

```

*D ALNORM.20
  T = ABS(X)
  Z = DBLE(T)
*D ALNORM.22
  IF (T.LT.UTZERO) GO TO 100
*D ALNORM.27
  IF (T.GT.CON) GO TO 110
*D PACSTAT.124,126
  MAXSAM = ISIZE/NVAR
  I = ISIZE
  IF (NSOLN .GT. 0) I=ISIZE/NSOLN
  IF (I .LT. MAXSAM) MAXSAM=I
*D ASG.52
C LOGIC = EXST$A (INF,INTS(NML4))
*D ASG.75
C LOGIC = OPEN$(A$READ+A$SAMF,INF,INTS(NML4),INTS(IFUNIT))
*D ASG.77
C LOGIC = OPEN$(A$RDWR+A$SAMF,INF,INTS(NML4),INTS(IFUNIT))
*D ASG.104
C LOGIC = DELE$(INF,INTS(NML4))
*D ASG.111
C LOGIC= OPEN$(A$WRIT+ASAMF,INF,INTS(NML4),INTS(IFUNIT))
*D RELEAS.15
C LOGIC=CLOS$(INTS(IFUNIT))
C
C CLOSING VAX OPEN STATEMENTS
C
  CLOSE (UNIT=12)
  CLOSE (UNIT=13)
  LOGIC = .TRUE.
*D PACSTAT.158
C CALL IDNUM (JRUNID,USRNAM)
C
C VAX EQUIVALENT CALL TO IDNUM
C
  CALL IDVAX (JRUNID,USRNAM)
*D IDNUM.42,44
C CALL TIMDAT (LOCAL(1),INTS(16))
C CALL DATE$(DATE)
C CALL TIME$(TIME)
*D PACSTAT.94,98
  IN=5
  IOUT=6
  IDAT=12
  IDATB=13
  INFIL=35
  CALL ASGVAX
C
C PRINT BANNER PAGE
C
  CALL VERSION
*D PACSTAT.137

```

```

C - PRIME - CALL ASG (I,IERR,IDAT,NMLEN,INF)
*D PACSTAT.149
C - PRIME - CALL ASG (I,IERR,IDATB,NMLEN,INF)
*ADDFILE ,ASG
*DECK ASGVAX
      SUBROUTINE ASGVAX
C
C THIS IS A SUBROUTINE THAT TAKES THE PLACE OF SUBROUTINE ASG
C IN THE PRIME VERSION. IT BASICALLY OPENS NECESSARY FILES
C TO READ AND WRITE AND SETS VARIABLE MODETYP WHICH DENOTES
C WHETHER YOU WANT TO RUN IN BATCH OR INTERACTIVE MODE.
C IT SHOULD TO BE NOTED THAT THIS ROUTINE IS ONLY TO BE USED ON
C VAX SYSTEMS. AUTHOR: C.L. BARTLEY
C
*CALL INOUT
C
      DATA MODETYP /.FALSE./
C
      LOGICAL MODETYP
C
C UNITS 12 AND 13 NEED TO BE OPENED FOR BOTH MODES
C
      OPEN (UNIT=12,FILE='PACSTAT.OUT',TYPE='NEW',
1        DISPOSE='SAVE')
C
      OPEN (UNIT=13,FILE='PACSTAT.BIN',TYPE='UNKNOWN',
1        DISPOSE='SAVE',FORM='UNFORMATTED')
C
C IF MODETYP IS SET TO TRUE, THIS WILL BE AN INTERACTIVE RUN
C
      IF (MODETYP) GO TO 1000
C
      OPEN (UNIT=5,FILE='PACSTAT.INP',STATUS='OLD',READONLY)
C
1000  CONTINUE
C
      IN = 5
      IOUT = 6
      IDAT = 12
      IDATB = 13
      INFIL = 35
C
      RETURN
      END
*ADDFILE ,IDNUM
*DECK IDVAX
      SUBROUTINE IDVAX (IRUNID,USRNAM)
C
C THIS ROUTINE IS THE VAX 11/780 EQUIVALENT OF THE PRIME 750
C PACSTAT IDNUM SUBROUTINE. IT'S PURPOSE IS THE SAME AS IDNUM,
C TO CREATE A UNIQUE RUN IDENTIFIER, UTILIZING THE DATE AND TIME

```

```

C  SYSTEM'S LIBRARIES AT THE TIME THIS ROUTINE IS CALLED.  THE
C  SYSTEM USER NAME IS ALSO PLACED INTO A CHARACTER VARIABLE.  THIS
C  INFORMATION IS USED TO INSURE TRACEABILITY AND ACCOUNTABILITY FOR
C  DATA FILES FROM SIMULATION RUNS.  AUTHOR: C.L. BARTLEY
C
C
C  IRUNID = RUN IDENTIFIER, AS FOLLOWS:
C      DIGITS 9-10 = MONTH OF CURRENT DATE.
C      DIGITS 7-8  = DAY OF THE MONTH (1 TO 31).
C      DIGITS 5-6  = CURRENT YEAR.
C      DIGITS 3-4  = CURRENT HOUR (0 TO 23).
C      DIGITS 1-2  = CURRENT MINUTE (0 TO 59).
C  USRNAM = 8 CHARACTER NAME OF THE CURRENT SYSTEM USER.
C
C      INTEGER*4
C      +   IRUNID,          JMM,          JDD,          JYY,
C      +   JHR,            JMIN
C  LOCAL ARRAY FOR READING DATE AND TIME
C      INTEGER*2
C      +   LOCAL(15)
C      CHARACTER*8
C      +   TIM,            USRN,          USRNAM
C      CHARACTER*16
C      +   DATE
C      EQUIVALENCE
C      +   (ASDATE,        LOCAL(1)),
C      +   (USRN,          LOCAL(13))
C
C      GET CURRENT TIME AND DATE
C      IDATE RETURNING:
C          LOCAL(1)=MM (MONTH)
C          LOCAL(2)=DD (DAY)
C          LOCAL(3)=YY (YEAR)
C      TIME RETURNING:
C          JHR  (4)=HOURS
C          JMIN (5)=MINUTES
C
C      CALL IDATE (LOCAL(1),LOCAL(2),LOCAL(3))
C
C      JMM = LOCAL(1)
C      JDD = LOCAL(2)
C      JYY = LOCAL(3)
C      CALL TIME (TIM)
C
C      READ(TIM,500) JHR,JMIN
500  FORMAT(2(I2,1X))
      JMM=JMM*1000000000
      JDD=JDD*1000000
      JYY=JYY*10000
      JHR=JHR*100

```

```

      JMIN=JMIN*1
      IRUNID=JMM+JDD+JYY+JHR+JMIN
      USRNAM=USRN
C
      RETURN
      END
*ADDFILE ,XUDIST
*DECK VERSION
      SUBROUTINE VERSION
C
C   THIS ROUTINE WAS WRITTEN PRIMARILY TO CREATE A BANNER PAGE FOR THE
C   PACSTAT CODE. IT WILL BE USED TO PROVIDE INFORMATION ON THE VERSION
C   NUMBER OF PACSTAT CURRENTLY IN USE, UPDATE INFORMATION, AND APPLICABLE
C   DOCUMENTATION.  AUTHOR: CL BARTLEY 4/15/86
C
      CHARACTER *1 STAR,MINUS
C
      STAR = '*'
      MINUS = '-'
C
      IDAT = 12
C
C   CHANGE ALL WRITES TO UNIT 9 TO IDAT LATER
C
      WRITE(IDAT,50)
50    FORMAT(///)
C
      DO 150 J=1,5
      WRITE(IDAT,100) (STAR,I=1,122)
100   FORMAT(3(5X 122A1/))
150   CONTINUE
C
      DO 250 J=1,5
      WRITE(IDAT,200) (STAR,I=1,40)
200   FORMAT(5X,20A1,82X,20A1/)
250   CONTINUE
C
      WRITE(IDAT,300) (STAR,I=1,40)
300   FORMAT(5X,20A1,34X,'P A C S T A T',35X,20A1)
C
      WRITE(IDAT,400) (STAR,I=1,40)
400   FORMAT(/5X,20A1,23X,'CODE VERSION AND UPDATE INFORMATION',24X,
120A1)
C
      WRITE(IDAT,500) (STAR,I=1,40)
500   FORMAT(/5X,20A1,22X,'WRITTEN FOR PRIME 750 BY D. LANGFORD',
124X,20A1)
C
      WRITE(IDAT,600) (STAR,I=1,40)
600   FORMAT(/5X,20A1,11X,'CONVERTED TO VAX 11/780 BY C. BARTLEY AND '
1'M. BUDDEN - 4/86',13X,20A1)

```

PACSTAT_A0.UPD.8

```

C      WRITE(IDAT,700) (STAR,I=1,40)
700    FORMAT(/5X,20A1,26X,'APPLICABLE DOCUMENTS TO FOLLOW',26X,20A1)
C      WRITE(IDAT,800) (STAR,I=1,40)
800    FORMAT(/5X,20A1,29X,'VERSION NUMBER (VAX#1)',31X,20A1)
C      DO 950 J=1,5
      WRITE(IDAT,200) (STAR,I=1,40)
950    CONTINUE
C      DO 1050 J=1,5
      WRITE(IDAT,100) (STAR,I=1,122)
1050   CONTINUE
      WRITE(IDAT,1200)
1200   FORMAT(H1)
      END

```


PACSTAT_A1.UPD

*IDENT DUMMY
*I PACSTAT.2
EXTERNAL BLKDAT.

PACSTAT_A2.UPD

```

*ID DUMMY
*PD VERSION
*AF ,XUDIST
*DECK VERSION
      SUBROUTINE VERSION
C
C THIS ROUTINE WAS WRITTEN PRIMARILY TO CREATE A BANNER PAGE FOR THE
C PACSTAT CODE. IT WILL BE USED TO PROVIDE INFORMATION ON THE VERSION
C NUMBER OF PACSTAT CURRENTLY IN USE, UPDATE INFORMATION, AND APPLICABLE
C DOCUMENTATION. AUTHOR: CL BARTLEY 4/15/86
C
      CHARACTER *1 STAR,MINUS
C
      STAR = '*'
      MINUS = '-'
C
      IDAT = 12
C
C CHANGE ALL WRITES TO UNIT 9 TO IDAT LATER
C
      WRITE(IDAT,50)
50    FORMAT(/)
C
      DO 150 J=1,5
      WRITE(IDAT,100) (STAR,I=1,122)
100   FORMAT(3(5X 122A1/))
150   CONTINUE
C
      DO 250 J=1,2
      WRITE(IDAT,200) (STAR,I=1,40)
200   FORMAT(5X,20A1,82X,20A1/)
250   CONTINUE
C
      WRITE(IDAT,300) (STAR,I=1,40)
300   FORMAT(5X,20A1,34X,'P A C S T A T',35X,20A1)
C
      WRITE(IDAT,400) (STAR,I=1,40)
400   FORMAT(/5X,20A1,23X,'CODE VERSION AND UPDATE INFORMATION',24X,
12DA1)
C
      WRITE(IDAT,500) (STAR,I=1,40)
500   FORMAT(/5X,20A1,22X,'WRITTEN FOR PRIME 750 BY D. LANGFORD',
124X,20A1)
C
      WRITE(IDAT,600) (STAR,I=1,40)
600   FORMAT(/5X,20A1,11X,'CONVERTED TO VAX 11/780 BY C. BARTLEY AND '
1'M. BUDDEN - 4/86',13X,20A1)
C
      WRITE(IDAT,700) (STAR,I=1,40)
700   FORMAT(/5X,2DA1,26X,'APPLICABLE DOCUMENTS TO FOLLOW',26X,20A1)
C

```

PACSTAT_A2.UPD.1

```

      WRITE(IDAT,800) (STAR,I=1,40)
800  FORMAT(/5X,20A1,28X,'VAX VERSION NUMBER ( B3  )',28X,20A1)
C
      WRITE(IDAT,810) (STAR,I=1,40)
810  FORMAT(/5X,20A1,5X,'DIR = [BWIP86.MJB.PACSTAT.B3]',48X,20A1)
      WRITE(IDAT,820) (STAR,I=1,40)
820  FORMAT(/5X,20A1,10X,'PACSTAT_A3.SRC      WITNESS SOURCE FILE',34X,
$20A1)
      WRITE(IDAT,830) (STAR,I=1,40)
830  FORMAT(/5X,20A1,10X,'PACSTAT_A3.OPL      WITNESS OLD PROGRAM LIBRAR
$Y',26X,20A1)
      WRITE(IDAT,840) (STAR,I=1,40)
840  FORMAT(/5X,20A1,10X,'PACSTAT_A3.OLB      WITNESS OBJECT LIBRARY',
$31X,20A1)
      WRITE(IDAT,850) (STAR,I=1,40)
850  FORMAT(/5X,20A1,10X,'PACSTAT_A3.FOR      WITNESS FORTRAN COMPILE
$FILE',23X,20A1)
      WRITE(IDAT,860) (STAR,I=1,40)
860  FORMAT(/5X,20A1,10X,'PACSTAT_A3.LIS      FORTRAN LIST FILE',36X,
$20A1)
      WRITE(IDAT,810) (STAR,I=1,40)
      DO 950 J=1,5
      WRITE(IDAT,200) (STAR,I=1,40)
950  CONTINUE
C
      DO 1050 J=1,5
      WRITE(IDAT,100) (STAR,I=1,122)
1050  CONTINUE
      WRITE(IDAT,1200)
1200  FORMAT(H1)
      WRITE(IDAT,50)
C
      DO 1250 J=1,5
      WRITE(IDAT,100) (STAR,I=1,122)
1250  CONTINUE
C
      DO 1300 J=1,2
      WRITE(IDAT,200) (STAR,I=1,40)
1300  CONTINUE
C
      WRITE(IDAT,1310) (STAR,I=1,20)
      WRITE(IDAT,1311) (STAR,I=1,20)
1310  FORMAT(5X,20A1,5X,'PRECEEDING VERSION A2')
C
      WRITE(IDAT,1312) (STAR,I=1,20)
1311  FORMAT(5X,20A1,10X,'THIS VERSION IS INTERACTIVE ONLY.  HAS NO COMM
$ENTS AND MULTIPLE TITLE CARDS ON THE FIRST CAROS.')
```

```

1312  FORMAT(5X,20A1,10X,'THESE CARDS ARE IDENTIFIED BY THE PATTERN
$*****" IN COLUMNS 1 - 4 OF EACH DATA CARD.')
```

```

      WRITE(IDAT,1200)
      RETURN
      END
```

PACSTAT_A3.UPD

```

*IDENT BCSFIX
*ADDFILE ,DATSET
*DECK DCLAIM
      SUBROUTINE DCLAIM (IOUT)
C
C      THIS ROUTINE PRINTS A VERIFICATION/BENCHMARKING DISCLAIMER TO
C      LOGICAL UNIT IOUT.
C
      WRITE (IOUT,500)
C
      RETURN
500 FORMAT (/1X,'Results from this code are based on the use of unveri
+fi ed'/1x,'software and are not for use in license related applicat
+ions.'/)
      END
*D INPUT.310
      WRITE (IDAT,820) PRG,VERNUM,JRUNID,TTLE,USRNAM,STTLE,ICNT
*D INPUT.397,398
820 FORMAT (/1X,A8,2X,[' ',F5.2,']',T51,'RUN I.D. ',I10,/1X,A40,9X,'U
+SER NAME',4X,A8/1X,A40,9X,'DATA SET NUMBER ',I5///1X,'TABLE 1.',3
+X,'ECHO OF THE INPUT DATA')
*D REORDR.28
      IF (NSAMC .EQ. 0) THEN
*D PACSTAT.95
C          SET INPUT/OUTPUT LOGICAL UNITS.
C          IDAT = L.U.  FOR PRINTED OUTPUT PROBLEM ECHO AND RESULTS
C          IDATB = L.U.  FOR BINARY OUTPUT RESULTS
C          IN   = L.U.  TO READ DATA FROM THE USERS TERMINAL
C          OUT  = L.U.  TO WRITE DATA TO THE USERS TERMINAL
*I PACSTAT.111
      CALL DCLAIM (IOUT)
*I PACSTAT.147
      WRITE (IDAT,580) PRGI,VERNMI
      CALL DCLAIM (IDAT)
*D PACSTAT.154
      WRITE(IOUT,590)
*D PACSTAT.175,176
      WRITE(IOUT,600)
      READ(IN,610) STTLE
*D PACSTAT.208,209
      WRITE (IOUT,620)
      READ (IN,630) ANS
*D PACSTAT.240
      WRITE (IOUT,640)
*I PACSTAT.243
      IF (IDAT.GT.0) WRITE (IDAT,650) DSEED
*D PACSTAT.253,254
      WRITE (IOUT,660)
      IF (IDAT.GT.0) WRITE (IDAT,660)
*D PACSTAT.257,262
*D PACSTAT.275
      WRITE (IOUT,670)

```

PACSTAT_A3.UPD.1

```

*D PACSTAT.296,297
  WRITE (IOUT,680) INDEX
  IF (IDAT.GT.0) WRITE (IDAT,680) INDEX
*D PACSTAT.299,300
  WRITE (IOUT,690)
  IF (IDAT.GT.0) WRITE (IDAT,690)
*D PACSTAT.331,332
  WRITE (IOUT,700) IQB
  READ (IN,630) ANS
*D PACSTAT.360,379
  580 FORMAT (1H1,1X,'( ',A8,1X,F5.2,')')
  590 FORMAT (/1X,'ENTER THE NAME FOR THE BINARY OUTPUT DATA FILE.'/1X,'
    +('NONE' TO OMIT)')
  595 FORMAT(/1X,'ENTER THE NAME FOR THE BINARY OUTPUT DATA FILE.'/1X,'
    +(OR A CARRIAGE RETURN TO DEFAULT TO DATA FILE PACSTAT.BIN)')
  600 FORMAT (/1X,'ENTER LABEL FOR THIS RUN (MAX 40 CHARACTERS)')
  610 FORMAT (A40)
  620 FORMAT (/1X,'WOULD YOU LIKE TO CONTINUE OR QUIT IF AN ERROR'/1X,'I
    +S ENCOUNTERED IN THE SOLUTION ROUTINE (C/Q)? ')
  630 FORMAT (A1)
  640 FORMAT (/1X,'ENTER AN INITIAL SEED NUMBER FOR THE RANDOM NUMBER GE
    +NERATOR.'/1X,'(A REAL NUMBER BETWEEN 1.0 AND (2^31)-2.)')
  650 FORMAT (/5X,'INITIAL RANDOM SEED NUMBER IS ',1PD14.7)
  660 FORMAT (/1X,'** ERROR COMPUTING INPUT DISTRIBUTION DATA. THIS ITE
    +RATION WAS'/4X,'ABORTED DUE TO AN INABILITY TO COMPUTE AND/OR READ
    + THE DESIRED'/4X,'RANDOM SAMPLES.')
  670 FORMAT (/1X,'*** ERROR, NO SUCCESSFUL SAMPLES WERE COMPUTED.'/5X,'
    +THE INPUT VARIABLE STATISTICS WILL BE EXAMINED.'/5X,'BUT THE OUTPUT
    +T DATA WILL BE IGNORED, AND THE BINARY'/5X,'OUTPUT FILE RECORD WIL
    +L NOT BE WRITTEN.')
  680 FORMAT (///5X,'--- ERROR ABORT, SAMPLE NUMBER ',I5)
  690 FORMAT (5X,'--- PROCEDURE WILL CONTINUE WITH REDUCED SAMPLE SPACE.
    +')
  700 FORMAT (/1X,'CREATE ANOTHER DATA SET (Y/N)? ',A1)
*I STATOT.45
C
C      TABLE HEADER AND INPUT VARIABLE STATISTICS
C
  WRITE (III,500)
  CALL EXPECT
*D STATOT.114,115
  WRITE (III,510)
  WRITE (III,520)
*D STATOT.117
  WRITE (III,530) VLABEL(N),VMIN(N),VMAX(N),VAVG(N),VMED(N),
*D STATOT.126
  WRITE (III,540)
*D STATOT.223
  WRITE (III,550) VLABEL(N),ANS,RD(1),RD(2),RM(1),RM(2)
*D STATOT.225
  WRITE (III,560) VLABEL(N),ANS,RD(1),RM(1)
*D STATOT.228

```



```

      IF (ISTAR.NE.0) WRITE (III,570)
*D STATOT.230,306
C
C      PRINT NUMBER OF RANDOM SAMPLES REJECTED DUE TO LIMITS
C
      IF (NVAR.LT.1) GO TO 400
      DO 360 N=1,NVAR
      IF (ILIM(N).EQ.0) GO TO 360
      IF ((NLIM(N,1).EQ.0).AND.(NLIM(N,2).EQ.0)) GO TO 360
      WRITE (IOUT,580) VLABEL(N)
      IF (IDAT.NE.0) WRITE (IDAT,580) VLABEL(N)
      IF (NLIM(N,1).EQ.0) GO TO 340
      WRITE (IOUT,590) NLIM(N,1)
      IF (IDAT.NE.0) WRITE (IDAT,590) NLIM(N,1)
340    CONTINUE
      IF (NLIM(N,2).EQ.0) GO TO 350
      WRITE (IOUT,600) NLIM(N,2)
      IF (IDAT.NE.0) WRITE (IDAT,600) NLIM(N,2)
350    CONTINUE
360 CONTINUE
C
C      STRATIFIED SAMPLING DIAGNOSTICS
C
      IF ((NLEVEL.LT.2).OR.(IDAT.EQ.0)) GO TO 390
      WRITE (IDAT,610)
      DO 380 N=1,NVAR
      IF (ITYPE(N).EQ.NTYPE) GO TO 380
      IF (ITYPE(N).EQ.10) GO TO 380
      K=NLEVEL
      IF (K.GT.10) K=10
      WRITE (IDAT,620) VLABEL(N), (NPTSPL(I,N),I=1,K)
      IF (K.EQ.NLEVEL) GO TO 380
370    CONTINUE
      J=K+1
      K=K+10
      IF (K.GT.NLEVEL) K=NLEVEL
      WRITE (IDAT,630) (NPTSPL(I,N),I=J,K)
      IF (K.LT.NLEVEL) GO TO 370
380    CONTINUE
390 CONTINUE
C
400 CONTINUE
C
C      OUTPUT VARIABLE STATISTICS
C
      IF (NSOLN.LT.1) GO TO 412
      WRITE (III,640)
      WRITE (III,520)
      DO 410 N=1,NSOLN
      WRITE (III,650) PLABEL(N)
      WRITE (III,660) FMIN(N),FMAX(N),FAVG(N),FMED(N),FSTD(N),FSKW(N)
410 CONTINUE

```

```

412 CONTINUE
C
  RETURN
500 FORMAT (1H1,1X,'TABLE 2. INPUT VARIABLE STATISTICS')
510 FORMAT (//1X,'**--- SAMPLE DIAGNOSTICS, INPUT DISTRIBUTIONS')
520 FORMAT (/T19,'MIN',T30,'MAX',T40,'MEAN',T51,'MEDIAN',T61,'STND DEV
+','T72,'SKEWNESS')
530 FORMAT (1X,A12,1X,1PE10.3,5(1X,E10.3))
540 FORMAT (//1X,'**--- MAXIMUM LIKELIHOOD ESTIMATORS FOR INPUT DISTRI
+BTIONS'/T24,'COMPUTED VALUES',T52,'EXPECTED VALUES'/3X,'VARIABLE'
+,T20,'PARAMETER 1',T33,'PARAMETER 2',T48,'PARAMETER 1',T61,'PARAME
+TER 2')
550 FORMAT (1X,A12,3X,A1,T20,1PE10.3,3X,E10.3,T48,E10.3,T61,E10.3)
560 FORMAT (1X,A12,3X,A1,T20,1PE10.3,T48,E10.3)
570 FORMAT (T33,'* INDICATES ENOPOINT LIMITING MAY MOVE THE '/T35,'DIS
+TRIBUTION AWAY FROM THE EXPECTED VALUES.')
580 FORMAT (//3X,'FOR THE DISTRIBUTION IN ',A12)
590 FORMAT (3X,I6,' RANDOM SAMPLES WERE BELOW THE LOWER LIMIT, AND SET
+ TO THAT LIMIT.')
600 FORMAT (3X,I6,' RANOOM SAMPLES WERE ABOVE THE UPPER LIMIT, AND SET
+ TO THAT LIMIT.')
610 FORMAT (///7X,'STRATIFIED SAMPLING DIAGNOSTICS'//1X,'VARIABLE',17X
+,'NUMBER OF SAMPLES CHOSEN FROM EACH LEVEL')
620 FORMAT (1X,A12,2X,10(1X,I5))
630 FORMAT (15X,10(1X,I5))
640 FORMAT (1H1,1X,'TABLE 3. OUTPUT VARIABLE STATISTICS '//1X,'**---
+ SAMPLE DIAGNOSTICS, OUTPUT DISTRIBUTIONS')
650 FORMAT (1X,A32)
660 FORMAT (1X,13X,1PE10.3,5(1X,E10.3))
  END
*0 IINPUT.399,424
830 FORMAT (/5X,A12,' (' ,A12,')'/15X,'DISTRIBUTION IS ',A20)
840 FORMAT (22X,'MEAN VALUE = ',T35,1PE12.4/17X,'STND DEVIATION = ',T3
+5,E12.4)
850 FORMAT (22X,'CONSTANTS FOR THE UNDERLYING NORMAL DISTRIBUTION ARE'
+/17X,'MEAN VALUE = ',T35,1PE12.4/17X,'STND DEVIATION = ',T35,E12.4)
860 FORMAT (22X,'MIN, MAX EXPONENTS FOR THE UNDERLYING'/17X,'UNIFORM D
+ISTRIBUITON ARE'/17X,'MIN = ',1PE12.4,', MAX = ',E12.4)
870 FORMAT (22X,'MEAN VALUE IS',T35,1PE12.4)
880 FORMAT (22X,'LOWER ENOPOINT = ',T35,1PE12.4/17X,'UPPER ENOPOINT = ',
+T35,E12.4)
890 FORMAT (22X,'LOWER VALUE = ',T35,1PE12.4/17X,'UPPER VALUE = ',T35,E1
+2.4/17X,'LOW VALUE PROB = ',T35,E12.4)
900 FORMAT (22X,'THE CONFIDENCE FUNCTION WILL BE READ AS A PIECE WISE'
+/17X,'CONTINUOUS DATA FUNCTION FROM THE EXTERNAL FILE:'/18X,20A4)
910 FORMAT (22X,'THE RANDOM DATA POINTS WILL BE READ'/17X,'FROM THE EX
+TERNAL FILE:'/18X,20A4)
920 FORMAT (22X,'CONSTANT VALUE = ',T35,1PE12.4)
930 FORMAT (22X,'LOWER BOUND = ',T35,1PE12.4/17X,'UPPER BOUND = ',T35,E1
+2.4)
940 FORMAT (/)
950 FORMAT (5X,'VALUE FOR ',A12,2X,'(' ,A12,') IS ',1PE12.4)

```

```

960 FORMAT (//5X,'NUMBER OF SAMPLES IS ',I8/1X,'PRINT INTERVAL IS',4X,
+I8)
970 FORMAT (5X,'STRATIFIED SAMPLING CHOSEN, USING ',I5,' LEVELS.')
```

```

980 FORMAT (5X,'STRATIFIED SAMPLING NOT CHOSEN.')
```

```

990 FORMAT (/1X,'***** ERROR ON INPUT, TRY AGAIN *****'/)
*ID ECHO
*I RELEAS.18
    CLOSE (UNIT=7)
*I PACSTAT.143
    CALL ASGVAX (NMLEN,INF,IFLAG)
    WRITE (IECHO,570) (INF(I),I=1,NMLEN)
*B PACSTAT.156
    75 CONTINUE
    WRITE (IOUT,595)
    WRITE (IECHO,570) (INF(I),I=1,NMLEN)
*B PACSTAT.210
    WRITE (IECHO,630) ANS
*I PACSTAT.241
    WRITE (IECHO,*) WD
*B PACSTAT.333
    WRITE (IECHO,630) ANS
*I ASG.63
    WRITE (IECHO,540) ANS
*I ASG.69
    WRITE (IECHO,560) (INF(I),I=1,NLEN)
*I ASG.90
    WRITE (IECHO,540) ANS
*I ASG.97
    WRITE (IECHO,540) ANS
*I ASG.108
    WRITE (IECHO,560) (INF (I),I=1,NLEN)
*I ASG.120
    WRITE (IECHO,540)
*I ASG.126
    WRITE (IECHO,560) (INF(I),I=1,NLEN)
*I DATOUT.50
    WRITE (IECHO,*) ISOLN
*I DATOUT.56
    WRITE (IECHO,*) NPRT
*I DATOUT.66
    WRITE (IECHO,*) ICCD
*I DATOUT.144
    WRITE (IECHO,620) ANS
*I IINPUT.66
    WRITE (IECHO,510) ANS
*I IINPUT.92
    WRITE (IECHO,*) IT
*I IINPUT.102
    WRITE (IECHO,*) PAR(N,1)
*I IINPUT.105
    WRITE (IECHO,*) PAR(N,2)
*I IINPUT.118
```

```

        WRITE (IECHO,*) PAR(N,1)
*I IINPUT.127
        WRITE (IECHO,*) PAR(N,2)
*I IINPUT.139
        WRITE (IECHO,*) PAR(N,1), PAR(N,2)
*I IINPUT.153
        WRITE (IECHO,*) PAR(N,1)
*I IINPUT.166
        WRITE (IECHO,*) PAR(N,1),PAR(N,2)
*I IINPUT.179
        WRITE (IECHO,*) PAR(N,1),PAR(N,2)
*I IINPUT.187
        WRITE (IECHO,*) PAR(N,3)
*I IINPUT.197
        WRITE (IECHO,690) (JJNF(I,N),I=1,NMLEN)
*I IINPUT.205
        WRITE (IECHO,*) PAR(N,1)
*I IINPUT.212
        WRITE (IECHO,510) ANS
*I IINPUT.219
        WRITE (IECHO,*) VLIM(N,1),VLIM(N,2)
*I IINPUT.240
        WRITE (IECHO,510) ANS
*I IINPUT.257
        WRITE (IECHO,*,ERR=410) CONST(I)
*I IINPUT.266
        WRITE (IECHO,*) NSAM
*I IINPUT.278
        WRITE (IECHO,*) NPRT
*I IINPUT.292
        WRITE (IECHO,*) NLEVEL
*I PLINIT.19
        WRITE (IECHO,*) KOEV
*I PLINIT.28
        WRITE (IECHO,520) ANS
*I PLINIT.35
        WRITE (IECHO,*) XL2, YL2
*I PPLT.54
        WRITE (IECHO,520) ANS
*I PPLT.61
        WRITE (IECHO,*) C1,C2
*I PPLT.100
        WRITE (IECHO,520) ANS
*I PPLT.125
        WRITE (IECHO,520) ANS
*B PACSTAT.177
        WRITE (IECHO,610) STTLE
*D PACSTAT.101,102
        IFLAG = 0
        CALL ASGVAX (NMLEN,INF,IFLAG)
*D ASGVAX.2
        SUBROUTINE ASGVAX (NLEN,INF,IFLAG)

```

PACSTAT_A3.UPD.6

```

*I ASGVAX.16
    WRITE(FNAME,100) (INF(I),I=1,NLEN)
100  FORMAT(10A4)
C
C  OPEN DATA ECHO FILE
C
C
    IF (IFLAG .EQ. 0) GO TO 500
C
    IF (INF(1) .EQ. ' ') OPEN (UNIT=7,
1  FILE = 'PACSTAT.ECH',TYPE='NEW',DISPOSE='SAVE')
C
    IF (INF(1) .NE. ' ') OPEN (UNIT=7,
1  FILE = FNAME,TYPE='NEW',DISPOSE='SAVE')
C
    IF (IFLAG .EQ. 1) GO TO 1000
*I ASGVAX.12
    CHARACTER *4 INF(NLEN)
    CHARACTER *40 FNAME
*I ASGVAX.35
    IECHO = 7
*I PACSTAT.98
    IECHO = 7
*I ASGVAX.38
    IFLAG = IFLAG + 1
*I ASGVAX.19
500  CONTINUE
*D INOUT.3
    +    IN,    IOUT,    IQB,    IECHO
*I PACSTAT.88
C
C  SET VARIABLE MODEVAX TO TRUE FOR RUNNING ON THE VAX
C
    DATA MODEVAX /.TRUE./
    LOGICAL MODEVAX
*I PACSTAT.141
    IF (MODEVAX) GO TO 50
*I PACSTAT.142
50  CONTINUE
    WRITE (IOUT,565)
*I PACSTAT.153
    IF (MODEVAX) GO TO 75
*I PACSTAT.358
565 FORMAT(/1X,'ENTER THE NAME FOR THE DATA ECHO FILE,'/1X
    +,'(OR A CARRIAGE RETURN TO DEFAULT TO DATA FILE PACSTAT.ECH)')
*I0 HEIDI3
*/
*/  MODIFY PACSTAT TO READ THE SEED DIRECTLY INTO THE VARIABLE DSEED,
*/  A DOUBLE PRECISION VARIABLE.  MODIFY THE RANGE THE SEED MUST FALL
*/  INTO TO 1.0 TO (2^31)-2.
*/
*I PACSTAT.88

```

```

      REAL *4 MNSEED
      REAL *8 MXSEED
*I PACSTAT.82
C      DOUBLE PRECISION MXSEED
*I PACSTAT.93
      MNSEED=1.0
      MXSEED=(2.0**31)-2.
*D PACSTAT.241,243
      READ(IN,*,ERR=190) DSEED
      WRITE(IECHO,*) DSEED
      IF ((DSEED .LT.MNSEED).OR.(DSEED.GT.MXSEED)) GO TO 190
*/
*/ REMOVE THE LINE THAT RE-CHECKS THE SEED VALUE
*D U01S.39
*D ALNORM.39
      + (Z + 3.98064794D-4 + 1.98615381364D0 /
*D ALNORM.40
      + (Z + 4.8385912808D0 - 15.1508972451D0 /

```

PACSTAT_B3.UPD

```

*IDENT BCSFIX
*ADDFILE ,DATSET
*DECK DCLAIM
      SUBROUTINE DCLAIM (IOUT)
C
C      THIS ROUTINE PRINTS A VERIFICATION/BENCHMARKING DISCLAIMER TO
C      LOGICAL UNIT IOUT.
C
      WRITE (IOUT,500)
C
      RETURN
500 FORMAT (/1X,'Results from this code are based on the use of unveri
+fed'/1X,'software and are not for use in license related applicat
+ions.'/)
      END
*D IINPUT.310
      WRITE (IDAT,820) PRG,VERNUM,JRUNID,TTLE,USRNAM,STTLE,ICNT
*D IINPUT.397,398
820 FORMAT (/1X,A8,2X,['',F5.2,''],T51,'RUN I.D. ',I10,/1X,A40,9X,'U
+SER NAME',4X,A8/1X,A40,9X,'DATA SET NUMBER ',I5////1X,'TABLE 1.',3
+X,'ECHO OF THE INPUT DATA')
*D REORDR.28
      IF (NSAMC .EQ. 0) THEN
*D PACSTAT.95
C          SET INPUT/OUTPUT LOGICAL UNITS.
C          IDAT = L.U.  FOR PRINTED OUTPUT PROBLEM ECHO AND RESULTS
C          IDATB = L.U.  FOR BINARY OUTPUT RESULTS
C          IN   = L.U.  TO READ DATA FROM THE USERS TERMINAL
C          OUT  = L.U.  TO WRITE DATA TO THE USERS TERMINAL
*I PACSTAT.111
      CALL DCLAIM (IOUT)
*I PACSTAT.147
      WRITE (IDAT,580) PRGI,VERNMI
      CALL DCLAIM (IDAT)
*D PACSTAT.154
      WRITE(IOUT,590)
*D PACSTAT.175,176
      WRITE(IOUT,600)
      READ(IN,610) STTLE
*D PACSTAT.208,209
      WRITE (IOUT,620)
      READ (IN,630) ANS
*D PACSTAT.240
      WRITE (IOUT,640)
*I PACSTAT.243
      IF (IDAT.GT.0) WRITE (IDAT,650) DSEED
*D PACSTAT.253,254
      WRITE (IOUT,660)
      IF (IDAT.GT.0) WRITE (IDAT,660)
*D PACSTAT.257,262
*D PACSTAT.275
      WRITE (IOUT,670)

```

PACSTAT.B3.UPD.1


```

*D PACSTAT.296,297
  WRITE (IOUT,680) INDEX
  IF (IDAT.GT.0) WRITE (IDAT,680) INDEX
*D PACSTAT.299,300
  WRITE (IOUT,690)
  IF (IDAT.GT.0) WRITE (IDAT,690)
*D PACSTAT.331,332
  WRITE (IOUT,700) IQB
  READ (IN,630) ANS
*D PACSTAT.360,379
  580 FORMAT (1H1,1X,(' ',A8,1X,F5.2,','))
  590 FORMAT (/1X,'ENTER THE NAME FOR THE BINARY OUTPUT DATA FILE.'/1X,'
    +('NONE' TO OMIT)')
  595 FORMAT(/1X,'ENTER THE NAME FOR THE BINARY OUTPUT DATA FILE.'/1X,'
    +(OR A CARRIAGE RETURN TO DEFAULT TO DATA FILE PACSTAT.BIN)')
  600 FORMAT (/1X,'ENTER LABEL FOR THIS RUN (MAX 40 CHARACTERS)')
  610 FORMAT (A40)
  620 FORMAT (/1X,'WOULD YOU LIKE TO CONTINUE OR QUIT IF AN ERROR'/1X,'I
    +S ENCOUNTERED IN THE SOLUTION ROUTINE (C/Q)? ')
  630 FORMAT (A1)
  640 FORMAT (/1X,'ENTER AN INITIAL SEED NUMBER FOR THE RANDOM NUMBER GE
    +NERATOR.'/1X,'(A REAL NUMBER BETWEEN 1.0 AND (2^31)-2.)')
  650 FORMAT (/5X,'INITIAL RANOM SEED NUMBER IS ',1PD14.7)
  660 FORMAT (/1X,'** ERROR COMPUTING INPUT DISTRIBUTION DATA. THIS ITE
    +RATION WAS'/4X,'ABORTED DUE TO AN INABILITY TO COMPUTE AND/OR READ
    + THE DESIRED'/4X,'RANDOM SAMPLES.')
  670 FORMAT (/1X,'*** ERROR, NO SUCCESSFUL SAMPLES WERE COMPUTED.'/5X,'
    +THE INPUT VARIABLE STATISTICS WILL BE EXAMINED.'/5X,'BUT THE OUTPU
    +T DATA WILL BE IGNORED, AND THE BINARY'/5X,'OUTPUT FILE RECORD WIL
    +L NOT BE WRITTEN.')
  680 FORMAT (///5X,'--- ERROR ABORT, SAMPLE NUMBER ',I5)
  690 FORMAT (5X,'--- PROCEDURE WILL CONTINUE WITH REDUCED SAMPLE SPACE.
    +')
  700 FORMAT (/1X,'CREATE ANOTHER OATA SET (Y/N)? ',A1)
10000 FORMAT (A80)
10001 FORMAT (20A4)
11000 FORMAT (5X,A8D,10X,I5)
*I STATOT.45
C
C          TABLE HEADER AND INPUT VARIABLE STATISTICS
C
  WRITE (III,500)
  CALL EXPECT
*D STATOT.114,115
  WRITE (III,510)
  WRITE (III,520)
*D STATOT.117
  WRITE (III,530) VLABEL(N),VMIN(N),VMAX(N),VAVG(N),VMED(N),
*D STATOT.126
  WRITE (III,540)
*D STATOT.223
  WRITE (III,550) VLABEL(N),ANS,RD(1),RD(2),RM(1),RM(2)

```

```

*D STATOT.225
  WRITE (III,560) VLABEL(N),ANS,RD(1),RM(1)
*D STATOT.228
  IF (ISTAR.NE.0) WRITE (III,570)
*D STATOT.230,306
C
C          PRINT NUMBER OF RANDOM SAMPLES REJECTED DUE TO LIMITS
C
  IF (NVAR.LT.1) GO TO 400
  DO 360 N=1,NVAR
    IF (ILIM(N).EQ.0) GO TO 360
    IF ((NLIM(N,1).EQ.0).AND.(NLIM(N,2).EQ.0)) GO TO 360
    WRITE (IOUT,580) VLABEL(N)
    IF (IDAT.NE.0) WRITE (IDAT,580) VLABEL(N)
    IF (NLIM(N,1).EQ.0) GO TO 340
    WRITE (IOUT,590) NLIM(N,1)
    IF (IDAT.NE.0) WRITE (IDAT,590) NLIM(N,1)
340    CONTINUE
    IF (NLIM(N,2).EQ.0) GO TO 350
    WRITE (IOUT,600) NLIM(N,2)
    IF (IDAT.NE.0) WRITE (IDAT,600) NLIM(N,2)
350    CONTINUE
360 CONTINUE
C
C          STRATIFIED SAMPLING DIAGNOSTICS
C
  IF ((NLEVEL.LT.2).OR.(IDAT.EQ.0)) GO TO 390
  WRITE (IDAT,610)
  DO 380 N=1,NVAR
    IF (ITYPE(N).EQ.NTYPE) GO TO 380
    IF (ITYPE(N).EQ.10) GO TO 380
    K=NLEVEL
    IF (K.GT.10) K=10
    WRITE (IDAT,620) VLABEL(N),(NPTSPL(I,N),I=1,K)
    IF (K.EQ.NLEVEL) GO TO 380
370    CONTINUE
    J=K+1
    K=K+10
    IF (K.GT.NLEVEL) K=NLEVEL
    WRITE (IDAT,630) (NPTSPL(I,N),I=J,K)
    IF (K.LT.NLEVEL) GO TO 370
380    CONTINUE
390 CONTINUE
C
400 CONTINUE
C
C          OUTPUT VARIABLE STATISTICS
C
  IF (NSOLN.LT.1) GO TO 412
  WRITE (III,640)
  WRITE (III,520)
  DO 410 N=1,NSOLN

```

```

        WRITE (III,650) PLABEL(N)
        WRITE (III,660) FMIN(N),FMAX(N),FAVG(N),FMED(N),FSTD(N),FSKW(N)
410 CONTINUE
412 CONTINUE
C
    RETURN
500 FORMAT (1H1,1X,'TABLE 2. INPUT VARIABLE STATISTICS')
510 FORMAT (//1X,'**--- SAMPLE DIAGNOSTICS, INPUT DISTRIBUTIONS')
520 FORMAT (/T19,'MIN',T30,'MAX',T40,'MEAN',T51,'MEDIAN',T61,'STND DEV
+ ',T72,'SKEWNESS')
530 FORMAT (1X,A12,1X,1PE10.3,5(1X,E10.3))
540 FORMAT (//1X,'**--- MAXIMUM LIKELIHOOD ESTIMATORS FOR INPUT DISTRI
+ BUTIONS'/T24,'COMPUTED VALUES',T52,'EXPECTED VALUES'/3X,'VARIABLE'
+ ,T20,'PARAMETER 1',T33,'PARAMETER 2',T48,'PARAMETER 1',T61,'PARAME
+ TER 2')
550 FORMAT (1X,A12,3X,A1,T20,1PE10.3,3X,E10.3,T48,E10.3,T61,E10.3)
560 FORMAT (1X,A12,3X,A1,T20,1PE10.3,T48,E10.3)
570 FORMAT (T33,'* INDICATES ENDPOINT LIMITING MAY MOVE THE '/T35,'DIS
+ TRIBUTION AWAY FROM THE EXPECTED VALUES.')
580 FORMAT (//3X,'FOR THE DISTRIBUTION IN ',A12)
590 FORMAT (3X,I6,' RANDOM SAMPLES WERE BELOW THE LOWER LIMIT, AND SET
+ TO THAT LIMIT.')
600 FORMAT (3X,I6,' RANDOM SAMPLES WERE ABOVE THE UPPER LIMIT, AND SET
+ TO THAT LIMIT.')
610 FORMAT (///7X,'STRATIFIED SAMPLING DIAGNOSTICS'//1X,'VARIABLE',17X
+ , 'NUMBER OF SAMPLES CHOSEN FROM EACH LEVEL')
620 FORMAT (1X,A12,2X,10(1X,I5))
630 FORMAT (15X,10(1X,I5))
640 FORMAT (1H1,1X,'TABLE 3. OUTPUT VARIABLE STATISTICS '//1X,'**---
+ SAMPLE DIAGNOSTICS, OUTPUT DISTRIBUTIONS')
650 FORMAT (1X,A32)
660 FORMAT (1X,13X,1PE10.3,5(1X,E10.3))
    END
*D INPUT.399,424
830 FORMAT (/5X,A12,' (' ,A12,')'/15X,'DISTRIBUTION IS ',A20)
840 FORMAT (22X,'MEAN VALUE = ',T35,1PE12.4/17X,'STND DEVIATION = ',T3
+ 5,E12.4)
850 FORMAT (22X,'CONSTANTS FOR THE UNDERLYING NORMAL DISTRIBUTION ARE'
+ /17X,'MEAN VALUE = ',T35,1PE12.4/17X,'STND DEVIATION = ',T35,E12.4)
860 FORMAT (22X,'MIN, MAX EXPONENTS FOR THE UNDERLYING'/17X,'UNIFORM D
+ ISTRIBUITON ARE'/17X,'MIN = ',1PE12.4,', MAX = ',E12.4)
870 FORMAT (22X,'MEAN VALUE IS',T35,1PE12.4)
880 FORMAT (22X,'LOWER ENDPOINT = ',T35,1PE12.4/17X,'UPPER ENDPOINT = ',
+ T35,E12.4)
890 FORMAT (22X,'LOWER VALUE = ',T35,1PE12.4/17X,'UPPER VALUE = ',T35,E1
+ 2.4/17X,'LOW VALUE PROB = ',T35,E12.4)
900 FORMAT (22X,'THE CONFIDENCE FUNCTION WILL BE READ AS A PIECE WISE'
+ /17X,'CONTINUOUS DATA FUNCTION FROM THE EXTERNAL FILE:'/18X,20A4)
910 FORMAT (22X,'THE RANDOM DATA POINTS WILL BE READ'/17X,'FROM THE EX
+ TERNAL FILE:'/18X,20A4)
920 FORMAT (22X,'CONSTANT VALUE = ',T35,1PE12.4)
930 FORMAT (22X,'LOWER BOUND = ',T35,1PE12.4/17X,'UPPER BOUND = ',T35,E1

```

```

+2.4)
940 FORMAT (/)
950 FORMAT (5X,'VALUE FOR ',A12,2X,'(',A12,') IS ',1PE12.4)
960 FORMAT (//5X,'NUMBER OF SAMPLES IS ',I8/1X,'PRINT INTERVAL IS',4X,
+I8)
970 FORMAT (5X,'STRATIFIED SAMPLING CHOSEN, USING ',I5,' LEVELS.')
```

```

980 FORMAT (5X,'STRATIFIED SAMPLING NOT CHOSEN.')
```

```

990 FORMAT (/1X,'***** ERROR ON INPUT, TRY AGAIN *****'/)
*ID ECHO
*I RELEAS.18
  CLOSE (UNIT=7)
*I PACSTAT.143
  CALL ASGVAX (NMLEN,INF,IFLAG)
  WRITE (IECHO,570) (INF(I),I=1,NMLEN)
*B PACSTAT.156
  75 CONTINUE
  WRITE (IOUT,595)
  WRITE (IECHO,570) (INF(I),I=1,NMLEN)
*B PACSTAT.210
  WRITE (IECHO,630) ANS
*I PACSTAT.241
  WRITE (IECHO,*) WD
*B PACSTAT.333
  WRITE (IECHO,630) ANS
*I ASG.63
  WRITE (IECHO,540) ANS
*I ASG.69
  WRITE (IECHO,560) (INF(I),I=1,NLEN)
*I ASG.90
  WRITE (IECHO,540) ANS
*I ASG.97
  WRITE (IECHO,540) ANS
*I ASG.108
  WRITE (IECHO,560) (INF (I),I=1,NLEN)
*I ASG.120
  WRITE (IECHO,540)
*I ASG.126
  WRITE (IECHO,560) (INF(I),I=1,NLEN)
*I DATOUT.50
  WRITE (IECHO,*) ISOLN
*I DATOUT.56
  WRITE (IECHO,*) NPRT
*I DATOUT.66
  WRITE (IECHO,*) ICCD
*I DATOUT.144
  WRITE (IECHO,620) ANS
*I IINPUT.66
  WRITE (IECHO,510) ANS
*I IINPUT.92
  WRITE (IECHO,*) IT
*I IINPUT.102
  WRITE (IECHO,*) PAR(N,1)

```

PACSTAT.B3.UPD.5

```

*I IINPUT.105
    WRITE (IECHO,*) PAR(N,2)
*I IINPUT.118
    WRITE (IECHO,*) PAR(N,1)
*I IINPUT.127
    WRITE (IECHO,*) PAR(N,2)
*I IINPUT.139
    WRITE (IECHO,*) PAR(N,1), PAR(N,2)
*I IINPUT.153
    WRITE (IECHO,*) PAR(N,1)
*I IINPUT.166
    WRITE (IECHO,*) PAR(N,1),PAR(N,2)
*I IINPUT.179
    WRITE (IECHO,*) PAR(N,1),PAR(N,2)
*I IINPUT.187
    WRITE (IECHO,*) PAR(N,3)
*I IINPUT.197
    WRITE (IECHO,690) (JJNF(I,N),I=1,NMLEN)
*I IINPUT.205
    WRITE (IECHO,*) PAR(N,1)
*I IINPUT.212
    WRITE (IECHO,510) ANS
*I IINPUT.219
    WRITE (IECHO,*) VLIM(N,1),VLIM(N,2)
*I IINPUT.240
    WRITE (IECHO,510) ANS
*I IINPUT.257
    WRITE (IECHO,*,ERR=410) CONST(I)
*I IINPUT.266
    WRITE (IECHO,*) NSAM
*I IINPUT.278
    WRITE (IECHO,*) NPRT
*I IINPUT.292
    WRITE (IECHO,*) NLEVEL
*I PLINIT.19
    WRITE (IECHO,*) KDEV
*I PLINIT.28
    WRITE (IECHO,520) ANS
*I PLINIT.35
    WRITE (IECHO,*) XL2, YL2
*I PPLT.54
    WRITE (IECHO,520) ANS
*I PPLT.61
    WRITE (IECHO,*) C1,C2
*I PPLT.100
    WRITE (IECHO,520) ANS
*I PPLT.125
    WRITE (IECHO,520) ANS
*B PACSTAT.177
    WRITE (IECHO,610) STTLE
*D PACSTAT.101,102
    IFLAG = 0

```

```

        CALL ASGVAX (NLEN,INF,IFLAG)
*D ASGVAX.2
        SUBROUTINE ASGVAX (NLEN,INF,IFLAG)
*I ASGVAX.16
        WRITE(FNAME,100) (INF(I),I=1,NLEN)
100    FORMAT(10A4)
C
C    OPEN DATA ECHO FILE
C
C
        IF (IFLAG .EQ. 0) GO TO 500
C
        IF (INF(1) .EQ. ' ') OPEN (UNIT=7,
1    FILE = 'PACSTAT.ECH',TYPE='NEW',DISPOSE='SAVE')
C
        IF (INF(1) .NE. ' ') OPEN (UNIT=7,
1    FILE = FNAME,TYPE='NEW',DISPOSE='SAVE')
C
        IF (IFLAG .EQ. 1) GO TO 1000
*I ASGVAX.12
        CHARACTER *4 INF(NLEN)
        CHARACTER *40 FNAME
*I ASGVAX.35
        IECHO = 7
*I PACSTAT.98
        IECHO = 7
*I ASGVAX.38
        IFLAG = IFLAG + 1
*I ASGVAX.19
500    CONTINUE
*D INOUT.3
        +    IN,    IOUT,    IQB,    IECHO
*I PACSTAT.88
C
C    SET VARIABLE MODEVAX TO TRUE FOR RUNNING ON THE VAX
C
        DATA MODEVAX /.FALSE./
        LOGICAL MODEVAX
*I PACSTAT.141
        IF (MODEVAX) GO TO 65
*I PACSTAT.142
        65 CONTINUE
        WRITE (IOUT,565)
*I PACSTAT.153
        IF (MODEVAX) GO TO 75
*I PACSTAT.358
        565 FORMAT(/1X,'ENTER THE NAME FOR THE DATA ECHO FILE, '/1X
        +,'(OR A CARRIAGE RETURN TO DEFAULT TO DATA FILE PACSTAT.ECH)')
*/
*/    UPDATE TO WRITE COMMENT CARDS TO THE DATA ECHO FILE FOR QA
*/    PURPOSES
*/

```

PACSTAT.B3.UPD.7

```

*I BATCH.8
  WRITE (IECHO,11000) INREC,KARD
C
*I ID HEIDI3
*/
*/ MODIFY PACSTAT TO READ THE SEED DIRECTLY INTO THE VARIABLE DSEED,
*/ A DOUBLE PRECISION VARIABLE.  MODIFY THE RANGE THE SEED MUST FALL
*/ INTO TO 1.0 TO (2^31)-2.
*/
*I PACSTAT.88
  REAL *4 MNSEED
  REAL *8 MXSEED
*I PACSTAT.82
C  DOUBLE PRECISION MXSEED
*I PACSTAT.93
  MNSEED=1.0
  MXSEED=(2.0**31)-2.
*I PACSTAT.241,243
  READ(IN,*,ERR=190) DSEED
  WRITE(IECHO,*) DSEED
  IF ((DSEED .LT. MNSEED).OR.(DSEED.GT.MXSEED)) GO TO 190
*/
*/ REMOVE THE LINE THAT RE-CHECKS THE SEED VALUE
*I D U01S.39
*I D ALNORM.39
  + (Z + 3.98064794D-4  + 1.98615381364D0 /
*I D ALNORM.40
  + (Z + 4.8385912808D0 - 15.1508972451D0 /
*PD VERSION
*AF ,XUDIST
*DECK VERSION
  SUBROUTINE VERSION
C
C THIS ROUTINE WAS WRITTEN PRIMARILY TO CREATE A BANNER PAGE FOR THE
C PACSTAT CODE. IT WILL BE USED TO PROVIDE INFORMATION ON THE VERSION
C NUMBER OF PACSTAT CURRENTLY IN USE, UPDATE INFORMATION, AND APPLICABLE
C DOCUMENTATION.  AUTHOR: CL BARTLEY 4/15/86
C
  CHARACTER *1 STAR,MINUS
C
  STAR = '*'
  MINUS = '-'
C
  IDAT = 12
C
C
C
  WRITE(IDAT,50)
  FORMAT(/)
50
C
  DO 150 J=1,5
    WRITE(IDAT,100) (STAR,I=1,122)

```

PACSTAT.B3.UPD.8

```

100  FORMAT(3(5X 122A1/))
150  CONTINUE
C
    DO 250 J=1,2
    WRITE(IDAT,200) (STAR,I=1,40)
200  FORMAT(5X,20A1,82X,20A1/)
250  CONTINUE
C
    WRITE(IDAT,300) (STAR,I=1,40)
300  FORMAT(5X,20A1,34X,'P A C S T A T',35X,20A1)
C
    WRITE(IDAT,400) (STAR,I=1,40)
400  FORMAT(/5X,20A1,23X,'CODE VERSION AND UPDATE INFORMATION',24X,
120A1)
C
    WRITE(IDAT,500) (STAR,I=1,40)
500  FORMAT(/5X,20A1,22X,'WRITTEN FOR PRIME 750 BY D. LANGFORD',
124X,20A1)
C
    WRITE(IDAT,600) (STAR,I=1,40)
600  FORMAT(/5X,20A1,11X,'CONVERTED TO VAX 11/780 BY C. BARTLEY AND '
1'M. BUDDEN - 4/86',13X,20A1)
C
    WRITE(IDAT,700) (STAR,I=1,40)
700  FORMAT(/5X,20A1,26X,'APPLICABLE DOCUMENTS TO FOLLOW',26X,20A1)
C
    WRITE(IDAT,800) (STAR,I=1,40)
800  FORMAT(/5X,20A1,28X,'VAX VERSION NUMBER ( B4  )',28X,20A1)
C
    WRITE(IDAT,810) (STAR,I=1,40)
810  FORMAT(/5X,20A1,5X,'DIR = [BWIP86.PACSTAT.B4]',52X,20A1)
    WRITE(IDAT,820) (STAR,I=1,40)
820  FORMAT(/5X,20A1,10X,'PACSTAT_B4.SRC      WITNESS SOURCE FILE',34X,
$20A1)
    WRITE(IDAT,830) (STAR,I=1,40)
830  FORMAT(/5X,20A1,10X,'PACSTAT_B4.OPL      WITNESS OLD PROGRAM LIBRAR
$Y',26X,20A1)
    WRITE(IDAT,840) (STAR,I=1,40)
840  FORMAT(/5X,20A1,10X,'PACSTAT_B4.OLB      WITNESS OBJECT LIBRARY',
$31X,20A1)
    WRITE(IDAT,850) (STAR,I=1,40)
850  FORMAT(/5X,20A1,10X,'PACSTAT_B4.FOR      WITNESS FORTRAN COMPILE
$FILE',23X,20A1)
    WRITE(IDAT,860) (STAR,I=1,40)
860  FORMAT(/5X,20A1,10X,'PACSTAT_B4.LIS      FORTRAN LIST FILE',36X,
$20A1)
    WRITE(IDAT,810) (STAR,I=1,40)
    DO 950 J=1,5
    WRITE(IDAT,200) (STAR,I=1,40)
950  CONTINUE
C
    DO 1050 J=1,5

```



```

        WRITE(IDAT,100) (STAR,I=1,122)
1050  CONTINUE
        WRITE(IDAT,1200)
1200  FORMAT(H1)
        WRITE(IDAT,50)
C
        DO 1250 J=1,5
        WRITE(IDAT,100) (STAR,I=1,122)
1250  CONTINUE
C
        DO 1300 J=1,2
        WRITE(IDAT,200) (STAR,I=1,40)
1300  CONTINUE
C
        WRITE(IDAT,1310) (STAR,I=1,20)
1310  FORMAT(5X,20A1,5X,'PRECEEDING VERSION B3',T108,20A1/)
C
        WRITE (IDAT,1350) (STAR,I=1,80)
1350  FORMAT(5X,20A1,5X,'THIS VERSION IS BATCH ONLY.  HAS '
$ ' COMMENTS AND MULTIPLE',T108,20A1/5X,20A1,5X,'TITLE CARDS ON'
$ ' THE FIRST CARDS',T108,20A1)
C
        WRITE (IDAT,1360)
        WRITE(IDAT,1360) (STAR,I=1,40)
C
        DO 1400 J=1,5
        WRITE(IDAT,200) (STAR,I=1,40)
1400  CONTINUE
C
        WRITE (IDAT,1450) (STAR,I=1,40)
1450  FORMAT (5X,20A1,5X,'CURRENT VERSION B4',T108,20A1/)
C
        WRITE (IDAT,1500) (STAR,I=1,80)
1500  FORMAT(5X,20A1,5X,'VERSION B4 HAS ENHANCED FEATURES',T108,20A1,/
$,5X,20A1,5X,'THE ADDED CAPABILITIES ARE:',T108,20A1/)
C
        WRITE (IDAT,1600) (STAR,I=1,80)
1600  FORMAT(5X,20A1,5X,'1)  SETTING VARIABLE MODETYP ALLOWS CODE TO'
$ ' RUN',T108,20A1/5X,20A1,7X,' EITHER INTERACTIVE OR BATCH MODE',
1T108,20A1/)
C
        WRITE (IDAT,1700) (STAR,I=1,80)
1700  FORMAT(5X,20A1,5X,'2)  FOR QA PURPOSES CREATES A DEFAULT ECHO',
$ ' FILE (PACSTAT.ECH)',T108,20A1/5X,20A1,9X,' IF A DATA FILE NAME',
1 ' IS NOT ENTERED',T108,20A1/)
C
        WRITE (IDAT,1800) (STAR,I=1,80)
1800  FORMAT(5X,20A1,5X,'3)  FIXES THAT ALLOW PACSTAT TO READ THE SEED',
$ ' VALUE INTO',T108,20A1/5X,20A1,7X,' THE VARIABLE DSEED, A',
1 ' DOUBLE PRECISION VARIABLE',T108,20A1/)
C
        DO 1900 J=1,3

```

```

        WRITE (IDAT,200) (STAR,I=1,40)
1900  CONTINUE
C
        DO 2000 J=1,5
        WRITE(IDAT,100) (STAR,I=1,122)
2000  CONTINUE
C
1360  FORMAT(5X,20A1,10X,'THESE CARDS ARE IDENTIFIED BY THE PATTERN'
$' "****" IN COLUMNS 1 - 4 OF EACH DATA CARD.')
        WRITE(IDAT,1200)
        RETURN
        END

```

APPENDIX E

PACSTAT EXAMPLE INPUT

**** THIS IS A SAMPLE BATCH INPUT RUN STREAM, FOR QA PURPOSES
**** A DATA ECHO FILE IS CREATED FOR THE TRACEABILITY OF OUTPUT
**** FILES AND THEIR CORRESPONDING INPUT FILES.

DATA.OUT

DATA.BIN

TEST RUN

C

1

3.E-2

3.E-3

N

11

1.

7

0.5 1.

11

1.E-3

5730.

.3

100

10

1

34552.

1

1

N

2

1

N

0

N

APPENDIX F

PACSTAT EXAMPLE OUTPUT


```

*****
*****
*****

*****
*****
*****
*****
*****

*****
*****

*****
*****

***** PRECEEDING VERSION B3
***** THIS VERSION IS BATCH ONLY. HAS COMMENTS AND MULTIPLE
***** TITLE CARDS ON THE FIRST CARDS *****

***** THESE CARDS ARE IDENTIFIED BY THE PATTERN "****" IN COLUMNS 1 - 4 OF EACH DATA CARD.
***** THESE CARDS ARE IDENTIFIED BY THE PATTERN "****" IN COLUMNS 1 - 4 OF EACH DATA CARD.
*****

*****
*****
*****
*****
*****

***** CURRENT VERSION B4 *****

***** VERSION B4 HAS ENHANCED FEATURES *****
***** THE ADDED CAPABILITIES ARE: *****

***** 1) SETTING VARIABLE MODETYP ALLOWS CODE TO RUN *****
***** EITHER INTERACTIVE OR BATCH MODE *****

***** 2) FOR QA PURPOSES CREATES A DEFAULT ECHO FILE (PACSTAT.ECH) *****
***** IF A DATA FILE NAME IS NOT ENTERED *****

***** 3) FIXES THAT ALLOW PACSTAT TO READ THE SEED VALUE INTO *****
***** THE VARIABLE DSEED, A DOUBLE PRECISION VARIABLE *****

*****
*****

```



```
1
****
**** THIS IS A SAMPLE BATCH INPUT RUN STREAM, FOR QA PURPOSES
**** A DATA ECHO FILE IS CREATED FOR THE TRACEABILITY OF OUTPUT
**** FILES AND THEIR CORRESPONDING INPUT FILES.
****
DATA.OUT
1 (PACSTAT 1.00)
```

Results from this code are based on the use of unverified software and are not for use in license related applications.

```
DIF-STAT [ 1.00]                RUN I.D.    1821861254  
MASS STORAGE AND RELEASE RATE INTO LAYER USER NAME   *G*O*Q*G*O*Q*O*  
TEST RUN                        DATA SET NUMBER      1
```

TABLE 1. ECHO OF THE INPUT DATA

MOLEC DIFFSV (MET**2/YEAR)
DISTRIBUTION IS NORMAL
MEAN VALUE = 3.0000E-02
STND DEVIATION = 3.0000E-03

```
RETARDATION (UNITLESS )
DISTRIBUTION IS CONSTANT
CONSTANT VAL 1.0000E+00
```

```

LAYER WIDTH (METERS )
DISTRIBUTION IS UNIFORM
LOWER ENDCOI 5.0000E-01
UPPER ENDPOINT = 1.0000E+00

```

SOLUBILITY (GM/MET**3)
DISTRIBUTION IS CONSTANT

CONSTANT VAL 1.0000E-03

VALUE FOR HALF LIFE (YEARS) IS 5.7300E+03
VALUE FOR POROSITY (UNITLESS) IS 3.0000E-01

NUMBER OF SAMPLES IS 100
PRINT INTERVAL IS 10
STRATIFIED SAMPLING NOT CHOSEN.

INITIAL RANDOM SEED NUMBER IS 3.4552000D+04

ONE DIMENSIONAL DIFFUSIONAL RELEASE INTO A BOUNDARY
LAYER OVER A SOLUBILITY LIMITED SOURCE ZONE.

1 TABLE 2. INPUT VARIABLE STATISTICS

**--- EXPECTED INPUT VARIABLE STATISTICS

VARIABLE	MODE	MEAN	MEDIAN	STND DEV
MOLEC DIFFSV	3.00E-02	3.00E-02	3.00E-02	3.00E-03
LAYER WIDTH	7.50E-01	7.50E-01	7.50E-01	1.44E-01

**-----

**--- SAMPLE DIAGNOSTICS, INPUT DISTRIBUTIONS

	MIN	MAX	MEAN	MEDIAN	STND DEV	SKENNESS
MOLEC DIFFSV	2.175E-02	3.752E-02	3.014E-02	2.999E-02	2.876E-03	-1.559E-03
RETARDATION	1.000E+00	1.000E+00	1.000E+00	1.000E+00	0.000E+00	0.000E+00
LAYER WIDTH	5.007E-01	9.991E-01	7.625E-01	7.688E-01	1.497E-01	7.084E-02
SOLUBILITY	1.000E-03	1.000E-03	1.000E-03	1.000E-03	0.000E+00	0.000E+00

***--- MAXIMUM LIKELIHOOD ESTIMATORS FOR INPUT DISTRIBUTIONS

VARIABLE	COMPUTED VALUES		EXPECTED VALUES	
	PARAMETER 1	PARAMETER 2	PARAMETER 1	PARAMETER 2
MOLEC DIFFSV	3.014E-02	2.876E-03	3.000E-02	3.000E-03
RETARDATION	1.000E+00		1.000E+00	
LAYER WIDTH	5.007E-01	9.991E-01	5.000E-01	1.000E+00
SOLUBILITY	1.000E-03		1.000E-03	

1 TABLE 3. OUTPUT VARIABLE STATISTICS

**--- SAMPLE DIAGNOSTICS, OUTPUT DISTRIBUTIONS

	MIN	MAX	MEAN	MEDIAN	STND DEV	SKENNESS
MASS STORAGE IN LAYER, GM/M**2						
	8.007E-02	2.770E-01	1.316E-01	1.141E-01	5.737E-02	-5.417E-02
REL RATE (S.S.), GM/M**3-YR						
	6.275E-06	1.054E-05	8.583E-06	8.527E-06	7.843E-07	-2.972E-07

**--- OUTPUT CUMULATIVE PROBABILITIES
 FOR STOCHASTIC VARIABLE, MASS STORAGE IN LAYER, GM/M**2

SAMPLE NUMBER	VARIABLE VALUE	CUMULATIVE CONFIDENCE
1	0.6007E-01	0.01000
10	0.7041E-01	0.10000
20	0.7859E-01	0.20000
30	0.9008E-01	0.30000
40	0.9848E-01	0.40000
50	0.1140	0.50000
60	0.1201	0.60000
70	0.1553	0.70000
80	0.1811	0.80000
90	0.2149	0.90000
100	0.2770	1.00000

**--- OUTPUT CUMULATIVE PROBABILITIES
 FOR STOCHASTIC VARIABLE, REL RATE (S.S.), GM/M**3-YR

SAMPLE NUMBER	VARIABLE VALUE	CUMULATIVE CONFIDENCE
1	0.8275E-05	0.01000
10	0.7820E-05	0.10000
20	0.7851E-05	0.20000
30	0.8118E-05	0.30000
40	0.8308E-05	0.40000
50	0.8498E-05	0.50000
60	0.8699E-05	0.60000
70	0.8936E-05	0.70000
80	0.9304E-05	0.80000
90	0.9752E-05	0.90000
100	0.1054E-04	1.00000

APPENDIX G

SOLN AND BLKDAT ROUTINES

C	BLOCK DATA BLKDAT	BLKDAT	2
C	THIS BLOCK DATA CONTAINS THE PROBLEM DEFINITION FOR A PACSTAT	BLKDAT	3
C	MONTE CARLO SIMULTAION RUN.	BLKDAT	4
C		BLKDAT	5
C	This problem definition is for the dummy problem constructed in	BLKDAT	6
C	in SOLN to allow us to remove strings of numbers directly from	HEIDI1	2
C	the random number generator.	HEIDI1	3
C		HEIDI1	4
C		BLKDAT	13
C	PARAMETER ISIZE = 50000 ! MAX DATA SET SIZE	PPARA	2
C	PARAMETER MAXCNT = 10 ! MAX NUMBER OF CONSTANTS	PPARA	3
C	PARAMETER MAXDST = 100 ! MAX NUMBER OF INPUT DATA POINTS	PPARA	4
C	PARAMETER MAXLVS = 100 ! MAX LEVELS FOR STRATIFIED SAMPLING	PPARA	5
C	PARAMETER MAXNS = 10000 ! MAX NUMBER OF SAMPLES	PPARA	6
C	PARAMETER MAXSOL = 10 ! MAX NUMBER OF SOLUTIONS	PPARA	7
C	PARAMETER MAXVAR = 25 ! MAX NUMBER OF INPUT VARIABLES	PPARA	8
C	PARAMETER NMLEN = 10 ! FILE NAME LENGTH	PPARA	9
C	PARAMETER NTYPE = 11 ! NUMBER OF DISTRIBUTION TYPES	PPARA	10
C		PPARA	11
C		PPARA	12
C	COMMON /PBLK1/	PBLK1	2
C	+ NCONST, NSOLN, NVAR	PBLK1	3
C		PBLK1	4
C		PBLK1	5
C	COMMON /PBLK2/	PBLK2	2
C	+ NSTTL, NTTL, STITLE,	PBLK2	3
C	+ TTLE	PBLK2	4
C	CHARACTER*40	PBLK2	5
C	+ STITLE, TTLE	PBLK2	6
C		PBLK2	7
C		PBLK2	8
C	COMMON /PBLK3/	PBLK3	2
C	+ CDIMEN(MAXCNT), CLABEL (MAXCNT), PLABEL (MAXSOL),	PBLK3	3
C	+ VDIMEN(MAXVAR), VLABEL (MAXVAR)	PBLK3	4
C	CHARACTER*12	PBLK3	5
C	+ CDIMEN, CLABEL, VDIMEN,	PBLK3	6
C	+ VLABEL	PBLK3	7
C	CHARACTER*32	PBLK3	8
C	+ PLABEL	PBLK3	9
C		PBLK3	10
C		PBLK3	11
C	PARAMETER MAXSRC=15	IDCOM	2
C	COMMON /IDCOM/	IDCOM	3
C	+ JRUNID, FL, FLT(MAXSRC),	IDCOM	4
C	+ NRUNID(MAXSRC), NSRC, PRG,	IDCOM	5
C	+ PRGT(MAXSRC), TITLE(20), USRNAM,	IDCOM	6
C	+ USRNMT(MAXSRC), VERNUM	IDCOM	7
C	CHARACTER*4	IDCOM	8
C	+ TTLE	IDCOM	9
C	CHARACTER*8	IDCOM	10
C	+ FL, FLT, PRG,	IDCOM	11
C	+ PRGT, USRNAM, USRNMT	IDCOM	12
C		IDCOM	13
C		IDCOM	14
C	PRIME - \$INSERT SYSTEMS>UTIL>PACSTAT>COMMON>PPARA	BLKDAT	19
C	PRIME - \$INSERT SYSTEMS>UTIL>PACSTAT>COMMON>PBLK1	BLKDAT	20
C	PRIME - \$INSERT SYSTEMS>UTIL>PACSTAT>COMMON>PBLK2	BLKDAT	21
C	PRIME - \$INSERT SYSTEMS>UTIL>PACSTAT>COMMON>PBLK3	BLKDAT	22
C	PRIME - \$INSERT SYSTEMS>UTIL>PACSTAT>COMMON>IDCOM	BLKDAT	23
C		BLKDAT	24
C	SET THE PROGRAM NAME AND VERSION NUMBER	BLKDAT	25
C		BLKDAT	26
C	Set the program name and version number	HEIDI1	5
C		HEIDI1	6
C		HEIDI1	7
C	DATA	HEIDI1	8
C	+ PRG/'RAN-GEN'/, VERNUM/1.0/	HEIDI1	9
C		HEIDI1	10
C	Set the problem title	HEIDI1	11
C		HEIDI1	12
C	DATA	HEIDI1	13
C	+ TTLE/'TEST THE RANDOM NUMBER GEN'/	HEIDI1	14
C		HEIDI1	15

C	Set number of solutions and the plotting label	HEIDI1	16
C	for the output variable for each solution	HEIDI1	17
C		HEIDI1	18
	DATA	HEIDI1	19
	+ NSOLN/1/	HEIDI1	20
	DATA	HEIDI1	21
	+ FLABEL(1)/'Dummy solution'/	HEIDI1	22
C		HEIDI1	23
C	Set the names of input variables and their names	HEIDI1	24
C		HEIDI1	25
	DATA	HEIDI1	26
	+ NVAR/1/	HEIDI1	27
	DATA	HEIDI1	28
	+ VLABEL(1)/'Input'/	HEIDI1	29
C		HEIDI1	30
C	Set the units for the input variables	HEIDI1	31
C		HEIDI1	32
	DATA	HEIDI1	33
	+ VDIMEN(1)/'No units'/	HEIDI1	34
C		HEIDI1	35
C	Set the number of problem constants and the name and units	HEIDI1	36
C	for each constant.	HEIDI1	37
C		HEIDI1	38
	DATA	HEIDI1	39
	+ NCONST/8/	HEIDI1	40
C		HEIDI1	41
	END	HEIDI1	42
C		BLKDAT	70
	END	BLKDAT	71
	SUBROUTINE SOLN (IERR)	SOLN	2
C		SOLN	3
C		HEIDI1	43
C	This is a dummy sample problem that sets the output distribution	HEIDI1	44
C	equal to the input distribution for use in selecting sets of numbe	HEIDI1	45
C	directly from the random number generator.	HEIDI1	46
C		HEIDI1	47
C		SOLN	10
C	INPUT VARIABLES/DATA	SOLN	11
C	ICNT = DATA SET NUMBER (# OF INPUT VARIABLE UPDATES)	SOLN	12
C	IERR = ERROR POINTER	SOLN	13
C	INDEX = SAMPLE NUMBER OF CURRENT RUN	SOLN	14
C		SOLN	15
C	INPUT VARIABLES	HEIDI1	48
C		HEIDI1	49
C	VINPT(1) = Output from the random number generator	HEIDI1	50
C		HEIDI1	51
C	OUTPUT VARIABLES	HEIDI1	52
C		HEIDI1	53
C	VALU(1) = Direct output from the random number generator	HEIDI1	54
C		HEIDI1	55
C		SOLN	28
	PARAMETER ISIZE = 50000 ! MAX DATA SET SIZE	PPARA	2
	PARAMETER MAXCNT = 10 ! MAX NUMBER OF CONSTANTS	PPARA	3
	PARAMETER MAXDST = 100 ! MAX NUMBER OF INPUT DATA POINTS	PPARA	4
	PARAMETER MAXLVS = 100 ! MAX LEVELS FOR STRATIFIED SAMPLING	PPARA	5
	PARAMETER MAXNS = 10000 ! MAX NUMBER OF SAMPLES	PPARA	6
	PARAMETER MAXSOL = 10 ! MAX NUMBER OF SOLUTIONS	PPARA	7
	PARAMETER MAXVAR = 25 ! MAX NUMBER OF INPUT VARIABLES	PPARA	8
	PARAMETER NMLEN = 10 ! FILE NAME LENGTH	PPARA	9
	PARAMETER NTYPE = 11 ! NUMBER OF DISTRIBUTION TYPES	PPARA	10
C		PPARA	11
C		PPARA	12
	COMMON /PBLK4/	PBLK4	2
	+ CONST(MAXCNT), VALU(MAXSOL), VINPT(MAXVAR)	PBLK4	3
C		PBLK4	4
C		PBLK4	5
	COMMON /PBLK5/	PBLK5	2
	+ ICNT, IDAT, INDEX	PBLK5	3
C		PBLK5	4
C		PBLK5	5
	COMMON /INOUT/	INOUT	2
	+ IN, IOUT, IQB	INOUT	3

CHARACTER*1	INOUT	4
* IQB	INOUT	5
C	INOUT	6
C	INOUT	7
DATA	SOLN	33
* BETA /1.0 /,	SOLN	34
* E /2.718/	SOLN	35
C	SOLN	36
IERR=0	SOLN	37
IF (INDEX.GT.1) GO TO 100	SOLN	38
WRITE (IOUT,500)	SOLN	39
IF (IDAT.GT.0) WRITE (IDAT,500)	SOLN	40
BETA=ALOG(2.0)/CONST(1)	SOLN	41
100 CONTINUE	SOLN	42
C	HEIDI1	56
VALU(1) = VINPY(1)	HEIDI1	57
RETURN	SOLN	52
500 FORMAT (/1X,'ONE DIMENSIONAL DIFFUSIONAL RELEASE INTO A BOUNDARY'/	SOLN	53
+1X,'LAYER OVER A SOLUBILITY LIMITED SOURCE ZONE.')	SOLN	54
END	SOLN	55

APPENDIX H

EXAMPLE VAX/VMS COMMAND FILE USED TO
OBTAIN 100 SETS OF 10,000 UNIFORM (0,1)
VARIATES FROM PACSTAT

\$ SD.HH	! Set subdirectory.
\$!	
\$! PACSTAT_A4 TEST RUN: 2	
\$!	
\$ RUN PACSTAT_A4	
NONE	! File name of diagnostic data echo file
FILE.BIN	! File name of binary output file
PACSTAT_A4 TEST RUN: 2	! Documentation label for run
C	! Continue if error encountered in solution
	! routine
7	! Generate data from uniform distribution
0.,1.	! Endpoints of uniform interval
10000	! Number of variates in sample
1	! Print interval for output
1	! Number of intervals for stratified sampling
1499244925	! Initial seed for random number generator
1	! Variable to solve for
1	! Cumulative probability description on
	! output
N	! No plotting desired
0	! Exit variable solution menu
N	! Another data set not desired
\$ APP PACSTAT.BIN BINARY.OUTPUT4	! Combine output file from this run with
	! previous output generated for this
	! distribution
\$ DEL PACSTAT.BIN;*	! Delete remaining file

APPENDIX I

PROGRAM READ USED TO PREPARE PACSTAT OUTPUT FOR USE BY
SAS FOR STATISTICAL TESTING PURPOSES

APPENDIX I

PROGRAM READ USED TO PREPARE PACSTAT OUTPUT FOR USE BY SAS FOR STATISTICAL TESTING PURPOSES

PROGRAM READ

DEFINITION BLOCK:

PURPOSE: Read the binary output of PACSTAT and add a group number
element number, and sorted data column to the file.

LIMITATIONS AND PREREQUISITES:

LOGICAL NAMES AND FILES USED:

[BWIP86.HH]BINARY.OUTPUT4 - Binary output of PACSTAT_A4 containing
the unsorted random number streams
[BWIP86.HH]PACSTAT.FINAL4 - Binary output of READ4 containing
group number, element number, sorted random
number streams and unsorted random number
streams.

ROUTINES USED:

IMPLEMENTATION BLOCK:

DEVELOPMENT INFORMATION:

CREATED BY : Heidi Harty ON : 6/12/86
AT : Battelle Pacific Northwest Laboratories
Richland, Washington 99352
MACHINE/OPERATING SYSTEM: Vax/VMS
COMPILER : DEC FORTRAN
COMPILER SWITCHES : Default

MODIFICATION HISTORY: none

MODIFIED BY : ON :
REASON FOR MODIFICATION:
DESCRIPTION OF MODIFICATION:

ALGORITHM: Read each line of the log file until the appropriate data is
reached. Write data to output file along with identification numbers.

CONSTANTS (PARAMETER STATEMENTS):
PARAMETER IDIM=10000

COMMON BLOCKS:

VARIABLES:

DIMENSION VALUE1(IDIM), VALUE2(IDIM)
VALUE1: Sample value of sorted data
VALUE2: Sample value from unsorted file

CODE BLOCK:

DATA STATEMENTS:
CODE:

```

      OPEN(UNIT=2,NAME='BINARY.OUTPUT4',TYPE='OLD',FORM='UNFORMATTED')
      OPEN(UNIT=3,NAME='PACSTAT.FINAL4',TYPE='NEW',FORM='UNFORMATTED')
C
      ICNT = 1
C
C   Read in first 7 lines of binary file
C
5      DO I=1,7

          READ(2,END=40)
          ENDDO
          READ(2) (VALUE2(I),I=1,IDIM)
C
          DO I = 1,IDIM
              VALUE1(I) = VALUE2(I)
          ENDDO
C
C   Call IMSL routine to sort data
C
          CALL VSRTA(VALUE1,IDIM)
C
          DO I=1,IDIM
              WRITE(3) ICNT,I,VALUE1(I),VALUE2(I)
          ENDDO
C
          ICNT = ICNT + 1
          GOTO 5
C
40      CLOSE(UNIT=2,DISPOSE='SAVE')
      CLOSE(UNIT=3,DISPOSE='SAVE')
C
      END

```

DISTRIBUTION

<u>No. of Copies</u>		<u>No. of Copies</u>	
	<u>OFFSITE</u>		V. Stello
			Office of the Executive Director for Operations Nuclear Regulatory Commission Mail Station 62D9 Washington, DC 20555
10	DOE Technical Information Center		G. L. Sjoblom
9	DOE Office of Civilian Radioactive Waste Management Forrestal Building Washington, DC 20585 ATTN: D. H. Alexander, RW-232 L. H. Barrett, RW-33 A. Berusch, RW-231 C. R. Cooley, RW-4 N. Eisenberg, RW-232 J. R. Hilley, RW-30 S. Kale, RW-20 D. E. Shelor, RW-32 R. Stein, RW-23		Environmental Protection Agency Office of Radiation Programs 401 M Street, S.W. Washington, DC 20460
3	DOE Office of Defense Waste & Transportation Management GTN Washington, DC 20545 ATTN: T. C. Chee, DP-123 G. H. Daly, DP-124 J. E. Lytle, DP-12		J. M. McGough DOE Albuquerque Operations Office P.O. Box 540D Albuquerque, NM 87185
4	DOE Office of Remedial Action & Waste Technology GTN Washington, DC 20545 ATTN: J. A. Coleman, NE-24 T. W. McIntosh, NE-24 W. R. Voight, NE-20 H. F. Walter, NE-24		P. G. Hagan Joint Integration Office Bldg. 3, 2nd Floor 2201 San Pedro, N.E. Albuquerque, NM 87110
	A. T. Clark Division of Fuel Material Safety Nuclear Regulatory Commission Washington, DC 20555		E. Maestas DOE West Valley Operations Office P.O. Box 191 West Valley, NY 14171
		2	DOE Idaho Operations Office 550 Second Street Idaho Falls, ID 83401 ATTN: S. T. Hinschberger J. P. Hamric

No. of
Copies

No. of
Copies

F. T. Fong DOE San Francisco Operations 1333 Broadway Oakland, CA 94612	L. D. Ramspott Lawrence Livermore National Laboratory University of California P.O. Box 808 Livermore, CA 94550
M. R. Jugan DOE Oak Ridge Operations Office P.O. Box E Oak Ridge, TN 37830	D. T. Oakley, MS 619 Los Alamos Scientific Laboratory P.O. Box 1663 Los Alamos, NM 87544
W. J. Brumley DOE Savannah River Operations Office P.O. Box A Aiken, SC 29801	4 Oak Ridge National Laboratory P.O. Box Y Oak Ridge, TN 37830 ATTN: J. O. Blomeke W. D. Burch R. T. Jubin L. J. Mezga
M. J. Steindler Argonne National Laboratory 9700 South Cass Avenue Argonne, IL 60439	3 Sandia Laboratories P.O. Box 5800 Albuquerque, NM 87185 ATTN: R. W. Lynch T. O. Hunter Technical Library
C. S. Abrams Argonne National Laboratory P.O. Box 2528 Idaho Falls, ID 83401	J. R. Berreth Westinghouse Idaho Nuclear Co., Inc. P.O. Box 4000 Idaho Falls, ID 83401
D. Schweitzer Brookhaven National Laboratory Upton, NY 11973	6 E. I. du Pont de Nemours Company Savannah River Laboratory Aiken, SC 29801 ATTN: R. G. Baxter M. D. Boersma J. G. Glasscock J. R. Knight M. J. Plodinec C. T. Randall
K. Pruess Lawrence Berkeley Laboratory Berkeley, CA 84720	
2 Battelle Memorial Institute Project Management Division 5D5 King Avenue Columbus, OH 43201 ATTN: J. F. Kircher Technical Library	

No. of
Copies

E. A. Jennrich
EG&G Idaho
P.O. Box 1625
Idaho Falls, ID 83415

R. Shaw
Electric Power Research
Institute
3412 Hillview Avenue
P.O. Box 10412
Palo Alto, CA 94304

West Valley Nuclear Services
Company
P.O. Box 191
West Valley, NY 14171
ATTN: J. M. Pope

J. L. White, Chairman
Energy Research & Development
Authority
Empire State Plaza
Albany, NY 12223

F. B. Cheung
Department of Mechanical
Engineering
The Pennsylvania State
University
University Park, PA 16802

ONSITE

5 DOE Richland Operations Office

N. T. Karagianes
P. E. Lamont
D. H. Dahlem
J. L. Rhoades
M. W. Shupe

No. of
Copies

8 Westinghouse Hanford Company

R. C. Arnett
T. A. Curran
H. J. Dahlke
E. A. Fredenburg
J. Graham
S. B. Sonnichsen
J. A. Thies
S. C. Yung

40 Pacific Northwest Laboratory

C. R. Allen
M. K. Altenhofen
W. W. Ballard, Jr.
C. L. Bartley
S. H. Bian
D. J. Bradley
M. J. Budden (10)
J. R. Burnell
T. T. Claudson
T. E. Gates
G. W. Gee
R. W. Goles
H. Harty
W. L. Kuhn
L. T. Lakey
A. M. Liebetrau
J. E. Mendel/M. R. Kreiter
M. E. Peterson
G. F. Piepel
P. F. Salter
G. J. Sevigny
C. W. Stewart
M. R. Toland
A. P. Toste
Publishing Coordination (2)
Technical Report Files (5)