

NBS TECHNICAL NOTE 868

U.S. DEPARTMENT OF COMMERCE / National Bureau of Standards

Statistical Analysis of Extreme Winds

QC 100 U5753 No.868 1975 c.2

NATIONAL BUREAU OF STANDARDS

The National Bureau of Standards¹ was established by an act of Congress March 3, 1901. The Bureau's overall goal is to strengthen and advance the Nation's science and technology and facilitate their effective application for public benefit. To this end, the Bureau conducts research and provides: (1) a basis for the Nation's physical measurement system, (2) scientific and technological services for industry and government, (3) a technical basis for equity in trade, and (4) technical services to promote public safety. The Bureau consists of the Institute for Basic Standards, the Institute for Materials Research, the Institute for Applied Technology, the Institute for Computer Sciences and Technology, and the Office for Information Programs.

THE INSTITUTE FOR BASIC STANDARDS provides the central basis within the United States of a complete and consistent system of physical measurement; coordinates that system with measurement systems of other nations; and furnishes essential services leading to accurate and uniform physical measurements throughout the Nation's scientific community, industry, and commerce. The Institute consists of a Center for Radiation Research, an Office of Measurement Services and the following divisions:

Applied Mathematics — Electricity — Mechanics — Heat — Optical Physics — Nuclear Sciences² — Applied Radiation² — Quantum Electronics³ — Electromagnetics³ — Time and Frequency³ — Laboratory Astrophysics³ — Cryogenics³.

THE INSTITUTE FOR MATERIALS RESEARCH conducts materials research leading to improved methods of measurement, standards, and data on the properties of well-characterized materials needed by industry, commerce, educational institutions, and Government; provides advisory and research services to other Government agencies; and develops, produces, and distributes standard reference materials. The Institute consists of the Office of Standard Reference Materials and the following divisions:

Analytical Chemistry — Polymers — Metallurgy — Inorganic Materials — Reactor Radiation — Physical Chemistry.

THE INSTITUTE FOR APPLIED TECHNOLOGY provides technical services to promote the use of available technology and to facilitate technological innovation in industry and Government; cooperates with public and private organizations leading to the development of technological standards (including mandatory safety standards), codes and methods of test; and provides technical advice and services to Government agencies upon request. The Institute consists of a Center for Building Technology and the following divisions and offices:

Engineering and Product Standards — Weights and Measures — Invention and Innovation — Product Evaluation Technology — Electronic Technology — Technical Analysis — Measurement Engineering — Structures, Materials, and Life Safety⁴ — Building Environment⁴ — Technical Evaluation and Application⁴ — Fire Technology.

THE INSTITUTE FOR COMPUTER SCIENCES AND TECHNOLOGY conducts research and provides technical services designed to aid Government agencies in improving cost effectiveness in the conduct of their programs through the selection, acquisition, and effective utilization of automatic data processing equipment; and serves as the principal focus within the executive branch for the development of Federal standards for automatic data processing equipment, techniques, and computer languages. The Institute consists of the following divisions:

Computer Services — Systems and Software — Computer Systems Engineering — Information Technology.

THE OFFICE FOR INFORMATION PROGRAMS promotes optimum dissemination and accessibility of scientific information generated within NBS and other agencies of the Federal Government; promotes the development of the National Standard Reference Data System and a system of information analysis centers dealing with the broader aspects of the National Measurement System; provides appropriate services to ensure that the NBS staff has optimum accessibility to the scientific information of the world. The Office consists of the following organizational units:

Office of Standard Reference Data — Office of Information Activities — Office of Technical Publications — Library — Office of International Relations.

¹Headquarters and Laboratories at Gaithersburg, Maryland, unless otherwise noted; mailing address Washington, D.C. 20234.

² Part of the Center for Radiation Research.

³ Located at Boulder, Colorado 80302.

^{*} Part of the Center for Building Technology.

3 1877 9CC,

153

868

5

1 7:1 -

Statistical Analysis of Extreme Winds

t technical note, no, 868

Emil Simiu

Institute for Applied Technology National Bureau of Standards Washington, D.C. 20234

and

James J. Filliben

Institute for Basic Standards National Bureau of Standards Washington, D.C. 20234



U.S. DEPARTMENT OF COMMERCE, Rogers C. B. Morton, Secretary $U_{1,S}$ NATIONAL BUREAU OF STANDARDS, Richard W. Roberts, Director

Issued June 1975

Library of Congress Catalog Card Number: 75-600028

National Bureau of Standards Technical Note 868 Nat. Bur. Stand. (U.S.), Tech. Note 868, 52 pages (June 1975) CODEN: NBTNAE

U.S. GOVERNMENT PRINTING OFFICE WASHINGTON: 1975

For sale by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402 (Order by SD Catalog No. Cl3.46:868). Price \$1.50 (Add 25 percent additional for other than U.S. mailing).

TABLE OF CONTENTS

Page

Abstract and Key Words
SI Conversion Units
List of Symbols
1. Introduction
2. Probability Distributions of the Largest Yearly Wind Speed
3. Description of Procedure for Estimating CDF, its Parameters, and the \overline{N} -year Winds 5
4. Summary and Interpretation of Results
5. Conclusions
6. References
Appendix: Computer Program Listing. Sample Input and Output



STATISTICAL ANALYSIS OF EXTREME WINDS

Emil Simiu

James J. Filliben

With a view to assessing the validity of current probabilistic approaches to the definition of design wind speeds, a study was undertaken of extreme wind speeds based on records taken at 21 U.S. weather stations. For the purpose of analyzing extreme value data, a computer program was developed which is described herein. The following results were obtained: (1) the assumption that a single probability distribution is universally applicable to all extreme wind data sets in a given type of climate was not confirmed, and (2) predictions of 100-year wind speeds based on overlapping 20-year sets of data taken at the same station differed between themselves by as much as 100%. Similar predictions for 1000-year winds differed by as much as a few hundred percent. Since wind pressures are proportional to the square of the wind speeds, errors of such magnitude are unacceptably high for structural design purposes. It is therefore suggested that while, in principle, probabilistic methods provide the most rational approach to specifying design wind speeds, it is of the utmost importance that the possible errors inherent in this approach be carefully taken into account.

Key words: Building codes; extreme value distributions; hurricanes; probability distribution functions; reliability; risk; statistical analysis; storms; structural engineering; wind loads; wind speeds.

SI CONVERSION UNITS

In view of the present practice in building technology in the United States and in publications of the National Oceanic and Atmospheric Administration (NOAA), common U.S. units of measurements have been used in this paper. However, in recognition of the position of the United States as a signatory to the General Conference on Weights and Measures, which gave official status to the metric SI system of units in 1960, conversion factors are given as follows:

Length

```
1 inch (in) = 0.0254* meter (m)
1 foot (ft) = 0.3048* meter (m)
1 mile (U.S. Statute) = 1.609344 x 10<sup>3</sup> meter (m)
```

Velocity

l mile per hour (mph) = 4.470400×10^7 meters per second (m/s) = 1.609344 kilometers per hour (km/hr)

*exactly

CDF	Cumulative distribution function
D, D'	Probability distributions
F (v)	Mixed distribution given by Eq. 6
Fo	Specified value of the cumulative distribution function
$f_{I}(v),F_{II}(v)$	Extreme type I and type II cumulative distribution function
$F_{II}^{E}(v), F_{II}^{T}(v)$	Extreme type II cumulative distribution function for extratropical and tropi- cal storm winds, respectively
F _{Xy} (x)	Extreme type II cumulative distribution function with tail length parameter $\boldsymbol{\gamma}$
G _{Xy} (p)	Percentage point function given by Eq. 5, corresponding to distribution of random variable X
M _i (D)	Median of i-th ordered observation from a sample of size n from a distribution D
M(D)	$\Sigma M_{i}(D)/n$
n	Sample size (number of observations)
N	Mean recurrence interval, in years
p	Value of cumulative distribution function
^p E, ^p T	Probability of largest yearly wind being produced by an extratropical and by a tropical storm, respectively
PPF	Percentage point function
r _D	Probability plot correlation coefficient defined by Eq. 7
SD(X)	Standard deviation of variable X
s _v	Standard deviation of the observed annual extreme wind speeds
v	Largest yearly wind speed
v, v _{max}	Mean, maximum value of the observed annual extreme wind speeds, respectively
$v_{\overline{N}}, v_{\overline{N}}^{\infty}$	Extreme wind speed corresponding to a \overline{N} -year mean recurrence interval obtained using a distribution with $\gamma = \gamma_{opt}$, $\gamma = \infty$, respectively
X, x	Random variable, value taken on by X.
Xi	i-th ordered observation
x	$\Sigma X_{i}/n$
Υ, Y _{opt}	Tail length parameter, optimal value of Y, respectively
μ	Location parameter
Ø	Probability distribution scale parameter

1. INTRODUCTION

In modern building codes and standards [1,3] basic design wind speeds are specified in probabilistic terms. At any given station at which wind records over a number of years are available, a random variable may be defined, which consists of the largest yearly wind speed for every year of record. Using these records the cumulative distribution function (CDF) of this random variable may, at least in theory, be estimated to characterize the probabilistic behavior of the largest yearly wind speeds. The basic design wind speed is then defined as the speed corresponding to a specified value F of the CDF or, equivalently (in view of the relation $\bar{N} = 1/(1-F_{n})$, in which $\bar{N} =$ mean recurrence interval), as the speed corresponding to a specified mean recurrence interval. For example, the American National Standard A58.1 [1] specifies that a basic design wind speed corresponding to a 50-year mean recurrence interval (i.e., to a value F of the CDF equal to 0.98, or to a probability of exceedance of the basic wind speed in any one year equal to 0.02) be used in designing all permanent structures, except structures with an unusually high degree of hazard to life and property in case of failure, for which a 100-year mean recurrence interval ($F_{p} = 0.96$) must be used, and structures having no human occupants or where there is negligible risk to human life, for which a 25-year mean recurrence ($F_0 = 0.96$) may be used. A wind speed corresponding to an N-year recurrence interval is commonly referred to as the \overline{N} -year wind.

The mean recurrence intervals specified by building codes, rather than being based on a formal risk analysis--which is in practice not feasible in the present state of the art--are selected in such a manner as to yield basic wind speeds which, by professional consensus, are judged to be adequate from a structural safety viewpoint. Nevertheless, it is generally assumed that the current probabilistic approach to the definition of design wind speeds insures, at least in theory, a certain degree of consistency with regard to the effect of the wind loads upon structural safety; i.e., all other relevant factors being equal, if appropriate recurrence intervals are used in design, the probabilities of failure of buildings in different wind climates will, on the average, be approximately the same.

In the practical application of the probabilistic definition of design wind speeds, certain important questions arise. One such question pertains to the type of probability distribution of the National Building Code of Canada [3] are based upon the assumption that this behavior is best modeled by a Type I (Gumbel) distribution. The American National Standard A58.1 [1], on the other hand, assumes that the appropriate models are Type II (Frechet) distributions with location parameters equal to zero and with tail length parameters dependent only upon type of storm.

A second important question is whether records of approximately 20-year length, i.e., of such length as has been used in developing wind intensity maps in the American National Standard A58.1, are sufficient for making reliable predictions of extreme wind speeds.

The present work, which is part of an effort to evaluate and improve building code provisions on design for wind, was undertaken with the intent of seeking an answer to these two questions. A computer technique was developed for estimating the parameters of the probability distribution function of the largest values which best fits any given set of extreme wind speed data; using this program, an analysis was carried out of extreme winds recorded at 21 U.S. weather stations and published by Court [5]. The data consisted of 5-minute averages of the largest yearly wind speeds recorded during 37 consecutive years. All the data were obtained at stations where no change in the height and the exposure of the wind recording instruments was noted throughout the period of record. The results of the analyses are presented and, on their basis, answers to the two questions previously mentioned are suggested. These results point to the need for carefully taking into account the possible errors inherent in the probabilistic approach to the definition of wind speeds for purposes of structural design.

2. PROBABILITY DISTRIBUTIONS OF THE LARGEST YEARLY WIND SPEED

Probabilistic considerations [11, pp. 274-275], as well as available empirical evidence [6, 17, 18] suggest that the asymptotic probability distributions of the largest values with unlimited upper tail are an appropriate model for the behavior of the largest yearly wind speed. There are two such distributions, known as the type I and type II distributions of the largest values [11], whose cumulative distributions functions, $F_{I}(v)$ and $F_{II}(v)$, respectively, are of the form

$F_{I}(v) = \exp \{-\exp[-(v-\mu)/\sigma]\}$	$\mu < v < \infty$	
	-∞ < µ < ∞	(1)
	0 < σ < ∞	
$F_{II}(v) = \exp \{-[v-\mu)/\sigma]^{-\gamma}\}$	µ < v < ∞	
	$-\infty < \gamma < \infty$	(0)
	$-\infty < \Omega < \infty$	(2)
	$\gamma > 0$	

in which μ , σ , and γ are location, scale and tail length parameters, respectively. Actually, the type I distribution may be shown to be a type II distribution with $\gamma = \infty$; however, it is convenient to refer to it separately.

It is convenient in many applications to use the inverse function of the CDF, known as the percent point function (PPF). For Eqs. 1 and 2, the PPF's are, respectively,

and

$$v(F_{I}) = \mu - \sigma \ln (-\ln F_{I}) \qquad 0 < F_{I} < 1 \quad (3)$$
$$v(F_{II}) = \mu + \sigma (-\ln F_{II})^{-1/\gamma} \qquad 0 < F_{II} < 1 \quad (4)$$

It is customary to denote the CDF value F_I or F_{II} as p and $v(F) = G_{X_{\gamma}}(p)$. With these notations, Eq. 4 becomes

$$G_{X_{\gamma}}(p) = \mu + \sigma (-\ln p)^{-1/\gamma}$$
 $0 (5)$

The probability distribution of the largest value depends upon the form of the underlying (or initial) distribution, i.e., the distribution of the parent population of wind speeds from which the largest values have been extracted. The underlying distribution is of the exponential type if its CDF converges toward unity with increasing value of the variate as fast as, or faster than, the CDF of the exponential distribution; otherwise, it is said to be of the Cauchy type. Under the assumption of statistical independence, it can be shown that, asymptotically, i.e., for increasingly larger sample sizes, the largest sample value from an exponential and from a Cauchy type distributions have type I and type II distributions, respectively. Since there is empirical evidence to the effect that its parent population (say, the largest weekly wind speed) appears to follow a Rayleigh distribution, which is of the exponential type, it has been argued that the largest yearly wind speed should follow a type I distribution [6]. According to Thom [16, 17, 18, 19], however, the largest yearly wind speed follows type II distributions with location parameter $\mu \equiv 0$ and with tail length parameters $\gamma \simeq 9.0$ and $\gamma \simeq 4.5$ for winds associated with extratropical storms and with tropical storms, respectively. At locations at which both types of storms occur, Thom assumes that a mixed distribution holds,

$$F(v) = p_E F_{II}^E(v) + p_T F_{II}^T(v)$$
 (6)

in which $F_{II}^{E}(v)$, $F_{II}^{T}(v)$ are two type II CDF's for extratropical and for tropical storm winds, p_{E} = probability of largest yearly wind being produced by an extratropical storm (or the proportion of extratropical storm extreme winds) and $p_{T} = 1 - p_{F}$.

3. DESCRIPTION OF PROCEDURE FOR ESTIMATING CDF, ITS PARAMETERS AND THE $\rm \overline{N-}YEAR$ WINDS

The purpose of this section is to describe the computer technique which was utilized to estimate the CDF, the values of its parameters and the corresponding extreme wind speeds (i.e. wind speeds with given probabilities of being exceeded in any one year). The input to this procedure is the observed set of annual wind speeds from a given station. Based on any given set of observed annual wind speeds, the principal output from this procedure is the estimated wind speeds $v_{\overline{N}}$ for various mean recurrence intervals. In this study $\overline{N} = 50$, 100, 500 and 1000 years were used.

The procedure consists of 3 distinct stages. In the first stage the value of γ (Eqs. 2 and 4) is determined which yields the closest fit to the observed data set (recall that $\gamma = \infty$ corresponds to an extreme value type I distribution). The "closest fit" criterion used in this stage is the so-called maximum probability plot correlation coefficient criterion [10]. The probability plot correlation coefficient is defined as

$$r_{D} = Corr(X,M) = \frac{\sum(X_{i} - \bar{X}) [M_{i}(D) - \overline{M(D)}]}{[\sum(X_{i} - \bar{X})^{2} \sum(M_{i}(D) - \overline{M(D)})^{2}]^{1/2}}$$
(7)

in which $\bar{X} = \Sigma X_i/n$, $\overline{M(D)} = \Sigma M_i(D)/n$, n = sample size, D = probability distribution tested. The quantities X_i are obtained by a rearrangement of the data set: X_1 is the smallest, X_2 the second smallest, X_i the i-th smallest of the observations in the set. The quantities $M_i(D)$ are obtained as follows. Given a random variable X with probability distribution D and given an integer sample size n, it is possible from probabilistic considerations, to derive mathematically the distributions of the smallest, second smallest, and in general the i-th smallest values of X in a sample of size n. There are various quantities that can be utilized to measure the location of the distribution of the i-th smallest value X_i (e.g., the mean, the median or the mode). As shown in Ref. 10, it is convenient to use the median as a measure of location in Eq. 7 - these medians of the distribution of the i-th smallest value being denoted by $M_i(D)$.

If the data set was generated by the distribution D, then aside from a location and scale factor, X_i will be approximately equal to $M_i(D)$ for all i, and so the plot of X_i versus $M_i(D)$ (referred to as probability plot) will be approximately linear. This linearity will, in turn, result in a near unity value in r_D . Thus, the better the fit of the distribution D to the data, the closer r_D will be to unity [10,22].

The procedure just described makes use of 43 extreme value type TI distributions defined by various values of γ from 1 to 25 in steps of 1, from 25 to 50 in steps of 5, from 50 to 100 in steps of 10, from 100 to 250 in steps of 50, $\gamma = 350$, $\gamma = 500$, $\gamma = 750$, $\gamma =$ 1000 and $\gamma = \infty$. For any given data set, 43 probability plot correlation coefficients are computed corresponding to these distributions, and the distribution with the maximum probability plot correlation coefficient is chosen as the one which best fits the data. The final result from this first stage is the value γ_{opt} of the γ corresponding to the estimated best fitting distributed.

The second stage in the procedure consists of estimating the location and scale parameters μ and σ , respectively, in Eqs. 1, 2, 3 and 4 for the observed data set and for the determined optimal value γ_{opt} as determined in stage 1. Estimates of the location and scale follow directly from the basic probability plot approach. If a least squares line is fit to

the probability plot corresponding to γ_{opt} , then the computed intercept and slope of the fitted line serve as estimates for the unknown location and scale parameters μ and σ . In terms of the X, and M_i(D), these estimated location and scale values $\hat{\mu}$ and $\hat{\sigma}$ are as follows:

$$\hat{\sigma} = \frac{\Sigma(X_{i} - \overline{X}) (M_{i}(D) - \overline{M(D)})}{\Sigma[M_{i}(D) - \overline{M(D)}]^{2}}$$
(9)

$$\hat{\mu} = \overline{X}_{i} - \hat{\sigma} \overline{M(D)}$$
(10)

The third and final stage in the procedure determines the predicted wind speed $v_{\overline{N}}$ for various intervals \overline{N} of interest (say, \overline{N} = 50, 100, 500, and 1000 years). The estimate for $v_{\overline{N}}$ is given by

$$\hat{\nabla}_{\overline{N}} = \hat{\mu} + \hat{\sigma} G_{X} (1 - 1/\overline{N})$$
(11)

where γ_{opt} is the optimal value of γ (as determined in stage 1), μ and σ are the estimates of the location and scale parameters μ and σ in Eqs. 1, 2, 3, and 4 (as determined in stage 2), and G_{X} (p) is the percent point function of the best fitting extreme value distribu- γ_{opt}

tion. If $\gamma_{opt} \neq \infty$ (that is, if a member of the extreme value type II family provides the best fit), then

$$G_{X_{\gamma_{opt}}}(p) = (-\ln p)^{-1/\gamma}$$
(12a)

If $\gamma_{opt} = \infty$ (that is, if the extreme value type 1 distribution provides the best fit), then

$$G_{X_{\gamma_{opt}}}(p) = -ln(-ln p)$$
(12b)

In effect, the procedure described in this section is an automated equivalent of probability paper plotting in which 43 types of probability paper, corresponding to 43 extreme value distributions, would be used and in which fitting would be carried out on the basis of the least squares method, rather than by eye.

It is noted that the procedure described is applicable without modification to the extreme value analysis of any physical phenomenon, i.e., it is in no way restricted to the analysis of extreme winds.

A listing of the computer program, and sample inputs and outputs, are given in an Appendix.

The data analyzed were obtained from Ref. 5 and are listed in table 1. The main results of the analysis are Jisted in table 2. The quantity γ_{opt} is the value of γ (see Eq. 2) for which the best distributional fit of the largest values is obtained. The quantities $v_{\overline{N}}$ are extreme wind speeds corresponding to a \overline{N} -year mean recurrence interval ($\overline{N} = 50$, 100 and 1000) and were calculated using Eq. 2 with $\gamma = \gamma_{opt}$ or, if $\gamma_{opt} = \infty$, Eq. 1. The quantities \overline{v} , s_v , v_{max} are the mean, the standard deviation and the maximum value of the largest yearly winds, respectively. The quantities in parentheses are the values $v_{\overline{N}}^{\infty}$ of the extreme winds corresponding to a \overline{N} -year recurrence interval calculated assuming $\gamma = \infty$. These quantities were omitted in those cases in which $\gamma_{opt} = \infty$ or γ_{opt} was sufficiently large for the difference $v_{\overline{N}} - v_{\overline{N}}^{\infty}$ to be insignificant.

Optimum Probabilistic Models

The results of the analysis may be conveniently divided into four categories, characterized by the following ranges of values γ_{opt} : (1) $\gamma_{opt} \geq 40$; (2) $10 \leq \gamma_{opt} \leq 39$; (3) $5 \leq \gamma_{opt} \leq 9$; (4) $2 \leq \gamma_{opt} \leq 4$. Of the 21 37-year series of data considered, about 45% belong to the first category, 25% to the second, 10% to the third, and 20% to the fourth. Similar percentages were obtained from the analysis of the 30-, 25- and 20-year sets of data listed in table 2. It is seen that the assumption of a unique generally valid distribution, i.e., one characterized by a single value of γ_{opt} -- whether it be a type I distribution, or a type II distribution with $\mu = 0$ and a specified value of γ as proposed in Ref. 17, 18 and 19 -- is not confirmed by the results presented herein.

The results obtained also showed that a mixed probability distribution (Eq. 6) cannot improve the empirical fit of the data in any significant way. In addition, it is noted that during a normal period of record (20-40 years) the frequency at any one station of winds associated with hurricanes is small (of the order of one in 20 years or even less) and therefore the sample size is insufficient for carrying out a meaningful statistical analysis. That this is the case can be seen in table 1, which shows that in the period 1912-1948, 5-minute winds in excess of 70 mph were recorded only twice at both the Key West, Florida and the Corpus Christi, Texas weather stations.

Length of Record and Reliability of Predictions

According to Shellard [16], for extreme wind predictions to be acceptable the length of the record used should be of at least 15, or preferably 20 years. Thom proposed isotach maps for the United States using records of 15- to 21-year average length [17]. Implied in Shellard's statement and in Thom's work is the assumption that, at any given station, the mean value, the standard deviation and the sample distribution of the largest annual winds

for a 20-year record are essentially the same as for any longer record at the station, i.e., that a 20-year record is a representative segment of a statistically stationary time series.

The extent to which this assumption is warranted was checked in each of the 21 cases included in table 2. The 37-year records were broken up into 30-, 25- and 20-year overlapping records which were separately analyzed. The results of the analysis are included in table 2 and are summarized in table 3, which shows the average values of the quantities $(v_{\overline{N}}^{\max} - v_{\overline{N}}^{\min})/v_{\overline{N}}^{\min}$ for the four ranges of γ_{opt} : $\gamma_{opt} \geq 40$; $10 \leq \gamma_{opt} \leq 39$; $5 \leq \gamma_{opt} \leq 9$; $2 \leq \gamma_{opt} \leq 4$, where $v_{\overline{N}}^{\max}$, $v_{\overline{N}}^{\min}$ are the maximum and the minimum N-year speed predicted on the basis of the 20-year records at one station and γ_{opt} is the tail length parameter of the distribution estimated from the 37 years of data at that station.

TABLE 3 - Average Values of $(v_{\overline{N}}^{\max} - v_{\overline{N}}^{\min})/v_{\overline{N}}^{\min}$ for

Various Ranges of γ_{opt} and Various Mean

Recurrence Intervals

N (years)	50	100	1000
$\gamma_{opt} \ge 40$.13	.17	.39
$10 \leq \gamma_{opt} \leq 39$.23	.29	.55
$5 \leq \gamma_{opt} \leq 9$.46	.53	2.40
$2 \leq \gamma_{opt} \leq 4$.54	.96	7.20

The lower bounds for the error in the estimation of the \overline{N} -year winds may be calculated in the case of a type I distribution on the basis of a mathematical statistical result, viz., the Cramer-Rao relation, which states that for the EVI distribution [see Ref. 11, p. 282]

$$\operatorname{var}(\mu) \ge \frac{1.10867\sigma^2}{n}$$
 (13)

$$\operatorname{var}(\hat{\sigma}) \geq \frac{0.60793\sigma^2}{n}$$
(14)

where var(μ), var(σ) are the variances of the estimated values of μ , σ ; σ is the actual value of the scale parameter and n is the sample size. Using Eqs. 13, 14, the quantity $3\text{SD}(\text{V}_{100})$, where $\text{SD}(\text{V}_{100})$ is the standard deviation of the error in the estimation of the 100-year wind, was calculated for n = 20 years and n = 50 years and for typical values of σ obtained from the analysis of the data. The results of the calculations are shown in Fig. 1 and show that even for type I distributions, the estimation errors are not negligible. The results presented in tables 2 and 3 suggest that as γ_{opt} decreases such errors become intolerably large and that extreme caution is thus in order in the interpretation and use in



structural design of probabilistically computed extreme winds. It is therefore the belief of the writers that further research is needed into the question of the validity of current probabilistic approaches to the definition of design wind speeds.

5. CONCLUSIONS

From the analysis of the sets of data reported herein, the following results were obtained:

- 1. No single distribution was universally applicable to all the data sets. The type I distribution was applicable in about 45% of the cases. In about 25% of the cases, the tail length parameter was $10 \le \gamma_{opt} \le 39$, in about 10% of the cases 5 $\le \gamma_{opt} \le 9$ and in about 20% of the cases, $2 \le \gamma_{opt} \le 4$.
- 2. No necessary correlation was noted between type of wind climate and the magnitude of the tail length parameter, i.e., both type I distributions and type II distributions with small tail length parameters were found to fit series of data generated by tropical storms, as well as data generated by extratropical storms.
- 3. Predictions of extreme wind speeds based on records of 20-year length were found to vary, on the average, by about 15%-100% for 50-years or 100-year recurrence intervals and 40% to a few hundred percent for a 1000-year recurrence interval between different 20-year sets of data taken at the same station.

These results suggest that while in principle, probabilistic methods provide the most rational approach to specifying design wind speeds, it is of the utmost importance that the errors inherent in this approach be carefully taken into account. In particular, predictions of wind speeds corresponding to 1000-year recurrence intervals appear in most cases to be far too unreliable to be used with any reasonable degree of confidence for purposes of structural design. Therefore, unless very carefully substantiated the use for such purposes of 1000-year winds in conjunction with reduced values of the safety factor, which has been suggested recently, would, in the writers' opinion, be unwise. In the light of the results obtained, it also appears that the reliability of predictions based on records of 20-year length or so may in certain cases be quite unsatisfactory. This question is therefore believed to merit further investigation and is currently under study at the National Bureau of Standards.

- "American National Standard Building Requirements for Minimum Design Loads in Buildings and Other Structures A58.1", American National Standards Institute, New York, N.Y., 1972.
- Benjamin, J.R., and Cornell, C.A., "Probability, Statistics, and Decision for Civil Engineers", McGraw-Hill Book Company, New York, 1970.
- 3. <u>Canadian Structural Design Manual</u>, Supplement No. 4 to the National Building Code of Canada, National Research Council of Canada, 1970.
- Caspar, W., "Maximale Windgeschwindigkeinten in der Bundesrepublik Deutchland", <u>Bautech-nik</u>, Vol. 47, No. 10, October 1970, pp. 335-340.
- 5. Court, A., "Wind Extremes as Design Factors", <u>Journal of the Franklin Institute</u>, Vol. 256, July 1953, pp. 39-55.
- Davenport, A.G., "The Dependence of Wind Loads upon Meteorological Parameters", <u>Proceedings</u>, Wind Effects on Buildings and Structures, Ottawa, Vol. 1, University of Toronto Press, Toronto, Canada, 1978.
- 7. Duchêne-Marullaz, P., "Etude des vitesses maximales du vent", <u>Cahiers du Centre</u> Scientifique et Technique du Bâtiment, Cahier 1118, No. 131, July-Aug, 1972.
- Durst, C.S., "Wind Speeds over Short Periods of Time", <u>Meteorological Magazine</u>, vol. 89, 1960.
- 9. Filliben, J.J., "Simple and Robust Linear Estimation of the Location Parameter of a Symmetric Distribution", Ph.D. Dissertation, Princeton University, Princeton, N.J., 1969.
- Filliben, J.J., "Techniques for Tail Length Analysis", <u>Proceedings</u>, 18th Conference on the Design of Experiments in Army Research, Development and Testing, Aberdeen, Md., October 1972.
- 11. Johnson, N.L., and Kotz, S., <u>Continuous Univariate Distributions 1</u>, John Wiley and Sons, New York, 1970.
- 12. Lieblein, J., "Method of Analyzing Extreme Value Data", <u>Technical Note 3053</u>, National Advisory Committee for Aeronautics, Washington, D.C.
- 13. Local Climatological Data Annual and Monthly Summaries, U.S. Department of Commerce, National Environmental Data Service, National Climatic Center, Ashville, N.C.
- 14. Sachs, P., Wind Forces in Engineering, Pergamon Press, Oxford, 1972.
- Shellard, H.C., "Extreme Wind Speeds over Great Britain and Northern Ireland", Meteorological Magazine, vol. 37, 1958.
- Shellard, H.C., "The Estimation of Design Wind Speeds", Proceedings, Wind Effects on Buildings and Structures, Vol. 1, Her Majesty's Stationery Office, London, England, 1965.
- 17. Thom, H.C.S., "New Distributions of Extreme Winds in the United States", Journal of <u>The Structural Division</u>, ASCE, Vol. 94, No. ST7, Proc. Paper 6038, July 1968, pp. 1787-1801.
- Thom, H.C.S., "Engineering Climatology if Design Winds, with Special Reference to the Chicago Area", <u>Proceedings</u>, Symposium on Wind Effects on High-Rise Buildings, Northwestern University, Evanston, IL., March 1970.

- 19. Thom, H.C.S., "Distributions of Extreme Winds Over Oceans", Journal of the Waterways, <u>Harbors and Coastal Engineering Division</u>, ASCE, Vol. 99, No. WW1, Proc. Paper 9556, Feb., 1973, pp. 1-17.
- 20. U.S. Weather Bureau, Manual of Surface Observations, Washington, D.C., 1951, p. 92.
- Vellozzi, J., and Cohen, E., "Dynamic Response of Tall Flexible Structures to Wind Loading", <u>Proceedings</u>, Technical Meeting Concerning Wind Loads on Buildings and Structures, Building Science Series 30, National Bureau of Standards, SD Catalog No. C 13.29/2:30, U.S. Government Printing Office, Washington, D.C., 1970.
- 22. Filliben, J.J., "The Probability Plot Correlation Coefficient Test for Normality", Technometrics, Vol. 17, No. 1, Feb., 1975, pp. 111-117.

TABLE 1 - Strongest Maximum (5-min.) Wind Speed (mph) During Each Year, 1912-1948, at 21 places in the United States

Alpena, Mich. 38 43 1 9 1 8 1 7 4 1 8 1 8 1 8 1 8 1 8 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 <th1< th=""> 1 1</th1<>	Cairo, Ill.	1912 13 14 15 16 17 18 19 35 38 33 35 40 38 45 46	20 21 22 23 24 25 26 27 28 29 42 47 38 38 47 43 41 47 37 45	30 31 32 33 34 35 36 37 38 39 37 30 35 40 35 38 40 51 34 39	40 41 42 43 44 45 46 47 48 43 34 42 37 34 40 43 43 45
Tatoosh Island, Vash. 66 51 65 61 68 54 57 0 71 84 59 69 6 61 76 71 84 59 69 6 61 66 62 65 63 71 59 59 69 68 61 76 71 74 64 22 65 69 71 Mulliston, N.D. 86 50 40 33 84 13 80 38 44 15 33 74 73 6 37 34 44 73 38 37 34 54 35 73 37 44 45 33 74 64 39 43 83 38 43 39 37 84 43 50 37 84 43 50 37 84 43 50 37 84 43 50 37 84 43 50 37 84 43 50 37 84 43 50 37 84 43 50 37 84 43 50 37 84 43 50 37 84 43 50 37 84 43 50 37 84 43 50 37 84 43 50 37 84 43 50 37 84 43 50 37 84 43 50 37 84 43 50 37 84 43 50 37 84 43 50 37 84 43 50 37 84 43 50 37 84 43 50 37 84 43 50 37 84 43 50 37 84 43 50 37 84 43 50 37 84 43 50 37 84 43 50 37 84 43 50 37 84 43 50 37 84 43 50 37 84 43 50 37 84 43 50 37 84 43 50 37 84 43 50 37 84 43 50 37 84 43 50 37 84 44 50 32 24 43 44 40 24 24 34 45 24 85 26 26 26 26 26 26 27 3 2 44 50 44 74 30 24 24 3 44 40 24 24 34 40 24 24 34 40 24 24 34 40 24 24 34 40 24 24 34 40 24 24 34 40 24 24 34 40 24 24 34 40 24 24 34 40 24 24 34 40 24 24 34 40 24 24 34 40 24 24 34 40 24 24 34 40 24 24 34 40 24 24 34 40 24 24 34 40 24 24 34 40 24 24 34 40 24 24 34 40 24 24 34 40 24 24 34 40 24 24 34 40 24 24 34 40 24 24 34 40 24 24 34 40 24 24 34 40 24 24 34 40 24 24 34 40 24 24 34 40 24 24 34 40 24 24 34 40 24 24 34 40 24 24 34 40 24 24 34 40 24 24 34 40 24 24 34 40 24 24 34 40 24 24 34 40 24 24 34 40 24 24 34 40 24 24 34 40 24 24 34 40 24 24 34 40 24 24 24 40 24 24 24 40 24 24 24 40 24 24 24 24 24 24 24 24 24 24 24 24 24	Alpena, Mich.	38 43 41 39 41 38 43 47	37 46 43 40 44 38 43 41 38 45	42 42 47 41 37 43 38 43 38 42	47 37 44 38 47 42 45 50 42
Milliston, N.D. 38 90 40 35 84 13 50 38 44 150 35 34 35 35 35 35 35 35 35 35 35 35 35 35 35 35 35 35 35 35 35 35 35 35 35 35 35 35 35 35 35 35 35 35 35 35 35 35 35 35 35 35 35 35 35 35 35 35 35 35 35 35 35 35 35 35 35 35 35 35 35 35 35 35 35 35 35 35 35 35 35 35 35 35 35 35 35 35 35 35 35 35 35 35 35 35 35 35 35 35	Tatoosh Island, Wash.	68 51 65 61 68 54 57 70	71 84 59 69 62 60 61 68 68 56	66 62 65 63 71 59 59 69 68 61	78 71 74 64 62 66 59 61 66
Rtchmond, Va. 46 48 1 37 47 36 37 38 1 37 28 45 37 86 49 45 36 37 84 37 86 37 86 45 37 86 45 37 86 47 45 46 47 45 46 47 45 46 47 45 46 47 45 46 47 45 46 47 45 46 47 45 46 47 45 46 47 45 46 47 46 47 46 47 45 46 47 45 46 47 45 46 47 45 46 46 47 46 46 47 46 46 47 46 47 46 47 46 47 47 46 47 47 46 47 47 46 47 47 46	Williston, N.D.	38 50 40 35 38 41 38 50	38 38 44 41 50 35 34 35 42 36	35 37 40 46 39 40 37 46 37 39	33 44 34 34 35 42 46 41 44
Burlington, Vt. 40 47 40 41 50 44 7 40 41 50 44 7 40 41 50 44 7 40 41 50 41 50 41 41 40 42 43 44 43 44 43 84 14 40 42 43 44 43 44 43 44 44 38 44 44 24 44 45 38 50 44 45 44 45 30 33 42 35 30 30 33 44 45 44 44 44 45 45 45 45 45 45 45 45 45 45 45 45 45 45 45 45 45 45 45 45 45 45 45 45 45 45 45 45 45 45 45 45 45 45	Richmond, Va.	46 48 41 43 37 47 47 36	34 32 37 36 37 38 41 37 42 38	45 37 38 46 39 34 38 34 38 33	32 35 44 46 40 34 32 41 38
Eastport, Me. 53 14 54 96 54 55 48 39 57 46 51 35 54 46 47 46 47 46 47 46 47 46 47 46 47 46 47 46 47 46 47 46 47 46 47 46 47 46 47 46 47 46 47 46 47 46 47 46 47 46 47 46 47 46 47 46 47 46 47 46 47 46 47 46 47 46 47 46 47 46 47 46 47 46 47 46 47 46 47 46 47 46 47 46 47 46 47 46 47 46 47 47 46 47 47 46 47 47 46 47	Burlington, Vt.	40 47 43 40 41 50 44 47	49 49 44 53 40 46 47 43 50 43	43 40 42 41 42 43 43 44 47 38	43 38 41 41 40 42 42 43 46
Canton, N.Y. S1 53 50 4.4 6.7 4.9 4.7 4.9 4.7 4.9 4.7 4.9 4.7 4.9 4.7 4.9 4.7 4.9 4.7 4.9 4.7 4.9 4.7 4.7 4.9 4.7 4.9 4.7 4.7 4.7 4.7 4.7 4.7 4.7 4.7 4.7 4.7 4.7 4.7 4.7 4.7 4.7 4.7 4.7 4.7 4.7 4.7 4.7 4.7 4.7 4.7 4.7 4.7 4.7 4.7 4.7 4.7 4.7 4.7 4.7 4.7 4.7 4.7 4.7 4.7 4.7 4.7 4.7 4.7 4.7 4.7 4.7 4.7 4.7 4.7 4.7 4.7 4.7 4.7 4.7 4.7 4.7 4.7 4.7 4.7 4.7 4.7 4.7 4.7 4.7 4.7 4.7 4.7 4.7 4.7 4.7 4.7	Eastport, Me.	53 41 54 49 60 54 52 56	48 39 57 46 46 51 38 50 45 50	48 52 42 46 51 48 46 46 45 47	46 49 46 42 51 55 44 52 48
Yuma, Ariz. 32 32 32 32 32 32 32 32 32 32 32 32 32 32 32 32 32 32 32 32 32 32 32 32 32 32 32 32 32 32 32 32 32 32 32 32 32 32 32 32 32 32 32 32 32 32 32 32 32 32 32 32 32 32 32 32 32 32 32 32 32 32 32 32 32 32 32 32 32 32 32 32 32 32 33 33 32 32 32 32 32 32 32 32 32 32 32 32 32 32 33 33 33 33 33 33 33 33 33 33	Canton, N.Y.	51 53 50 44 46 47 49 47	46 54 43 49 43 62 39 39 47 48	36 38 39 39 38 39 44 35 38 39	35 40 38 42 32 34 39 34 35
Duluth, Minn. 54 49 9 45 51 51 51 51 51 51 51 51 51 51 51 51 51 51 51 51 51 51 51 51 51 51 51 51 51 51 51 51 51 51 51 51 51 51 51 51 51 51 51 51 51 51 51 51 51 51 51 51 51 51 51 51 51 51 51 51 51 51 51 51 51 51 51 51 51 51 51 51 51 51 51 51 51 51 51 51 51 51 51 51 51 51 51 51 51 51 51 51 51 51 51 51 51 51 51 51	Yuma, Ariz.	32 32 29 32 32 37 32 34	30 33 33 34 29 35 30 30 30 38	29 34 34 35 30 35 32 29 34 34	29 29 31 29 30 33 37 34 41
valentine, Neb. 38 44 44 39 36 39 44 41 46 41 42 41 46 41 41 46 41 41 41 46 41 41 41 41 46 41 41 41 41 41 41 41 41 41 41 41 41 41 41 41 41 41 41 41 41 41 41 41 41 41 41 41 41 41 41 41 41 41 41 41 41 41 41 41 41 41 41 41 41 41 41 41 41 41 41 41 41 41 41 41 41 41 41 41 41 41 41 41 41 41 41 41 41 41 41 41 41 41 41 41	Duluth, Minn.	54 49 49 46 50 45 51 45	49 54 53 54 50 45 54 54 57 52	47 39 49 51 59 51 49 53 54 50	52 68 55 50 54 49 61 49 49
Charleston, S.C. 52 49 46 50 37 38 41 32 35 43 36 40 55 40 51 51 41 66 31 43 66 31 43 45 36 40 55 40 51 51 41 40 31 41 41 41 41 41 41 41 41 41 41 41 41 41 41 41 41 41 41 41 41 41 41 41 41 41 41 41 41 41 41 41 41 41 41 41 41 41 41 41 41 41 41 41 41 41 41 41 41 41 41 41 41 41 41 41 41 41 41 41 41 41 41 41 41 41 41 41	Valentine, Neb.	38 44 44 43 39 36 39 44	49 43 41 46 41 42 41 44 36 45	49 37 42 56 35 39 34 43 41 41	35 37 38 42 38 36 46 39 38
Eureka, Calif. 35 35 46 46 35 36 46 35 36 37 36 36 31 31 31 31 31 31 31 31 31 31 31 31 31 31 31 31 31 31 31 31 31 31 31 31 31 31 31 31 31 31 31 31 31 31 31 31 31 31 31 31 31 31 31 31 31 31 31 31 31 31 31 31 31 31 31 31 31 31 31 31 31 31 31 31 31 31 31 31 31 31 31 31 31 31 31 31 31 31 31 31 31 31 31 31 31 31 31 31	Charleston, S.C.	52 49 46 43 50 37 38 41	32 35 43 35 38 38 43 40 55 36	40 35 40 51 53 47 40 34 43 47	66 33 44 33 60 57 43 45 34
Oklahoma City, Okla. 56 41 45 7 48 43 7 40 38 7 40 38 40 38 38 38 38 38 38 38 38 38 38 38 38 38 38 38 38 38 39 32 31 31 31 31 31 31 31 31 31 31 31 31 31 31 31 31 31 31 31 31 31 31 31 31 31 31 31 31 31 31 31 31 31 31 31 31 31 31 31 31 31 31 31 31 31 31 31 31 31 31 31 31 31 31 31 31 31 31 31 31 31 31 31 31 31 31 31 31	Eureka, Calif.	35 35 46 46 35 35 40 35	32 38 39 37 34 38 36 30 34 31	31 34 37 30 31 30 34 38 35 35	34 35 37 41 37 35 38 34 35
Baker, Ore. 27 30 39 28 28 30 31 27 25 30 40 37 25 30 37 25 30 37 29 26 29 27 28 35 26 32 29 28 35 26 32 29 28 30 38 28 27 28 35 26 32 33 33 33 33 33 33 33 33 33 33 33 33 33 33 33 33 33 33 33 33 33 33 33 33 33 33 33 33 33 33 33 33 33 33 33 33 33 33 33 33 33 33 33 33 33 33 33 33 33 33 33 33 33 33 33 33 33 33 33	Oklahoma City, Okla.	56 41 44 57 48 43 57 46	43 37 40 38 46 35 36 38 34 38	38 29 32 32 34 38 30 34 32 33	33 31 33 26 34 28 31 37 33
Sheridan, Wyo. 44 38 41 43 40 38 23 23 31 32 33 31 32 31 32 33 32 33 33 33 33 33 33 33 33 33 33 33 33 33 33 33 33 33 33 33 33 33 33 33 33 33 33 33 33 33 33 33 33 33 33 33 33 33 33 33 33 33 33 33 33 33 33 33 33 33 33 33 33 33 33 33 33 33 33 33 33 33 33 33 33 33 33 33 33 33 33 33 33 33 33 33 33 33 33 33 33 33 33 33	Baker, Ore.	27 30 39 28 28 30 38 30	28 28 30 27 25 30 40 37 29 26	29 27 28 35 26 32 29 28 30 38	28 27 34 28 25 30 28 30 33
Block Island, R.I 60 54 65 54 54 56 56 56 56 56 56 56 56 56 56 56 56 56 56 56 56 56 56 56 56 56 56 56 56 56 56 57 56 56 56 57 56 56 57 70 82 56 57 70 82 56 57 70 82 56 57 70 82 53 52 54 51 59 60 57 62 58 57 70 82 63 67 70 31 32 32 31 32 31 32 31 32 31 32 31 32 31 32 33 33 33 34 32 33 33 33 33 33 33 33 33 33 33 33 33	Sheridan, Wyo.	44 38 41 43 40 38 32 32	34 46 37 37 37 31 32 33 33 34	33 31 32 37 33 32 32 33 32 33	38 53 49 51 52 59 57 66 56
Winnemucca, Nev. 36 32 36 32 36 43 38 40 38 31 32 34 32 40 30 35 36 35 36 35 45 33 42 39 40 North Head, Wash 69 65 70 63 73 65 66 66 70 70 87 68 67 66 66 79 70 87 68 67 66 66 79 70 87 68 67 66 67 70 87 68 67 66 67 70 87 68 67 67 66 67 70 87 68 67 66 67 70 87 68 67 67 68 67 70 87 68 67 68 67 70 87 68 67 70 88 67 56 67 68 67	Block Island, R.I	60 54 65 66 56 59 54 54	56 56 56 47 60 56 56 59 54 52	54 51 59 60 57 62 58 47 82 56	50 52 57 70 82 63 56 67 57
North Head, Wash 69 65 70 63 73 65 66 64 70 73 65 66 67 70 87 67 70 84 67 75 64 66 66 70 70 87 67 70 84 67 57 65 64 66 63 66 67 70 87 68 71 65 64 67 66 63 70 84 67 65 64 66 69 70 87 68 73 72 67 70 84 67 65 71 65 64 66 69 70 87 68 73 72 67 70 84 67 65 71 65 64 64 63 66 67 70 87 68 73 72 67 70 84 67 83 33 33 33 33 33	Winnemucca, Nev.	36 32 36 32 38 41 37 36	43 38 40 38 38 31 32 37 34 32	34 34 32 40 30 35 36 32 35 36	35 58 52 45 33 42 42 39 40
Key West, Fla. 32 40 39 44 40 31 40 51 41 49 44 37 61 34 46 40 32 46 33 33 42 40 35 47 8 43 33 33 42 40 35 47 8 43 33 33 42 40 35 47 49 43 33 33 42 40 35 47 49 43 33 33 42 40 35 47 49 43 33 33 42 40 35 47 49 43 33 33 42 40 35 47 49 47 39 49 42 30 38 43 37 61 54 45 56 43 31 35 47 49 47 39 49 42 30 38 43 37 61 54 45 56 43 31 35 47 49 47 39 49 42	North Head, Wash	69 65 70 63 73 65 68 68	57 95 60 68 64 70 73 65 66 63	66 66 79 70 87 68 73 72 67 70	84 67 65 77 65 64 67 66 69
Corpus Christi, Tex. 47 41 41 40 90 38 50 95 41 51 43 39 44 38 37 39 37 36 43 35 47 49 47 39 49 42 50 38 43 37 61 54 45 56 43 51 3	Key West, Fla.	32 40 39 44 41 40 40 84	40 38 41 40 51 41 49 44 37 61	34 46 40 43 32 46 38 43 33 33	42 40 35 40 56 40 35 54 72
	Corpus Christi, Tex.	47 41 41 40 90 38 50 95	41 51 43 39 44 38 37 39 37 36	43 35 47 49 47 39 49 42 50 38	43 37 61 54 45 56 43 51 3

TABLE 2 - Results of Analysis

	No. of	Years of							
Station	Years	Record	Yopt	^v 50	v ₁₀₀	v1000	v	s _v	v max
			•		(1	miles per h	our)		
	37	1912-48	œ	53	56	65	39.9	4.8	51
	30	1912-41	∞	53	56	65	39.9	4.7	51
	50	1919-48	00	53	56	64	40.6	4.6	51
Cairo	25	1912-36	00	52	54	62	39.8	4.3	47
(111.)	25	1924-48	00	53	56	65	40.2	4.6	51
(111.)	20	1912-31	00	53	55	64	40.2	45	47
	20	1917-36	00	52	55	62	40.8	4.2	47
		1023-42	00	54	56	66	40.0	4.8	51
		1929-48	00	52	55	64	39.6	4.6	51
	37	1912-48	00	51	53	59	41.9	3.4	50
	30	1912-41	00	50	52	57	41.4	3.1	47
		1919-48	00	52	54	61	42.2	3.6	50
Alpena	25	1912-36	00	50	51	57	41.4	3.0	47
(Mich.)		1924-48	00	52	54	61	42.2	3.5	-50
	20	1912-31	00	50	51	57	41.5	2.9	47
		1917-36	00	51	52	59	41.7	3.2	47
		1923-42	00	50	52	58	41.5	3.1	47
		1929-48	8	53	55	62	42.5	3.7	50
	37	1912-48	00	83	86	99	64.8	6.6	84
	30	1912-41	00	84	88	101	64.8	7.0	84
		1919-48	18	84	88	104	65.3	6.2	84
Tatoosh	25	1912-36	00	83	87	99	63.9	6.9	84
Island	25	1924-48	00	79	83	93	64.8	5.2	78
(Wash.)	20	1912-31	00	84	89	103	64.0	7.4	84
(20	1917-36	12	86(84)	91 (88)	111(101)	64.2	7.0	84
		1923-42	~ _	81	85	96	65.5	5.7	78
		1929-48	00	81	84	95	65.0	5.6	78
	37	1912-48	00	53	55	64	39.8	4.8	50
	30	1912-41	00	53	56	65	39.9	4.8	50
		1919-48	00	53	56	65	39.7	4.8	50
Williston	25	1912-36	18	54	57	69	39.9	4.8	50
(N.D.)		1924-48	00	52	55	64	39.2	4.7	50
	20	1912-31	12	55(54)	59(57)	73(66)	39.8	5.1	50
		1917-36	13	54(53)	58 (56)	61(65)	39.8	4.7	50
		1923-42	24	53 (52)	56 (55)	67(64)	39.0	4.7	50
		1929-48	8	51	54	62	39.3	4.3	46
	37	1912-48	8	52	54	63	39.9	4.7	48
	30	1912-41	∞	52	54	63	38.9	4.7	48
		1919-48	∞	49	51	58	37.7	4.0	46
Richmond	25	1912-36	8	52	55	63	39.8	4.6	48
(Virginia)		1924-48	00	50	52	60	38.3	4.1	46
	20	1912-31	00	53	56	65	40.0	4.7	48
		1917-36	00	51	54	62	39.0	4.4	47
		1923-42	00	49	51	59	38.1	3.9	46
		1929-48	00	51	53	62	38.1	4.5	46

	No. of	Years of							
Station	Years	Record	Yopt	^v 50	v100	^v 1000	v	s _v	vmax
					(1	miles per l	nour)		
	37	1912-48	8	53	55	62	47.3	3.5	53
	30	1912-41	~	54	56	63	44.1	3.7	53
		1919-48	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	53	55	62	44.7	3.5	53
Burlington	25	1912-36	8	54	57	63	44.5	3.6	53
(Vermont)		1924-48	80	50	52	57	42.8	2.8	50
	20	1912-31	8	56	58	65	45.1	3.8	53
		1917-36	8	55	57	64	45.1	3.6	53
		1923-42	8	54 (54)	58(56)	71(63)	43.5	3.7	53
		1929-48	8	48	49	53	42.2	2.2	47
	37	1912-48	œ	62	65	74	48.5	4.9	60
	30	1912-41	œ	62	65	77	48.5	5.1	60
		1919-48	8	60	62	71	47.7	4.5	57
Eastport	25	1912-36	8	64	.67	77	48.9	5.5	60
(Maine)		1924-48	œ	57	59	66	47.4	3.8	55
	20	1912-31	œ	65	69	79	49.5	5.8	60
		1917-36	8	62	65	74	48.2	5.0	57
		1923-42	8	55	57	63	46.9	3.3	52
		1929-48	8	57	59	66	47.7	3.4	55
	37	1912-48	8	61	64	77	42.5	6.6	62
	30	1912-41	8	62	65	77	43.9	6.4	62
		1919-48	5	63(59)	70(63)	101(75)	41.0	6.5	62
Canton	25	1912-36	8	62	66	78	45.2	6.2	62
(N.Y.)		1924-48	2	66(56)	81(59)	186(70)	39.7	6.0	62
	20	1912-31	80	64	67	79	46.6	6.1	62
		1917-36	7	65(62)	71(66)	95(78)	44.3	6.4	62
		1923-42	2	70(58)	87(62)	203(73)	41.3	6.3	62
		1929-48	13	49	52	62	38.1	3.7	48
	37	1912-48	80	40	42	48	32.5	2.9	41
	30	1912-41	8	39	41	45	32.2	2.5	38
		1919-48	60	41	43	48	32.5	3.1	41
Yuma	25	1912-36	8	39	41	45	32.4	2.5	38
(Ariz.)		1924-48	18	42	44	52	32.4	3.3	41
	20	1912-31	00	39	41	46	32.3	2.6	38
		1917-36	8	40	42	47	32.7	2.7	38
		1923-42	8	40	41	46	32.1	2.8	38
		1929-48	150	42	44	51	32.9	3.4	41
	37	1912-48	35	65	68	77	51.4	5.0	68
	30	1912-41	90	65	68	78	51.1	5.1	68
		1919-48	200	66	69	79	51.9	5.3	68
Duluth	25	1912-36	8	62	64	72	50.2	4.3	59
(Minn.)		1924-48	22	68	72	84	52.0	5.5	68
	20	1912-31	8	61	64	72	49.9	4.4	57
		1917-36	8	63	66	74	50.4	4.7	59
		1923-42	00	68	71	82	52.2	5.7	68
		1929-48	7	71(68)	76(71)	98(82)	52.1	5.9	68

.

	No. of	Years of							
Station	Years	Record	Yopt	v ₅₀	v 100	v1000	v	s v	v _{max}
			-		(1	miles per h	nour)		
	0 7	1010 /0	20	F /.	54		<i>(</i> 1 1		57
	37	1912-48	30	54	50	65	41.1	4.0	50
	30	1912-41	70	55	58	67	41.4	4.8	50
		1919-48	23	55	59	70	41.2	4.9	56
Valentine	25	1912-36	00	56	59	68	41.9	5.0	56
(Neb.)		1924-48	6	57 (54)	62(57)	82(67)	40.6	4.9	56
	20	1912-31	00	53	55	62	42.1	3.8	49
		1917-36	70	57	61	71	42.0	5.4	56
		1923-42	7	59(56)	64(59)	84(69)	41.1	5.3	56
		1929-48	4	61(56)	67(59)	101(69)	40.1	5.4	56
	37	1912-48	24	66	72	91	42.8	8.2	66
	30	1912-41	10	66(64)	72(68)	96(83)	42.3	7.8	66
		1919-48	9	69(66)	76(71)	104(88)	42.3	8.7	66
Charleston	25	1912-36	00	60	64	76	42.3	6.5	55
(S.C.)		1924-48	13	71(68)	77 (74)	102(91)	43.4	9.0	66
• •	20	1912-31	~	59	63	75	41.3	6.3	55
		1917-36	11	60(58)	65(62)	84(74)	40.9	6.3	55
		1923-42	4	73(66)	84(71)	137(87)	42.4	8.4	66
		1929-48	12	73(71)	81(76)	108(95)	43.5	6.9	66
								_	
	37	1912-48	23	46	48	55	35.6	3.7	46
	30	1912-41	11	47(46)	50(48)	61(56)	35.3	4.0	46
		1919 - 48	8	43	44	50	34.8	2.9	41
Eureka	25	1912-36	12	48(47)	51(50)	64(58)	35.3	4.3	46
(Calif.)		1924-48	œ	42	44	49	34.6	2.9	41
	20	1912-31	11	49(48)	53(51)	65(59)	30.1	4.3	46
		1917-36	œ	43	45	51	34.3	3.2	40
		1923-42	00	41	43	48	34.1	2.7	38
		1929-48	00	43	44	50	34.6	2.9	41
	37	1912-48	15	60(59)	65(63)	85(77)	37.7	7.7	57
	30	1912-41	19	62(60)	67 (65)	86 (80)	39.1	7.8	57
		1919-48	8	48	51	60	35.0	4.8	46
Oklahoma	25	1912-36	8	62	67	82	40.4	7.9	57
City		1924-48	00	45	47	55	33.8	4.1	46
(Oklahoma)	20	1912-31	~	64	68	83	42.2	7.7	57
		1917-36	6	60(56)	66(60)	94(73)	38.2	6.5	57
		1923-42	9	47 (45)	50(48)	62 (55)	34.7	3.9	46
		1929-48	8	42	44	50	32.8	3.3	38
	27	1012 /9	11	42(41)	45(42)	56(50)	20.1	6.0	10
	37	1912-40	11	42(41)	43(43)	50(50)	20.1	4.0	40
	20	1912-41	9	43(41)	40(44)	29(21)	20.2	4.2	40
Bakar	25	1012 20	/	42(40)	40(42)	59(49)	29.8	3.1	40
(Omener)	25	1912-30	8	43(42)	4/(44)	61(52)	30.2	4.2	40
(oregon)	20	1924-48	10	42(41)	46(43)	58(51)	30.0	4.0	40
	20	1912-31	6	45(42)	49(45)	67(53)	30.3	4.5	40
		1917-36	7	44 (42)	48(44)	63(52)	30.2	4.2	40
		1923-42	10	44(42)	47(45)	61(53)	30.3	4.3	40
		1979-48	1	40(39)	43(4)	56(4/)	29.5	3.3	38

	No. of	Years of							
Station	Years	Record	Yopt	v ₅₀	v100	^v 1000	v	s _v	v _{max}
					(1	niles per ho	our)		
	37	1912-48	7	69(65)	77(70)	111(87)	39.8	9.4	66
	30	1912-41	4	54(50)	61 (53)	92(63)	36.0	5.2	53
		1919-48	7	71(67)	80(73)	117 (91)	39.8	10.3	66
Sheridan	25	1912-36	12	49(48)	52(50)	64(58)	35.7	4.3	46
(Wyoming)		1924-48		74(69)	83(76)	119 (96)	40.4	11.0	66
	20	1912-31	200	49	52	61	36.3	4.6	46
		1917-36	2	51(44)	59(46)	124(52)	34.3	3.6	46
		1923-42	2	62 (50)	96(53)	182(63)	35.3	5.8	53
		1929-48	35	75	82	107	42.2	11.7	66
	37	1912-48	5	83(79)	91(83)	126(97)	58.4	7.6	82
	30	1912-41	3	81(66)	91(78)	145(89)	56.9	6.5	82
		1919-48	4	86(80)	96(85)	144(99)	58.2	8.2	82
Block	25	1912-36	80	68	71	78	56.8	4.2	66
Island		1924-48	5	88(82)	97(87)	138(103)	59.1	8.5	82
(R.I.)	20	1912-31	8	68	71	79	56.3	4.4	66
		1917-36	8	65	67	74	56.0	3.5	62
		1923-42	2	90(76)	107(80)	238(93)	56.45	7.4	82
		1929-48	6	91(86)	100(91)	140(109)	59.6	9.5	82
	37	1912-48	4	56(53)	74(56)	97(66)	37.3	5.7	58
	30	1912-41	2	58(50)	70(52)	156(62)	36.2	5.2	58
		1919-48	4	59(54)	67(58)	103(69)	37.6	6.1	58
Winnemucca	25	1912-36	œ	45	47	53	35.7	3.4	43
(Nevada)		1924-48	3	63(55)	73(59)	131(71)	37.4	6.6	58
	20	1912-31	œ	45	47	54	36.0	3.3	43
		1917-36	8	46	48	55	35.9	3.6	43
		1923-42	2	68(55)	85(58)	211(71)	36.6	6.9	58
		1929-48	4	64(58)	73(62)	118(75)	38.1	7.1	58
	37	1912-48	4	94(89)	103 (93)	146(106)	69.3	7.3	95
	30	1912-41	4	94(91)	107(95)	153(110)	69.7	7.8	95
North		1919-48	4	94(91)	107(96)	154(110)	69.7	7.9	95
North	25	1912-36	3	100(91)	113(95)	183(110)	69.2	8.0	95
(Wach)		1924-48	4	92(87)	100(90)	13/(102)	69.7	6.2	8/
(wash.)	20	1912-31	2	102(87)	120(91)	255(104)	6/./	/.5	95
		191/-36	3	105(94)	119(99)	198 (115)	69.6	8.8	95
		1923-42	4	94 (88)	102(92)	142(104)	/0.1	6.5	87
		1929-48	4	95(89)	103(93)	145(105)	/0.3	6./	87
	37	1912-48	3	83(71)	99(77)	188(97)	43.4	10.7	84
	30	1912-41	2	84(67)	106(72)	2/1(89)	42.4	9.9	84
Key West		1919-48	3	88(75)	106(82)	206(103)	44.3	11./	84
(Florida)	25	1912-36	2	89(70)	114(75)	300(94)	43.2	10.4	84
(FIOLIDA)		1924-48	5	77(70)	8/(76)	135(95)	43.4	9.7	/3
	20	1912-31	2	97(73)	125(79)	335(99)	44.1	11.3	84
		1917-36	2	92(74)	126(80)	336(100)	44.3	11.3	84
		1923-42	10	64(61)	69(66)	92(79)	41.4	/.1	61
		1929-48	3	82(73)	96(79)	162(99)	43.2	10.6	/3

Station	No. of Years	Years of Record	γ _{opt}	v 50	v ₁₀₀	v 1000	v	s v	v _{max}
					((miles per h	our)		
	37	1912-48	2	97(78)	125(85)	327(107)	46.3	12.7	95
	30	1912-41	2	101(78)	131(85)	351(107)	45.5	13.6	95
		1919-48	2	93(74)	119(80)	310(100)	45.6	11.4	95
Corpus	25	1912-36	2	109(82)	142(89)	390(114)	46.2	14.7	95
Christi		1924-48	70	63	67	82	44.0	6.9	61
(Texas)	20	1912-31	2	119(86)	159(94)	448(122)	46.3	16.4	95
		1917-36	1	132(76)	228(82)	1952(103)	44.9	12.9	95
		1923-42	5	65(61)	72(64)	104(77)	42.5	6.5	61
		1929-48	00	65	68	83	45.2	7.1	61

APPENDIX

COMPUTER PROGRAM LISTING SAMPLE INPUT AND OUTPUT

JF6*SIMI	U.MAIN	
1	С	PURPOSETHIS MAIN PROGRAM READS IN DATA UPON WHICH AN
2	С	EXTREME VALUE ANALYSIS IS TO BE PERFORMED.
3	С	AFTER READING IN THE DATA, THIS PROGRAM
4	С	CALLS IN A SUBROUTINE (EXTREM) WHICH
5	С	PERFORMS THE EXTREME VALUE ANALYSIS.
6	С	INPUT DATATHE NUMBER OF SETS OF DATA TO BE ANALYZED
7	С	(FORMAT-I2)
Å	č	
ă	č	THE IDENTIFYING TITLE FOR DATA SET 1
10	č	
11	č	THE NUMBER OF ORCEPLATIONS IN OATA SET 1
13	č	(EDMAT_T2)
12	2	
13	C	(FOULD TA COD LIAVING A 16FE 1 FORMAT)
14	C	(EACH DATA CARD HAVING A IBFS.I FORMAT)
15	C	
16	C	THE IDENTIFYING TITLE FOR DATA SET 2
17	C	(FORMAIBUAI)
18	С	THE NUMBER OF OBSERVATIONS IN DATA SET 2
19	С	(FORMATI2)
20	С	THE DATA FOR SET 2
21	С	(EACH DATA CARD HAVING A 16F5.1 FORMAT)
22	С	
23	c	•
24	С	•
25	С	•
26	С	
27	С	THE IDENTIFYING TITLE FOR THE LAST DATA SET
28	с	(FORMAT80A1)
29	Ċ	THE NUMBER OF OBSERVATIONS IN THE LAST DATA SET
30	С	(FORMATI2)
31	Ċ	THE DATA FOR THE LAST SET
32	ċ	(EACH DATA CARD HAVING A 16F5.1 FORMAT)
33	č	OUTPUTTHIS MAIN PROGRAM WILL (FOR FACH DATA SET)
34	č	SKIP TO A NEW PAGE: PRINT OUT THE TITLE.
35	č	PRINT OUT THE NUMBER OF OBSERVATIONS.
36	č	AND PRINT OUT THE INPUT DATA.
37	č	THIS WILL THEN BE FOLLOWED (FOR FACH DATA SET)
38	č	BY 4 OR 5 (DEPENDING ON THE DATA)
39	č	
40	č	
41	č	
42	č	CALLER BY THIS MAIN BOOGRAM.
43	č	CHERCHTES MAIN FROMANIE
45	č	SUBRUISE AND LAND AND AND AND AND AND AND AND AND AND
44	č	COMMENT-THIS MAIN DOUTINE AND ALL SUDDOUTINES
45	č	COMMENT THIS MAIN ROUTINE AND AND AND OUTDUTINES
40	č	HAVE A NUMERICAL DECIGNATION OF EAND CO
47	č	HAVE A NOMERICAL DESIGNATION OF 5 AND 6
48	L L	RESPECTIVELY.
49	C	CTATEMENTON IS MADE WITH THE FORTRAN
50	C	STATEMENTS
51	C	
52	C	IPR=6
53	С	ONE OR BOTH OF WHICH ARE FOUND AT THE
54	С	BEGINNING OF THE EXECUTABLE CODE
55	С	IN THIS MAIN ROUTINE AND ALL SUBROUTINES.
56	С	IF 5 AND 6 ARE NOT THE PROPER DESIGNATIONS
57	С	FOR YOUR COMPUTER, THEN SIMPLY CHANGE THE

J

58	С	5 AND 6 IN THE IRD=5 AND IPR=6 STATEMENTS
59	С	TO THE APPROPRIATE VALUE FOR YOUR COMPUTER.
60	С	COMMENTTHIS MAIN ROUTINE AND ALL SUBROUTINES
61	С	WILL, AS THEY STAND, ACCEPT DATA SETS
62	C	WITH UP TO 200 OBSERVATIONS.
63	C	IF COMPUTER STORAGE IS LIMITED AND IF SMALLER DATA
64	C	SETS ARE EXPECTED; THEN COMPUTER STORAGE MAY BE SAVED
65	ç	BY RESETTING THE DIMENSION LIMITS OF THE VECTORS
66	ç	X IN THIS MAIN ROUTINE,
67	C C	W, T, ANU Z IN THE SURROUTINE EXTREM,
68	C	W AND Y IN THE SUBROUTINE EVIPLT, AND
59	C	WAND Y IN THE SUBROUTINE EV2PLI
70	C	TO WHATSVER THE EXPECTED MAXIMUM DATA SET SIZE IS
71	Č	THE EXAMPLE A RECTED MAXIMUM DATA SET SIZE IS.
72	c	ADDIT STATEMENT 122 IN THIS SUDDULTINE.
74	č	AND UP NEAD THE REGINITING OF THE EVENTABLE
75	č	CODE IN THE SUBROUTINES EXTREM, EVIPLT, AND
76	č	EV2PLT) SHOULD ALSO BE CHANGED FROM 200
77	č	TO THE EXPECTED MAXIMUM DATA SET SIZE.
78	č	COMMENTON THE UNIVAC 1108, EXEC 8 COMPUTER SYSTEM-AT NBS,
79	С	THIS MAIN ROUTINE AND THE 6 NEEDED SUBROUTINES
80	С	HAVE A TOTAL (CODE + DIMENSIONS + COMMON) STORAGE
81	С	REQUIREMENT OF APPROXIMATELY 13000 WORDS (DECIMAL).
82	С	CODE DIMENSIONS COMMON
83	С	MAIN PROGRAM 130 320 0
84	С	EXTREM 770 1680 0
85	С	SORT 340 180 0
86	C	UNIMED 140 80 0
87	C	EVIPLT 210 550 0
88	C	EV2PLI 280 560 0
89	C C	
90	Č	NOTE THE RELATIVELT LARGE STORAGE ALLOCATION
91	č	OF HEADLE CTORAGE IN YOUR COMPLITED TO LESS THAN
92	č	13000 THEN AN ALTERNATIVE DLOT ROUTINE IS
QU.	č	AVAILABLE FROM THE AUTHOR WHICH WILL REDUCE
95	č	THE TOTAL STORAGE ALLOCATION FROM 13000
96	č	TO APPROXIMATELY 6000.
97	С	WRITTEN BYJAMES J. FILLIBEN (205.03)
98	С	EMIL SIMIU (461.01)
99	C	NATIONAL BUREAU OF STANDARDS
100	С	WASHINGTON, C. C. 20234
101	С	UPDATEDDECEMBER 1974
102	С	
103		DIMENSION X(200), ITITLE(80)
104	С	
105		IRD=5
106		IPR=6
107	C	
108	C C	READ IN THE NUMBER OF SETS OF DATA TO BE ANALYZED
110	C	PEAD (TPD - 105) NUMBET
111	C	
112	č	OPERATE ON FACH SET
113	c	
114	Ŭ	D0100ISET=1,NUMSET
115	С	

116 C REA 117 C FOR	D IN THE TITLE AND THE NUMBER OF OBSERVATIONS THIS SET
110 C 119 REA 120 REA	D(IRD,205)(ITIYLE(I),I=1,80) D(IRD,210)N
121 C 122 C ZER 123 C INT	O-OUT THE X VECTOR, AND THEN READ THE DATA FOR THIS SET
124 C 125 D02 126 X(I	00I=1,N)=0.0
127 200 CON 128 REA 129 C	TINUE D(IRD+215)(X(I)+I=1+N)
130 C WRI 131 C AND 132 C	TE OUT THE TITLE, THE NUMBER OF OBSERVATIONS, THE DATA FOR THIS SET
133 WRI 134 NSK 135 D03	TE(IPR+998) IP=10 0015KIP=1+NSKIP
136 WRI 137 300 CON	TE(IPR+999) ITINUE IE(IPR+305)(ITIT(E(I)+I=1-80)
139 WRI 140 WRI	TE(IPR/999) TE(IPR/999)
141 WRI 142 WRI 143 WRI	TE(IPR+399) TE(IPR+310)N TE(IPR+999)
144 WRI 145 WRI 146 C	TE(IPR,315) TE(IPR,320)(X(I),I=1,N)
147 C DO 148 C 149 CAL	AN EXTREME VALUE ANALYSIS OF THE DATA FOR THIS SET
150 C 151 100 CON	IT INUE
153 105 FOR 154 205 FOR 155 210 FOR	(MAT(12) (MAT(80A1) (MAT(12)
156 215 FOR 157 305 FOR 158 310 FOR	(MAT(16F5.1)) $(MAT(1H + 20X+80A1))$ $(MAT(1H + 29HTHE NUMBER OF OBSERVATIONS = .15)$
159 315 FOR 160 320 FOR	(MAT(1H +10HINPUT DATA) (MAT(1H +13X,16F5.1)
162 999 FOR 163 STO	(MAT(1H)) P

PRT.S SIMIU.EXTREM

JJF6*SIM	U.EXTREM	
1	•	SUBROUTINE EXTREM(X+N)
2	C C	DUDDOCE-THIS SUBDOUTINE DEREONS AN EXTREME VALUE ANALYSIS
5	C	ON THE DATA IN THE INPUT VECTOR X.
5	č	THIS ANALYSIS CONSISTS OF DETERMINING THAT PARTICULAR
6	с	EXTREME VALUE TYPE 1 OR EXTREME VALUE TYPE 2 DISTRIBUTION
7	С	WHICH BEST FITS THE DATA SET.
8	c	THE GOODNESS OF FIT CRITERION IS THE MAXIMUM PROBABILITY
9	C	AFTER THE REST-EIT DISTRIBUTION IS DETERMINED.
11	č	ESTIMATES ARE COMPLITED AND PRINTED OUT FOR THE
12	č	LOCATION AND SCALE PARAMETERS.
13	С	TWO PROBABILITY PLOTS ARE ALSO PRINTED OUT
14	c	THE BEST-FIT TYPE 2 PROBABILITY PLOT
15	c	(IF THE BEST FIT WAS IN FACT A TYPE 2),
16	c	AND THE TYPE 1 PROBABILITY PLOT.
18	č	ALSO COMPLITED AND PRINTED OUT.
19	č	INPUT ARGUMENTS=-X = THE SINGLE PRECISION VECTOR OF
20	č	(UNSORTED OR SORTED) OBSERVATIONS.
21	c	N = THE INTEGER NUMBER OF OBSERVATIONS
22	С	IN THE VECTOR X.
23	c	OUTPUT6 PAGES OF AUTOMATIC PRINTOUT
24	C	PRINTING==YES
25		AS INPUT TO THIS SUBBOUTINE IS 7500
27	č	OTHER DATAPAC SUBROUTINES NEEDED-SORT UNIMED EVIPLT EV2PLT PLOT
28	č	FORTRAN LIBRARY SUBROUTINES NEEDEDSORT AND ALOG
29	Ċ	MODE OF INTERNAL OPERATIONSSINGLE PRECISION
30	с	LANGUAGEMACHINE-INDEPENDENT ANSI FORTRAN
31	c	COMMENTTHIS SUBROUTINE AS IT STANDS WILL ACCEPT DATA SETS
32	L C	WITH UP TO 200 OBSERVATIONS. TE COMPLITED STODAGE IS LIMITED AND TE SMALLED DATA
34	C C	SETS ARE EXPECTED, THEN COMPUTER STORAGE MAY BE SAVED
35	č	BY RESETTING THE DIMENSION LIMITS OF THE VECTORS
36	С	W. Y. AND Z BELOW FROM THEIR PRESENT VALUE OF 200
37	C	TO WHATEVER THE EXPECTED MAXIMUM DATA SET SIZE IS.
38	C	THE STATEMENT IUPPER=200
39	Č	(ABOUL STATEMENT 122 IN THIS SUBROUTINE)
40	č	MAXIMUM DATA SET SIZE.
42	č	STORAGE SAVINGS CAN ALSO BE ACHIEVED BY JUDICIOUSLY
43	С	REDUCING THE DIMENSION LIMITS OF THE VECTORS W AND Y
44	С	IN THE NEEDED SUPPORT SUBROUTINES EV1PLT
45	C	AND EV2PLT.
46	c	REFERENCE FILLIBEN (1972) / TECHNIQUES FOR TAIL LENGTH
48	č	CONFERENCE ON THE DESIGN OF EXPERIMENTS IN
49	č	ARMY RESEARCH AND TESTING, PAGES 425-450.
50	Ċ	FILLIBEN, 'THE PERCENT POINT FUNCTION',
51	С	UNPUBLISHED MANUSCRIPT.
52	c	-JOHNSON AND KOTZ (1970), CONTINUOUS UNIVARIATE
53	C	WEITTEN BY LAMES I ETH TREN (HINE 1976)
55	c	STATISTICAL ENGINEERING LABORATORY (205.03)
56	č	NATIONAL BUREAU OF STANDARDS
57	С	WASHINGTON, D. C. 20234

58	С	PHONE301-921-2315
59	с	UPDATED-DECEMBER: 1974
60	С	
61		ΙΝΤΕGER ΒΙΔΝΚ, ΑΙΡΗΑΜ, ΑΙΡΗΑΑ, ΑΙΡΗΑΥ
62		INTEGER ALPHAI, ALPHAN, ALPHAF, ALPHAT, ALPHAY
63		INTEGER ALPHAG, EQUAL
64		DIMENSION X(1)
65		DIMENSION W(200),Y(200),Z(200)
66		DIMENSION GAMTAB(50), CORR(50)
67		DIMENSION YI (50), YS (50), T (50)
68		DIMENSION IFLAG1(50), IFLAG2(50), IFLAG3(50)
69		DIMENSION C(10),AM(50),SCRAT(50)
70		DIMENSION AINDEX(50)
71		DIMENSION PO(10)
72		DIMENSION H(60,2)
73		DATA BLANK, ALPHAM, ALPHAA, ALPHAX/1H , 1HM, 1HA, 1HX/
74		DATA ALPHAI,ALPHAN,ALPHAF,ALPHAT,ALPHAY/1HI,1HN,1HF,1HT,1HY/
75		DATA ALPHAG, EQUAL/1HG, 1H=/
76		DATA GAMTAB(1), GAMTAB(2), GAMTAP(3), GAMTAB(4), GAMTAB(5),
77		IGAMTAB(6),GAMTAB(7),GAMTAB(8),GAMTAB(9),GAMTAB(10),
78		IGAMTAB(11), GAMTAB(12), GAMTAB(13), GAMTAH(14), GAMTAB(15),
79		IGAMIAB(16), GAMIAB(17), GAMIAB(18), GAMIAB(19), GAMIAB(20),
80		IGAMIAB(21) (GAMIAB(22)) (GAMIAB(23)) (GAMIAB(24)) (GAMIAB(25))
81		
02		$110 \bullet 14 \bullet \bullet 15 \bullet 16 \bullet \bullet 16 \bullet \bullet 16 \bullet \bullet 17 \bullet \bullet 20 \bullet \bullet 21 \bullet \bullet 22 \bullet \bullet 23 \bullet \bullet 24 \bullet \bullet 23 \circ 7$
85		DATA GAMIADIZO/JOAMIADIZ///GAMIADIZO/JOAMIADIZO/JOAMIADIZO//
85		16AMTAB(31) 6AMTAB(32) 6AMTAB(33) 6AMTAB(39) 6AMTAB(30)
86		IGAMTAB(41).GAMTAB(42)
87		1/30++35++40++45++50++60++70++80++90++100++150++200++250++
88		1350.,500.,750.,1000./
89		DATA C(1)+C(2)+C(3)+C(4)+C(5)+C(6)+C(7)+C(8)+C(9)+C(10)
90		1/60.,75.,100.,150.,250.,500.,1000.,10000.,100000.,1000000./
91		DATA P0(1),P0(2),P0(3),P0(4),P0(5),P0(6),P0(7),P0(8),P0(9),P0(10)
92		1/.0+.5+.75+.9+.95+.975+.99+.999+.999+.99999
93		DATA AINDEX(1) + AINDEX(2) + AINDEX(3) + AINDEX(4) + AINDEX(5) +
94		1AINDEX(6), AINDEX(7), AINDEX(8), AINDEX(9), AINDEX(10),
95		IAINDEX(11), AINDEX(12), AINDEX(13), AINDEX(14), AINDEX(15),
96		IAINDEX(IG), AINDEX(I7), AINDEX(I8), AINDEX(IG), AINDEX(20),
97		IAINDEX(21) AINDEX(22) AINDEX(23) AINDEX(24) AINDEX(25)
90		
100		DATA ATNDEX(26) ATNDEX(37) ATNDEX(28) ATNDEX(29).
101		$1 \text{AINDEY}(31) \cdot \text{AINDEY}(32) \cdot \text{AINDEX}(33) \cdot \text{AINDEY}(34) \cdot \text{AINDEY}(35) \cdot$
102		TAINDEX (36) + AINDEX (37) + AINDEX (38) + AINDEX (39) + AINDEX (40) +
103		AINDEX(41) + AINDEX(42) + AINDEX(43) + AINDEX(44) + AINDEX(45) +
104		1AINDEX(46) AINDEX(47) AINDEX(48) AINDEX(49) AINDEX(50)
105		1/26.,27.,28.,29.,30.,31.,32.,33.,34.,35.,36.,37.,38.,
106		139.140.141.142.143.144.145.146.147.148.149.150./
107		DATA T(1),T(2),T(3),T(4),T(5),T(6),T(7),T(8),T(9),T(10),
108		1T(11),T(12),T(13),T(14),T(15),T(16),T(17),T(18),T(19),T(20),
109		1T(21),T(22),T(23),T(24),T(25)
110		1/10.18011.3.39672.2.47043.2.14609.1.98712.1.89429.1.83394.
111		11.79175,1.76069,1.73691,1.71814,1.70297,1.69045,1.67996,
112		11.67103,1.66335,1.65667,1.65082,1.64564,1.64102,1.63689,
113		11.63316,1.62979,1.62672,1.62391/
114		DATA T(26),T(27),T(28),T(29),T(30),
115		

116		1T(41),T(42),T(43)
117		1/1.61287.1.60516.1.59947.1.59510.1.59164.1.58651.1.58289.
118		11.58019,1.57811,1.57645,1.57152,1.56908,1.56763,1.56666,
119		11.56546,1.56377,1.56330,1.56197/
120	С	
121		IPR=6
122		IUPPER=200
123		NUMDIS=43
124		AN=N
125	C	
126	С	CHECK THE INPUT ARGUMENTS FOR ERRORS
127	С	
128		IF (N.LT.1.0R.N.GT.IUPPER) GOTO50
129		IF(N.EQ.1)G0T055
130		HOLD=X(1)
131		D060I=2+N
132		IF(X(I).NE.HOLD)GOT090
133		60 CONTINUE
134		WRITE(IPR, 9)HOLD
135		RETURN
136		SU WRITE (IPR) 17) IOPPER
137		WRITE(IPR/47)N
138		
109		DS WRITE(IPR/IG/
140		
141		Q CONTINUE
142		INT (A VECTOD) TO THE EXTERNAL DIAGNOSTICE THE FIRST INFOL ARGOME
144		1H *****
145		17 FORMAT(1H + 98H***** FATAL ERRORTHE SECOND INPUT ARGUMENT TO THE
146		1 EXTREM SUBROUTINE IS OUTSIDE THE ALLOWABLE (1:,16,16H) INTERVAL *
147		1****)
148		18 FORMAT(1H +100H***** NON-FATAL DIAGNOSTICTHE SECOND INPUT ARGUME
149		1NT TO THE EXTREM SUBROUTINE HAS THE VALUE 1 *****)
150		47 FORMAT(1H + 35H**** THE VALUE OF THE ARGUMENT IS + I8 +6H *****)
151	С	
152	С	COMPUTE THE SAMPLE MINIMUM AND SAMPLE MAXIMUM
153	С	
154		XMIN=X(1)
155		XMAX=X(1)
156		D0140I=2,N
157		IF(X(I).LT.XMIN)XMIN=X(I)
158		IF(X(I).GT.XMAX)XMAX=X(I)
159	_ 1	LAO CONTINUE
160	C	
161	č	COMPUTE THE PROB PLOT CORRELATION COEFFICIENTS FOR THE VARIOUS VALUES
162	č	UF GAMMA
164	~	CALL SOPT (Y+N+Y)
165		CALL INTED(N.7)
166	C	
167	Ŭ	
168		IF(IDIS-FQ-NUMDIS)GOTO150
169		
170		
171		W(I) = (-ALOG(Z(I))) * * (-1, 0/A)
172	1	10 CONTINUE
173		G0T0170

174	1	150	D0160I=1,N
175			W(I)=-ALOG(ALOG(1.0/Z(I)))
176	1	160	CONTINUE
177	С		
178	1	170	SUM1=0.0
179			SUM2=0.0
180			D0200T=1+N
181			SUM1=SUM1+Y(T)
182			
193		0.0	
100	2	200	
104			IDAR-SUMI/AN
105			WDAR-SUMZ/AN
186			
187			SUM2=0.0
188			SUM3=0.0
189			D0300I=1·N
190			SUM2=SUM2+(Y(I)-YBAR)*(W(I)-WBAR)
191			SUM1=SUM1+(Y(I)-YBAR)*(Y(I)-YBAR)
192			SUM3=SUM3+(W(I)-WBAR)*(W(I)-WBAR)
193	3	300	CONTINUE
194			SY=SQRT(SUM1/(AN-1.0))
195			CC=SUM2/SQRT(SUM3*SUM1)
196			YSLOPE=SUM2/SUM3
197			YINT=YBAR=YSL OPE*WBAR
198			
190			
200			
200			
201	~ 1	100	CONTINUE
202	č		DETERMINE THAT DISTOLOUTION WITH THE WAY DOOD DUAT COOD COEFFICIENT
203	C C		DETERMINE THAT DISTRIBUTION WITH THE MAX PROB PLOT CORR COEFFICIENT
204	C		
205			101SMX=1
206			CORRMX=CORR(1)
207			D0400IDIS=1.NUMDIS
208			IF(CORR(IDIS).GT.CORRMX)IDISMX=IDIS
209			IF(CORR(IDIS).GT.CORRMX)CORRMX=CORR(IDIS)
210	4	400	CONTINUE
211			D0500IDIS=1,NUMDIS
212			IFLAG1(IDIS)=BLANK
213			IFLAG2(IDIS)=BLANK
214			IFLAG3(IDIS)=BLANK
215			IE(IDIS-EQ.IDISMX) GOTOSSO
216			6010500
217		550	
218	-	550	
210			
219		500	IFERUS/IDIS/-ALPHAX
220	~	500	CONTINCE
221	č		WATE OUT THE TABLE OF PROD PLOT CORP. COFFEETENTS FOR VARIABLE CAMMA
222	C A		WRITE OUT THE TABLE OF PRUB PLUT CORR COEFFICIENTS FOR VARIOUS GAMMA
223	С		
224			WRIE(1PR/998)
225			WRITE(IPR+305)
226			WRITE(IPR+999)
227			WRITE(IPR+310)N
228			WRITE(IPR, 311)YBAR
229			WRITE(IPR, 312)SY
230			WRITE(IPR+313)XMIN

232		WRITE(IPR+999)
233		WRITE(IPR, 323)
234		WRITE(IPR+324)
235		WRITE(IPR+325)
236		WRITE(IPR+999)
237	С	
238		NUMDM1=NUMDIS-1
239		IF(NUMDM1+LT+1)GOTO850
240		DO800I=1,NUMDM1
241		WRITE(IPR,805)GAMTAB(I),CORR(I),IFLAG1(I),IFLAG2(I),IFLAG3(I),
242	1	YI(I)+YS(I)
243	800	CONTINUE
244	850	I=NUMDIS
245		WRITE(IPR+806)ALPHAI,ALPHAN+ALPHAF+ALPHAI+ALPHAN+ALPHAI+
246	1	LALPHAT,ALPHAY,CORR(I),IFLAG1(I),IFLAG2(I),IFLAG3(I),
247	1	YI(I),YS(I)
248	C	
249	C	PLOT THE PROB PLOT CORR COEFFICIENT VERSUS GAMMA VALUE INDEX
250	С	
251		CALL PLOT(CORR,AINDEX,NUMDIS)
252		WRITE(IPR+810)ALPHAG,ALPHAA+ALPHAM+ALPHAM+ALPHAA+EQUAL+
253	1	LGAMTAB(1),GAMTAB(12),GAMTAB(23),GAMTAB(34),
254	1	LALPHAI • ALPHAN • ALPHAF • ALPHAI • ALPHAN • ALPHAI • ALPHAT • ALPHAY
255		WRITE(IPR+999)
256		WRITE(IPR+812)
257		WRITE(IPR+813)
258	С	
259	С	IF THE OPTIMAL GAMMA IS FINITE, PLOT OUT THE EXTREME VALUE
260	С	TYPE 2 PROBABILITY PLOT FOR THE OPTIMAL VALUE
261	C	OF GAMMA.
262	С	
263		IF(IDISMX.LT.NUMDIS)CALL EV2PLT(X.N.GAMTAB(IDISMX))
264	C	
265	Ç	PLOT OUT AN EXTREME VALUE TYPE 1 PROBABILITY PLOT
266	C	
267	_	CALL EVIPLT(X+N)
268	C	
269	C	FORM THE VARIOUS RETURN PERIOD VALUES
270	С	
271	1650	K=0
272		D021001=1+4
273		D02200J=1+9
274		K=K+1
275		AM(K) = J = (10 + *(1 - 1))
276	2200	CONTINUE
277	2100	CONTINUE
278		K=K+1
279		AM(K)=10000.
280		
281		
282		
283		AM(K/=IUUUUU).
284		
200		AMILE - 500000 ·
200		V = V = 1000000
287		
200		
289		AMINJEN

290		NUMAM=K
291		CALL SORT (AM, NUMAM, SCRAT)
292		DO2300I=1+NUMAM
293		AM(I)=SCRAT(I)
294	2300	CONTINUE
295	С	
296	С	IF THE OPTIMAL GAMMA IS FINITE, COMPUTE THE
297	С	PREDICTED EXTREME (= F(1-(1/M)) FOR VARIOUS RETURN PERIODS M
298	č	FOR THE OPTIMAL EXTREME VALUE TYPE 2 DISTRIBUTION.
299	Ċ	
300	•	
301		
302		
303		
305		
304		
305		
300		
307		
308		IF (ARG+LE+0+0) G0102400
309		H(I,I)=YINI+YSLOPE*(ARG**(-1.0/A))
310	2400	CONTINUE
311	C	
312	C	COMPUTE THE PREDICTED EXTREME (= F(1-(1/M)) FOR VARIOUS RETURN
313	C	PERIODS M FOR THE EXTREME VALUE TYPE 1 DISTRIBUTION.
314	C	
315	2450	YINT=YI(NUMDIS)
316		YSLOPE=YS(NUMDIS)
317		D02500I=2+NUMAM
318		R=1.0/AM(I)
319		P=1.0-R
320		ARG=-ALOG(P)
321		IF(ARG.LE.0.0)GOT02500
322		H(I,2)=YINT+YSLOPE+(-ALOG(ARG))
323	2500	CONTINUE
324	C	
325	С	WRITE OUT THE PAGE WITH THE RETURN PERIODS AND THE PREDICTED EXTREMES
326	С	FOR THE 2 DISTRIBUTIONSOPTIMAL EXTREME VALUE TYPE 2, AND EXTREME
327	č	VALUE TYPE 1.
328	Ċ	
329	-	WRITE(IPR,998)
330		IF(IDISMX.EQ.NUMDIS)GOT02750
331		WRITE(IPR+2602)
332		WRITE(IPR,2604)
333		WRITE(IPR+2606)
334		WRITE(IPR+2608)
335		WRITE (IPR+2610) GAMTAB (IDISMX)
336		WRITE(IPR,999)
337		DO2TODI=2+NUMAM
338		WRITE(IPE, 2705) AM(T), H(T, 1), H(T, 2)
339		
340		
341		IF (JSK IP - FQ - D) WP ITF (TPR - 999)
342	2700	
343	2700	
340	C	AL TORN
345	2750	WPITE(100.2003)
345	2750	
347		TRAILLIF (TO, 2004)
577		

348 349		WRITE(IPR)	2808) 999)							
350		D02900I=2	NUMAM							
351		WRITE (IPR	2705) AN	(I),H(I)	(2)					
352		J=I-1								
353		JSKIP=J-51	(J/5)							
354		IF(JSKIP.E	Q.0)WR1	TE (IPR .	999)					
355	2900	CONTINUE								
356	c	CONTRICE								
357	998	EORMAT (1H1)							
358	999	FORMAT(1H	``							
359	305	FORMAT(1H	. 404.22	HEXTREME		IF ANALY	(212			
360	310	FORMAT(1H	-374-20	HEATHE SAM		STTE N -	.17)			
361	311	FORMAT(1H	· 3// · 20	HTHE SAN		VEAN = I	=14.7			
362	312	FORMAT(1H	.287.32	HTHE SAN	ADLE	TANDARD	DEVIAT	TON - A	=10.7)	
363	313	EODMAT(10	. 308.02			ATNITWEIM		7)	14+11	
365	310	EORMAT(11	. 324.21	UTHE SAR			510	7)		
364	303	FORMAT(1H	1 JZ X 1 Z J	EVTDEN		ILE .			OT	LOCATIO
365	525		SCALE)	CAIRE	IL VAL	_02	FRUDAD		_01	LUCATIO
360	32/1		SCALE	YPE 2 T			CODR	EL ATTON		ESTIMAT
369	J24 1			1FE 2 1/			CORK	LATION		COLIMAT
360	325		• 371MATE	PARAMETE		(AMMA)	COFF	ETCTENT	`	
370	805	FORMAT(1H	+37+E10	- 2.13V.	8.5.	1 8 . 3 . 1 . 2	V.E14.7	- 2Y - E14	.7)	
370	806	FORMAT(1H	•5X•8A1	+13Y+F8.	5.1Y	- 301 - 27 - 1	514.7.2	Y.E14.7	• / /	
372	810	FORMAT(1H	.128.54	1.1.1.4.1.	E14.1	7.11Y.F1	4.7.11Y	. 514.7.	11Y.E14.	7.
373	0101	151.841)	VILA U			FITURE T	++// + 1 /	*******		• • •
374	812	FORMAT(1H	• 96HTHE	ABOVE	SAF	PLOT OF	THE 43	PROBARTI	TTY PLO	T CORRE
375	1	LATION COF	FEICIEN	TS (FROM	THE	PREVIOUS	S PAGE))		o ontine
376	813	FORMAT(1H	+16X+41	HVERSUS	THE	13 EXTRE	ME VALU	F DISTR	TRUTTON	5)
377	2602	FORMAT(1H	+43H	RETURN	FRIO	D PRI	FDICTED	FXTREM	- WIND,	
378	1	27H F	REDICTE	DEXTREM	AE WIT	(D/				
379	2604	FORMAT(1H	+43H	(IN YEA	RS)		BASED	ON OPTI	A	
380	1	20H	E	ASED ON				•••••••••		
381	2606	FORMAT(1H	+42H			E)	TREME	VALUE T	YPE 2.	
382	1	27H	EXTREM	E VALUE	TYPE	1)				
383	2608	FORMAT(1H	•43H				DIST	RIBUTIO	V	
384	1	22H	DIS	TRIBUTI	DN)					
385	2610	FORMAT(1H	•30H			(G,	AMMA =	F12.5/	1H))	
386	2705	FORMAT(1H	+2X+F9.	1,13X,F1	10.2.	17X,F10.	2)			
387	2802	FORMAT(1H	•43H	RETURN F	ERIO	D PRI	EDICTED	EXTREME	E WIND)	
388	2804	FORMAT(1H	•36H	(IN YEA	RS)		BA	SED ON)		
389	2806	FORMAT(1H	+42H	_		EX	XTREME	VALUE T	YPE 1)	
390	2808	FORMAT(1H	• 38H				DIST	RIBUTIO	()	
391	С									
392		RETURN								
393		END								

PRT+S SIMIU.SORT

0.04214	110+SURT		
1		SUBROUTINE, SORT (X+N+Y)	
2	C		
3	C	THIS ROUTINE SORTS THE ELEMENTS OF THE INPUT VECTOR	R X AND PUTS THE SORTED
4	, C	ELEMENTS INTO THE VECTOR Y.	
5	C	THE INPUT TO THIS ROUTINE IS THE SINGLE PRECISION N	VECTOR X OF
6	С	(UNSORTED) OBSERVATIONS, THE INTEGER VALUE N (= SAM	MPLE SIZE).
7	С	AND AN EMPTY SINGLE PRECISION VECTOR Y INTO WHICH T	THE SORTED OBSERVATIONS
8	С	WILL BE PLACED.	
9	С	THE OUTPUT FROM THIS ROUTINE IS THE SINGLE PRECISION	ON VECTOR Y INTO WHICH
10	С	THE SORTED OBSERVATIONS HAVE BEEN PLACED.	
11	С	RESTRICTIONS ON THE MAXIMUM ALLOWABLE VALUE OF N1	THE DIMENSIONS
12	С	OF VECTORS IU AND IL (DEFINED AND USED INTERNALLY #	VITHIN THIS ROUTINE)
13	С	DETERMINE THE MAXIMUM ALLOWABLE VALUE OF N FOR THIS	5
14	С	ROUTINE. IF IU AND IL EACH HAVE DIMENSION K, THEN	N MAY NOT EXCEED
15	С	2**(K+1) - 1. FOR THIS ROUTINE AS WRITTEN, THE DIM	MENSIONS OF IU AND IL
16	С	HAVE BEEN SET TO 36, THUS THE MAXIMUM ALLOWABLE VAL	LUE OF N IS
17	С	APPROXIMATELY 137 BILLION. SINCE THIS EXCEEDS THE	MAXIMUM ALLOWABLE
18	С	VALUE FOR AN INTEGER VARIABLE IN MANY COMPUTERS, AN	ND SINCE A SORT OF 137
19	С	BILLION ELEMENTS IS PRESENTLY IMPRACTICAL AND UNLIF	ELY, THEREFORE NO
20	С	TEST FOR WHETHER THE INPUT SAMPLE SIZE N EXCEEDS 13	37 BILLION HAS BEEN
21	С	INCORPORATED INTO THIS ROUTINE. IT IS THUS ASSUMED	D THAT THERE IS NO
22	С	(PRACTICAL) RESTRICTION ON THE MAXIMUM VALUE OF N F	FOR THIS ROUTINE.
23	С	PRINTINGNONE UNLESS AN ERROR CONDITION EXISTS	
24	c	THIS ROUTINE IS SINGLE PRECISION IN INTERNAL OPERAT	TION.
25	С	SUBROUTINES NEEDEDNONE	
26	c	SORTING METHODBINARY SORT	
27	с	REFERENCECACM MARCH 1969, PAGE 186 (BINARY SORT A	ALGORITHM BY RICHARD
28	ċ	C. SINGLETON.	
29	Ċ	CACM JANUARY 1970, PAGE 54.	
30	Ċ	CACM OCTOBER 1970, PAGE 624.	
31	Ċ	JACM JANUARY 1961, PAGE 41.	
32	ċ		
33	c	THE BINARY SORT ALGORITHM USED HEREIN IS EXTREMELY	FAST AS THE
34	С	FOLLOWING TIME TRIALS (PERFORMED BY SORTING RANDOM	NUMBERS)
35	С	ON THE UNIVAC 1108 EXEC 8 SYSTEM INDICATE.	
36	С	THESE TIME TRIALS WERE CARRIED OUT IN AUGUST, 1974.	
37	С	BY WAY OF COMPARISON, THE TIME TRIAL VALUES FOR THE	EASY-TO-PROGRAM
38	С	BUT EXTREMELY INEFFICIENT BUBBLE SORT METHOD HAVE	ALSO BEFN
39	С	INCLUDED:	
40	с	NUMBER OF RANDOM BINARY SORT	BUBBLE SORT
41	c	NUMBERS SORTED	
42	С	N = 10 .002 SEC	+002 SEC
43	C	N = 100 .011 SEC	045 SEC
44	C	N = 1000 .141 SEC	4.332 SEC
45	č	N = 3000 .476 SEC	1.502 300
46	č	N = 10000 1.887 SEC NOT	
47	č		
48	č	WRITTEN BY JAMES J. FILLIBEN. STATISTICAL ENGINEED	ING LABORATORY (205.03)
49	č	NATIONAL BUREALL OF STANDARDS, WASHINGTON, D.C. 2023	
50	c	THE POILER OF STANDARDSY WASHINGTONY DIG. 2023	UNIC 1772
51	·	DIMENSION X(1) Y(1)	
52		DIMENSION TU(36) TI (36)	
53	C	011/210/010/00//12/00/	
54	v	IPR=6	
55	C		
56	č	CHECK THE INDUT ADDUMENTS FOR ERDARS	
57	č	CHECK THE INPUT AROUMENTS FUR ERRORS	
57	6		

37 Initiation 38 Initiation 41 Motion 42 IF(X(I), NE, HOLD) GOTO90 43 Go Continue 44 IF(X(I), NE, HOLD) GOTO90 45 Go Continue 46 Y(I)=X(I) 47 RETURN 48 So WRITE(IPR+13) 49 So WRITE(IPR+13) 71 RETURN 72 S5 WRITE(IPR+13) 73 Y(I)=X(I) 74 RETURN 75 9 CONTINUE 76 9 CONTINUE 77 RETURN 78 90 CONTINUE 79 90 CONTINUE 70 9 FORMAT(IH + 10#H***** NON=FATAL DIAGNOSTIC—THE FIRST INPUT ARGUMENT TO THE 71 RETURN 79 15 FORMAT(IH + 10#H************************************	58	IF(N.LT.1)GOTO50
ODGOT=2.N C2 IF(X(I).NE.HOLD)GOTO90 C3 GO CONTINUE C4 WRITE(IPR, 9)HOLD C5 DOGOT=2.N C5 DOGOT=2.N C6 CONTINUE C6 WRITE(IPR, 9)HOLD C6 WRITE(IPR, 10) C7 WRITE(IPR, 15) C6 RTURN C7 WRITE(IPR, 16) C7 INT (A VECTOR) TO THE SORT SUBROUTINE HAS ALL ELEMENTS = , e15.8.6 C7 INT (A VECTOR) TO THE SORT SUBROUTINE HAS ALL ELEMENTS = , e15.8.6 C7 INT (A VECTOR) TO THE SORT SUBROUTINE HAS THE VALUE INPUT ARGUMENT TO THE C7 INT (A VECTOR) TO THE SORT SUBROUTINE HAS THE VALUE INPUT ARGUMENT TO THE C8 C7 SUBROUTINE IS NON-FATAL DIAGNOSTICTHE SECOND INPUT ARGUMENT C8 INT TO THE SORT SUBROUTINE HAS THE VALUE INFUT ARGUMENT TO THE C8 C C0PY THE VECTOR X INTO THE VECTOR Y D01001=1.N YMITEXTINE YMITEXTINE SOUTINE C8 C C0PY THE VECTOR X INTO THE VECTOR Y	60	HOLD=X(1)
62 IF(X(1).WE.HOLD)GOTO90 63 60 CONTINUE 64 WRITE(IPR, 9)HOLD 65 DOGII:N 66 Y(1)=X(1) 67 61 CONTINUE 68 RETURN 69 50 WRITE(IPR, 15) 70 wRITE(IPR, 16) 71 RETURN 72 55 WRITE(IPR, 16) 73 Y(1)=X(1) 74 76 PORAT(IH + 1)BH***** NON=FATAL DIAGNOSTIC==THE FIRST INPUT ARGUME 75 90 CONTINUE 76 90 CONTINUE 77 1NT (A VECTOR) TO THE SORT SUPROUTINE HAS ALL ELEMENTS = *E15.0;6 78 1H ***** NON=FATAL DIAGNOSTIC==THE SECOND INPUT ARGUMENT TO THE 79 15 FORMAT(IH + 100H***** NON=FATAL DIAGNOSTIC==THE SECOND INPUT ARGUMENT TO THE 81 18 FORMAT(IH + 100H***** NON=FATAL DIAGNOSTIC==THE SECOND INPUT ARGUMENT TO THE 82 1NT TO THE SORT SUPROUTINE HAS THE VALUE I******) 83 47 FORMAT(IH + 35H***** THE VALUE OF THE ARGUMENT IS , 1B *6H ******) 84 C 85 C 86 DO1001E1*N 87 Y(1)=X(1) 88 C	61	D0601=2+N
63 60 CONTINUE 64 WRITE(IPR, 9)HOLD 65 00611:1.N 66 Y(1)=X(1) 67 61 CONTINUE 68 RETURN 69 50 WRITE(IPR,15) 70 WRITE(IPR,16) 71 RETURN 72 55 WRITE(IPR,18) 73 Y(1)=X(1) 74 RETURN 75 90 CONTINUE 76 9 FORMAT(1H, 10H***** NON=FATAL DIAGNOSTICTHE FIRST INPUT ARGUME 77 INT (A VECTOR) TO THE SORT SUBROUTINE HAS ALL ELEMENTS = ,E15.8.9.6 78 1N (A VECTOR) TO THE SORT SUBROUTINE HAS ALL ELEMENTS = ,E15.8.9.6 78 1N (A VECTOR) TO THE SORT SUBROUTINE HAS ALL ELEMENTS = ,E15.8.9.6 78 1N (A VECTOR) TO THE SORT SUBROUTINE HAS ALL ELEMENTS = ,E15.8.9.6 79 15 FORMAT(1H, 9)H***** NON=FATAL DIAGNOSTICTHE SECOND INPUT ARGUMENT TO THE 70 1 SORT SUBROUTINE IS NON-POSITIVE *****) 71 16 FORMAT(1H, 3)H***** THE VALUE 0 THE ARGUMENT IS ,IB ,6H *****) 74 FORMAT(1H, *3)H***** THE VALUE 0 THE ARGUMENT IS ,IB ,6H *****) 75 C COPY THE VECTOR X INTO THE VECTOR Y 76 001001=1.*N 77 (1)=X(1) 78 100 CONTINUE 79 C 70 C CHECK TO SEE IF THE INPUT VECTOR IS ALREADY SORTED 70 C 71 CHECK TO SEE IF THE INPUT VECTOR IS ALREADY SORTED 72 NM1=N-1 73 D02001=1.*NM1 74 IPI=1:+N 74 IPI=1:+N 75 IF(*(1).LE.*(IPI))GOT0200 77 200 CONTINUE 76 RETURN 79 250 M=1 70 200 CONTINUE 70 200 SONTINUE 71 200 SONTINUE 72 NM1=N-1 73 MEDE(IH) 74 IDIAE(1) 75 AMEDEY(MID) 75 AMEDEY(MID) 76 Y(1).LE.*(MED)GOT0320 77 Y(MID)=Y(1) 77 Y(MID)=Y(1) 77 Y(MID)=Y(1) 77 Y(MID)=Y(1) 77 Y(MID)=Y(1) 77 Y(1).EE.*(MED)GOT0340 77 Y(1).EE.*(MED)GOT0340 77 Y(1).LE.*(MED)GOT0340 77 Y(1).EE.*(MED)GOT0340 77 Y(MID)=Y(1) 77 Y(MID)=Y(1) 77 Y(MID)=Y(1) 77 Y(MID)=Y(MID) 77 Y(MID)=Y(MID) 77 Y(MID)=Y(MID) 77 Y(MID)=Y(MID) 77 Y(MID)=Y(MID	62	IF(X(I).NE.HOLD)GOTO90
64 WRITE(IPR, 9)HOLD 65 DOGII=1:N 66 Y(I)=X(I) 67 61 CONTINUE 68 RETURN 69 50 WRITE(IPR,15) 70 wRITE(IPR,15) 71 RETURN 72 55 WRITE(IPR,18) 73 Y(I)=X(I) 74 RETURN 75 90 CONTINUE 76 9 FORMAT(IH, + JUAH***** NON=FATAL DIAGNOSTIC==THE FIRST INPUT ARGUME 77 INT (A VECTOR) TO THE SORT SUBROUTINE HAS ALL ELEMENTS = +EIS*.8* 76 14 *****1 77 INT (A VECTOR) TO THE SORT SUBROUTINE HAS THE VALUE I*****) 81 18 FORMAT(IH - JOH***** NON=FATAL DIAGNOSTIC==THE SECOND INPUT ARGUMENT TO THE 82 1NT TO THE SORT SUBROUTINE HAS THE VALUE I*****) 83 47 FORMAT(IH - JOH***** THE VALUE OF THE ARGUMENT IS .18 .6H *****) 84 100 CONTINUE 85 C 86 C 97 FORMAT(IH - SH**** THE VALUE OF THE ARGUMENT IS .18 .6H *****) 86 C 97 DOIODITINE 87 Y(I)=X(I) 87 <td< td=""><td>63</td><td>60 CONTINUE</td></td<>	63	60 CONTINUE
65 D061121:N 66 Y(1):X(1) 67 61 CONTINUE 68 RTURN 69 50 WRITE(IPR:45) 71 RETURN 72 55 WRITE(IPR:45) 73 Y(1):X(1) 74 RETURN 75 90 CONTINUE 76 90 CONTINUE 77 INT (A VECTOR) TO THE SORT SUBROUTINE HAS ALL ELEMENTS = *E15.8.6 78 11 ****** 79 15 FORMAT(1H + 1)8H**** FATAL ERRORTHE SECOND INPUT ARGUMENT TO THE 80 18 FORMAT(1H + 1)8H***** FATAL ERRORTHE SECOND INPUT ARGUMENT TO THE 81 18 FORMAT(1H + 1)5H***** NON-FATAL DIAGNOSTICTHE SECOND INPUT ARGUME 82 INT TO THE SORT SUBROUTINE HAS THE VALUE 1 *****) 83 47 FORMAT(1H + 1)5H***** HE VALUE 0T THE ARGUMENT IS ,18 ',6H *****) 84 C 85 C 86 D01001=1.N 97 Y(1)=X(1) 88 100 CONTINUE 99 C 90 C 91 C 92 NM1=-1 93 D02001=1.N	64	WRITE(IPR, 9)HOLD
60 T(1)=X(1) 67 61 CONTINUE 68 RETURN 69 50 WRITE(IPR+15) 71 RETURN 72 55 WRITE(IPR+16) 73 Y(1)=X(1) 74 RETURN 75 90 CONTINUE 76 9 FORMAT(1H +)0AH***** NON=FATAL DIAGNOSTIC=-THE FIRST INPUT ARGUME 77 INT (A VECTOR) TO THE SORT SUBROUTINE HAS ALL ELEMENTS = +E15.63*6 78 11 SAFA***) 79 15 FORMAT(1H +)10H***** FATAL ERROR=THE SECOND INPUT ARGUMENT TO THE 81 18 FORMAT(1H +)10H****** FATAL ERROR=THE SECOND INPUT ARGUMENT TO THE 82 INT TO THE SORT SUBROUTIVE HAS THE VALUE SECOND INPUT ARGUMENT 83 47 FORMAT(1H +) 35H***** THE VALUE OF THE ARGUMENT IS ,IB ,6H *****) 84 C 85 C 86 100 CONTINUE 90 C 91 C 92 NMI=N-1 93 002001=1,*NM1 94 IPI=T+1 95 IF(Y(1) .LE,Y(IPI))6GT0200 96 GOT0250 97 200 CONTINUE	65	
67 61 CMMITE(IPR.15) 68 RETURN 69 50 WRITE(IPR.15) 71 RETURN 72 55 WRITE(IPR.15) 73 Y(1)=x(1) 74 RETURN 75 90 CONTINUE 76 9 FORMAT(IH + 10AH***** NON-FATAL DIAGNOSTICTHE FIRST INPUT ARGUME 77 INT (A VECTOR) TO THE SORT SUBROUTINE HAS ALL ELEMENTS = ,E15.8.6 78 I + ***** 79 15 FORMAT(IH + 10AH***** NON-FATAL DIAGNOSTICTHE SECOND INPUT ARGUMENT TO THE 80 I SORT SUBROUTINE IS NON-POSITILE ******) 81 16 FORMAT(IH + 10AH***** NON-FATAL DIAGNOSTICTHE SECOND INPUT ARGUMENT 82 INT TO THE SORT SUBROUTINE HAS THE VALUE 0 THE *****) 83 47 FORMAT(IH + 10AH***** NON-FATAL DIAGNOSTICTHE SECOND INPUT ARGUMENT 84 C 85 C OOPY THE VECTOR X INTO THE VECTOR Y 86 100 CONTINUE 87 C 88 100 90 C 91 C 92 NMI=N-1 93 D02001=1.*N 94	66	
00 NCIDAT 01 WRITE (IPR.15) 02 WRITE (IPR.15) 03 WRITE (IPR.15) 04 WRITE (IPR.15) 15 WRITE (IPR.16) 16 Y(1)=x(1) 17 RETURN 17 RETURN 17 RETURN 17 RETURN 18 FORMAT(1H + JOH+**** NON-FATAL DIAGNOSTICTHE FIRST INPUT ARGUME 114 IAV (A VECTOR) TO THE SORT SUBROUTINE HAS ALL ELEMENTS = FEI5.8*6 114 IAVENTAL (IH + JOH***** NON-FATAL DIAGNOSTICTHE SECOND INPUT ARGUME 115 FORMAT(1H + JOH***** FATAL ERRORTHE SECOND INPUT ARGUMENT TO THE 116 FORMAT(1H + JOH***** FATAL DIAGNOSTICTHE SECOND INPUT ARGUME 117 TO THE SORT SUBROUTINE HAS THE VALUE 1 ******) 118 FORMAT(1H + JOH***** THE VALUE OF THE ARGUMENT IS , 18 110 THE VECTOR X INTO THE VECTOR Y 110 DO10151+N 110 C 111 IF(Y(1).LE.Y(IP)))6010200 111 G 112 MIEN-1 113 DO200151+N 114 MIDC(1+J)/2	61	DETION
0 WRITE(IPR:47)N 71 RETURN 72 SWRITE(IPR:47)N 73 Y(1)=X(1) 74 RETURN 75 90 CONTINUE 76 9 FORMAT(1H . 104H***** NON=FATAL DIAGNOSTIC=THE FIRST INPUT ARGUME 77 INT (A VECTOR) TO THE SORT SUBROUTINE HAS ALL ELEMENTS = .EIS.8.6 78 IH ***** 79 15 FORMAT(1H . 91H***** FATAL ERROR=THE SECOND INPUT ARGUMENT TO THE 80 INT TO THE SORT SUBROUTIVE HAS THE VALUE 1 ******) 81 18 FORMAT(1H . 35H***** FATAL ERROR=THE SECOND INPUT ARGUMENT TO THE 82 INT TO THE SORT SUBROUTIVE HAS THE VALUE 1 ******) 83 47 FORMAT(1H . 35H***** THE VALUE OF THE ARGUMENT IS .JB .6H *****) 84 C 85 C 84 C 85 C 86 DOIODITINUE 87 Y(1)=X(1) 88 C 90 C 91 C 92 C 93 D0200151:NM1 94 IF(Y(1).LE.Y(IPT))60T0200 95 GOIO250 96	60	SO WRITE(IDR.15)
71 RETURN 72 55 WRITE(IPR+18) 73 Y(1)=X(1) 74 RETURN 75 90 CONTINUE 76 9 FORMAT(IH + 10RH**** NON-FATAL DIAGNOSTICTHE FIRST INPUT ARGUME 77 IAT (A VECTOR) TO THE SORT SUBROUTINE HAS ALL ELEMENTS = +E15.8+6 78 IAT (A VECTOR) TO THE SORT SUBROUTINE HAS ALL ELEMENTS = +E15.8+6 79 15 FORMAT(IH +) 91H***** FATAL ERRORTHE SECOND INPUT ARGUMENT TO THE 81 18 FORMAT(IH +) 91H***** FATAL ERRORTHE SECOND INPUT ARGUMENT TO THE 82 IAT TO THE SORT SUBROUTINE HAS THE VALUE 1 *****) 83 47 FORMAT(IH + 35H**** THE VALUE OF THE ARGUMENT IS , 18 , 6H *****) 84 C COPY THE VECTOR X INTO THE VECTOR Y 85 C COPY THE VECTOR X INTO THE VECTOR IS ALREADY SORTED 96 C 97 200 CONTINUE 98 RETURN 99 200 CONTINUE 98 RETURN 99 250 M=1 101 J=N 102 CONTINUE 98 RETURN 99 250 M=1 101 J=N	70	WRITE(IPR, 47)N
72 55 wRITE(IPR:18) 73 Y(1)=X(1) 74 RETURN 75 90 CONTINUE 76 9 FORMAT(1H + JUBH***** NON-FATAL DIAGNOSTICTHE FIRST INPUT ARGUME 77 INT (A VECTOR) TO THE SORT SUPROUTINE HAS ALL ELEMENTS = ,EIS.8*6 78 11 79 15 FORMAT(1H + JUBH**** FATAL ERRORTHE SECOND INPUT ARGUMENT TO THE 80 1 sort SUPROUTINE HAS THE VALUE 1 *****) 81 18 FORMAT(1H + JUBH**** NON-FATAL DIAGNOSTICTHE SECOND INPUT ARGUME 82 INT TO THE SORT SUPROUTINE HAS THE VALUE 1 *****) 83 47 FORMAT(1H + JUBH**** NON-FATAL DIAGNOSTICTHE SECOND INPUT ARGUME 84 C 85 C COPY THE VECTOR X INTO THE VALUE 0 THE ARGUMENT IS , 18 , 6H *****) 84 C 85 C COPY THE VECTOR X INTO THE VECTOR Y 86 100 CONTINUE 87 D02001F1:N 88 100 CONTINUE 89 C 90 C CHECK TO SEE IF THE INPUT VECTOR IS ALREADY SORTED 91 C 92 NM1=N-1 93 D02001F1:NM1 94 IFI(Y(1).LE.Y(IPI))60T0200 <	71	RETURN
73 Y(1)=x(1) 74 RETURN 75 90 CONTINUE 76 9 FORMAT(1H +108H**** NON=FATAL DIAGNOSTICTHE FIRST INPUT ARGUME 77 INT (A VECTOR) TO THE SORT SUBROUTINE HAS ALL ELEMENTS = rE15.8% 78 IH ***** 79 15 FORMAT(1H , 91H**** FATAL ERRORTHE SECOND INPUT ARGUMENT TO THE 80 1 SORT SUBROUTINE IS NON-POSITIVE *****) 81 18 FORMAT(1H , 100H**** NON-FATAL DIAGNOSTICTHE SECOND INPUT ARGUME 82 INT TO THE SORT SUBROUTINE HAS THE VALUE 1 *****) 83 47 FORMAT(1H , 35H**** NON-FATAL DIAGNOSTICTHE SECOND INPUT ARGUME 84 C 85 C COPY THE VECTOR X INTO THE VALUE OF THE ARGUMENT IS ,18 ,6H *****) 84 C 85 C COPY THE VECTOR X INTO THE VECTOR Y 86 100 CONTINUE 87 Y(1)=X(1) 88 100 CONTINUE 89 C 90 C 91 C 92 MI=N-1 93 DO2001=1+NM1 94 IPI=I+1 95 IF(Y(1),LE,Y(IPI))GOT0200 96 GOT250	72	55 WRITE(IPR+18)
74 RETURN 75 90 CONTINUE 76 9 FORMAT(IH + 10AH**** NON-FATAL DIAGNOSTICTHE FIRST INPUT ARGUME 77 INT (A VECTOR) TO THE SORT SURROUTINE HAS ALL ELEMENTS = rE15.8+6 78 1H *****1 79 15 FORMAT(IH , 91H**** FATAL ERRORTHE SECOND INPUT ARGUMENT TO THE 80 1 SORT SUBROUTINE IS NON-POSITIVE *****) 81 18 FORMAT(IH , 100H**** NON-FATAL DIAGNOSTICTHE SECOND INPUT ARGUMENT 82 INT TO THE SORT SUBROUTINE HAS THE VALUE 1 *****) 84 C 85 C COPY THE VECTOR X INTO THE VECTOR Y 86 D01001=1:N 87 Y(I)=X(I) 88 100 CONTINUE 89 C 90 C ONTINUE 91 C 92 NM1=N-1 93 D02001=1:NM1 94 IP1=I:N1 95 IF(Y(I).E.Y(IP1))60T0200 96 GOT0250 97 200 CONTINUE 98 RETURN 99 250 M=1 101 J=N 102 300 K=1 103 310	73	Y(1) = X(1)
75 90 CONTINUE 76 9 FORMAT(1H +1)UAH***** NON-FATAL DIAGNOSTICTHE FIRST INPUT ARGUME 77 INT (A VECTOR) TO THE SORT SURROUTINE HAS ALL ELEMENTS = ,e15.8,6 78 1H *****) 79 15 FORMAT(1H , 91H***** FATAL ERRORTHE SECOND INPUT ARGUMENT TO THE 80 1 SORT SUBROUTINE IS NON-POSITIVE *****) 81 18 FORMAT(1H , 100H***** NON-FATAL DIAGNOSTICTHE SECOND INPUT ARGUMENT 82 INT TO THE SORT SUBROUTIVE HAS THE VALUE 1 *****) 84 C 85 C COPY THE VECTOR X INTO THE VECTOR Y 86 D0100T=1.N 87 Y(1)=x(1) 88 100 CONTINUE 89 C 90 C CHECK TO SEE IF THE INPUT VECTOR IS ALREADY SORTED 91 C 92 NM1=N-1 93 D02001F1.NM1 94 IP1=I+1 95 IF(Y(1).LE.Y(IP1))GOT0200 96 GOT0250 97 200 CONTINUE 98 RETURN 99 250 M=1 101 J=N 102 305 IF(I.GE.J)GOT0370 103 GOT	74	RETURN
76 9 FORMAT(1H + 10 H#**** NON-FATAL DIAGNOSTIC=-THE FIRST INPUT ARGUME 77 INT (A VECTOR) TO THE SORT SUBROUTINE HAS ALL ELEMENTS = ,E15.8*6 78 1H *****) 79 15 FORMAT(1H , 91H***** FATAL ERRORTHE SECOND INPUT ARGUMENT TO THE 80 1B FORMAT(1H , 100H***** FATAL ERRORTHE SECOND INPUT ARGUMENT TO THE 81 1B FORMAT(1H , 100H***** NON-FATAL DIAGNOSTICTHE SECOND INPUT ARGUMENT 82 1NT TO THE SORT SUBROUTINE HAS THE VALUE 1*****) 83 47 FORMAT(1H , 35H***** THE VALUE OF THE ARGUMENT IS , 18 , 6H ****) 84 C 85 C COPY THE VECTOR X INTO THE VECTOR Y 86 100 CONTINUE 87 C 88 100 CONTINUE 89 C 90 C 91 C 92 NM1=N-1 93 D02001=1,NM1 94 IP1=I+1 95 IF(Y(1).LE,Y(IP1))GOT0200 96 GOT0250 97 200 CONTINUE 98 RETURN 99 250 M=1 101 J=N 102 J=1 103	75	90 CONTINUE
7/7 INT (A VECTOR) TO THE SORROOTINE HAS ALL ELEMENTS = 7E15.876 18 IN ***** 79 15 FORMAT(1H, 91H***** FATAL ERRORTHE SECOND INPUT ARGUMENT TO THE 80 1 SORT SUBROUTINE IS NON-POSITIVE *****) 81 18 FORMAT(1H, 100H***** NON-FATAL DIAGNOSTICTHE SECOND INPUT ARGUMENT 82 INT TO THE SORT SUBROUTINE HAS THE VALUE 1 *****) 83 47 FORMAT(1H, 35H**** THE VALUE OF THE ARGUMENT IS ,18 ,6H *****) 84 C 85 C 86 D01001=1:N 87 Y(1)=x(1) 88 100 CONTINUE 89 C 90 C 91 C 92 NM1=N-1 93 D02001=1:NM1 94 IP1=I+1 95 IF(Y(1).LE.Y(IP1))GOT0200 96 GOT0520 97 200 CONTINUE 98 RETURN 99 250 M=1 101 J=N 102 305 IF(I.6E.J)6OT0370 103 310 K=1 104 MID=(I+J)/2 105 AMED=Y(MID)	76	9 FORMAT(IH + 108H***** NON-FATAL DIAGNOSTICTHE FIRST INPUT ARGUME
16 IM *****) 15 FORMAT(1H + 91H***** FATAL ERRORTHE SECOND INPUT ARGUMENT TO THE 80 1 SORT SUBROUTINE IS NON-POSITIVE *****) 81 18 82 INT TO THE SORT SUBROUTINE HAS THE VALUE 1 *****) 83 47 84 C 85 C 86 DOID01=1*N 87 Y FORMAT(1H + 35H**** THE VALUE OF THE ARGUMENT IS , 18 , 6H *****) 88 100 CONTINUE 89 C 90 C 91 C 90 C 91 C 92 NM1=N-1 93 DO2001=1*NM1 94 IP1=1*1 95 IF(Y(1).LE.Y(IP1))GOTO200 96 GOTO370 97 200 CONTINUE 98 RETURN 99 250 90 I=1 91 J=N 92 SO IF(1.6E.J)GOTO370 93 JOSIF(1.6E.J)GOTO370 94 IP1=1*1 95 IF(Y(1).E.AMED)GOTO320 96	11	INI (A VECTOR) TO THE SORT SUPROUTINE HAS ALL ELEMENTS = FEIS-876
1 SORT SUBROUTINE IS NON-POSITIVE ******) 81 18 FORMAT(1H + 100H***** NON-POSITIVE ******) 82 INT TO THE SORT SUBROUTINE HAS THE VALUE 1******) 83 47 FORMAT(1H + 35H***** THE VALUE 0F THE SECOND INPUT ARGUME 84 C C COPY THE VECTOR X INTO THE VECTOR Y 85 C COPY THE VECTOR X INTO THE VECTOR IS ALREADY SORTED 86 D01001=1*N N 87 Y(1)=x(1) N 88 100 CONTINUE C 90 C CHECK TO SEE IF THE INPUT VECTOR IS ALREADY SORTED 91 C NM1=N-1 93 D02001=1*NM1 94 IP1=1+1 95 IF(Y(1).LE.Y(IP1))GOT0200 96 GOT0250 97 200 CONTINUE 98 RETURN 99 250 M=1 101 J=N 102 305 IF(I.6E.J)GOT0370 103 310 K=1 104 MDE1(I+J)/2 105 AMED=Y(MID) 106 IF(Y(1).LE.AMED)GOT0320 117 Y(MI	78	15 FORMAT(1) + 91H***** FATAL FRROR-THE SECOND INDUIT ARGUMENT TO THE
31 13 FORMAT(1H + 100H***** NON-FATAL DIAGNOSTICTHE SECOND INPUT ARGUME 32 1NT TO THE SORT SURROUTINE HAS THE VALUE 1 *****) 33 47 FORMAT(1H , 35H***** THE VALUE OF THE ARGUMENT IS , 18 , 6H *****) 34 C 35 C COPY THE VECTOR X INTO THE VECTOR Y 36 D01001=1:N 37 Y(1)=X(1) 38 100 39 C 30 C 310 CONTINUE 32 M1=N-1 33 D02001=1:N 34 IP1=I+1 35 IF(Y(1).LE.Y(IP1))GOT0200 36 GOT0250 37 200 CONTINUE 39 RETURN 30 K=I 101 J=N 111 J=N 124 MID=(I+J)/2 125 ME(ID) 126 J=N 127 Y(MID)=Y(I) 128 Y(MID)=Y(I) 129 Y(MID)=Y(I) 130 Y(1)=AMED 140 MED=Y(MID) 150	80	1 SOPT SUBPOLITINE IS NON-POSITIVE ****)
1NT TO THE SORT SURROUTINE HAS THE VALUE 1 *****) 47 83 47 84 C 85 C 85 C 86 D01001=1.* 87 Y(1)=x(1) 88 100 89 C 90 C 91 C 92 NM1=N-1 93 D02001=1.*N1 94 IP1=I+1 95 IF(Y(1).EE.Y(IP1))GOT0200 96 GOT0250 97 200 CONTINUE 98 RETURN 99 250 M=1 101 J=N 102 305 IF(1.6E.J)GOT0370 103 310 K=I 104 MID=(I+J)/2 105 AMED=Y(MID) 106 IF(Y(1).LE.AMED)GOT0320 107 Y(MID)=Y(I) 108 Y(1)=AMED 109 AMED=Y(MID) 110 320 L=J 111 IF(Y(J).6E.AMED)GOT0340 112 Y(MID)=Y(J) 113 Y(J)=AMED <td>81</td> <td>18 FORMAT (1H + 100H**** NON-FATAL DIAGNOSTICTHE SECOND INPUT ARGUME</td>	81	18 FORMAT (1H + 100H**** NON-FATAL DIAGNOSTICTHE SECOND INPUT ARGUME
<pre>83</pre>	82	INT TO THE SORT SUBBOUTINE HAS THE VALUE 1 *****)
84 C 85 C COPY THE VECTOR X INTO THE VECTOR Y 86 D01001=1:N 87 Y(I)=x(I) 88 100 89 C 90 C 91 C 92 NM1=N-1 93 D02001=1:NM1 94 IP1=1+1 95 IF(Y(I).LE.Y(IP1))60T0200 96 GOT0250 97 200 98 RETURN 99 250 91 J=N 100 I=1 101 J=N 102 305 IF(1.6E.J)6OT0370 103 310 K=I 104 MID=(I+J)/2 105 AMED=Y(MID) 106 IF(Y(I).LE.AMED)6OT0320 107 Y(MID)=Y(I) 108 Y(I)=AMED 109 AMED=Y(MID) 110 320 L=J 111 IF(Y(J).6E.AMED)6OT0340 112 Y(MID)=Y(J) 113 Y(J)=AMED 114 AMED=Y(MID)	83	47 FORMAT(1H , 35H**** THE VALUE OF THE ARGUMENT IS , IB , 6H *****)
85 C COPY THE VECTOR X INTO THE VECTOR Y 86 DO100I=1.N 87 Y(I)=x(I) 88 100 CONTINUE 89 C 90 C CHECK TO SEE IF THE INPUT VECTOR IS ALREADY SORTED 91 C 92 NM1=N-1 93 DO200I=1.NM1 94 IP1=I+1 95 IF(Y(I).LE.Y(IP1))GOTO200 96 GOT0250 97 200 98 RETURN 99 250 97 200 98 RETURN 99 250 90 IF(I.eE.J)GOT0370 101 J=N 102 305 103 310 104 MED=Y(MID) 105 AMED=Y(MID) 106 IF(Y(I).LE.AMED)GOT0320 107 Y(MID)=Y(I) 108 Y(I)=AMED 109 AMED=Y(MID) 110 320 121 IF(Y(J).GE.AMED)GOT0340 112 Y(MID)=Y(J)	84	c
86 D01001=1.N Y(I)=X(I) 87 Y(I)=X(I) 88 100 CONTINUE 89 C 90 C 91 C 92 NM1=N-1 93 D02001=1.NM1 94 IP1=I+1 95 IF(Y(I).LE.Y(IP1))GOT0200 96 GOT0250 97 200 CONTINUE 98 RETURN 99 250 M=1 101 J=N 102 305 IF(I.GE.J)GOT0370 103 310 K=I 104 MID=(I+J)/2 105 AMED=Y(MID) 106 IF(Y(I).LE.AMED)GOT0320 107 Y(MID)=Y(I) 108 Y(I)=AMED 109 AMED=Y(MID) 110 320 L=J 111 IF(Y(U).GE.AMED)GOT0340 112 Y(MID)=Y(J) 113 Y(J)=AMED 114 AMED=Y(MID) 115 IF(Y(I).LE.AMED)GOT0340	85	C COPY THE VECTOR X INTO THE VECTOR Y
87 Y(1)=X(1) 88 100 CONTINUE 90 C CHECK TO SEE IF THE INPUT VECTOR IS ALREADY SORTED 91 C 92 NM1=N-1 93 D02001=1,NM1 94 IP1=I+1 95 IF(Y(1).LE.Y(IP1))GOT0200 96 GOT0250 97 200 98 RETURN 99 250 91 J=N 101 J=N 102 305 11 J=N 102 305 110 J=N 102 305 103 310 K=I 104 MID=(I+J)/2 105 AMED=Y(MID) 106 IF(Y(I).LE.AMED)GOT0320 107 Y(MID)=Y(I) 108 Y(1)=AMED 109 AMED=Y(MID) 110 320 121 Y(MID)=Y(J) 113 Y(J)=AMED 114 AMED=Y(MID) 115 IF(Y(I).LE.AMED)GOT0340 <td>86</td> <td>D0100I=1+N</td>	86	D0100I=1+N
88 100 CONTINUE 89 C 90 C CHECK TO SEE IF THE INPUT VECTOR IS ALREADY SORTED 91 C 92 NM1=N-1 93 D02001=1+NM1 94 IP1=I+1 95 IF(Y(I).LE.Y(IP1))GOTO200 96 GOTO250 97 200 CONTINUE 98 RETURN 99 250 M=1 100 I=1 101 J=N 102 305 IF(I.6E.J)GOTO370 103 310 K=I 104 MID=(I+J)/2 105 AMED=Y(MID) 106 IF(Y(I).LE.AMED)GOTO320 Y(MID)=Y(I) Y(I)=AMED 108 Y(I)=AMED 109 AMED=Y(MID) 110 320 L=J 111 IF(Y(J).GE.AMED)GOTO340 112 Y(MID)=Y(J) 113 Y(J)=AMED 114 AMED=Y(MID) 115 IF(Y(I).LE.AMED)GOTO340	87	Y(I) = X(I)
89 C 90 C 91 C 92 NM1=N-1 93 D02001=1,NM1 94 IP1=I+1 95 IF(Y(I).LE.Y(IP1))GOT0200 96 GOT0250 97 200 98 RETURN 99 250 91 I=1 100 I=1 101 J=N 102 305 IF(I.6E.J)GOT0370 103 310 K=I 104 MID=(I+J)/2 105 AMED=Y(MID) 106 IF(Y(I).LE.AMED)GOT0320 107 Y(MID)=Y(I) 108 Y(I)=AMED 109 AMED=Y(MID) 110 IF(Y(J).GE.AMED)GOT0340 111 IF(Y(J).GE.AMED)GOT0340 112 Y(MID)=Y(J) 113 Y(J)=AMED 114 AMED=Y(MID) 115 IF(Y(I).LE.AMED)GOT0340	88	100 CONTINUE
91 C 92 NM1=N-1 93 D02001=1+NM1 94 IP1=I+1 95 IF(Y(I).LE.Y(IP1))GOT0200 96 GOT0250 97 200 98 RETURN 99 250 91 L 92 SOMTINUE 98 RETURN 99 250 99 250 11 J=N 100 I=1 101 J=N 102 305 11 J=N 103 310 104 MID=(I+J)/2 105 AMED=Y (MID) 106 IF(Y(I).LE.AMED)GOT0320 107 Y (MID)=Y(I) 108 Y(1)=AMED 109 AMED=Y (MID) 110 320 12 Y (MID)=Y(J) 13 Y (J) = AMED 14 AMED=Y (MID) 115 IF (Y(I).LE.AMED)GOT0340	89	C CHECK TO SEE TE THE INDUIT VECTOR IS AN READY CORTED
92 NM1=N-1 93 D0200I=1;NM1 94 IP1=I+1 95 IF(Y(I).LE.Y(IP1))GOT0200 96 GOT0250 97 200 98 RETURN 99 250 1=1 January 100 I=1 101 J=N 102 305 15 IF(I.GE.J)GOT0370 103 310 104 MID=(I+J)/2 105 AMED=Y(MID) 106 IF(Y(I).LE.AMED)GOT0320 107 Y(MID)=Y(I) 108 Y(I)=AMED 109 AMED=Y(MID) 110 320 111 IF(Y(J).GE.AMED)GOT0340 112 Y(MID)=Y(I) 113 Y(J)=AMED 114 AMED=Y(MID) 115 IF(Y(I).LE.AMED)GOT0340	90 Q1	C CHECK TO SEE IT THE INFOIL VECTOR IS ALREADT SORTED
93 D0200I=1,NM1 94 IP1=I+1 95 IF(Y(I).LE.Y(IP1))GOT0200 96 GOT0250 97 200 98 RETURN 99 250 101 J=N 102 305 103 310 104 MID=(I+J)/2 105 AMED=Y(MID) 106 IF(Y(I).LE.AMED)GOT0320 107 Y(MID)=Y(I) 108 Y(I)=AMED 109 AMED=Y(MID) 108 Y(I)=AMED 109 AMED=Y(MID) 110 J20 111 IF(Y(J).GE.AMED)GOT0340 112 Y(MID)=Y(J) 113 Y(J)=AMED 114 AMED=Y(MID) 115 IF(Y(I).LE.AMED)GOT0340	92	NM1=N-1
94 IP1=I+1 95 IF(Y(I).LE.Y(IP1))GOTO200 96 GOTO250 97 200 98 RETURN 99 250 101 J=N 102 305 103 310 104 MID=(I+J)/2 105 AMED=Y(MID) 106 IF(Y(I).LE.AMED)GOTO320 107 Y(MID)=Y(I) 108 Y(I)=AMED 109 AMED=Y(MID) 110 320 111 IF(Y(J).GE.AMED)GOTO340 112 Y(MID)=Y(J) 113 Y(J)=AMED 114 AMED=Y(MID) 115 IF(Y(I).LE.AMED)GOTO340	93	D02001=1,NM1
95 IF(Y(I).LE.Y(IP1))GOTO200 96 GOTO250 97 200 CONTINUE 98 RETURN 99 250 M=1 100 I=1 101 J=N 102 305 IF(I.GE.J)GOT0370 103 310 K=I 104 MID=(I+J)/2 105 AMED=Y(MID) 106 IF(Y(I).LE.AMED)GOT0320 107 Y(MID)=Y(I) 108 Y(I)=AMED 109 AMED=Y(MID) 110 320 121 IF(Y(J).GE.AMED)GOT0340 112 Y(MID)=Y(J) 113 Y(J)=AMED 114 AMED=Y(MID) 115 IF(Y(I).LE.AMED)GOT0340	94	IP1=I+1
96 GOTO250 97 200 CONTINUE 98 RETURN 99 250 100 I=1 101 J=N 102 305 IF(I.GE.J)GOTO370 103 310 K=I 104 MID=(I+J)/2 105 AMED=Y(MID) 106 IF(Y(I).LE.AMED)GOTO320 107 Y(MID)=Y(I) 108 Y(I)=AMED 109 AMED=Y(MID) 110 320 121 IF(Y(J).GE.AMED)GOTO340 112 Y(MID)=Y(J) 113 Y(J)=AMED 114 AMED=Y(MID) 115 IF(Y(I).LE.AMED)GOTO340	95	IF(Y(I)+LE+Y(IP1))GOTO200
97 200 CONTINUE 98 RETURN 99 250 M=1 100 I=1 101 J=N 102 305 IF(I.6E.J)GOT0370 103 310 K=I 104 MID=(I+J)/2 105 AMED=Y(MID) 106 IF(Y(I).E.AMED)GOT0320 107 Y(MID)=Y(I) 108 Y(I)=AMED 109 AMED=Y(MID) 110 320 12 Y(MID)=Y(J) 13 Y(J)=AMED 14 AMED=Y(MID) 115 IF(Y(I).LE.AMED)GOT0340	96	G0T0250
98 RETURN 99 250 M=1 100 I=1 101 J=N 102 305 IF(I.GE.J)GOT0370 103 310 K=I 104 MID=(I+J)/2 105 AMED=Y(MID) 106 IF(Y(I).E.AMED)GOT0320 107 Y(MID)=Y(I) 108 Y(I)=AMED 109 AMED=Y(MID) 110 320 L=J 111 IF(Y(J).GE.AMED)GOT0340 112 Y(MID)=Y(J) 113 Y(J)=AMED 114 AMED=Y(MID) 115 IF(Y(I).LE.AMED)GOT0340	97	200 CONTINUE
99 250 M=1 100 I=1 101 J=N 102 305 IF(I.6E.J)GOT0370 103 310 K=I 104 MID=(I+J)/2 105 AMED=Y(MID) 106 IF(Y(I).LE.AMED)GOT0320 107 Y(MID)=Y(I) 108 Y(I)=AMED 109 AMED=Y(MID) 110 320 121 IF(Y(J).GE.AMED)GOT0340 112 Y(MID)=Y(J) 113 Y(J)=AMED 114 AMED=Y(MID) 115 IF(Y(I).LE.AMED)GOT0340	98	RETURN
100 1=1 101 J=N 102 305 IF(I.6E.J)60T0370 103 310 K=I 104 MID=(I+J)/2 105 AMED=Y(MID) 106 IF(Y(I).LE.AMED)60T0320 107 Y(MID)=Y(I) 108 Y(I)=AMED 109 AMED=Y(MID) 110 320 121 IF(Y(J).6E.AMED)60T0340 112 Y(MID)=Y(J) 113 Y(J)=AMED 114 AMED=Y(MID) 115 IF(Y(I).LE.AMED)60T0340	99	250 M=1
102 305 IF(I.6E.J)GOT0370 103 310 K=I 104 MID=(I+J)/2 105 AMED=Y(MID) 106 IF(Y(I).LE.AMED)GOT0320 107 Y(MID)=Y(I) 108 Y(I)=AMED 109 AMED=Y(MID) 110 320 L=J 111 IF(Y(J).6E.AMED)GOT0340 112 Y(MID)=Y(J) 113 Y(J)=AMED 114 AMED=Y(MID) 115 IF(Y(I).LE.AMED)GOT0340		
103 310 K=I 104 MID=(I+J)/2 105 AMED=Y(MID) 106 IF(Y(I).LE.AMED)GOTO320 107 Y(MID)=Y(I) 108 Y(I)=AMED 109 AMED=Y(MID) 110 320 12 Y(MID)=Y(J) 13 Y(J)=AMED 14 AMED=Y(MID) 115 IF(Y(I).LE.AMED)GOTO340	102	
I04 MID=(I+J)/2 I05 AMED=Y(MID) I06 IF(Y(I).LE.AMED)GOTO320 I07 Y(MID)=Y(I) I08 Y(I)=AMED I09 AMED=Y(MID) I10 320 I11 IF(Y(J).GE.AMED)GOTO340 I12 Y(MID)=Y(J) I13 Y(J)=AMED I14 AMED=Y(MID) I15 IF(Y(I).LE.AMED)GOTO340	103	
105 AMED=Y(MID) 106 IF(Y(I).LE.AMED)GOTO320 107 Y(MID)=Y(I) 108 Y(I)=AMED 109 AMED=Y(MID) 100 320 L=J 111 IF(Y(J).GE.AMED)GOTO340 112 Y(MID)=Y(J) 113 Y(J)=AMED 114 AMED=Y(MID) 115 IF(Y(I).LE.AMED)GOTO340	104	MID=(I+J)/2
106 IF(Y(I).LE.AMED)GOT0320 107 Y(MID)=Y(I) 108 Y(I)=AMED 109 AMED=Y(MID) 110 320 12 Y(MID)=Y(J) 113 Y(J)=AMED 114 AMED=Y(MID) 115 IF(Y(I).LE.AMED)GOT0340	105	AMED=Y(MID)
L07 Y(MID)=Y(I) L08 Y(I)=AMED L09 AMED=Y(MID) L10 320 L=J L11 IF(Y(J).GE.AMED)GOT0340 L12 Y(MID)=Y(J) L13 Y(J)=AMED L14 AMED=Y(MID) L15 IF(Y(I).LE.AMED)GOT0340	106	IF(Y(I).LE.AMED)GOTO320
L08 Y(I)=AMED L09 AMED=Y(MID) L10 320 L=J L11 IF(Y(J).GE.AMED)GOT0340 L12 Y(MID)=Y(J) L13 Y(J)=AMED L14 AMED=Y(MID) L15 IF(Y(I).LE.AMED)GOT0340	107	Y(MID)=Y(I)
LU9 AMED=Y(MID) L10 320 L=J L11 IF(Y(J).GE.AMED)GOTO340 L12 Y(MID)=Y(J) L13 Y(J)=AMED L14 AMED=Y(MID) L15 IF(Y(I).LE.AMED)GOTO340	108	Y(I)=AMED
10 520 L=3 111 IF(Y(J).GE.AMED)GOTO340 12 Y(MID)=Y(J) 13 Y(J)=AMED 14 AMED=Y(MID) 15 IF(Y(I).LE.AMED)GOTO340	109	AMEDITY (MID)
112 Y(MID)=Y(J) 113 Y(J)=AMED 114 AMED=Y(MID) 115 IF(Y(I).LE.AMED)GOTO340		
113 Y(J)=AMED 114 AMED=Y(MID) 115 IF(Y(I).LE.AMED)GOTO340	112	
114 AMED=Y(MID) 115 IF(Y(I).LE.AMED)GOTO340	113	Y(.) = A F D
IS IF(Y(I).LE.AMED)GOTO340	114	AMED=Y(MID)
	115	IF(Y(I).LE.AMED)GOTO340

	Y(MID)=Y(I)
	Y(I)=AMED
	AMED=Y(MID)
	GOT0340
330	Y(L)=Y(K)
	Y(K)=TT
340	L=L-1
	IF(Y(L).GT.AMED)GOT0340
	TT=Y(L)
350	K=K+1
	IF(Y(K).LT.AMED)GOT0350
	IF(K.LE.L)GOT0330
	LMI=L-I
	JMK=J-K
	IF(LMI.LE.JMK)GOT0360
	IL(M)=I
	IU(M)=L
	I=K
	M=M+1
	GOTO380
360	IL(M)=K
	IU(M)=J
	J=L
	M=M+1
	GOTO380
370	M=M-1
	IF(M.EQ.0)RETURN
	I=IL(M)
	J=IU(M)
380	
	IF(JM1.GE.11)G010310
	IF(I.EQ.1)G010305
700	
240	
	AMED-1(1+1) 16(Y(1) LE ANED)COTO300
	V-T
105	X(K+1) = X(K)
393	K=K=1
	TE (AMED J T.Y(K)) GOTO 395
	Y(K+1)=AMED
	6010390
	END

PRT.S SIMIU.UNIMED

-

JJE6*STM1	J. UNIM	FD
1		
2	c	SUBLOUTINE DURINE CONTROL
3	č	THIS DOUTINE COMPUTES AN APPROXIMATION TO THE MEDIAN OF THE LETH OPDER
5	č	CTATISTIC (EVENTS) AN ALL STATISTICS THE PECTAN OF THE ITH ONLER
4	C C	STATISTIC (POR I - 1727) PROP P (IMTEGMA DISTRIBUTION (ON THE UNIT
5	C C	INTERVAL (0)177
6	C	THIS IS IDENTICAL TO THE MEDIAN OF THE BETA DISTRIBUTION WITH PARAMETERS
7	C	I AND $N-I+I$ FOR $I=1+2+\dots+N$.
8	С	THE INPUT TO THIS ROUTINE IS THE DESIRED INTEGER SAMPLE SIZE N
9	С	AND AN EMPTY SINGLE PRECISION VECTOR X (OF DIMENSION AT LEAST N) INTO
10	С	WHICH THE N GENERATED UNIFORM ORDER STATISTIC MEDIANS WILL BE PLACED.
11	С	THE OUTPUT FROM THIS ROUTINE IS THE SINGLE PRECISION VECTOR X
12	С	INTO WHICH THE N GENERATED UNIFORM ORDER STATISTIC MEDIANS
13	Ċ	HAVE BEEN PLACED.
14	Ċ	ALL OF THE PROBABILITY PLOT ROUTINES MAKE USE OF THIS ROUTINE.
15	č	JUSTIFICATION AND ACCURACY OF THE ALGORITHM USED IS FOUND IN AN
16	č	UNPUBLISHED LIF MANUSCRIPT.
17	č	THERE IS NO DESTRICTION ON THE MAYIMUM VALUE OF N FOR THIS POLITINE.
10	č	DENTING NOTE INTERIOR OF THE DEALED FOR THE CONTINUE
10	č	THIS DOLLAR INCLESS AN EXAMPLE OF THIS DOLLARS AND THE DALLARS DEPATION
19	č	CUDDUITINES SINGLE PROTISION IN INTERNAL OPERATION
20	Č,	
21	C C	REFERENCE - UNPUBLISHED JOF MANUSCHIPT
22	C	WRITTEN BY JAMES J. FILLIMEN, STATISTICAL ENGINEERING LABORATORY (205.03)
23	C	NATIONAL SUREAU OF STANDARDS, WASHINGTON, D.C. 20234 JUNE 1972
24	С	
25		DIMENSION X(1)
26	С	
27		AN=N
28		IPR=6
29	С	
30	С	CHECK THE INPUT ARGUMENTS FOR ERRORS
31	С	
32		IF(N+LT+1)G0T050
33		IF(N.EQ.1)G0T055
34		GOTOAN
35		50 WRITE(IPR, 5)
36		WRITE(IPR,47)N
37		BETURN
38		55 WRITE(IPR+ 8)
30		
40		5 FORMATINE - 91H***** FATAL FRORTHE FIRST INDUT ARGUMENT TO THE
40		1 HAMMED SUBDITINE IS NON-DOSTIVE ****)
41		R CONTRACT ALLOLANANAN NON-FORTAL DIAGNOSTIC_TUS STATA
42		INTO THE UNITED SUBDUITINE HAS THE VALUE 1 STATE
45		TRUE TO THE UNATED SUBCOUTINE HAS THE VALUE I *****/
44	~	THE EXAMPLET A DELAWARA THE MARGA. ALL THE ARGUMENT IS 118 108 *****
45	C	
46		
47		
48		
49		
50		IF (N+NE+NEVOID) X (NHALF)=0.5
51		IF (N.LL. 3) RETURN
52		G4M=U.31/5
53		IMAX=11/2
54		D0100I=2+IMAx
55		AIII
56		I?EV=N-I+1
57		X(I) = (AI - 6AM) / (AN - 2.0 + 6AM + 1.)

 58
 X(IREV)=1.0-X(I)

 59
 100
 CONTINUE

 60
 RETURN

 61
 END

۶

MPRT.S SIMIU.EV1PLT

JJF6*SIMIU	.EV1PL	т
1		SUBROUTINE EVIPLT(X+N)
2	С	
3	С	THIS ROUTINE GENERATES AN EXTREME VALUE TYPE 1 (EXPONENTIAL TYPE)
4	С	PROBABILITY PLOT
5	C	THE INPUT TO THIS ROUTINE IS THE SINGLE PRECISION VECTOR X OF
6	C	(UNSORIED OR SORIED) OBSERVATIONS AND THE INTEGER VALUE N (= SAMPLE SIZE)
8	č	DORADI ITY PLOT
9	č	PRINTING-YFS
10	č	SUBROUTINES REEDED-SORT, UNIMED, AND PLOT
11	С	REFERENCEUNPUB. JJF MANUSCRIPT 'THE PERCENT POINT FUNCTION', PAGE 26
12	С	WRITTEN BY JAMES J. FILLIREN, STATISTICAL ENGINEERING LABORATORY (205.03)
13	С	NATIONAL BUREAU OF STANDARDS, WASHINGTON, D.C. 20234 JUNE 1972
14	C	
15		
17	C	DIMENSION TREBUT
18	Ũ	DATA TAU/1.56186687/
19	С	
20		AN=N
21		IPR=6
22	~	IUPPER=7500
23	č	CHECK THE INDUIT ADDIMENTS FOD EPPOPS
25	č	
26	-	IF (N.LT.1.0R.N.GT.IUPPER) GOTO50
27		IF(N.EQ.1)GOT055
28		HOLD=X(1)
29		
30	6	
32	0	
33		GOTO90
34	5	0 WRITE(IPR+17)IUPPER
35		WRITE(IPR+47)N
36	_	RETURN
37	5	S WRITE(IPR/18)
38	0	
40	,	9 FORMAT(1H +109H***** NON-FATAL DIAGNOSTICTHE FIRST INPUT ARGUME
41		1NT (A VECTOR) TO THE EVIPLT SUBROUTINE HAS ALL ELEMENTS = +E15.8+6
42		1H *****)
43	1	7 FORMAT(1H + 98H***** FATAL ERRORTHE SECOND INPUT ARGUMENT TO THE
44		1 EVIPLT SUBROUTINE IS OUTSIDE THE ALLOWABLE (1++16+16+) INTERVAL *
45	1	1#####) 9 Format(14 +1004+### NON-FATAL DIACNOSTICTHE SECOND INDUIT ADDUME
40	1	INT TO THE EVIDIT SUBDOUTINE HAS THE VALUE 1 ****)
48	4	7 FORMAT(1H + 35H**** THE VALUE OF THE ARGUMENT IS (IB (6H ****))
49	c .	
50		CALL SORT(X,N,Y)
51		CALL UNIMED(N+W)
52		DO100I=1/N
53 54	10	
55	10	CALL PLOT (YeweN)
56		WRITE(IPR:105)TAU:N
57		SUM1=0.0

58 59 60 61 62 63 64 65 66 65 66 67 68 69 70	SUM2=0.0 D0200I=1.N SUM1=SUM1+Y(1) SUM2=SUM2+W(1) 200 CONTINUE YBAR=SUM1/AN WBAR=SUM2/AN SUM1=0.0 SUM2=0.0 SUM2=0.0 SUM3=0.0 D0300I=1.N SUM1+(Y(I)-YBAR)*(Y(I)-YBAR) SUM1=SUM1+(Y(I)-YBAR))
71	SUM3=SUM3+(W(I)-WBAR)*(W(I)-WBAR)
72	300 CONTINUE
73	CC=SUM2/SQRT(SUM3*SUM1)
74	YSLOPE=SUM2/SUM3
75	YINT=YBAR-YSLOPE*WBAR
76	WETE(IRE-305)CC+YINT+YSLOPE
77	105 FORMAT(1H +64HEXTREME VALUE TYPE 1 (EXPONENTIAL TYPE) PROBABILITY
78	1PLOT (TAU = +E15.8+1H)+23X+20HTHE SAMPLE SIZE N = +I7)
79	305 FORMAT(1H +43HPROBABILITY PLOT CORRELATION COEFFICIENT = +F8.5+5X+
80	122HESTIMATED INTERCEPT = +E15.8+3X+18HESTIMATED SLOPE = +E15.8)
81	RETURN
82	END

PPRT S SIMIU.EV2PLT

JU-645 INTU-EV2PLT SUBROUTINE EV2PLT(X:N:GAMMA) C THIS ROUTINE GENERATES AN EXTREME VALUE TYPE 2 (CAUCHY TYPE) G C C C C C C C C C C C C C			
<pre>SUBROUTINE EVERTIAINFORMANY SUBROUTINE EVERTIAINFORMANY C THIS ROUTINE EGNERATES AN EXTREME VALUE TYPE 2 (CAUCHY TYPE) PROBABILITY PLOT THE INPUT TO THIS ROUTINE IS THE SINGLE PRECISION VECTOR X OF (UNSORTED OR SORTED) OBSERVATIONS, THE INTEGER VALUE IN IS SAMPLE SIZE), AND THE SINGLE PRECISION VALUE GAMMA (THE EXPONENT PARAMETR) C THE OUTPUT FROM THIS ROUTINE IS A ONE-PAGE EXTREME VALUE TYPE 2 PROBABILITY PLOT C THE MAXIMUM ALLOWABLE VALUE OF N FOR THIS ROUTINE IS 7500 PROBABILITY PLOT C THE MAXIMUM ALLOWABLE VALUE OF N FOR THIS ROUTINE IS 7500 C PRINTING-YETS SUBROUTINES NEEDED—SORT, UNIVED, AND PLOT C REFERENCEUNPUB, JJF MANUSCRIPT 'THE PERCENT POINT FUNCTION', PAGE 26 WRITTEN BY JAMES J, FILLIAEN' STATISTICAL ENGINEERING LABORATORY (205.03) C NATIONAL BUREAU OF STANDARDS, WASHINGTON, D.C. 20234 DECEMBER 1972 C DIMENSION Y(1200).W(200) C ANEN I IPRE6 C DIMENSION Y(1200).W(200) C ANEN C CHECK THE INPUT ARGUMENTS FOR ERRORS C C CHECK THE INPUT ARGUMENTS FOR ERRORS C IF(N.LT.1.0R.N.GT.IUPPER)GOTO50 IF(N.LT.1.0R.N.GT.IUPPER)GOTO50 IF(N.LT.1.0R.N.GT.IUPPER)GOTO50 S INTE(IPR.47)N RETURN S SWRITE(IPR.47)N RETURN S SWRITE(IPR.47)N RETURN S SWRITE(IPR.47)N RETURN S SWRITE(IPR.47)N RETURN S SWRITE(IPR.47)N RETURN S SWRITE(IPR.410) RETURN S SWRITE(IPR.</pre>	JJF6*SIMIU	• EV2PLI	
<pre>5 C THIS ROUTINE GENERATES AN EXTREME VALUE TYPE 2 (CAUCHY TYPE) 5 C THE INPUT TO THIS ROUTINE IS THE SINGLE PRECISION VECTOR X OF 5 C (UNSORTED OR SORTED) OBSERVATIONS. THE INTEGEN VALUE N (= SAMPLE SIZE), 6 C (UNSORTED OR SORTED) OBSERVATIONS. THE INTEGEN VALUE N (= SAMPLE SIZE), 7 C AND THE SINGLE PRECISION VALUE GAMMA (THE EXPONENT PARAMETER) 7 C AND THE SINGLE PRECISION VALUE GAMMA (THE EXPONENT PARAMETER) 7 C THE MAXIMUM ALLOWABLE VALUE OF N FOR THIS ROUTINE IS 7500 10 C THE MAXIMUM ALLOWABLE VALUE OF N FOR THIS ROUTINE IS 7500 11 C PRINTING-YES 12 C SUBROUTINES NEEDED-SORT, UNIVED, AND PLOT 13 C REFERENCEUNPUB. JJF MANUSCRIPT 'THE PERCENT POINT FUNCTION', PAGE 26 14 C WRITTEN BY JAMES J. FILIPIENT STICLL ENDIFERING LABORATORY (205.03) 15 C NATIONAL BUREAU OF STANDARDS, WASHINGTON, D.C. 20234 DECEMBER 1972 16 DIMENSION Y(1200).W(200) 17 C 18 DIMENSION Y(1200).W(200) 19 C 19 C 10 ANN 21 IPRE6 50 C 1F(N.LT.1.OR.N.GT.IUPPER)GOTOSO 11 F(IN.EG.1)GOTOS5 23 C 24 C CHECK THE INPUT ARGUMENTS FOR ERRORS 25 C 26 IF(N.LT.1.OR.N.GT.IUPPER)GOTOSO 27 IF(N.LT.1.OR.N.GT.IUPPER)GOTOSO 28 C 29 CANEN 29 DOGOTE2N 20 ONTINUE (NOLD GOTOSO 20 IF(X(1).NE.HOLD GOTOSO 21 IF(I.N.EG.1)GOTOSO 23 C 24 C CHECK THE INPUT ARGUMENTS FOR ERRORS 25 C 26 IF(N.LT.1.OR.N.GT.IUPPER)GOTOSO 27 IF(I.N.EG.1)GOTOS5 28 MOLDZX(1) 29 DOGOTE2N 39 ON IF(X(1).NE.HOLD GOTOSO 31 GO CONTINUE 39 FORMAT(1H + JOBH***** NON-FATAL DIAGNOSTICTHE FIRST INPUT ARGUME 40 S FORMAT(1H + JOBH***** NON-FATAL DIAGNOSTICTHE FIRST INPUT ARGUME 41 INT (A VECTOR) TO THE EVAPLE SUBROUTINE HAS ALL ELEMENTS = *EIS.60^{+} 41 FEWRA 41 INT (A VECTOR) TO THE EVAPLE SUBROUTINE HAS ALL ELEMENT TO THE 41 FEWRAT(1H + JOBH***** NON-FATAL DIAGNOSTICTHE FIRST INPUT ARGUME 41 INT (A VECTOR) TO THE EVAPLE SUBROUTINE HAS ALL ELEMENTS = *EIS.60^{+} 41 FEWRAT(1H + JOBH***** NON-FATAL DIAGNOSTICTHE FIRST INPUT ARGUME 41 INT (A VECTOR) TO THE EVAPLE SUBROUTINE HAS ALL ELEMENTS = *EIS.60^{+} 41 FEWRAT(1H + JOBH***** NON-FATAL DIAGNOSTICTHE FIRST INPUT ARGUME 41 INT (A VECTOR) TO THE</pre>	1	~	SUBRUUTINE EVZPLICKINIGAMMA)
<pre>c maskapility plot c THE INPUT to THIS AN EXAMELSIAN EXAMPLE THE 2 (CARDINITHE) c THE INPUT to THIS ROUTINE IS THE SINGLE PRECISION VECTOR X OF c (UNSORTED OR SORTED) OBSERVATIONS, THE INTEGER VALUE TYEE SAMPLE SIZE), AND THE SINGLE PRECISION VALUE GAMMA (THE EXPONENT PARAMETR) c AND THE SINGLE PRECISION VALUE GAMMA (THE EXPONENT PARAMETR) c THE MAXIMUM ALLOWABLE VALUE OF N FOR THIS ROUTINE IS 7500 p RROBABILITY PLOT c THE MAXIMUM ALLOWABLE VALUE OF N FOR THIS ROUTINE IS 7500 p RROBABILITY PLOT c THE MAXIMUM ALLOWABLE VALUE OF N FOR THIS ROUTINE IS 7500 p RROBABILITY PLOT c SUBROUTINES NEEDED—SORT, UNIVED, AND PLOT c SUBROUTINES NEEDED—SORT, UNIVED, AND PLOT c REFERENCE—UNPUE, JJF MANUSCRIPT 'THE PERCENT POINT FUNCTION', PAGE 26 c WRITTEN BY JAMES J, FILLIBEN' STATISTICAL ENGINEERING LABORATORY (205.03) c NATIONAL BUREAU OF STANDARDS, WASHINGTON, D.C. 20234 DECEMBER 1972 c DIMENSION Y(1200).W(200) c ANEN i PPR-6 c DIMENSION Y(1200).W(200) c C C C CHECK THE INPUT ARGUMENTS FOR ERRORS c C CHECK THE INPUT ARGUMENTS FOR ERRORS c C CHECK THE INPUT ARGUMENTS FOR ERRORS c IF(N.L.T.I.OR.N.GT.IUPPER)GOTO50 i F(N.L.T.I.OR.N.GT.IUPPER)GOTO50 i F(N.L.T.I.OR.N.GT.IUPPER)GOTO50 i F(N.L.T.I.OR.N.GT.IUPPER)GOTO50 d OCONTINUE g GORMATCHH '100H***** NON-FATAL DIAGNOSTIC—THE FIRST INPUT ARGUME i NT (A VECTOR) TO THE EVPLYL SUBROUTINE HAS ALL ELEMENTS = *EIS.0+6 i H ****** g O CONTINUE g GORMATCHH '100H***** NON-FATAL DIAGNOSTIC—THE FIRST INPUT ARGUME i NT (A VECTOR) TO THE EVPLYL SUBROUTINE HAS ALL ELEMENTS = *EIS.0+6 i H ****** i FERLINN g O CONTINUE g FORMATCHH '100H***** NON-FATAL DIAGNOSTIC—THE SECOND INPUT ARGUMEY TO THE i FERLINN g C C ALL SORT(X*N*Y) c C ALL SORT(X*N*Y) c C C CALL SORT(X*N*Y) c C C CALL SORT(X*N*Y) c C C C C C C C C C C C C C C C C C C C</pre>	2	č	THIS DOUTTINE GENERATES AN EXTREME VALUE TYPE & (CAUCHY TYPE)
<pre>c</pre>	Ц	č	DORABILITY PLOT
<pre>c (UNSORTED OR SORTED) '05EF04TIONS. THE INTEGE VALUE 'N'C' SAMPLE SIZE),</pre>	5	č	THE INPUT TO THIS ROUTINE IS THE SINGLE PRECISION VECTOR Y OF
<pre>AND THE SINGLE PRECISION VALUE GAMMA (THE EXPONENT PARAMETER) LL DILTY C THE OUTPUT FROM THIS ROUTINE IS A ONE-PAGE EXTREME VALUE TYPE 2 PROBABILITY PLOT C THE MAXIMUM ALLOWABLE VALUE OF N FOR THIS ROUTINE IS 7500 PRINTING-YES SUBROUTINES NEEDED-SORT, UNIVED, AND PLOT C REFERENCEUNPUB. JJF MANUSCRIPT 'THE PERCENT POINT FUNCTION', PAGE 26 C REFERENCEUNPUB. JJF MANUSCRIPT 'THE PERCENT POINT FUNCTION', PAGE 26 C REFERENCEUNPUB. JJF MANUSCRIPT 'THE PERCENT POINT FUNCTION', PAGE 26 C REFERENCEUNPUB. JJF MANUSCRIPT 'THE PERCENT POINT FUNCTION', PAGE 26 C REFERENCEUNPUB. JJF MANUSCRIPT 'THE PERCENT POINT FUNCTION', PAGE 26 C REFERENCEUNPUB. JJF MANUSCRIPT 'THE PERCENT POINT FUNCTION', PAGE 26 C DIMENSION Y1200, W1200) C ANN C ANN C ANN C C C C C C C C C C C C C C C C C C C</pre>	6	č	(UNSORTED OR SORTED) OBSERVATIONS. THE INTEGER VALUE N (= SAMPLE SIZE).
<pre>a c The OUTPUT FROM THIS ROUTINE IS A ONE-PAGE EXTREME VALUE TYPE 2 c PROBABILITY PLOT 10 c THE MAXIMUM ALLOWABLE VALUE OF N FOR THIS ROUTINE IS 7500 11 c PRINTING-YES 12 c SUBROUTINES NEEDED-SORT, UNIVED, AND PLOT 13 c WHITEN BY JANES J. FILLIPEN, STATISTICAL ENGINEERING LABORATORY (205.03) 14 c WHITEN BY JANES J. FILLIPEN, STATISTICAL ENGINEERING LABORATORY (205.03) 15 c NATIONAL BUREAU OF STANDARDS, WASHINGTON, D.C. 20234 DECEMBER 1972 16 c JMENSION Y(200).W(200) 20 c ANEN 17 c DIMENSION Y(200).W(200) 21 c JMENSION Y(200).W(200) 22 c ANEN 23 c C CHECK THE INPUT ARGUMENTS FOR ERRORS 24 c C CHECK THE INPUT ARGUMENTS FOR ERRORS 25 c IF(N.LT.1.OR.N.GT.1UPPER)GOTO50 26 fF(N.LT.1.OR.N.GT.1UPPER)GOTO50 27 fF(N.E).JOGTO55 28 HOLDEX(1) 29 DOGOTE2.N 20 WRITE(IPR, 9)HOLD 30 GOTTINUE 31 G0 CONTINUE 32 WRITE(IPR, 10) 33 FWITE(IPR, 17)TUPPER 34 S0 WRITE(IPR, 17)TUPPER 35 WRITE(IPR, 17)TUPPER 36 RETURN 37 S5 WRITE(IPR, 10) 37 FWATCH + JOGH#**** NON-FATAL DIAGNOSTIC=-THE FIRST INPUT ARGUME 40 IN TO THE EVZPLT SUBROUTINE HAS ALL ELEMENTS = .E15.0+6 41 *****) 45 INFIE(IPR.17)TO THE EVZPLT SUBROUTINE HAS ALL ELEMENTS = .E15.0+6 41 FORMAT(1H . JOGH#**** NON-FATAL DIAGNOSTIC=-THE FIRST INPUT ARGUME 41 FORMAT(1H . 90H#**** FATAL ERROR=THE SECOND INPUT ARGUME 41 FORMAT(1H . 90H#**** FATAL ERROR=THE SECOND INPUT ARGUME 41 FORMAT(1H . 90H#**** FATAL DIAGNOSTIC=-THE FIRST INPUT ARGUME 42 INT OTHE EVZPLT SUBROUTINE HAS ALL ELEMENTS = .E15.0+6 43 IT FORMAT(1H . 90H#**** NON-FATAL DIAGNOSTIC=-THE SECOND INPUT ARGUME 44 TORMAT(1H . 90H#**** THE VALUE OF THE ARGUMENT IS .IB .6H *****) 45 OC CALL SORT(X-N.Y) 46 C C CALL SORT(X-N.Y) 47 FORMAT(1H . 55H**** THE VALUE OF THE ARGUMENT IS .IB .6H *****) 48 OC CALL SORT(X-N.Y) 59 C CALL SORT(X-N.Y) 50 C CALL SORT(X-N.Y) 50 C CALL SORT(X-N.Y) 51 C CALL SORT(X-N.Y) 52 C CALL SORT(X-N.Y) 53 C CALL SORT(X-N.Y) 54 C C CALL SORT(X-N.Y) 55 C CALL SORT(X-N.Y) 56 C CALL SORT(X-N.Y) 57 C CALL SORT(X-N.Y) 57 C CALL SORT(X-N.Y) 56 C CALL SORT(X-N.Y)</pre>	7	č	AND THE SINGLE PRECISION VALUE GAMMA (THE EXPONENT PARAMETER)
<pre>9 C PROBABILITY PLOT 10 C THE MAXIMUM ALLOWABLE VALUE OF N FOR THIS ROUTINE IS 7500 11 C PRINTINGYES 12 C SUBBOUTINES NEEPEDSORT, UNIMED, AND PLOT 13 C REFERENCEUNPUB, JJF MANUSCRIFT 'THE PERCENT POINT FUNCTION', PAGE 26 14 C WRITTEN BY JAMES J, FILLIEEN'S TATISTICAL ENGINEERING LABORATORY (205.03) 15 C NATIONAL BUREAU OF STANDARDS, WASHINGTON' D.C. 20234 DECEMBER 1972 16 DIMENSION X(1) 17 DIMENSION X(200).W(200) 18 C 19 C ANEN 19 PRE6 20 INFENSION X(200).W(200) 20 ANEN 21 IFR6 22 IUPPER-7500 23 C 24 C CHECK THE INPUT ARGUMENTS FOR ERRORS 25 C 26 IF (N.LT.1.OR-N.GT.IUPPER)GOTOS0 27 IF (N.G.1.JGGTOS5 28 HOLDSX(1) 29 DOGOT2/N 30 IF (X(1).NE.HOLD)GOTO90 31 G6 CONTINUE 32 WRITE (IPR. 9) HOLD 33 G0T090 34 S0 WRITE (IPR.17) IUPPER 35 WRITE (IPR.17) IUPPER 36 RETURN 37 S5 WRITE (IPR.17) IUPPER 37 MRTE (IPR.17) IUPPER 38 WRITE (IPR.17) IUPPER 39 OCONTINUE 40 9 FORMAT(1H '109H***** NON-FATAL DIAGNOSTICTHE FIRST INPUT ARGUME 41 INT (A VECTOR) TO THE EV2PLT SUBROUTINE HAS ALL ELEMENTS = .FIS.0+6 11 *****) 43 IF FORMAT(1H ' 9BH**** FATAL ERRORTHE SECOND INPUT ARGUME 44 INT (A VECTOR) TO THE EV2PLT SUBROUTINE HAS ALL ELEMENTS = .FIS.0+6 14 *****) 44 IB FORMAT(1H ' 9BH**** FATAL ERRORTHE SECOND INPUT ARGUME 41 INT OTHE EV2PLT SUBROUTINE HAS ALL ELEMENTS = .FIS.0+6 14 *****) 45 OC CALL SORT(X-N.Y) 46 C CALL SORT(X-N.Y) 47 FORMAT(1H ' 35H**** THE VALUE OF THE ARGUMENT IS .IB .6H *****) 49 C 40 C ALL SORT(X-N.Y) 41 CALL UNIME(CONN) 41 OC ONTINUE 55 CALL SORT(X-N.Y) 51 CALL UNIME(CONN) 52 OLOOTINUE 53 CALL SORT(X-N.Y) 54 CALL SORT(X-N.Y) 55 C CALL SORT(X-N.Y) 55 CALL SORT(X-N.Y) 56 CALL SORT(X-N.Y) 57 PP9975(-ALOG(0))**(-1.0/GAMMA) 58 OC C CALL SORT(X-N.Y) 59 CONTINUE 50 CONTINUE 50 CALL SORT(X-N.Y) 51 CALL UNIME(CONN) 52 CONTINUE 53 CALL SORT(X-N.Y) 54 CALL SORT(X-N.Y) 55 CALL SORT(X-N.Y) 55 CALL SORT(X-N.Y) 56 CALL SORT(X-N.Y) 57 CALL SORT(X-N.Y) 57 CALL SORT(X-N.Y) 58 CALL SORT(X-N.Y) 59 CONTINUE 50 CALL SORT(X-N.Y) 50 CALL SORT(X-N.Y) 51 CALL SORT(X-N.Y) 52 CALL SORT(X-N.Y) 53 CALL SORT(X-N.Y) 54 CALL SORT(X</pre>	Å	č	THE OUTPUT FROM THIS ROUTINE IS A ONE-PAGE EXTREME VALUE TYPE 2
<pre>10 C THE MAXIMUM ALLOWABLE VALUE OF N FOR THIS ROUTINE IS 7500 11 C PRINTINGYES 12 C SUBROUTINES NEEDEDSORT, UNIMED, AND PLOT 13 C REFERENCEUNPUB. JJ MANUSCRIPT 'THE PERCENT POINT FUNCTION', PAGE 26 14 C WRITTEN BY JAMES J. FILLIMEN' STATISTICAL ENGINEERING LABORATORY (205.03) 15 C NATIONAL BUREAU OF STANDARDS, WASHINGTON, D.C. 20234 DECEMBER 1972 16 C 17 DIMENSION X(1) 18 DIMENSION X(1) 19 C 10 ANEN 21 IPR=6 22 IUPPER=7500 23 C 24 C CHECK THE INPUT ARGUMENTS FOR ERRORS 25 C 26 IF(N.LT.1.0R.N.6T.IUPPER)60T050 27 IF(N.EG.1)60T055 28 HOLD=X(1) 29 DO60T=2N 30 OFITE(IPR.9)HOLD 30 GOTO90 31 60 CONTINUE 30 ONTIF(IPR.17)IUPPER 32 WRITE(IPR.9)HOLD 33 GOTO90 34 50 WRITE(IPR.17)IUPPER 35 WRITE(IPR.17)IUPPER 36 WRITE(IPR.18) 37 55 WRITE(IPR.18) 38 RETURN 39 90 CONTINUE 39 90 CONTINUE 39 90 CONTINUE 30 CONTINUE 41 17 FORMAT(1H .109H***** NON-FATAL DIAGNOSTICTHE FIRST INPUT ARGUME 41 INT (A VECTOR) TO THE EV2PLT SUBROUTINE HAS ALL ELEMENTS = *E15.8;6 21 H *****) 43 17 FORMAT(1H .109H***** NON-FATAL DIAGNOSTICTHE SECOND INPUT ARGUME 44 I EV2PLT SUBROUTINE IS OUTSIDE THE ALLOWABLE (1/.16/.16H) INTERVAL * 45 I****) 46 18 FORMAT(1H .39H**** FATAL ERRORTHE SECOND INPUT ARGUME 47 FORMAT(1H .39H**** NON-FATAL DIAGNOSTICTHE SECOND INPUT ARGUME 47 FORMAT(1H .39H**** FATAL ERROR-THE SECOND INPUT ARGUME 47 FORMAT(1H .39H**** NON-FATAL DIAGNOSTICTHE SECOND INPUT ARGUME 47 FORMAT(1H .39H**** NON-FATAL DIAGNOSTICTHE SECOND INPUT ARGUME 47 FORMAT(1H .39H**** FATAL ERROR-THE SECOND INPUT ARGUME 47 FORMAT(1H .39H**** NON-FATAL DIAGNOSTICTHE SECOND INPUT ARGUME 47 FORMAT(1H .39H**** THE VALUE OF THE ARGUMENT IS .18 .6H *****) 49 C 50 CALL SORT(X*N*Y) 51 CALL DOINT(Y*N*N) 52 DOIDOITINE MAS THE VALUE OF THE ARGUMENT IS .18 .6H *****) 53 CALL PLOT(Y**N) 54 CALL PLOT(Y**N) 55 CALL PLOT(Y**N) 55 FORMAT(1H .300)**(-1.0/GAM*A) 56 C 57 CALL SORT(X*N) 57 CALLOG(W(1)))**(-1.0/GAM*A) 57 CALL PLOT(Y**N) 58 CALL PLOT(Y**N) 59 CONTINUE 50 CALL PLOT(Y**N) 50 CALL PLOT(Y**N) 51 CALL PLOT(Y**N) 52 CALL PLOT(Y**N) 53 CALL PLOT(Y**N) 5</pre>	9	č	PROBABILITY PLOT
<pre>11 C PRINTINGYES 12 C SUBROUTINES NEEDEOSORT, UNIMED, AND PLOT 13 C REFERENCEUNPUB, JJF MANUSCRIPT 'THE PERCENT POINT FUNCTION, PAGE 26 14 C WRITTEN BY JAMES J. FILLIAEN, STATISTICAL ENGINEERING LABORATORY (205.03) 15 C NATIONAL BUREAU OF STANDARDS, WASHINGTON, D.C. 20234 DECEMBER 1972 16 C 17 DIMENSION X(1) 18 DIMENSION Y(200).W(200) 19 C 20 ANEN 21 IPRE6 22 IUPPER=7500 23 C 24 C CHECK THE INPUT ARGUMENTS FOR ERRORS 25 C 26 IF(N.LT.1.0R.N.GT.IUPPER)GOTO50 27 IF(N.EQ.1)60T055 28 HOLD=X(1) 29 DO60T22.N 30 GCT030 31 G0 CONTINUE 30 WRITE(IPR.9)HOLD 31 G0 CONTINUE 32 WRITE(IPR.17)IUPPER 35 WRITE(IPR.17)IUPPER 36 RETURN 37 S5 WRITE(IPR.17) IUPPER 38 WRITE(IPR.18) 39 90 CONTINUE 40 9 FORMAT(1H , 109H***** NON-FATAL DIAGNOSTICTHE FIRST INPUT ARGUME 41 INT (A VECTOR) TO THE EV2PLT SUBROUTINE HAS ALL ELEMENTS = *E15.8+6 41 INT (A VECTOR) TO THE EV2PLT SUBROUTINE HAS ALL ELEMENTS = *E15.8+6 41 INT (A VECTOR) TO THE EV2PLT SUBROUTINE HAS ALL ELEMENTS = *E15.8+6 41 INT (A VECTOR) TO THE EV2PLT SUBROUTINE HAS ALL ELEMENTS = *E15.8+6 41 INT (A VECTOR) TO THE EV2PLT SUBROUTINE HAS ALL ELEMENTS = *E15.8+6 41 INT (A VECTOR) TO THE EV2PLT SUBROUTINE HAS ALL ELEMENTS = *E15.8+6 41 INT (A VECTOR) TO THE EV2PLT SUBROUTINE HAS ALL ELEMENTS = *E15.8+6 41 INT (A VECTOR) TO THE EV2PLT SUBROUTINE HAS ALL ELEMENTS = *E15.8+6 41 INT (A VECTOR) TO THE EV2PLT SUBROUTINE HAS ALL ELEMENTS = *E15.8+6 41 INT (A VECTOR) TO THE EV2PLT SUBROUTINE HAS ALL ELEMENTS = *E15.8+6 41 INT (A VECTOR) TO THE EV2PLT SUBROUTINE HAS THE VALUE 1 *****) 42 C 43 C CALL SORT(X.N.Y) 44 CALL SORT(X.N.Y) 55 CALL SORT(X.N.Y) 56 CALL PLOT(Y.W.N) 57 PP975=(-ALOG(W(1)))**(-1.0/GAMMA) 58 JOO CONTINUE 59 CALL PLOT(Y.W.N) 50 CONTINUE 50 CALL PLOT(Y.W.N) 51 CALL PLOT(Y.W.N) 52 DO1001=1.*N 53 CALL PLOT(Y.W.N) 54 JOO CONTINUE 55 CALL PLOT(Y.W.N) 55 CALL PLOT(Y.W.N) 56 CALL PLOT(Y.W.N) 57 CALL SORT(X.N.Y) 57 CALL SORT(X.N.Y) 58 CALL PLOT(Y.W.N) 59 CALL PLOT(Y.W.N) 50 CALL PLOT(Y.W.N) 51 CALL PLOT(Y.W.N)</pre>	10	С	THE MAXIMUM ALLOWABLE VALUE OF N FOR THIS ROUTINE IS 7500
12 C SUBROUTINES NEEDED-SORT, UNIMED, AND PLOT 13 C REFERENCEUNPUB, JJ PMANUSCRIPT 'THE PERCENT POINT FUNCTION', PAGE 26 14 C WRITTEN BY JAMES J, FILLIREN' STATISTICAL ENGINEERING LABORATORY (205.03) 15 C NATIONAL BUREAU OF STANDARDS, WASHINGTON, D.C. 20234 DECEMBER 1972 16 DIMENSION Y(1) 17 DIMENSION Y(200),W(200) 19 C 20 ANSN 21 IFR:6 22 C CHECK THE INPUT ARGUMENTS FOR ERRORS 23 C 24 C CHECK THE INPUT ARGUMENTS FOR ERRORS 25 C 26 IF(N.LT.1.0R.N.6T.IUPPER)60T050 27 IF(N.EG.1)60T055 28 HOLDXX(1) 29 DO601=2*N 30 IF(X1).NC.HOLD)60T090 31 60 CONTINUE 32 WRITE(IPR.9)HOLD 33 GOT090 34 GOT090 35 WRITE(IPR.17)IUPPER 35 WRITE(IPR.17)IUPPER 36 RETURN 37 55 WRITE(IPR.18) 38 RETURN 39 90 CONTINUE 40 9 FORMAT(1H , 109H***** NON-FATAL DIAGNOSTICTHE FIRST INPUT ARGUME 41 INT (A VECTOR) TO THE EV2PLT SUBROUTINE HAS ALL ELEMENTS = :E15.8;6 41 H****) 43 17 FORMAT(1H , 98H**** FATAL ERRORTHE SECOND INPUT ARGUMENT TO THE 44 I EV2PLT SUBROUTINE IS OUTSIDE THE ALLOWABLE (1/.F6:16H) INTERVAL * 45 I****) 46 18 FORMAT(1H , 35H**** THE VALUE OF THE ARGUMENT IS .IB .6H *****) 47 C CALL SORT(X*N'Y) 48 47 FORMAT(1H , 35H**** THE VALUE OF THE ARGUMENT IS .IB .6H *****) 49 CONTINUE 40 C CALL SORT(X*N'Y) 51 CALL LOG(W(1)))**(-1.0/GAMMA) 54 100 CONTINUE	11	С	PRINTINGYES
<pre>13 C REFERENCEUNPUB. JJF MANUSCRIPT 'THE PERCENT POINT FUNCTION', PAGE 26 14 C WRITTEN BY JAMES J. FILLTBEN'S STATISTICAL ENGINEERING LABORATORY (205.03) 15 C 16 OIMENSION X(1) 17 DIMENSION X(1) 18 DIMENSION Y(200).W(200) 19 C 20 AN=N 21 IPRE6 22 IUPPER-7500 23 C 24 C CHECK THE INPUT ARGUMENTS FOR ERRORS 25 C 26 IF(N.LT.1.0R.N.GT.IUPPER)60T050 27 IF(N.GO.1)60T055 28 HOLD=X(1) 29 DO601=2:N 30 IF(X(1).NE.HOLD)60T090 31 60 CONTINUE 32 WRITE(IPR.17)IUPPER 35 WRITE(IPR.17)IUPPER 35 WRITE(IPR.17)IUPPER 36 OGT90 37 50 WRITE(IPR.17)IUPPER 37 55 WRITE(IPR.16) 38 GOT90 39 90 CONTINUE 40 9 FORMAT(IH .109H***** NON-FATAL DIAGNOSTICTHE FIRST INPUT ARGUME 41 INT (A VECTOR) TO THE EV2PLT SUBROUTINE HAS ALL ELEMENTS = .E15.8/6 42 IH *****) 43 17 FORMAT(IH .9H***** NON-FATAL DIAGNOSTICTHE FIRST INPUT ARGUME 44 INT (A VECTOR) TO THE EV2PLT SUBROUTINE HAS ALL ELEMENTS = .E15.8/6 45 IF ORMAT(IH .9H***** NON-FATAL DIAGNOSTICTHE FIRST INPUT ARGUME 46 IN TO THE EV2PLT SUBROUTINE HAS THE VALUE 1 *****) 47 FORMAT(IH .3SH***** NON-FATAL DIAGNOSTICTHE SECOND INPUT ARGUME 47 FORMAT(IH .3SH***** NON-FATAL DIAGNOSTICTHE SECOND INPUT ARGUME 48 INT TO THE EV2PLT SUBROUTINE HAS THE VALUE 1 *****) 49 C 40 C 41 A**** 41 INT (A VECTOR) TO THE EV2PLT SUBROUTINE HAS ALL ELEMENTS = .E15.8/6 42 IH *****) 43 17 FORMAT(IH .9H***** NON-FATAL DIAGNOSTICTHE SECOND INPUT ARGUME 44 INT TO THE EV2PLT SUBROUTINE HAS THE VALUE 1 *****) 45 CALL SORT(X.N.Y) 46 C 57 CALL SORT(X.N.Y) 51 CALL UNIMED(N:**) 53 CALL PLOT(Y:W:N) 54 OO CONTINUE 55 CALL PLOT(Y:W:N) 55 CALL PLOT(Y:W:N) 56 O=.975 57 PPRE7 57 PPRE7 57 CALOG(0))**(-1.0/GAM*A) 56 O=.975 57 PPRE7 57 PPRE7 57 CALOG(CALOR PLOTAGENEA 55 CALCACH PLOT(Y:W:N) 56 O=.975 57 PPRE7 5</pre>	12	С	SUBROUTINES NEEDEDSORT, UNIMED, AND PLOT
<pre>14 C WRITTEN BY JAMES J. FILLTREN: STATISTICAL ENGINEERING LABORATORY (205.03) 15 C NATIONAL BUREAU OF STANDARDS, WASHINGTON, D.C. 20234 DECEMBER 1972 16 C 17 DIMENSION X(1) 18 DIMENSION Y(200).W(200) 19 C 20 AN=N 21 IPR=6 22 IUPPER=7500 23 C 24 C CHECK THE INPUT ARGUMENTS FOR ERRORS 25 C 26 IF(N.LT.1.OR.N.GT.IUPPER)60T050 27 IF(N.EG.1)60T055 28 H0LD=X(1) 29 D06012:N 30 IF(X(1).WE.HOLD)60T090 31 60 CONTINUE 32 WRITE(IPR.17)IUPPER 35 WRITE(IPR.17)IUPPER 35 WRITE(IPR.10) 36 FORMAT(1H .109H***** NON-FATAL DIAGNOSTICTHE FIRST INPUT ARGUME 41 INT (A VECTOR) TO THE EV2PLT SUBROUTINE HAS ALL ELEMENTS = .E15.0F(41 A****) 43 17 FORMAT(1H .9H***** FATAL ERRORTHE SECOND INPUT ARGUMENT TO THE 44 1 EV2PLT SUBROUTINE HAS THE VALUE 1 *****) 45 CALL SORT(X.N.Y) 46 CAUL SORT(X.N.Y) 47 FORMAT(1H .35H***** THE VALUE OF THE ARGUMENT IS .18 .6H *****) 47 CALL SORT(X.N.Y) 48 CAUL SORT(X.N.Y) 49 CAUL SORT(X.N.Y) 49 CAUL SORT(X.N.Y) 40 G SORT(X.N.Y) 41 CALLOG(G))**(-1.0/GAMMA) 41 OCONTINUE 42 CAUL SORT(X.N.Y) 43 CAUL SORT(X.N.Y) 44 CAUL SORT(X.N.Y) 45 CAUL SORT(X.N.Y) 45 CAUL SORT(X.N.Y) 46 CAUL SORT(X.N.Y) 47 CONTINUE 48 CAUL SORT(X.N.Y) 49 CAUL SORT(X.N.Y) 49 CAUL SORT(X.N.Y) 40 CAUL SORT(X.N.Y) 41 CAUL SORT(X.N.Y) 42 CAUL SORT(X.N.Y) 43 CAUL SORT(X.N.Y) 44 CAUL SORT(X.N.Y) 45 CAUL SORT(X.N.Y) 45 CAUL SORT(X.N.Y) 46 CAUL SORT(X.N.Y) 47 CONTINUE 47 CONTINUE 48 CAUL SORT(X.N.Y) 49 CAUL SORT(X.N.Y) 49 CAUL SORT(X.N.Y) 40 CAUL SORT(X.N.Y) 40 CAUL SORT(X.N.Y) 41 CAUL SORT(X.N.Y) 41 CAUL SORT(X.N.Y) 42 CAUL SORT(X.N.Y) 43 CAUL SORT(X.N.Y) 44 CAUL SORT(X.N.Y) 45 CAUL SORT(X.N.Y) 45 CAUL SORT(X.N.Y) 46 CAUL SORT(X.N.Y) 47 CONTINUE 47 CAUL SORT(X.N.Y) 48 CAUL SORT(X.N.Y) 49 CAUL SORT(X.N.Y) 49 CAUL SORT(X.N.Y) 40 CAUL SORT(X.N.Y) 40 CAUL SORT(X.N.Y) 41 CAUL SORT(X.N.Y) 41 CAUL SORT(X.N.Y) 42 CAUL SORT(X.N.Y) 43 CAUL SORT(X.N.Y) 44 CAUL SORT(X.N.Y) 45 CAUL</pre>	13	С	REFERENCEUNPUB. JJF MANUSCRIPT 'THE PERCENT POINT FUNCTION', PAGE 26
<pre>15 C NATIONAL BUREAU OF STANDARDS, WASHINGTON, D.C. 20234 DECEMBER 1972 16 C 17 DIMENSION X(1) 18 DIMENSION Y(200).W(200) 19 C 20 AN=N 21 IPPE6 22 IUPPER=7500 23 C 24 C CHECK THE INPUT ARGUMENTS FOR ERRORS 26 IF(N.LT.1.0R.N.GT.IUPPER)GOTO50 27 IF(N.E6.1)GOTO55 28 HOLD=X(1) 29 DO60122.N 30 IF(X(1).NE.HOLD)GOTO90 31 60 CONTINUE 32 WRITE(IPR.17)IUPPER 33 WRITE(IPR.17)IUPPER 34 S0 WRITE(IPR.17)IUPPER 35 WRITE(IPR.17)IUPPER 36 RETURN 37 55 WRITE(IPR.18) 38 RETURN 39 90 CONTINUE 40 9 FORMAT(1H .109H***** NON=FATAL DIAGNOSTICTHE FIRST INPUT ARGUME 41 INT (A VECTOR) TO THE EV2PLT SUBROUTINE HAS ALL ELEMENTS = .E15.866 41 H ****) 43 17 FORMAT(1H .109H***** NON=FATAL DIAGNOSTICTHE SECOND INPUT ARGUME 44 18 FORMAT(1H .109H***** NON=FATAL DIAGNOSTICTHE SECOND INPUT ARGUME 45 I****) 46 18 FORMAT(1H .109H***** NON=FATAL DIAGNOSTICTHE SECOND INPUT ARGUME 47 INT TO THE EV2PLT SUBROUTINE HAS THE VALUE 0 THE ARGUMET TO THE 48 I****) 49 C 50 CALL SORT(X.N.Y) 51 CALL UNIMED(N.W) 52 DO100I=1.N W(1)=(-ALOG(W(I)))**(-1.0/GAMMA) 54 100 CONTINUE 55 CALL PLOT(Y.W.N) 56 G=.9975 57 PP9975(-ALOG(0))**(-1.0/GAMMA) 56 DO100I=1.****) 57 PP9755(-ALOG(0))**(-1.0/GAMMA) 56 DO100I=1.****) 57 PP175(-ALOG(0))**(-1.0/GAMMA) 57 DO100I=1.****) 58 CALL PLOT(Y.W.N) 59 CO100I=1.****) 59 CO100I=1.************************************</pre>	14	С	WRITTEN BY JAMES J. FILLIBEN, STATISTICAL ENGINEERING LABORATORY (205.03)
<pre>16 C DIMENSION X(1) DIMENSION Y(200).W(200) 20 AN=N IPR=6 21 IPR=7500 23 C 24 C CHECK THE INPUT ARGUMENTS FOR ERRORS 25 C 26 IF(N.LT.1.0R.N.6T.IUPPER)60T050 27 IF(N.EG.1)60T055 28 H0LD=X(1) 29 D060IT2.N 30 G0T090 31 60 CONTINUE 32 WRITE(IPR.9)H0LD 33 60 CONTINUE 34 50 WRITE(IPR.17)IUPPER 35 WRITE(IPR.17)IUPPER 36 RETURN 37 55 WRITE(IPR.18) 36 RETURN 39 00 CONTINUE 40 9 FORMAT(IH .109H**** NON=FATAL DIAGNOSTIC=THE FIRST INPUT ARGUME 41 INT (A VECTOR) TO THE EV2PLT SUBROUTINE HAS ALL ELEMENTS = .EIS.8.6 42 IH *****) 43 17 FORMAT(IH .98H**** FATAL ERROR=THE SECOND INPUT ARGUMENT TO THE 44 I EV2PLT SUBROUTINE IS OUTSIDE THE ALLOWABLE (116.16H) INTERVAL * 45 I****) 46 18 FORMAT(IH .35H**** THE VALUE OF THE ARGUMENT IS .18 .6H *****) 47 FORMAT(IH .35H**** THE VALUE OF THE ARGUMENT IS .18 .6H *****) 49 C 40 CALL SORT(X.N.Y) 51 CALL UNIMED(N.W) 52 D01001=1.N 33 W(13=(-ALOG(W(1)))**(-1.0/GAMMA)) 54 100 CONTINUE 55 CALL PLOT('*W.N) 56 g=.9975 57 PP9975=(-ALOG(Q))**(-1.0/GAMMA) 56 G=.2000000000000000000000000000000000000</pre>	15	С	NATIONAL BUREAU OF STANDARDS, WASHINGTON, D.C. 20234 DECEMBER 1972
<pre>17 DIMENSION X(1) 18 DIMENSION Y(200).W(200) 19 C AN=N 1PR=6 10PPER=7500 23 C 24 C CHECK THE INPUT ARGUMENTS FOR ERRORS 25 C 26 IF(N.LT.1.0R.N.6T.1UPPER)60T050 1F(N.12.1)60T055 40 DD52(1) 29 D0601=2.N 17 F(X(1).NE.HOLD)60T090 31 60 CONTINUE 32 WRITE(IPR.9)HOLD 33 G0T090 34 50 WRITE(IPR.47)N 35 WRITE(IPR.47)N 36 RETURN 39 00 CONTINUE 40 9 FORMAT(1H .109H***** NON=FATAL DIAGNOSTIC=-THE FIRST INPUT ARGUME 41 INT (A VECTOR) TO THE EV2PLT SUBROUTINE HAS ALL ELEMENTS = .E15.8.6 42 IH ****) 43 I7 FORMAT(1H .9 9H***** FATAL ERROR=-THE SECOND INPUT ARGUMENT TO THE 44 I \$V2PLT SUBROUTINE IS OUTSIDE THE ALLOWABLE (1,.16.16H) INTERVAL * 1****) 45 OFMAT(1H .35H***** THE VALUE OF THE ARGUMENT IS .18 .6H *****) 46 C 57 C CALL SORT(X.N.Y) 51 CALL UNIMED(N.W) 53 W(1)=(-ALOG(0))**(-1.0/GAMMA) 54 100 CONTINUE 55 CALL PLOT((*W.N) 56 G=.975 57 PP9975=(-ALOG(0))**(-1.0/GAMMA) 56 G=.975 57 PP9975=(-ALOG(0))**(-1.0/GAMMA) 57 CALL PLOT(*W.N) 56 G=.2000 57 CALL PLOT(*W.N) 57 CALL PLOT(*W.N) 56 G=.2000 57 CALL PLOT(*W.N) 56 G=.2000 57 CALL PLOT(*W.N) 56 CALL PLOT(*W.N) 57 CALL PLOT(*W.N) 56 CALL PLOT(*W.N) 57 CALL PLOT(*W.N) 56 CALL PLOT(*W.N) 57 CALL PLOT(*W.N) 57 CALL PLOT(*W.N) 56 CALL PLOT(*W.N) 57 CALL PLOT(*W.N) 57 CALL PLOT(*W.N) 56 CALL PLOT(*W.N) 57 CALL PLOT(*W.N) 57 CALL PLOT(*W.N) 57 CALL PLOT(*W.N) 56 CALL PLOT(*W.N) 57 CALL PLOT(*W.N) 57 CALL PLOT(*W.N) 56 CALL PLOT(*W.N) 57 CALL PLOT(*W.N) 57 CALL PLOT(*W.N) 56 CALL PLOT(*W.N) 57 CALL PLOT(*W.N) 57 CALL PLOT(*W.N) 58 CALL PLOT(*W.N) 59 CALL PLOT(*W.N) 59 CALL PLOT(*W.N) 50 CALL PLOT(*W.N) 51 CALL PLOT(*W.N) 52 CALL PLOT(*W.N) 53 CALL PLOT(*W.N) 54 CALL PLOT(*W.N) 55 CALL PLOT(*W.N) 56 CALL PLOT(*W.N) 57 CALL PLOT(*W.N) 57 CALL PLOT(*W.N) 58 CALL PLOT(*W.N) 59 CALL PLOT(*W.N) 59 CALL PLOT(*W.N) 50 CALL PLOT(*W.N) 51 CALL PLOT(*W.N) 52 CALL PLOT(*W.N) 53 CALL PLOT(*W.N) 54 CALL PLOT(*W.N) 55 CALL PLOT(*W.N) 55 CALL PLOT(*W.N) 56 CALL PLOT(*W.N) 57 CALL PLOT(*W.N) 57 CALL PLOT(*W</pre>	16	С	
<pre>18 DIMENSION Y(200).W(200) 19 C 20 AN=N 1PR=6 1PR=6 21 UPPER=7500 23 C 24 C CHECK THE INPUT ARGUMENTS FOR ERRORS 25 C 26 IF(N.LT.1.0R.N.GT.IUPPER)GOTO50 27 IF(N.E0.1)GOTO55 28 HOLD=2(N) 29 DOG01=2(N) 30 IF(X(1).NE.HOLD)GOTO90 31 G0 CONTINUE 32 WRITE(IPR, 9)HOLD 33 GOTO90 34 50 WRITE(IPR,17)IUPPER 35 WRITE(IPR,17)N 36 RETURN 37 55 WRITE(IPR,18) 38 RETURN 39 90 CONTINUE 40 9 FORMAT(1H ,109H***** NON=FATAL DIAGNOSTIC==THE FIRST INPUT ARGUME 41 INT (A VECTOR) TO THE EV2PLT SUBROUTINE HAS ALL ELEMENTS = +E15.8+6 42 IH ****1 45 IA**** 46 IB FORMAT(1H , 98H**** FATAL ERROR==THE SECOND INPUT ARGUME 47 INT TO THE EV2PLT SUBROUTINE HAS THE VALUE 1 *****) 46 G 47 C CALL SORT(X:N:Y) 48 W(I)=(-1.0/GAMMA) 49 CONTINUE 49 C CALL SORT(X:N:Y) 49 C 40 CONTINUE 40 CONTINUE 41 CONTINUE 44 CONTINUE 45 CALL PLOT(Y:W:N) 45 C 45 CALL PLOT(Y:W:N) 46 CONTINUE 47 CONTINUE 45 CALL PLOT(Y:W:N) 46 CONTINUE 45 CALL PLOT(Y:W:N) 45 CONTINUE 45 CONTINUE 45 CALL PLOT(Y:W:N) 45 CONTINUE 45 CONTINUE 45 CONTINUE 45 CALL PLOT(Y:W:N) 45 CONTINUE 45 CONTI</pre>	17		DIMENSION X(1)
<pre>19 C AN=N 1 IPR=6 22 IUPPER=7500 23 C 24 C CHECK THE INPUT ARGUMENTS FOR ERRORS 25 C 26 IF(N.LT.1.0R.N.GT.IUPPER)GOTO50 27 IF(N.E.0.1060T055 28 H0LD=X(1) 29 D0601=2:N 30 GOTO90 31 G0 CONTINUE 32 WRITE(IPR.9)HOLD 33 GOT090 34 S0 WRITE(IPR.47)N 35 WRITE(IPR.47)N 36 RETURN 37 S5 WRITE(IPR.47)N 38 RETURN 39 00 CONTINUE 40 9 FORMAT(1H .109H***** NON-FATAL DIAGNOSTICTHE FIRST INPUT ARGUME 41 INT (A VECTOR) TO THE EV2PLT SUBROUTINE HAS ALL ELEMENTS = .E15.8.6 42 IH ****3 43 I7 FORMAT(1H .99H***** FATAL ERRORTHE SECOND INPUT ARGUMENT TO THE 44 I EV2PLT SUBROUTINE IS OUTSIDE THE ALLOWABLE (116.16H) INTERVAL * 45 I****) 46 18 FORMAT(1H .100H***** NON-FATAL DIAGNOSTICTHE SECOND INPUT ARGUME 47 INT TO THE EV2PLT SUBROUTINE HAS THE VALUE 1 *****) 48 47 FORMAT(1H .100H***** NON-FATAL DIAGNOSTICTHE SECOND INPUT ARGUME 49 C 40 C CALL SORT(X.N.Y) 51 CALL UNIMED(N.W) 53 00100I=1.N 44 (1)=(-ALOG(W(I)))**(-1.0/GAMMA) 54 100 CONTINUE 55 CALL PLOT(Y.W.N) 56 G=.9975 57 PPP9755(-ALOG(G))**(-1.0/GAMMA) 57 PP9755(-ALOG(G))**(-1.0/GAMMA) 58 100 CONTINUE 55 CALL PLOT(Y.W.N) 56 G=.9975 57 PPP0755(-ALOG(G))**(-1.0/GAMMA) 57 PP9755(-ALOG(G))**(-1.0/GAMMA) 58 C</pre>	18		DIMENSION Y(200),W(200)
<pre>20 AN=N 21 IPR=6 22 IUPPER=7500 23 C 24 C CHECK THE INPUT ARGUMENTS FOR ERRORS 25 C 26 IF(N.LT.1.0R.N.GT.IUPPER)60T050 27 IF(N.E0.1)60T055 28 H0LD=x(1) 29 D060I=2:N 30 IF(X(1).NE.H0LD)60T090 31 60 CONTINUE 32 WRITE(IPR: 9)H0LD 33 G0T090 34 50 WRITE(IPR:17)IUPPER 35 WRITE(IPR:17)IUPPER 36 RETURN 37 55 WRITE(IPR:17)N 36 RETURN 39 90 CONTINUE 40 9 FORMAT(1H .109H***** NON=FATAL DIAGNOSTIC=-THE FIRST INPUT ARGUME 41 INT (A VECTOR) TO THE EV2PLT SUBROUTINE HAS ALL ELEMENTS = .E15.8:6 42 INT (A VECTOR) TO THE EV2PLT SUBROUTINE HAS ALL ELEMENTS = .E15.8:6 43 17 FORMAT(1H .98H***** FATAL ERROR=-THE SECOND INPUT ARGUMENT TO THE 44 1 EV2PLT SUBROUTINE IS OUTSIDE THE ALLOWABLE (1:.I6:16H) INTERVAL * 45 1****) 46 18 FORMAT(1H .39H***** THE VALUE OF THE ARGUMENT IS .18 .6H *****) 47 C 50 CALL SORT(X.N.Y) 51 CALL UNIMED(N.W) 52 D0100TI=N 53 W(1)=(-ALOG(W(1)))**(-1.0/GAMMA) 54 100 CONTINUE 55 CALL PLOT(Y.W.N) 56 G=.9975 57 PP99755(-ALOG(G))**(-1.0/GAMMA) 56 G=.9975 57 PP9755(-ALOG(G))**(-1.0/GAMMA) 57 PP9755(-ALOG(G))**(-1.0/GAMMA) 56 G=.9975 57 PP9755(-ALOG(G))**(-1.0/GAMMA) 57 PP9755(-ALOG(G))**(-1.0/GAMMA) 56 G=.9975 57 PP9755(-ALOG(G))**(-1.0/GAMMA) 57 PP9755(-ALOG(G))**(-1.0/GAMMA) 57 PP9755(-ALOG(G))**(-1.0/GAMMA) 57 PP9755(-ALOG(G))**(-1.0/GAMMA) 58 CALL PLOT(Y.W.N) 59 CALL PLOT(Y.W.N) 50 CALL PLOT(Y.W.N) 50 CALL PLOT(Y.W.N) 51 CALL PLOT(Y.W.N) 52 CALL PLOT(Y.W.N) 53 CALL PLOT(Y.W.N) 54 CALL PLOT(Y.W.N) 55 CALL PLOT(Y.W.N) 55 CALL PLOT(Y.W.N) 56 CALL PLOT(Y.W.N) 57 CALL PLOT(Y.W.N) 58 CALL PLOT(Y.W.N) 59 CALL PLOT(Y.W.N) 50 CALL PLOT(Y.W.N) 51 CALL PLOT(Y.W.N) 52 CALL PLOT(Y.W.N) 53 CALL PLOT(Y.W.N) 54 CALL PLOT(Y.W.N) 55 CALL PLOT(Y.W.N) 56 CALL PLOT(Y.W.N) 57 CALL PLOT(Y.W.N) 57 CALL PLOT(Y.W.N) 58 CALL PLOT(Y.W.N) 59 CALL PLOT(Y.W.N) 59 CALL PLOT(Y.W.N) 50 CALL PLOT(Y.W.N) 51 CALL PLOT(Y.W.N) 52 CALL PLOT(Y.W.N) 53 CALL PLOT(Y.W.N) 54 CALL PLOT(Y.W.N) 55 CALL PLOT(Y.W.N) 55 CALL PLOT(Y.W.N) 56 CALL PLOT(Y.W.N) 57 CALL PLOT(Y.W.N)</pre>	19	С	
<pre>21</pre>	20		
22 C 24 C 25 C 26 C 27 IF(N.LT.1.0R.N.6T.IUPPER)60T050 27 IF(N.LT.1.0R.N.6T.IUPPER)60T050 27 IF(N.LT.1.0R.N.6T.IUPPER)60T050 28 HOLD=X(1) 29 D060T=2.N 30 DF(X(1).NE.HOLD)60T090 31 60 CONTINUE 32 WRITE(IPR.9)HOLD 33 G0T090 34 50 WRITE(IPR.47)N 36 RETURN 37 55 WRITE(IPR.47)N 36 RETURN 37 90 CONTINUE 40 9 FORMAT(1H +109H***** NON-FATAL DIAGNOSTICTHE FIRST INPUT ARGUME 41 INT (A VECTOR) TO THE EV2PLT SUBROUTINE HAS ALL ELEMENTS = .E15.8.6 42 1H ****) 43 17 FORMAT(1H .98H**** FATAL ERRORTHE SECOND INPUT ARGUME 41 INT (A VECTOR) TO THE EV2PLT SUBROUTINE HAS ALL ELEMENTS = .E15.8.6 42 17 FORMAT(1H .98H**** FATAL ERRORTHE SECOND INPUT ARGUMENT TO THE 44 1 EV2PLT SUBROUTINE IS OUTSIDE THE ALLOWABLE (116.16H) INTERVAL * 45 1****) 46 18 FORMAT(1H .00H***** NON-FATAL DIAGNOSTICTHE SECOND INPUT ARGUME 47 FORMAT(1H .35H**** THE VALUE OF THE ARGUMENT IS .I8 .6H *****) 48 47 FORMAT(1H .35H**** THE VALUE OF THE ARGUMENT IS .I8 .6H *****) 49 C 50 CALL SORT(X.N.Y) 51 CALL UNIMED(N.W) 52 D01001=I.N 53 W(1)=(-ALOG(W(1)))**(-1.0/GAMMA) 54 100 CONTINUE 55 CALL PLOT(Y.W.N) 56 G=.9975 57 PP99755(-ALOG(0))**(-1.0/GAMMA)	21		
C CHECK THE INPUT ARGUMENTS FOR ERRORS C C CHECK THE INPUT ARGUMENTS FOR ERRORS C IF(N.LC.1)GOTOS5 HOLD=X(1) OGOI=2:N IF(X(1).NE.HOLD)GOTO90 GO CONTINUE WRITE(IPR.9)HOLD GO ONTINUE WRITE(IPR.9)HOLD GO ONTINUE WRITE(IPR.17)IUPPER WRITE(IPR.47)N RETURN G CONTINUE 9 GO CONTINUE 9 GO CONTINUE 9 GO CONTINUE 10 CONTINUE 11 *****) 13 FORMAT(1H + 109H***** NON-FATAL DIAGNOSTICTHE FIRST INPUT ARGUME 11 *****) 13 FORMAT(1H + 109H***** NON-FATAL DIAGNOSTICTHE FIRST INPUT ARGUME 11 *****) 14 FORMAT(1H + 98H**** FATAL ERRORTHE SECOND INPUT ARGUMENT TO THE 14 ****) 16 FORMAT(1H + 98H**** FATAL ERRORTHE SECOND INPUT ARGUMENT TO THE 18 FORMAT(1H + 100H***** NON-FATAL DIAGNOSTICTHE SECOND INPUT ARGUME 19 C C CALL SORT(X-N,Y) C CALL SORT(X-N,Y) C CALL SORT(X-N,Y) C CALL UNIMED(N=W) D CONTINUE 50 C CALL SORT(X-N,Y) C CALL PLOT(Y-W+N) 51 CALL UNIMED(N=W) 55 CALL PLOT(Y+W+N) 56 G=975 7 PP9755(-(-ALOG(0))**(-1,0/GAMMA)	22	c	10FFER-7500
<pre>25 C 26 IF (N.LT.1.0R.N.GT.IUPPER) 60T050 27 IF(N.E.G.1)60T055 28 HOLD=X(1) 29 D060T=2:N 30 IF(X(1).NE.HOLD) 60T090 31 60 CONTINUE 32 WRITE(IPR:9)HOLD 33 G0T090 34 50 WRITE(IPR:47)NUPPER 35 WRITE(IPR:47)N 36 RETURN 37 55 WRITE(IPR:47)N 38 RETURN 39 90 CONTINUE 40 9 FORMAT(1H :109H***** NON-FATAL DIAGNOSTICTHE FIRST INPUT ARGUME 41 INT (A VeCTOR) TO THE EV2PLT SUBROUTINE HAS ALL ELEMENTS = :E15.8:6 42 1H *****) 43 17 FORMAT(1H : 98H**** FATAL ERORETHE SECOND INPUT ARGUMENT TO THE 44 1 EV2PLT SUBROUTINE IS OUTSIDE THE ALLOWABLE (1::16:16H) INTERVAL * 45 1****) 46 18 FORMAT(1H : 00H**** NON-FATAL DIAGNOSTICTHE SECOND INPUT ARGUME 47 FORMAT(1H : 100H**** NON-FATAL DIAGNOSTICTHE SECOND INPUT ARGUME 47 FORMAT(1H : 35H**** THE VALUE OF THE ARGUMENT IS : 18 :6H *****) 48 47 FORMAT(1H : 35H**** THE VALUE OF THE ARGUMENT IS :18 :6H *****) 49 C 50 CALL SORT(X:N:Y) 51 CALL ONT(MED(N:W) 52 D01001T=1:N 53 W(1)=(-ALOG(W(1)))**(-1:0/GAMMA) 54 100 CONTINUE 55 CALL PLOT(Y:W:N) 56 G=:9975 57 PP9975=(-ALOG(0))**(-1:0/GAMMA)</pre>	23	č	CHECK THE INDUIT ADDIMENTS FOD EDDARS
<pre>26</pre>	25	č	Check the Infor Accounts for Encode
<pre>IF(N_EQ.1)GOTO55 IF(N_EQ.1)GOTO55 IF(N_EQ.1)GOTO55 IF(N_EQ.1)GOTO55 IF(N_EQ.1)GOTO55 IF(X(I).NE.HOLD)GOTO90 IF(X(I).H.HOLD)GOTO90 IF(X(I).HOLD)GOTO90 IF(X(I).HOLD)GOTO90 IF(X(I).H.HOLD)GOTO90 IF(X(I).HOLD)GOTO90 IF(X(I).HOLD)GOTO90 IF(X(I).H.HOLD)GOTO90 IF(X(I).HOLD)GOTO90 IF(X(I).HOLD)GOTO90 IF(X(I).HOLD)GOTO90 IF(X(I).HOLD)GOTO9</pre>	26	Ŭ	IF(N.LT.1.OR.N.GT.IUPPER)GOTO50
<pre>HoLD=X(1) DoGoT=2:N HoLD=X(1) DoGoT=2:N HoLD=X(1),NE+HoLD)GOT090 HF(X(1),NE+HoLD)GOT090 HF(X(1),NE+HOLD)GOT090 GOT090 HTTE(IPR,9)HOLD GOT090 HTTE(IPR,17)IUPPER WRITE(IPR,17)N RETURN HTTE(IPR,18) RETURN HTTE(IPR,18) RETURN HTTE(IPR,18) RETURN HTTE(IPR,18) RETURN HTTE(IPR,18) RETURN HTTE(IPR,18) RETURN HTTE(IPR,18) HTTE(IPR,18) RETURN HTTE(IPR,18) HTTE(IPR,18) HTTE(IPR,18) HTTE(IPR,18) HTTE(IPR,18) HTTE(IPR,18) HTTE(IPR,18) HTTE(IPR,18) HTTE(IPR,18) HTTE(IPR,18) HTTE(IPR,18) HTTE(IPR,18) HTTE(IPR,18) HTTE(IPR,18) HTTE(IPR,18) HTTE(IPR,18) HTTE(IPR,18) HTTE(IPR,18) HTTE(IPR,18) HTTE(IPR,18) HTTE(IPR,18) HTTE(IPR,18) HTTE(IPR,18) HTTE(IPR,18) HTTE(IPR,18) HTTE(IPR,18) HTTE(IPR,18) HTTE(IPR,18) HTTE(IPR,18) HTTE(IPR,18) HTTE(IPR,18) HTTE(IPR,18) HTTE(IPR,18) HTTE(IPR,18) HTTE(IPR,18) HTTE(IPR,18) HTTE(IPR,18) HTTE(IPR,18) HTTE(IPR,18) HTTE(IPR,18) HTTE(IPR,18) HTTE(IPR,18) HTTE(IPR,18) HTTE(IPR,18) HTTE(IPR,18) HTTE(IPR,18) HTTE(IPR,18) HTTE(IPR,18) HTTE(IPR,18) HTTE(IPR,18) HTTE(IPR,18) HTTE(IPR,18) HTTE(IPR,18) HTTE(IPR,18) HTTE(IPR,18) HTTE(IPR,18) HTTE(IPR,18) HTTE(IPR,18) HTTE(IPR,18) HTTE(IPR,18) HTTE(IPR,18) HTTE(IPR,18) HTTE(IPR,18) HTTE(IPR,18) HTTE(IPR,18) HTTE(IPR,18) HTTE(IPR,18) HTTE(IPR,18) HTTE(IPR,18) HTTE(IPR,18) HTTE(IPR,18) HTTE(IPR,18) HTTE(IPR,18) HTTE(IPR,18) HTTE(IPR,18) HTTE(IPR,18) HTTE(IPR,18) HTTE(IPR,18) HTTE(IPR,18) HTTE(IPR,18) HTTE(IPR,18) HTTE(IPR,18) HTTE(IPR,18) HTTE(IPR,18) HTTE(IPR,18) HTTE(IPR,18) HTTE(IPR,18) HTTE(IPR,18) HTTE(IPR,18) HTTE(IPR,18) HTTE(IPR,18) HTTE(IPR,18) HTTE(IPR,18) HTTE(IPR,18) HTTE(IPR,18) HTTE(IPR,18) HTTE(IPR,18) HTTE(IPR,18) HTTE(IPR,18) HTTE(IPR,18) HTTE(IPR,18) HTTE(IPR,18) HTTE(IPR,18) HTTE(IPR,18) HTTE(IPR,18) HTTE(IPR,18) HTTE(IPR,18) HTTE(IPR,18) HTTE(IPR,18) HTTE(IPR,18) HTTE(IPR,18) HTTE(IPR,18) HTTE(IPR,18) HTTE(IPR,18) HTTE(IPR,18) HTTE(IPR,18) HTTE(IPR,18) HTTE(IPR,18) HTTE(IPR,18) HTTE(IPR,18) HTTE(IPR,18) HTTE(IPR,18) HTTE(IPR,18) HTTE(IPR,18) HTTE(IPR,18) HTTE(IPR,18) HTTE(IPR,18) HTTE(IPR,18) HTTE(IPR,18) HTTE(IPR,18) HTTE(IPR,18) HTT</pre>	27		IF(N+FQ+1)G0T055
<pre>29 D0601=2:N 30 IF(x(1).NE.HOLD)GOT090 31 60 CONTINUE 32 WRITE(IPR, 9)HOLD 33 G0T090 34 50 WRITE(IPR, 47)N 35 WRITE(IPR, 47)N 36 RETURN 37 55 WRITE(IPR, 47)N 38 RETURN 39 90 CONTINUE 40 9 FORMAT(1H :109H***** NON-FATAL DIAGNOSTICTHE FIRST INPUT ARGUME 41 INT (A VECTOR) TO THE EV2PLT SUBROUTINE HAS ALL ELEMENTS = :E15.8+6 42 IH ****) 43 17 FORMAT(1H :98H***** FATAL ERRORTHE SECOND INPUT ARGUMENT TO THE 44 1 EV2PLT SUBROUTINE IS OUTSIDE THE ALLOWABLE (1::16:16H) INTERVAL * 45 1****) 46 18 FORMAT(1H :00H***** NON-FATAL DIAGNOSTICTHE SECOND INPUT ARGUME 47 INT TO THE EV2PLT SUBROUTINE HAS THE VALUE 1 *****) 48 47 FORMAT(1H : 35H**** THE VALUE OF THE ARGUMENT IS :I8 '6H ****) 49 C 50 CALL SORT(X:N:Y) 51 CALL UNIMED(N:W) 52 D0100I=1:N 46 100 CONTINUE 55 CALL PLOT(Y:W:N) 56 G=:9975 57 PP9975=(-ALOG(0))**(-1:0/GAMMA) 56 G=:9975</pre>	28		HOLD=X(1)
<pre>30 IF(X(1).NE.HOLD)GOTO90 31 60 CONTINUE 32 WRITE(IPR,9)HOLD 33 GOTO90 34 50 WRITE(IPR,17)IUPPER 35 WRITE(IPR,17)IUPPER 36 RETURN 37 55 WRITE(IPR,18) 38 RETURN 39 90 CONTINUE 40 9 FORMAT(1H +109H***** NON=FATAL DIAGNOSTICTHE FIRST INPUT ARGUME 41 INT (A VECTOR) TO THE EV2PLT SUBROUTINE HAS ALL ELEMENTS = .E15.8.6 42 IH *****) 43 17 FORMAT(1H , 9BH**** FATAL ERRORTHE SECOND INPUT ARGUMENT TO THE 44 1 EV2PLT SUBROUTINE IS OUTSIDE THE ALLOWABLE (116.16H) INTERVAL * 45 1****) 46 18 FORMAT(1H + 100H**** NON=FATAL DIAGNOSTICTHE SECOND INPUT ARGUME 47 INT TO THE EV2PLT SUBROUTINE HAS THE VALUE 1 *****) 48 47 FORMAT(1H + 35H**** THE VALUE OF THE ARGUMENT IS .I8 .6H ****) 49 C 50 CALL SORT(X,N,Y) 51 CALL UNIMED(N.**) 52 DO1001=1:N 53 W(I)=(-ALOG(0))**(-1.0/GAMMA) 54 100 CONTINUE 55 CALL PLOT(Y,W,N) 56 g=.9975 57 PP9975=(-ALOG(0))**(-1.0/GAMMA) 57 CALL PLOT(Y,W,N) 58 PP9975=(-ALOG(0))**(-1.0/GAMMA) 54 PP9975=(-ALOG(0))**(-1.0/GAMMA) 55 PP9975=(-ALOG(0))**(-1.0/GAMMA) 56 PP9975=(-ALOG(0))**(-1.0/GAMMA) 57 PP9975=(-ALOG(0))**(-1.0/GAMMA) 57 PP9975=(-ALOG(0))**(-1.0/GAMMA) 58 PP9975=(-ALOG(0))**(-1.0/GAMMA) 59 PP975=(-ALOG(0))**(-1.0/GAMMA) 50 PP975=(-ALOG(0))**(-1.0/GAMMA) 50 PP9975=(-ALOG(0))**(-1.0/GAMMA) 51 PP9975=(-</pre>	29		D060I=2+N
<pre>31 60 CONTINUE 32 WRITE(IPR, 9)HOLD 33 60T090 34 50 WRITE(IPR,17)IUPPER 35 WRITE(IPR,47)N 36 RETURN 37 55 WRITE(IPR,18) 38 RETURN 39 90 CONTINUE 40 9 FORMAT(1H ,109H***** NON-FATAL DIAGNOSTICTHE FIRST INPUT ARGUME 41 INT (A VECTOR) TO THE EV2PLT SUBROUTINE HAS ALL ELEMENTS = +E15.8+6 42 IH *****) 43 17 FORMAT(1H , 98H**** FATAL ERRORTHE SECOND INPUT ARGUMENT TO THE 44 I EV2PLT SUBROUTINE IS OUTSIDE THE ALLOWABLE (1,,16,16H) INTERVAL * 45 1****) 46 18 FORMAT(1H , 100H***** NON-FATAL DIAGNOSTICTHE SECOND INPUT ARGUME 47 INT TO THE EV2PLT SUBROUTINE HAS THE VALUE 1 *****) 48 47 FORMAT(1H , 35H**** THE VALUE OF THE ARGUMENT IS ,I8 ,6H *****) 49 C 50 CALL SORT(X,N,Y) 51 CALL UNIMED(N,W) 52 DO100I=1:N 46 (1) = (-ALOG(W(I)))**(-1,0/GAMMA) 54 100 CONTINUE 55 CALL PLOT(Y,W,N) 56 G=.9975 57 PP9975=(-ALOG(Q))**(-1,0/GAMMA)</pre>	30		IF(X(I).NE.HOLD)GOT090
32 wRITE(IPR, 9)HOLD 33 GOTO90 34 50 WRITE(IPR,17)IUPPER 35 wRITE(IPR,17)N 36 RETURN 37 55 WRITE(IPR,18) 38 RETURN 39 90 CONTINUE 40 9 FORMAT(1H +109H**** NON-FATAL DIAGNOSTICTHE FIRST INPUT ARGUME 41 INT (A VECTOR) TO THE EV2PLT SUBROUTINE HAS ALL ELEMENTS = *E15.8*6 42 1H *****) 43 17 FORMAT(1H + 98H**** FATAL ERRORTHE SECOND INPUT ARGUMENT TO THE 44 1 EV2PLT SUBROUTINE IS OUTSIDE THE ALLOWABLE (1**16**16H) INTERVAL * 45 1****) 46 18 FORMAT(1H *100H***** NON-FATAL DIAGNOSTICTHE SECOND INPUT ARGUME 47 INT TO THE EV2PLT SUBROUTINE HAS THE VALUE 1 *****) 48 47 FORMAT(1H * 35H**** THE VALUE OF THE ARGUMENT IS *18 *6H *****) 49 C 50 CALL SORT(X*N*Y) 51 CALL SORT(X*N*Y) 52 D01001=1*N 53 w(I)=(-ALOG(w(I)))**(-1.0/GAMMA) 54 100 CONTINUE 55 CALL PLOT(Y*W*N) 56 0975 57 <	31	60	CONTINUE
<pre>33 GOTO90 34 50 WRITE(IPR,17)IUPPER 35 WRITE(IPR,47)N 36 RETURN 37 55 WRITE(IPR,18) 38 RETURN 39 90 CONTINUE 40 9 FORMAT(1H ,109H***** NON-FATAL DIAGNOSTICTHE FIRST INPUT ARGUME 41 INT (A VECTOR) TO THE EV2PLT SUBROUTINE HAS ALL ELEMENTS = ,E15.8,6 42 IH *****) 43 17 FORMAT(1H , 98H**** FATAL ERRORTHE SECOND INPUT ARGUMENT TO THE 44 I EV2PLT SUBROUTINE IS OUTSIDE THE ALLOWABLE (1,,I6,16H) INTERVAL * 45 I****) 46 18 FORMAT(1H ,100H***** NON-FATAL DIAGNOSTICTHE SECOND INPUT ARGUME 47 INT TO THE EV2PLT SUBROUTINE HAS THE VALUE 1 *****) 48 47 FORMAT(1H , 35H**** THE VALUE OF THE ARGUMENT IS ,I8 ,6H *****) 49 C 50 CALL SORT(X,N,Y) 51 CALL UNIMED(N,W) 52 DO100I=1.N 41 100 CONTINUE 55 CALL PLOT(Y,W,N) 54 100 CONTINUE 55 CALL PLOT(Y,W,N) 56 G9975 57 PP9975=(-ALOG(Q))**(-1.0/GAMMA) 54 100 CONTINUE 55 CALL PLOT(Y,W,N) 56 CALL PLOT(Y,W,N) 57 CALL OG(Q))**(-1.0/GAMMA) 54 100 CONTINUE 55 CALL PLOT(Y,W,N) 56 CALL PLOT(Y,W,N) 57 CALL OG(Q))**(-1.0/GAMMA) 54 100 CONTINUE 55 CALL PLOT(Y,W,N) 56 CALL PLOT(Y,W,N) 57 CALL OG(Q))**(-1.0/GAMMA) 56 CALL PLOT(Y,W,N) 57 CALL OG(Q))**(-1.0/GAMMA) 56 CALL PLOT(Y,W,N) 57 CALL OG(Q))**(-1.0/GAMMA) 57 CALL PLOT(Y,W,N) 58 CALL PLOT(Y,W,N) 59 CALL PLOT(Y,W,N) 59 CALL PLOT(Y,W,N) 50 CALL PLOT(Y,W,N) 51 CALL OG(Q))**(-1.0/GAMMA) 54 CALL PLOT(Y,W,N) 55 CALL PLOT(Y,W,N) 56 CALL PLOT(Y,W,N) 57 CALL PLOT(Y,W,N) 58 CALL PLOT(Y,W,N) 59 CALL PLOT(Y,W,N) 59 CALL PLOT(Y,W,N) 50 CALL PLOT(Y,W,N) 50 CALL PLOT(Y,W,N) 51 CALL PLOT(Y,W,N) 52 CALL PLOT(Y,W,N) 53 CALL PLOT(Y,W,N) 54 CALL PLOT(Y,W,N) 55 CALL PLOT(Y,W,N) 56 CALL PLOT(Y,W,N) 57 CALL PLOT(Y,W,N) 58 CALL PLOT(Y,W,N) 59 CALL PLOT(Y,W,N) 59 CALL PLOT(Y,W,N) 50 CALL PLOT(Y,W,N) 51 CALL PLOT(Y,W,N) 52 CALL PLOT(Y,W,N) 53 CALL PLOT(Y,W,N) 54 CALL PLOT(Y,W,N) 55 CALL PLOT(Y,W,N) 55 CALL PLOT(Y,W,N) 56 CALL PLOT(Y,W,N) 57 CALL PLOT(Y,W,N) 58 CALL PLOT(Y,W,N) 59 CALL PLOT(Y,W,N) 59 CALL PLOT(Y,W,N) 50 CALL PLOT(Y,W,N) 51 CALL PLOT(Y,W,N) 51 CALL PLOT(Y,W,N) 52 CALL PLOT(Y,W,N) 53 CALL PLOT(Y,W,N) 54 CALP PLOT(Y,W,N) 55 CALP PLOT(Y,W,N) 55 CALP</pre>	32		WRITE(IPR, 9)HOLD
34 50 WRITE(IPR,17)IUPPER 35 WRITE(IPR,47)N 36 RETURN 37 55 WRITE(IPR,18) 38 RETURN 39 90 CONTINUE 40 9 FORMAT(IH +109H***** NON-FATAL DIAGNOSTICTHE FIRST INPUT ARGUME 41 INT (A VECTOR) TO THE EV2PLT SUBROUTINE HAS ALL ELEMENTS = *E15*8*6 42 1H *****) 43 17 44 1 EV2PLT SUBROUTINE IS OUTSIDE THE ALLOWABLE (1**16*16H) INTERVAL * 45 1****) 46 18 47 INT TO THE EV2PLT SUBROUTINE HAS THE VALUE 1 ******) 48 47 47 FORMAT(1H * 100H***** NON-FATAL DIAGNOSTICTHE SECOND INPUT ARGUME 47 INT TO THE EV2PLT SUBROUTINE HAS THE VALUE 1 ******) 48 47 47 FORMAT(1H * 35H***** THE VALUE OF THE ARGUMENT IS *18 * 6H *****) 49 C 50 CALL SORT(X*N*Y) 51 CALL UNIMED(N*W) 52 D0100I=1*N W(1)=(-4.0G(W(1)))**(-1.0/GAMMA) 54 100 55 CALL PLOT(Y*W*N)<	33		G0T090
<pre>35 WRITE(IPR.47)N 36 RETURN 37 S5 WRITE(IPR.18) 38 RETURN 39 90 CONTINUE 40 9 FORMAT(1H .109H***** NON-FATAL DIAGNOSTICTHE FIRST INPUT ARGUME 41 INT (A VECTOR) TO THE EV2PLT SUBROUTINE HAS ALL ELEMENTS = .E15.8.6 42 1H ****) 43 17 FORMAT(1H .98H**** FATAL ERRORTHE SECOND INPUT ARGUMENT TO THE 44 1 EV2PLT SUBROUTINE IS OUTSIDE THE ALLOWABLE (116.16H) INTERVAL * 45 1***) 46 18 FORMAT(1H .100H**** NON-FATAL DIAGNOSTICTHE SECOND INPUT ARGUME 47 INT TO THE EV2PLT SUBROUTINE HAS THE VALUE 1 *****) 48 47 FORMAT(1H .35H**** THE VALUE OF THE ARGUMENT IS .I8 .6H ****) 49 C 50 CALL SORT(X.N.Y) 51 CALL UNIMED(N.W) 52 DO100I=1.N 46 100 CONTINUE 55 CALL PLOT(Y.W.N) 56 Q=.9975 57 PP9975=(-ALOG(Q))**(-1.0/GAM*A) 54 100 CONTINUE 55 CALL PLOT(Y.W.N) 56 PP9775=(-ALOG(Q))**(-1.0/GAM*A) 57 PP9775=(-ALOG(Q))**(-1.0/GAM*A) 58 PORT PD975=(-ALOG(Q))**(-1.0/GAM*A) 59 PORT PD975=(-ALOG(Q))**(-1.0/GAM*A) 50 PORT PD1 PD1 PD1 PD1 PD1 PD1 PD1 PD1 PD1 PD1</pre>	34	50	WRITE(IPR, 17) IUPPER
36 RETURN 37 55 WRITE(IPR+18) 38 RETURN 39 90 CONTINUE 40 9 FORMAT(1H + 109H***** NON-FATAL DIAGNOSTICTHE FIRST INPUT ARGUME 41 INT (A VECTOR) TO THE EV2PLT SUBROUTINE HAS ALL ELEMENTS = +E15.8+6 42 1H *****) 43 17 FORMAT(1H + 98H**** FATAL ERRORTHE SECOND INPUT ARGUMENT TO THE 44 1 EV2PLT SUBROUTINE IS OUTSIDE THE ALLOWABLE (1+, 16+16H) INTERVAL * 45 1****) 46 18 FORMAT(1H + 100H***** NON-FATAL DIAGNOSTICTHE SECOND INPUT ARGUME 47 1NT TO THE EV2PLT SUBROUTINE HAS THE VALUE 1 *****) 46 18 FORMAT(1H + 100H***** NON-FATAL DIAGNOSTICTHE SECOND INPUT ARGUME 47 1NT TO THE EV2PLT SUBROUTINE HAS THE VALUE 1 *****) 48 47 FORMAT(1H + 35H**** THE VALUE OF THE ARGUMENT IS , I8 , 6H ****) 49 C 50 CALL SORT(X+N+Y) 51 CALL UNIMED(N+W) 52 DO100I=1+N W(I)=(-ALOG(W(I)))**(-1.0/GAMMA) 54 100 CONTINUE 55 CALL PLOT(Y+W+N) 65 q.9975 57 PP9975=(-ALOG(Q))**(-1.0/GAM#VA) <td>35</td> <td></td> <td>WRITE(IPR/47)N</td>	35		WRITE(IPR/47)N
<pre>37 55 WRITE(TPR+T8) 38 RETURN 39 90 CONTINUE 40 9 FORMAT(1H +109H***** NON-FATAL DIAGNOSTICTHE FIRST INPUT ARGUME 41 INT (A VECTOR) TO THE EV2PLT SUBROUTINE HAS ALL ELEMENTS = +E15.8+6 41 INT (A VECTOR) TO THE EV2PLT SUBROUTINE HAS ALL ELEMENTS = +E15.8+6 42 1H *****) 43 17 FORMAT(1H + 98H***** FATAL ERRORTHE SECOND INPUT ARGUMENT TO THE 44 1 EV2PLT SUBROUTINE IS OUTSIDE THE ALLOWABLE (1++16+16H) INTERVAL * 45 1****) 46 18 FORMAT(1H +100H***** NON-FATAL DIAGNOSTICTHE SECOND INPUT ARGUME 47 INT TO THE EV2PLT SUBROUTINE HAS THE VALUE 1 *****) 48 47 FORMAT(1H + 35H**** THE VALUE OF THE ARGUMENT IS +I8 +6H *****) 49 C 50 CALL SORT(X+N,Y) 51 CALL UNIMED(N+W) 52 D01001=1+N W(1)=(-ALOG(W(1)))**(-1.0/GAMMA) 54 100 CONTINUE 55 CALL PLOT(Y+W+N) 56 G=.9975 57 PP9975=(-ALOG(Q))**(-1.0/GAMMA)</pre>	36		RETURN
<pre>38 RETURN 39 90 CONTINUE 40 9 FORMAT(1H +109H***** NON-FATAL DIAGNOSTICTHE FIRST INPUT ARGUME 41 INT (A VECTOR) TO THE EV2PLT SUBROUTINE HAS ALL ELEMENTS = +E15.8+6 42 1H *****) 43 17 FORMAT(1H + 9BH***** FATAL ERRORTHE SECOND INPUT ARGUMENT TO THE 44 1 EV2PLT SUBROUTINE IS OUTSIDE THE ALLOWABLE (1++16+16H) INTERVAL * 45 1****) 46 18 FORMAT(1H +100H***** NON-FATAL DIAGNOSTICTHE SECOND INPUT ARGUME 47 INT TO THE EV2PLT SUBROUTINE HAS THE VALUE 1 *****) 48 47 FORMAT(1H + 35H**** THE VALUE OF THE ARGUMENT IS +18 +6H *****) 49 C 50 CALL SORT(X+N+Y) 51 CALL UNIMED(N+W) 52 D0100I=1+N W(I)=(-ALOG(W(I)))**(-1.0/GAMMA) 54 100 CONTINUE 55 CALL PLOT(Y+W+N) 66 g=.9975 7 PP9975=(-ALOG(Q))**(-1.0/GAMMA)</pre>	37	50	
<pre>9 FORMAT(1H +109H***** NON-FATAL DIAGNOSTICTHE FIRST INPUT ARGUME 1NT (A VECTOR) TO THE EV2PLT SUBROUTINE HAS ALL ELEMENTS = +E15.8+6 1H *****) 43 17 FORMAT(1H + 98H***** FATAL ERRORTHE SECOND INPUT ARGUMENT TO THE 44 1 EV2PLT SUBROUTINE IS OUTSIDE THE ALLOWABLE (1++16+16H) INTERVAL * 1****) 46 18 FORMAT(1H +100H***** NON-FATAL DIAGNOSTICTHE SECOND INPUT ARGUME 47 INT TO THE EV2PLT SUBROUTINE HAS THE VALUE 1 *****) 48 47 FORMAT(1H + 35H**** THE VALUE OF THE ARGUMENT IS +18 +6H *****) 49 C 50 CALL SORT(X+N+Y) 51 CALL UNIMED(N+W) 52 D0100I=1+N W(I)=(-ALOG(W(I)))**(-1.0/GAMMA) 54 100 CONTINUE 55 CALL PLOT(Y+W+N) 66 g=.9975 7 PP9975=(-ALOG(Q))**(-1.0/GAMMA)</pre>	38	00	
<pre>41 INT (A VECTOR) TO THE EV2PLT SUBROUTINE HAS ALL ELEMENTS = *E15.8*6 42 1H *****) 43 17 FORMAT(1H * 98H**** FATAL ERRORTHE SECOND INPUT ARGUMENT TO THE 44 1 EV2PLT SUBROUTINE IS OUTSIDE THE ALLOWABLE (1**16*16H) INTERVAL * 45 1****) 46 18 FORMAT(1H *100H***** NON-FATAL DIAGNOSTICTHE SECOND INPUT ARGUME 47 INT TO THE EV2PLT SUBROUTINE HAS THE VALUE 1 *****) 48 47 FORMAT(1H * 35H**** THE VALUE OF THE ARGUMENT IS *I8 *6H *****) 49 C 50 CALL SORT(X*N*Y) 51 CALL UNIMED(N*W) 52 D0100I=1*N 53 W(I)=(-ALOG(W(I)))**(-1.0/GAMMA) 54 100 CONTINUE 55 CALL PLOT(Y*W*N) 56 G=.9975 57 PP9975=(-ALOG(Q))**(-1.0/GAMMA)</pre>	3 7 40	90	FORMAT(1H +109H***** NON-FATA) DIAGNOSTICTHE FIRST INPUT ADDIME
<pre>42 1H ****) 43 17 FORMAT(1H , 98H**** FATAL ERRORTHE SECOND INPUT ARGUMENT TO THE 44 1 EV2PLT SUBROUTINE IS OUTSIDE THE ALLOWABLE (1,,I6,16H) INTERVAL * 45 1****) 46 18 FORMAT(1H ,100H**** NON-FATAL DIAGNOSTICTHE SECOND INPUT ARGUME 47 INT TO THE EV2PLT SUBROUTINE HAS THE VALUE 1 *****) 48 47 FORMAT(1H , 35H**** THE VALUE OF THE ARGUMENT IS ,I8 ,6H *****) 49 C 50 CALL SORT(X,N,Y) 51 CALL UNIMED(N,W) 52 D0100I=1.N 53 W(I)=(-ALOG(W(I)))**(-1.0/GAMMA) 54 100 CONTINUE 55 CALL PLOT(Y,W,N) 56 g=.9975 57 PP9975=(-ALOG(Q))**(-1.0/GAMMA)</pre>	41	-	INT (A VECTOR) TO THE EV2PLT SUBBOUTINE HAS ALL FLEMENTS = F15.8.6
<pre>43 17 FORMAT(1H , 98H**** FATAL ERRORTHE SECOND INPUT ARGUMENT TO THE 44 1 EV2PLT SUBROUTINE IS OUTSIDE THE ALLOWABLE (1,,16,16H) INTERVAL * 45 1****) 46 18 FORMAT(1H ,100H***** NON-FATAL DIAGNOSTICTHE SECOND INPUT ARGUME 47 INT TO THE EV2PLT SUBROUTINE HAS THE VALUE 1 *****) 48 47 FORMAT(1H , 35H**** THE VALUE OF THE ARGUMENT IS ,18 ,6H *****) 49 C 50 CALL SORT(X,N,Y) 51 CALL UNIMED(N,W) 52 D0100I=1:N W(I)=(-ALOG(W(I)))**(-1.0/GAMMA) 54 100 CONTINUE 55 CALL PLOT(Y,W,N) 56 G=.9975 57 PP9975=(-ALOG(Q))**(-1.0/GAMMA)</pre>	42		1H *****)
<pre>44 1 EV2PLT SUBROUTINE IS OUTSIDE THE ALLOWABLE (1,,16,16H) INTERVAL * 45 1****) 46 18 FORMAT(1H ,100H***** NON-FATAL DIAGNOSTICTHE SECOND INPUT ARGUME 47 INT TO THE EV2PLT SUBROUTINE HAS THE VALUE 1 *****) 48 47 FORMAT(1H , 35H**** THE VALUE OF THE ARGUMENT IS ,18 ,6H *****) 49 C 50 CALL SORT(X,N,Y) 51 CALL UNIMED(N,W) 52 D0100I=1+N 53 W(I)=(-ALOG(W(I)))**(-1.0/GAMMA) 54 100 CONTINUE 55 CALL PLOT(Y,W,N) 56 G=.9975 57 PP9975=(-ALOG(Q))**(-1.0/GAMMA)</pre>	43	17	FORMAT(1H + 98H**** FATAL ERROR-THE SECOND INPUT ARGUMENT TO THE
<pre>45 1****) 46 18 FORMAT(1H +100H***** NON-FATAL DIAGNOSTICTHE SECOND INPUT ARGUME 47 INT TO THE EV2PLT SUBROUTINE HAS THE VALUE 1 *****) 48 47 FORMAT(1H + 35H**** THE VALUE OF THE ARGUMENT IS +I8 +6H *****) 49 C 50 CALL SORT(X+N+Y) 51 CALL UNIMED(N+W) 52 D0100I=1+N 53 W(I)=(-ALOG(W(I)))**(-1.0/GAMMA) 54 100 CONTINUE 55 CALL PLOT(Y+W+N) 56 g=.9975 57 PP9975=(-ALOG(Q))**(-1.0/GAMMA)</pre>	44		1 EV2PLT SUBROUTINE IS OUTSIDE THE ALLOWABLE (1++16+16H) INTERVAL *
<pre>46</pre>	45		1****)
<pre>47 INT TO THE EV2PLT SUBROUTINE HAS THE VALUE 1 *****) 48 47 FORMAT(1H , 35H**** THE VALUE OF THE ARGUMENT IS ,I8 ,6H *****) 49 C 50 CALL SORT(X,N,Y) 51 CALL UNIMED(N,W) 52 D0100I=1,N 53 W(I)=(-ALOG(W(I)))**(-1.0/GAMMA) 54 100 CONTINUE 55 CALL PLOT(Y,W,N) 56 Q=.9975 57 PP9975=(-ALOG(Q))**(-1.0/GAMMA)</pre>	46	18	FORMAT(1H +100H***** NON-FATAL DIAGNOSTICTHE SECOND INPUT ARGUME
<pre>48</pre>	47		1NT TO THE EV2PLT SUBROUTINE HAS THE VALUE 1 *****)
49 C 50 CALL SORT(X,N,Y) 51 CALL UNIMED(N,W) 52 D0100I=1+N 53 W(I)=(-ALOG(W(I)))**(-1.0/GAMMA) 54 100 CONTINUE 55 CALL PLOT(Y,W,N) 56 Q=.9975 57 PP9975=(-ALOG(Q))**(-1.0/GAMMA)	48	47	FORMAT(1H + 35H***** THE VALUE OF THE ARGUMENT IS +I8 +6H *****)
50 CALL SORT(X,N,Y) 51 CALL UNIMED(N,W) 52 D0100I=1,N 53 W(I)=(-ALOG(W(I)))**(-1.0/GAMMA) 54 100 CONTINUE 55 CALL PLOT(Y,W,N) 56 Q=.9975 57 PP9975=(-ALOG(Q))**(-1.0/GAMMA)	49	C	
51 CALL UNIMED(N,W) 52 D0100I=1+N 53 W(I)=(-ALOG(W(I)))**(-1.0/GAMMA) 54 100 CONTINUE 55 CALL PLOT(Y+W+N) 56 Q=.9975 57 PP9975=(-ALOG(Q))**(-1.0/GAMMA)	50		CALL SORT(X,N,Y)
52 D01001-1/N 53 W(I)=(-ALOG(W(I)))**(-1.0/GAMMA) 54 100 CONTINUE 55 CALL PLOT(Y+W+N) 56 Q=.9975 57 PP9975=(-ALOG(Q))**(-1.0/GAMMA)	51		
54 100 CONTINUE 55 CALL PLOT(Y+W+N) 56 Q=.9975 57 PP9975=(-ALOG(Q))**(-1.0/GAMMA)	52		
55 CALL PLOT(Y+W+N) 56 Q=.9975 57 PP9975=(-ALOG(Q))**(-1.0/GAMMA)	55	100	
56 Q=.9975 57 PP9975=(-ALOG(Q))**(-1.0/GAMMA)	55	100	
57 PP9975=(-ALOG(Q))**(-1.0/GAMWA)	56		
	57		PP9975=(-ALOG(Q))**(-1.0/GAMPA)

58 Q=.0025 59 PP0025=(-ALOG(Q))**(-1.0/GAMMA) 60 Q=.975 61 PP975=(-ALOG(Q))**(-1.0/GAMMA) 62 Q=.025 63 PP025=(-ALOG(Q))**(-1.0/GAMMA) 64 TAU=(PP9975-PP0025)/(PP975-PP025) 65 WRITE(IPR:105)GAMMA.TAU.N 66 SUM1=0.0 67 SUM2=0.0 68 D0200I=1.N 69 SUM1=SUM1+Y(I) 70 SUM2=SUM2+W(I) 71 200 CONTINUE 72 YBAR=SUM1/AN 73 wBAR=SUM2/AN 74 SUM1=0.0 75 SUM2=0.0 76 SUM3=0.0 77 D0300I=1.N 78 SUM1=SUM1+(Y(I)-YBAR)*(Y(I)-YBAR) 79 SUM2=SUM2+(Y(I)-YBAR)*(Y(I)-YBAR) 80 SUM3=SUM3+(W(I)-WBAR) 81 300 82 CC=SUM2/SQRT(SUM3+SUM1) 83 YSLOPE=SUM2/SUM3 84 YINT=YBAR-YSLOPE*#BAR 85 WRITE(IPR:305)CC:YINT:YSLOPE <th></th> <th></th>		
59 PP0025=(-ALOG(Q))**(-1.0/GAMMA) 60 Q=.975 61 PP975=(-ALOG(Q))**(-1.0/GAMMA) 62 Q=.025 63 PP025=(-ALOG(Q))**(-1.0/GAMMA) 64 TAU=(PP9975-PP0025)/(PP975-PP025) 65 WRITE(IPR.105)GAMMA.TAU.N 66 SUM1=0.0 67 SUM2=0.0 68 D02001=1.N 69 SUM1=SUM1+Y(I) 70 SUM2=SUM2+W(I) 71 200 72 YBAR=SUM2/AN 73 WBAR=SUM2/AN 74 SUM1=0.0 75 SUM3=0.0 76 SUM3=0.0 77 D03001=1.N 78 SUM1=SUM1+(Y(I)-YBAR)*(Y(I)-YBAR) 79 SUM2=SUM2+(Y(I)-YBAR)*(W(I)-WBAR) 80 SUM3=SUM3+(W(I)-WBAR)*(W(I)-WBAR) 81 300 CONTINUE 82 CC=SUM2/SQRT(SUM3+SUM1) 83 YSLOPE=SUM2/SUM3 84 YINT=YBAR-YSLOPE*WBAR 85 WRITE(IPR.305)CC.YINT.YSLOPE	58	9=.0025
57 Theory S 60 Q=.975 61 PP975 = (-ALOG(Q))**(-1.0/GAMMA) 62 Q=.025 63 PP025 = (-ALOG(Q))**(-1.0/GAMMA) 64 TAU=(PP9975-PP0025)/(PP975-PP025) 65 WRITE(IPR.105)GAMMA.TAU.N 66 SUM1=0.0 67 SUM2=0.0 68 D0200I=1.N 69 SUM1=SUM1+Y(I) 70 SUM2=SUM2+W(I) 71 200 CONTINUE 72 YBAR=SUM1/AN 73 WBAR=SUM2/AN 74 SUM1=0.0 75 SUM2=0.0 76 SUM3=0.0 77 D0300I=1.N 78 SUM2=SUM2+Y(I)-YBAR)*(Y(I)-YBAR) 79 SUM2=SUM2+Y(I)-YBAR)*(W(I)-WBAR) 80 SUM3=SUM3+(W(I)-WBAR) 81 300 CONTINUE 82 CC=SUM2/SQRT(SUM3*SUM1) 83 YSLOPE=SUM2/SUM3 84 YINT=YBAR-YSLOPE*WBAR 85 WRITE(IPR.305)CC.YINT,YSLOPE	59	PP0025=(-ALOG(Q)) **(-1, 0/GAMMA)
01 PP975 = (-ALOG(Q))**(-1.0/GAMMA) 62 Q=.025 63 PP025 = (-ALOG(Q))**(-1.0/GAMMA) 64 TAU=(PP975-PP0025)/(PP975-PP025) 65 WRITE(IPR,105)GAMMA,TAU,N 66 SUM1=0.0 67 SUM2=0.0 68 D02001=1.N 69 SUM1=SUM1+Y(I) 70 SUM2=SUM2+w(I) 71 200 CONTINUE 72 YBAR=SUM1/AN 73 wBAR=SUM2/AN 74 SUM1=0.0 75 SUM2=0.0 76 SUM3=0.0 77 D03001=1.N 78 SUM1=SUM1+(Y(I)-YBAR)*(Y(I)-YBAR) 79 SUM2=SUM2+(Y(I)-YBAR)*(W(I)-WBAR) 80 SUM3=SUM3+(W(I)-WBAR)*(W(I)-WBAR) 81 300 CONTINUE 82 CC=SUM2/SQRT(SUM3*SUM1) SUM2=SUM2/SUM3 83 YSLOPE=SUM2/SUM3 84 YINT=YBAR-YSLOPE *WBAR 85 WRITE(IPR, 305)CC, YINT, YSLOPE	60	
61 CALOS(G) +* (=1.0/GAMMA) 62 Q=,025 63 PP025 = (-ALOG(Q)) ** (=1.0/GAMMA) 64 TAU=(PP9975-PP0025)/(PP975-PP025) 65 WRITE(IPR,105)GAMMA,TAU,N 66 SUM1=0.0 67 SUM2=0.0 68 D0200I=1,N 69 SUM1=SUM1+Y(I) 70 SUM2=SUM2+W(I) 71 200 72 YBAR=SUM1/AN 73 WBAR=SUM2/AN 74 SUM1=0.0 75 SUM2=0.0 76 SUM2=0.0 77 D0300I=1,N 78 SUM1=SUM1 + (Y(I) - YBAR) * (Y(I) - YBAR) 79 SUM2=SUM2 + (Y(I) - YBAR) * (W(I) - WBAR) 80 SUM3=SUM3+ (W(I) - WBAR) * (W(I) - WBAR) 81 300 CONTINUE 82 CC=SUM2/SQRT (SUM3+SUM1) 83 YSLOPE=SUM2/SUM3 84 YINT=YBAR-YSLOPE * WBAR 85 WRITE (IPR, 305) CC, YINT, YSLOPE	61	
02 Q=.025 63 PP025 = (-ALOG(Q))**(-1.0/GAMMA) 64 TAU=(PP9975-PP0025)/(PP975-PP025) 65 WRITE(IPR,105)GAMMA,TAU,N 66 SUM1=0.0 67 SUM2=0.0 68 D0200I=1,N 69 SUM1=SUM1+Y(I) 70 SUM2=SUM2+W(I) 71 200 72 YBAR=SUM2/AN 73 WBAR=SUM2/AN 74 SUM1=0.0 75 SUM2=0.0 76 SUM3=0.0 77 D0300I=1,N 78 SUM1=SUM1+(Y(I)-YBAR)*(Y(I)-YBAR) 79 SUM2=SUM2+(Y(I)-YBAR)*(W(I)-WBAR) 80 SUM3=SUM3+(W(I)-WBAR)*(W(I)-WBAR) 81 300 CONTINUE 82 CC=SUM2/SQRT(SUM3*SUM1) 83 YSLOPE=SUM2/SUM3 84 YINT=YBAR-YSLOPE 85 WRITE(IPR,305)CC,YINT,YSLOPE	61	
63 PPO25 = (=ALOG(0))***(=1.0)*GAMMA) 64 TAU=(PP9975-PP0025)/(PP975-PP025) 65 WRITE(IPR,105)GAMMA,TAU,N 66 SUM1=0.0 67 SUM2=0.0 68 D0200I=1.N 69 SUM1=SUM1+Y(I) 70 SUM2=SUM2+W(I) 71 200 72 YBAR=SUM1/AN 73 wBAR=SUM2/AN 74 SUM2=0.0 75 SUM2=0.0 76 SUM3=0.0 77 D0300I=1.N 78 SUM1=SUM1+(Y(I)=YBAR)*(Y(I)=YBAR) 79 SUM2=SUM2+(Y(I)=YBAR)*(Y(I)=WBAR) 80 SUM3=SUM3+(W(I)=WBAR)*(W(I)=WBAR) 81 300 CONTINUE 82 CC=SUM2/SQRT (SUM3*SUM1) 83 YSLOPE=SUM2/SUM3 84 YINT=YBAR=YSLOPE*WBAR 85 WRITE(IPR, 305)CC, YINT, YSLOPE	62	
64 TAU=(PP9975=PP0025)/(PP975=PP025) 65 WRITE(IPR+105)GAMMA,TAU,N 66 SUM1=0.0 67 SUM2=0.0 68 D0200I=1.N 69 SUM1=SUM1+Y(I) 70 SUM2=SUM2+W(I) 71 200 CONTINUE 72 YBAR=SUM2/AN 73 WBAR=SUM2/AN 74 SUM1=0.0 75 SUM2=0.0 76 SUM3=0.0 77 D0300I=1.N 78 SUM1=SUM1+(Y(I)=YBAR)*(Y(I)=YBAR) 79 SUM2=SUM2+(Y(I)=YBAR)*(W(I)=WBAR) 80 SUM3=SUM3+(W(I)=WBAR)*(W(I)=WBAR) 80 SUM3=SUM3+(W(I)=WBAR)*(W(I)=WBAR) 81 300 CONTINUE 82 CC=SUM2/SQRT(SUM3*SUM1) 83 YSLOPE=SUM2/SUM3 84 YINT=YBAR=YSLOPE*WBAR 85 WRITE(IPR,305)CC,YINT,YSLOPE	63	$PP025 = (-ALOG(Q)) + (-1 \cdot 0) GAMMA)$
65 WRITE (IPR, 105) GAMMA, TAU, N 66 SUM1=0.0 67 SUM2=0.0 68 D0200I=1, N 69 SUM1=SUM1+Y(I) 70 SUM2=SUM2+W(I) 71 200 CONTINUE 72 YBAR=SUM1/AN 73 WBAR=SUM2/AN 74 SUM1=0.0 75 SUM2=0.0 76 SUM3=0.0 77 D0300I=1, N 78 SUM1=SUM1+(Y(I)-YBAR)*(Y(I)-YBAR) 79 SUM2=SUM2+(Y(I)-YBAR)*(W(I)-WBAR) 80 SUM3=SUM3+(W(I)-WBAR)*(W(I)-WBAR) 81 300 CONTINUE 82 CC=SUM2/SQRT(SUM3*SUM1) 83 YSLOPE=SUM2/SUM3 84 YINT=YBAR-YSLOPE*WBAR 85 WRITE (IPR, 305) CC , YINT, YSLOPE	64	TAU=(PP9975-PP0025)7(PP975-PP025)
66 SUM1=0.0 67 SUM2=0.0 68 D0200I=1.N 69 SUM1=SUM1+Y(I) 70 SUM2=SUM2+W(I) 71 200 CONTINUE 72 YBAR=SUM1/AN 73 wBAR=SUM2/AN 74 SUM1=0.0 75 SUM2=0.0 76 SUM3=0.0 77 D0300I=1.N 78 SUM1=SUM1+(Y(I)-YBAR)*(Y(I)-YBAR) 79 SUM2=SUM2+(Y(I)-YBAR)*(W(I)-WBAR) 80 SUM3=SUM3+(W(I)-WBAR)*(W(I)-WBAR) 81 300 CONTINUE 82 CC=SUM2/SQRT(SUM3*SUM1) 83 YSLOPE=SUM2/SUM3 84 YINT=YBAR-YSLOPE*WBAR 85 WRITE(IPR, 305)CC, YINT, YSLOPE	65	WRITE (IPR+105) GAMMA+TAU+N
67 SUM2=0.0 68 D0200I=1,N 69 SUM1=SUM1+Y(I) 70 SUM2=SUM2+W(I) 71 200 CONTINUE 72 YBAR=SUM1/AN 73 WBAR=SUM2/AN 74 SUM1=0.0 75 SUM2=0.0 76 SUM3=0.0 77 D0300I=1,N 78 SUM1=SUM1+(Y(I)-YBAR)*(Y(I)-YBAR) 79 SUM2=SUM2+(Y(I)-YBAR)*(W(I)-WBAR) 80 SUM3=SUM3+(W(I)-WBAR)*(W(I)-WBAR) 81 300 CONTINUE 82 CC=SUM2/SQRT(SUM3*SUM1) 83 YSLOPE=SUM2/SUM3 84 YINT=YBAR-YSLOPE*WBAR 85 WRITE(IPR, 305)CC,YINT,YSLOPE	66	SUM1=0.0
68 D0200I=1;N 69 SUM1=SUM1+Y(I) 70 SUM2=SUM2+W(I) 71 200 CONTINUE 72 YBAR=SUM1/AN 73 WBAR=SUM2/AN 74 SUM1=0.0 75 SUM3=0.0 76 SUM3=0.0 77 D0300I=1;N 78 SUM1=SUM1+(Y(I)-YBAR)*(Y(I)-YBAR) 79 SUM2=SUM2+(Y(I)-YBAR)*(W(I)-WBAR) 80 SUM3=SUM3+(W(I)-WBAR)*(W(I)-WBAR) 81 300 82 CC=SUM2/SQRT(SUM3*SUM1) 83 YSLOPE=SUM2/SUM3 84 YINT=YBAR-YSLOPE*WBAR 85 WRITE(IPR, 305)CC, YINT, YSLOPE	67	SUM2=0.0
69 SUM1=SUM1+Y(I) 70 SUM2=SUM2+W(I) 71 200 CONTINUE 72 YBAR=SUM1/AN 73 WBAR=SUM2/AN 74 SUM1=0.0 75 SUM2=0.0 76 SUM3=0.0 77 D0300I=1.N 78 SUM1=SUM1+(Y(I)-YBAR)*(Y(I)-YBAR) 79 SUM2=SUM2+(Y(I)-YBAR)*(W(I)-WBAR) 80 SUM3=SUM3+(W(I)-WBAR)*(W(I)-WBAR) 81 300 CONTINUE 82 CC=SUM2/SQRT(SUM3*SUM1) 83 YSLOPE=SUM2/SUM3 84 YINT=YBAR-YSLOPE*WBAR 85 WRITE(IPR, 305)CC, YINT, YSLOPE	68	D0200I=1+N
70 SUM2=SUM2+W(I) 71 200 CONTINUE 72 YBAR=SUM1/AN 73 wBAR=SUM2/AN 74 SUM1=0.0 75 SUM2=0.0 76 SUM3=0.0 77 D0300I=1.N 78 SUM1=SUM1+(Y(I)-YBAR)*(Y(I)-YBAR) 79 SUM2=SUM2+(Y(I)-YBAR)*(W(I)-wBAR) 80 SUM3=SUM3+(W(I)-WBAR)*(W(I)-wBAR) 81 300 CONTINUE 82 CC=SUM2/SQRT(SUM3*SUM1) 83 YSLOPE=SUM2/SUM3 84 YINT=YBAR-YSLOPE*WBAR 85 WRITE(IPR, 305)CC, YINT, YSLOPE	69	SUM1=SUM1+Y(I)
71 200 CONTINUE 72 YBAR=SUM1/AN 73 wBAR=SUM2/AN 74 SUM1=0.0 75 SUM2=0.0 76 SUM3=0.0 77 D03001=1.N 78 SUM1=SUM1+(Y(I)-YBAR)*(Y(I)-YBAR) 79 SUM2=SUM2+(Y(I)-YBAR)*(W(I)-wBAR) 80 SUM3=SUM3+(W(I)-WBAR)*(W(I)-wBAR) 81 300 CONTINUE 82 CC=SUM2/SQRT(SUM3*SUM1) 83 YSLOPE=SUM2/SUM3 84 YINT=YBAR-YSLOPE*WBAR 85 WRITE(IPR, 305)CC,YINT,YSLOPE	70	SUM2=SUM2+W(I)
72 YBAR=SUM1/AN 73 WBAR=SUM2/AN 74 SUM1=0.0 75 SUM2=0.0 76 SUM3=0.0 77 D03001=1.N 78 SUM1=SUM1+(Y(I)-YBAR)*(Y(I)-YBAR) 79 SUM2=SUM2+(Y(I)-YBAR)*(W(I)-WBAR) 80 SUM3=SUM3+(W(I)-WBAR)*(W(I)-WBAR) 81 300 82 CC=SUM2/SQRT(SUM3*SUM1) 83 YSLOPE=SUM2/SUM3 84 YINT=YBAR-YSLOPE*WBAR 85 WRITE(IPR, 305)CC,YINT,YSLOPE	71	200 CONTINUE
73 WBAR=SUM2/AN 74 SUM1=0.0 75 SUM2=0.0 76 SUM3=0.0 77 D0300I=1.N 78 SUM1=SUM1+(Y(I)-YBAR)*(Y(I)-YBAR) 79 SUM2=SUM2+(Y(I)-YBAR)*(W(I)-WBAR) 80 SUM3=SUM3+(W(I)-WBAR)*(W(I)-WBAR) 81 300 CONTINUE 82 CC=SUM2/SQRT(SUM3*SUM1) 83 YSLOPE=SUM2/SUM3 84 YINT=YBAR-YSLOPE*WBAR 85 WRITE(IPR, 305)CC,YINT,YSLOPE	72	YBAR=SUM1/AN
74 SUM1=0.0 75 SUM2=0.0 76 SUM3=0.0 77 D0300I=1.N 78 SUM1=SUM1+(Y(I)-YBAR)*(Y(I)-YBAR) 79 SUM2=SUM2+(Y(I)-YBAR)*(W(I)-WBAR) 80 SUM3=SUM3+(W(I)-WBAR)*(W(I)-WBAR) 81 300 CONTINUE 82 CC=SUM2/SQRT(SUM3*SUM1) 83 YSLOPE=SUM2/SUM3 84 YINT=YBAR-YSLOPE*WBAR 85 WRITE(IPR, 305)CC,YINT,YSLOPE	73	WBAR SLIM2/AN
75 SUM2:0:0 76 SUM3:0:0 77 D0300I=1:N 78 SUM1=SUM1+(Y(I)-YBAR)*(Y(I)-YBAR) 79 SUM2=SUM2+(Y(I)-YBAR)*(W(I)-WBAR) 80 SUM3=SUM3+(W(I)-WBAR)*(W(I)-WBAR) 81 300 CONTINUE 82 CC=SUM2/SQRT(SUM3*SUM1) 83 YSLOPE=SUM2/SUM3 84 YINT=YBAR-YSLOPE*WBAR 85 WRITE(IPR, 305)CC,YINT,YSLOPE	74	SUM1=0-0
76 SUM3=0.0 77 D0300I=1.N 78 SUM1=SUM1+(Y(I)-YBAR)*(Y(I)-YBAR) 79 SUM2=SUM2+(Y(I)-YBAR)*(W(I)-WBAR) 80 SUM3=SUM3+(W(I)-WBAR)*(W(I)-WBAR) 81 300 82 CC=SUM2/SQRT(SUM3*SUM1) 83 YSLOPE=SUM2/SUM3 84 YINT=YBAR-YSLOPE*WBAR 85 WRITE(IPR, 305)CC,YINT,YSLOPE	75	
77 D0300I=1,N 78 SUMI=SUM1+(Y(I)-YBAR)*(Y(I)-YBAR) 79 SUM2=SUM2+(Y(I)-YBAR)*(W(I)-WBAR) 80 SUM3=SUM3+(W(I)-WBAR)*(W(I)-WBAR) 81 300 CONTINUE 82 CC=SUM2/SQRT(SUM3*SUM1) 83 YSLOPE=SUM2/SUM3 84 YINT=YBAR-YSLOPE*WBAR 85 WRITE(IPR, 305)CC,YINT,YSLOPE	76	
78 SUM1=SUM1+(Y(I)-YBAR)*(Y(I)-YBAR) 79 SUM2=SUM2+(Y(I)-YBAR)*(W(I)-WBAR) 80 SUM3=SUM3+(W(I)-WBAR)*(W(I)-WBAR) 81 300 CONTINUE 82 CC=SUM2/SQRT(SUM3*SUM1) 83 YSLOPE=SUM2/SUM3 84 YINT=YBAR-YSLOPE*WBAR 85 WRITE(IPR, 305)CC, YINT, YSLOPE	70	
78 SUMI=SUMI+(T(I)-TBAR)*(T(I)-TBAR) 79 SUM2=SUM2+(Y(I)-YBAR)*(W(I)-WBAR) 80 SUM3=SUM3+(W(I)-WBAR)*(W(I)-WBAR) 81 300 CONTINUE 82 CC=SUM2/SQRT(SUM3*SUM1) 83 YSLOPE=SUM2/SUM3 84 YINT=YBAR-YSLOPE*WBAR 85 WRITE(IPR, 305)CC, YINT, YSLOPE	70	
79 SUM2=SUM2+(T(I)-TBAR)*(W(I)-WBAR) 80 SUM3=SUM3+(W(I)-WBAR)*(W(I)-WBAR) 81 300 CONTINUE 82 CC=SUM2/SQRT(SUM3*SUM1) 83 YSLOPE=SUM2/SUM3 84 YINT=YBAR-YSLOPE*WBAR 85 WRITE(IPR, 305)CC, YINT, YSLOPE	78	$SUMI_SUMI_T(T(I) = TBAR) + (T(I) = TBAR)$
80 SUM3=SUM3+(W(I)=WBAR)*(W(I)=WBAR) 81 300 CONTINUE 82 CC=SUM2/SQRT(SUM3*SUM1) 83 YSLOPE=SUM2/SUM3 84 YINT=YBAR=YSLOPE*WBAR 85 WRITE(IPR, 305)CC, YINT, YSLOPE	79	SUM2=SUM2+(Y(I)-TBAR)*(W(I)-WBAR)
81 300 CONTINUE 82 CC=SUM2/SQRT(SUM3*SUM1) 83 YSLOPE=SUM2/SUM3 84 YINT=YBAR=YSLOPE*WBAR 85 WRITE(IPR, 305)CC, YINT, YSLOPE	80	SUM3=SUM3+(W(I)-WBAR)*(W(I)-WBAR)
82 CC=SUM2/SQRT(SUM3*SUM1) 83 YSLOPE=SUM2/SUM3 84 YINT=YBAR=YSLOPE*WBAR 85 WRITE(IPR, 305)CC,YINT,YSLOPE	81	300 CONTINUE
83 YSLOPE=SUM2/SUM3 84 YINT=YBAR=YSLOPE*WBAR 85 WRITE(IPR, 305)CC, YINT, YSLOPE	82	CC=SUM2/SQRT(SUM3*SUM1)
84 YINT=YBAR-YSLOPE*WBAR 85 WRITE(IPR, 305)CC, YINT, YSLOPE	83	YSLOPE=SUM2/SUM3
85 WRITE(IPR, 305)CC, YINT, YSLOPE	84	YINT=YBAR-YSLOPE*WBAR
	85	WRITE(IPR, 305)CC, YINT, YSLOPE
86 105 FORMAT(1H +63HEXTREME VALUE TYPE 2 (CAUCHY TYPE) PROB. PLOT WITH E	86	105 FORMAT(1H +63HEXTREME VALUE TYPE 2 (CAUCHY TYPE) PROB. PLOT WITH E
87 1XP. PAR. =E17.10,1X,7H(TAU = .E15.8,1H),1X,16HSAMPLE SIZE N = .I	87	1XP. PAR. = .,E17.10,1X,7H(TAU = ,E15.8,1H),1X,16HSAMPLE SIZE N = ,I
88 17)	88	17)
89 305 FORMAT(1H +43HPROBABILITY PLOT CORRELATION COEFFICIENT = +F8.5+5X+	89	305 FORMAT(1H +43HPROBABILITY PLOT CORRELATION COEFFICIENT = +F8.5+5X+
90 122HESTIMATED INTERCEPT = ,E15,8,3X,18HESTIMATED SLOPE = ,E15,8)	90	122HESTIMATED INTERCEPT = ,E15,8,3X,18HESTIMATED SLOPE = ,E15,8)
91 RETURN	91	RETURN
92 END	92	END

PRT S SIMIU.PLOT

JJF6*SIMIU	PLOT	
1		SUBROUTINE PLOT(Y+X+N)
2	С	
3	С	THIS ROUTINE YIELDS A ONE-PAGE PLOT OF Y(I) VERSUS X(I).
4	С	THE INPUT TO THIS ROUTINE IS THE SINGLE PRECISION VECTOR Y OF
5	С	OBSERVATIONS, THE SINGLE PRECISION VECTOR X OF CORRESPONDING
6	С	OBSERVATIONS, AND THE INTEGER VALUE N (= SAMPLE SIZE).
7	С	MULTIPLE PLOT POINTS ARE NOT INDICATED AS SUCH.
8	С	THERE IS NO RESTRICTION ON THE MAXIMUM VALUE OF N FOR THIS ROUTINE.
9	С	PRINTINGYES
10	С	SUBROUTINES NEEDEDNONE
11	С	WRITTEN BY JAMES J. FILLIBEN, STATISTICAL ENGINEERING LABORATORY (205.03)
12	С	NATIONAL BUREAU OF STANDARDS, WASHINGTON, D.C. 20234 JUNE 1972
13	С	UPDATED OCT 1974
14	С	UPDATED NOV 1974
15	С	
16		INTEGER BLANK, HYPHEN, ALPHAI, ALPHAX
17		INTEGER ALPHAM, ALPHAA, ALPHAD, ALPHAN, EQUAL
18		DIMENSION Y(1),X(1)
19		COMMON IGRAPH(55,130)
20		DIMENSION YLABLE(11)
21	С	
22		DATA BLANK, HYPHEN, ALPHAI, ALPHAX/1H, 1H-, 1HI, 1HX/
23		DATA ALPHAM, ALPHAA, ALPHAD, ALPHAN, EQUAL/1HM, 1HA, 1HD, 1HN, 1H=/
24	С	
25	С	CHECK THE INPUT ARGUMENTS FOR ERRORS
26	С	
27		IPR=6
28	С	
29	-	IF(N.LT.1)GOT050
30		IF(N.EQ.1)GOT055
31		HOLD=Y(1)
32		D060I=2+N
33		IF(Y(I).NE.HOLD)GOT065
34	e	50 CONTINUE
35		WRITE(IPR, 9)HOLD
36	e	55 HOLD=X(1)
37		D070I=2+N
38		IF(X(I).NE.HOLD)GOTO90
39	7	70 CONTINUE
40		WRITE(IPR+19)HOLD
41		GOTO90
42	5	50 WRITE(IPR+25)
43		WRITE(IPR+47)N
44		RETURN
45	5	55 WRITE(IPR+28)
46		RETURN
47	ç	90 CONTINUE
48		9 FORMAT(1H +108H***** NON-FATAL DIAGNOSTICTHE FIRST INPUT ARGUME
49		INT (A VECTOR) TO THE PLOT SUBROUTINE HAS ALL ELEMENTS = +E15.8+6
50		1H ****)
51	1	L9 FORMAT(1H +108H***** NON-FATAL DIAGNOSTICTHE SECOND INPUT ARGUME
52		INT (A VECTOR) TO THE PLOT SUBROUTINE HAS ALL ELEMENTS = +E15.8+6
53		1H *****)
54	2	25 FORMAT(1H + 91H**** FATAL ERROR-THE THIRD INPUT ARGUMENT TO THE
55		1 PLOT SUBROUTINE IS NON-POSITIVE *****)
56	2	28 FORMAT(1H +100H***** NON-FATAL DIAGNOSTICTHE THIRD INPUT ARGUME
57		INT TO THE PLOT SUBROUTINE HAS THE VALUE 1 *****)

58		47	FORMAT(1H , 35H***** THE VALUE OF THE ARGUMENT IS , I8 , 6H *****)
59	c		DETERMINE THE X MALLES TO BE LISTED ON THE LEST MERTICAL AVIS
60	ř		DETERMINE THE T VALUES TO BE LISTED ON THE LEFT VERTICAL AXIS
62	2		YMIN=Y(1)
63			
64			D01051=1,N
65			IF(Y(I),LT,YMIN)YMIN=Y(I)
66			IF(Y(I).GT.YMAX)YMAX=Y(I)
67		105	CONTINUE
68		-	D0110I=1,11
69			AIM1=I-1
70			YLABLE(I)=YMAX-(AIM1/10.0)*(YMAX-YMIN)
71		110	CONTINUE
72	С		
73	С		DETERMINE XMIN, XMAX, XMID, X25 (=THE 25% POINT), AND
74	С		X75 (=THE 75% POINT)
75			XMIN=X(1)
76			
70			
70			$\Gamma (X(1) \circ L) \circ AMIN/AMIN-X(1)$
80		115	
81		115	
82			X25=0.75+XMIN+0.25+XMAX
83			X75=0.25*XMIN+0.75*XMAX
84	с		
85	Ċ		BLANK OUT THE GRAPH
86	С		
87			D0100I=1,55
88			D0200J=1,129
89			IGRAPH(I,J)=BLANK
90		200	CONTINUE
91		100	CONTINUE
92	ç		PROVIDE THE N AND
93	Č		PRODUCE THE Y AXIS
94	C		D03001-3-#3
95			
97			IGRAPH(I)/20/24LPHAT
98		300	CONTINUE
99		000	D03501=3,43,4
100			IGRAPH(I,25)=HYPHEN
101			IGRAPH(I,129)=HYPHEN
102		350	CONTINUE
103			IGRAPH(3,21)=EQUAL
104			IGRAPH(3,22)=ALPHAM
105			IGRAPH(3,23)=ALPHAA
106			IGRAPH(3,24)=ALPHAX
107			IGRAPH(25/21)=EQUAL
108			TCDADU(03.03) TALDUAT
110			
111			IGRAPH(43+21)=FOUAL
112			IGRAPH(43,22)=ALPHAM
113			IGRAPH(43,23)=ALPHAI
114			IGRAPH(43,24)=ALPHAN
115	С		

116	c		PRODUCE THE X AXIS
117	6		
118			004003=27.127
119			IGRAPH(1,J)=HYPHEN
120			IGRAPH (45+J)=HYPHEN
121		400	CONTINUE
122			D0450J=27,127,25
123			IGRAPH(1,J)=ALPHAI
124			IGRAPH(45,J)=ALPHAI
125		450	CONTINUE
126			D0460J=40+127+25
127			IGRAPH(1,J)=ALPHAI
128			IGRAPH(45,J)=ALPHAI
129		460	CONTINUE
130	С		
131	ċ		DETERMINE THE (X,Y) PLOT POSITIONS
132	ċ		
133	•		RATIOY=40.0/(YMAX-YMIN)
134			
135			
136			MX = D T T O X (X (T) = YMTN) + 0.5
137			
139			MY = DATIOY + (Y(T) = YMTN) + 0
130			
1/10			
140		< 0.0	
141	~	600	CONTINCE
142	č		WATTE OUT THE COADU
143	č		WRITE OUT THE GRAPH
144	C		
145			WRIE(IPR, 998)
146			D0700I=1,45
147			IP1=I+1
148			IFLAG=IP1-(IP1/4)*4
149			K=IP1/4
150			IF(IFLAG.NE.0)WRITE(IPR,705)(IGRAPH(I,J),J=1,129)
151			IF(IFLAG.EQ.0)WRITE(IPR,706)YLABLE(K),(IGRAPH(I,J),J=21,129)
152		700	CONTINUE
153			WRITE(IPR+707)XMIN+X25+XMID+X75+XMAX
154		705	FORMAT(1H +129A1)
155		706	FORMAT(1H +F20.7+109A1)
156		707	FORMAT(1H +14X+F20.7+5X+F20.7+5X+F20.7+5X+F20.7+1X+F20.7)
157		998	FORMAT(1H1)
158			RETURN
159			END

OPRTIS SIMIU.DATA4

MAXIMUM YEARLY WIND SPEEDS, CORPUS CHRISTI, TEXAS, 1912-1948

THE NUMBER OF OBSERVATIONS = 37

INPUT DATA

47.0 41.0 41.0 40.0 90.0 38.0 50.0 95.0 41.0 51.0 43.0 39.0 44.0 38.0 37.0 39.0 37.0 36.0 43.0 35.0 47.0 49.0 47.0 39.0 49.0 42.0 50.0 38.0 42.0 37.0 61.0 54.0 45.0 56.0 43.0 51.0 39.0

EXTREME VALUE ANALYSIS

	THE	SAMPLE SIZE N =	: 37
	THE SAM	APLE MEAN =	46.3243241
	THE SAMPLE ST	TANDARD DEVIATIO	N = 12.7498453
	THE SAMPL	E MINIMUM =	35,0000000
	THE SAMPL	E MAXIMUM =	95.0000000
EXTREME VALUE	PROBABILITY PLOT	LOCATION	SCALE
YPE 2 TATI LENGTH	COPPELATION	ECTIMATE	ECTIMATE
PARAMETER (GAMMA)	COEFFICIENT	CSTIMAT	ESTIMATE
1.00	•91022	40.9147968	1.2478256
2.00	•97191 MAX	31.0718093	9.3875747
3.00	•96594	20.9988256	19.2656157
4.00	.95601	11.1366539	29,1725538
5.00	.94787	1.4036670	38,9815693
6.00	.94158	-8,2550049	48,7112250
7.00	•93668	-17,8684359	58,3850513
8.00	.93279	-27,4526310	68,0197020
9.00	92965	=37.0169468	77.6262465
10.00	-92706	=46.5671854	87.2121058
11.00	92489	=56.1070957	96 7923524
12 00	02305	-65 6302170	106 3005639
13.00	• 72 303	-75 1653366	115 9903100
14 00	02010	-9/1 6967095	113.0073174
14.00	•92010	-04.0007085	125.4305038
15.00	• 91891	-94.2042866	134.9655555
16.00	•91785	-103./18/805	144.4955559
17.00	•91691	-113.2307281	154.0213642
18.00	•91607	-122.7405472	163.5436363
19.00	•91531	-132.2485828	1/3.0629253
20.00	•91463	=141./550869	182.5796452
21.00	•91400	-151.2603016	192.0941658
22.00	•91344	-160.7643795	201.6067638
23.00	•91292	-170.2674828	211.1176987
24.00	•91244	-1/9./697258	220.6271515
25.00	•91200	-189.2712097	230.1353092
30.00	•91022	-236.7699699	277.6610641
35.00	•90894	-284.2588081	325.1694984
40.00	•90797	-331.7414551	372.6669960
45.00	.90721	-379.2194707	420.1571693
50.00	•90660	-426.6956291	467.6422195
60.00	•90569	-521.6410751	562.6018524
70.00	•90503	-616.5816116	657.5525970
80.00	•90454	-711.5190506	752.4977341
90.00	•90415	-806.4543991	847.4390717
100.00	•90384	-901.3884811	942.3779907
150.00	•90291	-1376.0462189	1417.0503082
200.00	•90245	-1850.6961517	1891.7076111
250.00	•90217	-2325.3416443	2366.3575439
350.00	•90185	-3274.6292419	3315.6502075
500.00	.90161	-4698.5545654	4739.5795898
750.00	•90142	-7071.7604980	7112.7887573
1000.00	.90132	-9444.9562988	9485,9863281
INFINITY	.90104	41.0333295	9.4928209







RETURN PERIOD (IN YEARS)	PREDICTED EXTREME WIND BASED ON OPTIMAL EXTREME VALUE TYPE 2 DISTRIBUTION (GAMMA = 2.00000)	PREDICTED EXTREME WIND BASED ON EXTREME VALUE TYPE 1 DISTRIBUTION
2.0	42.35	44.51
3.0	45.81	49.60
4.0	48.57	52,86
5.0	50.94	55.27
6.0	53+06	57.19
7.0	54.98	58.78
8.0	56.76	60.15
9.0	58.43	61.34
10.0	59.99	62.40
20.0	72.52	69.23
30.0	82.06	73.16
37.0	87.79	75.18
40.0	90.07	75.93
50.0	97.12	78.07
60.0	103.48	79.82
70.0	109.33	81.30
80.0	114.77	82.007
90.0	119.88	85.70
100.0	124.71	84.70
200.0	163+67	91.51
300.0	193.53	95+16
400.0	218.71	97.90
500.0	240.88	100.02
600.0	260.92	101.75
700.0	279.36	103.21
800.0	296.51	104.48
900.0	312,62	105.60
1000.0	327.86	106.60
2000.0	450.85	113.19
3000.0	545.21	117.04
4000.0	624.76	119.77
5000+0	694.86	121.89
6000.0	758.23	123.62
7000.0	816.50	125.08
8000.0	870.73	126.35
9000+0	921.66	127.47
10000.0	969+87	128.47
50000.0	2130.33	143.74
100000.0	2999.87	150.32
500000.0	6674.48	165.62
1000000.0	9426.27	172.20



NBS-114A (REV. 7-73)					
U.S. DEPT. OF COMM. BIBLIOGRAPHIC DATA SHEET	1. PUBLICATION OR REPORT NO. IIBS TH-868	2. Gov't Acce No.	ssion 3. Recipient	's Accession No.	
4. TITLE AND SUBTITLE	5. Publicatio	5. Publication Date			
Statistical	l Analysis of Extreme Winds		June	e 1975	
	6. Performin	g Organization Code			
7. AUTHOR(S) Emil Simiu	and James J. Filliben		8. Performin	g Organ. Report No.	
9. PERFORMING ORGANIZAT	ION NAME AND ADDRESS		10. Project/	Fask/Work Unit No.	
NATIONAL E DEPARTMEN WASHINGTOI	BUREAU OF STANDARDS IT OF COMMERCE N, D.C. 20234		11. Contract	Grant No.	
12. Sponsoring Organization Na	me and Complete Address (Street, City, S	tate, ZIP)	13. Type of I Covered Fir	Report & Period	
Sama ac 0			14. Sponsorir	ng Agency Code	
Sallle as 9.					
 16. ABSTRACT (A 200-word or less factual summary of most significant information. If document includes a significant bibliography or literature survey, mention it here.) With a view to assessing the validity of current probabilistic approaches to the definition of design wind speeds, a study was undertaken of extreme wind speeds based on records taken at 21 U.S. weather stations. For the purpose of analyzing extreme value data, a computer program was developed, which is described herein. The following results were obtained: (1) the assumption that a single probability distribution is universally applicable to all extreme wind data sets in a given type of climate was not confirmed, and (2) predictions of 100-year wind speeds based on overlapping 20-year sets of data taken at the same station differed between themselves by as much as 100%. Similar predictions for 1000-year winds differed by as much as a few hundred percent. Since wind pressures are proportional to the square of the wind speeds, errors of such magnitude are unacceptably high for structural design purposes. It is therefore suggested that while, in principle, probabilisitc methods provide the most rational approach to specifying design wind speeds, it is of the utmost importance that the possible errors inherent in this approach be carefully taken into account. 					
17. KEY WORDS (six to twelve name; separated by semicol probability distribu structural engineer	entries; alphabetical order; capitalize on ons) Building codes; extrem ution functions; reliability; ing; wind loads; wind spec	ly the first letter e value dis risk; sta eds	r of the first key word stributions; hu tistical analys	unless a proper .rricanes; is; storms;	
18. AVAILABILITY	LX Unlimited	19. SI (]	ECURITY CLASS THIS REPORT)	21. NO. OF PAGES	
For Official Distribution	n. Do Not Release to NTIS	U	NCL ASSIFIED	52	

USCOMM-DC 29042-P74

\$1.50

22. Price

20. SECURITY CLASS

PERIODICALS

JOURNAL OF RESEARCH reports National Bureau of Standards research and development in physics, mathematics, and chemistry. It is published in two sections, available separately:

• Physics and Chemistry (Section A)

Papers of interest primarily to scientists working in these fields. This section covers a broad range of physical and chemical research, with major emphasis on standards of physical measurement, fundamental constants, and properties of matter. Issued six times a year. Annual subscription: Domestic, \$17.00; Foreign, \$21.25.

Mathematical Sciences (Section B)

Studies and compilations designed mainly for the mathematician and theoretical physicist. Topics in mathematical statistics, theory of experiment design, numerical analysis, theoretical physics and chemistry, logical design and programming of computers and computer systems. Short numerical tables. Issued quarterly. Annual subscription: Domestic, \$9.00; Foreign, \$11.25.

DIMENSIONS/NBS (formerly Technical News Bulletin)—This monthly magazine is published to inform scientists, engineers, businessmen, industry, teachers, students, and consumers of the latest advances in science and technology, with primary emphasis on the work at NBS. The magazine highlights and reviews such issues as energy research, fire protection, building technology, metric conversion, pollution abatement, health and safety, and consumer product performance. In addition, it reports the results of Bureau programs in measurement standards and techniques, properties of matter and materials, engineering standards and services, instrumentation, and automatic data processing.

Annual subscription: Domestic, \$9.45; Foreign, \$11.85.

NONPERIODICALS

Monographs—Major contributions to the technical literature on various subjects related to the Bureau's scientific and technical activities.

Handbooks-Recommended codes of engineering and industrial practice (including safety codes) developed in cooperation with interested industries, professional organizations, and regulatory bodies.

Special Publications—Include proceedings of conferences sponsored by NBS, NBS annual reports, and other special publications appropriate to this grouping such as wall charts, pocket cards, and bibliographies.

Applied Mathematics Series—Mathematical tables, manuals, and studies of special interest to physicists, engineers, chemists, biologists, mathematicians, computer programmers, and others engaged in scientific and technical work.

National Standard Reference Data Series—Provides quantitative data on the physical and chemical properties of materials, compiled from the world's literature and critically evaluated. Developed under a world-wide program coordinated by NBS. Program under authority of National Standard Data Act (Public Law 90-396).

NOTE: At present the principal publication outlet for these data is the Journal of Physical and Chemical Reference Data (JPCRD) published quarterly for NBS by the American Chemical Society (ACS) and the American Institute of Physics (AIP). Subscriptions, reprints, and supplements available from ACS, 1155 Sixteenth St. N. W., Wash. D. C. 20056.

Building Science Series—Disseminates technical information developed at the Bureau on building materials, components, systems, and whole structures. The series presents research results, test methods, and performance criteria related to the structural and environmental functions and the durability and safety characteristics of building elements and systems.

Technical Notes—Studies or reports which are complete in themselves but restrictive in their treatment of a subject. Analogous to monographs but not so comprehensive in scope or definitive in treatment of the subject area. Often serve as a vehicle for final reports of work performed at NBS under the sponsorship of other government agencies.

Voluntary Product Standards—Developed under procedures published by the Department of Commerce in Part 10, Title 15, of the Code of Federal Regulations. The purpose of the standards is to establish nationally recognized requirements for products, and to provide all concerned interests with a basis for common understanding of the characteristics of the products. NBS administers this program as a supplement to the activities of the private sector standardizing organizations.

Federal Information Processing Standards Publications (FIPS PUBS)—Publications in this series collectively constitute the Federal Information Processing Standards Register. Register serves as the official source of information in the Federal Government regarding standards issued by NBS pursuant to the Federal Property and Administrative Services Act of 1949 as amended, Public Law 89-306 (79 Stat. 1127), and as implemented by Executive Order 11717 (38 FR 12315, dated May 11, 1973) and Part 6 of Title 15 CFR (Code of Federal Regulations).

Consumer Information Series—Practical information, based on NBS research and experience, covering areas of interest to the consumer. Easily understandable language and illustrations provide useful background knowledge for shopping in today's technological marketplace.

NBS Interagency Reports (NBSIR)—A special series of interim or final reports on work performed by NBS for outside sponsors (both government and non-government). In general, initial distribution is handled by the sponsor; public distribution is by the National Technical Information Service (Springfield, Va. 22161) in paper copy or microfiche form.

Order NBS publications (except NBSIR's and Bibliographic Subscription Services) from: Superintendent of Documents, Government Printing Office, Washington, D.C. 20402.

BIBLIOGRAPHIC SUBSCRIPTION SERVICES

The following current-awareness and literature-survey bibliographies are issued periodically by the Bureau: Cryogenic Data Center Current Awareness Service

A literature survey issued biweekly. Annual subscription: Domestic, \$20.00; foreign, \$25.00.

Liquefied Natural Gas. A literature survey issued quarterly. Annual subscription: \$20.00.

Superconducting Devices and Materials. A literature

survey issued quarterly. Annual subscription: \$20.00. Send subscription orders and remittances for the preceding bibliographic services to National Technical Information Service, Springfield, Va. 22161.

Electromagnetic Metrology Current Awareness Service Issued monthly. Annual subscription: \$100.00 (Special rates for multi-subscriptions). Send subscription order and remittance to Electromagnetics Division, National Bureau of Standards, Boulder, Colo. 80302.

U.S. DEPARTMENT OF COMMERCE National Bureau of Standards Washington, D.C. 20234

OFFICIAL BUSINESS

Penalty for Private Use, \$300

POSTAGE AND FEES PAID U.S. DEPARTMENT OF COMMERCE COM-215 SPECIAL FOURTH-CLASS RATE BOOK

e:



