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CE & TECHNOLOGY:

Application of Measurement Criteria in the Selection of Interactive Computer Services

NBS Special Publication 500-58

U.S. DEPARTMENT OF COMMERCE
National Bureau of Standards

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COMPUTER SCIENCE & TECHNOLOGY:

Application of Measurement Criteria in the Selection of Interactive Computer Services

Paul D. Amer

Center for Computer Systems Engineering
Institute for Computer Sciences and Technology
National Bureau of Standards
Washington, DC 20234

+ Special publication

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Application of Measurement Criteria in the Selection of Interactive Computer Services

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DISCLAIMER

This publication discusses three procedures which may be utilized in the experimental design - data analysis components of a remote access computer service selection. It is not intended to represent the entire government computer service procurement process. Consideration of testing costs, bidding procedures, environment test conditions, and other selection issues are beyond the scope of this publication.

Application of Measurement Criteria in the Selection of Interactive Computer Services

Paul D. Amer

ABSTRACT

This publication emphasizes the data analysis component of the computer service selection process. A computer service selection model, introduced in NBS Special Publication 500-44, is presented and three binary type selection procedures applicable in the measurement phases of that model are given. A binary type procedure determines which competing computer services perform above and which perform below a specified performance level. Those services determined to perform below a specified performance level can be eliminated or penalized depending on whether the performance specification is mandatory or desirable. The procedures explicitly specify prior to measurement an appropriate decision rule and/or the number of test measurements required in a comparison effort to attain a given level of statistical confidence in the results. Experimental data from a previous case study are reanalyzed to illustrate application of the selection procedures. If the collection of measurements is necessary in a computer service selection, then these procedures (or similar statistically sound procedures) should be employed because of their mathematical justification.

Key words: Binary selection; computer comparison; computer performance measurement; computer service; data analysis; experimental design; performance evaluation; ranking and selection; selection methodology.

1.0 INTRODUCTION

NBS Special Publication 500-44 [MAM79a] (herein referred as SP 500-44) addresses the comparison and selection of remote access interactive computer services in terms of a statistical comparison methodology. That methodology relies principally on the collection and statistical analysis of measurement data obtained from the interactions between a computer service and a user. Four general test procedures or experimental designs are described for use in the data analysis component of the comparison and selection process.

Three of the procedures in SP 500-44 determine the "best" of a set of computer services where best is defined by a single performance index and either a mean, percentile or proportion statistic. For example, one of the procedures might be employed to determine the computer service with the shortest mean response time for all text-editor transactions.

The fourth procedure in SP 500-44 determines a subset of computer services that includes all services which, for a particular performance index, perform at or above a specified "single proportion" performance level. For example, the procedure will determine a subset of computer services that includes all services for which at least 80% of the response times are less than two seconds. This procedure is a "binary" or "yes-no" type procedure since for each service a decision is made either to include it in or to exclude it from the selected subset. A binary type procedure provides an analyst with reliable performance information about which services perform above and which services perform below a specified performance level.

This Special Publication also emphasizes the experimental design - data analysis components of the computer service selection process. Introduced are two binary type selection procedures which are extensions of the binary type procedure in SP 500-44. The first procedure determines a subset of computer services that includes all services which, for a particular performance index, perform at or above a specified "dual proportion" performance level. For example, the procedure will determine a subset of computer services that includes all services for which at least 50% of the response times are less than two seconds and at least 80% of the responses are less than five seconds. A dual proportion permits greater flexibility than a single proportion in defining measurable performance by specifying two, rather than one, statistical values of interest of each service's performance distribution.

The second procedure determines a subset of computer services that includes all services which, for a particular performance index, perform at or above a specified "upper proportion" performance level and excludes all services which perform at or below a specified "lower proportion" performance level. For example, suppose computer services are defined to be in one of three categories: (1) those with 80% or more responses less than two seconds, (2) those with 50%-80% responses less than two seconds, and (3) those with 50% or less responses less than two seconds. This procedure will determine a subset that includes all services in category (1) and excludes all services in category (3). An upper-lower proportion combination permits greater control than a single or dual proportion by regulating just how poorly a service can perform and still be selected due to variability present in a measurement study.

An important characteristic of the procedures in SP 500-44 and here is the analyst's ability to control (limit, bound) the probability of obtaining an incorrect selection (further explained in Section 3.2). These procedures explicitly specify prior to measurement an appropriate decision rule and/or the number of measurements required in a computer service comparison to attain a given level of statistical confidence in the results. Although each procedure compares services for a single performance index, together they may be employed for several indices with the individual results then integrated in a comprehensive selection methodology (see Section 2.3). The procedures specifically are applicable in a comparison effort whenever a selection methodology requires binary information about a set of competing computer services, i.e. which services do and which services do not provide a certain level of performance.

If the collection of measurements is necessary in a computer service selection, then these procedures (or similar statistically sound procedures) should be employed because their mathematical foundation permits an analyst to justify and document the selection making process.

2.0 SELECTION OF INTERACTIVE COMPUTER SERVICES

Federal Information Processing Guidelines for the Measurement of Remote Access Interactive Computer Service Response Time and Turnaround Time [FIP57] indicates that when two or more computer services are being compared, statistics and statistical techniques should be employed for the description and analysis of the measurements which are collected. Further, since the statistical techniques which are employed can influence the results, the techniques must be clearly specified in advance. With regard to the kind of statistics to employ, the guidelines more specifically state:

> "Quite often the distributions of response time and turnaround time are not known (in closed mathematical form). Since most of the data distributions which have been collected and analyzed have been non-normal (non-Gaussian), Gaussian statistical descriptors such as the mean and standard deviation are not appropriate. It is therefore recommended that non-parametric statistical descriptors be employed when specifying response time and turnaround time."

Performance data in a computer service selection usually are collected in an uncontrolled environment. That is, an analyst exercises little or no control over the software, hardware or external workload of a computer service during the test periods. (+) This mode of testing is in accord with the actual mode of utilization of a computer service once it has been selected. Users do not have, nor do they desire, control of the technical aspects of how services are produced or how they are delivered when they purchase computer services (in contrast to computer systems) [ABR77b]. However, they do desire a guaranteed level of service at their terminal interface and that is precisely what is measured. Due to the many uncontrolled variables present in a typical computer service evaluation effort, there is an unknown degree of variability in the collected measurements. Therefore, it is necessary to employ valid statistical techniques and to collect multiple measurements to confidently obtain an accurate estimate of a computer service's performance. This publication addresses the questions of what data analysis technique and how many measurements are necessary for a desired level of statistical confidence in the comparison and selection results.

A computer service selection model (CSSM) is presented in SP 500-44. Based on that model, a methodology is given which relies principally on the statistical analysis of measurement data obtained from the interactions between a computer service and a user. The methodology incorporates

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(+) Complete specification of the testing environment is beyond the scope of this publication.

confidence statements about the probabilities of correct selections made at various phases of a computer service selection process. The technical and economic feasibilities of applying the selection methodology are verified in a case study comparing four heterogenous remote access time sharing services. (It is recommended that the reader study SP 500-44 for a global view of the selection process. Some portions of SP 500-44 have been summarized in this SP for completeness.)

This publication presents selection procedures beyond those previously published in SP 500-44 for use in the measurement phases of a computer service selection when the criteria for selection are measurable and are expressed in terms of proportion statistics. Specifically, they are applicable when the analyst wishes to know only if a service performs above or below a specified performance level.

One of the four experimental procedures that are presented in SP 500-44 (Section 2.4.1) is repeated here to assist the reader in understanding proportion criteria and to facilitate presentation of the two additional procedures that follow. In conjunction with SP 500-44, this publication furthers the development of a statistical methodology for the comparison and selection of interactive computer services.

2.1 Classification of Performance Criteria

The computer service comparison and selection process is a complicated one, based on various performance indices. Some indices are measurable (such as service response time), and some are not (such as ease of service use and coherence of service documentation). For example, evaluating service documentation and the amount of main memory does not require measurement collecting activity, whereas evaluating service turnaround time and response time clearly requires measurement. When criteria are based on measurable indices, comparison requires collecting and analyzing relevant performance measurements from the various computer services being considered.

Performance criteria can be divided further into those which are mandatory and those which are desirable. A mandatory criterion defines a service requirement which <u>must</u> be satisfied by the computer services being considered for selection. Failure to satisfy even one mandatory criterion results in a service's elimination. Desirable criteria, on the other hand, are those which are not absolute requirements for acceptance, but which if satisfied would facilitate processing of a user's workload. Therefore, if a given computer service does not fulfill some desirable criteria, it would continue to be considered for selection, but depending on the overall selection methodology failure to satisfy each desirable criterion would perhaps invoke some associated penalty on the respective service. (Likewise, for each desirable criterion satisfied, a given service could be compensated with an associated reward.)

Based on the two characteristics described above, performance criteria can be classified as: Mandatory Nonmeasurable (MN), Mandatory Measurable (MM), Desirable Nonmeasurable (DN), and Desirable Measurable (DM). Examples of each class of criteria are provided in Table 1.

There are a large number of performance indices which may be used for defining comparison criteria in a computer service selection. Abrams and Treu [ABR77b] have tabulated more than fifty measures which may be used to describe the demands and needs of a user at an interactive terminal. Those measures which describe the time, length, rate and ratios of user-computer interactive behavior, are likely to be of primary interest in the evaluation and selection of computer services, especially the three measures of response time, turnaround time and cost.

Ultimately a decision about how many and which performance factors are most important in an evaluation is a management policy issue. One user may view system reliablility as the over-riding consideration in a service selection effort while another might view cost and response time for short edit commands as the most important factors. Usually some combination of various measures of service response time and costs is used in the selection process. <u>This publication makes no statement about which performance indices should be used in defining selection criteria</u>. It does, however, assume that selection criteria exist and can be stated in advance of any measurement effort.

2.2 Application of Performance Criteria

The CSSM in SP 500-44 indicates a sequence in which the four classes of performance criteria typically are applied in most service selection methodologies. This model is repeated here in Figure 1. Phase I involves the application of MN criteria. The phase is managed easily since each

Table 1

Examples of Performance Criteria

Type	Example
Mandatory Nonmeasurable	1. The system must be fully delivered and operational no later than September 1, 1979. 2. Timesharing service must include FORTRAN, Basic, Lisp, SNOBOL, and editing facilities.
Mandatory Measurable	1. The mean turnaround time for all student jobs must be less than 15 minutes. 2. 95% of all trivial command response times must be less than 1 second.
Desirable Nonmeasurable	1. It is desirable that the system include Pascal and COBOL facilities. 2. It is desired that the system provide a text editing capability.
Desirable Measurable	1. It is desired that the system provide a mean turnaround time for the benchmark run of 5 minutes or less. 2. It is desired that 95% of all trivial command response times be 0.5 seconds or less.

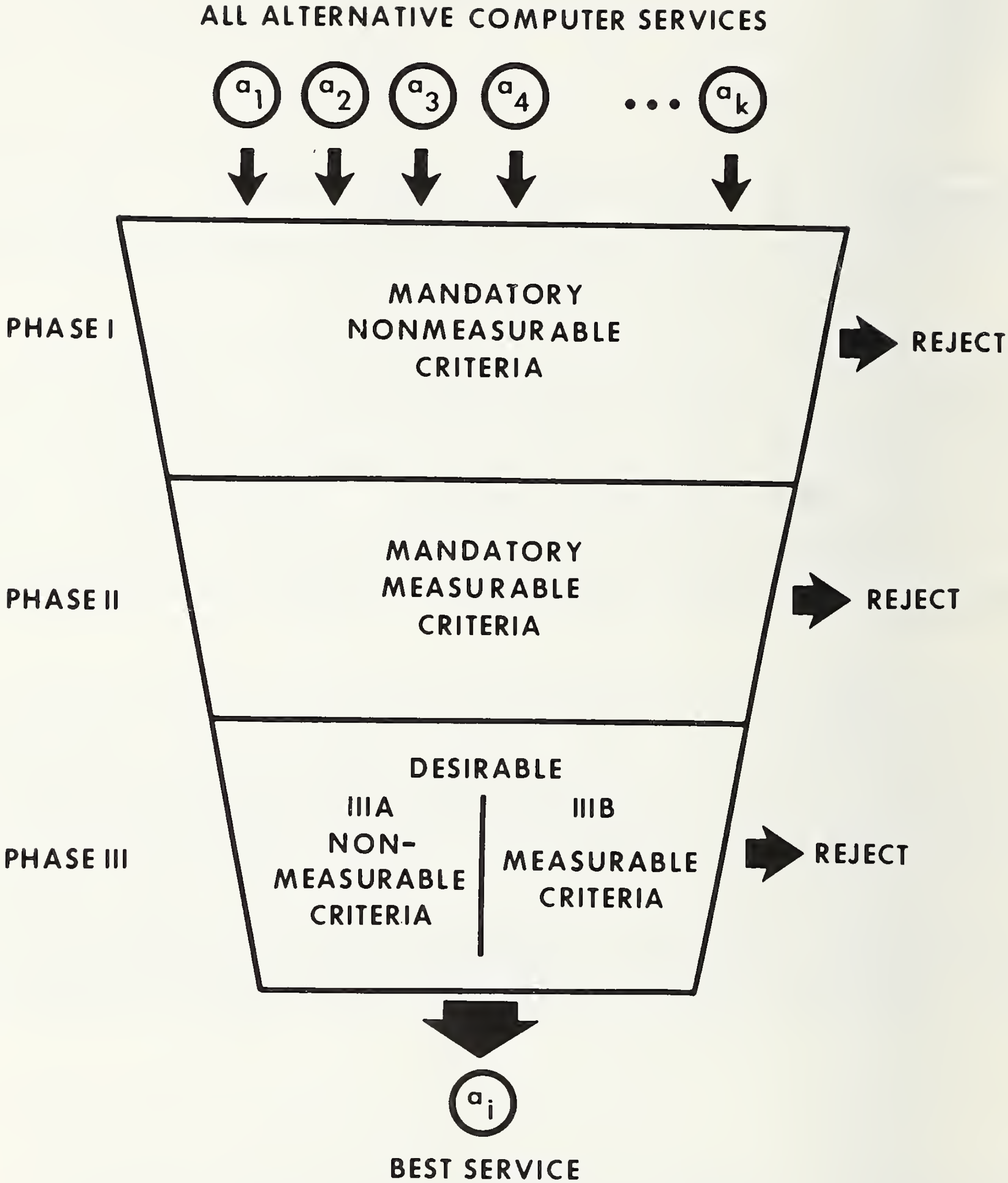

Figure 1 Computer Service Selection Model (CSSM)

computer service either does or does not have the required characteristic. All of those services which do not satisfy the MN criteria are eliminated.

Phase II involves the application of MM criteria. In general for each MM criterion, performance measurements are gathered from every computer service and a decision is made as to whether or not the criterion is satisfied. Failure to satisfy a single MM criterion results in a service's elimination. A typical selection criterion that might be applied in phase II is "consider only those services which provide a turnaround time of five minutes or less for at least 80% of the remote job entry requests."

Finally, determination of the best computer service is made in phase III. This phase is separated into two parts, phase IIIA for the application of DN criteria and phase IIIB for the application of DM criteria. (Note that it is not implied that DN and DM criteria are necessarily applied separately or in any particular order.) Phase III involves gathering both measurement and subjective data and integrating all of the information in a complex manner to determine which computer service is the best one. A service's failure to satisfy a desirable criterion results not in its elimination, but rather in a penalty to compensate it with those services that do satisfy the desirable criterion. Different selection methodologies incorporate these penalties into the overall selection process in different manners, yet the effect is the same. Typical questions asked in phase III are "does a service provide adequate software and hardware documentation?" and "does a service have a desired x% of its response times less than a five second threshold?".

In both phases II and IIIB, comparison requires collecting and analyzing relevant performance measurements from the various computer services under consideration: in phase II, to eliminate those services failing to satisfy mandatory performance requirements, and in phase IIIB, to penalize those services failing to perform at desirable performance levels.

2.3 Methodology for Selection

To understand better how the procedures described in Section 3 fit into the overall selection process, two general approaches to computer service selection are now discussed. The first approach applies a set of mandatory criteria and then chooses the least expensive service remaining. In terms of the CSSM, phase III is greatly simplified with this approach (since minimum cost becomes the only desirable criterion). When possible such an approach is suggested due to its ease and objectivity. Sole use of mandatory criteria to define computer service requirements, however, is appropriate only when a user has a well justified set of functional (nonmeasurable) and performance (measurable) requirements. The latter occurs if there exist threshold levels of performance for which "better" performance represents no significant improvement in satisfying processing needs. For example, in a particular application, a service for which 80% of its responses occur in less than two seconds may be for practical purposes just as good as a service for which 80% of its responses occur in less than one second. That is, as long as 80% of its responses occur in less than two seconds, a service is considered acceptable. Once a certain threshold level of performance is assured, other considerations such as cost and available software become more important factors in the selection process.

A second approach for use in more complex selections applies a set of mandatory criteria (thereby reducing the original set of services to a set of minimally acceptable ones) and then applies a set of desirable criteria. For each desirable criterion satisfied, a service is rewarded an amount (either in dollars or points) which represents the effort required for the user to make up for the service feature had it been lacking. After all desirable criteria are applied, the service with the lowest cost or score is selected. This technique is part of a cost-value selection methodology detailed in [JOS77] and summarized in [TIM73]. Other selection methodologies define a weights and scores approach [DOW67] and a figure of merit approach [ABR77b]. The reader should be familiar with one or more of these techniques to understand fully how the procedures described below fit into the overall selection process.

Regardless of the selection methodology used, information about the computer services being compared with respect to particular performance indices is needed. The procedures presented in this publication determine which services perform at specified performance threshold levels when those levels are expressed in terms of proportion statistics. If the procedures are applied in phase II of a selection process, the included services continue to be considered for selection, while the excluded services are eliminated. If the procedures are applied in phase IIIB of a selection process, the included services are properly rewarded and/or the excluded services are properly penalized. In general, the procedures are employed as part of a binary decision making process. Each procedure provides the analyst with a confidence statement which characterizes a comparison study's probability of success. That is, confidence statements similar to, "we are 90% confident that services x, y, z provide a specified level of performance while services a, b, c do not" can be made after measurement.

For computer service measurement analyses, there are four steps which must be followed to collect meaningful measurements from the computer services being compared. They are:

1. determination of performance criteria which will form the basis of a service comparison [ABR77b],
2. development of a user scenario that is representative of a projected workload [CRO74, NOL74, WAT77, WRI76],
3. translation of a scenario into individual scripts executable on the respective services under test [MAM79a], and
4. collection and analysis of the data required for a comparison.

The procedures now presented address issues relevant to step four; some references for the others are provided.

3.0 APPLICATION OF PROPORTION CRITERIA

The application of proportion criteria in a computer service selection occurs when an analyst wants to know which services provide a minimum level of performance. The efficiency of the data collection process and the validity of the data analysis in making the binary decisions required in such an application depend upon the choice of an appropriate experimental design. An area of statistics entitled "Statistical Ranking and Selection" provides an appropriate foundation for the data collection and analysis component of a computer service comparison and selection (see [DUD78] or [GIB77] for a survey of ranking and selection techniques).

The statistical ranking and selection literature refers to the binary decision making process as selection "better than a standard" or "subset selection". Reference in this publication to a service as being better than standard is an attempt to be consistent with this literature and does not imply a "standard" such as a voluntary national standard or a Federal Information Processing Standard. Subset selection procedures based on a proportion statistic are appropriate for the application of measurable criteria in a computer service selection. Three of these procedures are described here.

The actual step-by-step procedures that are presented in this section, combined with Tables 1-19 in Appendix B of SP 500-44 and Appendices A and B here, are complete in that they may applied without reference to other books or articles. No statistical justification for the procedures is presented; the interested reader is referred to [AME79] and [AME80] for the statistical theory. Other references describing the application of ranking and selection theory to computer selection include [AME78] and [MAM77].

To those readers for whom this is a first exposure to ranking and selection procedures, it is suggested that Sections 3.2.1, 3.2.2 and 3.2.3 be read in parallel with Sections 4.2.1, 4.2.2 and 4.2.3, respectively, where example applications of the procedures are given. This mode of reading will provide an intuitive feel for the procedures and will place their necessarily abstract and general steps in an environment with which the reader is already familiar.

3.1 Proportion Criteria

As quoted in Section 2.0, [FIP57] recommends the use of non-parametric statistical descriptors when specifying computer service response time and turnaround time. In particular, it is recommended that in specifying acceptable computer service response, one or more classes of interactive tasks be specified to the degree required by the complexity of the workload. The examples given are:

1. In the use of the text editor for insertions, deletions or changes involving n characters or less, the response time shall be less than w seconds 50% of the time.

2. In the compilation of PL/I programs of less than m lines, the response shall be x seconds or

less 90% of the time.

3. Retrieval requests to a bibliographic information retrieval service, in which p criteria (keys) shall all be satisfied in order for an item to be displayed, shall be serviced with a response time of u seconds or less 95% of the time.

These are all examples of "single" proportion criteria; each one defines a single threshold level of performance (w seconds, x seconds, u seconds) and an associated minimum proportion (50%, 90%, 95%). (Note that percentages such as 50%, 90%, 95% are equivalent to proportions of 0.50, 0.90, 0.95, respectively.)

It also is possible for the user to increase the complexity of a selection criterion (and likewise the complexity of the associated data analysis) by using multiple proportion statistics in specifying acceptable response. For instance, number 1. above could be restated as:

1'. In the use of the text editor for insertions, deletions or changes involving n characters or less, the response time shall be less than w seconds 50% of the time and less than 2w seconds 85% of the time.

This is an example of a "dual" proportion criterion since it defines two threshold levels of performance (w seconds, 2w seconds) and two associated minimum proportions (50%, 85%).

Procedures for the application of single and dual proportion criteria are discussed in Sections 3.2.1 and 3.2.2, respectively. A procedure for the application of an "upper-lower" proportion criterion, a variation of a single proportion criterion, is discussed in Section 3.2.3.

A basic set of definitions common to ranking and selection procedures is presented in Table 2 for easy reference. Table 2 should be read in conjunction with the next section. The notation is consistent with the statistical ranking and selection literature and will facilitate reference to that literature.

Table 2
Summary of Ranking and Selection Terminology

A. Notation common to all procedures

k:	number of computer services in the study
P*:	desired level of confidence in the correctness of the selection results; P* is a probability of correct selection
n:	number of measurements collected from each computer service
service(i):	the ith computer service; i = 1, 2, ..., k

B. Notation common to selection based on single proportion criteria

C(thld):	measure threshold value for a performance index
X(i):	number of measurements from service(i) which are less than C(thld)
p(min):	minimum proportion of measurements less than C(thld) required to include a service in a selected subset
p(i):	true proportion of measurements from service(i) which are less than C(thld)

C. Notation common to selection based on dual proportion criteria

C1(thld): C2(thld)	first and second measure threshold values for a performance index
X1(i), X2(i):	number of measurements from service(i) which are less than C1(thld), C2(thld), respectively
p1(min), p2(min):	minimum proportion of measurements less than C1(thld) C2(thld), respectively, required to include a service in a selected subset
p1(i), p2(i):	true proportion of measurements from service(i) which are less than C1(thld), and greater than or equal to C2(thld), respectively

D. Notation common to selection based on upper-lower proportion criteria

C(thld):	measure threshold value for a particular index
X(i):	number of measurements from service(i) which are less than C(thld)
p_upper(min):	minimum proportion of measurements less than C(thld) required to include a service in a selected subset
p_lower(max):	maximum proportion of measurements less than C(thld) required to exclude a service from a selected subset
p(i):	true proportion of measurements from service(i) which are less than C(thld)

3.2 Procedures for the Application of Proportion Criteria

For selection based on proportions, it is assumed that there are $k > 0$ computer services from which it is desired to determine a subset of minimal size which includes all computer services satisfying a specific performance requirement. Each procedure achieves a correct subset selection with probability at least P^* ($0 < P^* < 1$). The value P^* is prespecified; its complement $1-P^*$ is the upper bound on the probability of an incorrect selection. (That is, the selection procedures limit the probability of an incorrect selection to no more than $1-P^*$.)

For each procedure, it is necessary to obtain n independent measurements from each computer service. The requirement that the data be statistically independent poses a problem that must be given careful consideration. If the data are not independent, they are "correlated". This means that the value of a current measurement is related to or dependent on the value of one or more previous measurements. In a comparison study, correlation among data points would exist if measurement collection did not account for the periodic nature of the workload demands. For example, if the processing requests on a computer service significantly change during certain periods of the day, consecutive measurements taken over short time intervals are likely to be correlated. That is, a fast (slow) response time data point is likely to follow a fast (slow) response time data point if the time interval between collection is not long enough to negate the periodic effect.

SP 500-44 contains an extensive discussion of the statistical notion of correlation and how it relates to computer service data collection. In general, if data are correlated, the number of measurements needed for a given probability of making a correct selection increases dramatically since correlated measurements provide less "information" than do independent measurements. There are many techniques, however, for avoiding correlation in the data, such as properly spacing measurement collection in order to assume independence. With careful planning, adequate time over which to spread measurement, and reasonably well-behaved computer services, a correlation problem often can be avoided without violating experimental objectives. (+)

(+) In some cases a correlation problem is unavoidable. The author is developing procedures which take correlation into account.

A significant advantage of these procedures is that they make no assumptions about the underlying distribution of the measurements. That is, one need not assume that response times, turnaround times, etc., follow a normal, exponential, or any other often assumed distribution.

The goals of the procedures are:

Section 3.2.1 - Determining S(single), a subset of computer services that includes all services better than a single proportion criterion.

Section 3.2.2 - Determining S(dual) - a subset of computer services that includes all services better than a dual proportion criterion.

Section 3.2.3 - Determining S(upper-lower) - a subset of computer services that includes all services better than an upper proportion criterion and excludes all services worse than a lower proportion criterion.

3.2.1 Selection of Services Satisfying a Single Proportion Criterion

A single proportion criterion is stated in terms of a measure threshold value, C(thld), and a minimum proportion, p(min). The object of the procedure is to determine a subset of the k computer services being compared which includes every service whose performance distribution (for a particular index) has values less than C(thld) at least p(min) proportion of the time. (+) The true proportion of values from the ith computer service, denoted service(i), which are less than C(thld) is denoted p(i).

For example, if a performance index of interest is turnaround time for a certain sequence of user-computer interactions, then a single proportion criterion might state that at least eighty percent of the time the sequence must be executed in less than 10 minutes. In this case, p(min) = 0.80 and C(thld) = 10 minutes.

(+) One can determine a subset which includes every computer service whose performance distribution has values greater than C(thld) at least p(min) proportion of the time by replacing "less" (<) with "greater" (>) wherever values of C(thld) are referenced.

The values of the parameters C(thld) and p(min) (and analogous parameters in the two procedures that follow) are analyst choices based on nonstatistical considerations such as past performance or projected performance needs. These values also may be the results of psychological studies of human-computer interaction studies which indicate threshold levels of computer performance necessary for efficient and/or acceptable human performance [CAR68, MIL68, WIL77]. For example, [MIL68] indicates that most response delays in conversational interaction between human and information systems must be less than 15 seconds. (In this case, "most" might be interpretted as 90%.)

Selection is accomplished by collecting measurements from the computer services under study and estimating each service's p(i) value. Using an appropriate decision rule based on statistical ranking and selection theory, the analyst is then able to determine those computer services which satisfy the single proportion criterion.

Denoting S(single) as the selected subset of computer services, by definition a correct selection occurs if and only if:

$$\forall\, i[p(i) \geq p(min) \dashrightarrow service(i) \in S(single)]$$

That is, for each and every service, if the proportion of values less than a threshold is greater than or equal to a minimum proportion value, then that service is included in the selected subset (see Figure 2).

When applying proportion criteria, an analyst would prefer a procedure which perfectly separated all "better than (or equal to) standard" computer services from all "worse than standard" services. With only a finite number of measurements from which to draw inference, any rule separating "better" services from "worse" services will have positive probability of two kinds of selection error: that of excluding better services, and that of including worse services. Based on practical considerations in procurement situations, it is assumed better to minimize the chance of the latter type of selection error (i.e. it is better to include a "worse" service than to omit a "better" one). This attitude is justifiable in government procurement where efforts must be made to minimize the chance of incorrectly claiming a vendor's product to be below specifications.

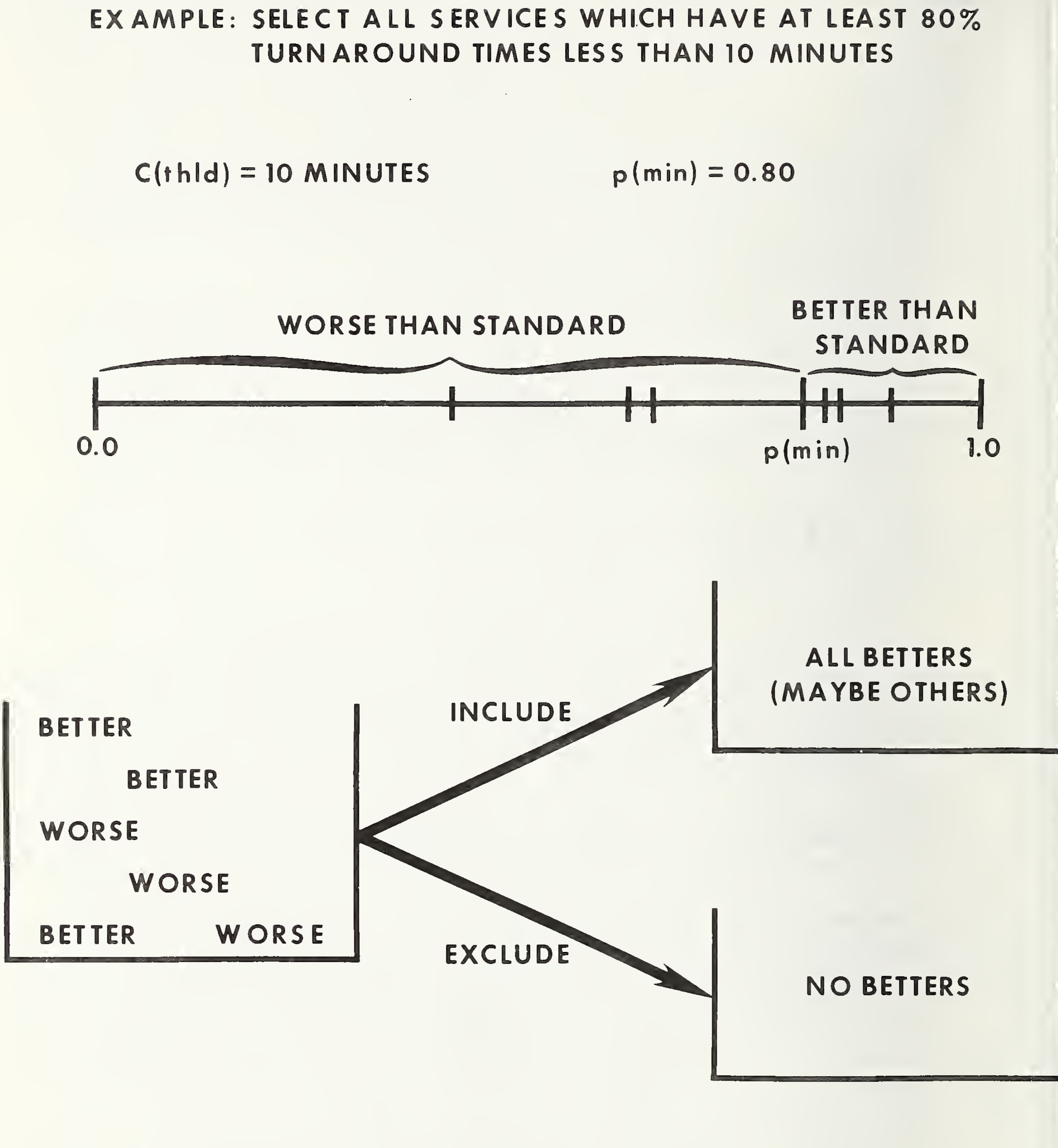

FIGURE 2: APPLICATION OF A SINGLE PROPORTION CRITERION

Therefore this procedure determines (with probability at least P*) a subset of services which includes all services that perform better than C(thld) at least p(min) proportion of the time. Other assumptions regarding the two kinds of selection errors result in different subset selection procedures; they are not investigated here. This selection goal is extended in the procedure in Section 3.2.3 where an analyst has some control over how far below standard a service can be, and still be included in the selected subset.

Note that for a subset selection policy, there is also an implicit objective of minimizing the size of the selected subset (subject to a 1-P* constraint on the probability of incorrect selection). One can always attain a correct subset selection with probability equal to one by including all services in a selected subset (since such a subset indeed would include all better than standard services), yet this contradicts the purpose of applying proportion criteria - that of detecting as many worse than standard computer services as possible.

The procedure is a four step process:

Step 1: Choose appropriate P*, C(thld) and p(min) values according to nonstatistical considerations.

Step 2: Collect n independent measurements from each of the k computer services. The analyst chooses n based on practical considerations, bearing in mind that as n increases, more accurate estimates of each service's proportion will be attained, thereby increasing the chances of excluding those services whose performance does not satisfy the single proportion criterion.

Step 3: Let X(i) = number of measurements from service(i) which are < C(thld). Since n is identical for each computer service, the X(i) values provide information about the true proportions.

Step 4: For each service, compare X(i) to a constant M, which is derived from statistical ranking and selection theory. If X(i) $\geq$ M, then include service(i) in the selected subset; otherwise exclude it. M is determined by table lookup based on the parameters k, n, P* and p(min). Extensive values for M are tablulated in [AME79] and are reproduced as Tables 1-19 in Appendix B of SP 500-44. (In these tables p(min) is referred to as the standard proportion.)

3.2.2 Selection of Services Satisfying a Dual Proportion Criterion

A dual proportion criterion is stated in terms of two measure threshold values, C1(thld) and C2(thld), and two minimum proportions, p1(min) and p2(min). The object of the procedure is to determine a subset of the k computer services being compared which includes every service whose performance distribution (for a particular index) has values less than C1(thld) at least p1(min) proportion of the time and has values less than C2(thld) at least p2(min) proportion of the time. (+) (Assuming without loss of generalization that C1(thld) < C2(thld), then to be meaningful p1(min) < p2(min).) The latter part of a dual proportion criterion equivalently can be stated as "has values greater than or equal to C2(thld) at most 1-p2(min) proportion of time" (see Figure 3).

For example, if a performance index of interest is response time for program compilations, then a dual proportion criterion might state that at least 60% of the compilations must take less than thirty seconds and at least 90% of the compilations must take less than one minute. In this case p1(min) = 0.60, p2(min) = 0.90, C1(thld) = 30 seconds and C2(thld) = 1 minute.

The values of the parameters C1(thld), C2(thld), p1(min), and p2(min) are analyst choices based on nonstatistical considerations. Selection is accomplished by collecting measurements from each computer service under study and estimating the true proportions of measurements from service(i) lying below C1(thld) and C2(thld).

Performance measurements from the computer services fall into one of three intervals; interval 1 = [0,C1(thld)), interval 3 = [C1(thld),C2(thld)) and interval 2 = [C2(thld), infinity). (Note that the intervals are ordered 1,3,2 and not 1,2,3.) The true proportions of measurements from service(i) which lie in the intervals 1,3,2 are denoted p1(i), 1-p1(i)-p2(i), and p2(i), respectively (see Figure 4).

(+) Justification for determining a subset which includes all better than standard services rather than one which precisely separates the better than standard services from the worse than standards services is discussed in Section 3.2.1.

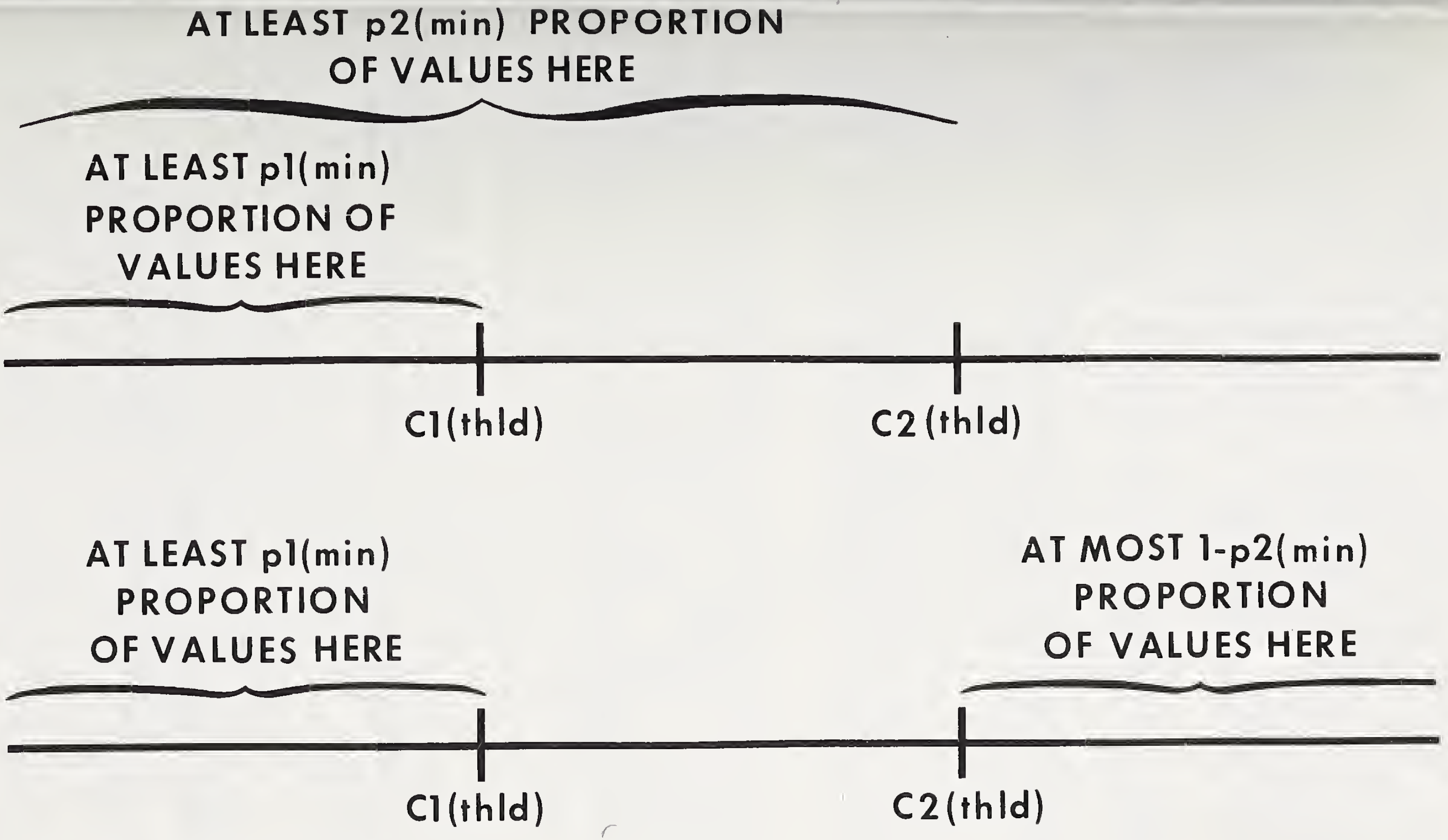

FIGURE 3: EQUIVALENT FORMULATIONS OF A DUAL PROPORTION CRITERION

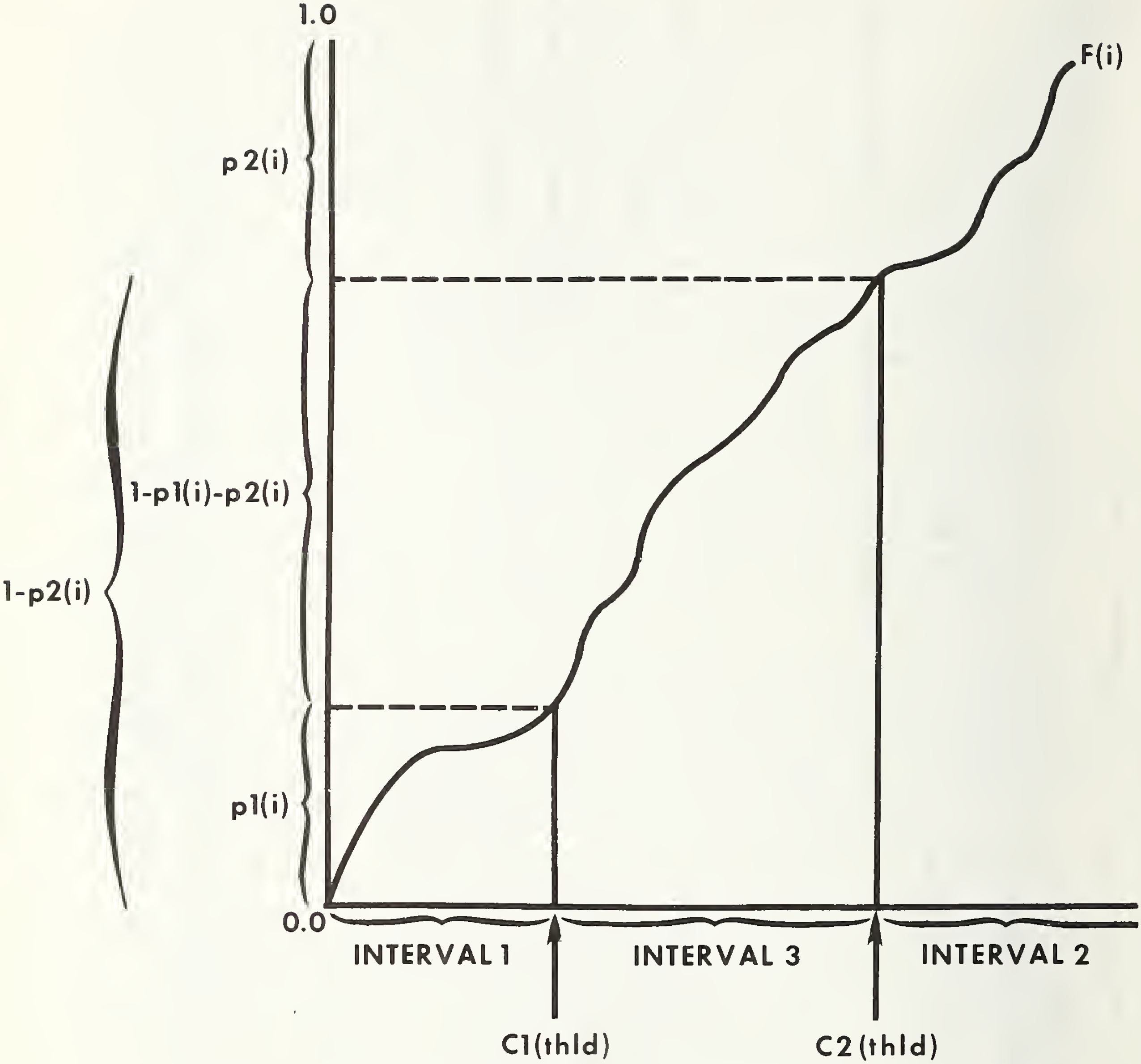

FIGURE 4: TYPICAL CUMULATIVE DISTRIBUTION FUNCTION F(i) OF OBSERVATIONS FROM SERVICE(i)

A dual proportion criterion defines service(i) to be better than standard if $p1(i) \geq p1(min)$ and $1-p2(i) \geq p2(min)$. Stated in other terms, p1(min) is a minimum probability of a measurement lying in interval 1, and p2(min) is a minimum probability of a measurement lying in the union of intervals 1 and 3. (Note that the latter part of this statement is <u>not</u> equivalent to saying p2(min)-p1(min) is a minimum probability of a measurement lying in interval 3.)

Denoting S(dual) as the selected subset of computer services, by definition a correct selection occurs if and only if:

$$\forall i[\{p1(i) \geq p1(min) \text{ and } 1-p2(i) \geq p2(min)\} \longrightarrow service(i) \in S(dual)]$$

That is, for each and every service, if the proportions of values less than both threshold values are greater than or equal to two minimum proportion values, respectively, then that service is included in the selected subset (see Figure 5).

A dual proportion criterion permits greater flexibility than a single proportion criterion in defining performance requirements in a computer service comparison effort by specifying two, rather than one, statistical values of interest of a performance distribution. The added flexibility of a dual criterion is attained at the expense of a more complex experimental design.

The procedure is a four step process:

<u>Step 1</u>: Choose appropriate P*, C1(thld), C2(thld), p1(min) and p2(min) values according to nonstatistical considerations.

<u>Step 2</u>: Collect n independent measurements from each of the k computer services. The analyst chooses n based on practical considerations, bearing in mind that as n increases more accurate estimates of each service's proportions will be attained, thereby increasing the chances of excluding those services whose performance does not satisfy the dual proportion criterion.

<u>Step 3</u>: Let X1(i) and X2(i) = number of measurements from service(i) which are < C1(thld) and < C2(thld), respectively. Since n is identical for each computer service, the X1(i) and X2(i) values provide information

EXAMPLE: SELECT ALL SERVICES WHICH HAVE AT LEAST
60% RESPONSE TIMES LESS THAN 30 SECONDS
& AT LEAST 90% RESPONSE TIMES
LESS THAN 60 SECONDS

C1(thld)= 30 SECONDS   p1(min)=0.60

C2(thld)=60 SECONDS   p2(min)=0.90

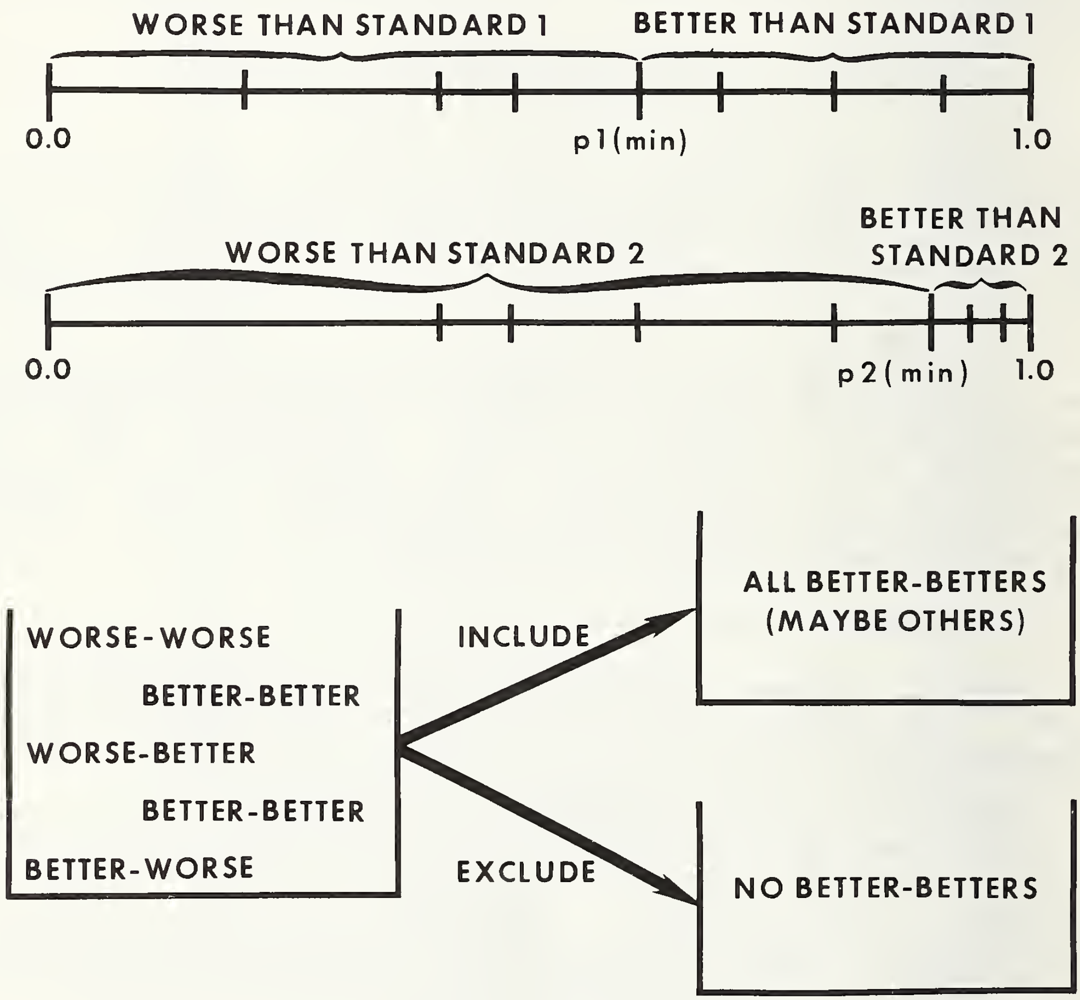

FIGURE 5: APPLICATION OF A DUAL PROPORTION CRITERION

about the true proportions.

Step 4: For each service, compare X1(i) and X2(i) to constants M1 and M2, respectively, which are derived from statistical ranking and selection theory. If X1(i) ≥ M1 and X2(i) ≥ M2, then include service(i) in the selected subset; otherwise exclude it. M1 and M2 are determined by table lookup based on the parameters k, n, P*, p1(min) and p2(min). Extensive values of M1 and M2 are tabulated in [AME79] and are reproduced as Tables 5-24 in Appendix A. (In these tables p1(min) and p2(min) are referred to as standard proportions 1 and 2, respectively.)

3.2.3 Selection of Services Satisfying an Upper-Lower Proportion Criterion

This procedure is a variation of the procedure described in Section 3.2.1. In that section, it is assumed that there are k > 0 computer services being compared from which a subset is determined that includes all services satisfying a specific single proportion criterion. Such a procedure does not control how far below standard a computer service can perform and still be included in the selected subset. (Although the farther below standard a service performs in general, the greater the probability that it will be excluded as a result of a particular empirical study) The procedure only achieves with confidence P* that all better than standard services are included. Therefore it is possible to obtain a correct selection and include several worse than standard services.

For this procedure it is assumed that there are k > 0 computer services from which a subset is determined that includes all services better than an "upper" proportion criterion and that excludes all services worse than a "lower" proportion criterion. An upper-lower proportion criterion is stated in terms of a measure threshold value, C(thld), and minimum upper and maximum lower proportions, p_upper(min) and p_lower(max). The object of this procedure is to determine a subset 1) that includes every computer service whose performance distribution (for a particular index) has values less than C(thld) at least p_upper(min) proportion of the time and 2) that excludes every service whose performance distribution (for the same index) has values less than C(thld) at most p_lower(max) proportion of the time. (Note that if p_upper(min) = p_lower(max), the problem reduces to perfectly separating better services from worse services for a single proportion criterion. As discussed in Section 3.2.1, with only a finite number of measurements to estimate the true proportions, perfect separation is not possible.)

For example, if a performance index of interest is edit command response time, then a performance criterion might state that at least seventy percent of the response times must be less than three seconds. Using the procedure in Section 3.2.1, a comparison study could determine a subset of services which includes all services for which at least 70% of the responses are less than three seconds. Using the procedure below, an analyst could design the same study also to exclude, with probability P*, all services whose percentage (proportion) was less than 50% (0.50). In this case, p_upper(min) = 0.70, p_lower(max) = 0.50 and C(thld) = 3 seconds.

The values of the parameters C(thld), p_upper(min) and p_lower(max) are analyst choices based on nonstatistical considerations. Service selection is accomplished by collecting measurements from the computer services under study and estimating each one's p(i) value.

Denoting S(upper-lower) as the selected subset of computer services, by definition a correct selection occurs if and only if:

$$\forall i[p(i) \geq \text{p\_upper(min)} \dashrightarrow \text{service}(i) \in S(\text{upper-lower}) \text{ and } p(i) \leq \text{p\_lower(max)} \dashrightarrow \text{service}(i) \notin S(\text{upper-lower})]$$

That is, for each and every service, if p(i) is greater than or equal to a minimum upper proportion value, then that service is included in the selected subset. And if p(i) is less than or equal to a maximum lower proportion value, then that service is excluded from the selected subset. No statement is made about those services for which p_upper(min) > p(i) > p_lower(max) (see Figure 6).

An upper-lower proportion criterion provides more control than a single proportion criterion does in applying proportion criteria in the selection process. It does so by permitting an analyst to regulate how poorly a service can perform and still be selected due to variability in the collected measurements.

An upper-lower proportion criterion differs from a single or dual proportion criterion in that for the latter two types of criteria, the analyst chooses n bearing in mind

EXAMPLE: SELECT ALL SERVICES WHICH HAVE AT LEAST 70% RESPONSE TIMES LESS THAN 3 SECONDS ALSO GUARANTEEING TO EXCLUDE ALL SERVICES WITH AT MOST 50% RESPONSE TIMES LESS THAN 3 SECONDS.

C(thld) = 3 SECONDS

p-upper(min) = 0.70

p-lower(max) = 0.50

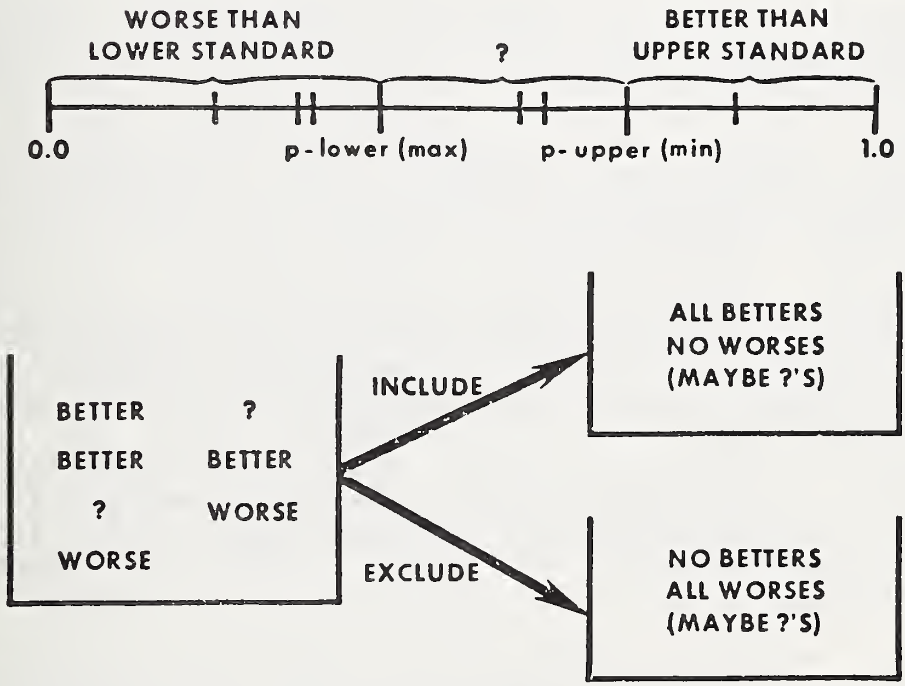

FIGURE 6: APPLICATION OF AN UPPER-LOWER PROPORTION CRITERION

only practical considerations and a desire to detect as many worse than standard services as possible. Applying an upper-lower criterion, however, requires a minimum number of measurements which must be collected for a given combination of parameter values. This is because n must be large enough to differentiate at the desired confidence level between those computer services better than the upper standard proportion and those services worse than the lower standard proportion.

The procedure is a four step process:

Step 1: Choose appropriate P*, C(thld), p_upper(min) and p_lower(max) values according to nonstatistical considerations.

Step 2: Collect n independent measurements from each of the k computer services. The analyst chooses n based on table lookup in Appendix B.

Step 3: Let X(i) = number of measurements from service(i) which are < C(thld). Since n is identical for each computer service, the X(i) values provide information about the true proportions.

Step 4: For each service, compare X(i) to a constant M, which is derived from statistical ranking and selection theory. If X(i) $\geq$ M, then include service(i) in the selected subset; otherwise exclude it. M is determined by table lookup based on the parameter values k, n, P*, p_upper(min) and p_lower(max). Extensive values for M are tabulated in [AME79] and are reproduced as Tables 25-44 in Appendix B. (In these tables p_upper(min) and p_lower(max) are referred to as upper and lower standard proportions, respectively.)

Table entries in Appendix B are computed as (n,M) pairs such that if n measurements are collected in Step 2, a decision rule will exist in the form stated in Step 4. Three (n,M) pairs are computed for each combination of k, P*, p_lower(max) and p_upper(min). The first pair indicates the minimum n for which a decision rule that satisfies the P* requirement exists. The next two pairs are for larger n in the situation when an analyst can afford more data and wants the same P* value. Larger n values result in more accurate estimates of p(i) and therefore in a more accurate selection process.

4.0 COMPARISON RESULTS

Using the procedures above, this section reanalyzes computer service measurement data collected in a case study performed at the National Bureau of Standards during Summer 1978. The purpose of reanalyzing past data is to illustrate the selection procedures in terms of an actual comparison effort. The original study, discussed in detail in SP 500-44, was conducted to evaluate the time and cost required to apply various statistical ranking and selection procedures in an actual computer service procurement environment. Case study results in terms of the theoretical, technical and economic feasibility of comparing interactive computer services can be found in [MAM79b].

4.1 Summary of a Case Study

Four heterogeneous remote access time sharing services were compared: a DEC System-10 running a TOPS-10 Monitor, a Honeywell 6180 running MULTICS, an IBM 360/65 running MVT/TSO, and a UNIVAC 1108 running Exec 8. A "scenario", or functional description of an interactive benchmark which is to be executed and measured on each computer service being compared [WAT77], was designed to be reasonably typical of the functional requirements of a real workload. It was not expected nor supposed to be representative of a specific user's workload; rather the scenario was designed to be a realistic example which could be used to investigate the overall selection methodology. The scenario is presented in Table 3.

The scenario was translated into "equivalent" scripts executable on the four services. Eight performance indices based on the activities in the script were chosen for computer service comparison in the case study. They are:

1. cost,
2. turnaround time for the entire script execution,
3. response time for the bibliographic retrieval (no. 2 in the scenario),
4. response time for the FORTRAN program (no. 3

Note: Reference to commercial products in this report is for identification only and does not imply endorsement by the National Bureau of Standards.

Table 3

Scenario for the Case Study

General Specifications: Think time (response-to-stimulus delay) for all user commands is 6 seconds.

File Characteristics: the files listed below are to be resident on the respective systems before the start of script execution.

1. Files for executing a COBOL search of a bibliographic database:
   - SELECT: compiled COBOL program
   - BIB: bibliographic database
   - ACCESS: bibliographic entries to be found
   - CHOSEN: list of entries retrieved
   - RESULT: summary of search

2. Files for executing a FORTRAN version of the BELL benchmark:
   - BELL: compiled FORTRAN program
   - BELLIN: input specifications for the program run
   - BELLOUT: output of program run

3. File for interactive FORTRAN program, INTERA, a source program (with errors) to compute prime numbers

Functional Script:

1. Logon to the system.
2. Execute SELECT.
3. Execute BELL.
4. Copy file INTERA to file INTR1.
5. Edit INTR1, correcting a syntax error by changing line 14 to read: GO TO 10.
6. Edit INTR1, correcting a logical error by changing line 23 to read: PP=PP+1.
7. Compile INTR1.
8. Execute INTR1. This will initiate the following dialogue:

```
        ARE YOU TESTING A NUMBER? (0 or 1)
                   Enter: 0 (CR)
       ARE YOU GENERATING PRIMES? (0 or 1)
                   Enter: 1 (CR)
   LIMIT UNDER WHICH PRIMES ARE TO BE GENERATED:
                  Enter: 100 (CR)
25, 2, 3, 5, 7, 11, 13, 17, 19, 23, 31, 37, 41, 43, 47,
53, 59, 71, 68, 71, 73, 79, 83, 89, 97
        ARE YOU TESTING A NUMBER? (0 or 1)
                   Enter: 0 (CR)
       ARE YOU GENERATING PRIMES? (0 or 1)
                   Enter: 0 (CR)
          DO YOU WANT TO QUIT? (0 or 1)
                   Enter: 1 (CR)
```

9. Delete INTR1 file.
10. Logoff system.

in the scenario),

5. response time for the copy command (no. 4 in the scenario),
6. response time for the first edit command (no. 5 in the scenario),
7. response time for the second edit command (no. 6 in the scenario), and
8. response time for the interactive calculation of all prime numbers less than 100 (no. 8 in the scenario).

The hardware/software configuration for the case study is illustrated in Figure 7. The scripts were repeatedly executed on each of the computer services under the automatic control of a remote terminal emulator called the Network Access Machine [ROS75]. Turnaround time, response time and cost data were automatically collected for each execution of each script by a minicomputer called the Network Measurement Machine [ABR77a, ROS76]. The data were analyzed using a statistical package called OMNITAB [HOG71]. Correlation coefficients, means, percentiles and proportions were calculated.

In the case study comparison results, the four computer services are referred to as service 1, 2, 3 and 4. The numbers were randomly assigned to the four services to ensure their anonymity. The selection results discussed below are primarily a function of the load on a given system and not of the individual hardware/software combinations providing the computer service. Thus, it cannot be concluded from this study that a given computer <u>system</u> is better than the others, but only that a given computer <u>service</u> is better. The results of the case study are not to be construed as an endorsement of any one computer service.

4.2 Application of Proportion Criteria

The purpose of the case study was to demonstrate several selection procedures each of which might require a different number of computer service measurements. Therefore a maximum number anticipated for any selection procedure was collected. In a real application of performance criteria using ranking and selection procedures, the number of measurements as well as the selection criteria are determined in advance. Initially the scripts were executed 120 times on each service, resulting in 120 measurements for each of the eight performance indices listed in Section 4.1. Due to the independence requirement,

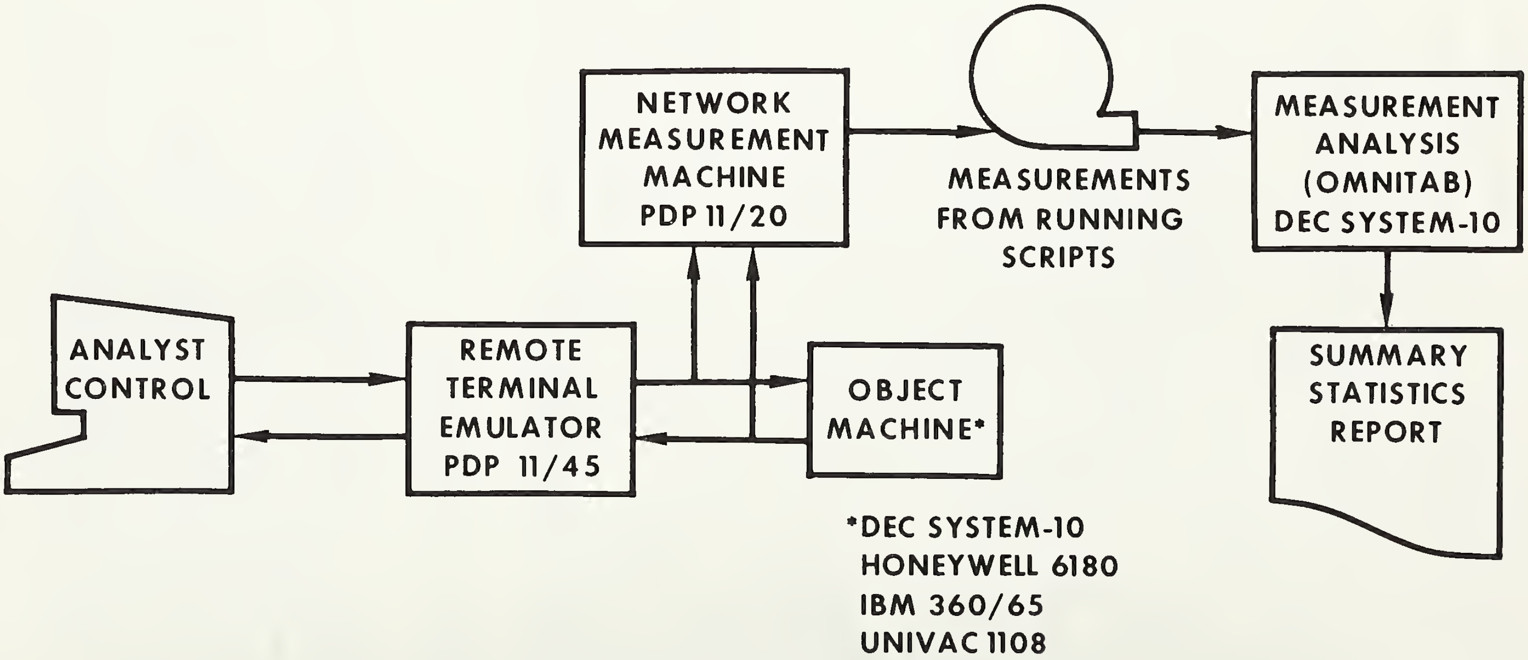

Figure 7 Hardware/Software Configuration for the Case Study

each data set was eventually reduced to 90 (independent) measurements for each index. (See SP 500-44: Appendix A and Section 3.2.2 for a discussion of reduction techniques.)

In the examples that follow, proportion criteria which likely would be used in an actual procurement are chosen. Each example employs one of the experimental procedures presented in Section 3.2. (Additional examples can be found in [AME79] and [MAM79a].) In those examples requiring $n < 90$ measurements from each computer service for a given level of confidence, the first n measurements were chosen. In a real comparison, when application of one criterion requires fewer measurements than are collected to satisfactorily apply another criterion, it is statistically acceptable (and, in fact, strongly advisable) to use more than the required number of measurements. The examples use the minimum number of measurements for purposes of clarity only.

In the examples, the values of those parameters which are analyst choices were specified to make the examples as clear and explicit as possible. Efforts also were made to select parameter values that are likely to be chosen in a computer service selection process. The steps in the examples parallel the steps in the original presentations of the procedures in Sections 3.2.1, 3.2.2 and 3.2.3.

Table 4 presents various summary statistics for the four computer services. Only the proportion information (i.e. the column titled "No. Measurements < C(thld)") is used in the examples below. The mean and quantile statistics are presented to provide a more detailed comparison picture. The complete set of $n = 90$ independent measurements were used for the calculation of all statistics in Table 4 except where a different n value is indicated.

4.2.1 Selection of Services Satisfying a Single Proportion Criterion (2 examples)

<u>Example</u>
(parallels Section 3.2.1)

<u>Step</u> <u>1</u>: Suppose it is a mandatory criterion that a computer service be able to interactively calculate the prime numbers between 1 and 100 (no. 8 in Table 3) in less than 1.00 second at least 80% of the time. Further, suppose it is desired to select a subset which includes all such services with a probability of correct selection at least

Table 4

Statistics from the Case Study

Variable	Computer Service	Mean	.5-quantile (Median)	.9-quantile	No. Measurements < C(thld) (+)	
					C(thld)=2.0	
1. Cost	1	3.44	3.93	4.51	13	
	2	.81	.76	1.08	90	
	3	1.69	1.64	2.43	67	
	4	1.72	1.71	1.81	87	
					C(thld)=8.0 n=77	
2. Script turnaround (min.)	1	4.53	4.35	5.69	77	
	2	4.97	4.55	7.52	76	
	3	12.77	12.32	18.21	9	
	4	7.85	7.70	10.36	43	
					C1(thld)=8.0	C2(thld)=10.0
3. Response time for bibliographic retrieval (sec.)	1	10.63	9.33	18.46	38	52
	2	1.08	.66	2.52	90	90
	3	147.82	116.41	254.17	00	00
	4	6.36	3.37	12.19	78	80
4. Response time for FORTRAN synthetic program (sec.)	1	12.91	10.06	28.10	84	
	2	1.19	.80	2.60	90	
	3	30.27	21.31	50.61	56	
	4	11.32	7.00	20.22	84	

(+) n=90 except where otherwise specified

Table 4 (continued)

					C(thld)=3.0 n=30	C(thld)=3.0 n=60
5. Response time for copy command (sec.)	1	2.27	1.59	3.99	22	49
	2	2.53	2.05	4.45	25	44
	3	23.74	18.54	44.32	00	00
	4	4.26	3.69	9.12	16	27
					C(thld)=3.0	
6. Response time for first edit (sec.)	1	1.24	.92	2.63	84	
	2	.15	.15	.15	90	
	3	4.18	2.74	9.49	50	
	4	3.50	2.06	6.27	57	
					C(thld)=3.0	
7. Response time for second edit(sec.)	1	1.05	.64	1.93	87	
	2	.15	.15	.15	90	
	3	4.38	2.54	8.13	62	
	4	3.63	1.82	4.87	61	
					C(thld)=1.0	
8. Response time for calculation of prime numbers (sec.)	1	1.21	.92	2.37	49	
	2	.13	.12	.15	90	
	3	.76	.60	1.30	74	
	4	2.62	1.66	6.80	32	

0.90. Then k = 4, P* = 0.90, C(thld) = 1.00 and p(min) = 0.80.

Step 2: Choose n = 90. Ninety independent measurements have been made on each computer service.

Step 3: For the computer services under study, Table 4 indicates that X(1) = 49, X(2) = 90, X(3) = 74 and X(4) = 32.

Step 4: Table 3 in Appendix B of SP 500-44 shows that M = 64 for this example. Therefore include services 2 and 3 and exclude services 1 and 4, i.e. S(single) = {service(2), service(3)}. Since the criterion was mandatory, services 1 and 4 would be eliminated from the selection process.

Example
(parallels Section 3.2.1)

Step 1: Suppose it is a desirable criterion that a computer service be able to process the first edit command (no. 5 in Table 3) in less than 3.00 seconds at least 70% of the time. So, k = 4, C(thld) = 3.00 and p(min) = 0.70. Let P* = 0.95.

Step 2: Choose n = 90. Ninety independent measurements have been made on each computer service.

Step 3: For the four computer services, Table 4 indicates that X(1) = 84, X(2) = 90, X(3) = 50 and X(4) = 57.

Step 4: Table 3 in Appendix B of SP 500-44 shows that M = 53 for this example. Therefore, include services 1, 2 and 4 and exclude service 3, i.e. S(single) = {service(1), service(2), service(4)}. Since the criterion was desirable, services 1, 2 and 4 would be appropriately rewarded.

Note that if ranking and selection techniques were not being applied in this example, then service 4 might have been excluded since the "expected" number of responses less than 3.00 seconds for a service providing minimally acceptable response is 70% of 90 or 63, and X(4) < 63. But the ranking and selection procedure indicates that because of experimental variation service 4 cannot be excluded at the 95% confidence level.

4.2.2 Selection of Services Satisfying a Dual Proportion Criterion (1 example)

Example
(parallels Section 3.2.2)

Step 1: Suppose it is a desirable criterion that a computer service be able to perform the bibliographic retrieval (no. 2 in Table 3) in less than 8.0 seconds at least 40% of the time and in less than 10.0 seconds at least 70% of the time. Further, suppose it is desired to select a subset which includes all such services with a probability of correct selection at least 0.90. Then k = 4, C1(thld) = 8.0, C2(thld) = 10.0, p1(min) = 0.40, p2(min) = 0.70, and P* = 0.90.

Step 2: Choose n = 90. Ninety independent measurements have been made on each computer service.

Step 3: For the four computer services, Table 4 indicates that:

X1(1)=38	X2(1)=52
X1(2)=90	X2(2)=90
X1(3)= 0	X2(3)= 0
X1(4)=78	X2(4)=80

Step 4: Table 8 in Appendix A shows that (M1,M2) = (27,52) for this example. Therefore include services 1, 2 and 4 and exclude service 3, i.e. S(dual) = {service(1), service(2), service(4)}. Since the criterion was desirable, services 1, 2 and 4 would be appropriately rewarded.

4.2.3 Selection of Services Satisfying an Upper-Lower Proportion Criterion (1 example)

Example
(parallels Section 3.2.3)

Step 1: Suppose it is a mandatory criterion that a computer service be able to perform the entire script (1-10 in Table 3) in less than 8.0 minutes at least 80% of the time. Further, suppose it is desired to select, with probability of correct selection 0.90, a subset which includes all such services and excludes any service which performs the script in less than 8.0 minutes less than 60% of the time. Then k = 4, C(thld)= 8.0, p_upper(min) = 0.80, p_lower(max) = 0.60, and P* = 0.90.

Step 2: Choose n = 77 (based on Table 28 in Appendix B). Ninety independent measurements have been made on each computer service; choose the first 77 measurements.

Step 3: For the four computer services, Table 4 indicates that X(1)=77, X(2)=76, X(3)=9 and X(4)=43.

Step 4: Table 28 in Appendix B shows M = 55 for this example. Therefore include services 1 and 2 and exclude services 3 and 4, i.e. S(upper-lower) = {service(1), service(2)}. since the criterion was mandatory, services 3 and 4 would be eliminated from the selection process.

5.0 DISCUSSION AND CONCLUSIONS

One requirement for effective computer service comparison in a selection methodology is a set of procedures which can provide accurate appraisals of service behavior. Because services are compared in an uncontrolled environment, the data collection and analysis component of the selection methodology must account for the variability in the collected measurements. This publication indicates a general model of the computer service selection process based on the application of four classes of performance criteria. For use in phase II or phase IIIB of that model, where measurable criteria are applied, three binary type selection procedures are given. Based on statistical ranking and selection theory, assuming one can collect statistically independent measurements, the procedures have valid application when measurable selection criteria define computer service performance in terms of a threshold level(s) and a proportion statistic(s).

Each procedure described provides information regarding the performance of a set of computer services for a particular performance index. To arrive at a final selection of the best overall service, it may be necessary to integrate the information obtained from individually applying these procedures for several performance indices with cost estimates and other analysis results. Selection methodologies for integrating all of the available information have been referenced.

The procedures explicitly specify prior to measurement an appropriate decision rule and/or the number of independent measurements required from each computer service to attain a given level of statistical confidence in the comparison results. The procedures are valuable in the computer service procurement process because they design comparison studies to result in statistical confidence statements about the probability of having accurately estimated computer service performance. This is in contrast to those studies which make statements about which computer services satisfy certain performance specifications, but omit statistical justification in the form of probabilistic confidence statements.

If the collection of measurements is necessary in a computer service selection, then these procedures (or similar statistically sound procedures such as those in SP 500-44) should be employed. Their mathematical derivation provides an analyst with the ability to justify the empirical results employed in the computer service selection decision making process.

6.0 ACKNOWLEDGMENTS

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APPENDIX A

Tables for Dual Proportion Criteria

This appendix contains tabled values which are likely to be needed to apply the selection procedure described in Section 3.2.2. A demonstration of the use of these tables can be found in Section 4.2.2. The original source of the tables is [AME79]. In all of these tables, "population" represents a computer service, "dual standard" represents a dual proportion criterion, "P(CS)" represents the probability of correct selection, and "standard proportions 1 and 2" represents p1(min) and p2(min), respectively.

Table 5

VALUES OF M1,M2 FOR SELECTING, WITH P(CS) >= P*, A SUBSET OF k = 1 TRINOMIAL POPULATIONS WHICH CONTAINS ALL POPULATIONS BETTER THAN A DUAL STANDARD (POPULATIONS WITH AT LEAST M1 OBSERVATIONS IN INTERVAL 1, AND AT LEAST M2 OBSERVATIONS IN THE UNION OF INTERVALS 1 AND 3, ARE SELECTED)

P* = .90

NUMBER OF OBSERVATIONS(n)

STANDARD PROPORTIONS 1	2	10		20		30		40		50		60		70		80		90		100	
		M1	M2	M1	M2	M1	M2	M1	M2	M1	M2	M1	M2	M1	M2	M1	M2	M1	M2	M1	M2
.10	.20	0	0	0	2	1	3	2	4	2	6	3	8	4	9	5	10	5	13	6	14
	.30	0	1	0	3	1	5	2	7	2	10	3	13	4	15	5	16	5	21	6	23
	.40	0	2	0	5	1	8	2	10	2	15	3	18	4	21	5	23	5	29	6	32
	.50	0	3	0	7	1	11	2	14	2	20	3	24	4	28	5	31	5	38	6	42
	.60	0	4	0	9	1	14	2	18	2	25	3	30	4	35	5	38	5	47	6	52
	.70	0	5	0	11	1	17	2	22	2	30	3	36	4	42	5	47	5	56	6	62
	.80	0	6	0	14	1	21	2	27	2	36	3	43	4	50	5	56	5	66	6	73
	.90	0	8	0	16	1	24	2	32	2	42	3	50	4	58	5	66	5	76	6	85
.20	.30	0	1	2	3	3	6	5	7	6	11	8	13	10	15	11	18	13	20	15	23
	.40	0	2	2	4	3	8	5	11	6	15	8	18	10	20	11	25	13	28	15	31
	.50	0	3	2	6	3	11	5	14	6	20	8	24	10	27	11	33	13	37	15	41
	.60	0	4	2	8	3	14	5	18	6	25	8	29	10	34	11	41	13	46	15	51
	.70	0	5	2	10	3	17	5	22	6	30	8	36	10	41	11	49	13	55	15	61
	.80	0	6	2	13	3	21	5	27	6	35	8	42	10	49	11	58	13	65	15	72
	.90	0	8	2	15	3	24	5	32	6	41	8	50	10	57	11	67	13	76	15	84
.30	.40	1	2	3	5	6	8	8	12	11	15	14	14	16	22	19	25	21	29	24	32
	.50	1	3	3	7	6	10	8	15	11	19	14	18	16	28	19	32	21	38	24	42
	.60	1	4	3	9	6	13	8	19	11	24	14	23	16	35	19	39	21	46	24	51
	.70	1	5	3	11	6	16	8	23	11	29	14	28	16	42	19	47	21	56	24	62
	.80	1	6	3	13	6	20	8	28	11	34	14	35	16	50	19	56	21	65	24	72
	.90	1	8	3	16	6	24	8	33	11	41	14	43	16	58	19	66	21	76	24	84
.40	.50	2	3	5	7	9	10	12	15	16	18	19	24	23	28	26	33	30	38	34	41
	.60	2	4	5	9	9	12	12	19	16	23	19	30	23	34	26	41	30	46	34	50
	.70	2	5	5	11	9	15	12	23	16	27	19	36	23	41	26	49	30	55	34	60
	.80	2	6	5	13	9	19	12	27	16	33	19	42	23	49	26	58	30	65	34	71
	.90	2	7	5	16	9	23	12	32	16	39	19	50	23	57	26	67	30	75	34	83
.50	.60	3	4	7	9	11	14	16	19	20	25	25	30	30	34	34	41	39	46	44	50
	.70	3	5	7	11	11	17	16	23	20	30	25	36	30	41	34	49	39	55	44	59
	.80	3	6	7	13	11	21	16	27	20	35	25	42	30	48	34	58	39	64	44	70
	.90	3	7	7	16	11	24	16	32	20	41	25	49	30	57	34	67	39	75	44	82
.60	.70	4	5	9	11	15	16	20	23	26	28	31	36	37	42	42	50	48	56	54	61
	.80	4	6	9	13	15	19	20	28	26	33	31	43	37	49	42	58	48	65	54	71
	.90	4	7	9	16	15	22	20	32	26	39	31	50	37	57	42	67	48	75	54	83
.70	.80	5	6	11	13	18	20	24	28	31	35	37	43	44	50	51	57	57	66	64	73
	.90	5	7	11	16	18	24	24	33	31	41	37	50	44	58	51	66	57	76	64	84
.80	.90	6	8	14	15	21	24	29	32	36	42	44	50	52	58	59	68	67	76	75	84

P* = .95

NUMBER OF OBSERVATIONS(n)

STANDARD PROPORTIONS 1	2	10		20		30		40		50		60		70		80		90		100	
		M1	M2	M1	M2	M1	M2	M1	M2	M1	M2	M1	M2	M1	M2	M1	M2	M1	M2	M1	M2
.10	.20	0	0	0	1	1	2	1	4	2	5	2	7	3	8	4	9	5	9	5	13
	.30	0	1	0	3	1	4	1	7	2	9	2	12	3	14	4	16	5	16	5	22
	.40	0	2	0	4	1	6	1	11	2	13	2	17	3	20	4	23	5	24	5	31
	.50	0	2	0	6	1	9	1	14	2	18	2	23	3	27	4	31	5	33	5	41
	.60	0	3	0	8	1	12	1	18	2	23	2	29	3	34	4	39	5	42	5	51
	.70	0	5	0	11	1	15	1	23	2	28	2	36	3	41	4	47	5	51	5	61
	.80	0	6	0	13	1	18	1	27	2	34	2	42	3	49	4	56	5	61	5	72
	.90	0	7	0	16	1	23	1	32	2	40	2	50	3	58	4	66	5	73	5	84
.20	.30	0	1	1	3	3	4	4	7	6	8	7	12	9	13	10	17	12	19	14	20
	.40	0	2	1	4	3	6	4	10	6	11	7	17	9	19	10	24	12	27	14	28
	.50	0	2	1	6	3	9	4	14	6	16	7	22	9	25	10	31	12	35	14	37
	.60	0	3	1	8	3	11	4	18	6	20	7	28	9	32	10	39	12	44	14	47
	.70	0	5	1	10	3	15	4	22	6	26	7	35	9	39	10	48	12	53	14	58
	.80	0	6	1	13	3	18	4	27	6	31	7	41	9	47	10	57	12	63	14	69
	.90	0	7	1	15	3	22	4	32	6	38	7	49	9	56	10	66	12	74	14	81
.30	.40	1	1	3	4	5	7	7	11	10	13	12	17	15	20	17	24	20	27	23	29
	.50	1	2	3	6	5	10	7	14	10	18	12	23	15	26	17	32	20	35	23	37
	.60	1	3	3	7	5	13	7	18	10	22	12	29	15	33	17	39	20	44	23	47
	.70	1	4	3	10	5	16	7	22	10	28	12	35	15	40	17	48	20	53	23	57
	.80	1	5	3	12	5	19	7	27	10	33	12	42	15	48	17	57	20	63	23	68
	.90	1	7	3	15	5	23	7	32	10	40	12	49	15	57	17	66	20	74	23	81
.40	.50	2	2	4	6	8	9	11	14	14	19	18	22	21	27	25	31	28	36	32	40
	.60	2	2	4	8	8	12	11	18	14	23	18	28	21	34	25	39	28	45	32	50
	.70	2	3	4	10	8	15	11	22	14	29	18	34	21	41	25	47	28	54	32	60
	.80	2	4	4	13	8	18	11	26	14	34	18	41	21	49	25	55	28	64	32	71
	.90	2	6	4	15	8	23	11	32	14	40	18	48	21	58	25	65	28	75	32	83
.50	.60	2	3	6	8	11	11	15	18	19	24	24	28	28	34	33	38	37	45	42	50
	.70	2	4	6	10	11	14	15	22	19	29	24	33	28	41	33	46	37	54	42	59
	.80	2	6	6	13	11	17	15	26	19	34	24	40	28	49	33	55	37	64	42	70
	.90	2	7	6	15	11	21	15	31	19	40	24	47	28	57	33	64	37	75	42	82
.60	.70	3	4	8	10	14	15	19	22	24	29	30	34	35	42	41	47	46	55	52	61
	.80	3	6	8	13	14	18	19	26	24	34	30	41	35	49	41	55	46	64	52	71
	.90	3	7	8	15	14	22	19	31	24	40	30	48	35	57	41	65	46	75	52	83
.70	.80	5	5	11	12	17	19	23	27	30	33	36	42	43	48	49	57	56	64	62	72
	.90	5	6	11	14	17	23	23	32	30	39	36	49	43	56	49	66	56	74	62	84
.80	.90	6	7	13	15	20	24	28	31	35	41	43	49	50	58	58	66	66	74	73	84

VALUES OF M1,M2 FOR SELECTING, WITH P(CS) >= P*, A SUBSET OF k = 2 TRINOMIAL POPULATIONS WHICH CONTAINS ALL POPULATIONS BETTER THAN A DUAL STANDARD (POPULATIONS WITH AT LEAST M1 OBSERVATIONS IN INTERVAL 1, AND AT LEAST M2 OBSERVATIONS IN THE UNION OF INTERVALS 1 AND 3, ARE SELECTED)

P* = .90

NUMBER OF OBSERVATIONS(n)

STANDARD PROPORTIONS 1	2	10		20		30		40		50		60		70		80		90		100	
		M1	M2	M1	M2	M1	M2	M1	M2	M1	M2	M1	M2	M1	M2	M1	M2	M1	M2	M1	M2
.10	.20	0	0	0	1	1	2	1	4	2	5	2	7	3	8	4	9	5	10	5	13
	.30	0	1	0	3	1	4	1	7	2	9	2	12	3	14	4	16	5	17	5	22
	.40	0	2	0	5	1	6	1	11	2	13	2	17	3	20	4	23	5	25	5	31
	.50	0	2	0	6	1	9	1	14	2	18	2	23	3	27	4	31	5	33	5	41
	.60	0	3	0	8	1	12	1	18	2	23	2	29	3	34	4	39	5	42	5	51
	.70	0	5	0	11	1	15	1	23	2	28	2	36	3	42	4	47	5	52	5	61
	.80	0	6	0	13	1	19	1	27	2	34	2	42	3	49	4	56	5	62	5	72
	.90	0	7	0	16	1	23	1	32	2	40	2	50	3	58	4	66	5	73	5	84
.20	.30	0	1	1	3	3	4	4	7	6	8	7	12	9	13	10	17	12	19	14	20
	.40	0	2	1	4	3	6	4	10	6	12	7	17	9	19	10	24	12	27	14	29
	.50	0	2	1	6	3	9	4	14	6	16	7	22	9	26	10	31	12	35	14	38
	.60	0	3	1	8	3	12	4	18	6	21	7	28	9	32	10	39	12	44	14	48
	.70	0	5	1	10	3	15	4	22	6	26	7	35	9	40	10	48	12	53	14	53
	.80	0	6	1	13	3	18	4	27	6	32	7	42	9	48	10	57	12	63	14	69
	.90	0	7	1	15	3	23	4	32	6	39	7	49	9	56	10	66	12	74	14	82
.30	.40	1	1	3	4	5	7	7	11	10	13	12	17	15	20	17	24	20	27	23	29
	.50	1	2	3	6	5	10	7	14	10	18	12	23	15	26	17	32	20	35	23	38
	.60	1	3	3	8	5	13	7	18	10	23	12	29	15	33	17	40	20	44	23	48
	.70	1	4	3	10	5	16	7	22	10	28	12	35	15	40	17	48	20	53	23	58
	.80	1	5	3	12	5	19	7	27	10	33	12	42	15	48	17	57	20	63	23	69
	.90	1	7	3	15	5	23	7	32	10	40	12	49	15	57	17	66	20	74	23	81
.40	.50	2	2	5	5	8	10	11	14	14	19	18	22	21	27	25	31	28	36	32	40
	.60	2	3	5	6	8	12	11	18	14	24	18	28	21	34	25	39	28	45	32	50
	.70	2	3	5	7	8	15	11	22	14	29	18	34	21	41	25	47	28	54	32	60
	.80	2	5	5	10	8	19	11	27	14	34	18	41	21	49	25	56	28	64	32	71
	.90	2	6	5	13	8	23	11	32	14	41	18	48	21	58	25	65	28	75	32	83
.50	.60	2	3	6	8	11	12	15	18	19	24	24	28	28	34	33	39	37	45	42	50
	.70	2	4	6	10	11	14	15	22	19	29	24	34	28	41	33	46	37	54	42	60
	.80	2	6	6	13	11	18	15	26	19	34	24	40	28	49	33	55	37	64	42	70
	.90	2	7	6	15	11	22	15	31	19	40	24	48	28	57	33	65	37	75	42	82
.60	.70	3	5	8	10	14	15	19	22	24	29	30	35	35	42	41	47	46	55	52	61
	.80	3	6	8	13	14	18	19	27	24	34	30	41	35	49	41	56	46	64	52	71
	.90	3	7	8	15	14	22	19	32	24	40	30	48	35	58	41	65	46	75	52	83
.70	.80	5	5	11	12	17	19	23	27	30	33	36	42	43	48	49	57	56	64	62	72
	.90	5	6	11	14	17	23	23	32	30	39	36	49	43	56	49	66	56	74	62	84
.80	.90	6	7	13	15	20	24	28	32	33	41	43	49	50	58	58	66	66	74	73	84

P* = .95

NUMBER OF OBSERVATIONS(n)

STANDARD PROPORTIONS 1	2	10		20		30		40		50		60		70		80		90		100	
		M1	M2	M1	M2	M1	M2	M1	M2	M1	M2	M1	M2	M1	M2	M1	M2	M1	M2	M1	M2
.10	.20	0	0	0	1	0	2	1	3	1	5	2	6	3	5	3	9	4	10	5	10
	.30	0	0	0	2	0	4	1	6	1	9	2	10	3	10	3	16	4	17	5	18
	.40	0	1	0	4	0	7	1	9	1	13	2	16	3	16	3	23	4	25	5	26
	.50	0	2	0	6	0	10	1	13	1	18	2	21	3	23	3	30	4	34	5	36
	.60	0	3	0	8	0	13	1	17	1	23	2	27	3	29	3	38	4	43	5	46
	.70	0	4	0	10	0	16	1	21	1	28	2	34	3	37	3	47	4	52	5	56
	.80	0	5	0	12	0	19	1	26	1	34	2	41	3	45	3	56	4	63	5	68
	.90	0	7	0	15	0	23	1	31	1	40	2	48	3	54	3	66	4	74	5	80
.20	.30	0	0	1	2	2	4	3	6	5	8	6	11	8	12	9	16	11	17	12	21
	.40	0	1	1	4	2	7	3	10	5	12	6	16	8	18	9	23	11	25	12	30
	.50	0	2	1	5	2	9	3	13	5	17	6	22	8	25	9	30	11	34	12	39
	.60	0	3	1	7	2	12	3	17	5	22	6	28	8	32	9	38	11	43	12	49
	.70	0	4	1	9	2	15	3	22	5	27	6	34	8	39	9	47	11	52	12	60
	.80	0	5	1	12	2	19	3	26	5	33	6	41	8	47	9	56	11	62	12	71
	.90	0	7	1	15	2	23	3	32	5	39	6	48	8	56	9	66	11	73	12	83
.30	.40	0	1	2	4	4	7	7	8	9	13	11	16	14	19	16	23	19	25	21	30
	.50	0	2	2	5	4	9	7	12	9	17	11	22	14	25	16	30	19	33	21	39
	.60	0	3	2	7	4	12	7	15	9	22	11	28	14	31	16	38	19	42	21	49
	.70	0	4	2	10	4	16	7	19	9	27	11	34	14	39	16	46	19	51	21	59
	.80	0	5	2	12	4	19	7	24	9	33	11	41	14	47	16	55	19	61	21	70
	.90	0	7	2	15	4	23	7	30	9	39	11	48	14	56	16	65	19	73	21	82
.40	.50	1	2	4	5	7	9	10	13	13	18	17	21	20	26	24	28	27	34	31	36
	.60	1	3	4	7	7	12	10	17	13	22	17	26	20	33	24	35	27	43	31	45
	.70	1	4	4	9	7	15	10	21	13	28	17	32	20	40	24	43	27	52	31	55
	.80	1	5	4	12	7	18	10	26	13	33	17	39	20	48	24	52	27	62	31	67
	.90	1	7	4	14	7	23	10	31	13	40	17	47	20	56	24	63	27	73	31	79
.50	.60	2	3	6	7	10	12	14	17	18	22	22	28	27	33	31	39	36	43	40	49
	.70	2	4	6	9	10	15	14	21	18	28	22	34	27	39	31	47	36	52	40	59
	.80	2	5	6	11	10	18	14	26	18	33	22	41	27	47	31	55	36	62	40	70
	.90	2	7	6	14	10	22	14	31	18	40	22	48	27	56	31	65	36	73	40	82
.60	.70	3	4	8	9	13	15	18	21	23	28	29	32	34	40	39	47	45	53	50	60
	.80	3	5	8	11	13	18	18	26	23	33	29	37	34	48	39	56	45	62	50	71
	.90	3	7	8	14	13	22	18	31	23	40	29	45	34	56	39	65	45	73	50	82
.70	.80	4	5	10	12	16	19	22	26	29	31	35	41	41	49	48	55	54	63	61	70
	.90	4	7	10	14	16	23	22	31	29	37	35	48	41	57	48	65	54	74	61	82
.80	.90	5	7	12	15	19	23	27	31	34	40	42	48	49	57	57	65	64	74	72	82

Table 7

VALUES OF M1,M2 FOR SELECTING, WITH P(CS) >= P*, A SUBSET OF k = 3 TRINOMIAL POPULATIONS WHICH CONTAINS ALL POPULATIONS BETTER THAN A DUAL STANDARD (POPULATIONS WITH AT LEAST M1 OBSERVATIONS IN INTERVAL 1, AND AT LEAST M2 OBSERVATIONS IN THE UNION OF INTERVALS 1 AND 3, ARE SELECTED)

P* = .90

NUMBER OF OBSERVATIONS(n)

STANDARD PROPORTIONS		10		20		30		40		50		60		70		80		90		100	
1	2	M1	M2	M1	M2	M1	M2	M1	M2	M1	M2	M1	M2	M1	M2	M1	M2	M1	M2	M1	M2
.10	.20	0	0	0	1	0	2	1	3	2	3	2	6	3	7	3	9	4	11	5	12
	.30	0	1	0	2	0	5	1	6	2	6	2	11	3	13	3	16	4	18	5	20
	.40	0	1	0	4	0	7	1	10	2	10	2	17	3	19	3	24	4	27	5	29
	.50	0	2	0	6	0	10	1	14	2	14	2	22	3	26	3	31	4	35	5	39
	.60	0	3	0	8	0	13	1	18	2	19	2	28	3	33	3	39	4	44	5	49
	.70	0	4	0	10	0	16	1	22	2	24	2	35	3	40	3	48	4	54	5	59
	.80	0	6	0	13	0	20	1	27	2	30	2	41	3	48	3	57	4	64	5	71
	.90	0	7	0	15	0	24	1	32	2	37	2	49	3	57	3	66	4	75	5	83
.20	.30	0	1	1	2	2	4	4	6	5	9	7	10	8	14	10	15	11	19	13	21
	.40	0	1	1	4	2	7	4	9	5	13	7	15	8	20	10	22	11	27	13	29
	.50	0	2	1	6	2	10	4	12	5	18	7	20	8	26	10	29	11	35	13	39
	.60	0	3	1	8	2	13	4	16	5	23	7	26	8	33	10	37	11	44	13	49
	.70	0	4	1	10	2	16	4	21	5	28	7	32	8	41	10	46	11	54	13	59
	.80	0	6	1	12	2	19	4	25	5	34	7	39	8	48	10	55	11	64	13	70
	.90	0	7	1	15	2	23	4	31	5	40	7	47	8	57	10	65	11	74	13	82
.30	.40	1	1	2	4	5	6	7	10	9	13	12	16	14	20	17	22	19	27	22	29
	.50	1	2	2	6	5	9	7	13	9	18	12	21	14	26	17	29	19	35	22	38
	.60	1	2	2	8	5	11	7	17	9	23	12	27	14	33	17	37	19	44	22	48
	.70	1	3	2	10	5	14	7	21	9	28	12	33	14	40	17	45	19	53	22	59
	.80	1	5	2	12	5	18	7	26	9	34	12	40	14	48	17	54	19	63	22	70
	.90	1	6	2	15	5	22	7	31	9	40	12	47	14	57	17	64	19	74	22	82
.40	.50	1	2	4	6	7	10	10	14	14	17	17	22	21	25	24	31	28	34	31	40
	.60	1	3	4	8	7	13	10	18	14	22	17	28	21	32	24	38	28	42	31	49
	.70	1	4	4	10	7	16	10	22	14	27	17	34	21	39	24	47	28	51	31	60
	.80	1	5	4	12	7	19	10	27	14	33	17	41	21	47	24	56	28	61	31	71
	.90	1	7	4	15	7	23	10	32	14	39	17	48	21	55	24	65	28	72	31	83
.50	.60	2	3	6	8	10	13	14	18	19	22	23	28	27	34	32	38	36	45	41	49
	.70	2	4	6	10	10	16	14	22	19	26	23	34	27	41	32	46	36	54	41	59
	.80	2	5	6	12	10	19	14	26	19	32	23	41	27	49	32	65	36	63	41	70
	.90	2	7	6	15	10	23	14	32	19	38	23	48	27	57	32	65	36	74	41	82
.60	.70	3	4	8	10	13	16	18	22	24	27	29	34	34	41	40	47	45	54	51	60
	.80	3	5	8	12	13	19	18	27	24	32	29	41	34	49	40	56	45	64	51	71
	.90	3	7	8	15	13	23	18	32	24	39	29	48	34	57	40	65	45	74	51	82
.70	.80	4	5	10	12	16	20	23	26	29	34	35	42	42	48	48	57	55	63	62	69
	.90	4	7	10	15	16	23	23	30	29	40	35	49	42	57	48	66	55	74	62	80
.80	.90	6	6	13	14	20	23	27	32	35	39	42	49	50	57	57	66	65	74	73	80

P* = .95

NUMBER OF OBSERVATIONS(n)

STANDARD PROPORTIONS		10		20		30		40		50		60		70		80		90		100	
1	2	M1	M2	M1	M2	M1	M2	M1	M2	M1	M2	M1	M2	M1	M2	M1	M2	M1	M2	M1	M2
.10	.20	0	0	0	1	0	2	1	2	1	4	2	5	2	7	3	8	4	6	4	11
	.30	0	0	0	2	0	4	1	5	1	8	2	9	2	13	3	14	4	11	4	20
	.40	0	1	0	4	0	6	1	8	1	12	2	14	2	19	3	21	4	18	4	29
	.50	0	2	0	5	0	9	1	11	1	17	2	20	2	26	3	29	4	26	4	33
	.60	0	3	0	7	0	12	1	15	1	22	2	26	2	33	3	37	4	34	4	48
	.70	0	4	0	9	0	16	1	19	1	27	2	32	2	40	3	46	4	44	4	59
	.80	0	5	0	12	0	19	1	24	1	33	2	39	2	48	3	55	4	55	4	70
	.90	0	7	0	15	0	23	1	30	1	40	2	47	2	57	3	65	4	67	4	82
.20	.30	0	0	1	2	2	4	3	5	4	8	6	10	7	13	9	14	10	17	12	19
	.40	0	1	1	3	2	6	3	9	4	12	6	15	7	19	9	21	10	25	12	28
	.50	0	2	1	5	2	8	3	13	4	17	6	20	7	25	9	28	10	34	12	37
	.60	0	3	1	6	2	11	3	17	4	22	6	26	7	32	9	36	10	43	12	47
	.70	0	4	1	9	2	15	3	21	4	27	6	33	7	40	9	45	10	52	12	58
	.80	0	5	1	11	2	18	3	26	4	33	6	40	7	48	9	54	10	63	12	69
	.90	0	7	1	14	2	22	3	31	4	40	6	47	7	57	9	64	10	74	12	81
.30	.40	0	1	2	3	4	6	6	9	8	12	11	15	13	19	16	20	18	25	21	26
	.50	0	2	2	5	4	9	6	13	8	17	11	20	13	25	16	27	18	33	21	35
	.60	0	3	2	7	4	12	6	17	8	22	11	26	13	32	16	35	18	42	21	44
	.70	0	4	2	9	4	15	6	21	8	27	11	32	13	39	16	43	18	52	21	55
	.80	0	5	2	11	4	18	6	26	8	33	11	39	13	47	16	52	18	62	21	66
	.90	0	7	2	14	4	23	6	31	11	40	11	47	13	56	16	63	18	73	21	79
.40	.50	1	2	4	4	6	9	10	12	13	17	16	21	19	26	23	29	26	34	30	37
	.60	1	3	4	6	6	12	10	15	13	21	16	27	19	32	23	37	26	43	30	47
	.70	1	4	4	8	6	15	10	19	13	26	16	33	19	40	23	45	26	52	30	57
	.80	1	5	4	10	6	19	10	24	13	32	16	40	19	48	23	54	26	62	30	68
	.90	1	6	4	13	6	23	10	30	13	39	16	48	19	56	23	64	26	73	30	81
.50	.60	2	2	5	7	9	12	13	17	18	20	22	27	26	32	31	35	35	43	39	49
	.70	2	3	5	9	9	15	13	21	18	25	22	33	26	39	31	43	35	52	39	59
	.80	2	5	5	12	9	19	13	26	18	30	22	39	26	47	31	52	35	62	39	70
	.90	2	6	5	15	9	23	13	31	18	37	22	47	26	56	31	62	35	73	39	82
.60	.70	3	3	7	9	12	15	17	21	23	26	28	33	33	40	39	45	44	52	50	56
	.80	3	5	7	12	12	19	17	26	23	31	28	40	33	48	39	53	44	62	50	66
	.90	3	6	7	15	12	23	17	31	23	38	28	47	33	56	39	63	44	73	50	78
.70	.80	4	5	9	12	16	16	22	25	28	33	34	40	41	47	47	55	54	61	60	70
	.90	4	6	9	15	16	19	22	30	28	39	34	48	41	55	47	65	54	71	60	82
.80	.90	5	7	12	14	19	23	26	31	34	39	41	46	49	55	56	65	64	72	71	82

Table 8

VALUES OF M1,M2 FOR SELECTING, WITH P(CS) >= P*, A SUBSET OF k = 4 TRINOMIAL POPULATIONS WHICH CONTAINS ALL POPULATIONS BETTER THAN A DUAL STANDARD (POPULATIONS WITH AT LEAST M1 OBSERVATIONS IN INTERVAL 1, AND AT LEAST M2 OBSERVATIONS IN THE UNION OF INTERVALS 1 AND 3, ARE SELECTED)

P* = .90

NUMBER OF OBSERVATIONS(n)

STANDARD PROPORTIONS 1	2	10 M1	10 M2	20 M1	20 M2	30 M1	30 M2	40 M1	40 M2	50 M1	50 M2	60 M1	60 M2	70 M1	70 M2	80 M1	80 M2	90 M1	90 M2	100 M1	100 M2
.10	.20	0	0	0	1	0	2	1	3	1	5	2	6	3	6	3	9	4	10	5	10
	.30	0	0	0	2	0	4	1	6	1	9	2	11	3	11	3	16	4	17	5	18
	.40	0	1	0	4	0	7	1	9	1	13	2	16	3	17	3	23	4	25	5	27
	.50	0	2	0	6	0	10	1	13	1	18	2	21	3	23	3	30	4	34	5	36
	.60	0	3	0	8	0	13	1	17	1	23	2	27	3	30	3	39	4	43	5	46
	.70	0	4	0	10	0	16	1	21	1	28	2	34	3	38	3	47	4	53	5	57
	.80	0	5	0	12	0	20	1	26	1	34	2	41	3	46	3	56	4	63	5	68
	.90	0	7	0	15.	0	24	1	31	1	40	2	48	3	55	3	66	4	74	5	81
.20	.30	0	0	1	2	2	4	3	6	5	8	6	11	8	13	9	16	11	18	13	18
	.40	0	1	1	4	2	7	3	10	5	12	6	16	8	18	9	23	11	25	13	26
	.50	0	2	1	5	2	9	3	14	5	17	6	22	8	25	9	30	11	34	13	35
	.60	0	3	1	7	2	12	3	18	5	22	6	28	8	32	9	38	11	43	13	45
	.70	0	4	1	9	2	15	3	22	5	27	6	34	8	39	9	47	11	52	13	55
	.80	0	5	1	12	2	19	3	26	5	33	6	41	8	47	9	56	11	62	13	67
	.90	0	7	1	15	2	23	3	32	5	39	6	48	8	56	9	66	11	73	13	79
.30	.40	0	1	2	4	4	7	7	9	9	13	11	16	14	19	16	23	19	25	21	30
	.50	0	2	2	6	4	9	7	12	9	17	11	22	14	25	16	30	19	33	21	39
	.60	0	3	2	7	4	12	7	16	9	22	11	28	14	32	16	38	19	42	21	49
	.70	0	4	2	10	4	16	7	20	9	27	11	34	14	39	16	46	19	51	21	59
	.80	0	5	2	12	4	19	7	24	9	33	11	41	14	47	16	55	19	62	21	70
	.90	0	7	2	15	4	23	7	30	9	39	11	48	14	56	16	65	19	73	21	83
.40	.50	1	2	4	5	7	9	10	13	13	18	17	21	20	26	24	29	27	35	31	37
	.60	1	3	4	7	7	12	10	17	13	23	17	27	20	33	24	36	27	43	31	46
	.70	1	4	4	9	7	15	10	21	13	28	17	33	20	40	24	44	27	52	31	56
	.80	1	5	4	12	7	19	10	26	13	33	17	40	20	48	24	53	27	62	31	68
	.90	1	7	4	14	7	23	10	31	13	40	17	47	20	57	24	63	27	74	31	80
.50	.60	2	3	6	7	10	12	14	17	18	23	23	24	27	33	31	39	36	43	40	49
	.70	2	4	6	9	10	15	14	21	18	28	23	29	27	40	31	47	36	52	40	59
	.80	2	5	6	11	10	18	14	26	18	33	23	36	27	47	31	56	36	62	40	70
	.90	2	7	6	14	10	22	14	31	18	40	23	44	27	56	31	65	36	73	40	82
.60	.70	3	4	8	9	13	15	18	21	23	28	29	32	34	40	39	47	45	53	50	60
	.80	3	5	8	11	13	18	18	26	23	33	29	39	34	48	39	56	45	62	50	71
	.90	3	7	8	14	13	22	18	31	23	40	29	46	34	56	39	65	45	73	50	83
.70	.80	4	5	10	12	16	19	22	26	29	32	35	41	41	49	48	55	54	64	61	70
	.90	4	7	10	15	16	23	22	31	29	38	35	48	41	57	48	65	54	74	61	82
.80	.90	5	7	12	15	20	21	27	31	34	40	42	48	49	57	57	65	64	74	72	82

P* = .95

NUMBER OF OBSERVATIONS(n)

STANDARD PROPORTIONS 1	2	10 M1	10 M2	20 M1	20 M2	30 M1	30 M2	40 M1	40 M2	50 M1	50 M2	60 M1	60 M2	70 M1	70 M2	80 M1	80 M2	90 M1	90 M2	100 M1	100 M2
.10	.20	0	0	0	1	0	2	0	3	1	4	1	5	2	7	3	7	3	10	4	11
	.30	0	0	0	2	0	4	0	6	1	8	1	10	2	12	3	13	3	17	4	19
	.40	0	1	0	3	0	6	0	9	1	12	1	16	2	18	3	20	3	25	4	28
	.50	0	2	0	5	0	9	0	13	1	17	1	21	2	25	3	27	3	34	4	37
	.60	0	3	0	7	0	12	0	17	1	22	1	27	2	32	3	35	3	43	4	47
	.70	0	4	0	9	0	15	0	21	1	27	1	34	2	39	3	44	3	52	4	58
	.80	0	5	0	12	0	19	0	26	1	33	1	41	2	47	3	53	3	62	4	69
	.90	0	6	0	15	0	23	0	31	1	39	1	48	2	56	3	63	3	74	4	82
.20	.30	0	0	1	1	2	3	3	5	4	8	6	8	7	12	8	15	10	17	12	16
	.40	0	1	1	2	2	5	3	8	4	12	6	13	7	18	8	22	10	24	12	24
	.50	0	2	1	4	2	8	3	12	4	17	6	18	7	24	8	29	10	33	12	33
	.60	0	3	1	5	2	10	3	16	4	21	6	24	7	31	8	37	10	42	12	42
	.70	0	4	1	8	2	14	3	20	4	27	6	30	7	39	8	46	10	51	12	53
	.80	0	5	1	10	2	17	3	25	4	33	6	37	7	47	8	55	10	62	12	65
	.90	0	6	1	13	2	22	3	30	4	39	6	45	7	56	8	65	10	73	12	78
.30	.40	0	1	2	3	4	6	6	9	8	12	10	15	13	18	15	22	18	23	20	28
	.50	0	2	2	5	4	8	6	12	8	16	10	21	13	24	15	29	18	31	20	37
	.60	0	3	2	6	4	11	6	16	8	21	10	27	13	31	15	37	18	40	20	47
	.70	0	4	2	9	4	14	6	20	8	27	10	33	13	38	15	45	18	49	20	58
	.80	0	5	2	11	4	18	6	25	8	32	10	40	13	46	15	54	18	59	20	69
	.90	0	6	2	14	4	22	6	30	8	39	10	48	13	55	15	64	18	71	20	81
.40	.50	1	1	3	5	6	9	9	13	12	17	16	20	19	25	22	29	26	33	29	38
	.60	1	2	3	7	6	12	9	16	12	22	16	25	19	31	22	37	26	41	29	48
	.70	1	3	3	9	6	15	9	21	12	27	16	32	19	39	22	46	26	50	29	58
	.80	1	5	3	11	6	18	9	25	12	33	16	39	19	47	22	55	26	61	29	69
	.90	1	6	3	14	6	22	9	31	12	39	16	46	19	56	22	65	26	72	29	81
.50	.60	2	2	5	7	9	11	13	16	17	22	21	27	26	31	30	37	34	43	39	47
	.70	2	3	5	9	9	14	13	20	17	27	21	33	26	38	30	45	34	52	39	57
	.80	2	4	5	11	9	18	13	25	17	32	21	40	26	46	30	54	34	62	39	68
	.90	2	6	5	14	9	22	13	30	17	39	21	48	26	55	30	64	34	73	39	81
.60	.70	3	3	7	9	12	15	17	21	22	27	27	33	33	39	38	46	44	49	49	58
	.80	3	4	7	11	12	18	17	25	22	33	27	49	33	46	38	54	44	58	49	69
	.90	3	5	7	14	12	22	17	30	22	39	27	48	33	55	38	64	44	70	49	81
.70	.80	4	4	9	11	15	18	21	26	28	31	34	40	40	47	47	53	53	62	60	67
	.90	4	6	9	14	15	22	21	31	28	37	34	47	40	56	47	63	53	73	60	79
.80	.90	5	6	12	14	19	22	26	31	33	39	41	47	48	56	56	64	63	73	71	81

Table 9

VALUES OF M1,M2 FOR SELECTING, WITH P(CS) >= P*, A SUBSET OF k = 5 TRINOMIAL POPULATIONS WHICH CONTAINS ALL POPULATIONS BETTER THAN A DUAL STANDARD (POPULATIONS WITH AT LEAST M1 OBSERVATIONS IN INTERVAL 1, AND AT LEAST M2 OBSERVATIONS IN THE UNION OF INTERVALS 1 AND 3, ARE SELECTED)

P* = .90

NUMBER OF OBSERVATIONS(n)

STANDARD PROPORTIONS 1	2	10 M1	10 M2	20 M1	20 M2	30 M1	30 M2	40 M1	40 M2	50 M1	50 M2	60 M1	60 M2	70 M1	70 M2	80 M1	80 M2	90 M1	90 M2	100 M1	100 M2
.10	.20	0	0	0	1	0	2	1	3	1	4	2	5	2	7	3	8	4	9	4	12
	.30	0	0	0	2	0	4	1	5	1	8	2	10	2	13	3	15	4	16	4	20
	.40	0	1	0	4	0	7	1	9	1	13	2	15	2	19	3	22	4	24	4	29
	.50	0	2	0	6	0	9	1	12	1	17	2	21	2	26	3	30	4	33	4	39
	.60	0	3	0	7	0	12	1	16	1	22	2	27	2	33	3	38	4	42	4	49
	.70	0	4	0	10	0	16	1	21	1	28	2	33	2	41	3	46	4	51	4	60
	.80	0	5	0	12	0	19	1	25	1	34	2	40	2	48	3	55	4	61	4	71
	.90	0	7	0	15	0	23	1	31	1	40	2	48	2	57	3	65	4	73	4	83
.20	.30	0	0	1	2	2	4	3	6	5	7	6	10	8	11	9	15	11	16	12	20
	.40	0	1	1	3	2	6	3	9	5	11	6	16	8	16	9	22	11	24	12	29
	.50	0	2	1	5	2	9	3	13	5	15	6	21	8	22	9	29	11	32	12	38
	.60	0	3	1	7	2	12	3	17	5	20	6	27	8	29	9	37	11	41	12	48
	.70	0	4	1	9	2	15	3	21	5	26	6	33	8	37	9	46	11	50	12	59
	.80	0	5	1	11	2	19	3	26	5	32	6	40	8	45	9	55	11	60	12	70
	.90	0	7	1	14	2	23	3	31	5	38	6	48	8	54	9	65	11	72	12	82
.30	.40	0	1	2	4	4	6	6	10	9	12	11	16	13	19	16	22	18	26	21	29
	.50	0	2	2	5	4	9	6	13	9	16	11	21	13	26	16	29	18	34	21	38
	.60	0	3	2	7	4	12	6	17	9	21	11	27	13	33	16	37	18	43	21	48
	.70	0	4	2	9	4	15	6	21	9	26	11	33	13	40	16	45	18	53	21	58
	.80	0	5	2	12	4	19	6	26	9	32	11	40	13	48	16	54	18	63	21	69
	.90	0	7	2	15	4	23	6	31	9	38	11	48	13	57	16	64	18	74	21	82
.40	.50	1	2	4	5	7	9	10	13	13	17	16	22	20	25	23	30	27	33	30	39
	.60	1	3	4	7	7	11	10	16	13	22	16	27	20	32	23	38	27	41	30	48
	.70	1	4	4	9	7	14	10	21	13	27	16	34	20	39	23	46	27	51	30	59
	.80	1	5	4	11	7	18	10	23	13	33	16	41	20	47	23	55	27	61	30	70
	.90	1	7	4	14	7	22	10	31	13	39	16	48	20	56	23	65	27	72	30	82
.50	.60	2	3	6	6	9	12	14	16	18	22	22	27	27	30	31	38	35	44	40	48
	.70	2	4	6	7	9	15	14	20	18	27	22	34	27	36	31	46	35	53	40	38
	.80	2	5	6	9	9	19	14	24	18	32	22	40	27	44	31	54	35	63	40	69
	.90	2	6	6	12	9	23	14	30	18	39	22	48	27	53	31	64	35	74	40	81
.60	.70	3	4	7	10	12	16	18	20	23	27	28	34	34	38	39	46	44	53	50	59
	.80	3	5	7	12	12	19	18	25	23	33	28	40	34	46	39	55	44	63	50	70
	.90	3	6	7	15	12	23	18	30	23	39	28	48	34	54	39	65	44	74	50	82
.70	.80	4	5	10	11	16	18	22	26	28	33	35	39	41	48	47	56	54	63	60	71
	.90	4	6	10	14	16	22	22	31	28	40	35	46	41	56	47	65	54	73	60	83
.80	.90	5	7	12	15	19	23	27	30	34	40	41	48	49	56	56	66	64	74	72	81

P* = .95

NUMBER OF OBSERVATIONS(n)

STANDARD PROPORTIONS 1	2	10 M1	10 M2	20 M1	20 M2	30 M1	30 M2	40 M1	40 M2	50 M1	50 M2	60 M1	60 M2	70 M1	70 M2	80 M1	80 M2	90 M1	90 M2	100 M1	100 M2
.10	.20	0	0	0	0	0	1	0	3	1	4	1	5	2	6	2	8	3	9	4	10
	.30	0	0	0	2	0	4	0	6	1	7	1	10	2	12	2	15	3	17	4	18
	.40	0	1	0	3	0	6	0	9	1	11	1	15	2	18	2	22	3	25	4	27
	.50	0	1	0	5	0	9	0	13	1	16	1	21	2	24	2	29	3	33	4	36
	.60	0	2	0	7	0	12	0	17	1	21	1	27	2	31	2	37	3	42	4	46
	.70	0	3	0	9	0	15	0	21	1	26	1	33	2	39	2	46	3	52	4	57
	.80	0	5	0	12	0	19	0	26	1	32	1	40	2	47	2	55	3	62	4	68
	.90	0	6	0	14	0	23	0	31	1	39	1	48	2	56	2	65	3	73	4	81
.20	.30	0	0	0	2	1	4	3	5	4	7	5	10	7	11	8	14	10	16	11	19
	.40	0	1	0	3	1	6	3	8	4	11	5	15	7	17	8	21	10	23	11	28
	.50	0	1	0	5	1	9	3	11	4	16	5	20	7	23	8	29	10	31	11	37
	.60	0	2	0	7	1	12	3	15	4	21	5	26	7	30	8	37	10	40	11	47
	.70	0	3	0	9	1	15	3	20	4	26	5	33	7	38	8	45	10	50	11	58
	.80	0	5	0	12	1	18	3	24	4	32	5	40	7	46	8	54	10	60	11	69
	.90	0	6	0	14	1	23	3	30	4	39	5	48	7	55	8	64	10	72	11	82
.30	.40	0	1	2	3	4	5	6	8	8	11	10	15	12	18	15	21	17	25	20	27
	.50	0	1	2	4	4	7	6	11	8	16	10	20	12	25	15	28	17	33	20	36
	.60	0	2	2	6	4	10	6	15	8	21	10	26	12	32	15	36	17	42	20	45
	.70	0	3	2	8	4	13	6	19	8	26	10	32	12	39	15	44	17	51	20	56
	.80	0	5	2	11	4	17	6	24	8	32	10	39	12	47	15	53	17	62	20	67
	.90	0	6	2	14	4	21	6	30	8	38	10	47	12	56	15	64	17	73	20	60
.40	.50	1	1	3	5	6	8	9	12	12	16	15	21	19	24	22	29	25	33	29	37
	.60	1	2	3	7	6	11	9	16	12	21	15	26	19	30	22	36	25	42	29	46
	.70	1	3	3	9	6	14	9	20	12	26	15	33	19	37	22	45	25	52	29	57
	.80	1	4	3	11	6	18	9	25	12	32	15	40	19	45	22	54	25	62	29	68
	.90	1	6	3	14	6	22	9	30	12	39	15	47	19	55	22	64	25	73	29	60
.50	.60	1	2	5	7	9	11	13	16	17	21	21	26	25	32	30	36	34	42	38	48
	.70	1	3	5	9	9	14	13	20	17	26	21	32	25	39	30	44	34	51	38	58
	.80	1	5	5	11	9	17	13	24	17	32	21	39	25	47	30	53	34	61	38	69
	.90	1	6	5	14	9	22	13	30	17	38	21	47	25	56	30	63	34	72	38	81
.60	.70	2	3	7	9	12	14	17	20	22	26	27	33	32	39	38	44	43	52	49	55
	.80	2	5	7	11	12	17	17	24	22	32	27	39	32	47	38	53	43	61	49	66
	.90	2	6	7	14	12	22	17	30	22	38	27	47	32	56	38	63	43	73	49	78
.70	.80	3	5	9	11	15	18	21	25	27	33	34	38	40	47	46	55	53	61	59	69
	.90	3	6	9	14	15	22	21	30	27	39	34	45	40	55	46	64	53	72	59	81
.80	.90	5	6	12	13	19	21	26	30	33	39	40	48	48	56	55	65	63	72	70	82

Table 10

VALUES OF M1,M2 FOR SELECTING, WITH P(CS) >= P*, A SUBSET OF k = 6 TRINOMIAL POPULATIONS WHICH CONTAINS ALL POPULATIONS BETTER THAN A DUAL STANDARD (POPULATIONS WITH AT LEAST M1 OBSERVATIONS IN INTERVAL 1, AND AT LEAST M2 OBSERVATIONS IN THE UNION OF INTERVALS 1 AND 3, ARE SELECTED)

P* = .90

NUMBER OF OBSERVATIONS(n)

STANDARD PROPORTIONS 1	2	10 M1	10 M2	20 M1	20 M2	30 M1	30 M2	40 M1	40 M2	50 M1	50 M2	60 M1	60 M2	70 M1	70 M2	80 M1	80 M2	90 M1	90 M2	100 M1	100 M2
.10	.20	0	0	0	1	0	2	1	2	1	4	2	5	2	7	3	8	4	7	4	11
	.30	0	0	0	2	0	4	1	5	1	8	2	9	2	13	3	14	4	14	4	20
	.40	0	1	0	4	0	7	1	8	1	12	2	14	2	19	3	22	4	21	4	29
	.50	0	2	0	5	0	9	1	11	1	17	2	20	2	26	3	29	4	30	4	38
	.60	0	3	0	7	0	12	1	15	1	22	2	26	2	33	3	37	4	39	4	48
	.70	0	4	0	10	0	16	1	20	1	28	2	32	2	40	3	46	4	48	4	59
	.80	0	5	0	12	0	19	1	24	1	33	2	39	2	48	3	55	4	59	4	70
	.90	0	7	0	15	0	23	1	30	1	40	2	47	2	57	3	65	4	70	4	82
.20	.30	0	0	1	2	2	4	3	6	4	8	6	10	7	13	9	14	10	18	12	19
	.40	0	1	1	3	2	6	3	9	4	12	6	15	7	19	9	21	10	25	12	28
	.50	0	2	1	5	2	8	3	13	4	17	6	20	7	25	9	29	10	34	12	37
	.60	0	3	1	7	2	11	3	17	4	22	6	26	7	32	9	37	10	43	12	47
	.70	0	4	1	9	2	15	3	21	4	27	6	33	7	40	9	45	10	53	12	58
	.80	0	5	1	11	2	18	3	26	4	33	6	40	7	48	9	54	10	63	12	69
	.90	0	7	1	14	2	22	3	31	4	40	6	47	7	57	9	64	10	74	12	82
.30	.40	0	1	2	3	4	6	6	9	8	13	11	15	13	19	16	21	18	25	21	27
	.50	0	2	2	5	4	9	6	13	8	17	11	20	13	25	16	28	18	34	21	36
	.60	0	3	2	7	4	12	6	17	8	22	11	26	13	32	16	35	18	42	21	45
	.70	0	4	2	9	4	15	6	21	8	27	11	32	13	39	16	44	18	52	21	56
	.80	0	5	2	12	4	18	6	26	8	33	11	39	13	47	16	53	18	62	21	67
	.90	0	7	2	14	4	23	6	31	8	40	11	47	13	56	16	63	18	73	21	80
.40	.50	1	2	4	4	7	7	10	12	13	17	16	21	20	22	23	29	26	34	30	38
	.60	1	3	4	6	7	9	10	16	13	21	16	27	20	27	23	37	26	43	30	47
	.70	1	4	4	8	7	12	10	20	13	26	16	33	20	34	23	45	26	52	30	57
	.80	1	5	4	10	7	16	10	24	13	32	16	40	20	42	23	54	26	62	30	69
	.90	1	6	4	13	7	20	10	30	13	39	16	48	20	51	23	64	26	73	30	81
.50	.60	2	2	5	7	9	12	13	17	18	21	22	27	26	32	31	36	35	43	39	49
	.70	2	3	5	9	9	15	13	21	18	25	22	33	26	40	31	44	35	52	39	59
	.80	2	5	5	12	9	19	13	26	18	31	22	39	26	47	31	53	35	62	39	70
	.90	2	6	5	15	9	23	13	31	18	38	22	47	26	56	31	63	35	73	39	82
.60	.70	3	3	7	9	12	15	17	21	23	26	28	33	33	40	39	45	44	52	50	57
	.80	3	5	7	12	12	19	17	26	23	31	28	40	33	48	39	53	44	62	50	67
	.90	3	6	7	15	12	23	17	31	23	38	28	47	33	56	39	63	44	73	50	80
.70	.80	4	5	10	10	16	17	22	25	28	33	34	41	41	47	47	55	54	61	60	70
	.90	4	6	10	13	16	21	22	30	28	39	34	48	41	55	47	65	54	72	60	82
.80	.90	5	7	12	14	19	23	26	31	34	39	41	48	49	55	56	65	64	73	71	82

P* = .95

NUMBER OF OBSERVATIONS(n)

STANDARD PROPORTIONS 1	2	10 M1	10 M2	20 M1	20 M2	30 M1	30 M2	40 M1	40 M2	50 M1	50 M2	60 M1	60 M2	70 M1	70 M2	80 M1	80 M2	90 M1	90 M2	100 M1	100 M2
.10	.20	0	0	0	0	0	1	0	3	1	3	1	5	2	6	2	8	3	9	4	9
	.30	0	0	0	2	0	3	0	5	1	7	1	10	2	11	2	14	3	16	4	16
	.40	0	1	0	3	0	6	0	9	1	11	1	15	2	17	2	21	3	24	4	25
	.50	0	1	0	5	0	9	0	13	1	16	1	21	2	24	2	29	3	32	4	34
	.60	0	2	0	7	0	12	0	17	1	21	1	27	2	31	2	37	3	42	4	44
	.70	0	3	0	9	0	15	0	21	1	26	1	33	2	38	2	46	3	51	4	55
	.80	0	5	0	11	0	18	0	26	1	32	1	40	2	46	2	55	3	61	4	66
	.90	0	6	0	14	0	25	0	31	1	39	1	48	2	55	2	65	3	73	4	79
.20	.30	0	0	0	2	1	3	3	4	4	7	5	9	7	10	8	14	9	17	11	18
	.40	0	1	0	3	1	6	3	7	4	11	5	15	7	16	8	21	9	24	11	27
	.50	0	1	0	5	1	8	3	10	4	15	5	20	7	22	8	28	9	33	11	36
	.60	0	2	0	7	1	11	3	14	4	20	5	26	7	29	8	36	9	42	11	46
	.70	0	3	0	9	1	15	3	18	4	26	5	32	7	36	8	45	9	52	11	57
	.80	0	5	0	11	1	18	3	23	4	32	5	39	7	44	8	54	9	62	11	68
	.90	0	6	0	14	1	22	3	29	4	38	5	47	7	54	8	64	9	73	11	81
.30	.40	0	1	2	2	3	6	5	9	8	11	10	14	12	18	15	19	17	24	19	28
	.50	0	1	2	4	3	8	5	12	8	15	10	20	12	24	15	26	17	32	19	37
	.60	0	2	2	5	3	11	5	16	8	20	10	25	12	31	15	34	17	41	19	47
	.70	0	3	2	7	3	15	5	20	8	25	10	32	12	39	15	42	17	51	19	58
	.80	0	5	2	10	3	18	5	25	8	31	10	39	12	47	15	52	17	61	19	69
	.90	0	6	2	13	3	22	5	31	8	38	10	47	12	56	15	62	17	72	19	81
.40	.50	1	1	3	5	6	8	9	12	12	16	15	20	18	25	22	28	25	33	29	34
	.60	1	2	3	6	6	11	9	15	12	21	15	26	18	31	22	35	25	41	29	42
	.70	1	3	3	9	6	14	9	20	12	26	15	32	16	39	22	44	25	51	29	52
	.80	1	4	3	11	6	18	9	24	12	32	15	39	18	47	22	53	25	61	29	64
	.90	1	6	3	14	6	22	9	30	12	38	15	47	18	56	22	63	25	72	29	77
.50	.60	1	2	5	6	9	10	13	14	17	20	21	26	25	31	29	37	34	41	38	47
	.70	1	3	5	8	9	13	13	18	17	25	21	32	25	38	29	45	34	50	38	57
	.80	1	5	5	11	9	16	13	23	17	31	21	39	25	46	29	54	34	60	38	68
	.90	1	6	5	14	9	21	13	28	17	37	21	46	25	55	29	64	34	71	38	81
.60	.70	2	3	7	8	12	13	17	19	22	25	27	32	32	39	37	45	43	51	48	58
	.80	2	5	7	11	12	16	17	23	22	31	27	39	32	46	37	54	43	60	48	69
	.90	2	6	7	13	12	20	17	28	22	38	27	47	32	55	37	64	43	72	48	81
.70	.80	3	5	9	11	15	18	21	25	27	32	33	40	40	45	46	54	52	62	59	68
	.90	3	6	9	14	15	22	21	30	27	39	33	47	40	54	46	64	52	73	59	80
.80	.90	5	6	11	14	18	22	26	29	33	39	40	47	48	54	55	64	63	70	70	81

Table 11

VALUES OF M1,M2 FOR SELECTING, WITH P(CS) >= P*, A SUBSET OF k = 7 TRINOMIAL POPULATIONS WHICH CONTAINS ALL POPULATIONS BETTER THAN A DUAL STANDARD (POPULATIONS WITH AT LEAST M1 OBSERVATIONS IN INTERVAL 1, AND AT LEAST M2 OBSERVATIONS IN THE UNION OF INTERVALS 1 AND 3, ARE SELECTED)

P* = .90

NUMBER OF OBSERVATIONS(n)

STANDARD PROPORTIONS 1	2	10 M1	10 M2	20 M1	20 M2	30 M1	30 M2	40 M1	40 M2	50 M1	50 M2	60 M1	60 M2	70 M1	70 M2	80 M1	80 M2	90 M1	90 M2	100 M1	100 M2
.10	.20	0	0	0	1	0	2	1	1	1	4	2	4	2	7	3	8	3	10	4	11
	.30	0	0	0	2	0	4	1	3	1	8	2	8	2	12	3	14	3	17	4	19
	.40	0	1	0	3	0	6	1	6	1	12	2	13	2	19	3	21	3	25	4	28
	.50	0	2	0	5	0	9	1	9	1	17	2	18	2	25	3	28	3	34	4	38
	.60	0	3	0	7	0	12	1	13	1	22	2	24	2	32	3	36	3	43	4	48
	.70	0	4	0	9	0	15	1	17	1	27	2	31	2	40	3	45	3	53	4	59
	.80	0	5	0	12	0	19	1	22	1	33	2	38	2	48	3	54	3	63	4	70
	.90	0	7	0	15	0	23	1	28	1	40	2	46	2	57	3	64	3	74	4	82
.20	.30	0	0	1	1	2	3	3	6	4	8	6	9	7	12	9	14	10	17	12	19
	.40	0	1	1	3	2	6	3	9	4	12	6	14	7	18	9	20	10	25	12	27
	.50	0	2	1	4	2	8	3	12	4	17	6	20	7	25	9	27	10	33	12	36
	.60	0	3	1	6	2	11	3	16	4	22	6	26	7	32	9	35	10	42	12	46
	.70	0	4	1	8	2	14	3	21	4	27	6	32	7	39	9	44	10	52	12	57
	.80	0	5	1	11	2	18	3	25	4	33	6	39	7	47	9	53	10	62	12	68
	.90	0	7	1	14	2	22	3	31	4	40	6	47	7	56	9	63	10	73	12	81
.30	.40	0	1	2	3	4	6	6	9	8	12	11	14	13	18	15	22	18	25	20	29
	.50	0	2	2	5	4	8	6	12	8	17	11	19	13	25	15	29	18	33	20	38
	.60	0	3	2	7	4	11	6	16	8	22	11	25	13	31	15	37	18	41	20	48
	.70	0	4	2	9	4	14	6	21	8	27	11	31	13	39	15	46	18	51	20	58
	.80	0	5	2	11	4	18	6	25	8	33	11	38	13	47	15	55	18	61	20	70
	.90	0	7	2	14	4	22	6	31	8	39	11	46	13	56	15	65	18	72	20	82
.40	.50	1	2	3	5	6	9	9	13	13	16	16	21	19	25	23	28	26	34	30	35
	.60	1	2	3	7	6	12	9	17	13	20	16	26	19	32	23	35	26	42	30	44
	.70	1	3	3	9	6	15	9	21	13	25	16	33	19	39	23	44	26	52	30	54
	.80	1	5	3	12	6	19	9	26	13	31	16	39	19	47	23	53	26	62	30	65
	.90	1	6	3	15	6	23	9	31	13	38	16	47	19	56	23	63	26	73	30	78
.50	.60	2	2	5	7	9	12	13	17	17	22	22	26	26	32	30	38	35	42	39	48
	.70	2	3	5	9	9	15	13	21	17	27	22	32	26	39	30	46	35	51	39	58
	.80	2	4	5	11	9	18	13	25	17	33	22	38	26	47	30	55	35	61	39	69
	.90	2	6	5	14	9	22	13	31	17	39	22	46	26	56	30	65	35	72	39	82
.60	.70	3	3	7	9	12	15	17	21	22	27	28	32	33	39	38	46	44	52	49	59
	.80	3	4	7	12	12	18	17	26	22	33	28	39	33	47	38	55	44	61	49	70
	.90	3	6	7	14	12	22	17	31	22	39	28	46	33	56	38	65	44	72	49	82
.70	.80	4	5	9	12	15	19	22	24	28	32	34	40	40	48	47	55	53	63	60	69
	.90	4	6	9	14	15	23	22	28	28	39	34	48	40	56	47	64	53	73	60	81
.80	.90	5	6	12	14	19	22	26	31	34	38	41	48	48	57	56	65	63	74	71	82

P* = .95

NUMBER OF OBSERVATIONS(n)

STANDARD PROPORTIONS 1	2	10 M1	10 M2	20 M1	20 M2	30 M1	30 M2	40 M1	40 M2	50 M1	50 M2	60 M1	60 M2	70 M1	70 M2	80 M1	80 M2	90 M1	90 M2	100 M1	100 M2
.10	.20	0	0	0	0	0	1	0	2	1	3	1	5	2	5	2	8	3	8	3	11
	.30	0	0	0	1	0	3	0	5	1	6	1	9	2	11	2	14	3	16	3	19
	.40	0	1	0	3	0	6	0	9	1	11	1	15	2	17	2	21	3	23	3	28
	.50	0	1	0	5	0	8	0	12	1	15	1	20	2	23	2	29	3	32	3	37
	.60	0	2	0	7	0	11	0	16	1	20	1	26	2	30	2	37	3	41	3	47
	.70	0	3	0	9	0	15	0	21	1	25	1	33	2	37	2	43	3	51	3	58
	.80	0	5	0	11	0	18	0	25	1	31	1	40	2	46	2	54	3	61	3	69
	.90	0	6	0	14	0	22	0	31	1	38	1	47	2	55	2	64	3	72	3	82
.20	.30	0	0	0	1	1	3	2	5	4	7	5	9	6	12	8	13	9	16	11	18
	.40	0	1	0	3	1	6	2	9	4	10	5	14	6	18	8	20	9	24	11	26
	.50	0	1	0	5	1	8	2	12	4	15	5	20	6	24	8	27	9	33	11	36
	.60	0	2	0	7	1	11	2	16	4	20	5	26	6	31	8	35	9	42	11	46
	.70	0	3	0	9	1	14	2	20	4	25	5	32	6	39	8	44	9	51	11	56
	.80	0	5	0	11	1	18	2	25	4	31	5	39	6	47	8	53	9	61	11	68
	.90	0	6	0	14	1	22	2	31	4	38	5	47	6	56	8	63	9	73	11	80
.30	.40	0	1	1	3	3	6	5	8	8	9	10	14	12	17	14	21	17	23	19	27
	.50	0	1	1	5	3	8	5	12	8	12	10	19	12	24	14	28	17	31	19	37
	.60	0	2	1	7	3	11	5	16	8	16	10	25	12	31	14	36	17	40	19	46
	.70	0	3	1	9	3	14	5	20	8	21	10	31	12	38	14	45	17	50	19	57
	.80	0	5	1	11	3	18	5	25	8	27	10	38	12	46	14	54	17	60	19	68
	.90	0	6	1	14	3	22	5	30	8	35	10	46	12	55	14	64	17	72	19	81
.40	.50	1	1	3	4	6	8	9	11	12	15	15	20	18	24	22	26	25	32	28	37
	.60	1	2	3	6	6	10	9	15	12	20	15	25	18	31	22	33	25	41	28	47
	.70	1	2	3	8	6	13	9	19	12	25	15	32	18	38	22	41	25	50	28	57
	.80	1	4	3	11	6	17	9	24	12	31	15	39	18	46	22	50	25	60	28	68
	.90	1	5	3	14	6	21	9	29	12	33	15	47	18	55	22	61	25	72	28	81
.50	.60	1	2	5	6	8	11	12	16	16	21	21	25	25	31	29	36	33	42	38	46
	.70	1	3	5	8	8	14	12	20	16	26	21	31	25	38	29	44	33	51	38	56
	.80	1	5	5	10	8	18	12	25	16	32	21	37	25	46	29	54	33	61	38	67
	.90	1	6	5	13	8	22	12	30	16	39	21	45	25	55	29	64	33	73	38	80
.60	.70	2	3	7	8	11	14	16	20	21	26	27	31	32	38	37	45	43	49	48	57
	.80	2	4	7	10	11	18	16	25	21	32	27	38	32	46	37	54	43	58	48	68
	.90	2	6	7	13	11	22	16	30	21	39	27	46	32	55	37	64	43	69	48	80
.70	.80	3	5	9	11	15	17	21	24	27	32	33	39	39	47	46	53	52	61	59	66
	.90	3	6	9	14	15	21	21	29	27	38	33	47	39	56	46	63	52	72	59	78
.80	.90	5	6	11	14	18	22	25	31	33	38	40	47	47	56	55	64	62	73	70	80

Table 12

VALUES OF M1,M2 FOR SELECTING, WITH P(CS) >= P*, A SUBSET OF k = 8 TRINOMIAL POPULATIONS WHICH CONTAINS ALL POPULATIONS BETTER THAN A DUAL STANDARD (POPULATIONS WITH AT LEAST M1 OBSERVATIONS IN INTERVAL 1, AND AT LEAST M2 OBSERVATIONS IN THE UNION OF INTERVALS 1 AND 3, ARE SELECTED)

P* = .90

NUMBER OF OBSERVATIONS(n)

STANDARD PROPORTIONS 1	2	10 M1	10 M2	20 M1	20 M2	30 M1	30 M2	40 M1	40 M2	50 M1	50 M2	60 M1	60 M2	70 M1	70 M2	80 M1	80 M2	90 M1	90 M2	100 M1	100 M2
.10	.20	0	0	0	1	0	2	0	3	1	4	1	5	2	7	3	7	3	10	4	11
	.30	0	0	0	2	0	4	0	6	1	8	1	10	2	12	3	13	3	17	4	19
	.40	0	1	0	3	0	6	0	9	1	12	1	16	2	18	3	20	3	25	4	28
	.50	0	2	0	5	0	9	0	13	1	17	1	21	2	25	3	28	3	34	4	37
	.60	0	3	0	7	0	12	0	17	1	22	1	27	2	32	3	36	3	43	4	47
	.70	0	4	0	9	0	15	0	21	1	27	1	34	2	39	3	44	3	52	4	58
	.80	0	5	0	12	0	19	0	26	1	33	1	41	2	47	3	53	3	63	4	69
	.90	0	7	0	15	0	23	0	31	1	39	1	48	2	56	3	64	3	74	4	82
.20	.30	0	0	1	1	2	3	3	5	4	8	6	9	7	12	8	15	10	17	12	17
	.40	0	1	1	2	2	5	3	9	4	12	6	13	7	18	8	22	10	24	12	25
	.50	0	2	1	4	2	8	3	12	4	17	6	18	7	25	8	29	10	33	12	34
	.60	0	3	1	6	2	11	3	16	4	22	6	24	7	31	8	37	10	42	12	44
	.70	0	4	1	8	2	14	3	20	4	27	6	31	7	39	8	46	10	51	12	55
	.80	0	5	1	10	2	17	3	25	4	33	6	38	7	47	8	55	10	62	12	66
	.90	0	7	1	13	2	22	3	31	4	39	6	46	7	56	8	65	10	73	12	79
.30	.40	0	1	2	3	4	6	6	9	8	12	10	15	13	18	15	22	18	24	20	28
	.50	0	2	2	5	4	8	6	12	8	16	10	21	13	24	15	29	18	31	20	37
	.60	0	3	2	6	4	11	6	16	8	21	10	27	13	31	15	37	18	40	20	47
	.70	0	4	2	9	4	14	6	20	8	27	10	33	13	38	15	45	18	50	20	58
	.80	0	5	2	11	4	18	6	25	8	32	10	40	13	46	15	54	18	60	20	69
	.90	0	7	2	14	4	22	6	30	8	39	10	48	13	55	15	65	18	71	20	81
.40	.50	1	1	3	5	6	9	9	13	12	17	16	20	19	25	22	29	26	33	29	38
	.60	1	2	3	7	6	12	9	17	12	22	16	26	19	32	22	37	26	41	29	48
	.70	1	3	3	9	6	15	9	21	12	27	16	32	19	39	22	46	26	51	29	58
	.80	1	5	3	11	6	18	9	25	12	33	16	39	19	47	22	55	26	61	29	69
	.90	1	6	3	14	6	22	9	31	12	39	16	47	19	56	22	65	26	72	29	82
.50	.60	2	2	5	7	9	11	13	16	17	22	21	27	26	31	30	37	34	43	39	47
	.70	2	3	5	9	9	15	13	21	17	27	21	33	26	38	30	45	34	52	39	57
	.80	2	4	5	11	9	18	13	25	17	32	21	40	26	46	30	54	34	62	39	69
	.90	2	6	5	14	9	22	13	31	17	39	21	48	26	55	30	64	34	73	39	81
.60	.70	3	3	7	9	12	15	17	21	22	27	27	33	33	39	38	46	44	50	49	58
	.80	3	4	7	11	12	18	17	25	22	33	27	40	33	46	38	54	44	59	49	69
	.90	3	5	7	14	12	22	17	31	22	39	27	48	33	55	38	64	44	71	49	81
.70	.80	4	4	9	12	15	18	21	26	28	31	34	40	40	47	47	54	53	62	60	68
	.90	4	6	9	14	15	22	21	31	28	38	34	47	40	56	47	63	53	73	60	80
.80	.90	5	6	12	14	19	22	26	31	33	39	41	47	48	56	56	64	63	73	71	81

P* = .95

NUMBER OF OBSERVATIONS(n)

STANDARD PROPORTIONS 1	2	10 M1	10 M2	20 M1	20 M2	30 M1	30 M2	40 M1	40 M2	50 M1	50 M2	60 M1	60 M2	70 M1	70 M2	80 M1	80 M2	90 M1	90 M2	100 M1	100 M2
.10	.20	0	0	0	0	0	1	0	2	1	3	1	5	2	5	2	7	3	8	3	10
	.30	0	0	0	1	0	3	0	5	1	6	1	9	2	10	2	14	3	15	3	19
	.40	0	1	0	3	0	6	0	9	1	10	1	14	2	16	2	21	3	23	3	27
	.50	0	1	0	5	0	8	0	12	1	14	1	20	2	22	2	28	3	31	3	37
	.60	0	2	0	6	0	11	0	16	1	19	1	26	2	29	2	36	3	40	3	47
	.70	0	3	0	9	0	15	0	21	1	25	1	32	2	37	2	45	3	50	3	58
	.80	0	5	0	11	0	18	0	25	1	31	1	39	2	45	2	54	3	60	3	69
	.90	0	6	0	14	0	22	0	31	1	38	1	47	2	54	2	64	3	72	3	81
.20	.30	0	0	0	1	1	3	2	5	4	6	5	9	6	11	8	13	9	16	11	17
	.40	0	1	0	3	1	5	2	8	4	10	5	14	6	17	8	19	9	24	11	25
	.50	0	1	0	5	1	8	2	12	4	14	5	19	6	24	8	27	9	32	11	34
	.60	0	2	0	6	1	11	2	16	4	19	5	25	6	31	8	35	9	41	11	44
	.70	0	3	0	9	1	14	2	20	4	24	5	32	6	38	8	43	9	51	11	55
	.80	0	5	0	11	1	18	2	25	4	30	5	39	6	47	8	52	9	61	11	66
	.90	0	6	0	14	1	22	2	30	4	37	5	47	6	56	8	63	9	72	11	79
.30	.40	0	1	1	3	3	5	5	8	7	11	10	13	12	17	14	21	17	22	19	27
	.50	0	1	1	4	3	8	5	12	7	16	10	18	12	23	14	28	17	30	19	36
	.60	0	2	1	6	3	11	5	16	7	21	10	24	12	30	14	36	17	39	19	46
	.70	0	3	1	9	3	14	5	20	7	26	10	30	12	38	14	44	17	48	19	56
	.80	0	5	1	11	3	18	5	25	7	32	10	37	12	46	14	54	17	58	19	68
	.90	0	6	1	14	3	22	5	30	7	39	10	45	12	55	14	64	17	79	19	80
.40	.50	1	1	3	4	6	7	9	11	12	15	15	19	18	24	21	28	25	31	28	36
	.60	1	1	3	6	6	10	9	14	12	19	15	25	18	30	21	36	25	39	28	46
	.70	1	2	3	8	6	13	9	18	12	24	15	31	18	38	21	44	25	49	28	56
	.80	1	3	3	11	6	16	9	23	12	30	15	38	18	46	21	54	25	59	28	68
	.90	1	5	3	14	6	21	9	28	12	37	15	46	18	55	21	64	25	71	28	80
.50	.60	1	2	5	5	8	11	12	16	16	21	20	26	25	30	29	36	33	41	38	45
	.70	1	3	5	7	8	14	12	20	16	26	20	32	25	37	29	44	33	51	38	55
	.80	1	4	5	10	8	18	12	25	16	32	20	39	25	45	29	53	33	61	38	66
	.90	1	6	5	13	8	22	12	30	16	39	20	47	25	54	29	63	33	72	38	79
.60	.70	2	3	6	9	11	14	16	20	21	26	26	32	32	37	37	44	42	51	48	56
	.80	2	4	6	11	11	18	16	25	21	32	26	39	32	45	37	53	42	61	48	67
	.90	2	6	6	14	11	22	16	30	21	39	26	47	32	54	37	63	42	72	48	79
.70	.80	3	4	9	10	15	15	21	23	27	31	33	39	39	46	46	51	52	61	58	69
	.90	3	6	9	13	15	19	21	28	27	38	33	46	39	55	46	60	52	72	58	81
.80	.90	5	5	11	14	18	22	25	30	33	37	40	47	47	55	55	63	52	72	70	79

Table 13

VALUES OF M1,M2 FOR SELECTING, WITH P(CS) >= P*, A SUBSET OF k = 9 TRINOMIAL POPULATIONS WHICH CONTAINS ALL POPULATIONS BETTER THAN A DUAL STANDARD (POPULATIONS WITH AT LEAST M1 OBSERVATIONS IN INTERVAL 1, AND AT LEAST M2 OBSERVATIONS IN THE UNION OF INTERVALS 1 AND 3, ARE SELECTED)

P* = .90

NUMBER OF OBSERVATIONS(n)

STANDARD PROPORTIONS 1	2	10 M1	10 M2	20 M1	20 M2	30 M1	30 M2	40 M1	40 M2	50 M1	50 M2	60 M1	60 M2	70 M1	70 M2	80 M1	80 M2	90 M1	90 M2	100 M1	100 M2
.10	.20	0	0	0	1	0	2	0	3	1	4	1	5	2	6	3	6	3	9	4	10
	.30	0	0	0	2	0	4	0	6	1	7	1	10	2	12	3	12	3	17	4	18
	.40	0	1	0	3	0	6	0	9	1	12	1	15	2	18	3	19	3	25	4	27
	.50	0	2	0	5	0	9	0	13	1	16	1	21	2	25	3	26	3	33	4	37
	.60	0	2	0	7	0	12	0	17	1	21	1	27	2	32	3	34	3	43	4	47
	.70	0	4	0	9	0	15	0	21	1	27	1	33	2	39	3	43	3	52	4	57
	.80	0	5	0	12	0	19	0	26	1	33	1	40	2	47	3	52	3	62	4	69
	.90	0	6	0	15	0	23	0	31	1	39	1	48	2	56	3	63	3	73	4	81
.20	.30	0	0	1	1	2	3	3	5	4	8	5	10	7	12	8	15	10	16	11	19
	.40	0	1	1	1	2	5	3	8	4	12	5	15	7	18	8	22	10	24	11	28
	.50	0	2	1	2	2	7	3	12	4	16	5	21	7	24	8	29	10	32	11	38
	.60	0	2	1	4	2	10	3	16	4	21	5	27	7	31	8	37	10	41	11	48
	.70	0	4	1	6	2	13	3	20	4	27	5	33	7	38	8	46	10	51	11	58
	.80	0	5	1	9	2	17	3	25	4	32	5	40	7	47	8	55	10	61	11	70
	.90	0	6	1	12	2	21	3	30	4	39	5	48	7	56	8	65	10	72	11	82
.30	.40	0	1	2	3	4	5	6	8	8	12	10	15	13	17	15	21	17	25	20	28
	.50	0	2	2	4	4	8	6	12	8	16	10	21	13	23	15	29	17	33	20	37
	.60	0	2	2	6	4	11	6	16	8	21	10	26	13	30	15	36	17	42	20	47
	.70	0	4	2	8	4	14	6	20	8	26	10	33	13	37	15	45	17	52	20	57
	.80	0	5	2	11	4	17	6	25	8	32	10	40	13	45	15	54	17	62	20	68
	.90	0	6	2	14	4	22	6	30	8	39	10	48	13	54	15	64	17	73	20	81
.40	.50	1	1	3	5	6	9	9	12	12	17	16	19	19	24	22	29	26	32	29	37
	.60	1	2	3	7	6	11	9	16	12	21	16	24	19	31	22	37	26	40	29	47
	.70	1	3	3	9	6	15	9	21	12	27	16	31	19	38	22	45	26	49	29	57
	.80	1	4	3	11	6	18	9	25	12	33	16	38	19	46	22	54	26	60	29	69
	.90	1	6	3	14	6	22	9	31	12	39	16	46	19	55	22	64	26	71	29	81
.50	.60	2	2	5	7	9	11	13	16	17	21	21	27	26	30	30	37	34	42	39	46
	.70	2	3	5	9	9	14	13	20	17	26	21	33	26	37	30	45	34	52	39	56
	.80	2	4	5	11	9	18	13	25	17	32	21	40	26	44	30	54	34	62	39	67
	.90	2	5	5	14	9	22	13	30	17	39	21	47	26	54	30	64	34	73	39	80
.60	.70	2	4	7	9	12	14	17	20	22	27	27	33	33	38	38	45	43	52	49	57
	.80	2	5	7	11	12	18	17	25	22	32	27	40	33	45	38	54	43	62	49	68
	.90	2	6	7	14	12	22	17	30	22	39	27	47	33	54	38	64	43	73	49	89
.70	.80	4	4	9	11	15	18	21	25	27	33	34	39	40	47	46	55	53	62	59	70
	.90	4	5	9	14	15	22	21	31	27	39	34	47	40	55	46	65	53	72	59	82
.80	.90	5	6	12	14	19	22	26	31	33	39	41	46	48	56	56	62	63	73	71	80

P* = .95

NUMBER OF OBSERVATIONS(n)

STANDARD PROPORTIONS 1	2	10 M1	10 M2	20 M1	20 M2	30 M1	30 M2	40 M1	40 M2	50 M1	50 M2	60 M1	60 M2	70 M1	70 M2	80 M1	80 M2	90 M1	90 M2	100 M1	100 M2
.10	.20	0	0	0	0	0	1	0	2	1	2	1	5	2	4	2	7	3	8	3	10
	.30	0	0	0	1	0	3	0	5	1	5	1	9	2	8	2	14	3	14	3	18
	.40	0	0	0	3	0	6	0	8	1	9	1	14	2	14	2	21	3	22	3	27
	.50	0	1	0	4	0	8	0	12	1	14	1	20	2	20	2	28	3	31	3	37
	.60	0	2	0	6	0	11	0	16	1	19	1	26	2	27	2	36	3	40	3	47
	.70	0	3	0	9	0	14	0	20	1	24	1	32	2	35	2	45	3	49	3	57
	.80	0	4	0	11	0	18	0	25	1	30	1	39	2	43	2	54	3	60	3	69
	.90	0	6	0	14	0	22	0	31	1	37	1	47	2	53	2	64	3	71	3	81
.20	.30	0	0	0	1	1	3	2	5	4	4	5	9	6	11	8	12	9	16	10	18
	.40	0	0	0	3	1	5	2	8	4	7	5	14	6	17	8	18	9	23	10	27
	.50	0	1	0	4	1	8	2	12	4	11	5	19	6	24	8	25	9	32	10	37
	.60	0	2	0	6	1	11	2	16	4	16	5	25	6	31	8	33	9	41	10	47
	.70	0	3	0	9	1	14	2	20	4	21	5	31	6	38	8	42	9	50	10	57
	.80	0	4	0	11	1	18	2	25	4	27	5	38	6	46	8	51	9	61	10	69
	.90	0	6	0	14	1	22	2	30	4	35	5	46	6	55	8	62	9	72	10	81
.30	.40	0	0	1	3	3	5	5	8	7	11	9	14	12	17	14	20	16	24	19	26
	.50	0	1	1	4	3	8	5	12	7	16	9	20	12	23	14	28	16	32	19	35
	.60	0	2	1	6	3	11	5	16	7	21	9	26	12	29	14	35	16	41	19	45
	.70	0	3	1	8	3	14	5	20	7	26	9	32	12	37	14	44	16	51	19	56
	.80	0	4	1	11	3	18	5	25	7	32	9	39	12	45	14	53	16	61	19	67
	.90	0	6	1	14	3	22	5	30	7	39	9	47	12	54	14	63	16	72	19	80
.40	.50	0	1	3	4	6	6	8	12	11	16	15	19	18	23	21	28	24	32	28	36
	.60	0	2	3	6	6	8	8	15	11	21	15	24	18	30	21	36	24	41	28	45
	.70	0	3	3	8	6	11	8	20	11	26	15	30	18	37	21	44	24	51	28	56
	.80	0	4	3	10	6	14	8	25	11	32	15	37	18	45	21	53	24	61	28	67
	.90	0	6	3	13	6	19	8	30	11	39	15	46	18	55	21	64	24	72	28	80
.50	.60	1	2	4	6	8	11	12	16	16	21	20	26	24	31	29	35	33	41	37	47
	.70	1	3	4	8	8	14	12	20	16	26	20	32	24	38	29	43	33	50	37	57
	.80	1	4	4	11	8	18	12	24	16	32	20	39	24	46	29	52	33	60	37	68
	.90	1	6	4	14	8	22	12	30	16	38	20	47	24	55	29	63	33	72	37	81
.60	.70	2	3	6	8	11	14	16	20	21	26	26	32	32	35	37	44	42	51	47	57
	.80	2	4	6	11	11	18	16	24	21	32	26	39	32	42	37	53	42	61	47	68
	.90	2	6	6	14	11	22	16	30	21	38	26	47	32	52	37	63	42	72	47	81
.70	.80	3	4	9	10	14	18	20	25	27	33	33	38	39	46	45	54	52	60	58	68
	.90	3	6	9	13	14	22	20	30	27	36	33	46	39	55	45	64	52	71	58	80
.80	.90	4	6	11	14	18	22	25	30	32	39	40	46	47	55	54	64	62	72	69	81

Table 14

VALUES OF M1,M2 FOR SELECTING, WITH P(CS) >= P*, A SUBSET OF k = 10 TRINOMIAL POPULATIONS WHICH CONTAINS ALL POPULATIONS BETTER THAN A DUAL STANDARD (POPULATIONS WITH AT LEAST M1 OBSERVATIONS IN INTERVAL 1, AND AT LEAST M2 OBSERVATIONS IN THE UNION OF INTERVALS 1 AND 3, ARE SELECTED)

P* = .90

NUMBER OF OBSERVATIONS(n)

STANDARD PROPORTIONS 1	2	10 M1	10 M2	20 M1	20 M2	30 M1	30 M2	40 M1	40 M2	50 M1	50 M2	60 M1	60 M2	70 M1	70 M2	80 M1	80 M2	90 M1	90 M2	100 M1	100 M2
.10	.20	0	0	0	0	0	1	0	3	1	4	1	5	2	6	2	8	3	9	4	10
	.30	0	0	0	2	0	4	0	6	1	7	1	10	2	12	2	15	3	17	4	18
	.40	0	1	0	3	0	6	0	9	1	11	1	15	2	18	2	22	3	25	4	27
	.50	0	1	0	5	0	9	0	13	1	16	1	21	2	24	2	29	3	33	4	36
	.60	0	2	0	7	0	12	0	17	1	21	1	27	2	31	2	37	3	42	4	46
	.70	0	3	0	9	0	15	0	21	1	26	1	33	2	39	2	46	3	52	4	57
	.80	0	5	0	12	0	19	0	26	1	32	1	40	2	47	2	55	3	62	4	68
	.90	0	6	0	14	0	23	0	31	1	39	1	48	2	56	2	65	3	73	4	81
.20	.30	0	0	0	2	1	4	3	5	4	7	5	10	7	11	8	14	10	16	11	19
	.40	0	1	0	3	1	6	3	8	4	12	5	15	7	17	8	21	10	23	11	28
	.50	0	1	0	5	1	9	3	11	4	16	5	21	7	24	8	29	10	32	11	37
	.60	0	2	0	7	1	12	3	15	4	21	5	27	7	31	8	37	10	41	11	47
	.70	0	3	0	9	1	15	3	20	4	26	5	33	7	38	8	45	10	50	11	58
	.80	0	5	0	12	1	18	3	24	4	32	5	40	7	46	8	54	10	60	11	69
	.90	0	6	0	14	1	23	3	30	4	39	5	48	7	55	8	64	10	72	11	82
.30	.40	0	1	2	3	4	5	6	8	8	11	10	15	12	18	15	21	17	25	20	27
	.50	0	1	2	4	4	7	6	11	8	16	10	20	12	25	15	28	17	33	20	36
	.60	0	2	2	6	4	10	6	15	8	21	10	26	12	32	15	36	17	42	20	46
	.70	0	3	2	8	4	13	6	19	8	26	10	33	12	39	15	44	17	51	20	56
	.80	0	5	2	11	4	17	6	24	8	32	10	40	12	47	15	53	17	62	20	68
	.90	0	6	2	14	4	21	6	30	8	39	10	47	12	56	15	64	17	73	20	80
.40	.50	1	1	3	5	6	8	9	12	12	16	15	21	19	24	22	29	25	33	29	37
	.60	1	2	3	7	6	11	9	16	12	21	15	27	19	30	22	36	25	42	29	46
	.70	1	3	3	9	6	14	9	20	12	26	15	33	19	38	22	45	25	52	29	57
	.80	1	4	3	11	6	18	9	25	12	32	15	40	19	46	22	54	25	62	29	68
	.90	1	6	3	14	6	22	9	30	12	39	15	47	19	55	22	64	25	73	29	81
.50	.60	1	2	5	7	9	11	13	16	17	21	21	26	25	32	30	36	34	42	38	48
	.70	1	3	5	9	9	14	13	20	17	26	21	33	25	39	30	44	34	51	38	58
	.80	1	5	5	11	9	17	13	24	17	32	21	39	25	47	30	53	34	61	38	69
	.90	1	6	5	14	9	22	13	30	17	38	21	47	25	56	30	63	34	73	38	82
.60	.70	2	3	7	9	12	14	17	20	22	26	27	33	32	39	38	45	43	52	49	56
	.80	2	5	7	11	12	17	17	25	22	32	27	40	32	47	38	53	43	62	49	67
	.90	2	6	7	14	12	22	17	30	22	39	27	47	32	56	38	63	43	73	49	79
.70	.80	3	5	9	11	15	18	21	25	27	33	34	38	40	47	46	55	53	61	59	69
	.90	3	6	9	14	15	22	21	30	27	39	34	46	40	55	46	64	53	72	59	81
.80	.90	5	6	12	13	19	21	26	30	33	39	40	48	48	56	55	65	63	73	70	82

P* = .95

NUMBER OF OBSERVATIONS(n)

STANDARD PROPORTIONS 1	2	10 M1	10 M2	20 M1	20 M2	30 M1	30 M2	40 M1	40 M2	50 M1	50 M2	60 M1	60 M2	70 M1	70 M2	80 M1	80 M2	90 M1	90 M2	100 M1	100 M2
.10	.20	0	0	0	0	0	1	0	2	0	3	1	4	1	6	2	7	3	7	3	10
	.30	0	0	0	1	0	3	0	5	0	7	1	9	1	11	2	13	3	14	3	18
	.40	0	0	0	3	0	5	0	8	0	11	1	14	1	18	2	20	3	21	3	27
	.50	0	1	0	4	0	8	0	12	0	16	1	20	1	24	2	28	3	29	3	36
	.60	0	2	0	6	0	11	0	16	0	21	1	26	1	31	2	36	3	38	3	46
	.70	0	3	0	8	0	14	0	20	0	26	1	32	1	39	2	44	3	48	3	57
	.80	0	4	0	11	0	18	0	25	0	32	1	39	1	47	2	54	3	59	3	68
	.90	0	6	0	14	0	22	0	31	0	39	1	47	1	56	2	64	3	70	3	81
.20	.30	0	0	0	1	1	3	2	5	3	7	5	8	6	11	7	14	9	15	10	18
	.40	0	0	0	3	1	5	2	8	3	11	5	13	6	17	7	20	9	23	10	27
	.50	0	1	0	4	1	8	2	12	3	16	5	18	6	23	7	28	9	31	10	36
	.60	0	2	0	6	1	11	2	16	3	21	5	24	6	30	7	36	9	40	10	46
	.70	0	3	0	8	1	14	2	20	3	26	5	31	6	38	7	45	9	50	10	57
	.80	0	4	0	11	1	18	2	25	3	32	5	38	6	46	7	54	9	60	10	68
	.90	0	6	0	14	1	22	2	30	3	39	5	46	6	55	7	64	9	72	10	81
.30	.40	0	0	1	3	3	5	5	8	7	11	9	14	12	16	14	20	16	24	19	26
	.50	0	1	1	4	3	8	5	11	7	15	9	20	12	22	14	27	16	32	19	34
	.60	0	2	1	6	3	11	5	15	7	20	9	26	12	29	14	35	16	41	19	44
	.70	0	3	1	8	3	14	5	20	7	26	9	32	12	36	14	44	16	50	19	55
	.80	0	4	1	11	3	17	5	24	7	32	9	39	12	44	14	53	16	61	19	66
	.90	0	6	1	14	3	22	5	30	7	38	9	47	12	54	14	63	16	72	19	79
.40	.50	0	1	3	4	5	8	8	12	11	16	15	17	18	23	21	28	24	32	28	35
	.60	0	2	3	6	5	11	8	16	11	21	15	22	18	29	21	35	24	41	28	44
	.70	0	3	3	8	5	14	8	20	11	26	15	29	18	37	21	44	24	50	28	55
	.80	0	4	3	10	5	18	8	25	11	32	15	36	18	45	21	53	24	61	28	66
	.90	0	6	3	13	5	22	8	30	11	38	15	44	18	54	21	63	24	72	28	79
.50	.60	1	2	4	6	8	11	12	15	16	20	20	25	24	31	29	34	33	41	37	46
	.70	1	3	4	8	8	14	12	19	16	25	20	32	24	38	29	42	33	50	37	57
	.80	1	4	4	11	8	17	12	24	16	31	20	39	24	46	29	51	33	60	37	68
	.90	1	6	4	14	8	22	12	30	16	38	20	47	24	55	29	62	33	71	37	80
.60	.70	2	3	6	8	11	14	16	20	21	26	26	32	31	38	37	43	42	50	47	57
	.80	2	4	6	11	11	17	16	24	21	31	26	39	31	46	37	52	42	60	47	68
	.90	2	6	6	14	11	22	16	30	21	38	26	47	31	55	37	62	42	72	47	81
.70	.80	3	4	8	11	14	18	20	25	26	32	33	38	39	46	45	53	52	58	58	68
	.90	3	6	8	14	14	22	20	30	26	38	33	45	39	55	45	63	52	69	58	80
.80	.90	4	6	11	14	18	22	25	30	32	38	40	45	47	55	54	64	62	71	69	81

Table 15

VALUES OF M1,M2 FOR SELECTING, WITH P(CS) >= P*, A SUBSET OF k = 11 TRINOMIAL POPULATIONS WHICH CONTAINS ALL POPULATIONS BETTER THAN A DUAL STANDARD (POPULATIONS WITH AT LEAST M1 OBSERVATIONS IN INTERVAL 1, AND AT LEAST M2 OBSERVATIONS IN THE UNION OF INTERVALS 1 AND 3, ARE SELECTED)

P* = .90

NUMBER OF OBSERVATIONS(n)

STANDARD PROPORTIONS 1	2	10 M1	10 M2	20 M1	20 M2	30 M1	30 M2	40 M1	40 M2	50 M1	50 M2	60 M1	60 M2	70 M1	70 M2	80 M1	80 M2	90 M1	90 M2	100 M1	100 M2
.10	.20	0	0	0	0	0	1	0	3	1	3	1	5	2	6	2	8	3	9	4	10
	.30	0	0	0	2	0	4	0	6	1	7	1	10	2	11	2	14	3	16	4	17
	.40	0	1	0	3	0	6	0	9	1	11	1	15	2	18	2	22	3	24	4	26
	.50	0	1	0	5	0	9	0	13	1	16	1	21	2	24	2	29	3	33	4	35
	.60	0	2	0	7	0	12	0	17	1	21	1	27	2	31	2	37	3	42	4	46
	.70	0	3	0	9	0	15	0	21	1	26	1	33	2	39	2	46	3	51	4	56
	.80	0	5	0	11	0	19	0	26	1	32	1	40	2	47	2	55	3	62	4	68
	.90	0	6	0	14	0	23	0	31	1	39	1	48	2	56	2	65	3	73	4	60
.20	.30	0	0	0	2	1	3	3	5	4	7	5	10	7	11	8	14	10	15	11	19
	.40	0	1	0	3	1	6	3	8	4	11	5	15	7	17	8	21	10	22	11	28
	.50	0	1	0	5	1	9	3	11	4	16	5	20	7	23	8	28	10	31	11	37
	.60	0	2	0	7	1	12	3	15	4	21	5	26	7	30	8	36	10	40	11	47
	.70	0	3	0	9	1	15	3	19	4	26	5	33	7	37	8	45	10	49	11	58
	.80	0	5	0	11	1	18	3	24	4	32	5	40	7	46	8	54	10	59	11	69
	.90	0	6	0	14	1	23	3	30	4	39	5	47	7	55	8	64	10	71	11	81
.30	.40	0	1	2	3	4	4	6	8	8	11	10	15	12	18	15	20	17	24	20	26
	.50	0	1	2	4	4	6	6	11	8	15	10	20	12	25	15	27	17	33	20	35
	.60	0	2	2	6	4	9	6	14	8	20	10	26	12	31	15	35	17	42	20	44
	.70	0	3	2	8	4	12	6	19	8	26	10	32	12	39	15	44	17	51	20	55
	.80	0	5	2	10	4	16	6	24	8	31	10	39	12	47	15	53	17	61	20	66
	.90	0	6	2	13	4	20	6	29	6	33	10	47	12	56	15	63	17	73	20	79
.40	.50	1	1	3	5	6	8	9	12	12	16	15	20	19	23	22	28	25	33	29	36
	.60	1	2	3	7	6	11	9	16	12	21	15	26	19	29	22	36	25	42	29	46
	.70	1	3	3	9	6	14	9	20	12	26	15	33	19	37	22	44	25	51	29	56
	.80	1	4	3	11	6	18	9	25	12	32	15	40	19	45	22	53	25	61	29	67
	.90	1	6	3	14	6	22	9	30	12	39	15	47	19	54	22	64	25	73	29	80
.50	.60	1	2	5	6	9	11	13	15	17	21	21	26	25	32	30	35	34	42	38	47
	.70	1	3	5	8	9	14	13	19	17	26	21	32	25	39	30	42	34	51	38	58
	.80	1	5	5	11	9	17	13	24	17	31	21	39	25	47	30	51	34	61	38	69
	.90	1	6	5	14	9	21	13	29	17	38	21	47	25	56	30	62	34	72	38	81
.60	.70	2	3	7	9	12	14	17	20	22	26	27	33	32	39	38	44	43	51	48	58
	.80	2	5	7	11	12	17	17	24	22	32	27	39	32	47	38	52	43	61	48	69
	.90	2	6	7	14	12	21	17	29	22	38	27	47	32	56	38	63	43	72	48	81
.70	.80	3	5	9	11	15	18	21	25	27	32	33	40	40	46	46	54	53	60	59	69
	.90	3	6	9	14	15	22	21	30	27	39	33	47	40	55	46	64	53	70	59	81
.80	.90	5	6	11	14	19	20	26	30	33	39	40	48	48	55	55	64	63	72	70	82

P* = .95

NUMBER OF OBSERVATIONS(n)

STANDARD PROPORTIONS 1	2	10 M1	10 M2	20 M1	20 M2	30 M1	30 M2	40 M1	40 M2	50 M1	50 M2	60 M1	60 M2	70 M1	70 M2	80 M1	80 M2	90 M1	90 M2	100 M1	100 M2
.10	.20	0	0	0	0	0	1	0	2	0	3	1	4	1	6	2	7	3	6	3	10
	.30	0	0	0	1	0	3	0	5	0	7	1	9	1	11	2	13	3	9	3	18
	.40	0	0	0	3	0	5	0	8	0	11	1	14	1	17	2	20	3	9	3	27
	.50	0	1	0	4	0	8	0	12	0	16	1	19	1	24	2	28	3	9	3	36
	.60	0	2	0	6	0	11	0	16	0	21	1	25	1	31	2	36	3	9	3	46
	.70	0	3	0	8	0	14	0	20	0	26	1	32	1	39	2	44	3	9	3	57
	.80	0	4	0	11	0	18	0	25	0	32	1	39	1	47	2	53	3	9	3	68
	.90	0	6	0	14	0	22	0	30	0	39	1	47	1	56	2	64	3	9	3	81
.20	.30	0	0	0	1	1	3	2	5	3	7	5	8	6	11	7	13	9	15	10	18
	.40	0	0	0	3	1	5	2	8	3	11	5	13	6	17	7	20	9	22	10	27
	.50	0	1	0	4	1	8	2	12	3	16	5	18	6	23	7	28	9	31	10	36
	.60	0	2	0	6	1	11	2	15	3	21	5	24	6	30	7	36	9	40	10	46
	.70	0	3	0	8	1	14	2	20	3	26	5	30	6	38	7	44	9	49	10	57
	.80	0	4	0	11	1	18	2	25	3	32	5	37	6	46	7	54	9	60	10	68
	.90	0	6	0	14	1	22	2	30	3	39	5	46	6	55	7	64	9	71	10	81
.30	.40	0	0	1	3	3	5	5	8	7	11	9	14	12	14	14	20	16	23	19	24
	.50	0	1	1	4	3	8	5	11	7	15	9	19	12	19	14	27	16	32	19	33
	.60	0	2	1	6	3	10	5	15	7	20	9	23	12	21	14	35	16	41	19	42
	.70	0	3	1	8	3	14	5	19	7	25	9	32	12	21	14	43	16	50	19	53
	.80	0	4	1	11	3	17	5	24	7	31	9	39	12	21	14	52	16	60	19	64
	.90	0	6	1	14	3	22	5	30	7	38	9	47	12	21	14	63	16	72	19	76
.40	.50	0	1	3	4	5	8	8	12	11	16	14	20	18	22	21	27	24	32	28	33
	.60	0	2	3	5	5	11	8	15	11	20	14	25	18	29	21	35	24	41	28	41
	.70	0	3	3	7	5	14	8	20	11	26	14	32	18	36	21	43	24	50	28	52
	.80	0	4	3	10	5	18	8	24	11	32	14	39	18	44	21	52	24	60	28	63
	.90	0	6	3	13	5	22	8	30	11	38	14	47	18	53	21	63	24	72	28	76
.50	.60	1	2	4	6	8	11	12	15	16	20	20	25	24	31	28	36	33	40	37	46
	.70	1	3	4	8	8	14	12	19	16	25	20	31	24	38	28	44	33	49	37	56
	.80	1	4	4	11	8	17	12	24	16	31	20	38	24	46	28	53	33	59	37	67
	.90	1	6	4	14	8	22	12	30	16	38	20	46	24	55	28	64	33	71	37	80
.60	.70	2	3	6	8	11	14	16	19	21	25	26	32	31	38	36	44	42	50	47	57
	.80	2	4	6	11	11	17	16	24	21	31	26	38	31	46	36	53	42	60	47	68
	.90	2	6	6	14	11	21	16	29	21	38	26	46	31	55	36	64	42	71	47	80
.70	.80	3	4	8	11	14	18	20	25	26	32	32	39	39	45	45	53	51	61	58	67
	.90	3	6	8	14	14	22	20	30	26	38	32	47	39	54	45	63	51	72	58	79
.80	.90	4	6	11	14	18	22	25	30	32	38	39	47	47	55	54	64	62	71	69	81

Table 16

VALUES OF M1,M2 FOR SELECTING, WITH P(CS) >= P*, A SUBSET OF k = 12 TRINOMIAL POPULATIONS WHICH CONTAINS ALL POPULATIONS BETTER THAN A DUAL STANDARD (POPULATIONS WITH AT LEAST M1 OBSERVATIONS IN INTERVAL 1, AND AT LEAST M2 OBSERVATIONS IN THE UNION OF INTERVALS 1 AND 3, ARE SELECTED)

P* = .90

NUMBER OF OBSERVATIONS(n)

STANDARD PROPORTIONS		10		20		30		40		50		60		70		80		90		100	
1	2	M1	M2	M1	M2	M1	M2	M1	M2	M1	M2	M1	M2	M1	M2	M1	M2	M1	M2	M1	M2
.10	.20	0	0	0	0	0	1	0	3	1	3	1	5	2	6	2	8	3	9	4	9
	.30	0	0	0	2	0	3	0	6	1	7	1	10	2	11	2	14	3	16	4	17
	.40	0	1	0	3	0	6	0	9	1	11	1	15	2	17	2	21	3	24	4	25
	.50	0	1	0	5	0	9	0	13	1	16	1	21	2	24	2	29	3	33	4	35
	.60	0	2	0	7	0	12	0	17	1	21	1	27	2	31	2	37	3	42	4	45
	.70	0	3	0	9	0	15	0	21	1	26	1	33	2	38	2	46	3	51	4	55
	.80	0	5	0	11	0	18	0	26	1	32	1	40	2	46	2	55	3	61	4	67
	.90	0	6	0	14	0	23	0	31	1	39	1	48	2	55	2	65	3	73	4	80
.20	.30	0	0	0	2	1	3	3	4	4	7	5	10	7	10	8	14	10	14	11	18
	.40	0	1	0	3	1	6	3	7	4	11	5	15	7	16	8	21	10	20	11	27
	.50	0	1	0	5	1	8	3	10	4	16	5	20	7	22	8	28	10	28	11	37
	.60	0	2	0	7	1	11	3	14	4	20	5	26	7	29	8	36	10	37	11	47
	.70	0	3	0	9	1	15	3	19	4	26	5	33	7	36	8	45	10	46	11	57
	.80	0	5	0	11	1	18	3	23	4	32	5	40	7	45	8	54	10	57	11	69
	.90	0	6	0	14	1	22	3	29	4	38	5	47	7	54	8	64	10	69	11	81
.30	.40	0	1	2	2	3	6	6	7	8	11	10	14	12	18	15	20	17	24	19	28
	.50	0	1	2	4	3	8	6	9	8	15	10	20	12	24	15	27	17	32	19	37
	.60	0	2	2	5	3	11	6	13	8	20	10	26	12	31	15	34	17	41	19	47
	.70	0	3	2	8	3	15	6	17	8	25	10	32	12	39	15	43	17	51	19	58
	.80	0	5	2	10	3	18	6	22	8	31	10	39	12	47	15	52	17	61	19	69
	.90	0	6	2	13	3	22	6	28	8	38	10	47	12	56	15	63	17	72	19	81
.40	.50	1	1	3	5	6	8	9	12	12	16	15	20	18	25	22	28	25	33	29	35
	.60	1	2	3	6	6	11	9	16	12	21	15	26	18	31	22	35	25	42	29	44
	.70	1	3	3	9	6	14	9	20	12	26	15	32	18	39	22	44	25	51	29	54
	.80	1	4	3	11	6	18	9	25	12	32	15	39	18	47	22	53	25	61	29	66
	.90	1	6	3	14	6	22	9	30	12	38	15	47	18	56	22	63	25	72	29	79
.50	.60	1	2	5	6	9	10	13	15	17	20	21	26	25	31	29	37	34	41	38	47
	.70	1	3	5	8	9	13	13	19	17	25	21	32	25	38	29	45	34	50	38	57
	.80	1	5	3	11	9	17	13	23	17	31	21	39	25	46	29	54	34	60	38	69
	.90	1	6	5	14	9	21	13	29	17	38	21	47	23	55	29	64	34	72	38	81
.60	.70	2	3	7	8	12	13	17	19	22	26	27	32	32	39	37	45	43	51	48	58
	.80	2	5	7	11	12	16	17	23	22	31	27	39	32	47	37	54	43	61	48	69
	.90	2	6	7	14	12	21	17	29	22	38	27	47	32	55	37	64	43	72	48	81
.70	.80	3	5	9	11	15	18	21	25	27	32	33	40	40	46	46	54	52	62	59	68
	.90	3	6	9	14	15	22	21	30	27	39	33	47	40	54	46	64	52	73	59	80
.80	.90	5	6	11	14	18	22	26	30	33	39	40	47	48	55	55	64	63	71	70	81

P* = .95

NUMBER OF OBSERVATIONS(n)

STANDARD PROPORTIONS		10		20		30		40		50		60		70		80		90		100	
1	2	M1	M2	M1	M2	M1	M2	M1	M2	M1	M2	M1	M2	M1	M2	M1	M2	M1	M2	M1	M2
.10	.20	0	0	0	0	0	1	0	2	0	3	1	4	1	6	2	7	2	9	3	10
	.30	0	0	0	1	0	3	0	5	0	7	1	9	1	11	2	13	2	16	3	18
	.40	0	0	0	3	0	5	0	8	0	11	1	14	1	17	2	20	2	24	3	26
	.50	0	1	0	4	0	8	0	12	0	16	1	19	1	24	2	27	2	32	3	36
	.60	0	2	0	6	0	11	0	16	0	21	1	25	1	31	2	35	2	41	3	46
	.70	0	3	0	8	0	14	0	20	0	26	1	32	1	38	2	44	2	51	3	57
	.80	0	4	0	11	0	18	0	25	0	32	1	39	1	46	2	53	2	61	3	68
	.90	0	6	0	14	0	22	0	30	0	39	1	47	1	56	2	63	2	73	3	81
.20	.30	0	0	0	1	1	3	2	5	3	7	5	7	6	11	7	13	9	15	10	18
	.40	0	0	0	3	1	5	2	8	3	11	5	12	6	16	7	20	9	22	10	26
	.50	0	1	0	4	1	8	2	11	3	15	5	17	6	23	7	28	9	30	10	36
	.60	0	2	0	6	1	11	2	15	3	20	5	23	6	30	7	36	9	39	10	46
	.70	0	3	0	8	1	14	2	20	3	26	5	29	6	37	7	44	9	49	10	56
	.80	0	4	0	11	1	17	2	24	3	32	5	37	6	45	7	53	9	59	10	68
	.90	0	6	0	14	1	22	2	30	3	38	5	45	6	55	7	64	9	71	10	80
.30	.40	0	0	1	3	3	5	5	8	7	11	9	14	11	17	14	19	16	23	18	27
	.50	0	1	1	4	3	7	5	11	7	15	9	19	11	23	14	26	16	31	18	36
	.60	0	2	1	6	3	10	5	15	7	20	9	25	11	30	14	34	16	40	18	46
	.70	0	3	1	8	3	14	5	19	7	25	9	32	11	38	14	42	16	50	18	57
	.80	0	4	1	11	3	17	5	24	7	31	9	39	11	46	14	52	16	60	18	68
	.90	0	6	1	14	3	22	5	30	7	38	9	47	11	55	14	62	16	72	18	81
.40	.50	0	1	3	4	5	8	8	11	11	15	14	19	17	24	21	27	24	32	27	36
	.60	0	2	3	5	5	11	8	15	11	20	14	25	17	30	21	34	24	40	27	46
	.70	0	3	3	7	5	14	8	19	11	25	14	32	17	38	21	43	24	50	27	56
	.80	0	4	3	10	5	17	8	24	11	31	14	39	17	46	21	52	24	60	27	68
	.90	0	6	3	13	5	22	8	30	11	38	14	47	17	55	21	62	24	72	27	80
.50	.60	1	2	4	6	8	10	12	15	16	20	20	25	24	30	28	36	33	39	37	46
	.70	1	3	4	8	8	13	12	19	16	25	20	31	24	37	28	44	33	48	37	56
	.80	1	4	4	11	8	17	12	24	16	31	20	38	24	46	28	53	33	58	37	67
	.90	1	6	4	14	8	21	12	29	16	38	20	46	24	55	28	63	33	70	37	80
.60	.70	2	3	6	8	11	14	16	19	21	25	26	31	31	38	36	44	42	49	47	56
	.80	2	4	6	11	11	17	16	24	21	31	26	38	31	46	36	53	42	59	47	67
	.90	2	6	6	14	11	21	16	29	21	37	26	46	31	55	36	63	42	70	47	80
.70	.80	3	4	8	11	14	17	20	24	26	32	32	39	39	45	45	53	51	61	58	66
	.90	3	6	8	14	14	22	20	30	26	38	32	47	39	53	45	63	51	72	58	79
.80	.90	4	6	11	13	18	21	25	30	32	38	39	47	47	54	54	63	62	68	69	80

Table 17

VALUES OF M1,M2 FOR SELECTING, WITH P(CS) >= P*, A SUBSET OF k = 13 TRINOMIAL POPULATIONS WHICH CONTAINS ALL POPULATIONS BETTER THAN A DUAL STANDARD (POPULATIONS WITH AT LEAST M1 OBSERVATIONS IN INTERVAL 1, AND AT LEAST M2 OBSERVATIONS IN THE UNION OF INTERVALS 1 AND 3, ARE SELECTED)

P* = .90

NUMBER OF OBSERVATIONS(n)

STANDARD PROPORTIONS 1	2	10		20		30		40		50		60		70		80		90		100	
		M1	M2	M1	M2	M1	M2	M1	M2	M1	M2	M1	M2	M1	M2	M1	M2	M1	M2	M1	M2
.10	.20	0	0	0	0	0	1	0	3	1	3	1	5	2	6	2	8	3	9	4	8
	.30	0	0	0	2	0	3	0	5	1	7	1	10	2	11	2	14	3	16	4	15
	.40	0	1	0	3	0	6	0	9	1	11	1	15	2	17	2	21	3	24	4	23
	.50	0	1	0	5	0	9	0	12	1	15	1	20	2	23	2	29	3	32	4	32
	.60	0	2	0	7	0	14	0	16	1	20	1	26	2	30	2	37	3	41	4	42
	.70	0	3	0	9	0	15	0	21	1	26	1	33	2	38	2	45	3	51	4	53
	.80	0	5	0	11	0	18	0	26	1	32	1	40	2	46	2	55	3	61	4	65
	.90	0	6	0	14	0	23	0	31	1	33	1	48	2	55	2	65	3	73	4	78
.20	.30	0	0	0	2	1	3	3	3	4	7	5	9	7	9	8	14	9	16	11	18
	.40	0	1	0	3	1	6	3	6	4	11	5	14	7	14	8	20	9	24	11	27
	.50	0	1	0	5	1	8	3	9	4	15	5	20	7	20	8	28	9	33	11	36
	.60	0	2	0	7	1	11	3	13	4	20	5	26	7	27	8	36	9	42	11	46
	.70	0	3	0	9	1	15	3	17	4	26	5	32	7	34	8	44	9	51	11	57
	.80	0	5	0	11	1	18	3	22	4	31	5	39	7	42	8	54	9	62	11	68
	.90	0	6	0	14	1	22	3	28	4	38	5	47	7	52	8	64	9	73	11	81
.30	.40	0	1	2	2	3	6	5	9	8	10	10	14	12	18	15	18	17	24	19	28
	.50	0	1	2	3	3	8	5	12	8	14	10	19	12	24	15	25	17	32	19	37
	.60	0	2	2	5	3	11	5	16	8	19	10	25	12	31	15	32	17	41	19	47
	.70	0	3	2	7	3	14	5	20	8	24	10	32	12	38	15	41	17	50	19	57
	.80	0	5	2	9	3	18	5	25	8	30	10	39	12	46	15	50	17	61	19	69
	.90	0	6	2	13	3	22	5	31	8	37	10	47	12	56	15	61	17	72	19	81
.40	.50	1	1	3	5	6	8	9	12	12	16	15	20	18	24	22	27	25	33	28	37
	.60	1	2	3	6	6	11	9	15	12	20	15	26	18	31	22	35	25	41	28	47
	.70	1	3	3	8	6	14	9	20	12	26	15	32	18	39	22	43	25	51	28	57
	.80	1	4	3	11	6	17	9	24	12	32	15	39	18	47	22	52	25	61	28	69
	.90	1	6	3	14	6	22	9	30	12	38	15	47	18	56	22	63	25	72	28	81
.50	.60	1	2	5	6	9	9	12	16	17	20	21	25	25	31	29	37	34	40	38	47
	.70	1	3	5	8	9	11	12	20	17	24	21	31	25	38	29	45	34	49	38	57
	.80	1	5	5	10	9	14	12	25	17	30	21	38	25	46	29	54	34	59	38	68
	.90	1	6	5	13	9	19	12	30	17	37	21	46	25	55	29	64	34	71	38	81
.60	.70	2	3	7	8	11	15	16	20	22	25	27	32	32	39	37	45	43	50	48	58
	.80	2	5	7	10	11	18	16	25	22	30	27	38	32	46	37	54	43	60	48	68
	.90	2	6	7	13	11	22	16	30	22	37	27	46	32	55	37	64	43	71	48	81
.70	.80	3	5	9	11	15	18	21	25	27	32	33	39	40	44	46	54	52	62	59	68
	.90	3	6	9	14	15	22	21	30	27	38	33	47	40	52	46	63	52	73	59	80
.80	.90	5	6	11	14	18	22	26	29	33	38	40	47	48	54	55	64	62	73	70	81

P* = .95

NUMBER OF OBSERVATIONS(n)

STANDARD PROPORTIONS 1	2	10		20		30		40		50		60		70		80		90		100	
		M1	M2	M1	M2	M1	M2	M1	M2	M1	M2	M1	M2	M1	M2	M1	M2	M1	M2	M1	M2
.10	.20	0	0	0	0	0	1	0	2	0	3	1	4	1	6	2	7	2	8	3	9
	.30	0	0	0	1	0	3	0	3	0	7	1	9	1	11	2	13	2	16	3	17
	.40	0	0	0	3	0	5	0	8	0	11	1	14	1	17	2	20	2	24	3	26
	.50	0	1	0	4	0	8	0	12	0	16	1	19	1	24	2	27	2	32	3	36
	.60	0	2	0	6	0	11	0	16	0	21	1	25	1	31	2	35	2	41	3	46
	.70	0	3	0	8	0	14	0	20	0	26	1	31	1	33	2	44	2	51	3	56
	.80	0	4	0	11	0	18	0	25	0	32	1	39	1	46	2	53	2	61	3	68
	.90	0	6	0	14	0	22	0	30	0	39	1	47	1	55	2	63	2	72	3	80
.20	.30	0	0	0	1	1	3	2	5	3	7	5	5	6	10	7	13	9	14	10	17
	.40	0	0	0	3	1	5	2	8	3	11	5	9	6	16	7	20	9	21	10	26
	.50	0	1	0	4	1	8	2	11	3	15	5	12	6	23	7	27	9	30	10	35
	.60	0	2	0	6	1	10	2	15	3	20	5	12	6	30	7	35	9	38	10	45
	.70	0	3	0	8	1	14	2	20	3	26	5	12	6	37	7	44	9	48	10	56
	.80	0	4	0	11	1	17	2	24	3	32	5	12	6	45	7	53	9	59	10	68
	.90	0	6	0	14	1	22	2	30	3	38	5	12	6	54	7	63	9	70	10	80
.30	.40	0	0	1	2	3	5	5	8	7	10	9	14	11	17	14	19	16	23	18	27
	.50	0	1	1	4	3	7	5	11	7	15	9	19	11	23	14	25	16	31	18	36
	.60	0	2	1	6	3	10	5	15	7	20	9	25	11	30	14	33	16	40	18	46
	.70	0	3	1	8	3	13	5	19	7	25	9	31	11	38	14	42	16	49	18	56
	.80	0	4	1	11	3	17	5	24	7	31	9	38	11	46	14	51	16	60	18	68
	.90	0	6	1	14	3	21	5	29	7	38	9	46	11	55	14	62	16	71	18	80
.40	.50	0	1	3	3	5	8	8	11	11	15	14	19	17	23	21	26	24	31	27	36
	.60	0	2	3	5	5	10	8	15	11	20	14	25	17	30	21	34	24	40	27	46
	.70	0	3	3	7	5	14	8	19	11	25	14	31	17	38	21	42	24	49	27	56
	.80	0	4	3	9	5	17	8	24	11	31	14	38	17	46	21	51	24	60	27	68
	.90	0	6	3	12	5	22	8	30	11	38	14	46	17	55	21	62	24	71	27	80
50	.60	1	2	4	6	8	10	12	15	16	19	20	25	24	30	28	35	32	41	37	45
	.70	1	3	4	8	8	13	12	19	16	24	20	31	24	37	28	44	32	50	37	55
	.80	1	4	4	11	8	17	12	23	16	30	20	38	24	45	28	53	32	60	37	66
	.90	1	6	4	14	8	21	12	29	16	37	20	46	24	54	28	63	32	72	37	79
.60	.70	2	3	6	8	11	13	16	19	21	25	26	31	31	38	36	44	42	47	47	56
	.80	2	4	6	11	11	17	16	23	21	30	26	38	31	45	36	53	42	56	47	67
	.90	2	6	6	14	11	21	16	29	21	37	26	46	31	54	36	63	42	68	47	79
.70	.80	3	4	8	11	14	17	20	24	26	31	32	39	38	46	45	52	51	60	57	68
	.90	3	6	8	14	14	21	20	30	26	38	32	46	38	55	45	63	51	72	57	80
.80	.90	4	6	11	13	18	21	25	29	32	38	39	47	47	54	54	63	61	72	69	80

VALUES OF M1,M2 FOR SELECTING, WITH P(CS) >= P*, A SUBSET OF k = 14 TRINOMIAL POPULATIONS WHICH CONTAINS ALL POPULATIONS BETTER THAN A DUAL STANDARD (POPULATIONS WITH AT LEAST M1 OBSERVATIONS IN INTERVAL 1, AND AT LEAST M2 OBSERVATIONS IN THE UNION OF INTERVALS 1 AND 3, ARE SELECTED)

P* = .90

NUMBER OF OBSERVATIONS(n)

STANDARD PROPORTIONS		10		20		30		40		50		60		70		80		90		100	
1	2	M1	M2	M1	M2	M1	M2	M1	M2	M1	M2	M1	M2	M1	M2	M1	M2	M1	M2	M1	M2
.10	.20	0	0	0	0	0	1	0	2	1	3	1	5	2	5	2	8	3	9	3	11
	.30	0	0	0	1	0	3	0	5	1	7	1	10	2	11	2	14	3	16	3	19
	.40	0	1	0	3	0	6	0	9	1	11	1	15	2	17	2	21	3	24	3	28
	.50	0	1	0	5	0	8	0	12	1	15	1	20	2	23	2	29	3	32	3	37
	.60	0	2	0	7	0	11	0	16	1	20	1	26	2	30	2	37	3	41	3	47
	.70	0	3	0	9	0	15	0	21	1	26	1	33	2	38	2	45	3	51	3	58
	.80	0	5	0	11	0	18	0	25	1	31	1	40	2	46	2	54	3	61	3	69
	.90	0	6	0	14	0	22	0	31	1	38	1	48	2	55	2	65	3	72	3	82
.20	.30	0	0	0	1	1	3	2	5	4	7	5	9	6	12	8	13	9	16	11	18
	.40	0	1	0	3	1	6	2	9	4	11	5	14	6	18	8	20	9	24	11	26
	.50	0	1	0	5	1	8	2	12	4	15	5	20	6	24	8	28	9	33	11	36
	.60	0	2	0	7	1	11	2	16	4	20	5	26	6	31	8	35	9	42	11	46
	.70	0	3	0	9	1	14	2	20	4	25	5	32	6	39	8	44	9	51	11	56
	.80	0	5	0	11	1	18	2	25	4	31	5	39	6	47	8	53	9	61	11	68
	.90	0	6	0	14	1	22	2	31	4	38	5	47	6	56	8	64	9	73	11	80
.30	.40	0	1	1	3	3	6	5	9	8	10	10	14	12	18	14	21	17	23	19	27
	.50	0	1	1	5	3	8	5	12	8	13	10	19	12	24	14	28	17	32	19	37
	.60	0	2	1	7	3	11	5	16	8	18	10	25	12	31	14	36	17	40	19	47
	.70	0	3	1	9	3	14	5	20	8	23	10	31	12	38	14	45	17	50	19	57
	.80	0	5	1	11	3	18	5	25	8	29	10	38	12	46	14	54	17	60	19	68
	.90	0	6	1	14	3	22	5	30	8	36	10	46	12	55	14	64	17	72	19	81
.40	.50	1	1	3	4	6	8	9	11	12	16	15	20	18	24	22	26	25	32	28	37
	.60	1	2	3	6	6	10	9	15	12	20	15	26	18	31	22	34	25	41	28	47
	.70	1	3	3	8	6	14	9	19	12	25	15	32	18	38	22	42	25	50	28	57
	.80	1	4	3	11	6	17	9	24	12	31	15	39	18	46	22	51	25	60	28	68
	.90	1	5	3	14	6	21	9	30	12	38	15	47	18	55	22	62	25	72	28	81
.50	.60	1	2	5	6	8	11	12	16	16	21	21	25	25	31	29	36	34	38	38	46
	.70	1	3	5	8	8	14	12	20	16	26	21	31	25	38	29	45	34	47	38	56
	.80	1	5	5	10	8	18	12	25	16	32	21	38	25	46	29	54	34	57	38	68
	.90	1	6	5	13	8	22	12	30	16	39	21	46	25	55	29	64	34	69	38	80
.60	.70	2	3	7	8	11	14	16	20	21	26	27	31	32	38	37	45	43	49	48	57
	.80	2	4	7	10	11	18	16	25	21	32	27	38	32	46	37	54	43	59	48	68
	.90	2	6	7	13	11	22	16	30	21	39	27	46	32	55	37	64	43	70	48	80
.70	.80	3	5	9	11	15	17	21	24	27	32	33	39	39	47	46	53	52	61	59	67
	.90	3	6	9	14	15	21	21	30	27	38	33	47	39	56	46	63	52	72	59	79
.80	.90	5	6	11	14	18	22	25	31	33	38	40	47	47	56	55	64	62	73	70	81

P* = .95

NUMBER OF OBSERVATIONS(n)

STANDARD PROPORTIONS		10		20		30		40		50		60		70		80		90		100	
1	2	M1	M2	M1	M2	M1	M2	M1	M2	M1	M2	M1	M2	M1	M2	M1	M2	M1	M2	M1	M2
.10	.20	0	0	0	0	0	1	0	2	0	3	1	4	1	6	2	6	2	8	3	9
	.30	0	0	0	1	0	3	0	5	0	7	1	8	1	11	2	13	2	16	3	17
	.40	0	0	0	3	0	5	0	8	0	11	1	13	1	17	2	19	2	23	3	26
	.50	0	1	0	4	0	8	0	12	0	16	1	19	1	24	2	27	2	32	3	33
	.60	0	2	0	6	0	11	0	16	0	21	1	25	1	31	2	35	2	41	3	45
	.70	0	3	0	8	0	14	0	20	0	26	1	31	1	38	2	43	2	51	3	56
	.80	0	4	0	11	0	18	0	25	0	32	1	38	1	46	2	53	2	61	3	68
	.90	0	6	0	14	0	22	0	30	0	39	1	46	1	55	2	63	2	72	3	80
.20	.30	0	0	0	1	1	3	2	5	3	7	4	9	6	10	7	13	9	13	10	17
	.40	0	0	0	3	1	5	2	8	3	11	4	14	6	16	7	20	9	20	10	26
	.50	0	1	0	4	1	7	2	11	3	15	4	19	6	22	7	27	9	28	10	35
	.60	0	2	0	6	1	10	2	15	3	20	4	25	6	29	7	35	9	37	10	45
	.70	0	3	0	8	1	14	2	19	3	26	4	32	6	37	7	44	9	47	10	56
	.80	0	4	0	11	1	17	2	24	3	31	4	39	6	45	7	53	9	57	10	67
	.90	0	6	0	14	1	22	2	30	3	38	4	47	6	54	7	63	9	69	10	80
.30	.40	0	0	1	2	3	5	5	7	7	10	9	13	11	17	14	17	16	23	18	26
	.50	0	1	1	4	3	7	5	11	7	15	9	19	11	23	14	23	16	31	18	36
	.60	0	2	1	6	3	10	5	15	7	19	9	25	11	30	14	30	16	39	18	45
	.70	0	3	1	8	3	13	5	19	7	25	9	31	11	37	14	38	16	49	18	56
	.80	0	4	1	11	3	17	5	24	7	31	9	38	11	46	14	48	16	59	18	67
	.90	0	6	1	14	3	21	5	29	7	38	9	46	11	55	14	59	16	71	18	80
.40	.50	0	1	3	3	5	8	8	11	11	15	14	19	17	23	21	25	24	31	27	36
	.60	0	2	3	4	5	10	8	15	11	20	14	25	17	30	21	32	24	39	27	45
	.70	0	3	3	6	5	14	8	19	11	25	14	31	17	38	21	40	24	49	27	56
	.80	0	4	3	8	5	17	8	24	11	31	14	38	17	46	21	50	24	59	27	67
	.90	0	6	3	11	5	22	8	30	11	38	14	46	17	55	21	60	24	71	27	80
.50	.60	1	2	4	6	8	10	12	14	16	19	20	24	24	30	28	35	32	41	37	44
	.70	1	3	4	8	8	13	12	18	16	24	20	30	24	37	28	43	32	50	37	54
	.80	1	4	4	10	8	17	12	23	16	30	20	37	24	45	28	53	32	60	37	66
	.90	1	6	4	14	8	21	12	29	16	37	20	45	24	54	28	63	32	72	37	79
.60	.70	2	3	6	8	11	13	16	18	21	24	26	31	31	37	36	44	41	50	47	55
	.80	2	4	6	10	11	17	16	23	21	30	26	37	31	45	36	53	41	60	47	66
	.90	2	6	6	13	11	21	16	28	21	37	26	45	31	54	36	63	41	72	47	79
.70	.80	3	4	8	11	14	17	20	24	26	31	32	39	38	46	45	52	51	60	57	68
	.90	3	6	8	14	14	21	20	29	26	38	32	46	38	55	45	62	51	71	57	80
.80	.90	4	6	11	13	18	21	25	29	32	38	39	46	46	55	54	63	61	72	69	79

Table 19

VALUES OF M1.M2 FOR SELECTING, WITH P(CS) >= P*, A SUBSET OF k = 15 TRINOMIAL POPULATIONS WHICH CONTAINS ALL POPULATIONS BETTER THAN A DUAL STANDARD (POPULATIONS WITH AT LEAST M1 OBSERVATIONS IN INTERVAL 1, AND AT LEAST M2 OBSERVATIONS IN THE UNION OF INTERVALS 1 AND 3, ARE SELECTED)

P* = .90

NUMBER OF OBSERVATIONS(n)

STANDARD PROPORTIONS 1	2	10 M1	10 M2	20 M1	20 M2	30 M1	30 M2	40 M1	40 M2	50 M1	50 M2	60 M1	60 M2	70 M1	70 M2	80 M1	80 M2	90 M1	90 M2	100 M1	100 M2
.10	.20	0	0	0	0	0	1	0	2	1	3	1	5	2	5	2	8	3	8	3	10
	.30	0	0	0	1	0	3	0	5	1	6	1	9	2	10	2	14	3	15	3	19
	.40	0	1	0	3	0	6	0	9	1	10	1	15	2	16	2	21	3	23	3	28
	.50	0	1	0	5	0	8	0	12	1	15	1	20	2	23	2	29	3	32	3	37
	.60	0	2	0	7	0	11	0	16	1	20	1	26	2	30	2	37	3	41	3	47
	.70	0	3	0	9	0	15	0	21	1	25	1	33	2	37	2	45	3	50	3	58
	.80	0	5	0	11	0	18	0	25	1	31	1	40	2	45	2	54	3	61	3	69
	.90	0	6	0	14	0	22	0	31	1	38	1	47	2	55	2	64	3	72	3	82
.20	.30	0	0	0	1	1	3	2	5	4	6	5	9	6	12	8	13	9	16	11	18
	.40	0	1	0	3	1	6	2	8	4	10	5	14	6	18	8	20	9	24	11	26
	.50	0	1	0	5	1	8	2	12	4	15	5	20	6	24	8	27	9	32	11	35
	.60	0	2	0	7	1	11	2	16	4	20	5	26	6	31	8	35	9	41	11	45
	.70	0	3	0	9	1	14	2	20	4	25	5	32	6	39	8	44	9	51	11	56
	.80	0	5	0	11	1	18	2	25	4	31	5	39	6	47	8	53	9	61	11	67
	.90	0	6	0	14	1	22	2	31	4	38	5	47	6	56	8	63	9	73	11	80
.30	.40	0	1	1	3	3	6	5	8	7	11	10	14	12	17	14	21	17	23	19	27
	.50	0	1	1	5	3	8	5	12	7	16	10	19	12	24	14	28	17	31	19	36
	.60	0	2	1	6	3	11	5	16	7	21	10	25	12	30	14	36	17	40	19	46
	.70	0	3	1	9	3	14	5	20	7	26	10	31	12	38	14	45	17	49	19	57
	.80	0	5	1	11	3	18	5	25	7	32	10	38	12	46	14	54	17	69	19	68
	.90	0	6	1	14	3	22	5	30	7	39	10	46	12	55	14	64	17	71	19	81
.40	.50	1	1	3	4	6	8	9	11	12	15	15	20	18	24	21	29	25	32	28	37
	.60	1	1	3	6	6	10	9	15	12	20	15	25	18	31	21	36	25	40	28	46
	.70	1	2	3	8	6	13	9	19	12	25	15	32	18	38	21	45	25	50	28	57
	.80	1	4	3	11	6	17	9	24	12	31	15	39	18	46	21	54	25	60	28	68
	.90	1	5	3	14	6	21	9	29	12	38	15	47	18	55	21	64	25	71	28	81
.50	.60	1	2	5	6	8	11	12	16	16	21	21	24	25	30	29	36	33	42	38	46
	.70	1	3	5	8	8	14	12	20	16	26	21	30	25	37	29	44	33	51	38	56
	.80	1	4	5	10	8	18	12	25	16	32	21	37	25	45	29	53	33	61	38	67
	.90	1	6	5	13	8	22	12	30	16	39	21	45	25	55	29	64	33	72	38	80
.60	.70	2	3	7	8	11	14	16	20	21	26	27	31	32	38	37	45	42	51	48	57
	.80	2	4	7	10	11	18	16	25	21	32	27	37	32	46	37	54	42	61	48	68
	.90	2	6	7	13	11	22	16	30	21	39	27	45	32	55	37	64	42	73	48	80
.70	.80	3	4	9	11	15	17	21	24	27	32	33	39	39	47	46	53	52	61	58	69
	.90	3	6	9	13	15	21	21	29	27	38	33	47	39	55	46	63	52	72	58	81
.80	.90	5	5	11	14	18	22	25	30	33	38	40	47	47	56	55	63	62	73	70	80

P* = .95

NUMBER OF OBSERVATIONS(n)

STANDARD PROPORTIONS 1	2	10 M1	10 M2	20 M1	20 M2	30 M1	30 M2	40 M1	40 M2	50 M1	50 M2	60 M1	60 M2	70 M1	70 M2	80 M1	80 M2	90 M1	90 M2	160 M1	160 M2
.10	.20	0	0	0	0	0	1	0	2	0	3	1	4	1	6	2	6	2	8	3	9
	.30	0	0	0	1	0	3	0	5	0	7	1	8	1	11	2	12	2	15	3	17
	.40	0	0	0	2	0	5	0	8	0	11	1	13	1	17	2	19	2	23	3	26
	.50	0	1	0	4	0	8	0	12	0	16	1	19	1	23	2	27	2	32	3	35
	.60	0	2	0	6	0	11	0	16	0	21	1	25	1	31	2	35	2	41	3	45
	.70	0	3	0	8	0	14	0	20	0	26	1	31	1	38	2	43	2	50	3	56
	.80	0	4	0	11	0	18	0	25	0	32	1	38	1	46	2	52	2	64	3	67
	.90	0	6	0	14	0	22	0	30	0	39	1	46	1	55	2	63	2	72	3	80
.20	.30	0	0	0	1	1	3	2	4	3	7	4	9	6	10	7	13	8	15	10	17
	.40	0	0	0	2	1	5	2	8	3	11	4	14	6	16	7	20	8	23	10	26
	.50	0	1	0	4	1	7	2	11	3	15	4	19	6	22	7	27	8	32	10	35
	.60	0	2	0	6	1	10	2	15	3	20	4	25	6	29	7	35	8	41	10	45
	.70	0	3	0	8	1	14	2	19	3	25	4	32	6	36	7	43	8	50	10	56
	.80	0	4	0	11	1	17	2	24	3	31	4	39	6	45	7	53	8	61	10	67
	.90	0	6	0	14	1	22	2	30	3	38	4	47	6	54	7	63	8	72	10	80
.30	.40	0	0	1	2	3	5	5	7	7	10	9	13	11	17	13	20	16	22	18	26
	.50	0	1	1	4	3	7	5	10	7	14	9	19	11	23	13	27	16	30	18	35
	.60	0	2	1	6	3	10	5	14	7	19	9	24	11	30	13	35	16	39	18	45
	.70	0	3	1	8	3	13	5	19	7	25	9	31	11	37	13	44	16	49	18	56
	.80	0	4	1	11	3	17	5	23	7	31	9	38	11	45	13	53	16	59	18	67
	.90	0	6	1	14	3	21	5	29	7	37	9	46	11	55	13	63	16	71	18	80
.40	.50	0	1	2	4	5	7	8	11	11	15	14	19	17	23	20	27	24	30	27	35
	.60	0	2	2	6	5	10	8	15	11	20	14	25	17	30	20	35	24	39	27	45
	.70	0	3	2	8	5	13	8	19	11	25	14	31	17	37	20	44	24	48	27	56
	.80	0	4	2	11	5	17	8	24	11	31	14	38	17	45	20	53	24	59	27	67
	.90	0	6	2	14	5	21	8	29	11	38	14	46	17	55	20	63	24	70	27	80
.50	.60	1	2	4	6	8	10	12	14	16	18	20	24	24	29	28	35	32	40	37	43
	.70	1	3	4	8	8	13	12	18	16	23	20	30	24	37	28	43	32	50	37	53
	.80	1	4	4	10	8	17	12	22	16	29	20	37	24	45	28	52	32	60	37	64
	.90	1	6	4	13	8	21	12	28	16	36	20	45	24	54	28	63	32	72	37	77
.60	.70	2	3	6	8	11	13	16	18	21	23	26	30	31	37	36	44	41	50	47	55
	.80	2	4	6	10	11	16	16	22	21	28	26	37	31	45	36	52	41	60	47	65
	.90	2	6	6	13	11	21	16	27	21	35	26	45	31	54	36	63	41	72	47	78
.70	.80	3	4	8	10	14	17	20	24	26	31	32	38	38	46	45	51	51	60	57	68
	.90	3	6	8	13	14	21	20	29	26	38	32	46	38	55	45	61	51	71	57	80
.80	.90	4	6	11	13	18	21	25	29	32	38	39	46	46	55	54	63	61	72	69	79

VALUES OF M1,M2 FOR SELECTING, WITH P(CS) >= P*, A SUBSET OF k = 16
TRINOMIAL POPULATIONS WHICH CONTAINS ALL POPULATIONS BETTER THAN A DUAL
STANDARD (POPULATIONS WITH AT LEAST M1 OBSERVATIONS IN INTERVAL 1, AND AT
LEAST M2 OBSERVATIONS IN THE UNION OF INTERVALS 1 AND 3, ARE SELECTED)

P* = .90

STANDARD PROPORTIONS 1	2	NUMBER OF OBSERVATIONS(n) 10 M1	10 M2	20 M1	20 M2	30 M1	30 M2	40 M1	40 M2	50 M1	50 M2	60 M1	60 M2	70 M1	70 M2	80 M1	80 M2	90 M1	90 M2	100 M1	100 M2
.10	.20	0	0	0	0	0	1	0	2	1	3	1	5	2	5	2	7	3	8	3	10
	.30	0	0	0	1	0	3	0	5	1	6	1	9	2	10	2	14	3	15	3	19
	.40	0	1	0	3	0	6	0	9	1	10	1	14	2	16	2	21	3	23	3	28
	.50	0	1	0	5	0	8	0	12	1	15	1	20	2	22	2	28	3	31	3	37
	.60	0	2	0	7	0	11	0	16	1	20	1	26	2	29	2	36	3	40	3	47
	.70	0	3	0	9	0	15	0	21	1	25	1	33	2	37	2	45	3	50	3	58
	.80	0	5	0	11	0	18	0	25	1	31	1	39	2	45	2	54	3	60	3	69
	.90	0	6	0	14	0	22	0	31	1	38	1	47	2	54	2	64	3	72	3	81
.20	.30	0	0	0	1	1	3	2	5	4	6	5	9	6	12	8	13	9	16	11	17
	.40	0	1	0	3	1	5	2	8	4	10	5	14	6	18	8	19	9	24	11	25
	.50	0	1	0	5	1	8	2	12	4	14	5	19	6	24	8	27	9	32	11	35
	.60	0	2	0	7	1	11	2	16	4	19	5	25	6	31	8	35	9	41	11	45
	.70	0	3	0	9	1	14	2	20	4	25	5	32	6	38	8	43	9	51	11	55
	.80	0	5	0	11	1	18	2	25	4	31	5	39	6	47	8	53	9	61	11	67
	.90	0	6	0	14	1	22	2	31	4	37	5	47	6	56	8	63	9	72	11	80
.30	.40	0	1	1	3	3	5	5	8	7	11	10	13	12	17	14	21	17	22	19	27
	.50	0	1	1	5	3	8	5	12	7	16	10	18	12	23	14	28	17	30	19	36
	.60	0	2	1	6	3	11	5	16	7	21	10	24	12	30	14	36	17	39	19	46
	.70	0	3	1	9	3	14	5	20	7	26	10	30	12	36	14	44	17	49	19	57
	.80	0	5	1	11	3	18	5	25	7	32	10	37	12	46	14	54	17	59	19	68
	.90	0	6	1	14	3	22	5	30	7	39	10	46	12	55	14	64	17	71	19	81
.40	.50	1	1	3	4	6	7	9	11	12	15	15	19	18	24	21	28	25	31	28	37
	.60	1	1	3	6	6	10	9	14	12	19	15	25	18	31	21	36	25	40	28	46
	.70	1	2	3	8	6	13	9	18	12	25	15	31	18	38	21	45	25	49	28	57
	.80	1	3	3	11	6	17	9	23	12	31	15	38	18	46	21	54	25	59	28	68
	.90	1	5	3	14	6	21	9	29	12	37	15	46	18	55	21	64	25	71	28	81
.50	.60	1	2	5	6	8	11	12	16	16	21	20	26	25	30	29	36	33	42	38	45
	.70	1	3	5	7	8	14	12	20	16	26	20	32	25	37	29	44	33	51	38	55
	.80	1	4	5	10	8	18	12	25	16	32	20	39	25	45	29	53	33	61	38	66
	.90	1	6	5	13	8	22	12	30	16	39	20	47	25	54	29	63	33	72	38	79
.60	.70	2	3	7	7	11	14	16	20	21	26	26	32	32	38	37	44	42	51	48	56
	.80	2	4	7	9	11	18	16	25	21	32	26	39	32	45	37	53	42	61	48	67
	.90	2	6	7	12	11	22	16	30	21	39	26	47	32	54	37	63	42	72	48	80
.70	.80	3	4	9	10	15	16	21	23	27	31	33	39	39	47	46	52	52	61	58	69
	.90	3	6	9	13	15	20	21	29	27	38	33	47	39	55	46	62	52	72	58	81
.80	.90	5	5	11	14	18	22	25	30	33	37	40	47	47	56	55	63	62	72	70	80

P* = .95

STANDARD PROPORTIONS 1	2	NUMBER OF OBSERVATIONS(n) 10 M1	10 M2	20 M1	20 M2	30 M1	30 M2	40 M1	40 M2	50 M1	50 M2	60 M1	60 M2	70 M1	70 M2	80 M1	80 M2	90 M1	90 M2	100 M1	100 M2
.10	.20	0	0	0	0	0	1	0	2	0	3	1	4	1	5	2	6	2	8	3	9
	.30	0	0	0	1	0	3	0	5	0	7	1	8	1	11	2	12	2	15	3	17
	.40	0	0	0	2	0	5	0	8	0	11	1	13	1	17	2	19	2	23	3	26
	.50	0	1	0	4	0	8	0	11	0	15	1	19	1	23	2	26	2	32	3	35
	.60	0	2	0	6	0	11	0	15	0	20	1	25	1	30	2	34	2	41	3	45
	.70	0	3	0	8	0	14	0	20	0	26	1	31	1	38	2	43	2	50	3	56
	.80	0	4	0	11	0	18	0	25	0	32	1	38	1	46	2	52	2	61	3	67
	.90	0	6	0	14	0	22	0	30	0	38	1	46	1	55	2	63	2	72	3	80
.20	.30	0	0	0	1	1	3	2	4	3	6	4	9	6	10	7	13	8	15	10	17
	.40	0	0	0	2	1	5	2	7	3	10	4	14	6	15	7	19	8	23	10	25
	.50	0	1	0	4	1	7	2	11	3	15	4	19	6	22	7	27	8	31	10	35
	.60	0	2	0	6	1	10	2	15	3	20	4	25	6	28	7	35	8	40	10	45
	.70	0	3	0	8	1	13	2	19	3	25	4	32	6	36	7	43	8	50	10	55
	.80	0	4	0	11	1	17	2	24	3	31	4	39	6	44	7	53	8	60	10	67
	.90	0	6	0	14	1	21	2	30	3	38	4	47	6	54	7	63	8	72	10	80
.30	.40	0	0	1	2	3	5	5	7	7	10	9	13	11	16	13	20	16	22	18	26
	.50	0	1	1	4	3	7	5	10	7	14	9	18	11	23	13	27	16	30	18	35
	.60	0	2	1	6	3	10	5	14	7	19	9	24	11	30	13	35	16	38	18	45
	.70	0	3	1	8	3	13	5	18	7	24	9	31	11	37	13	44	16	48	18	55
	.80	0	4	1	10	3	17	5	23	7	30	9	38	11	45	13	53	16	58	18	67
	.90	0	6	1	14	3	21	5	29	7	37	9	46	11	55	13	63	16	70	18	80
.40	.50	0	1	2	4	5	7	8	11	11	15	14	19	17	23	20	27	24	30	27	35
	.60	0	2	2	6	5	10	8	15	11	19	14	24	17	30	20	35	24	38	27	45
	.70	0	3	2	8	5	13	8	19	11	25	14	31	17	37	20	44	24	48	27	55
	.80	0	4	2	11	5	17	8	24	11	31	14	38	17	45	20	53	24	58	27	67
	.90	0	6	2	14	5	21	8	29	11	38	14	46	17	55	20	63	24	70	27	80
.50	.60	1	2	4	6	8	10	11	15	15	20	20	23	24	29	28	35	32	40	36	46
	.70	1	3	4	6	8	13	11	19	15	25	20	29	24	36	28	43	32	50	36	56
	.80	1	4	4	10	8	16	11	24	15	31	20	36	24	44	28	52	32	60	36	67
	.90	1	6	4	13	8	21	11	30	15	38	20	44	24	54	28	63	32	71	36	80
.60	.70	2	3	6	8	11	13	15	20	20	25	26	29	31	37	36	43	41	50	47	51
	.80	2	4	6	10	11	16	15	24	20	31	26	36	31	44	36	52	41	60	47	60
	.90	2	5	6	13	11	20	15	30	20	38	26	44	31	54	36	63	41	71	47	60
.70	.80	3	4	8	10	14	17	20	24	26	31	32	38	38	46	44	53	51	60	57	68
	.90	3	6	8	13	14	21	20	29	26	37	32	46	38	55	44	63	51	71	57	80
.80	.90	4	6	11	13	18	20	25	29	32	37	39	46	46	55	54	62	61	72	69	78

VALUES OF M1,M2 FOR SELECTING, WITH P(CS) >= P*, A SUBSET OF k = 17 TRINOMIAL POPULATIONS WHICH CONTAINS ALL POPULATIONS BETTER THAN A DUAL STANDARD (POPULATIONS WITH AT LEAST M1 OBSERVATIONS IN INTERVAL 1, AND AT LEAST M2 OBSERVATIONS IN THE UNION OF INTERVALS 1 AND 3, ARE SELECTED)

P* = .90

NUMBER OF OBSERVATIONS(n)

STANDARD PROPORTIONS 1	2	10 M1	10 M2	20 M1	20 M2	30 M1	30 M2	40 M1	40 M2	50 M1	50 M2	60 M1	60 M2	70 M1	70 M2	80 M1	80 M2	90 M1	90 M2	100 M1	100 M2
.10	.20	0	0	0	0	0	1	0	2	1	3	1	5	2	5	2	7	3	8	3	10
	.30	0	0	0	1	0	3	0	5	1	6	1	9	2	10	2	14	3	15	3	18
	.40	0	1	0	3	0	6	0	9	1	10	1	14	2	15	2	21	3	23	3	27
	.50	0	1	0	5	0	8	0	12	1	14	1	20	2	22	2	28	3	31	3	37
	.60	0	2	0	6	0	11	0	16	1	19	1	26	2	29	2	36	3	40	3	47
	.70	0	3	0	9	0	14	0	20	1	25	1	32	2	36	2	45	3	50	3	58
	.80	0	4	0	11	0	18	0	25	1	31	1	39	2	44	2	54	3	60	3	69
	.90	0	6	0	14	0	22	0	31	1	38	1	47	2	54	2	64	3	72	3	81
.20	.30	0	0	0	1	1	3	2	5	4	6	5	9	6	11	8	13	9	16	11	17
	.40	0	1	0	3	1	5	2	8	4	9	5	14	6	17	8	19	9	24	11	25
	.50	0	1	0	5	1	8	2	12	4	14	5	19	6	24	8	26	9	32	11	34
	.60	0	2	0	6	1	11	2	16	4	19	5	25	6	31	8	34	9	41	11	44
	.70	0	3	0	9	1	14	2	20	4	24	5	32	6	38	8	43	9	51	11	54
	.80	0	4	0	11	1	18	2	25	4	30	5	39	6	46	8	52	9	61	11	66
	.90	0	6	0	14	1	22	2	30	4	37	5	47	6	56	8	63	9	72	11	79
.30	.40	0	1	1	3	3	5	5	8	7	11	10	13	12	17	14	21	17	22	19	27
	.50	0	1	1	4	3	8	5	12	7	16	10	18	12	23	14	28	17	29	19	36
	.60	0	2	1	6	3	11	5	16	7	21	10	23	12	30	14	36	17	38	19	46
	.70	0	3	1	9	3	14	5	20	7	26	10	29	12	37	14	44	17	47	19	56
	.80	0	4	1	11	3	18	5	25	7	32	10	37	12	45	14	53	17	58	19	68
	.90	0	6	1	14	3	22	5	30	7	39	10	45	12	55	14	64	17	70	19	80
.40	.50	1	1	3	4	6	7	9	10	12	15	15	19	18	24	21	28	25	31	28	36
	.60	1	1	3	6	6	10	9	13	12	19	15	25	18	30	21	36	25	39	28	46
	.70	1	2	3	8	6	13	9	17	12	24	15	31	18	38	21	44	25	48	28	56
	.80	1	3	3	11	6	16	9	22	12	30	15	38	18	46	21	54	25	59	28	68
	.90	1	4	3	14	6	21	9	28	12	37	15	46	18	55	21	64	25	70	28	80
.50	.60	1	2	5	5	8	11	12	16	16	21	20	26	25	29	29	36	33	41	38	44
	.70	1	3	5	7	8	14	12	20	16	26	20	32	25	36	29	44	33	51	38	54
	.80	1	4	5	9	8	18	12	25	16	32	20	39	25	44	29	53	33	61	38	65
	.90	1	6	5	12	8	22	12	30	16	38	20	47	25	54	29	63	33	72	38	78
.60	.70	2	3	6	9	11	14	16	20	21	26	26	32	32	37	37	44	42	51	48	56
	.80	2	4	6	11	11	18	16	25	21	32	26	39	32	45	37	53	42	61	48	66
	.90	2	6	6	14	11	22	16	30	21	38	26	47	32	54	37	63	42	72	48	79
.70	.80	3	4	9	10	14	18	20	25	27	31	33	39	39	46	45	54	52	60	58	69
	.90	3	6	9	13	14	22	20	30	27	37	33	46	39	55	45	64	52	72	58	81
.80	.90	4	6	11	14	18	22	25	30	32	39	40	46	47	55	55	62	62	72	70	78

P* = .95

NUMBER OF OBSERVATIONS(n)

STANDARD PROPORTIONS 1	2	10 M1	10 M2	20 M1	20 M2	30 M1	30 M2	40 M1	40 M2	50 M1	50 M2	60 M1	60 M2	70 M1	70 M2	80 M1	80 M2	90 M1	90 M2	100 M1	100 M2
.10	.20	0	0	0	0	0	1	0	2	0	3	1	4	1	5	2	6	2	8	3	9
	.30	0	0	0	1	0	3	0	5	0	7	1	8	1	11	2	12	2	15	3	17
	.40	0	0	0	2	0	5	0	8	0	11	1	13	1	17	2	19	2	23	3	25
	.50	0	1	0	4	0	8	0	11	0	15	1	18	1	23	2	26	2	32	3	35
	.60	0	2	0	6	0	11	0	15	0	20	1	24	1	30	2	34	2	41	3	45
	.70	0	3	0	8	0	14	0	20	0	26	1	31	1	38	2	43	2	50	3	55
	.80	0	4	0	11	0	17	0	25	0	32	1	38	1	46	2	52	2	61	3	67
	.90	0	6	0	14	0	22	0	30	0	38	1	46	1	55	2	63	2	72	3	80
.20	.30	0	0	0	1	1	2	2	4	3	6	4	9	6	9	7	13	8	15	10	17
	.40	0	0	0	2	1	5	2	7	3	10	4	14	6	15	7	19	8	23	10	25
	.50	0	1	0	4	1	7	2	11	3	15	4	19	6	21	7	27	8	31	10	34
	.60	0	2	0	6	1	10	2	15	3	29	4	25	6	28	7	35	8	40	10	44
	.70	0	3	0	8	1	13	2	19	3	25	4	31	6	35	7	43	8	50	10	55
	.80	0	4	0	11	1	17	2	24	3	31	4	38	6	44	7	52	8	60	10	66
	.90	0	6	0	14	1	21	2	30	3	30	4	46	6	53	7	63	8	72	10	79
.30	.40	0	0	1	2	3	4	5	7	7	10	9	13	11	16	13	20	16	21	18	26
	.50	0	1	1	4	3	7	5	10	7	14	9	18	11	23	13	27	16	29	18	35
	.60	0	2	1	6	3	10	5	14	7	19	9	24	11	29	13	35	16	38	18	45
	.70	0	3	1	8	3	13	5	18	7	24	9	30	11	37	13	43	16	47	18	55
	.80	0	4	1	10	3	17	5	23	7	30	9	38	11	45	13	53	16	58	18	67
	.90	0	6	1	13	3	21	5	29	7	37	9	46	11	54	13	63	16	70	18	80
.40	.50	0	1	2	4	5	7	8	11	11	15	14	19	17	23	20	27	24	29	27	35
	.60	0	2	2	6	5	10	8	14	11	19	14	24	17	30	20	35	24	37	27	44
	.70	0	3	2	8	5	13	8	19	11	24	14	31	17	37	20	43	24	46	27	55
	.80	0	4	2	10	5	17	8	24	11	30	14	38	17	45	20	53	24	57	27	66
	.90	0	6	2	14	5	21	8	29	11	37	14	46	17	54	20	63	24	69	27	79
.50	.60	1	2	4	6	8	10	11	15	15	20	19	25	24	29	28	34	32	40	36	46
	.70	1	3	4	8	8	12	11	19	15	25	19	31	24	35	28	43	32	49	36	56
	.80	1	4	4	10	8	16	11	24	15	31	19	38	24	44	28	52	32	60	36	67
	.90	1	6	4	13	8	20	11	30	15	38	19	46	24	53	28	62	32	71	36	80
.60	.70	2	3	6	8	11	12	15	19	20	25	25	31	31	36	36	43	41	50	46	56
	.80	2	4	6	10	11	16	15	24	20	31	25	38	31	44	36	52	41	60	46	67
	.90	2	5	6	13	11	20	15	30	20	38	25	46	31	53	36	62	41	71	46	80
.70	.80	3	4	8	10	14	17	20	24	26	31	32	38	38	45	44	53	51	59	57	67
	.90	3	5	8	13	14	21	20	29	26	37	32	46	38	54	44	63	51	70	57	80
.80	.90	4	6	11	13	17	22	25	28	32	37	39	46	46	55	54	62	61	71	68	80

Table 22

VALUES OF M1,M2 FOR SELECTING, WITH P(CS) >= P*, A SUBSET OF k = 18 TRINOMIAL POPULATIONS WHICH CONTAINS ALL POPULATIONS BETTER THAN A DUAL STANDARD (POPULATIONS WITH AT LEAST M1 OBSERVATIONS IN INTERVAL 1, AND AT LEAST M2 OBSERVATIONS IN THE UNION OF INTERVALS 1 AND 3, ARE SELECTED)

P* = .90

NUMBER OF OBSERVATIONS(n)

STANDARD PROPORTIONS		10		20		30		40		50		60		70		80		90		100	
1	2	M1	M2	M1	M2	M1	M2	M1	M2	M1	M2	M1	M2	M1	M2	M1	M2	M1	M2	M1	M2
.10	.20	0	0	0	0	0	1	0	2	1	2	1	5	2	4	2	7	3	8	3	10
	.30	0	0	0	1	0	3	0	5	1	6	1	9	2	9	2	14	3	15	3	18
	.40	0	0	0	3	0	6	0	8	1	9	1	14	2	15	2	21	3	22	3	27
	.50	0	1	0	4	0	8	0	12	1	14	1	20	2	21	2	28	3	31	3	37
	.60	0	2	0	6	0	11	0	16	1	19	1	26	2	28	2	36	3	40	3	47
	.70	0	3	0	9	0	14	0	20	1	24	1	32	2	35	2	45	3	49	3	57
	.80	0	4	0	11	0	18	0	25	1	30	1	39	2	44	2	54	3	60	3	69
	.90	0	6	0	14	0	22	0	31	1	37	1	47	2	53	2	64	3	71	3	81
.20	.30	0	0	0	1	1	3	2	5	4	5	5	9	6	11	8	12	9	16	11	16
	.40	0	0	0	3	1	5	2	8	4	9	5	14	6	17	8	19	9	23	11	23
	.50	0	1	0	4	1	8	2	12	4	13	5	19	6	24	8	26	9	32	11	32
	.60	0	2	0	6	1	11	2	16	4	18	5	25	6	31	8	34	9	41	11	42
	.70	0	3	0	9	1	14	2	20	4	23	5	31	6	38	8	42	9	50	11	53
	.80	0	4	0	11	1	18	2	25	4	29	5	38	6	46	8	52	9	61	11	64
	.90	0	6	0	14	1	22	2	30	4	36	5	46	6	55	8	62	9	72	11	78
.30	.40	0	0	1	3	3	5	5	8	7	11	9	14	12	17	14	20	16	24	19	26
	.50	0	1	1	4	3	8	5	12	7	16	9	20	12	23	14	28	16	32	19	35
	.60	0	2	1	6	3	11	5	16	7	21	9	26	12	30	14	36	16	41	19	45
	.70	0	3	1	8	3	14	5	20	7	26	9	32	12	37	14	44	16	51	19	56
	.80	0	4	1	11	3	18	5	25	7	32	9	39	12	45	14	53	16	61	19	67
	.90	0	6	1	14	3	22	5	30	7	39	9	47	12	54	14	64	16	72	19	80
.40	.50	0	1	3	4	6	7	8	12	12	14	15	19	18	23	21	28	25	29	28	36
	.60	0	2	3	6	6	9	8	16	12	18	15	24	18	30	21	36	25	37	28	45
	.70	0	3	3	8	6	12	8	20	12	23	15	31	18	37	21	44	25	46	28	56
	.80	0	4	3	10	6	15	8	25	12	29	15	38	18	46	21	53	25	57	28	67
	.90	0	6	3	13	6	20	8	30	12	36	15	46	18	55	21	64	25	69	28	80
.50	.60	1	2	4	6	8	11	12	16	16	21	20	26	25	28	29	35	33	41	37	47
	.70	1	3	4	8	8	14	12	20	16	26	20	32	25	35	29	43	33	50	37	57
	.80	1	4	4	11	8	18	12	24	16	32	20	39	25	43	29	52	33	60	37	68
	.90	1	6	4	14	8	22	12	30	16	38	20	47	25	52	29	63	33	72	37	81
.60	.70	2	3	6	8	11	14	16	20	21	26	26	32	32	36	37	44	42	51	48	54
	.80	2	4	6	11	11	18	16	25	21	32	26	39	32	44	37	53	42	61	48	64
	.90	2	6	6	14	11	22	16	30	21	38	26	47	32	53	37	63	42	72	48	77
.70	.80	3	4	9	10	14	18	20	25	27	30	33	38	39	46	45	54	52	60	58	68
	.90	3	6	9	13	14	22	20	30	27	37	33	46	39	55	45	64	52	71	58	81
.80	.90	4	6	11	14	18	22	25	30	32	39	40	46	47	55	55	61	62	72	69	81

P* = .95

NUMBER OF OBSERVATIONS(n)

STANDARD PROPORTIONS		10		20		30		40		50		60		70		80		90		100	
1	2	M1	M2	M1	M2	M1	M2	M1	M2	M1	M2	M1	M2	M1	M2	M1	M2	M1	M2	M1	M2
.10	.20	0	0	0	0	0	1	0	2	0	3	1	4	1	5	2	6	2	8	3	9
	.30	0	9	0	1	0	3	0	5	0	7	1	8	1	11	2	12	2	15	3	16
	.40	0	0	0	2	0	5	0	8	0	11	1	13	1	17	2	18	2	23	3	25
	.50	0	1	0	4	0	8	0	11	0	15	1	18	1	23	2	26	2	31	3	34
	.60	0	2	0	6	0	10	0	15	0	20	1	24	1	30	2	34	2	40	3	44
	.70	0	3	0	8	0	14	0	20	0	26	1	31	1	38	2	42	2	50	3	55
	.80	0	4	0	11	0	17	0	24	0	32	1	38	1	46	2	52	2	60	3	67
	.90	0	6	0	14	0	22	0	30	0	38	1	46	1	55	2	62	2	72	3	80
.20	.30	0	0	0	1	1	2	2	4	3	6	4	8	6	9	7	12	8	15	10	16
	.40	0	0	0	2	1	5	2	7	3	10	4	13	6	14	7	19	8	23	10	25
	.50	0	1	0	4	1	7	2	11	3	15	4	19	6	20	7	26	6	31	10	34
	.60	0	2	0	6	1	10	2	15	3	20	4	25	6	27	7	34	8	40	10	44
	.70	0	3	0	8	1	13	2	19	3	25	4	31	6	34	7	42	8	50	10	54
	.80	0	4	0	11	1	17	2	24	3	31	4	38	6	43	7	52	8	60	10	66
	.90	0	6	0	14	1	21	2	29	3	38	4	46	6	52	7	63	8	72	10	79
.30	.40	0	0	1	2	3	4	5	7	7	9	9	13	11	16	13	20	16	20	18	25
	.50	0	1	1	4	3	7	5	10	7	14	9	18	11	22	13	27	16	27	18	34
	.60	0	2	1	6	3	9	5	13	7	18	9	24	11	29	13	35	16	35	18	44
	.70	0	3	1	8	3	13	5	18	7	24	9	30	11	37	13	43	16	45	18	55
	.80	0	4	1	10	3	16	5	22	7	30	9	37	11	45	13	53	16	55	18	66
	.90	0	6	1	13	3	21	5	28	7	37	9	45	11	54	13	63	16	68	18	79
.40	.50	0	1	2	4	5	7	8	11	11	14	14	18	17	23	20	27	23	31	27	34
	.60	6	2	2	6	5	10	8	14	11	19	14	24	17	29	20	35	23	40	27	44
	.70	0	3	2	8	5	13	8	19	11	24	14	30	17	37	20	43	23	50	27	54
	.80	0	4	2	10	5	17	6	23	11	30	14	37	17	45	20	52	23	60	27	66
	.90	0	6	2	13	5	21	8	29	11	37	14	46	17	54	20	63	23	72	27	79
.50	.60	1	2	4	6	8	9	11	15	15	20	19	25	24	27	28	34	32	40	36	45
	.70	1	3	4	8	8	12	11	19	15	25	19	31	24	34	28	42	32	49	36	56
	.80	1	4	4	10	8	16	11	24	15	31	19	38	24	42	28	51	32	59	36	67
	.90	1	6	4	13	8	20	11	30	15	38	19	46	24	52	28	62	32	71	36	80
.60	.70	2	3	6	8	10	14	15	19	20	25	25	31	31	35	36	43	41	49	46	56
	.80	2	4	6	10	10	17	15	24	20	31	25	38	31	43	36	52	41	59	46	67
	.90	2	5	6	13	10	22	15	30	20	38	25	46	31	52	36	62	41	71	46	80
.70	.80	3	4	8	10	14	17	20	23	26	30	32	38	38	45	44	53	51	59	57	67
	.90	3	5	8	13	14	21	20	29	26	37	32	46	38	54	44	63	51	70	57	79
.80	.90	4	6	11	13	17	22	24	30	32	37	39	46	46	55	54	61	61	71	68	80

Table 23

VALUES OF M1,M2 FOR SELECTING, WITH P(CS) >= P*, A SUBSET OF k = 19 TRINOMIAL POPULATIONS WHICH CONTAINS ALL POPULATIONS BETTER THAN A DUAL STANDARD (POPULATIONS WITH AT LEAST M1 OBSERVATIONS IN INTERVAL 1, AND AT LEAST M2 OBSERVATIONS IN THE UNION OF INTERVALS 1 AND 3, ARE SELECTED)

P* = .90

NUMBER OF OBSERVATIONS(n)

STANDARD PROPORTIONS 1	2	10 M1	10 M2	20 M1	20 M2	30 M1	30 M2	40 M1	40 M2	50 M1	50 M2	60 M1	60 M2	70 M1	70 M2	80 M1	80 M2	90 M1	90 M2	100 M1	100 M2
.10	.20	0	0	0	0	0	1	0	2	1	2	1	5	2	3	2	7	3	8	3	10
	.30	0	0	0	1	0	3	0	5	1	5	1	9	2	7	2	13	3	14	3	18
	.40	0	0	0	3	0	5	0	8	1	9	1	14	2	11	2	20	3	22	3	27
	.50	0	1	0	4	0	8	0	12	1	13	1	20	2	17	2	28	3	30	3	37
	.60	0	2	0	6	0	11	0	16	1	18	1	26	2	24	2	36	3	39	3	47
	.70	0	3	0	9	0	14	0	20	1	24	1	32	2	31	2	45	3	49	3	57
	.80	0	4	0	11	0	18	0	25	1	30	1	39	2	40	2	54	3	59	3	69
	.90	0	6	0	14	0	22	0	31	1	37	1	47	2	50	2	64	3	71	3	81
.20	.30	0	0	0	1	1	3	2	5	3	7	5	9	6	11	8	12	9	16	10	18
	.40	0	0	0	3	1	5	2	8	3	11	5	13	6	17	8	18	9	23	10	27
	.50	0	1	0	4	1	8	2	12	3	16	5	19	6	24	8	25	9	32	10	37
	.60	0	2	0	6	1	11	2	16	3	21	5	25	6	31	8	33	9	41	10	47
	.70	0	3	0	9	1	14	2	20	3	26	5	31	6	38	8	41	9	50	10	57
	.80	0	4	0	11	1	18	2	25	3	32	5	38	6	46	8	51	9	60	10	69
	.90	0	6	0	14	1	22	2	30	3	39	5	46	6	55	8	61	9	72	10	81
.30	.40	0	0	1	3	3	5	5	8	7	11	9	14	12	16	14	20	16	24	19	26
	.50	0	1	1	4	3	8	5	12	7	16	9	20	12	22	14	27	16	32	19	35
	.60	0	2	1	6	3	11	5	15	7	20	9	26	12	29	14	35	16	41	19	45
	.70	0	3	1	8	3	14	5	29	7	26	9	32	12	37	14	44	16	51	19	56
	.80	0	4	1	11	3	18	5	25	7	32	9	39	12	45	14	53	16	61	19	67
	.90	0	6	1	14	3	22	5	30	7	38	9	47	12	54	14	63	16	72	19	80
.40	.50	0	1	3	4	5	8	8	12	11	16	15	18	18	23	21	28	24	32	28	36
	.60	0	2	3	6	5	11	8	16	11	21	15	24	18	30	21	36	24	41	28	45
	.70	0	3	3	8	5	14	8	20	11	26	15	30	18	37	21	44	24	51	28	56
	.80	0	4	3	10	5	18	8	25	11	32	15	37	18	45	21	53	24	61	28	67
	.90	0	6	3	13	5	22	8	30	11	39	15	45	18	55	21	63	24	72	28	80
.50	.60	1	2	4	6	8	11	12	16	16	21	20	26	24	31	29	35	33	41	37	47
	.70	1	3	4	8	8	14	12	20	16	26	20	32	24	38	29	43	33	50	37	57
	.80	1	4	4	11	8	19	12	24	16	31	20	39	24	46	29	52	33	60	37	68
	.90	1	6	4	14	8	22	12	30	16	38	20	47	24	55	29	62	33	72	37	81
.60	.70	2	3	6	8	11	14	16	20	21	26	26	32	31	38	37	44	42	51	47	57
	.80	2	4	6	11	11	18	16	24	21	32	26	39	31	46	37	52	42	60	47	68
	.90	2	6	6	14	11	22	16	30	21	38	26	47	31	55	37	63	42	72	47	81
.70	.80	3	4	9	10	14	18	20	25	26	32	33	38	39	46	45	54	52	60	58	68
	.90	3	6	9	13	14	22	20	30	26	39	33	46	39	55	45	64	52	71	58	80
.80	.90	4	6	11	14	18	22	25	30	32	39	40	46	47	55	54	64	62	72	69	81

P* = .95

NUMBER OF OBSERVATIONS(n)

STANDARD PROPORTIONS 1	2	10 M1	10 M2	20 M1	20 M2	30 M1	30 M2	40 M1	40 M2	50 M1	50 M2	60 M1	60 M2	70 M1	70 M2	80 M1	80 M2	90 M1	90 M2	100 M1	100 M2
.10	.20	0	0	0	0	0	1	0	2	0	3	1	4	1	5	2	6	2	8	3	9
	.30	0	0	0	1	0	3	0	5	0	7	1	3	1	11	2	11	2	15	3	16
	.40	0	0	0	2	0	5	0	8	0	11	1	13	1	17	2	18	2	23	3	25
	.50	0	1	0	4	0	8	0	11	0	15	1	18	1	23	2	25	2	31	3	34
	.60	0	2	0	6	0	10	0	15	0	20	1	24	1	30	2	33	2	40	3	44
	.70	0	3	0	8	0	14	0	20	0	26	1	30	1	38	2	42	2	50	3	55
	.80	0	4	0	11	0	17	0	24	0	32	1	38	1	46	2	51	2	60	3	66
	.90	0	6	0	14	0	22	0	30	0	38	1	46	1	55	2	62	2	72	3	79
.20	.30	0	0	0	1	1	2	2	4	3	6	4	8	5	11	7	12	8	15	10	16
	.40	0	0	0	2	1	5	2	7	3	10	4	13	5	17	7	19	8	23	10	24
	.50	0	1	0	4	1	7	2	11	3	15	4	19	5	23	7	26	8	31	10	33
	.60	0	2	0	6	1	10	2	15	3	20	4	25	5	30	7	34	8	40	10	43
	.70	0	3	0	8	1	13	2	19	3	25	4	31	5	38	7	43	8	50	10	54
	.80	0	4	0	11	1	17	2	24	3	31	4	38	5	46	7	52	8	60	10	66
	.90	0	6	0	14	1	21	2	29	3	38	4	46	5	55	7	63	8	72	10	79
.30	.40	0	0	1	2	3	4	5	6	7	9	9	13	11	16	13	19	15	23	13	25
	.50	0	1	1	4	3	7	5	9	7	13	9	18	11	22	13	27	15	31	18	34
	.60	0	2	1	6	3	9	5	13	7	18	9	23	11	29	13	35	15	40	18	44
	.70	0	3	1	8	3	12	5	17	7	23	9	30	11	37	13	43	15	50	18	55
	.80	0	4	1	10	3	16	5	22	7	29	9	37	11	45	13	52	15	60	18	66
	.90	0	6	1	13	3	21	5	28	7	36	9	45	11	54	13	63	15	72	18	79
.40	.50	0	1	2	4	5	7	8	10	11	14	14	18	17	22	20	27	23	31	27	34
	.60	0	2	2	6	5	10	8	14	11	19	14	24	17	29	20	35	23	40	27	43
	.70	0	3	2	8	5	13	8	18	11	24	14	30	17	37	20	43	23	50	27	54
	.80	0	4	2	10	5	17	8	23	11	30	14	37	17	45	20	52	23	60	27	65
	.90	0	6	2	13	5	21	8	29	11	37	14	45	17	54	20	63	23	71	27	78
.50	.60	1	2	4	6	8	9	11	15	15	20	19	25	23	30	28	34	32	40	36	45
	.70	1	3	4	8	8	11	11	19	15	25	19	31	23	37	28	42	32	49	36	56
	.80	1	4	4	10	8	15	11	24	15	31	19	38	23	45	28	51	32	59	36	67
	.90	1	6	4	13	8	20	11	30	15	38	19	46	23	55	28	61	32	71	36	80
.60	.70	2	2	6	8	10	14	15	19	20	25	25	31	30	37	36	42	41	49	46	56
	.80	2	4	6	10	10	17	15	24	20	31	25	38	30	45	36	51	41	59	46	67
	.90	2	5	6	13	10	21	15	30	20	38	25	46	30	55	36	62	41	71	46	80
.70	.80	3	4	8	10	14	17	20	23	26	30	32	38	38	45	44	53	51	58	57	67
	.90	3	5	8	13	14	21	20	28	26	37	32	45	38	54	44	63	51	69	57	79
.80	.90	4	6	11	12	17	21	24	30	32	37	39	46	46	55	53	63	61	71	68	80

VALUES OF M1,M2 FOR SELECTING, WITH P(CS) >= P*, A SUBSET OF k = 20 TRINOMIAL POPULATIONS WHICH CONTAINS ALL POPULATIONS BETTER THAN A DUAL STANDARD (POPULATIONS WITH AT LEAST M1 OBSERVATIONS IN INTERVAL 1, AND AT LEAST M2 OBSERVATIONS IN THE UNION OF INTERVALS 1 AND 3, ARE SELECTED)

P* = .90

NUMBER OF OBSERVATIONS(n)

STANDARD PROPORTIONS 1	2	10 M1	10 M2	20 M1	20 M2	30 M1	30 M2	40 M1	40 M2	50 M1	50 M2	60 M1	60 M2	70 M1	70 M2	80 M1	80 M2	90 M1	90 M2	100 M1	100 M2
.10	.20	0	0	0	0	0	1	0	2	1	2	1	4	1	6	2	7	3	7	3	10
	.30	0	0	0	1	0	3	0	5	1	4	1	9	1	12	2	13	3	14	3	18
	.40	0	0	0	3	0	5	0	8	1	8	1	14	1	18	2	20	3	22	3	27
	.50	0	1	0	4	0	8	0	12	1	12	1	20	1	24	2	28	3	30	3	36
	.60	0	2	0	6	0	11	0	16	1	17	1	26	1	31	2	36	3	39	3	47
	.70	0	3	0	9	0	14	0	20	1	22	1	32	1	39	2	44	3	48	3	57
	.80	0	4	0	11	0	18	0	25	1	28	1	39	1	47	2	54	3	59	3	69
	.90	0	6	0	14	0	22	0	31	1	36	1	47	1	56	2	64	3	71	3	81
.20	.30	0	0	0	1	1	3	2	5	3	7	5	8	6	11	7	14	9	15	10	18
	.40	0	0	0	3	1	5	2	8	3	11	5	13	6	17	7	21	9	23	10	27
	.50	0	1	0	4	1	8	2	12	3	16	5	19	6	23	7	28	9	31	10	36
	.60	0	2	0	6	1	11	2	16	3	21	5	25	6	30	7	36	9	40	10	46
	.70	0	3	0	9	1	14	2	20	3	26	5	31	6	38	7	45	9	50	10	57
	.80	0	4	0	11	1	18	2	25	3	32	5	38	6	46	7	54	9	60	10	68
	.90	0	6	0	14	1	22	2	30	3	39	5	46	6	55	7	64	9	72	10	81
.30	.40	0	0	1	3	3	5	5	8	7	11	9	14	12	16	14	20	16	24	19	26
	.50	0	1	1	4	3	8	5	11	7	15	9	20	12	22	14	27	16	32	19	35
	.60	0	2	1	6	3	11	5	15	7	20	9	26	12	29	14	35	16	41	19	44
	.70	0	3	1	8	3	14	5	20	7	26	9	32	12	36	14	44	16	50	19	55
	.80	0	4	1	11	3	18	5	24	7	32	9	39	12	44	14	53	16	61	19	67
	.90	0	6	1	14	3	22	5	30	7	38	9	47	12	54	14	63	16	72	19	79
.40	.50	0	1	3	4	5	8	8	12	11	16	15	18	18	23	21	28	24	32	28	35
	.60	0	2	3	6	5	11	8	16	11	21	15	23	18	30	21	35	24	41	28	45
	.70	0	3	3	8	5	14	8	20	11	26	15	29	18	37	21	44	24	50	28	55
	.80	0	4	3	10	5	18	8	25	11	32	15	36	13	45	21	53	24	61	28	66
	.90	0	6	3	13	5	22	8	30	11	38	15	45	18	54	21	63	24	72	28	79
.50	.60	1	2	4	6	8	11	12	15	16	20	20	26	24	31	29	34	33	41	37	46
	.70	1	3	4	8	8	14	12	20	16	26	20	32	24	38	29	42	33	50	37	57
	.80	1	4	4	11	8	17	12	24	16	31	20	39	24	46	29	51	33	60	37	68
	.90	1	6	4	14	8	22	12	30	16	38	20	47	24	55	29	62	33	71	37	81
.60	.70	2	3	6	8	11	14	16	20	21	26	26	32	31	38	37	43	42	50	47	57
	.80	2	4	6	11	11	17	16	24	21	31	26	39	31	46	37	52	42	60	47	68
	.90	2	6	6	14	11	22	16	30	21	38	26	47	31	55	37	62	42	72	47	81
.70	.80	3	4	9	9	14	18	20	25	26	32	33	38	39	46	45	54	52	59	58	68
	.90	3	6	9	12	14	22	20	30	26	38	33	45	39	55	45	64	52	70	58	80
.80	.90	4	6	11	14	18	22	25	30	32	39	40	46	47	55	54	64	62	72	69	81

P* = .95

NUMBER OF OBSERVATIONS(n)

STANDARD PROPORTIONS 1	2	10 M1	10 M2	20 M1	20 M2	30 M1	30 M2	40 M1	40 M2	50 M1	50 M2	60 M1	60 M2	70 M1	70 M2	80 M1	80 M2	90 M1	90 M2	100 M1	100 M2
.10	.20	0	0	0	0	0	1	0	2	0	3	1	3	1	5	2	5	2	8	3	8
	.30	0	0	0	1	0	3	0	4	0	7	1	8	1	11	2	11	2	15	3	16
	.40	0	0	0	2	0	5	0	8	0	11	1	12	1	17	2	18	2	23	3	25
	.50	0	1	0	4	0	7	0	11	0	15	1	18	1	23	2	25	2	31	3	34
	.60	0	2	0	6	0	10	0	15	0	20	1	24	1	30	2	33	2	40	3	44
	.70	0	3	0	8	0	14	0	20	0	26	1	30	1	38	2	42	2	50	3	55
	.80	0	4	0	10	0	17	0	24	0	32	1	37	1	46	2	51	2	60	3	66
	.90	0	6	0	14	0	22	0	30	0	38	1	46	1	55	2	62	2	72	3	79
.20	.30	0	0	0	1	1	2	2	4	3	6	4	8	5	11	7	12	8	15	10	16
	.40	0	0	0	2	1	4	2	7	3	10	4	13	5	16	7	19	8	23	10	24
	.50	0	1	0	4	1	7	2	11	3	15	4	19	5	23	7	26	8	31	10	33
	.60	0	2	0	6	1	10	2	14	3	19	4	25	5	30	7	34	8	40	10	43
	.70	0	3	0	8	1	13	2	19	3	25	4	31	5	37	7	42	8	49	10	53
	.80	0	4	0	10	1	17	2	24	3	31	4	38	5	46	7	52	8	60	10	65
	.90	0	6	0	14	1	21	2	29	3	38	4	46	5	55	7	62	8	71	10	78
.30	.40	0	0	1	2	3	4	5	5	7	8	9	12	11	16	13	19	15	23	18	25
	.50	0	1	1	4	3	6	5	6	7	12	9	17	11	22	13	27	15	31	18	34
	.60	0	2	1	6	3	9	5	9	7	17	9	23	11	29	13	34	15	40	18	44
	.70	0	3	1	8	3	12	5	12	7	22	9	30	11	36	13	43	15	50	18	54
	.80	0	4	1	10	3	16	5	12	7	28	9	37	11	45	13	52	15	60	18	66
	.90	0	6	1	13	3	21	5	12	7	35	9	45	11	54	13	63	15	72	18	79
.40	.50	0	1	2	4	5	7	8	10	11	14	14	18	17	22	20	27	23	31	27	33
	.60	0	2	2	6	5	10	8	14	11	18	14	24	17	29	20	34	23	40	27	43
	.70	0	3	2	8	5	13	8	18	11	24	14	30	17	36	20	43	23	49	27	53
	.80	0	4	2	10	5	17	8	23	11	30	14	37	17	45	20	52	23	60	27	65
	.90	0	6	2	13	5	21	8	29	11	37	14	45	17	54	20	63	23	71	27	78
.50	.60	1	2	4	6	7	10	11	15	15	20	19	25	23	30	28	33	32	39	36	45
	.70	1	3	4	8	7	13	11	19	15	25	19	31	23	37	28	41	32	48	36	55
	.80	1	4	4	10	7	17	11	24	15	31	19	38	23	45	28	50	32	59	36	67
	.90	1	5	4	13	7	21	11	30	15	38	19	46	23	55	28	61	32	70	36	80
.60	.70	2	2	6	8	10	13	15	19	20	25	25	31	30	37	36	42	41	49	46	56
	.80	2	4	6	10	10	17	15	24	20	31	25	38	30	45	36	50	41	59	46	67
	.90	2	5	6	13	10	21	15	29	20	38	25	46	30	55	36	61	41	71	46	80
.70	.80	3	4	8	10	14	16	20	23	26	30	32	37	38	45	44	53	50	60	57	67
	.90	3	5	8	13	14	21	20	28	26	36	32	45	38	54	44	63	50	72	57	79
.80	.90	4	6	10	13	17	21	24	30	32	36	39	46	46	54	53	63	61	71	68	80

APPENDIX B

Tables for Upper-Lower Proportion Criteria

This appendix contains tabled values which are likely to be needed to apply the selection procedure described in Section 3.2.3. A demonstration of the use of these tables can be found in Section 4.2.3. The original source of the tables is [AME79]. In all of these tables, "population" represents a computer service, "P(CS)" represents the probability of correct selection, and "standard proportions upper and lower" represents p_upper(min) and p_lower(max), respectively.

Table 25

VALUES OF n,M FOR SELECTING, WITH P(CS) >= P*, A SUBSET OF k = 1
BINOMIAL POPULATIONS WHICH CONTAINS ALL POPULATIONS BETTER THAN AN
UPPER STANDARD AND NO POPULATIONS WORSE THAN A LOWER STANDARD
(POPULATIONS WITH NO. OF 'SUCCESSES' >= M OUT OF n TRIALS ARE SELECTED)

STANDARD PROPORTIONS		P* = .90						P* = .95					
UPPER	LOWER	n	M	n	M	n	M	n	M	n	M	n	M
.90	.80	86	74	172	150	258	226	135	116	270	235	405	354
	.70	25	21	50	42	75	64	41	34	82	69	123	105
	.60	15	12	30	25	45	38	24	19	48	40	72	60
	.50	9	7	18	15	27	22	13	10	26	21	39	32
	.40	5	4	10	8	15	12	8	6	16	12	24	19
	.30	4	3	8	6	12	9	7	5	14	11	21	16
	.20	4	3	8	6	12	9	6	4	12	9	18	14
	.10	1	1	3	2	3	2	3	2	6	4	9	6
.80	.70	127	96	254	195	381	295	204	154	408	313	612	473
	.60	36	26	72	53	108	81	60	43	120	89	180	135
	.50	19	13	38	27	57	42	28	19	56	40	84	61
	.40	9	6	18	12	27	19	17	11	34	23	51	36
	.30	6	4	12	8	18	12	10	6	20	13	30	20
	.20	5	3	10	6	15	10	7	4	14	9	21	14
	.10	4	2	8	5	12	8	6	3	12	7	18	11
.70	.60	156	102	312	208	468	315	248	162	496	330	744	500
	.50	39	24	78	49	117	76	67	41	134	85	201	130
	.40	19	11	38	23	57	35	28	16	56	33	84	52
	.30	9	5	18	10	27	16	17	9	34	19	51	30
	.20	6	3	12	6	18	10	10	5	20	11	30	17
	.10	4	2	8	4	12	6	7	3	14	7	21	11
.60	.50	168	93	336	190	504	288	268	148	536	303	804	459
	.40	41	21	82	43	123	67	67	34	134	71	201	109
	.30	19	9	38	19	57	29	28	13	56	28	84	43
	.20	9	4	18	8	27	13	17	7	34	16	51	25
	.10	5	2	10	4	15	7	8	3	16	6	24	10
.50	.40	168	76	336	156	504	238	268	121	536	249	804	379
	.30	39	16	78	33	117	52	67	27	134	57	201	89
	.20	19	7	38	15	57	24	28	10	56	22	84	34
	.10	9	3	18	6	27	10	13	4	26	9	39	14
.40	.30	156	55	312	114	468	174	248	87	496	181	744	276
	.20	36	11	72	23	108	37	60	18	120	39	180	61
	.10	15	4	30	9	45	14	24	6	48	14	72	22
.30	.20	127	32	254	67	381	103	204	51	408	107	612	165
	.10	25	5	50	11	75	17	41	8	82	18	123	29
.20	.10	86	13	172	28	258	43	135	20	270	43	405	68

Table 26

VALUES OF n,M FOR SELECTING, WITH P(CS) >= P*, A SUBSET OF k = 2 BINOMIAL POPULATIONS WHICH CONTAINS ALL POPULATIONS BETTER THAN AN UPPER STANDARD AND NO POPULATIONS WORSE THAN A LOWER STANDARD (POPULATIONS WITH NO. OF 'SUCCESSES' >= M OUT OF n TRIALS ARE SELECTED)

STANDARD PROPORTIONS		P* = .90						P* = .95					
UPPER	LOWER	n	M	n	M	n	M	n	M	n	M	n	M
.90	.80	135	116	270	235	405	354	190	163	380	330	570	499
	.70	41	34	82	69	123	105	57	47	114	96	171	146
	.60	20	16	40	33	60	50	29	23	58	47	87	72
	.50	13	10	26	21	39	32	17	13	34	27	51	41
	.40	8	6	16	12	24	19	14	10	28	22	42	34
	.30	7	5	14	11	21	16	9	6	18	13	27	21
	.20	6	4	12	9	18	14	6	4	12	8	18	13
	.10	3	2	6	4	9	6	5	3	10	7	15	11
.80	.70	200	151	400	307	600	464	285	215	570	437	855	661
	.60	57	41	114	84	171	128	80	57	160	118	240	180
	.50	28	19	56	40	84	61	37	25	74	52	111	80
	.40	17	11	34	23	51	36	22	14	44	30	66	46
	.30	10	6	20	13	30	20	15	9	30	19	45	31
	.20	7	4	14	9	21	14	9	5	18	11	27	17
	.10	6	3	12	7	18	12	6	3	12	7	18	11
.70	.60	245	160	490	326	735	494	351	229	675	449	1000	671
	.50	67	41	134	85	201	130	92	56	184	116	276	178
	.40	28	16	56	34	84	52	44	25	88	53	132	82
	.30	15	8	30	17	45	26	23	12	46	26	69	41
	.20	10	5	20	11	30	17	15	7	30	16	45	25
	.10	7	3	14	7	21	11	9	4	18	9	27	14
.60	.50	266	147	532	301	798	456	377	208	688	388	1000	570
	.40	65	33	130	69	195	106	95	48	190	101	285	155
	.30	28	13	56	28	84	43	44	20	88	44	132	68
	.20	17	7	34	16	51	25	22	9	44	20	66	32
	.10	8	3	16	6	24	10	14	5	28	12	42	19
.50	.40	266	120	532	247	798	376	377	170	688	318	1000	469
	.30	67	27	134	58	201	89	92	37	184	79	276	122
	.20	28	10	56	22	84	35	37	13	74	29	111	45
	.10	13	4	26	9	39	14	17	5	34	11	51	19
.40	.30	245	86	490	178	735	272	351	123	675	245	1000	370
	.20	57	17	114	37	171	58	80	24	160	52	240	81
	.10	20	5	40	11	60	18	29	7	58	16	87	26
.30	.20	200	50	400	105	600	162	285	71	570	150	855	231
	.10	41	8	82	18	123	29	57	11	114	25	171	40
.20	.10	135	20	270	43	405	68	190	28	380	61	570	96

Table 27

VALUES OF n,M FOR SELECTING, WITH P(CS) >= P*, A SUBSET OF k = 3 BINOMIAL POPULATIONS WHICH CONTAINS ALL POPULATIONS BETTER THAN AN UPPER STANDARD AND NO POPULATIONS WORSE THAN A LOWER STANDARD (POPULATIONS WITH NO. OF 'SUCCESSES' >= M OUT OF n TRIALS ARE SELECTED)

STANDARD PROPORTIONS UPPER	LOWER	P* = .90 n	M	n	M	n	M	P* = .95 n	M	n	M	n	M
.90	.80	169	145	338	294	507	444	225	193	450	391	675	591
	.70	51	42	102	86	153	131	68	56	136	115	204	174
	.60	25	20	50	41	75	63	34	27	68	56	102	85
	.50	17	13	34	27	51	42	21	16	42	33	63	51
	.40	11	8	22	17	33	26	15	11	30	23	45	36
	.30	7	5	14	10	21	16	10	7	20	15	30	23
	.20	6	4	12	9	18	14	8	5	16	11	24	18
	.10	3	2	6	4	9	6	5	3	10	7	15	11
.80	.70	249	188	498	382	747	578	337	254	668	512	1000	773
	.60	70	50	140	103	210	157	94	67	188	138	282	211
	.50	34	23	68	48	102	74	43	29	86	61	129	93
	.40	20	13	40	27	60	42	27	17	54	37	81	57
	.30	13	8	26	17	39	26	17	10	34	22	51	34
	.20	7	4	14	8	21	13	11	6	22	13	33	21
	.10	6	3	12	7	18	11	8	4	16	9	24	15
.70	.60	305	199	610	406	915	615	414	270	707	469	1000	669
	.50	82	50	164	104	246	159	107	65	214	135	321	207
	.40	37	21	74	45	111	69	48	27	96	57	144	89
	.30	19	10	38	21	57	33	27	14	54	30	81	48
	.20	13	6	26	14	39	22	17	8	34	18	51	29
	.10	7	3	14	7	21	11	10	4	20	9	30	16
.60	.50	328	181	656	371	984	562	446	246	723	406	1000	567
	.40	81	41	162	86	243	132	111	56	222	118	333	181
	.30	37	17	74	37	111	57	48	22	96	47	144	74
	.20	20	8	40	18	60	29	27	11	54	25	81	39
	.10	11	4	22	9	33	15	15	5	30	12	45	20
.50	.40	328	148	656	305	984	463	446	201	723	333	1000	466
	.30	82	33	164	70	246	109	107	43	214	92	321	142
	.20	34	12	68	27	102	42	43	15	86	33	129	52
	.10	17	5	34	12	51	19	21	6	42	14	63	23
.40	.30	305	107	610	222	915	339	414	145	707	255	1000	367
	.20	70	21	140	46	210	71	94	28	188	61	282	95
	.10	25	6	50	14	75	22	34	8	68	19	102	30
.30	.20	249	62	498	131	747	201	337	84	668	176	1000	270
	.10	51	10	102	22	153	36	68	13	136	30	204	48
.20	.10	169	25	338	54	507	85	225	33	450	72	675	113

Table 28

VALUES OF n,M FOR SELECTING, WITH P(CS) >= P*, A SUBSET OF k = 4 BINOMIAL POPULATIONS WHICH CONTAINS ALL POPULATIONS BETTER THAN AN UPPER STANDARD AND NO POPULATIONS WORSE THAN A LOWER STANDARD (POPULATIONS WITH NO. OF 'SUCCESSES' >= M OUT OF n TRIALS ARE SELECTED)

STANDARD PROPORTIONS		P* = .90						P* = .95					
UPPER	LOWER	n	M	n	M	n	M	n	M	n	M	n	M
.90	.80	190	163	380	330	570	499	252	216	504	438	756	661
	.70	57	47	114	96	171	146	78	64	156	132	234	200
	.60	29	23	58	47	87	73	38	30	76	62	114	95
	.50	17	13	34	27	51	41	24	18	48	38	72	59
	.40	12	9	24	18	36	29	15	11	30	23	45	36
	.30	9	6	18	13	27	21	12	8	24	18	36	28
	.20	6	4	12	9	18	13	8	5	16	11	24	18
	.10	5	3	10	7	15	11	5	3	10	6	15	11
.80	.70	281	212	562	431	843	652	374	282	687	526	1000	771
	.60	77	55	154	113	231	173	104	74	208	153	312	233
	.50	37	25	74	52	111	80	49	33	98	69	147	106
	.40	22	14	44	30	66	46	30	19	60	41	90	63
	.30	15	9	30	20	45	31	17	10	34	22	51	34
	.20	9	5	18	11	27	17	11	6	22	13	33	21
	.10	6	3	12	7	18	11	8	4	16	9	24	15
.70	.60	348	227	674	448	1000	672	457	298	728	482	1000	667
	.50	92	56	184	117	276	178	120	73	240	152	360	232
	.40	44	25	88	53	132	82	55	31	110	66	165	102
	.30	23	12	46	26	69	41	29	15	58	33	87	51
	.20	15	7	30	16	45	25	17	8	34	18	51	28
	.10	9	4	18	9	27	14	12	5	24	12	36	19
.60	.50	377	208	688	388	1000	570	495	273	747	418	1000	565
	.40	93	47	186	99	279	151	123	62	246	130	369	200
	.30	44	20	88	44	132	68	55	25	110	54	165	85
	.20	22	9	44	20	66	32	30	12	60	27	90	44
	.10	12	4	24	10	36	16	15	5	30	12	45	20
.50	.40	377	170	688	319	1000	469	495	223	747	343	1000	465
	.30	92	37	184	79	276	122	120	48	240	103	360	159
	.20	37	13	74	29	111	45	49	17	98	38	147	60
	.10	17	5	34	11	51	19	24	7	48	16	72	27
.40	.30	348	122	674	245	1000	370	457	160	728	262	1000	366
	.20	77	23	154	50	231	78	104	31	208	68	312	106
	.10	29	7	58	16	87	26	38	9	76	21	114	34
.30	.20	281	70	562	148	843	227	374	93	687	180	1000	268
	.10	57	11	114	25	171	40	78	15	156	34	234	55
.20	.10	190	28	380	61	570	96	252	37	504	81	756	127

Table 29

VALUES OF n,M FOR SELECTING, WITH P(CS) >= P*, A SUBSET OF k = 5 BINOMIAL POPULATIONS WHICH CONTAINS ALL POPULATIONS BETTER THAN AN UPPER STANDARD AND NO POPULATIONS WORSE THAN A LOWER STANDARD (POPULATIONS WITH NO. OF 'SUCCESSES' >= M OUT OF n TRIALS ARE SELECTED)

STANDARD PROPORTIONS UPPER	LOWER	P* = .90 n	M	n	M	n	M	P* = .95 n	M	n	M	n	M
.90	.80	210	180	420	365	630	551	266	228	532	462	798	698
	.70	62	51	124	104	186	159	83	68	166	140	249	213
	.60	33	26	66	54	99	83	42	33	84	69	126	105
	.50	20	15	40	32	60	49	25	19	50	40	75	61
	.40	14	10	28	22	42	33	18	13	36	28	54	43
	.30	10	7	20	15	30	23	12	8	24	18	36	28
	.20	6	4	12	8	18	13	9	6	18	13	27	20
	.10	5	3	10	7	15	11	5	3	10	6	15	10
.80	.70	309	233	618	474	927	716	402	303	701	536	1000	770
	.60	87	62	174	128	261	195	111	79	222	163	333	249
	.50	40	27	80	56	120	87	52	35	104	73	156	113
	.40	25	16	50	34	75	53	30	19	60	40	90	63
	.30	15	9	30	19	45	30	20	12	40	26	60	40
	.20	9	5	18	11	27	17	13	7	26	16	39	25
	.10	6	3	12	7	18	11	9	4	18	10	27	16
.70	.60	377	246	688	457	1000	670	486	317	743	491	1000	666
	.50	102	62	204	129	306	198	130	79	260	165	390	252
	.40	46	26	92	55	138	85	57	32	114	68	171	106
	.30	25	13	50	28	75	44	31	16	62	35	93	55
	.20	15	7	30	16	45	25	20	9	40	21	60	34
	.10	10	4	20	10	30	16	12	5	24	11	36	19
.60	.50	415	229	707	398	1000	568	535	295	767	429	1000	564
	.40	103	52	206	109	309	168	133	67	266	141	399	217
	.30	46	21	92	46	138	71	57	26	114	56	171	88
	.20	25	10	50	23	75	36	30	12	60	27	90	43
	.10	14	5	28	11	42	19	18	6	36	15	54	24
.50	.40	415	187	707	326	1000	468	535	241	767	351	1000	463
	.30	102	41	204	87	306	135	130	52	260	111	390	172
	.20	40	14	80	31	120	49	52	18	104	40	156	64
	.10	20	6	40	14	60	22	25	7	50	17	75	28
.40	.30	377	132	688	249	1000	369	486	170	743	266	1000	364
	.20	87	26	174	57	261	88	111	33	222	72	333	113
	.10	33	8	66	18	99	30	42	10	84	23	126	38
.30	.20	309	77	618	162	927	250	402	100	701	182	1000	267
	.10	62	12	124	27	186	43	83	16	166	36	249	58
.20	.10	210	31	420	68	630	106	266	39	532	85	798	134

Table 30

VALUES OF n,M FOR SELECTING, WITH P(CS) >= P*, A SUBSET OF k = 6
BINOMIAL POPULATIONS WHICH CONTAINS ALL POPULATIONS BETTER THAN AN
UPPER STANDARD AND NO POPULATIONS WORSE THAN A LOWER STANDARD
(POPULATIONS WITH NO. OF 'SUCCESSES' >= M OUT OF n TRIALS ARE SELECTED)

STANDARD PROPORTIONS		P* = .90						P* = .95					
UPPER	LOWER	n	M	n	M	n	M	n	M	n	M	n	M
.90	.80	224	192	448	389	672	588	286	245	572	497	858	751
	.70	68	56	136	115	204	174	88	72	176	148	264	225
	.60	34	27	68	56	102	85	46	36	92	75	138	115
	.50	21	16	42	33	63	51	28	21	56	45	84	68
	.40	15	11	30	23	45	36	18	13	36	28	54	43
	.30	10	7	20	15	30	23	13	9	26	19	39	30
	.20	6	4	12	8	18	13	9	6	18	13	27	20
	.10	5	3	10	7	15	11	7	4	14	9	21	15
.80	.70	333	251	666	511	999	772	426	321	713	544	1000	769
	.60	94	67	188	139	282	211	118	84	236	174	354	265
	.50	43	29	86	61	129	93	55	37	110	78	165	119
	.40	25	16	50	34	75	52	32	20	64	43	96	67
	.30	17	10	34	22	51	34	22	13	44	28	66	45
	.20	11	6	22	13	33	21	13	7	26	16	39	25
	.10	6	3	12	6	18	11	9	4	18	10	27	16
.70	.60	409	267	704	467	1000	669	520	339	760	502	1000	665
	.50	107	65	214	135	321	207	135	82	270	171	405	261
	.40	48	27	96	58	144	89	62	35	124	74	186	115
	.30	27	14	54	31	81	48	33	17	66	37	99	58
	.20	17	8	34	18	51	29	22	10	44	23	66	37
	.10	10	4	20	10	30	16	13	5	26	12	39	20
.60	.50	444	245	722	405	1000	567	566	312	783	437	1000	563
	.40	109	55	218	115	327	177	139	70	278	147	417	226
	.30	48	22	96	47	144	74	62	28	124	61	186	96
	.20	25	10	50	23	75	36	32	13	64	29	96	46
	.10	15	5	30	12	45	20	18	6	36	15	54	24
.50	.40	444	200	722	333	1000	467	566	255	783	358	1000	462
	.30	107	43	214	92	321	142	135	54	270	115	405	179
	.20	43	15	86	33	129	53	55	19	110	43	165	67
	.10	21	6	42	14	63	23	28	8	56	19	84	31
.40	.30	409	143	704	254	1000	367	520	182	760	272	1000	363
	.20	94	28	188	61	282	96	118	35	236	77	354	120
	.10	34	8	68	19	102	31	46	11	92	26	138	42
.30	.20	333	83	666	175	999	269	426	106	713	185	1000	266
	.10	68	13	136	30	204	48	88	17	176	39	264	62
.20	.10	224	33	448	72	672	113	286	42	572	92	858	144

Table 31

VALUES OF n,M FOR SELECTING, WITH P(CS) >= P*, A SUBSET OF k = 7 BINOMIAL POPULATIONS WHICH CONTAINS ALL POPULATIONS BETTER THAN AN UPPER STANDARD AND NO POPULATIONS WORSE THAN A LOWER STANDARD (POPULATIONS WITH NO. OF 'SUCCESSES' >= M OUT OF n TRIALS ARE SELECTED)

STANDARD PROPORTIONS		P* = .90						P* = .95					
UPPER	LOWER	n	M	n	M	n	M	n	M	n	M	n	M
.90	.80	238	204	476	414	714	625	300	257	600	521	900	787
	.70	73	60	146	123	219	187	89	73	178	150	267	228
	.60	37	29	74	61	111	93	46	36	92	75	138	115
	.50	21	16	42	33	63	51	28	21	56	44	84	68
	.40	15	11	30	23	45	36	18	13	36	27	54	43
	.30	10	7	20	15	30	23	13	9	26	19	39	30
	.20	8	5	16	11	24	18	10	6	20	14	30	22
	.10	5	3	10	7	15	11	7	4	14	9	21	15
.80	.70	354	267	677	519	1000	772	446	336	723	552	1000	769
	.60	100	71	200	147	300	225	125	89	250	184	375	281
	.50	46	31	92	65	138	100	58	39	116	82	174	126
	.40	27	17	54	36	81	57	35	22	70	47	105	74
	.30	17	10	34	22	51	34	22	13	44	28	66	44
	.20	11	6	22	13	33	21	13	7	26	15	39	25
	.10	8	4	16	9	24	15	10	5	20	11	30	18
.70	.60	434	283	717	475	1000	668	543	354	771	508	1000	664
	.50	112	68	224	142	336	217	145	88	290	184	435	281
	.40	53	30	106	64	159	99	64	36	128	77	192	119
	.30	27	14	54	30	81	48	35	18	70	39	105	62
	.20	17	8	34	18	51	28	22	10	44	23	66	37
	.10	10	4	20	9	30	15	13	5	26	12	39	20
.60	.50	466	257	733	411	1000	566	595	328	797	444	1000	562
	.40	117	59	234	124	351	191	147	74	294	156	441	239
	.30	53	24	106	53	159	82	64	29	128	63	192	98
	.20	27	11	54	25	81	39	35	14	70	32	105	51
	.10	15	5	30	12	45	20	18	6	36	14	54	24
.50	.40	466	210	733	337	1000	466	595	268	797	364	1000	461
	.30	112	45	224	96	336	148	145	58	290	124	435	192
	.20	46	16	92	36	138	56	58	20	116	45	174	71
	.10	21	6	42	14	63	23	28	8	56	19	84	31
.40	.30	434	152	717	258	1000	366	543	190	771	275	1000	362
	.20	100	30	200	65	300	102	125	37	250	81	375	127
	.10	37	9	74	21	111	33	46	11	92	26	138	41
.30	.20	354	88	677	177	1000	269	446	111	723	187	1000	265
	.10	73	14	146	32	219	51	89	17	178	39	267	62
.20	.10	238	35	476	77	714	120	300	44	600	97	900	151

Table 32

VALUES OF n,M FOR SELECTING, WITH P(CS) >= P*, A SUBSET OF k = 8 BINOMIAL POPULATIONS WHICH CONTAINS ALL POPULATIONS BETTER THAN AN UPPER STANDARD AND NO POPULATIONS WORSE THAN A LOWER STANDARD (POPULATIONS WITH NO. OF 'SUCCESSES' >= M OUT OF n TRIALS ARE SELECTED)

STANDARD PROPORTIONS		P* = .90						P* = .95					
UPPER	LOWER	n	M	n	M	n	M	n	M	n	M	n	M
.90	.80	245	210	490	426	735	643	307	263	614	533	921	805
	.70	73	60	146	123	219	187	94	77	188	158	282	241
	.60	38	30	76	62	114	95	47	37	94	77	141	117
	.50	24	18	48	38	72	59	28	21	56	44	84	68
	.40	15	11	30	23	45	36	21	15	42	32	63	50
	.30	10	7	20	15	30	23	15	10	30	22	45	35
	.20	8	5	16	11	24	18	10	6	20	14	30	22
	.10	5	3	10	7	15	11	7	4	14	9	21	15
.80	.70	370	279	685	524	1000	771	466	351	733	559	1000	768
	.60	101	72	202	149	303	227	128	91	256	188	384	287
	.50	49	33	98	69	147	106	61	41	122	86	183	132
	.40	30	19	60	41	90	63	35	22	70	47	105	73
	.30	17	10	34	22	51	34	22	13	44	28	66	44
	.20	11	6	22	13	33	21	15	8	30	18	45	29
	.10	8	4	16	9	24	15	10	5	20	11	30	18
.70	.60	454	296	727	481	1000	668	566	369	783	516	1000	664
	.50	117	71	234	148	351	226	150	91	300	190	450	290
	.40	55	31	110	66	165	102	66	37	132	79	198	122
	.30	29	15	58	33	87	51	37	19	74	42	111	65
	.20	17	8	34	18	51	28	22	10	44	23	66	37
	.10	10	4	20	9	30	15	15	6	30	15	45	24
.60	.50	495	273	747	418	1000	565	615	339	807	449	1000	561
	.40	121	61	242	128	363	197	153	77	306	162	459	249
	.30	55	25	110	54	165	85	66	30	132	65	198	102
	.20	30	12	60	27	90	44	35	14	70	32	105	50
	.10	15	5	30	12	45	20	21	7	42	17	63	28
.50	.40	495	223	747	343	1000	465	615	277	807	368	1000	461
	.30	117	47	234	100	351	155	150	60	300	128	450	199
	.20	49	17	98	38	147	60	61	21	122	47	183	75
	.10	24	7	48	16	72	27	28	8	56	19	84	31
.40	.30	454	159	727	262	1000	366	566	198	783	279	1000	362
	.20	101	30	202	65	303	102	128	38	256	83	384	130
	.10	38	9	76	21	114	34	47	11	94	26	141	42
.30	.20	370	92	685	179	1000	268	466	116	733	189	1000	264
	.10	73	14	146	32	219	51	94	18	188	41	282	66
.20	.10	245	36	490	79	735	123	307	45	614	99	921	155

Table 33

VALUES OF n,M FOR SELECTING, WITH P(CS) >= P*, A SUBSET OF k = 9 BINOMIAL POPULATIONS WHICH CONTAINS ALL POPULATIONS BETTER THAN AN UPPER STANDARD AND NO POPULATIONS WORSE THAN A LOWER STANDARD (POPULATIONS WITH NO. OF 'SUCCESSES' >= M OUT OF n TRIALS ARE SELECTED)

STANDARD PROPORTIONS		P* = .90						P* = .95					
UPPER	LOWER	n	M	n	M	n	M	n	M	n	M	n	M
.90	.80	259	222	518	450	777	680	321	275	642	558	963	842
	.70	78	64	156	131	234	200	99	81	198	167	297	254
	.60	38	30	76	62	114	95	51	40	102	83	153	128
	.50	24	18	48	38	72	59	31	23	62	49	93	76
	.40	17	12	34	26	51	41	21	15	42	32	63	50
	.30	12	8	24	18	36	28	15	10	30	22	45	35
	.20	8	5	16	11	24	18	11	7	22	16	33	25
	.10	5	3	10	6	15	10	7	4	14	9	21	15
.80	.70	386	291	693	530	1000	771	479	361	739	563	1000	767
	.60	108	77	216	159	324	242	135	96	270	199	405	303
	.50	52	35	104	74	156	113	63	42	126	89	189	137
	.40	30	19	60	41	90	63	35	22	70	47	105	73
	.30	19	11	38	24	57	38	24	14	48	31	72	49
	.20	13	7	26	16	39	25	15	8	30	18	45	29
	.10	8	4	16	9	24	14	11	5	22	12	33	20
.70	.60	469	306	734	485	1000	667	586	382	793	522	1000	663
	.50	122	74	244	154	366	236	155	94	310	196	465	300
	.40	55	31	110	66	165	102	70	39	140	84	210	130
	.30	31	16	62	35	93	55	37	19	74	42	111	65
	.20	19	9	38	20	57	32	24	11	48	25	72	40
	.10	12	5	24	12	36	19	15	6	30	14	45	23
.60	.50	515	284	757	423	1000	565	635	350	817	455	1000	561
	.40	127	64	254	135	381	207	157	79	314	166	471	256
	.30	55	25	110	54	165	85	70	32	140	69	210	108
	.20	30	12	60	27	90	43	35	14	70	32	105	50
	.10	17	6	34	14	51	23	21	7	42	17	63	28
.50	.40	515	232	757	347	1000	464	635	286	817	372	1000	460
	.30	122	49	244	104	366	161	155	62	310	133	465	205
	.20	52	18	104	40	156	64	63	22	126	49	189	77
	.10	24	7	48	16	72	26	31	9	62	21	93	34
.40	.30	469	164	734	264	1000	365	586	205	793	282	1000	361
	.20	108	32	216	70	324	110	135	40	270	88	405	137
	.10	38	9	76	21	114	34	51	12	102	29	153	46
.30	.20	386	96	693	181	1000	267	479	119	739	191	1000	264
	.10	78	15	156	34	234	55	99	19	198	43	297	70
.20	.10	259	38	518	83	777	131	321	47	642	103	963	162

Table 34

VALUES OF n,M FOR SELECTING, WITH P(CS) >= P*, A SUBSET OF k = 10 BINOMIAL POPULATIONS WHICH CONTAINS ALL POPULATIONS BETTER THAN AN UPPER STANDARD AND NO POPULATIONS WORSE THAN A LOWER STANDARD (POPULATIONS WITH NO. OF 'SUCCESSES' >= M OUT OF n TRIALS ARE SELECTED)

STANDARD PROPORTIONS		P* = .90						P* = .95					
UPPER	LOWER	n	M	n	M	n	M	n	M	n	M	n	M
.90	.80	266	228	532	462	798	698	328	281	656	570	984	861
	.70	83	68	166	140	249	213	100	82	200	168	300	256
	.60	42	33	84	69	126	105	51	40	102	83	153	127
	.50	25	19	50	40	75	61	32	24	64	51	96	78
	.40	18	13	36	28	54	43	21	15	42	32	63	50
	.30	12	8	24	18	36	28	15	10	30	22	45	35
	.20	8	5	16	11	24	18	11	7	22	16	33	25
	.10	5	3	10	6	15	10	7	4	14	9	21	15
.80	.70	398	300	699	534	1000	770	491	370	745	567	1000	767
	.60	111	79	222	163	333	249	135	96	270	199	405	303
	.50	52	35	104	73	156	113	64	43	128	90	192	139
	.40	30	19	60	40	90	63	38	24	76	51	114	80
	.30	20	12	40	26	60	40	24	14	48	31	72	48
	.20	13	7	26	16	39	25	15	8	30	18	45	29
	.10	8	4	16	9	24	14	11	5	22	12	33	20
.70	.60	483	315	741	490	1000	666	603	393	801	527	1000	662
	.50	127	77	254	161	381	246	155	94	310	196	465	300
	.40	57	32	114	68	171	106	73	41	146	88	219	136
	.30	31	16	62	35	93	55	39	20	78	44	117	69
	.20	20	9	40	21	60	34	24	11	48	25	72	40
	.10	12	5	24	11	36	19	15	6	30	14	45	23
.60	.50	526	290	763	426	1000	564	655	361	827	460	1000	560
	.40	131	66	262	139	393	213	163	82	326	173	489	265
	.30	57	26	114	56	171	88	73	33	146	72	219	113
	.20	30	12	60	27	90	43	38	15	76	35	114	55
	.10	18	6	36	15	54	24	21	7	42	17	63	28
.50	.40	526	237	763	350	1000	464	655	295	827	377	1000	459
	.30	127	51	254	109	381	168	155	62	310	132	465	205
	.20	52	18	104	40	156	64	64	22	128	50	192	78
	.10	25	7	50	17	75	28	32	9	64	22	96	35
.40	.30	483	169	741	266	1000	364	603	211	801	285	1000	360
	.20	111	33	222	72	333	113	135	40	270	88	405	137
	.10	42	10	84	23	126	38	51	12	102	28	153	46
.30	.20	398	99	699	182	1000	267	491	122	745	192	1000	263
	.10	83	16	166	36	249	58	100	19	200	44	300	70
.20	.10	266	39	532	86	798	134	328	48	656	105	984	165

Table 35

VALUES OF n,M FOR SELECTING, WITH P(CS) >= P*, A SUBSET OF k = 11 BINOMIAL POPULATIONS WHICH CONTAINS ALL POPULATIONS BETTER THAN AN UPPER STANDARD AND NO POPULATIONS WORSE THAN A LOWER STANDARD (POPULATIONS WITH NO. OF 'SUCCESSES' >= M OUT OF n TRIALS ARE SELECTED)

STANDARD PROPORTIONS UPPER	LOWER	P* = .90 n	M	n	M	n	M	P* = .95 n	M	n	M	n	M
.90	.80	273	234	546	474	819	716	335	287	667	579	1000	875
	.70	84	69	168	142	252	215	100	82	200	168	300	256
	.60	42	33	84	69	126	105	51	40	102	83	153	127
	.50	25	19	50	40	75	61	32	24	64	51	96	78
	.40	18	13	36	28	54	43	21	15	42	32	63	50
	.30	12	8	24	18	36	28	15	10	30	22	45	35
	.20	9	6	18	13	27	20	11	7	22	16	33	25
	.10	5	3	10	6	15	10	7	4	14	9	21	15
.80	.70	410	309	705	539	1000	770	503	379	751	572	1000	767
	.60	114	81	228	168	342	256	141	100	282	208	423	316
	.50	55	37	110	78	165	120	66	44	132	93	198	143
	.40	30	19	60	40	90	63	38	24	76	51	114	80
	.30	21	12	42	27	63	43	24	14	48	31	72	48
	.20	13	7	26	16	39	25	15	8	30	18	45	29
	.10	9	4	18	10	27	16	11	5	22	12	33	20
.70	.60	503	328	751	496	1000	666	615	401	807	531	1000	662
	.50	132	80	264	167	396	256	160	97	320	202	480	310
	.40	61	34	122	73	183	113	73	41	146	87	219	135
	.30	33	17	66	37	99	58	39	20	78	44	117	69
	.20	21	10	42	22	63	35	24	11	48	25	72	40
	.10	12	5	24	11	36	19	15	6	30	14	45	23
.60	.50	546	301	773	432	1000	564	673	371	836	465	1000	559
	.40	135	68	270	143	405	220	167	84	334	177	501	272
	.30	61	28	122	60	183	94	73	33	146	72	219	112
	.20	30	12	60	27	90	43	38	15	76	34	114	55
	.10	18	6	36	15	54	24	21	7	42	17	63	28
.50	.40	546	246	773	354	1000	463	673	303	836	380	1000	459
	.30	132	53	264	113	396	175	160	64	320	137	480	212
	.20	55	19	110	43	165	67	66	23	132	51	198	81
	.10	25	7	50	17	75	27	32	9	64	22	96	35
.40	.30	503	176	751	269	1000	364	615	215	807	287	1000	360
	.20	114	34	228	74	342	116	141	42	282	92	423	143
	.10	42	10	84	23	126	38	51	12	102	28	153	46
.30	.20	410	102	705	183	1000	266	503	125	751	193	1000	263
	.10	84	16	168	37	252	59	100	19	200	44	300	70
.20	.10	273	40	546	88	819	137	335	49	667	107	1000	168

Table 36

VALUES OF n,M FOR SELECTING, WITH P(CS) >= P*, A SUBSET OF k = 12 BINOMIAL POPULATIONS WHICH CONTAINS ALL POPULATIONS BETTER THAN AN UPPER STANDARD AND NO POPULATIONS WORSE THAN A LOWER STANDARD (POPULATIONS WITH NO. OF 'SUCCESSES' >= M OUT OF n TRIALS ARE SELECTED)

STANDARD PROPORTIONS		P* = .90						P* = .95					
UPPER	LOWER	n	M	n	M	n	M	n	M	n	M	n	M
.90	.80	286	245	572	497	858	751	348	298	674	585	1000	874
	.70	84	69	168	141	252	215	105	86	210	177	315	269
	.60	43	34	86	70	129	107	55	43	110	90	165	138
	.50	28	21	56	45	84	69	32	24	64	51	96	78
	.40	18	13	36	28	54	43	21	15	42	32	63	50
	.30	13	9	26	19	39	30	15	10	30	22	45	35
	.20	9	6	18	13	27	20	11	7	22	15	33	25
	.10	5	3	10	6	15	10	7	4	14	9	21	15
.80	.70	422	318	711	543	1000	769	515	388	757	576	1000	766
	.60	118	84	236	174	354	265	142	101	284	209	426	319
	.50	55	37	110	78	165	119	69	46	138	98	207	150
	.40	32	20	64	43	96	67	40	25	80	54	120	84
	.30	21	12	42	27	63	42	24	14	48	31	72	48
	.20	13	7	26	16	39	25	15	8	30	18	45	28
	.10	9	4	18	10	27	16	11	5	22	12	33	20
.70	.60	517	337	758	500	1000	665	629	410	814	535	1000	661
	.50	135	82	270	171	405	261	165	100	330	209	495	319
	.40	62	35	124	74	186	115	75	42	150	90	225	139
	.30	33	17	66	37	99	58	41	21	82	46	123	72
	.20	21	10	42	22	63	35	24	11	48	25	72	40
	.10	13	5	26	12	39	20	15	6	30	14	45	23
.60	.50	564	311	782	436	1000	563	686	378	843	468	1000	559
	.40	139	70	278	147	417	226	169	85	338	179	507	275
	.30	62	28	124	61	186	96	75	34	150	74	225	116
	.20	32	13	64	29	96	46	40	16	80	36	120	58
	.10	18	6	36	15	54	24	21	7	42	17	63	27
.50	.40	564	254	782	358	1000	462	686	309	843	383	1000	458
	.30	135	54	270	116	405	179	165	66	330	141	495	218
	.20	55	19	110	43	165	67	69	24	138	54	207	85
	.10	28	8	56	19	84	31	32	9	64	22	96	35
.40	.30	517	181	758	271	1000	363	629	220	814	289	1000	359
	.20	118	35	236	77	354	120	142	42	284	92	426	144
	.10	43	10	86	24	129	39	55	13	110	31	165	50
.30	.20	422	105	711	185	1000	266	515	128	757	194	1000	262
	.10	84	16	168	37	252	59	105	20	210	46	315	74
.20	.10	286	42	572	92	858	144	348	51	674	108	1000	167

Table 37

VALUES OF n,M FOR SELECTING, WITH P(CS) >= P*, A SUBSET OF k = 13 BINOMIAL POPULATIONS WHICH CONTAINS ALL POPULATIONS BETTER THAN AN UPPER STANDARD AND NO POPULATIONS WORSE THAN A LOWER STANDARD (POPULATIONS WITH NO. OF 'SUCCESSES' >= M OUT OF n TRIALS ARE SELECTED)

STANDARD PROPORTIONS		P* = .90						P* = .95					
UPPER	LOWER	n	M	n	M	n	M	n	M	n	M	n	M
.90	.80	293	251	586	509	879	769	355	304	677	588	1000	874
	.70	89	73	178	150	267	228	105	86	210	177	315	269
	.60	46	36	92	75	138	115	55	43	110	90	165	138
	.50	28	21	56	44	84	68	32	24	64	51	96	78
	.40	18	13	36	28	54	43	21	15	42	32	63	50
	.30	13	9	26	19	39	30	15	10	30	22	45	34
	.20	10	6	20	14	30	23	11	7	22	15	33	24
	.10	7	4	14	9	21	15	7	4	14	9	21	15
.80	.70	434	327	717	547	1000	769	527	397	763	580	1000	766
	.60	118	84	236	174	354	265	145	103	290	213	435	325
	.50	58	39	116	82	174	126	69	46	138	97	207	150
	.40	35	22	70	48	105	74	40	25	80	54	120	84
	.30	22	13	44	28	66	45	24	14	48	31	72	48
	.20	13	7	26	16	39	25	17	9	34	21	51	33
	.10	10	5	20	11	30	18	11	5	22	12	33	20
.70	.60	526	343	763	503	1000	665	646	421	823	541	1000	661
	.50	140	85	280	177	420	271	170	103	340	215	510	329
	.40	64	36	128	77	192	119	75	42	150	90	225	139
	.30	33	17	66	37	99	58	41	21	82	46	123	72
	.20	22	10	44	23	66	37	24	11	48	25	72	40
	.10	13	5	26	12	39	20	15	6	30	14	45	23
.60	.50	575	317	787	439	1000	563	704	388	852	473	1000	559
	.40	143	72	286	152	429	233	173	87	346	183	519	282
	.30	64	29	128	63	192	99	75	34	150	74	225	115
	.20	35	14	70	32	105	51	40	16	80	36	120	58
	.10	18	6	36	14	54	24	21	7	42	17	63	27
.50	.40	575	259	787	360	1000	462	704	317	852	387	1000	458
	.30	140	56	280	120	420	185	170	68	340	146	510	225
	.20	58	20	116	45	174	71	69	24	138	53	207	84
	.10	28	8	56	19	84	31	32	9	64	21	96	35
.40	.30	526	184	763	273	1000	363	646	226	823	292	1000	359
	.20	118	35	236	76	354	120	145	43	290	94	435	147
	.10	46	11	92	26	138	42	55	13	110	31	165	50
.30	.20	434	108	717	186	1000	265	527	131	763	196	1000	262
	.10	89	17	178	39	267	62	105	20	210	46	315	73
.20	.10	293	43	586	94	879	148	355	52	677	108	1000	167

Table 38

VALUES OF n,M FOR SELECTING, WITH P(CS) >= P*, A SUBSET OF k = 14 BINOMIAL POPULATIONS WHICH CONTAINS ALL POPULATIONS BETTER THAN AN UPPER STANDARD AND NO POPULATIONS WORSE THAN A LOWER STANDARD (POPULATIONS WITH NO. OF 'SUCCESSES' >= M OUT OF n TRIALS ARE SELECTED)

STANDARD PROPORTIONS		P* = .90						P* = .95					
UPPER	LOWER	n	M	n	M	n	M	n	M	n	M	n	M
.90	.80	299	256	598	520	897	785	362	310	681	591	1000	874
	.70	89	73	178	150	267	228	110	90	220	185	330	282
	.60	46	36	92	75	138	115	55	43	110	90	165	137
	.50	28	21	56	44	84	68	32	24	64	50	96	78
	.40	18	13	36	27	54	43	21	15	42	32	63	50
	.30	13	9	26	19	39	30	15	10	30	22	45	34
	.20	10	6	20	14	30	22	11	7	22	15	33	24
	.10	7	4	14	9	21	15	7	4	14	9	21	15
.80	.70	442	333	721	550	1000	769	535	403	767	583	1000	765
	.60	121	86	242	178	363	271	149	106	298	219	447	334
	.50	58	39	116	82	174	126	72	48	144	102	216	156
	.40	35	22	70	47	105	74	40	25	80	54	120	84
	.30	22	13	44	28	66	44	26	15	52	33	78	52
	.20	13	7	26	15	39	25	17	9	34	20	51	33
	.10	10	5	20	11	30	18	11	5	22	12	33	20
.70	.60	543	354	771	508	1000	664	655	427	827	543	1000	661
	.50	140	85	280	177	420	271	170	103	340	215	510	329
	.40	64	36	128	77	192	119	77	43	154	92	231	143
	.30	35	18	70	39	105	62	41	21	82	46	123	72
	.20	22	10	44	23	66	37	26	12	52	27	78	43
	.10	13	5	26	12	39	20	15	6	30	14	45	23
.60	.50	586	323	793	442	1000	562	715	394	857	475	1000	558
	.40	145	73	290	154	435	236	177	89	354	187	531	288
	.30	64	29	128	63	192	99	77	35	154	76	231	118
	.20	35	14	70	32	105	51	40	16	80	36	120	57
	.10	18	6	36	14	54	24	21	7	42	17	63	27
.50	.40	586	264	793	362	1000	462	715	322	857	389	1000	458
	.30	140	56	280	120	420	185	170	68	340	145	510	225
	.20	58	20	116	45	174	71	72	25	144	56	216	88
	.10	28	8	56	19	84	31	32	9	64	21	96	35
.40	.30	543	190	771	275	1000	362	655	229	827	293	1000	359
	.20	121	36	242	78	363	123	149	44	298	97	447	151
	.10	46	11	92	26	138	41	55	13	110	30	165	49
.30	.20	442	110	721	187	1000	265	535	133	767	197	1000	262
	.10	89	17	178	39	267	62	110	21	220	48	330	77
.20	.10	299	44	598	96	897	151	362	53	681	109	1000	167

Table 39

VALUES OF n,M FOR SELECTING, WITH P(CS) >= P*, A SUBSET OF k = 15
BINOMIAL POPULATIONS WHICH CONTAINS ALL POPULATIONS BETTER THAN AN
UPPER STANDARD AND NO POPULATIONS WORSE THAN A LOWER STANDARD
(POPULATIONS WITH NO. OF 'SUCCESSES' >= M OUT OF n TRIALS ARE SELECTED)

STANDARD PROPORTIONS		P* = .90						P* = .95					
UPPER	LOWER	n	M	n	M	n	M	n	M	n	M	n	M
.90	.80	300	257	600	521	900	787	368	315	684	594	1000	874
	.70	94	77	188	158	282	241	111	91	222	187	333	284
	.60	47	37	94	77	141	118	56	44	112	91	168	140
	.50	28	21	56	44	84	68	35	26	70	55	105	85
	.40	18	13	36	27	54	43	24	17	48	37	72	57
	.30	13	9	26	19	39	30	16	11	32	24	48	37
	.20	10	6	20	14	30	22	11	7	22	15	33	24
	.10	7	4	14	9	21	15	7	4	14	9	21	15
.80	.70	454	342	727	555	1000	768	547	412	773	588	1000	765
	.60	125	89	250	184	375	280	152	108	304	224	456	341
	.50	60	40	120	85	180	130	72	48	144	102	216	156
	.40	35	22	70	47	105	73	40	25	80	54	120	84
	.30	22	13	44	28	66	44	26	15	52	33	78	52
	.20	15	8	30	18	45	29	17	9	34	20	51	33
	.10	10	5	20	11	30	18	11	5	22	12	33	20
.70	.60	549	358	774	510	1000	664	669	436	834	548	1000	660
	.50	145	88	290	184	435	281	175	106	350	221	525	339
	.40	64	36	128	77	192	119	80	45	160	96	240	148
	.30	35	18	70	39	105	62	43	22	86	48	129	76
	.20	22	10	44	23	66	37	26	12	52	27	78	43
	.10	13	5	26	12	39	20	16	6	32	15	48	25
.60	.50	597	329	798	445	1000	562	726	400	863	479	1000	558
	.40	149	75	298	158	447	243	179	90	358	190	537	291
	.30	64	29	128	63	192	98	80	36	160	79	240	123
	.20	35	14	70	32	105	51	40	16	80	36	120	57
	.10	18	6	36	14	54	23	24	8	48	20	72	32
.50	.40	597	269	798	364	1000	461	726	327	863	392	1000	457
	.30	145	58	290	124	435	192	175	70	350	150	525	232
	.20	60	21	120	47	180	74	72	25	144	56	216	88
	.10	28	8	56	19	84	31	35	10	70	24	105	39
.40	.30	549	192	774	276	1000	362	669	234	834	296	1000	358
	.20	125	37	250	81	375	127	152	45	304	99	456	154
	.10	47	11	94	26	141	42	56	13	112	31	168	50
.30	.20	454	113	727	188	1000	265	547	136	773	198	1000	261
	.10	94	18	188	41	282	66	111	21	222	49	333	78
.20	.10	300	44	600	96	900	151	368	54	684	109	1000	166

Table 40

VALUES OF n,M FOR SELECTING, WITH P(CS) >= P*, A SUBSET OF k = 16 BINOMIAL POPULATIONS WHICH CONTAINS ALL POPULATIONS BETTER THAN AN UPPER STANDARD AND NO POPULATIONS WORSE THAN A LOWER STANDARD (POPULATIONS WITH NO. OF 'SUCCESSES' >= M OUT OF n TRIALS ARE SELECTED)

STANDARD PROPORTIONS		P* = .90						P* = .95					
UPPER	LOWER	n	M	n	M	n	M	n	M	n	M	n	M
.90	.80	307	263	614	534	921	806	369	316	684	593	1000	873
	.70	94	77	188	158	282	241	111	91	222	187	333	284
	.60	47	37	94	77	141	117	56	44	112	91	168	140
	.50	28	21	56	44	84	68	35	26	70	55	105	85
	.40	18	13	36	27	54	43	24	17	48	37	72	57
	.30	13	9	26	19	39	30	18	12	36	27	54	42
	.20	10	6	20	14	30	22	11	7	22	15	33	24
	.10	7	4	14	9	21	15	7	4	14	9	21	14
.80	.70	462	348	731	557	1000	768	555	418	777	591	1000	765
	.60	128	91	256	188	384	287	152	108	304	224	456	341
	.50	61	41	122	86	183	133	72	48	144	102	216	156
	.40	35	22	70	47	105	73	43	27	86	58	129	90
	.30	22	13	44	28	66	44	26	15	52	33	78	52
	.20	15	8	30	18	45	29	17	9	34	20	51	32
	.10	10	5	20	11	30	18	11	5	22	12	33	20
.70	.60	563	367	781	515	1000	664	675	440	837	549	1000	660
	.50	145	88	290	183	435	280	175	106	350	221	525	338
	.40	66	37	132	79	198	122	82	46	164	98	246	152
	.30	35	18	70	39	105	62	43	22	86	48	129	76
	.20	22	10	44	23	66	37	26	12	52	27	78	43
	.10	13	5	26	12	39	20	18	7	36	17	54	28
.60	.50	613	338	806	449	1000	561	737	406	868	481	1000	557
	.40	151	76	302	160	453	246	183	92	366	194	549	298
	.30	66	30	132	65	198	102	82	37	164	81	246	126
	.20	35	14	70	32	105	50	43	17	86	39	129	62
	.10	18	6	36	14	54	23	24	8	48	19	72	32
.50	.40	613	276	806	368	1000	461	737	332	868	394	1000	457
	.30	145	58	290	124	435	192	175	70	350	150	525	231
	.20	61	21	122	47	183	75	72	25	144	56	216	88
	.10	28	8	56	19	84	31	35	10	70	24	105	39
.40	.30	563	197	781	279	1000	362	675	236	837	296	1000	358
	.20	128	38	256	83	384	130	152	45	304	99	456	154
	.10	47	11	94	26	141	42	56	13	112	31	168	50
.30	.20	462	115	731	189	1000	264	555	138	777	199	1000	261
	.10	94	18	188	41	282	66	111	21	222	48	333	78
.20	.10	307	45	614	99	921	155	369	54	684	109	1000	166

Table 41

VALUES OF n,M FOR SELECTING, WITH P(CS) >= P*, A SUBSET OF k = 17 BINOMIAL POPULATIONS WHICH CONTAINS ALL POPULATIONS BETTER THAN AN UPPER STANDARD AND NO POPULATIONS WORSE THAN A LOWER STANDARD (POPULATIONS WITH NO. OF 'SUCCESSES' >= M OUT OF n TRIALS ARE SELECTED)

STANDARD PROPORTIONS		P* = .90						P* = .95					
UPPER	LOWER	n	M	n	M	n	M	n	M	n	M	n	M
.90	.80	314	269	628	546	942	824	376	322	688	597	1000	873
	.70	94	77	188	158	282	241	115	94	230	194	345	294
	.60	47	37	94	77	141	117	59	46	118	96	177	148
	.50	31	23	62	49	93	76	35	26	70	55	105	85
	.40	21	15	42	32	63	50	24	17	48	37	72	57
	.30	15	10	30	22	45	35	18	12	36	27	54	42
	.20	11	7	22	16	33	25	11	7	22	15	33	24
	.10	7	4	14	9	21	15	7	4	14	9	21	14
.80	.70	470	354	735	560	1000	768	563	424	781	593	1000	765
	.60	128	91	256	188	384	287	155	110	310	228	465	348
	.50	61	41	122	86	183	132	75	50	150	106	225	163
	.40	35	22	70	47	105	73	43	27	86	58	129	90
	.30	22	13	44	28	66	44	28	16	56	36	84	57
	.20	15	8	30	18	45	29	17	9	34	20	51	32
	.10	11	5	22	13	33	20	11	5	22	12	33	20
.70	.60	569	371	784	516	1000	663	689	449	844	554	1000	660
	.50	150	91	300	190	450	290	180	109	360	228	540	348
	.40	66	37	132	79	198	122	82	46	164	98	246	152
	.30	37	19	74	42	111	63	43	22	86	48	129	76
	.20	22	10	44	23	66	37	28	13	56	29	84	47
	.10	15	6	30	14	45	24	18	7	36	17	54	28
.60	.50	624	344	812	452	1000	561	746	411	873	484	1000	557
	.40	153	77	306	162	459	249	185	93	370	196	555	301
	.30	66	30	132	65	198	101	82	37	164	81	246	126
	.20	35	14	70	32	105	50	43	17	86	39	129	62
	.10	21	7	42	17	63	28	24	8	48	19	72	32
.50	.40	624	281	812	370	1000	460	746	336	873	396	1000	457
	.30	150	60	300	128	450	198	180	72	360	154	540	238
	.20	61	21	122	47	183	75	75	26	150	58	225	92
	.10	31	9	62	21	93	34	35	10	70	24	105	39
.40	.30	569	199	784	279	1000	361	689	241	844	299	1000	358
	.20	128	38	256	83	384	130	155	46	310	101	465	157
	.10	47	11	94	26	141	42	59	14	118	33	177	53
.30	.20	470	117	735	190	1000	264	563	140	781	200	1000	261
	.10	94	18	188	41	282	66	115	22	230	50	345	81
.20	.10	314	46	628	101	942	158	376	55	688	109	1000	166

Table 42

VALUES OF n,M FOR SELECTING, WITH P(CS) >= P*, A SUBSET OF k = 18
BINOMIAL POPULATIONS WHICH CONTAINS ALL POPULATIONS BETTER THAN AN
UPPER STANDARD AND NO POPULATIONS WORSE THAN A LOWER STANDARD
(POPULATIONS WITH NO. OF 'SUCCESSES' >= M OUT OF n TRIALS ARE SELECTED)

STANDARD PROPORTIONS		P* = .90						P* = .95					
UPPER	LOWER	n	M	n	M	n	M	n	M	n	M	n	M
.90	.80	314	269	628	546	942	824	383	328	691	599	1000	873
	.70	99	81	198	167	297	254	116	95	232	195	348	297
	.60	47	37	94	77	141	117	59	46	118	96	177	147
	.50	31	23	62	49	93	76	36	27	72	57	108	88
	.40	21	15	42	32	63	50	24	17	48	37	72	57
	.30	15	10	30	22	45	35	18	12	36	27	54	42
	.20	11	7	22	16	33	25	11	7	22	15	33	24
	.10	7	4	14	9	21	15	7	4	14	9	21	14
.80	.70	475	358	737	562	1000	768	571	430	785	596	1000	764
	.60	132	94	264	194	396	296	159	113	318	234	477	357
	.50	63	42	126	89	189	137	75	50	150	106	225	163
	.40	35	22	70	47	105	73	43	27	86	58	129	90
	.30	24	14	48	31	72	49	28	16	56	36	84	56
	.20	15	8	30	18	45	29	17	9	34	20	51	32
	.10	11	5	22	12	33	20	11	5	22	12	33	20
.70	.60	583	380	791	521	1000	663	695	453	847	556	1000	659
	.50	150	91	300	190	450	290	180	109	360	228	540	348
	.40	68	38	136	81	204	126	82	46	164	98	246	152
	.30	37	19	74	42	111	65	45	23	90	51	135	79
	.20	24	11	48	25	72	40	28	13	56	29	84	47
	.10	15	6	30	14	45	23	18	7	36	17	54	28
.60	.50	633	349	816	454	1000	561	764	421	882	489	1000	557
	.40	157	79	314	166	471	256	187	94	374	198	561	304
	.30	68	31	136	67	204	105	82	37	164	81	246	126
	.20	35	14	70	32	105	50	43	17	86	39	129	62
	.10	21	7	42	17	63	28	24	8	48	19	72	32
.50	.40	633	285	816	372	1000	460	764	344	882	400	1000	456
	.30	150	60	300	128	450	198	180	72	360	154	540	238
	.20	63	22	126	49	189	77	75	26	150	58	225	92
	.10	31	9	62	21	93	34	36	10	72	24	108	40
.40	.30	583	204	791	282	1000	361	695	243	847	300	1000	357
	.20	132	39	264	86	396	134	159	47	318	103	477	161
	.10	47	11	94	26	141	42	59	14	118	33	177	53
.30	.20	475	118	737	190	1000	264	571	142	785	200	1000	260
	.10	99	19	198	44	297	70	116	22	232	51	348	81
.20	.10	314	46	628	101	942	158	383	56	691	110	1000	166

Table 43

VALUES OF n,M FOR SELECTING, WITH P(CS) >= P*, A SUBSET OF k = 19 BINOMIAL POPULATIONS WHICH CONTAINS ALL POPULATIONS BETTER THAN AN UPPER STANDARD AND NO POPULATIONS WORSE THAN A LOWER STANDARD (POPULATIONS WITH NO. OF 'SUCCESSES' >= M OUT OF n TRIALS ARE SELECTED)

STANDARD PROPORTIONS		P* = .90						P* = .95					
UPPER	LOWER	n	M	n	M	n	M	n	M	n	M	n	M
.90	.80	321	275	642	558	963	842	383	328	691	599	1000	873
	.70	99	81	198	167	297	253	116	95	232	195	348	297
	.60	51	40	102	83	153	128	60	47	120	98	180	150
	.50	31	23	62	49	93	76	36	27	72	57	108	88
	.40	21	15	42	32	63	50	24	17	48	37	72	57
	.30	15	10	30	22	45	35	18	12	36	27	54	42
	.20	11	7	22	16	33	25	13	8	26	18	39	29
	.10	7	4	14	9	21	15	9	5	18	12	27	19
.80	.70	483	364	741	565	1000	767	579	436	789	599	1000	764
	.60	135	96	270	199	405	303	159	113	318	234	477	357
	.50	64	43	128	90	192	139	75	50	150	106	225	163
	.40	35	22	70	47	105	73	43	27	86	58	129	90
	.30	24	14	48	31	72	49	28	16	56	36	84	56
	.20	15	8	30	18	45	29	17	9	34	20	51	32
	.10	11	5	22	12	33	20	13	6	26	15	39	24
.70	.60	589	384	794	523	1000	663	707	461	853	559	1000	659
	.50	155	94	310	196	465	300	185	112	370	234	555	358
	.40	71	40	142	85	213	132	84	47	168	101	252	156
	.30	37	19	74	41	111	65	45	23	90	51	135	79
	.20	24	11	48	25	72	40	28	13	56	29	84	47
	.10	15	6	30	14	45	23	18	7	36	17	54	28
.60	.50	644	355	822	457	1000	560	766	422	883	489	1000	537
	.40	159	80	318	168	477	259	191	96	382	202	573	311
	.30	71	32	142	70	213	109	84	38	168	83	252	129
	.20	35	14	70	31	105	50	43	17	86	39	129	62
	.10	21	7	42	17	63	28	24	8	48	19	72	31
.50	.40	644	290	822	375	1000	460	766	345	883	400	1000	456
	.30	155	62	310	133	465	205	185	74	370	158	555	245
	.20	64	22	128	50	192	78	75	26	150	58	225	92
	.10	31	9	62	21	93	34	36	10	72	24	108	40
.40	.30	589	206	794	283	1000	361	707	247	853	302	1000	357
	.20	135	40	270	88	405	137	159	47	318	103	477	161
	.10	51	12	102	28	153	46	60	14	120	33	180	54
.30	.20	483	120	741	191	1000	264	579	144	789	201	1000	260
	.10	99	19	198	43	297	69	116	22	232	51	348	81
.20	.10	321	47	642	103	963	162	383	56	691	110	1000	166

Table 44

VALUES OF n,M FOR SELECTING, WITH P(CS) >= P*, A SUBSET OF k = 20 BINOMIAL POPULATIONS WHICH CONTAINS ALL POPULATIONS BETTER THAN AN UPPER STANDARD AND NO POPULATIONS WORSE THAN A LOWER STANDARD (POPULATIONS WITH NO. OF 'SUCCESSES' >= M OUT OF n TRIALS ARE SELECTED)

STANDARD PROPORTIONS		P* = .90						P* = .95					
UPPER	LOWER	n	M	n	M	n	M	n	M	n	M	n	M
.90	.80	328	281	656	570	984	861	390	334	695	602	1000	873
	.70	100	82	200	168	300	256	116	95	232	195	348	297
	.60	51	40	102	83	153	128	60	47	120	98	180	150
	.50	32	24	64	51	96	78	36	27	72	57	108	88
	.40	21	15	42	32	63	50	24	17	48	37	72	57
	.30	15	10	30	22	45	35	18	12	36	27	54	42
	.20	11	7	22	16	33	25	13	8	26	18	39	29
	.10	7	4	14	9	21	15	9	5	18	12	27	19
.80	.70	491	370	745	568	1000	767	587	442	793	602	1000	764
	.60	135	96	270	199	405	303	162	115	324	238	486	363
	.50	64	43	128	90	192	139	78	52	156	110	234	169
	.40	38	24	76	51	114	80	43	27	86	58	129	90
	.30	24	14	48	31	72	48	28	16	56	36	84	56
	.20	15	8	30	18	45	29	19	10	38	23	57	37
	.10	11	5	22	12	33	20	13	6	26	15	39	24
.70	.60	595	388	797	524	1000	663	715	466	857	562	1000	659
	.50	155	94	310	196	465	300	185	112	370	234	555	358
	.40	71	40	142	85	213	132	84	47	168	101	252	156
	.30	39	20	78	44	117	69	45	23	90	50	135	79
	.20	24	11	48	25	72	40	28	13	56	29	84	47
	.10	15	6	30	14	45	23	18	7	36	17	54	28
.60	.50	646	356	823	458	1000	560	777	428	868	492	1000	556
	.40	161	81	322	171	483	262	193	97	386	204	579	314
	.30	71	32	142	70	213	109	84	38	168	83	252	129
	.20	38	15	76	35	114	55	43	17	86	39	129	62
	.10	21	7	42	17	63	28	24	8	48	19	72	31
.50	.40	646	291	823	375	1000	460	777	350	888	402	1000	456
	.30	155	62	310	133	465	205	185	74	370	158	555	245
	.20	64	22	128	50	192	78	78	27	156	61	234	96
	.10	32	9	64	22	96	36	36	10	72	24	108	40
.40	.30	595	208	797	284	1000	361	715	250	857	303	1000	357
	.20	135	40	270	88	405	137	162	48	324	105	486	164
	.10	51	12	102	28	153	46	60	14	120	33	180	54
.30	.20	491	122	745	192	1000	263	587	146	793	202	1000	260
	.10	100	19	200	44	300	70	116	22	232	51	348	81
.20	.10	328	48	656	106	984	165	390	57	695	110	1000	165

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☐ Document describes a computer program; SF-185, FIPS Software Summary, is attached.

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.)*

This publication addresses the data analysis component of the computer service selection process. A computer service selection model, introduced in NBS Special Publication 500-44, is presented and three binary type selection procedures applicable in the measurement phases of that model are given. A binary type procedure determines which of a set of competing computer services perform above and which perform below a specified performance level. As a result of employing these procedures, those services that perform below the performance level can be eliminated or penalized depending on whether the performance specification is mandatory or desirable in nature. The procedures explicitly specify prior to measurement an appropriate selection rule and/or the number of test measurements required in a comparison effort to attain a given level of statistical confidence in the results. Experimental data from a previous case study are reanalyzed to illustrate application of the selection procedures.

17. KEY WORDS *(six to twelve entries; alphabetical order; capitalize only the first letter of the first key word unless a proper name; separated by semicolons)*

Binary selection; computer comparison; computer measurement; computer service; data analysis; performance evaluation; ranking and selection; selection methodology.

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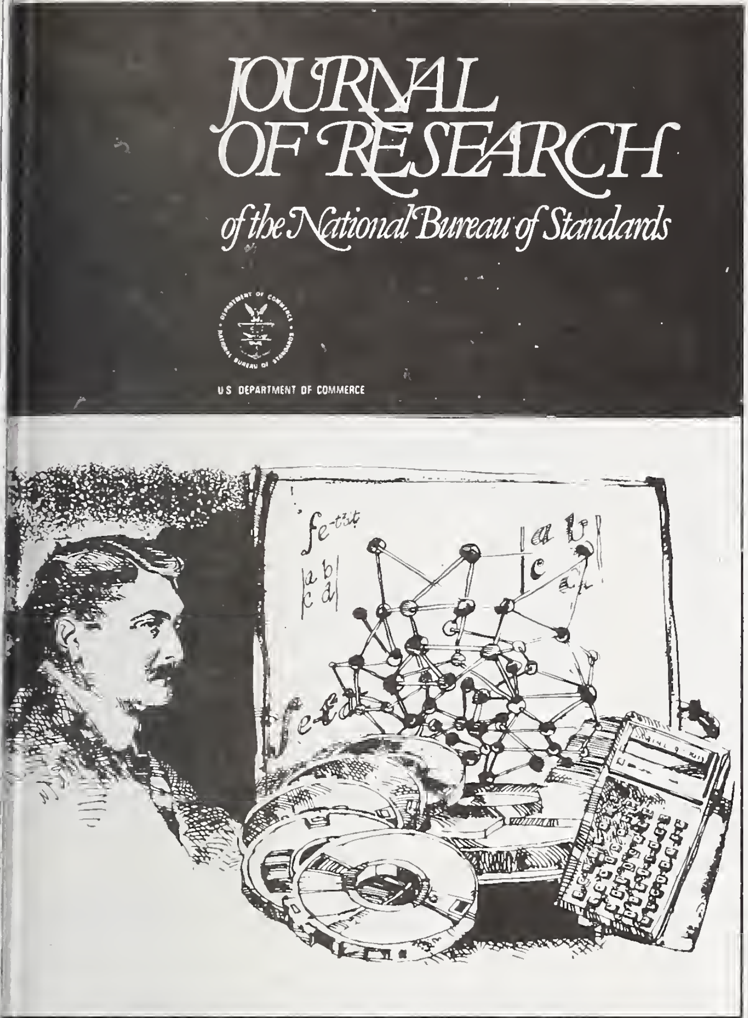

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