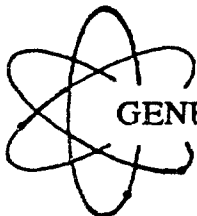


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US Army Corps
of Engineers
Hydrologic Engineering Center



GENERALIZED COMPUTER PROGRAM

HEC-4

Monthly Streamflow Simulation

User's Manual

February 1971

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February 1971

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MONTHLY STREAMFLOW SIMULATION

HYDROLOGIC ENGINEERING CENTER
COMPUTER PROGRAM 723-X6-L2340

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HEC-4

MONTHLY STREAMFLOW SIMULATION

HYDROLOGIC ENGINEERING CENTER
COMPUTER PROGRAM 723-X6-L2340

1. ORIGIN OF PROGRAM

This program was prepared in The Hydrologic Engineering Center, Corps of Engineers. Up-to-date information and copies of source statement cards for various types of computers can be obtained from the Center upon request by Government and cooperating agencies. Programs are furnished by the Government and are accepted and used by the recipient upon the express understanding that the United States Government makes no warranties, express or implied, concerning the accuracy, completeness, reliability, usability, or suitability for any particular purpose of the information and data contained in the programs or furnished in connection therewith, and the United States shall be under no liability whatsoever to any person by reason of any use made thereof.

The programs belong to the Government. Therefore, the recipient further agrees not to assert any proprietary rights therein or to represent the programs to anyone as other than a Government program.

2. PURPOSE OF PROGRAM

This program will analyze monthly streamflows at a number of inter-related stations to determine their statistical characteristics and will generate a sequence of hypothetical streamflows of any desired length having those characteristics. It will reconstitute missing streamflows on the basis of concurrent flows observed at other locations and will obtain maximum and minimum quantities for each month and for specified durations in the recorded, reconstituted and generated flows. It will also use the generalized simulation model for generating monthly streamflows at ungaged locations based on regional studies. There are many options of using the program for various related purposes, and it can be used for other variables such as rainfall, evaporation, and water requirements, alone or in combination.

3. DESCRIPTION OF EQUIPMENT

This program requires a FORTRAN IV compiler, a random number generator (function RNGEN included, see exhibit 2), and a fairly large memory (64K on the CDC 6600). Provision is made for use of three scratch tapes, 7 (for punched output), 8 and 9.

4. METHODS OF COMPUTATION

a. In the statistical analysis portion of this program, the flows for each calendar month at each station are first incremented by 1 percent of their calendar-month average in order to prevent infinite negative

logarithms. This increment is later subtracted. The mean, standard deviation and skew coefficients for each station and calendar month are then computed. This involves the following equations:

$$X_{i,m} = \log (Q_{i,m} + q_i) \quad (1)$$

$$\bar{X}_i = \sum_{m=1}^N X_{i,m} / N \quad (2)$$

$$S_i = \sqrt{\sum_{m=1}^N (X_{i,m} - \bar{X}_i)^2 / (N-1)} \quad (3)$$

$$g_i = N \sum_{m=1}^N (X_{i,m} - \bar{X}_i)^3 / ((N-1)(N-2)S_i^3) \quad (4)$$

in which:

- X = Logarithm of incremented monthly flow
- Q = Monthly recorded streamflow
- q = Small increment of flow used to prevent infinite logarithms for months of zero flow
- \bar{X} = Mean logarithm of incremented monthly flows
- N = Total years of record
- S = Unbiased estimate of population standard deviation
- g = Unbiased estimate of population skew coefficient
- i = Month number
- m = Year number

b. For each station and month with incomplete record, a search is made for longer records among the stations used, to find that which will contribute most toward increasing the reliability of the statistics computed from the incomplete record. The mean and standard deviation are then adjusted. Equation 5 is used to compute the equivalent record required to obtain statistics equally reliable to these adjusted statistics and is the basis for selecting the best record to be used in the adjustment. Equations 6 and 7 are the adjustment equations.

$$N_1' = \frac{N_1}{1 - \frac{N_2 - N_1}{N_2} R^2} \quad (5)$$

$$\bar{X}'_1 - \bar{X}_1 = (\bar{X}'_2 - \bar{X}_2) RS_1/S_2 \quad (6)$$

$$S'_1 - S_1 = (S'_2 - S_2) R^2 S_1/S_2 \quad (7)$$

The primes indicate the long-period values and those without primes are based on the same short period for both stations 1 and 2, and:

N = Length of record
R = Linear correlation coefficient

c. Each individual flow is then converted to a normalized standard variate, using the following approximation of the Pearson Type III distribution:

$$t_{i,m} = (X_{i,m} - \bar{X}_i) / S_i \quad (8)$$

$$K_{i,m} = 6/S_i \left[((g_i t_{i,m}/2) + 1)^{1/3} - 1 \right] + g_i/6 \quad (9)$$

t = Pearson Type III standard deviate
K = Normal standard deviate

d. After transforming the flows for all months and stations to normal, the gross (simple) correlation coefficients R between all pairs of stations for each current and preceding calendar month are computed by use of the following formula:

$$R_{i,i-1} = \left\{ 1 - \left[1 - \left(\frac{\sum_{m=1}^N x_{i,m} x_{i-1,m}}{\sum_{m=1}^N x_{i,m}^2 \sum_{m=1}^N x_{i-1,m}^2} \right)^2 \right] \right\}^{1/2} \quad (10)$$

in which:

$$x = X - \bar{X}$$

e. If there are insufficient simultaneous observations of any pair of variables to compute a required correlation coefficient, that value must be estimated. Each missing value is estimated by examining its relationship to related pairs of values in the current and preceding month by use of the following formula using i, j, and k subscripts to indicate variables used in the gross correlation.

$$R_{ij} = R_{ki}R_{kj} \pm \sqrt{(1 - R_{ki}^2)(1 - R_{kj}^2)} \quad (11)$$

Since, in order to be consistent with the two related correlation coefficients, the correlation coefficient must lie between the limits given by equation 11, the lowest upper limit and highest lower limit are established for all related pairs, and the average of these two limits is taken as the estimated correlation coefficient.

f. Monthly streamflows missing from the records of the various stations are estimated for all stations for each month in turn. Accordingly, whenever a missing flow is being reconstituted, there always exists a valid value for all stations already examined that month and for all remaining stations in either the current or preceding month. For these remaining stations, the current value is selected where available; otherwise the preceding value is used. In order to reconstitute the missing value, a regression equation in terms of normal standard variates is computed by selecting required coefficients from the complete correlation matrix for that month and solving by the Crout method (See exhibit 1). The missing value is computed from this regression equation, introducing a random component equal to the nondetermination of the equation, as discussed in the streamflow generation procedure.

g. It has been found that valid use of the regression technique requires that all correlation coefficients agree with the data that will be substituted into the equations and that the correlation coefficients be mutually consistent. Inconsistency in the correlation coefficients causes the dependent variable to be over-defined and is evidenced by a determination coefficient greater than 1.0. If this occurs (because of incomplete data), the independent variable contributing least to the correlation is dropped, and a new regression equation is computed. This process is repeated as necessary until consistency is reached (which must occur by the time that only one independent variable remains). In order to make the correlation matrix consistent with the data matrix, all affected correlation coefficients are recomputed after each estimate of missing data.

h. Normal standard deviates are then converted to flows by use of the following equations:

$$t_{i,m} = \left\{ \left[(\epsilon_1/6)(K'_{i,m} - \epsilon_1/6) + 1 \right]^3 - 1 \right\} 2/\epsilon_1 \quad (12)$$

$$X_{i,m} = \bar{X} + t_{i,m} S_i \quad (13)$$

$$Q_{i,m} = \text{Antilog } X_{i,m} - q_i \quad (14)$$

imposing the constraint:

$$Q_{i,m} \geq 0 \quad (15)$$

i. When the set of flows is complete, all correlation matrices should be consistent except for truncation errors in the computer, since the data arrays are complete. Any consistency of matrices obtained in this manner or of matrices read into the computer will result in determination coefficients greater than 1.0. If this occurs, consistency of each correlation matrix is assured by first testing all combinations of triads of correlation coefficients in the current and preceding month for all calendar months using equation 11 and raising the lowest of the three coefficients to obtain a consistent triad. The test of consistency of each complete matrix is made by recomputing the multiple correlation coefficient. If this value is greater than 1.0, further adjustment is required. Such further adjustment is obtained by introducing a coefficient, successively smaller by 0.2, on the radical in equation 11 and repeating all triad consistency tests until all matrices are consistent. If consistency is not reached, coefficients in each inconsistent matrix are moved toward the average value of all coefficients in that matrix until consistency is reached.

j. Generation of hypothetical streamflows is accomplished by computing a regression equation, by the Crout method (described in exhibit 1) for each station and month and then computing streamflows for each station in turn for one month at a time using the following equation. This process is started with average values (zero deviation) for all stations in the first month and discarding the first 2 years of generated flows.

$$K'_{i,j} = \beta_1 K'_{i,1} + \beta_2 K'_{i,2} + \dots + \beta_{j-1} K'_{i,j-1} + \beta_j K'_{i-1,j} + \beta_{j+1} K'_{i-1,j+1} + \dots + \beta_n K'_{i-1,n} + \sqrt{1-R^2_{i,j}} Z_{i,j} \quad (16)$$

in which:

- K' = Monthly flow logarithm, expressed as a normal standard deviate
- β = Beta coefficient computed from correlation matrix
- i = Month number
- j = Station number
- n = Number of interrelated stations
- R = Multiple correlation coefficient
- Z = Random number from normal standard population

k. Maximum, minimum and average flows are obtained for the entire period of flows as recorded and for specified periods of reconstituted and generated flows by routine search technique.

1. Provision is also included in this program for use of the generalized model requiring only 4 generalized coefficients for each station (in place of 48) and one generalized correlation coefficient (in place of 12) for each pair of stations, in addition to identification of wet and dry seasons for each station. These are defined as follows:

(1) The average value of mean logarithms of flows for the wet season (3 months). This value plus 0.2 is applied to the middle month and the average minus 0.1 is applied to the other 2 months.

(2) The average value of mean logarithms of flows for the dry season (3 months). This is applied to all 3 dry months. Mean logarithms for months between dry and wet seasons are interpolated linearly.

(3) The average standard deviation for all 12 months. This is applied to each of the 12 months.

(4) The average serial correlation coefficient for all 12 months. This value minus .15 (but not less than zero) is applied to each wet-season month, and the value plus .15 (but not more than .98) is applied to each dry-season month. The average value is applied to all intermediate months.

(5) The average interstation correlation coefficient for all 12 months is applied to each month for that pair of stations.

m. Because of limitations in computer memory size and because of increasing change of computational instability with larger matrices, the number of stations usable simultaneously in this program has been limited to 10. However, the program can reconstitute and generate streamflows for

any number of stations in groups of 10 or less. It will ordinarily be desirable to include one or more stations from earlier groups in each successive group in order to preserve important correlations. In addition to providing flow data for all stations, it is necessary to designate NPASS and to follow each group of flow data with a standard-format card with NSTX (number of stations in next pass that were also used in preceding passes) and station identification numbers for those stations. These numbers must be listed in the same sequence as their data were arranged in earlier passes. Data for the new stations for the new pass should then be read. None of these flows can occur in a year later than the latest year for which flow data occurred in the first pass.

n. As soon as flows are reconstituted for any pass, they are read onto the flow tape. After statistics are computed from transformed reconstituted flows, they are read onto the statistics tape (after identification of stations in the pass for future reference). Final regression equation data for each pass are read onto the same tape at the same time (for use in generation later). For each new pass, the flow and statistics tapes are searched separately for data for those stations already used that also occur in the new pass. In order to read and write intermittently and alternatively on the same tapes, it is necessary to keep track of tape records so as to assure that any read statement does not read beyond the record mark and so that new write statements occur at the end of all previous write statements that are to be saved.

o. Once that statistics are put on tape, they are retained throughout the reconstitution and generation processes. Flows, however, are saved only for the set of data in which they were reconstituted or generated, until the last pass for that set is completed. In the generation process, it is necessary to save the last flow generated for each station in one set for use as the antecedent flow in starting generation in the next set. These are saved in the QSTAP array with subscript ISTAP.

8. INPUT

Input is summarized in exhibits 7 and 8. Data are entered consecutively on each card using a simple variety of formats to simplify punching and handling cards. Computed and generated flows cannot be 1,000,000 units or larger, and consequently must be expressed in units that cannot exceed this magnitude. Units should be indicated on one of the 3 header cards. Column 1 of each card is reserved for card identification. These are ignored by the computer except for the A in column 1 of the first header card, which is used to identify the first data card. An example of input is given in exhibit 3. Certain inadequacies of data will abort the job and waste input cards until the next card with A in column 1 is reached. A card with A in column 1 followed by 4 blank cards causes the computer to stop.

6. OUTPUT

Printed output includes key input information for job identification and all results of computations. Generated flows are put on magnetic tape, and computed statistics are punched on cards in the format usable later by the program. An example of printed output is given in exhibit 4.

7. OPERATING INSTRUCTIONS

Standard FORTRAN IV instructions and random number generator are required. No sense switches are used.

8. DEFINITIONS OF TERMS

Terms used in the program are defined in exhibit 5.

9. PROPOSED FUTURE DEVELOPMENT

There are cases where the model used herein does not reproduce historical droughts with reasonable frequency. Consequently, the model is under continuous study and development. It is requested that any user who finds an inadequacy or desirable addition or modification notify The Hydrologic Engineering Center.

EXHIBIT 1
DETAILED EXPLANATION
OF
COMPUTER PROGRAM

GENERAL

Much of the program is explained by comment cards and definitions of variables. Supplementary explanation follows, referring to sections identified with the indicated letter in column 2 of a comment card.

SECTION A

Correlation coefficients, R, and beta coefficients, B, are in double precision for matrix inversion computation, in order to minimize computational instability. Correlation coefficient, RA, as originally computed and stored, may be defined in single precision. For computers with word length smaller than 32 bits, many other variables in this program should be in double precision.

When dimensions are changed, the corresponding variable (starting with K) should be changed accordingly, as these are used to prevent exceedence of dimensions. If an excessive subscript is used, the job will be dumped until a card with A in column 1 is encountered, at which time a new job is automatically started. If 5 blank cards (with an A in column 1 of the first) are encountered, the run will be terminated. Job specification cards are read in this section.

SECTION B

NSTAX is number of columns in correlation matrix. These consist of NSTA columns for the current-month values and a similar number for antecedent-month values. NSTAA is initial column number for antecedent-month coefficients. These are computed from NSTA, which is read in if statistics are to be provided, rather than computed from raw data. If raw data are to be used, NSTA is defined in the program later and NSTAA and NSTA must be also. Data for each new pass are processed after transferring back to statement 42. In the multipass operation, NSTX is the number of stations used from previous passes and NSTXX is the subscript of the first new station for the current pass. Station identification for the NSTX stations must be in the order in which data for those stations were originally used, because search of data and statistics on tape is made in this order. Flows for these stations are read from tape IQTAP, and corresponding statistics from tape ISTAT. Variables LQTAP and LSTAT are used to keep track of tape position for subsequent writing.

*Provided through the cooperation of the Texas Water Development Board.

Months are identified consecutively by the variable M starting with the month preceeding the first year of data. Some quantities to be accumulated are initialized. Station combination data are stored for the purpose of obtaining maximums and minimums (section D) of weighted flow values later. Tandem stations are identified for cases where a check on consistency of generated quantities is deemed appropriate. Station identification numbers are set to a large number so they will not be undefined. The flow array is filled with -1 values to indicate missing values. For each station and calendar month, the total flow and number of recorded values are computed for computing a flow increment and other statistics later. The minimum flow for each station month is also computed in order to avoid negative logarithms later.

SECTION C

Station data can be read in random order. Stations are identified by subscript in the order in which data for each station are first read. The year subscript is computed. Negative subscripts will occur if data are for years earlier than the starting year indicated on B card, and data for these are rejected, with diagnostic printout. The stations are counted and the flows for each month at each station are counted for the purpose of computing frequency statistics later. If the number of stations or years exceeds its dimension limit, the job is aborted. The number of stations is permanently stored in the NSTNP array for later identification in multipass operations. The remainder of this section is self explanatory, except to state that permanent identification station numbers are given for stations in combination, for tandem stations, and for consistency-test stations, and subscripts are identified for rapid computation later.

SECTION D

In this section, maximum and minimum recorded flows for each calendar month, the water year and for durations of 1, 6, and 54 months, and average flows are computed for each station and combination. Durations do not span a break in any record. Quantities are rounded off and printed in fixed-point format.

SECTION E

The logarithm transform of flows is accomplished here. Missing values are indicated by an impossibly large number (the -1 used for missing flows is a reasonable logarithm and therefore cannot be used for missing logarithms). Before the log transform, the average flow for each calendar month at each station is computed and one (constrained to a minimum of 0.1 flow unit) is added to each flow. If the minimum observed flow for that station month is negative, that absolute value

is also added before the transform. After the logarithm transform, frequency statistics for each calendar month and station are computed. An increment needed to convert the logarithms to an approximately normal distribution is also computed as an alternative future transform. Logarithms to the base 10 are used so that statistics are comparable to other commonly used statistics. A variable IRCON is set to 1 if any missing values are encountered, so that the flow reconstitution routine will be called later. A variable INDC is set to 1 if the first approximation of increments causes any one of the skew coefficients to be smaller than 0.1 or larger than 0.1. In an optional routine that follows, the increment for each station and calendar month is adjusted individually and iteratively (up to 14 trials) until skew is within 0.1 of zero.

Stations with less than three years of data for any calendar month are deleted, since skew and correlation computations require at least three items of data.

SECTION F

Correlation matrices are computed here for the purpose of adjusting frequency statistics for short-record stations. All correlation coefficients are first set to -4.0 in order to identify those not computed later for lack of sufficient observed data. Then accumulations of the various quantities required are computed for all items above the main diagonal in the correlation matrix for each month, using all data common to the two stations involved. If more than two items of data are available, the correlation coefficients are computed. Coefficients for the main diagonal are set to 1.0, and those below the main diagonal are set equal to their symmetrical element. Coefficients between the current and preceding month's values are similarly computed. These items constitute an extension of the matrix to the right, which doubles its size, and the new portion is not necessarily symmetrical. Similar complete arrays of average values and root-mean-square values for only those logarithms common to each pair of stations are found for later use in adjusting statistics.

A search is then made to determine the station that would be most useful in adjusting statistics for station months with incomplete record, and the means and standard deviations are adjusted in accordance with the following equations:

$$S'_1 = S_1 + (S'_2 - S_2) R^2 S_1 / S_2$$

$$\bar{x}'_1 = \bar{x}_1 + (\bar{x}'_2 - \bar{x}_2) R S_1 / S_2$$

where primes indicate long-period values, subscripts are 1 for the short-record station and 2 for the long-record station and,

\bar{X} = mean logarithm

S = standard deviation of the logarithms

R = correlation coefficient.

An optional check of consistency of standard deviations between adjacent stations for the same month is next made. This is to assure that frequency curves do not cross within three standard deviations from the mean. If there is a conflict, the standard deviation of that station designated in the input data as the dependent variable is modified accordingly. All frequency statistics are then printed out.

SECTION G

All flows are next standardized by subtracting the mean and dividing by the standard deviation for the month and station. An approximate Pearson Type III transform is then applied as follows:

$$K = 6 \left[(.5 gt + 1)^{1/3} - 1 \right] / g + g/6$$

where:

K = normal standard deviate
t = Pearson Type III standard deviate
g = skew coefficient

New correlation matrices are then computed, based on the normalized variates and using the same standard procedures previously employed for correlating logarithms. The sign of the correlation coefficient is preserved, since the coefficient will be used to establish regression equations. Correlation coefficients are set to zero if the variance of either variable approximates zero, since the computation of the coefficient is highly unstable and since its use would be of little value.

SECTION H

For jobs where correlation data are given, the portion of the correlation matrix above the main diagonal for all months and the entire correlation matrix relating current and preceding month's values are read, with a different card for each pair of stations. Values for all 12 months are contained on one card, and the two stations involved are identified on the same card. An automatic check is made to assure that cards are in the required order of columns and rows in the correlation matrix. When generalized statistics are used, only one correlation coefficient for the entire year is read, but card order is the same. Symmetrical elements below the main diagonal are then filled in and values of 1.0 are placed in the main diagonal.

Frequency statistics are then read, 4 cards per station, with 12 monthly values and station identifications on each card. A check is made of the station order, to assure proper subscripting. When generalized statistics are used, only one card per station is read, and this contains the maximum and minimum mean logarithms and the average standard deviation for the year. The months of maximum and minimum mean logarithms are also read and converted to corresponding subscripts. These subscripts will differ from the calendar month number if the year used in the study does not begin with January.

SECTION I

This section searches for each calendar month the entire correlation matrix to be the right of the main diagonal for missing correlation coefficients due to the nonexistence of at least three years of simultaneous data for the month. As soon as a coefficient between two variables is identified as missing, a search of the correlation matrix is made to find established correlation coefficients between each of these variables (i and j) and any other variable (k). The range within which correlation between the two variables must lie in order to be mathematically consistent with the correlation with the third variable is established by use of the following equation:

$$R_{ij} = R_{ki} R_{kj} \pm \sqrt{(1-R_{ki}^2)(1-R_{kj}^2)}$$

As each successive third variable with established correlation coefficients is found, the upper limit of R_{ij} is constrained to the lowest of all upper limits computed, and the lower limit is constrained to the highest of all such lower limits computed. When the entire matrix has been searched the correlation coefficient is estimated as the average of these two constrained limits. If this element is above the main diagonal, the value is also entered for the element symmetrically across the main diagonal. The search for further missing correlation coefficients is then continued.

SECTION J

Where a correlation matrix is not to be used for reconstituting data but might be inconsistent, a triad consistency test can be made in this section. This is done by examining all groups of three related correlation coefficients, and testing the lowest one to determine whether it is above minimum constraint established by the equation in the preceding station. If not, it is raised to that minimum. When this is done, it is possible that the adjusted coefficient had already been used in another triad test, and consequently that previous test would need to be repeated. In order to do this properly, the entire matrix is searched up to 12 NSTA times, where NSTA is the number of stations, until a complete search reveals no inconsistent triad (INDC = 0).

A coefficient FAC of the radical in the equation is used in order to obtain complete matrix consistency in difficult cases, whenever possible by this means. A test for overall consistency is made in section K, and if this fails, FAC is successively reduced by 0.2 until overall consistency is reached.

SECTION K

The test for overall consistency of the correlation matrix for each month is made by constructing for each station the correlation matrix that would be used in flow generation for that station and computing the multiple determination coefficient. If the determination coefficient of the matrix for any station and any month exceeds 1.0, all correlation matrices must be reexamined, since some coefficients are common to two or more matrices. This is done by reducing FAC in the triad test (section J) by 0.2 and repeating all triad tests. If FAC is reduced to zero and consistency is not obtained, an index of NCB is set to 1 and an averaging routine is used for each inconsistent matrix. A quantity SUM is computed as the average of all correlation coefficients in that matrix, and each element is modified by multiplying SUM by the excess of determination coefficient and adding this product to the product of the complement of this multiplier and the value of the element in the inconsistent matrix. The averaged or smoothed values are replaced in the complete matrix for the month, and this requires some careful manipulation of subscripts. A new computation of determination coefficient is made and the smoothing process is repeated up to nine times until consistency prevails. If this does not occur, the job is terminated. When consistency is established all complete matrices are printed out and essential elements are punched if desired.

SECTION L

In reconstituting missing data, a search is made for each month of record starting with the first for stations that have no record during that month (Q=T). When one is found, a search of all other stations is made to determine whether recorded or previously reconstituted flows exist for the current month or, if not, for the preceding month. If one is found, it will constitute an independent variable for estimating the missing value, and its value and pertinent correlation coefficients are stored in new arrays for computation purposes. The correlation coefficients with the dependent variable is temporarily stored in the NVAR (NSTA+1) column to assure that coefficients relating independent variables which have sufficient array space (they cannot exceed NSTA in number). A variable ITEMP counts the number of independent variables (stations for which recorded or reconstituted data are available). It is incremented after its set of correlation coefficients are stored in the R array, and is finally used to relocate the correlation coefficients involving the dependent variable. If no independent variables with data

are found, as can happen in the first month of record, a correlation is made with the preceding value for the same station and that preceding value is arbitrarily set at the average for the month. The regression equation and determination coefficient are then computed using subroutine CROUT. The variable having the lowest absolute value of correlation with the dependent variable is identified, and beta coefficients are searched in order to eliminate all unreasonable coefficients. In the usual case where the simple correlation coefficient between any variable and the dependent variable is positive, unreasonable coefficients are assumed to be those larger than 1.5 or smaller than -.5. In the case where the variable correlates negatively with the dependent variable, the reasonable range is -1.5 to 0.5. If an unacceptable coefficient is found, INDC is set to 1. If this happens or if the determination coefficient does not lie between 0 and 1.0, the variable with the smallest correlation coefficient is eliminated, the correlation array reconstructed accordingly, and the regression equation recomputed. This process is repeated until all required conditions exist. The missing value is then computed by use of the regression equation and adding a random component normally distributed with zero mean and with variance equal to the error variance of the regression equation.

As soon as the missing value is estimated a search is made for all established values in the current and preceding month with which it is to be correlated, and sums of logarithms, squares, and cross products are incremented in preparation for recomputing all affected correlation coefficients. After checking for sufficient (three years) record and nonzero variance, the correlation coefficient is recomputed. If the standard deviation of either variable is very small, the correlation coefficient is set to zero. If the coefficient is above the main diagonal of the correlation matrix, its value is also assigned to symmetrical element. Since estimation of a missing value affects correlation coefficients between variables in the current and following month, which coefficients are stored in a different matrix, this process of adjusting the correlation coefficient is applied to those values next.

SECTION M

After all flows are reconstituted, the flow tape is read until the proper position for writing the newly computed flow data on that tape is reached, and headings are printed for writing flows on the printer later. Then the standard deviates are converted to flows by reversing the Pearson type III transform, multiplying by the standard deviation, adding to the mean and taking the antilogarithm. The increment is then subtracted and if the resulting value is negative for a variable with zero lower limit, it is set to zero. In the case of reconstituted flows, the Pearson Type III transform is constrained so that the excess of the standard deviate over and above 2.0 is multiplied by a maximum of 0.3 (if the standard

diviation exceeds 0.2). This simply prevents obtaining unreasonably extreme values due to sampling errors. It is a moderation of the extrapolation rather than an abrupt truncation.

The test for tandem station consistency is next made, and inconsistent flows are identified for printout and changed to the limit of consistency. The downstream flow is made consistent with the sum of upstream flows. Flows are punched on cards, if desired, printed out, and written on the flow tape for use in future passes. NQTAP is incremented and represents the total number of records on the tape.

SECTION N

After converting deviates to flows, the frequency statistics are recomputed in order to agree accurately with observed and reconstituted data. If a consistency test is called for, the variable ITRNS is set to 2 and computation is transferred to near the end of section F, where the test is made and the transfer index causes a return to this portion of the program. Adjusted statistics are printed, and the consistent correlation matrix is printed (and, if desired, also punched) by transfer to section K, using ITRNS as a return indicator again. The statistics are then punched, if desired. Flows for the specified station combinations are then computed.

SECTION O

Maximum and minimum recorded flows are computed by transfer to section S, using ITRNS=1 as a return indicator. The variable ITMP keeps a record of the remaining years whose maximum and minimum flows have not been searched yet.

Next, generalized statistics are computed, if desired, (if IGNRL equals two). As indicated, straight averages of all 12 monthly correlation coefficients in every category are taken. Means are averaged for the three wettest consecutive months and the three driest consecutive months and the seasonal timing noted. Standard deviations for all 12 months are averaged. Generalized statistics are then printed out.

Next, generalized statistics read in section H are used to compute required arrays of statistics. Skew and increments are set to zero. The mean for the middle month of the wet season is .2 higher than the wet season average and means for the other two months are .1 lower. Means for the dry seasons are uniform, and means for the transition seasons are interpolated linearly. Correlation coefficients for the dry season are .15 higher (constrained below .98) than the annual average, and those for the wet season are .15 low (constrained above zero). All of these operations are in accord with the generalized model developed in HEC.

SECTION P

After obtaining monthly statistics and correlation matrices, regression equations for each station and calendar month are computed. Flows are generated in the station order in which data or statistics are read and are generated for each month at all stations before proceeding to the next month. Flows at each station are correlated with flows of the antecedent month at that station and at all stations for which the current month's flows have not yet been generated. For other stations, flows for the current month are used.

Regression equations are computed in subroutine CROUT. If any correlation matrix formed is inconsistent (which should not occur at this stage, except for truncation of computed intermediate variables), a transfer to section J is effected, and consistency operations performed on all correlation matrices. After such a transfer, all regression equations must be recomputed, since any correlation coefficient might have changed. After this, only the beta and alienation coefficients need be retained, in addition to the frequency statistics. In the multipass operation, these are all written on tape ISTST at this point.

SECTION Q

A routine for projecting historical sequences into the future is employed here. Values of Δ PREV (previous month's deviate) for each station is determined as the transform of the flow for the month preceding the first month specified (by input data) to be generated. The variable MA is computed for the subscript of Q that conforms to the first month of projected flows. If the projected flow routine is not to be used, the computer is next set up to generate two years of flows, at the end of which synthetic sequences will have a virtually random start.

In the multipass operation, stations are identified and all necessary statistics are contained in the order needed on tape ISTAT. In any pass after the first, flows generated in earlier passes for the same period (the same sequence of data) must be read from tape IQTAP, and this tape must be rewound before each pass in order to permit a complete search. In any sequence after the first, the preceding flow for the first month to be generated is the last flow in the preceding sequence for that station, and these are saved in the QSTAP array for multipass operation. If the multipass feature is not used, all necessary statistics and flows for generating are in memory.

SECTION R

In starting to generate flows, a variable JXTMP is used to identify the year number of the first year of each sequence in the multipass

operation. Variables AVG and SDV are used to compute the mean and standard deviation of the deviates for each flow sequence. These are later used to adjust all deviates so that the means and standard deviations in every generated sequence will be the same as those of the historical sequence.

Variables JA and NJ are set up to correspond to the first and last year of generation in each successive sequence, depending on the type of operation. MA has already been set up as the subscript of Q corresponding to the first month of flows to be generated (for use in projecting historical flows recorded to the current time). QPREV for each station has been identified as the previous month's flow for that station. Flows are then generated for each station, using stored regression equations and a random component. Each generated flow is immediately entered into the QPREV array, because its preceding flow will never again be used in that pass.

In the multipass routine, flows (as deviates) are written on tape at the end of each pass, and the last flow for each station is stored in the QSTAP array for use in the next sequence.

If more than 19 years (an arbitrarily selected length) of flow are being generated in any sequence, deviates are adjusted so that their mean is zero and variance 1.0. Their unadjusted mean and standard deviation are printed. Then they are transformed to flows, and, if called for, consistency tests between stations are made. For variables with zero natural limit, a check for negative values is then made. Flows are then printed and, if desired, punched. Flow combinations are then computed.

SECTION 5

Before computing maximum and minimum values of generated flows, a positive value of JX is looked for to assure that flows generated are not to be discarded (the first two years generated for a random start). Also, at least NYMXG years must have been generated before maximum and minimum values are computed (this applies only when the number of years remaining for generation in the last sequence does not equal NYMXG). Maximum sums are initiated at an extremely large negative number and minimum sums as an extremely large positive number (T). Then a routine search of flow sums for the specified durations at each station is made for the sequence, and results are printed out. Since this routine is used for reconstituted flows as well as for generated flows, a transfer indicator is used to determine whether the next step is back to the reconstitution routine or the generation routine. If the latter, a check is made for the multipass routine. If all passes are not completed, a transfer to section 4 is made. If all passes are completed for this sequence or if the multipass routine is not being

used, a check is made of remaining years to be generated. If greater than zero, a transfer to section 4 is made after adjusting years yet to be generated. Otherwise the job is ended and a new job, if any, is started.

RANDOM NUMBER FUNCTION RNGEN

This random number function is for a binary machine and the constants must be computed according to the number of bits in an integer word. The numbers generated are uniformly distributed in the interval 0 to 1.

The function is called from the main program by a statement similar to the following:

$$A = \text{RNGEN} (IX)$$

Where A is some floating point variable name and IX is some integer variable name. The argument name IX need not be the same in the main program and the function. The argument must be initialized to zero in the main program. The location of the initializing statement is important and depends on the results desired. If it is desired to have different sets of random numbers for each of several different sets of computations (jobs) that are run sequentially on the same program, then the argument must be initialized at the very beginning of the program and never reinitialized. If it is permissible to use the same sequence of random numbers for each job, the argument must be initialized at the beginning of each job. The advantage of this latter option occurs when one of the jobs must be re-run for some minor reason as the same random numbers will be used and the results will be comparable.

Three constants must be computed by the following equations:

$$\text{Constant one (C1)} = 2^{(B+1)/2} + 3$$

$$\text{Constant two (C2)} = 2^B - 1$$

$$\text{Constant three (C3)} = 1./2.^B$$

Where: B = number of bits in an integer word

The constants for some of the common computers are listed in the following table:

COMPUTER	SIZE OF INTEGER WORD	CONSTANTS		
		C1	C2	C3
GE 200 Series	19	1027	524287	0.190734863E-05
GE 400 Series	23	4099	8388607	0.119209290E-06
IBM 360 Series	31	65539	2147483647	0.465661287E-09
IBM 7040 and 7090 Series	35	262147	34359738367	0.2910383046E-10
UNIVAC 1108	"	"	"	"
CDC 6000 Series	48	16777219	281474976710655	0.3552713678E-14

April 1960

EXHIBIT 2
Crout's Method

One of the best methods for solving systems of linear equations on desk calculating machines was developed by P. D. Crout in 1941. This method is based on the elimination method, with the calculations arranged in systematic order so as to facilitate their accomplishment on a desk calculator. In this method the coefficients and constant terms of the equations are written in the form of a "matrix," which is a rectangular array of quantities arranged in rows and columns.

The method is best explained by an example. Suppose that in a multiple correlation analysis it is required to solve the following system of linear equations to obtain the unknown values of b_2 , b_3 , b_4 and b_5 .

$$\begin{aligned}\Sigma x_2^2 b_2 + \Sigma x_2 x_3 b_3 + \Sigma x_2 x_4 b_4 + \Sigma x_2 x_5 b_5 &= \Sigma x_1 x_2 \\ \Sigma x_2 x_3 b_2 + \Sigma x_3^2 b_3 + \Sigma x_3 x_4 b_4 + \Sigma x_3 x_5 b_5 &= \Sigma x_1 x_3 \\ \Sigma x_2 x_4 b_2 + \Sigma x_3 x_4 b_3 + \Sigma x_4^2 b_4 + \Sigma x_4 x_5 b_5 &= \Sigma x_1 x_4 \\ \Sigma x_2 x_5 b_2 + \Sigma x_3 x_5 b_3 + \Sigma x_4 x_5 b_4 + \Sigma x_5^2 b_5 &= \Sigma x_1 x_5\end{aligned}$$

For simplicity let us replace the coefficients of the b 's by the letters p , q , r and s , and the constant terms by the letter t , using subscripts 1, 2, 3 and 4 to denote the respective equations.

$$\begin{aligned}p_1 b_2 + q_1 b_3 + r_1 b_4 + s_1 b_5 &= t_1 \\ p_2 b_2 + q_2 b_3 + r_2 b_4 + s_2 b_5 &= t_2 \\ p_3 b_2 + q_3 b_3 + r_3 b_4 + s_3 b_5 &= t_3 \\ p_4 b_2 + q_4 b_3 + r_4 b_4 + s_4 b_5 &= t_4\end{aligned}$$

A continuous check on the computations as they progress may be obtained by adding to the matrix of the above system a column of u 's, such that $u = p + q + r + s + t$. The matrix and check column are written as follows:

EXHIBIT 2

$$\begin{vmatrix} P_1 & q_1 & r_1 & s_1 & t_1 & u_1 \\ & P_2 & q_2 & r_2 & s_2 & t_2 & u_2 \\ & & P_3 & q_3 & r_3 & s_3 & t_3 & u_3 \\ & & & P_4 & q_4 & r_4 & s_4 & t_4 & u_4 \end{vmatrix}$$

The elements P_1, q_2, r_3 and s_4 form the "principal diagonal" of the matrix. Examination of the original equations shows that the coefficients are symmetrical about the principal diagonal, i.e., $q_1 = P_2, r_1 = P_3, r_2 = q_3, s_1 = P_4, s_2 = q_4,$ and $s_3 = r_4.$

This is characteristic of the system of equations to be solved in any multiple correlation analysis. Because of this symmetry, the computations are considerably simplified. While the Crout method may be used to solve any system of linear equations, the computational steps given here are applicable only to those with symmetrical coefficients.

The solution consists of two parts, viz., the computation of a "derived matrix" and the "back solution." Let the derived matrix be denoted as follows:

$$\begin{vmatrix} P_1 & Q_1 & R_1 & S_1 & T_1 & U_1 \\ & P_2 & Q_2 & R_2 & S_2 & T_2 & U_2 \\ & & P_3 & Q_3 & R_3 & S_3 & T_3 & U_3 \\ & & & P_4 & Q_4 & R_4 & S_4 & T_4 & U_4 \end{vmatrix}$$

The elements of the derived matrix are computed as follows:

$$P_1 = p_1 \quad P_2 = p_2 \quad P_3 = p_3 \quad P_4 = p_4$$

$$Q_1 = \frac{q_1}{p_1} \quad R_1 = \frac{r_1}{p_1} \quad S_1 = \frac{s_1}{p_1} \quad T_1 = \frac{t_1}{p_1} \quad U_1 = \frac{u_1}{p_1}$$

$$Q_2 = q_2 - P_2 Q_1 \quad Q_3 = q_3 - P_3 Q_1 \quad R_2 = \frac{r_2}{Q_2}$$

$$Q_4 = q_4 - P_4 Q_1 \quad S_2 = \frac{S_1 Q_2}{Q_2} \quad T_2 = \frac{t_2 - T_1 P_2}{Q_2} \quad U_2 = \frac{u_2 - U_1 P_2}{Q_2}$$

$$R_3 = r_3 - Q_3 R_2 - P_3 R_1 \quad R_4 = r_4 - Q_4 R_2 - P_4 R_1 \quad S_3 = \frac{R_3}{R_2}$$

$$T_3 = \frac{t_3 - T_2 Q_3 - T_1 P_3}{R_3} \quad U_3 = \frac{u_3 - U_2 Q_3 - U_1 P_3}{R_3}$$

$$S_4 = s_4 - R_4 S_3 - Q_4 S_2 - P_4 S_1$$

$$T_4 = \frac{t_4 - T_3 R_4 - T_2 Q_4 - T_1 P_4}{S_4} \quad U_4 = \frac{u_4 - U_3 R_4 - U_2 Q_4 - U_1 P_4}{S_4}$$

The general pattern of the above computations, which may be applied to a system containing any number of equations, is as follows:

(1) The first column of the derived matrix is copied from the first column of the given matrix.

(2) The remaining elements in the first row of the derived matrix are computed by dividing the corresponding elements in the first row of the given matrix by the first element in that row.

(3) After completing the n^{th} row, the remaining elements in the $(n+1)^{\text{th}}$ column are computed. Such an element (X) equals the corresponding element of the given matrix minus the product of the element immediately to the left of (X) by the element immediately above the principal diagonal in the same column as (X), minus the product of the second element to the left of (X) by the second element above the principal diagonal in the same column as (X), etc. After each element below the principal diagonal is recorded, and while that element is still in the calculator, it is divided by the element of the principal diagonal which is in the same column. The quotient is the element whose location is symmetrical to (X) with respect to the principal diagonal.

(4) When the elements in the $(n+1)$ th column and their symmetrical counterparts have been recorded, the $(n+1)$ th row will be complete except for the last two elements, which are next computed. Such an element (X) equals the corresponding element of the given matrix minus the product of the element immediately above (X) by the element immediately to the left of the principal diagonal in the same row as (X), minus the product of the second element above (X) by the second element to the left of the principal diagonal in the same row as (X), etc., all divided by the element of the principal diagonal in the same row as (X).

The check column (U) of the derived matrix serves as a continuous check on the computations in that each element in the column equals one plus the sum of the elements in the same row to the right of the principal diagonal. That is,

$$U_1 = 1 + Q_1 + R_1 + S_1 + T_1$$

$$U_2 = 1 + R_2 + S_2 + T_2$$

$$U_3 = 1 + S_3 + T_3$$

$$U_4 = 1 + T_4$$

This check should be made after completing each row.

The elements of the derived matrix to the right of the principal diagonal form a system of equations which may now be used to compute the unknown values of b_2 , b_3 , b_4 and b_5 by successive substitution. This is known as the "back solution." The computations are as follows:

$$b_5 = T_4$$

$$b_4 = T_3 - S_3 b_5$$

$$b_3 = T_2 - S_2 b_5 - R_2 b_4$$

$$b_2 = T_1 - S_1 b_5 - R_1 b_4 - Q_1 b_3$$

It is very important that the computations be carried to a sufficient number of digits, both in computing the coefficients and constant terms of the original equations, and in computing the elements of the derived matrix. It is possible for relatively small errors in the coefficients and constant terms of the original equations to result in relatively large errors in the computed solutions of the unknowns. The

greatest source of error in computing the elements of the derived matrix arises from the loss of leading significant digits by subtraction. This must be guarded against and can be done by carrying the computations to more figures than the data. As a general rule, it is recommended that the coefficients and constant terms of the original equations be carried to a sufficient number of decimals to produce at least five significant digits in the smallest quantity, and that the elements of the derived matrix be carried to one more decimal than this, but to not less than six significant digits.

TEST DATA - 723-X6-L2340
 MONTHLY STREAMFLOW SIMULATION - NOV 1970
 STANDARD ANALYSIS AND GENERATION

	10	1	5	10	5	1		10	1	5	10	5	1	
A	1904	107	110	111										
A	1	1.	1.	1.										
A	3	2.24	3.74	9.72	30.2	36.5	13.8	14.8	4.36	1.48	.553	.085		
A	3	1.35	2.25	33.2	16.7	84.2	33.1	18.3	10.7	3.24	1.09	.400		
B	1907	1.98	31.4	72.6	32.5	121.	32.4	12.2	6.49	2.80	1.19	1.15		
C	1	4.08	3.38	3.65	13.2	46.7	62.5	14.1	70.2	14.1	6.76	7.14		
D	3	6.49	5.50	6.89	14.0	34.4	47.5	88.5	82.7	18.4	4.52	2.61		
E	3	3.31	5.04	48.9	23.1	152.	110.	200.	288.	216.	42.6	12.3		
H1071905	6.40	6.07	14.1	25.6	33.4	64.0	118.	122.	124.	64.6	16.1	5.60		
H1071906	7.07	6.37	12.3	12.8	18.8	37.1	48.0	55.5	36.2	11.4	5.44	5.01		
H1071907	12.4	13.9	13.1	12.5	37.4	134.	212.	590.	431.	123.	65.2	42.7		
H1071908	119.	37.7	22.6	28.1	50.8	116.	165.	366.	386.	116.	28.3	12.6		
H1101904	11.2	12.1	16.3	146.	68.3	330.	287.	682.	1010.	1000.	270.	67.2		
H1101905	31.4	23.4	43.0	87.9	101.	248.	403.	563.	625.	454.	121.	32.5		

TEST DATA - 723-X6-L2340
 MONTHLY STREAMFLOW SIMULATION - NOV 1970
 MULTI-PASS RECONSTITUTION AND GENERATION

	10	1	5	10	5	1		10	1	5	10	5	1	
A	1904	107	110	111										
A	1	1.	1.	1.										
A	3	2.24	3.74	9.72	30.2	36.5	13.8	14.8	4.36	1.48	.553	.085		
A	3	1.35	2.25	33.2	16.7	84.2	33.1	18.3	10.7	3.24	1.09	.400		
B	1907	1.98	31.4	72.6	32.5	121.	32.4	12.2	6.49	2.80	1.19	1.15		
C	1	4.08	3.38	3.65	13.2	46.7	62.5	14.1	70.2	14.1	6.76	7.14		
H1071905	6.49	5.50	6.89	14.0	34.4	47.5	88.5	82.7	18.4	4.52	2.61			
H1071906	3.31	5.04	48.9	23.1	152.	110.	200.	288.	216.	42.6	12.3			
H1071907	6.40	6.07	14.1	25.6	33.4	64.0	118.	122.	124.	64.6	16.1	5.60		
H1071908	7.07	6.37	12.3	12.8	18.8	37.1	48.0	55.5	36.2	11.4	5.44	5.01		
H1101904	12.4	13.9	13.1	12.5	37.4	134.	212.	590.	431.	123.	65.2	42.7		
H1101905	119.	37.7	22.6	28.1	50.8	116.	165.	366.	386.	116.	28.3	12.6		
H1101906	11.2	12.1	16.3	146.	68.3	330.	287.	682.	1010.	1000.	270.	67.2		
H1101907	31.4	23.4	43.0	87.9	101.	248.	403.	563.	625.	454.	121.	32.5		

TEST DATA - 723-X6-L2340
MONTHLY STREAMFLOW SIMULATION - NOV 1970
FLOW PROJECTIONS

	10	1	5	2	1909	10	1913	
A	1904							
A		4.08	3.38	3.65	13.2	46.7	62.5	141.
A		6.49	5.50	6.89	14.0	34.4	47.5	88.5
B	1904							
B		2.72	2.59	2.59	48.9	23.1	152.	110.
B		3.31	5.04	48.9	23.1	152.	110.	200.
C		6.07	14.1	25.6	33.4	64.0	118.	122.
H1101904		7.07	6.37	12.8	18.8	37.1	48.0	55.5
H1101905		12.4	13.9	13.1	12.5	37.4	134.	212.
H1101906		11.2	37.7	22.6	28.1	50.8	116.	165.
H1101907		31.4	23.4	43.0	87.9	101.	248.	403.
I								
I								
H1101904		2.72	4.08	3.38	3.65	13.2	46.7	62.5
H1101905		31.5	6.49	5.50	6.89	14.0	34.4	47.5
H1101906		2.59	3.31	5.04	48.9	23.1	152.	110.
H1101907		6.40	6.07	14.1	25.6	33.4	64.0	118.
H1101908		7.07	6.37	12.3	12.8	18.8	37.1	48.0
H1111904		12.4	13.9	13.1	12.5	37.4	134.	212.
H1111905		11.2	37.7	22.6	28.1	50.8	116.	165.
H1111906		11.2	12.1	16.3	146.	68.3	330.	287.
H1111907		31.4	23.4	43.0	87.9	101.	248.	403.

6.76	7.14
4.52	2.61
42.6	12.3
16.1	5.60
5.44	5.01
65.2	42.7
28.3	12.6
270.	67.2
121.	-1

TEST DATA - 723-X6-L2340
MONTHLY STREAMFLOW SIMULATION - NOV 1970
COMPUTE AND USE GENERALIZED STATISTICS

	10	1	5	10	10	1
A	1904					
A		4.08	3.38	3.65	13.2	46.7
A		6.49	5.50	6.89	14.0	34.4
B	1904					
B		2.72	2.59	2.59	48.9	23.1
B		3.31	5.04	48.9	23.1	152.
C		6.07	14.1	25.6	33.4	64.0
H1101904		7.07	6.37	12.8	18.8	37.1
H1101905		12.4	13.9	13.1	12.5	37.4
H1101906		11.2	37.7	22.6	28.1	50.8
H1101907		31.4	23.4	43.0	87.9	101.
I						
I						
H1101904		2.72	4.08	3.38	3.65	13.2
H1101905		31.5	6.49	5.50	6.89	14.0
H1101906		2.59	3.31	5.04	48.9	23.1
H1101907		6.40	6.07	14.1	25.6	33.4
H1101908		7.07	6.37	12.3	12.8	18.8
H1111904		12.4	13.9	13.1	12.5	37.4
H1111905		11.2	37.7	22.6	28.1	50.8
H1111906		11.2	12.1	16.3	146.	68.3
H1111907		31.4	23.4	43.0	87.9	101.

6.76	7.14
4.52	2.61
42.6	12.3
16.1	5.60
5.44	5.01
65.2	42.7
28.3	12.6
270.	67.2
121.	32.5

TEST DATA - 723-X6-L2340
MONTHLY STREAMFLOW SIMULATION - NOV 1970
STATISTICS FURNISHED

	10	10	10	3
A	107	107		
A		.864	.949	.521
A		.390	.951	.532
A		.390	.956	.510
B	110	107		
B		.998	.979	.988
C		.866	.928	.518
		.402	.000	.916
		.407	.000	.999
		.392	0.	.967
		.793	.000	.770
		.317	.999	.000
		.923	.833	.000
		.000	.000	.947
		.998	.998	.936
		.926	.955	.863
		.988	.965	.822
		.000	.983	.963
		.880	.880	.897
		.850	.850	.754
		.863	.863	.769
		.822	.822	.596
		.963	.963	.729

110	110	.391	.930	.529	.321	.793	.757	.860	.826	.986	.971	.959	.833
110	111	.391	.936	.507	.309	.789	.733	.938	.763	.915	.975	.974	.850
111	107	.992	.979	.968	.784	.000	.866	.917	.000	.992	.980	.858	.591
111	110	.994	.957	.963	.995	.967	.917	.924	.924	.980	.985	.980	.998
111	107	.861	.970	.538	.315	.968	.000	.999	.906	.000	.968	.974	.728
111	110	.389	.971	.550	.319	.767	.826	.795	.899	.990	.956	.940	.832
111	111	.388	.977	.526	.307	.763	.799	.867	.831	.918	.974	.955	.849
107	107	.123	.277	.917	1.378	1.449	1.851	1.393	1.156	.778	.327	-.079	-.529
107	107	.509	.100	.651	.339	.151	.196	.154	.076	.176	.152	.138	.412
107	107	.015	-.027	.157	-.211	-.750	-.829	-.658	-.164	-.098	-.643	-.793	-.253
107	107	.0	.0	.1	.5	.3	1.0	.3	.2	.1	.0	.0	.0
110	110	.817	.712	.849	1.132	1.291	1.760	1.859	2.052	1.983	1.538	1.021	.768
110	110	.443	.131	.263	.437	.164	.259	.189	.208	.327	.528	.399	.241
110	110	.220	-.036	-.048	.150	.418	.586	.262	-.006	.236	.550	.464	.307
110	110	.1	.1	.1	.2	.2	.8	.9	1.5	1.4	.8	.2	.1
111	1.529	1.332	1.401	1.637	1.798	2.281	2.407	2.707	2.707	2.712	2.345	1.878	1.574
111	.451	.207	.242	.416	.160	.184	.143	.118	.118	.195	.469	.391	.283
111	.289	.505	.359	.118	.073	.144	-.099	-.253	-.253	.125	.274	-.074	-.115
111	.5	.3	.3	.8	.8	.8	2.5	3.2	6.6	7.4	5.1	1.5	.5

A TEST DATA - 723-X6-L2340
A MONTHLY STREAMFLOW SIMULATION - NOV 1970
A GENERALIZED STATISTICS FURNISHED
H 10 10 10
C 10 10 10

107	107	.531											
110	107	.741											
110	110	.763											
111	107	.744											
111	110	.965											
111	111	.763											
107	1.494	-.189	.290	4.	10.								
110	1.965	.766	.299	6.	11.								
111	2.611	1.427	.269	6.	12.								

A

FREQUENCY STATISTICS AFTER ADJUSTMENTS

STA	ITEM	10	11	12	1	2	3	4	5	6	7	8	9
107	MEAN	.012	.205	.769	1.403	1.41	1.026	1.321	1.177	.710	.316	-.033	-.314
	STD DEV	.077	.191	.637	.803	.157	.227	.187	.087	.228	.156	.133	.415
	SKEW	1.041	-1.078	1.491	-.627	-1.053	-1.073	-1.728	.164	.348	-1.689	-1.681	-.122
	INCRMT	.10	.10	.12	.39	.26	.61	.26	.15	.1	.10	.10	.10
110	MEAN	.315	.715	.849	1.131	1.290	1.758	1.856	2.051	1.982	1.536	1.020	.770
	STD DEV	.444	.130	.262	.439	.164	.259	.190	.208	.328	.530	.400	.240
	SKEW	1.211	-.335	.220	.071	.626	1.454	.371	-1.453	.485	1.041	1.085	-.121
	INCRMT	.10	.10	.10	.20	.20	.67	.77	1.21	1.20	.65	.15	.10
111	MEAN	1.448	1.334	1.385	1.609	1.782	2.250	2.372	2.681	2.693	2.368	1.890	1.507
	STD DEV	.407	.209	.224	.409	.158	.198	.163	.153	.220	.441	.380	.265
	SKEW	1.117	.621	1.004	-.243	.258	.258	.278	-1.429	.892	.472	-.019	-.939
	INCRMT	.43	.22	.24	.69	.64	2.07	2.67	5.50	6.13	4.23	1.21	.39

RAW CORRELATION COEFFICIENTS FOR MONTH 10

STA	107	110	111
			WITH CURRENT MONTH
107	1.000	.998	.987
110	.998	1.000	.997
111	.987	.997	1.000
			WITH PRECEDING MONTH AT ABOVE STATION
107	-4.000	.534	.526
110	.905	.588	.578
111	-4.000	.663	.656

RAW CORRELATION COEFFICIENTS FOR MONTH 11

STA	107	110	111
			WITH CURRENT MONTH
107	1.000	.976	1.000
110	.976	1.000	.974
111	1.000	.974	1.000
			WITH PRECEDING MONTH AT ABOVE STATION
107	.964	.981	.994
110	.970	.981	.944
111	.964	.982	.994

NOTE: Remaining months not shown.

RECORDED AND RECONSTITUTED FLOWS

STA	YEAR	1C	11	12	1	2	3	4	5	6	7	8	9	TOTAL
107	1904	GE	2E	1E	15E	24E	48E	29E	11E	4E	2E	1E	9	128
107	1905	5	2	4	10	30	36	14	15	4	1	1	0	122
107	1906	0	1	2	33	17	84	33	18	11	3	1	0	203
107	1907	1	2	31	73	32	121	42	12	6	3	1	1	315
107	1908	1E	2E	16E	46E	32E	56E	15E	13E	2E	1E	1E	0E	185
STA	YEAR	10	11	12	1	2	3	4	5	6	7	8	9	TOTAL
110	1904	3	4	3	4	13	47	62	141	70	14	7	7	375
110	1905	33	0	5	7	14	34	47	88	83	18	5	3	343
110	1906	3	3	5	49	23	152	110	200	286	216	43	12	1104
110	1907	6	6	14	26	33	64	118	122	124	65	16	6	600
110	1909	7	6	12	13	19	37	48	55	36	11	5	5	254
STA	YEAR	10	11	12	1	2	3	4	5	6	7	8	9	TOTAL
111	1904	12	14	13	12	37	134	212	590	431	123	65	43	1686
111	1905	119	38	23	28	51	116	165	366	386	116	28	13	1449
111	1906	11	12	16	146	68	330	287	682	1010	1000	270	67	3899
111	1907	31	23	43	88	101	248	403	563	625	454	121	32	2732
111	1908	30E	24E	40E	51E	64E	107E	149E	294E	269E	70E	48E	29E	1175

ADJUSTED FREQUENCY STATISTICS

STA	ITEM	1C	11	12	1	2	3	4	5	6	7	8	9
107	MEAN	.019	.278	.761	1.451	1.424	1.807	1.336	1.141	.712	.313	.009	-.314
107	STD DEV	.412	.096	.575	.350	.122	.202	.176	.082	.233	.172	.116	.294
107	SKEW	1.185	-.595	.399	-.251	-1.298	.445	.192	1.018	.135	.335	-1.606	-.061
107	INCRMT	.10	.10	.12	.39	.26	.81	.26	.15	.10	.10	.10	.10
110	MEAN	.815	.715	.849	1.130	1.290	1.758	1.858	2.051	1.982	1.536	1.020	.770
110	STD DEV	.444	.130	.262	.439	.164	.259	.190	.208	.328	.530	.400	.240
110	SKEW	1.211	-.835	.220	.071	.620	1.454	.371	-1.453	.485	1.041	1.085	-.121
110	INCRMT	.10	.10	.10	.20	.20	.67	.77	1.21	1.21	.65	.15	.10
111	MEAN	1.447	1.314	1.388	1.682	1.789	2.232	2.361	2.683	2.696	2.344	1.902	1.512
111	STD DEV	.407	.197	.227	.410	.158	.215	.176	.152	.216	.470	.372	.263
111	SKEW	.964	.188	.070	-.335	.094	.677	.580	-1.629	.541	.722	.545	-.671
111	INCRMT	.43	.22	.24	.69	.64	2.07	2.67	5.50	6.13	4.23	1.21	.39

CONSISTENT CORRELATION MATRIX FOR MONTH 10

STA	107	110	111
107	1.000	.997	.989
110	.997	1.000	.997
111	.989	.997	1.000
107	.963	.526	.516
110	.454	.588	.578
111	.481	.660	.651

CONSISTENT CORRELATION MATRIX FOR MONTH 11

STA	107	110	111
107	1.000	.963	.989
110	.963	1.000	.954
111	.989	.954	1.000
107	.964	.975	.985
110	.867	.881	.904
111	.969	.980	.990

NOTE: Remaining months not shown.

STA	MAXIMUM VOLUMES FOR PERIOD 1 OF 5 YEARS OF RECORDED AND RECONSTITUTED FLOWS												AV MD
	10	11	12	1	2	3	4	5	6	7	8	9	
107	5	2	31	73	32	121	33	18	11	3	1	1	1-MO
110	33	6	14	49	33	152	118	200	288	216	43	1	121
111	119	38	43	146	101	330	403	682	1010	1000	270	12	288
996	157	40	88	228	167	566	953	900	1339	1219	314	67	1010
54-MO												80	1309
6-MO												302	4738
1-MO												121	16
110	3	1	3	10	17	36	14	11	2	1	1	0	1-MO
111	11	3	3	4	13	34	47	55	36	11	5	3	0
996	14	12	13	12	37	107	149	294	269	70	28	13	3
54-MO												15	14
6-MO												196	239
1-MO												11	14
AV MD												14411	13726

INCONSISTENT CORREL MATRIX FOR I= 1 K= 2 UTRMC= 1.001
 INCONSISTENT CORREL MATRIX ADJUSTED G 1 3 1.000

GENERATED FLOWS FOR PERIOD 1

STA	YEAR	10	11	12	1	2	3	4	5	6	7	8	9	TOTAL
107	1	1	2	4	12	37	28	8	11	2	6	8	9	107
107	2	1	2	3	12	37	28	8	11	2	6	8	9	107
107	3	1	2	3	12	37	28	8	11	2	6	8	9	107
107	4	1	2	3	12	37	28	8	11	2	6	8	9	107
107	5	1	2	3	12	37	28	8	11	2	6	8	9	107
STA	YEAR	10	11	12	1	2	3	4	5	6	7	8	9	TOTAL
110	1	7	5	6	3	11	25	28	55	36	10	4	5	195
110	2	3	4	5	22	15	40	56	184	200	41	9	6	585
110	3	3	5	9	30	22	96	103	154	226	125	29	15	817
110	4	8	6	9	13	19	50	69	162	228	112	16	6	698
110	5	6	5	3	4	14	49	58	84	50	9	4	2	288
STA	YEAR	10	11	12	1	2	3	4	5	6	7	8	9	TOTAL
111	1	26	22	22	11	40	60	124	254	237	62	8	9	920
111	2	13	14	18	60	46	132	190	698	836	337	71	34	2469
111	3	13	16	26	100	75	287	290	575	741	552	245	81	3003
111	4	39	28	34	51	63	163	214	615	781	572	109	34	2703
111	5	25	19	13	13	44	109	213	420	308	77	22	6	1269

MAXIMUM VOLUMES FOR PERIOD 1 OF 5 YEARS OF SYNTHETIC FLOWS

STA	YEAR	10	11	12	1	2	3	4	5	6	7	8	9	1-MO	6-MO	54-MO	AV MO
107	1	1	2	4	12	37	28	8	11	2	6	8	9	0	192	724	12
110	1	7	5	6	3	11	25	28	55	36	10	4	5	64	192	724	12
110	2	3	4	5	22	15	40	56	184	200	41	9	6	228	731	2555	43
110	3	3	5	9	30	22	96	103	154	226	125	29	15	228	731	2555	43
110	4	8	6	9	13	19	50	69	162	228	112	16	6	836	2691	10255	173
996	47	36	54	178	121	447	424	1046	687	275	96	275	96	1046	3545	13522	228
STA	YEAR <th>10</th> <th>11</th> <th>12</th> <th>1</th> <th>2</th> <th>3</th> <th>4</th> <th>5</th> <th>6</th> <th>7</th> <th>8</th> <th>9</th> <th>1-MO</th> <th>6-MO</th> <th>54-MO</th> <th>AV MO</th>	10	11	12	1	2	3	4	5	6	7	8	9	1-MO	6-MO	54-MO	AV MO
107	1	1	2	4	12	37	28	8	11	2	6	8	9	0	6	648	12
110	1	7	5	6	3	11	25	28	55	36	10	4	5	0	6	648	12
110	2	3	4	5	22	15	40	56	184	200	41	9	6	2	31	2427	43
110	3	3	5	9	30	22	96	103	154	226	125	29	15	2	149	9506	173
110	4	8	6	9	13	19	50	69	162	228	112	16	6	6	207	12648	228
996	16	20	17	23	74	113	160	275	73	26	8	26	8	8	207	12648	228

GENERATED FLOWS FOR PERIOD 2

STA	YEAR	10	11	12	1	2	3	4	5	6	7	8	9	TOTAL
107	6	0	1	1	15	16	77	34	18	7	3	8	9	174
107	7	0	1	145	160	35	79	20	15	5	2	1	0	473
107	8	0	1	48	26	20	65	20	11	4	1	1	0	185
107	9	1	2	20	25	25	51	24	12	3	2	1	0	145
107	10	1	2	20	23	115	115	33	13	8	3	1	0	280
STA	YEAR	10	11	12	1	2	3	4	5	6	7	8	9	TOTAL
110	6	2	3	20	1	2	106	113	124	6	7	8	9	655
110	7	64	8	33	26	25	42	66	106	90	32	27	12	655
110	8	2	4	9	21	21	47	71	114	63	12	10	6	510
110	9	4	5	5	9	18	84	79	94	55	38	7	4	374
110	10	5	7	13	19	27	87	122	169	197	146	26	11	829
STA	YEAR	10	11	12	1	2	3	4	5	6	7	8	9	TOTAL
111	6	9	11	9	64	63	292	325	542	6	7	8	9	2680
111	7	207	48	92	102	85	146	189	476	470	198	218	68	2134
111	8	9	11	25	72	68	149	243	508	396	104	87	34	1661
111	9	17	17	20	34	57	211	249	385	337	174	53	33	1587
111	10	23	23	39	71	69	284	373	672	784	675	199	62	3274

MAXIMUM VOLUMES FOR PERIOD 2 OF 5 YEARS OF SYNTHETIC FLOWS

STA	IC	11	12	1	2	3	4	5	6	7	8	9	1-MO	6-MO	54-MO	AV	MO
107	9	2	145	160	35	115	34	18	6	7	3	1	160	454	1254	21	21
110	64	8	33	28	27	106	122	159	197	146	27	12	197	748	2707	46	46
111	207	48	92	102	85	292	373	672	784	675	218	68	784	2987	11121	189	189
996	280	59	270	289	145	485	528	855	990	824	246	81	990	3908	15054	256	256
MINIMUM VOLUMES																	
STA	IC	11	12	1	2	3	4	5	6	7	8	9	1-MO <th>6-MO</th> <th>54-MO</th> <th>AV</th> <th>MO</th>	6-MO	54-MO	AV	MO
107	0	1	1	15	16	51	20	11	6	7	1	0	0	8	1150	21	21
110	4	3	9	42	66	94	66	94	55	12	6	4	2	33	2216	46	46
111	9	11	34	146	189	385	337	104	337	104	50	26	9	163	8936	189	189
996	11	15	12	63	100	261	275	442	395	118	56	30	11	223	12386	256	256

TEST DATA - 723-X6-L2340
 MONTHLY STREAMFLOW SIMULATION - NOV 1970
 MULTI-PASS RECONSTITUTION AND GENERATION

STATION	1	2	3	4	5	6	7	8	9	1-MO	6-MO	54-MO	AV MO				
107	10	11	12	1	2	3	4	5	6	7	8	9	1	121	302	9999998	18
110	10	11	12	1	2	3	4	5	6	7	8	9	1	288	1009	2656	45

MAXIMUM VOLUMES OF RECORDED FLOWS

STATION	1	2	3	4	5	6	7	8	9	1-MO	6-MO	54-MO	AV MO				
107	10	11	12	1	2	3	4	5	6	7	8	9	1	121	302	9999998	18
110	10	11	12	1	2	3	4	5	6	7	8	9	1	288	1009	2656	45

MINIMUM VOLUMES

STATION	1	2	3	4	5	6	7	8	9	1-MO	6-MO	54-MO	AV MO				
107	10	11	12	1	2	3	4	5	6	7	8	9	1	121	302	9999998	18
110	10	11	12	1	2	3	4	5	6	7	8	9	1	288	1009	2656	45

FREQUENCY STATISTICS

STATION	ITEM	10	11	12	1	2	3	4	5	6	7	8	9
107	MEAN	.112	.283	.820	1.465	1.410	1.862	1.395	1.177	.834	.395	.000	-.312
	STD DEV	.513	.108	.597	.433	.157	.263	.214	.087	.192	.173	.162	.415
	SKEW	1.041	-1.308	1.491	-.627	-1.653	-1.073	-1.728	.144	.348	-1.489	-1.641	-.122
	INCRMT YEARS	.10	.10	.12	.39	.26	.81	.26	.15	.10	.10	.10	.10
110	MEAN	.815	.715	.849	1.130	1.290	1.758	1.858	2.051	1.982	1.536	1.020	.770
	STD DEV	.444	.130	.262	.439	.164	.259	.190	.208	.328	.530	.400	.240
	SKEW	1.211	-.835	.220	.071	.626	1.454	.371	-.453	.485	1.041	1.085	-.121
	INCRMT YEARS	.10	.10	.10	.20	.20	.67	.77	1.21	1.20	.65	.15	.10

FREQUENCY STATISTICS AFTER ADJUSTMENTS

STATION	ITEM	10	11	12	1	2	3	4	5	6	7	8	9
107	MEAN	.012	.283	.769	1.403	1.410	1.862	1.321	1.177	.710	.316	-.033	-.312
	STD DEV	.409	.089	.637	.363	.157	.263	.187	.087	.228	.166	.133	.415
	SKEW	1.041	-1.308	1.491	-.627	-1.653	-1.073	-1.728	.144	.348	-1.489	-1.641	-.122
	INCRMT YEARS	.10	.10	.12	.39	.26	.81	.26	.15	.10	.10	.10	.10
110	MEAN	.815	.715	.849	1.130	1.290	1.758	1.858	2.051	1.982	1.536	1.020	.770
	STD DEV	.444	.130	.262	.439	.164	.259	.190	.208	.328	.530	.400	.240
	SKEW	1.211	-.835	.220	.071	.626	1.454	.371	-.453	.485	1.041	1.085	-.121
	INCRMT YEARS	.10	.10	.10	.20	.20	.67	.77	1.21	1.20	.65	.15	.10

RAW CORRELATION COEFFICIENTS FOR MONTH 10

STA	107	110	
			WITH CURRENT MONTH
107	1.000	.998	
110	.998	1.000	
			WITH PRECEDING MONTH AT ABOVE STATION
107	-.4030	.234	
110	.905	.588	

RAW CORRELATION COEFFICIENTS FOR MONTH 11

STA	107	110	
			WITH CURRENT MONTH
107	1.000	.970	
110	.970	1.000	
			WITH PRECEDING MONTH AT ABOVE STATION
107	.964	.980	
110	.870	.881	

NOTE: Remaining months not shown.

RECORDED AND RECONSTITUTED FLOWS
PASS 1

STA	YEAR	10	11	12	1	2	3	4	5	6	7	8	9	TOTAL
107	1904	0E	2E	1C	12E	27E	08E	20E	11E	4E	2E	1E	9	148
107	1905	5	2	4	10	30	36	14	15	4	1	1	0	122
107	1906	0	1	2	33	17	84	33	18	11	3	1	0	203
107	1907	1	2	31	73	32	121	32	12	6	3	1	1	315
107	1908	1E	2E	20E	44E	24E	84E	16E	17E	3E	1E	1E	0E	213
110	1904	3	4	3	4	13	3	4	5	6	7	8	9	375
110	1905	33	6	5	7	14	34	47	48	85	14	7	7	343
110	1906	3	3	5	49	23	152	110	200	288	18	5	3	1104
110	1907	0	6	14	26	33	64	118	122	124	43	16	12	600
110	1908	7	6	12	13	19	37	48	55	36	11	5	5	254

ADJUSTED FREQUENCY STATISTICS

STA	ITEM	10	11	12	1	2	3	4	5	6	7	8	9
107	MEAN	.610	.285	.748	1.427	1.408	1.870	1.342	1.167	.707	.318	-.037	-.453
107	STD DEV	.412	.585	.586	.365	.113	.189	.172	.091	.230	.166	.144	.424
107	SKEW	1.185	-.822	.383	-.144	-1.182	-.994	.141	-.143	.453	.436	-.327	-.071
107	INCRMT	.10	.10	.12	.39	.26	.31	.26	.15	.10	.10	.10	.10
110	MEAN	.310	.715	.849	1.130	1.290	1.758	1.858	2.051	1.982	1.530	1.020	.770
110	STD DEV	.474	.130	.262	.439	.164	.259	.190	.208	.328	.330	.400	.240
110	SKEW	1.211	-.855	.420	.071	.625	1.454	.371	-.453	.485	1.041	1.085	-.121
110	INCRMT	.10	.10	.10	.20	.20	.67	.77	1.21	1.20	.65	.15	.10

CONSISTENT CORRELATION MATRIX FOR MONTH 10

STA	107	110	
	WITH CURRENT MONTH		
107	1.000	.997	
110	.997	1.000	
	WITH PRECEDING MONTH AT ABOVE STATION		
107	.481	.526	
110	.475	.588	

CONSISTENT CORRELATION MATRIX FOR MONTH 11

STA	107	110	
	WITH CURRENT MONTH		
107	1.000	.972	
110	.972	1.000	
	WITH PRECEDING MONTH AT ABOVE STATION		
107	.941	.950	
110	.867	.881	

NOTE: Remaining months not shown.

MAXIMUM VOLUMES FOR PERIOD 1 OF 5 YEARS OF RECORDED AND RECONSTITUTED FLOWS

STA	10	11	12	1	2	3	4	5	6	7	8	9	1-MO	6-MO	54-MO	AV MO
107	5	2	31	73	32	121	33	18	11	3	1	1	121	302	1000	17
110	33	6	14	49	33	152	118	200	288	216	43	12	284	1009	2656	45

MINIMUM VOLUMES

STA	10	11	12	1	2	3	4	5	6	7	8	9	1-MO	6-MO	54-MO	AV MO
107	0	1	1	10	17	36	14	11	3	1	1	0	0	6	894	6
110	3	3	3	4	13	34	47	55	36	11	5	3	3	36	2564	36

INCONSISTENT CORREL MATRIX FOR I= 1 K= 2 DTANC= 1.000

PASS 2
 STA(S) FROM PREVIOUS PASSES 111

MAXIMUM VOLUMES OF RECORDED FLUPS
 STA 11 12 1 2 3 4 5 6 7 8 9 1-MU 54-MU 6-MU 1-MU AV MO
 111 119 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88 89 90 91 92 93 94 95 96 97 98 99 100 101 102 103 104 105 106 107 108 109 110 111 112 113 114 115 116 117 118 119 120 121 122 123 124 125 126 127 128 129 130 131 132 133 134 135 136 137 138 139 140 141 142 143 144 145 146 147 148 149 150 151 152 153 154 155 156 157 158 159 160 161 162 163 164 165 166 167 168 169 170 171 172 173 174 175 176 177 178 179 180 181 182 183 184 185 186 187 188 189 190 191 192 193 194 195 196 197 198 199 200 201 202 203 204 205 206 207 208 209 210 211 212 213 214 215 216 217 218 219 220 221 222 223 224 225 226 227 228 229 230 231 232 233 234 235 236 237 238 239 240 241 242 243 244 245 246 247 248 249 250 251 252 253 254 255 256 257 258 259 260 261 262 263 264 265 266 267 268 269 270 271 272 273 274 275 276 277 278 279 280 281 282 283 284 285 286 287 288 289 290 291 292 293 294 295 296 297 298 299 300 301 302 303 304 305 306 307 308 309 310 311 312 313 314 315 316 317 318 319 320 321 322 323 324 325 326 327 328 329 330 331 332 333 334 335 336 337 338 339 340 341 342 343 344 345 346 347 348 349 350 351 352 353 354 355 356 357 358 359 360 361 362 363 364 365 366 367 368 369 370 371 372 373 374 375 376 377 378 379 380 381 382 383 384 385 386 387 388 389 390 391 392 393 394 395 396 397 398 399 400 401 402 403 404 405 406 407 408 409 410 411 412 413 414 415 416 417 418 419 420 421 422 423 424 425 426 427 428 429 430 431 432 433 434 435 436 437 438 439 440 441 442 443 444 445 446 447 448 449 450 451 452 453 454 455 456 457 458 459 460 461 462 463 464 465 466 467 468 469 470 471 472 473 474 475 476 477 478 479 480 481 482 483 484 485 486 487 488 489 490 491 492 493 494 495 496 497 498 499 500 501 502 503 504 505 506 507 508 509 510 511 512 513 514 515 516 517 518 519 520 521 522 523 524 525 526 527 528 529 530 531 532 533 534 535 536 537 538 539 540 541 542 543 544 545 546 547 548 549 550 551 552 553 554 555 556 557 558 559 560 561 562 563 564 565 566 567 568 569 570 571 572 573 574 575 576 577 578 579 580 581 582 583 584 585 586 587 588 589 590 591 592 593 594 595 596 597 598 599 600 601 602 603 604 605 606 607 608 609 610 611 612 613 614 615 616 617 618 619 620 621 622 623 624 625 626 627 628 629 630 631 632 633 634 635 636 637 638 639 640 641 642 643 644 645 646 647 648 649 650 651 652 653 654 655 656 657 658 659 660 661 662 663 664 665 666 667 668 669 670 671 672 673 674 675 676 677 678 679 680 681 682 683 684 685 686 687 688 689 690 691 692 693 694 695 696 697 698 699 700 701 702 703 704 705 706 707 708 709 710 711 712 713 714 715 716 717 718 719 720 721 722 723 724 725 726 727 728 729 730 731 732 733 734 735 736 737 738 739 740 741 742 743 744 745 746 747 748 749 750 751 752 753 754 755 756 757 758 759 760 761 762 763 764 765 766 767 768 769 770 771 772 773 774 775 776 777 778 779 780 781 782 783 784 785 786 787 788 789 790 791 792 793 794 795 796 797 798 799 800 801 802 803 804 805 806 807 808 809 810 811 812 813 814 815 816 817 818 819 820 821 822 823 824 825 826 827 828 829 830 831 832 833 834 835 836 837 838 839 840 841 842 843 844 845 846 847 848 849 850 851 852 853 854 855 856 857 858 859 860 861 862 863 864 865 866 867 868 869 870 871 872 873 874 875 876 877 878 879 880 881 882 883 884 885 886 887 888 889 890 891 892 893 894 895 896 897 898 899 900 901 902 903 904 905 906 907 908 909 910 911 912 913 914 915 916 917 918 919 920 921 922 923 924 925 926 927 928 929 930 931 932 933 934 935 936 937 938 939 940 941 942 943 944 945 946 947 948 949 950 951 952 953 954 955 956 957 958 959 960 961 962 963 964 965 966 967 968 969 970 971 972 973 974 975 976 977 978 979 980 981 982 983 984 985 986 987 988 989 990 991 992 993 994 995 996 997 998 999 1000

MINIMUM VOLUMES
 STA 11 12 1 2 3 4 5 6 7 8 9 1-MU 54-MU 6-MU 1-MU AV MO
 111 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88 89 90 91 92 93 94 95 96 97 98 99 100 101 102 103 104 105 106 107 108 109 110 111 112 113 114 115 116 117 118 119 120 121 122 123 124 125 126 127 128 129 130 131 132 133 134 135 136 137 138 139 140 141 142 143 144 145 146 147 148 149 150 151 152 153 154 155 156 157 158 159 160 161 162 163 164 165 166 167 168 169 170 171 172 173 174 175 176 177 178 179 180 181 182 183 184 185 186 187 188 189 190 191 192 193 194 195 196 197 198 199 200 201 202 203 204 205 206 207 208 209 210 211 212 213 214 215 216 217 218 219 220 221 222 223 224 225 226 227 228 229 230 231 232 233 234 235 236 237 238 239 240 241 242 243 244 245 246 247 248 249 250 251 252 253 254 255 256 257 258 259 260 261 262 263 264 265 266 267 268 269 270 271 272 273 274 275 276 277 278 279 280 281 282 283 284 285 286 287 288 289 290 291 292 293 294 295 296 297 298 299 300 301 302 303 304 305 306 307 308 309 310 311 312 313 314 315 316 317 318 319 320 321 322 323 324 325 326 327 328 329 330 331 332 333 334 335 336 337 338 339 340 341 342 343 344 345 346 347 348 349 350 351 352 353 354 355 356 357 358 359 360 361 362 363 364 365 366 367 368 369 370 371 372 373 374 375 376 377 378 379 380 381 382 383 384 385 386 387 388 389 390 391 392 393 394 395 396 397 398 399 400 401 402 403 404 405 406 407 408 409 410 411 412 413 414 415 416 417 418 419 420 421 422 423 424 425 426 427 428 429 430 431 432 433 434 435 436 437 438 439 440 441 442 443 444 445 446 447 448 449 450 451 452 453 454 455 456 457 458 459 460 461 462 463 464 465 466 467 468 469 470 471 472 473 474 475 476 477 478 479 480 481 482 483 484 485 486 487 488 489 490 491 492 493 494 495 496 497 498 499 500 501 502 503 504 505 506 507 508 509 510 511 512 513 514 515 516 517 518 519 520 521 522 523 524 525 526 527 528 529 530 531 532 533 534 535 536 537 538 539 540 541 542 543 544 545 546 547 548 549 550 551 552 553 554 555 556 557 558 559 560 561 562 563 564 565 566 567 568 569 570 571 572 573 574 575 576 577 578 579 580 581 582 583 584 585 586 587 588 589 590 591 592 593 594 595 596 597 598 599 600 601 602 603 604 605 606 607 608 609 610 611 612 613 614 615 616 617 618 619 620 621 622 623 624 625 626 627 628 629 630 631 632 633 634 635 636 637 638 639 640 641 642 643 644 645 646 647 648 649 650 651 652 653 654 655 656 657 658 659 660 661 662 663 664 665 666 667 668 669 670 671 672 673 674 675 676 677 678 679 680 681 682 683 684 685 686 687 688 689 690 691 692 693 694 695 696 697 698 699 700 701 702 703 704 705 706 707 708 709 710 711 712 713 714 715 716 717 718 719 720 721 722 723 724 725 726 727 728 729 730 731 732 733 734 735 736 737 738 739 740 741 742 743 744 745 746 747 748 749 750 751 752 753 754 755 756 757 758 759 760 761 762 763 764 765 766 767 768 769 770 771 772 773 774 775 776 777 778 779 780 781 782 783 784 785 786 787 788 789 790 791 792 793 794 795 796 797 798 799 800 801 802 803 804 805 806 807 808 809 810 811 812 813 814 815 816 817 818 819 820 821 822 823 824 825 826 827 828 829 830 831 832 833 834 835 836 837 838 839 840 841 842 843 844 845 846 847 848 849 850 851 852 853 854 855 856 857 858 859 860 861 862 863 864 865 866 867 868 869 870 871 872 873 874 875 876 877 878 879 880 881 882 883 884 885 886 887 888 889 890 891 892 893 894 895 896 897 898 899 900 901 902 903 904 905 906 907 908 909 910 911 912 913 914 915 916 917 918 919 920 921 922 923 924 925 926 927 928 929 930 931 932 933 934 935 936 937 938 939 940 941 942 943 944 945 946 947 948 949 950 951 952 953 954 955 956 957 958 959 960 961 962 963 964 965 966 967 968 969 970 971 972 973 974 975 976 977 978 979 980 981 982 983 984 985 986 987 988 989 990 991 992 993 994 995 996 997 998 999 1000

FREQUENCY STATISTICS
 STA ITEM 11 12 1 2 3 4 5 6 7 8 9 1-MU 54-MU 6-MU 1-MU AV MO
 111 MEAN 1.439 1.298 1.335 1.673 1.784 2.281 2.407 2.734 2.760 2.462 1.953 1.524
 STD DEV .003 .223 .182 .473 .182 .213 .160 .115 .187 .449 .408 .302
 SKEW 1.117 .620 1.004 -.243 .258 .208 .278 -.1429 .892 .472 -.019 -.939
 INCRMT .43 .22 .24 .69 .64 .207 2.67 5.50 6.13 4.23 1.21 .39
 YEARS 4 4 4 4 4 4 4 4 4 4 4 4

FREQUENCY STATISTICS AFTER ADJUSTMENTS
 STA ITEM 10 11 12 1 2 3 4 5 6 7 8 9 1-MU 54-MU 6-MU 1-MU AV MO
 111 MEAN .815 .715 .849 1.130 1.290 1.758 1.858 2.051 1.982 1.536 1.020 .710
 STD DEV .444 .130 .262 .439 .164 .259 .190 .208 .328 .530 .400 .240
 SKEW 1.211 -.835 .220 .071 .626 .1454 .371 -.453 .465 1.061 1.085 -.121
 INCRMT .10 .10 .10 .20 .20 .67 .77 1.21 1.20 .65 .15 .10
 111 MEAN 1.448 1.334 1.385 1.669 1.782 2.250 2.372 2.681 2.693 2.368 1.890 1.507
 STD DEV .407 .209 .224 .409 .158 .198 .163 .153 .220 .441 .380 .265
 SKEW 1.117 .620 1.004 -.243 .258 .208 .278 -.1429 .892 .472 -.019 -.939
 INCRMT .43 .22 .24 .69 .64 2.07 2.67 5.50 6.13 4.23 1.21 .39

RAM CORRELATION COEFFICIENTS FOR MONTH 10

STA	110	111	
110	1.000	.997	WITH CURRENT MONTH
111	.997	1.000	
110	.589	.579	WITH PRECEDING MONTH AT ABOVE STATION
111	.663	.656	

RAM CORRELATION COEFFICIENTS FOR MONTH 11

STA	110	111	
110	1.000	.974	WITH CURRENT MONTH
111	.974	1.000	
110	.881	.944	WITH PRECEDING MONTH AT ABOVE STATION
111	.982	.994	

NOTE: Remaining months not shown.

RECORDED AND RECONSTITUTED FLOWS
PASS 2

STA	YEAR	10	11	12	1	2	3	4	5	6	7	8	9	TOTAL
111	1904	12	14	13	12	37	134	212	590	431	123	65	8	9
111	1905	119	38	23	28	51	116	165	366	386	116	28	43	1686
111	1906	11	12	16	146	68	330	287	682	1010	1000	270	13	1449
111	1907	31	23	43	88	101	248	603	563	625	454	121	67	3899
111	1908	34E	23E	35E	47E	52E	137E	180E	256E	313E	95E	33E	32	2732
													29E	1234

ADJUSTED FREQUENCY STATISTICS

STA	ITEM	10	11	12	1	2	3	4	5	6	7	8	9
111	MEAN	1.458	1.312	1.378	1.674	1.771	2.254	2.378	2.671	2.709	2.369	1.870	1.512
	STD DEV	.409	.196	.216	.489	.163	.195	.158	.173	.198	.441	.399	.263
	SKEN	.520	.239	.089	-.243	.613	.737	.611	-.878	.890	.896	.578	-.674
	INCRMT	.43	.22	.24	.69	.64	2.07	2.67	3.50	6.13	4.23	1.21	.39

CONSISTENT CORRELATION MATRIX FOR MONTH 10

STA	110	111
110	1.000	.990
111	.996	1.000
110	.588	.578
111	.653	.642

CONSISTENT CORRELATION MATRIX FOR MONTH 11

STA	110	111
110	1.000	.949
111	.949	1.000
110	.681	.920
111	.981	.994

NOTE: Remaining months not shown.

MAXIMUM VOLUMES FOR PERIOD 1 OF 5 YEARS OF RECORDED AND RECONSTITUTED FLOWS

STA	10	11	12	1	2	3	4	5	6	7	8	9	1-MO	6-MO	54-MO	AV MO
110	119	38	43	146	101	330	403	682	1010	1000	270	67	1010	3979	10890	183
STA	10	11	12	1	2	3	4	5	6	7	8	9	1-MO	6-MO	54-MO	AV MO
111	11	12	13	12	37	116	165	256	313	95	28	13	11	196	10264	183

GENERATED FLOWS FOR PERIOD 1 PASS 1

STA YEAR	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100	TOTAL
107	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100	TOTAL			
107	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100	TOTAL			
107	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100	TOTAL			
107	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100	TOTAL			
107	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100	TOTAL			
107	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100	TOTAL			
107	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100	TOTAL			
107	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100	TOTAL			
107	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100	TOTAL			
107	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100	TOTAL			
107	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100	TOTAL			
107	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100	TOTAL			
107	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51																																																					

GENERATED FLOWS FOR PERIOD 2
PASS 1

STA	YEAR	IC	11	12	1	2	3	4	5	6	7	8	9	TOTAL
107	6	1	29	14	3	2	19	4	12	0	7	8	9	172
107	7	1	23	24	89	14	36	61	12	3	2	1	0	225
107	8	2	5	22	22	22	14	16	16	4	2	2	1	92
107	9	2	24	22	64	22	18	15	2	2	1	1	0	150
107	10	1	31	19	57	19	15	15	3	3	1	1	0	146
110	6	1	1	2	3	2	4	5	5	6	7	8	9	322
110	7	6	21	16	37	16	115	164	84	54	14	8	8	2102
110	8	19	18	18	96	18	45	74	164	335	783	335	21	337
110	9	2	2	9	40	9	55	65	7	9	9	3	3	252
110	10	3	30	17	34	17	48	91	7	11	11	4	4	306

MAXIMUM VOLUMES FOR PERIOD 2 OF 5 YEARS OF SYNTHETIC FLOWS

STA	IC	11	12	1	2	3	4	5	6	7	8	9	1-MO	6-MO	54-MO	AV MO
107	2	2	31	24	89	36	18	18	6	7	8	2	1	89	208	13
110	19	6	30	18	96	115	164	534	783	335	21	783	21	783	3281	55

MINIMUM VOLUMES

STA	IC	11	12	1	2	3	4	5	6	7	8	9	1-MO	6-MO	54-MO	AV MO
107	0	1	2	5	14	22	14	12	2	1	1	1	0	0	6	650
110	2	4	9	2	9	34	45	65	34	9	3	3	2	2	27	3149

GENERATED FLOWS FOR PERIOD 2
PASS 2

STA	YEAR	IC	11	12	1	2	3	4	5	6	7	8	9	TOTAL
111	6	26	22	26	67	56	135	208	390	392	108	8	9	1538
111	7	28	22	24	67	65	252	339	635	1319	2916	60	48	8124
111	8	96	34	18	6	31	115	157	394	400	182	72	33	1538
111	9	8	11	14	52	42	136	176	316	281	72	22	14	1144
111	10	11	13	18	99	62	131	164	395	379	117	26	22	1437

MAXIMUM VOLUMES FOR PERIOD 2 OF 5 YEARS OF SYNTHETIC FLOWS

STA	IC	11	12	1	2	3	4	5	6	7	8	9	1-MO	6-MO	54-MO	AV MO
111	10	11	12	1	2	3	4	5	6	7	8	9	5	2916	7819	230
111	96	34	26	99	65	252	339	635	1339	2916	2337	100	5	2916	13594	230

MINIMUM VOLUMES

STA	IC	11	12	1	2	3	4	5	6	7	8	9	1-MO	6-MO	54-MO	AV MO
111	8	11	14	6	31	115	157	201	281	72	22	14	6	152	12818	230

TEST DATA - 723-K6-L2340
 MONTHLY STELLMELON SIMULATION - NOV 1970
 FLOW PROJECTIONS

IVRA	IMNTH	IANVAL	IARCS	NYRG	NYMKG	NPASS	IPCCHQ	IPCCHS	NSTA	NCUMB	NTNDM	NCSTY	IGNRL	NPRJ	IYRPJ	MTMPJ	LVRPJ
1904	10	1	5	-0	-0	1	-0	-0	-0	-0	-0	-0	-0	2	1909	10	1913
MAXIMUM VOLUMES OF RECORDED FLOWS																	
STA	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	13	14
110	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	13	14
111	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	13	14
MINIMUM VOLUMES																	
STA	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	13	14
110	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	13	14
111	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	13	14

FREQUENCY STATISTICS																	
STA	ITEM	10	11	12	1	2	3	4	5	6	7	8	9				
110	MEAN	.815	.715	.849	1.130	1.290	1.758	1.858	2.051	1.982	1.536	1.020	.770				
	STD DEV	.444	.130	.262	.439	.164	.259	.190	.208	.328	.530	.400	.240				
	SKEW	1.211	-.835	.220	.071	.626	1.454	-.371	-.453	1.061	1.085	1.085	-.121				
	INCRMT	.10	.10	.10	.20	.25	.67	.77	1.21	1.20	.65	.15	.10				
	YEARS	5	5	5	5	5	5	5	5	5	5	5	5				
111	MEAN	1.439	1.498	1.335	1.673	1.784	2.281	2.407	2.734	2.760	2.462	1.953	1.526				
	STD DEV	.469	.223	.223	.473	.182	.213	.166	.115	.187	.449	.408	.370				
	SKEW	1.117	.820	1.004	-.243	.258	.208	.278	-1.429	.892	.472	-.019	-1.204				
	INCRMT	.43	.22	.24	.69	.64	2.07	2.67	5.50	6.13	4.23	1.21	.41				
	YEARS	4	4	4	4	4	4	4	4	4	4	4	3				

FREQUENCY STATISTICS AFTER ADJUSTMENTS																	
STA	ITEM	10	11	12	1	2	3	4	5	6	7	8	9				
110	MEAN	.815	.715	.849	1.130	1.290	1.758	1.858	2.051	1.982	1.536	1.020	.770				
	STD DEV	.444	.130	.262	.439	.164	.259	.190	.208	.328	.530	.400	.240				
	SKEW	1.211	-.835	.220	.071	.626	1.454	.371	-.453	1.061	1.085	1.085	-.121				
	INCRMT	.10	.10	.10	.20	.25	.67	.77	1.21	1.20	.65	.15	.10				
111	MEAN	1.468	1.334	1.385	1.669	1.782	2.250	2.372	2.681	2.693	2.368	1.890	1.499				
	STD DEV	.407	.209	.224	.409	.158	.198	.163	.153	.220	.441	.380	.266				
	SKEW	1.117	.820	1.004	-.243	.258	.208	.278	-1.429	.892	.472	-.019	-1.204				
	INCRMT	.43	.22	.24	.69	.64	2.07	2.67	5.50	6.13	4.23	1.21	.41				

RAW CORRELATION COEFFICIENTS FOR MONTH 1

STA	11C	111	WITH CURRENT MONTH
110	1.000	.337	
111	.997	1.000	
STA	11C	111	WITH PRECEDING MONTH AT ABOVE STATION
110	.588	.538	
111	.665	.613	

RAW CORRELATION COEFFICIENTS FOR MONTH 11

STA	110	111	WITH CURRENT MONTH
110	1.000	.974	
111	.974	1.000	
STA	110	111	WITH PRECEDING MONTH AT ABOVE STATION
110	.681	.944	
111	.982	.994	

NOTE: Remaining months not shown.

RECORDED AND RECONSTITUTED FLOWS

STA	YEAR	10	11	12	1	2	3	4	5	6	7	8	9	TOTAL
110	1904	3	4	3	4	13	47	62	141	70	14	7	7	375
110	1905	33	6	5	7	14	34	47	88	83	18	5	3	343
110	1906	3	3	5	49	23	152	110	200	288	216	43	12	1104
110	1907	6	6	14	26	33	64	118	122	124	65	16	6	600
110	1908	7	6	12	13	19	37	48	55	36	11	5	5	254
111	1904	12	11	12	12	2	3	4	5	6	7	8	9	TOTAL
111	1905	119	38	23	28	37	134	212	590	431	123	65	43	1686
111	1906	11	12	14	146	51	116	165	366	386	116	28	13	1449
111	1907	31	23	43	88	68	330	287	682	1010	1000	270	67	3899
111	1908	29C	29C	39C	47E	59E	116E	136E	279E	315E	454	121	33E	2733
											98E	43E	30E	1222

ADJUSTED FREQUENCY STATISTICS

STA	ITEM	10	11	12	1	2	3	4	5	6	7	8	9
11C	MEAN	.815	.715	.849	1.130	1.290	1.758	1.858	2.051	1.982	1.536	1.020	.770
	STD DEV	.444	.130	.262	.439	.164	.259	.190	.208	.328	.530	.400	.240
	SKEW	1.211	-.835	.220	.671	.626	1.454	.371	-.453	.485	1.041	1.085	-.121
	INCRMT	.10	.10	.10	.20	.20	.67	.77	1.21	1.20	.65	.15	.10
111	MEAN	1.459	1.321	1.486	1.674	1.785	2.240	2.354	2.678	2.709	2.371	1.892	1.518
	STD DEV	.409	.290	.224	.409	.158	.207	.186	.160	.193	.439	.379	.262
	SKEW	.806	.043	.068	-.239	.297	.741	.399	-.725	.906	.908	.581	-.785
	INCRMT	.43	.22	.24	.69	.64	2.07	2.67	5.50	6.13	4.23	1.21	.41

CONSISTENT CORRELATION MATRIX FOR MONTH 10

STA	110	111	
110	1.000	.995	WITH CURRENT MONTH
111	.995	1.000	
110	.588	.531	WITH PRECEDING MONTH AT ABOVE STATION
111	.652	.596	

CONSISTENT CORRELATION MATRIX FOR MONTH 11

STA	110	111	
110	1.000	.967	WITH CURRENT MONTH
111	.967	1.000	
110	.881	.922	WITH PRECEDING MONTH AT ABOVE STATION
111	.972	.990	

NOTE: Remaining months not shown.

MAXIMUM VOLUMES FOR PERIOD 1 OF 5 YEARS OF RECORDED AND RECONSTITUTED FLOWS

STA	1C	11	12	1	2	3	4	5	6	7	8	9	1-MO	6-MO	54-MO	AV MO
110	33	8	14	49	33	152	118	200	288	216	43	12	288	1009	2656	45
111	119	38	43	146	101	330	403	682	1010	1000	270	67	1010	3579	10872	183

MINIMUM VOLUMES

STA	1C	11	12	1	2	3	4	5	6	7	8	9	1-MO	6-MO	54-MO	AV MO
110	3	3	3	4	13	34	47	55	36	11	5	3	3	36	2564	45
111	11	12	13	12	37	116	136	279	315	98	28	13	11	196	10214	183

GENERATED FLOWS FOR PERIOD 1

STA	YEAR	1C	1	2	3	4	5	6	7	8	9	TOTAL
11C	1909	12	99	37	43	74	124	162	47	26	8	642
11C	1910	12	27	19	131	176	172	241	354	65	10	1114
11C	1911	14	11	36	156	133	267	744	766	123	12	2215
11C	1912	4	7	37	42	66	110	159	35	8	4	572
11C	1913	8	28	16	58	62	120	59	25	13	10	404
11I	1909	12	1	2	3	4	5	6	7	8	9	TOTAL
11I	1910	33	265	95	185	216	490	650	418	197	8	2628
11I	1911	34	99	55	291	293	666	1037	1561	384	55	459C
11I	1912	15	38	81	344	241	833	2588	3593	626	73	8484
11I	1913	45	218	129	182	189	475	642	217	59	27	2267
11I	1913	23	92	49	185	167	474	399	209	129	60	1802

GENERATED FLOWS FOR PERIOD 2

STA	YEAR	1C	1	2	3	4	5	6	7	8	9	TOTAL
11O	1909	12	27	28	59	90	150	118	31	8	9	535
11O	1910	9	34	34	84	116	217	201	65	21	4	800
11O	1911	7	9	16	28	38	45	37	9	4	3	238
11O	1912	4	24	19	53	73	127	161	72	26	11	58C
11O	1913	13	4	13	34	57	90	52	11	4	6	306
11I	1909	12	1	2	3	4	5	6	7	8	9	TOTAL
11I	1910	29	96	97	214	248	596	649	225	69	24	2294
11I	1911	20	113	129	329	280	727	631	433	165	60	2938
11I	1912	44	35	52	88	138	257	309	77	30	19	1213
11I	1913	14	99	62	169	238	495	669	519	205	62	2554
11I	1913	46	15	44	114	196	396	346	87	33	21	1622

RAW CORRELATION COEFFICIENTS FOR MONTH 10

STA	110	111	
			WITH CURRENT MONTH
110	1.000	.997	
111	.997	1.000	
			WITH PRECEDING MONTH AT ABOVE STATION
110	.548	.578	
111	.663	.656	

RAW CORRELATION COEFFICIENTS FOR MONTH 11

STA	110	111	
			WITH CURRENT MONTH
110	1.000	.974	
111	.974	1.000	
			WITH PRECEDING MONTH AT ABOVE STATION
110	.841	.944	
111	.982	.994	

NOTE: Remaining months not shown.

RECORDED AND RECONSTITUTED FLOWS

STA	YEAR	10	11	12	1	2	3	4	5	6	7	8	9	TOTAL
110	1904	3	4	3	4	13	47	62	141	70	14	7	9	375
110	1905	33	6	5	7	14	34	47	88	83	18	5	7	343
110	1906	3	3	5	49	23	152	110	200	283	216	43	12	1104
110	1907	6	6	14	26	33	64	118	122	124	65	16	6	600
110	1908	7	6	12	13	19	37	48	55	35	11	5	5	254
111	1904	10	11	12	12	2	3	4	5	6	7	8	9	TOTAL
111	1904	12	14	13	12	37	134	212	590	431	123	65	43	1686
111	1905	119	38	23	28	51	116	165	366	386	116	28	13	1489
111	1906	11	12	16	146	68	330	287	682	1010	1000	270	67	3899
111	1907	31	23	43	88	101	246	403	563	625	454	121	32	2732
111	1908	30E	25E	39E	48E	59E	131E	153E	216E	253E	117E	48E	29E	1148

ADJUSTED FREQUENCY STATISTICS

STA	ITEM	10	11	12	1	2	3	4	5	6	7	8	9
110	MEAN	.815	.715	.849	1.130	1.290	1.758	1.858	2.051	1.982	1.536	1.020	.770
110	STD DEV	.444	.130	.262	.439	.164	.259	.190	.208	.328	.530	.400	.240
110	SKEW	1.211	-.835	.220	.071	.626	1.454	.371	-.453	.485	1.041	1.085	-.121
110	INCRNT	.10	.10	.10	.20	.81	.67	.77	1.21	1.20	.85	.15	.10
111	MEAN	1.407	1.319	1.386	1.675	1.783	2.250	2.363	2.657	2.691	2.306	1.900	1.513
111	STD DEV	.407	.199	.225	.409	.158	.198	.173	.200	.224	.424	.372	.263
111	SKEW	.972	.077	.068	-.261	.261	.758	.626	-1.140	.389	.957	.550	-.656
111	INCRNT	.44	.22	.24	.69	.84	2.07	2.67	5.50	6.13	4.83	1.21	.39

CONSISTENT CORRELATION MATRIX FOR MONTH 10

STA	110	111
	WITH CURRENT MONTH	
110	1.000	.997
111	.997	1.000
	WITH PRECEDING MONTH AT ABOVE STATION	
110	.588	.578
111	.660	.651

CONSISTENT CORRELATION MATRIX FOR MONTH 11

STA	110	111
	WITH CURRENT MONTH	
110	1.000	.964
111	.964	1.000
	WITH PRECEDING MONTH AT ABOVE STATION	
110	.681	.903
111	.974	.984

NOTE: Remaining months not shown

MAXIMUM VOLUMES FOR PERIOD 1 OF 5 YEARS OF RECORDED AND RECONSTITUTED FLOWS

STA	10	11	12	1	2	3	4	5	6	7	8	9	1-MO	6-MO	54-MO	AV MO
110	33	6	14	49	33	152	118	200	288	216	43	12	288	1009	2636	45
111	119	38	43	146	101	330	403	692	1010	1000	270	67	1010	3579	10797	162

MINIMUM VOLUMES

STA	10	11	12	1	2	3	4	5	6	7	8	9	1-MO	6-MO	54-MO	AV MO
110	3	3	3	4	13	34	47	55	36	11	3	3	3	36	2564	45
111	11	12	13	12	37	116	153	216	253	116	28	13	11	196	10240	162

GENERALIZED STATISTICS

STA	110	111
	SDAV	
110	1.964	.767
111	2.578	1.384
	SDAV MAXMO	
110	6	11
111	7	12

CONSISTENT CORRELATION MATRIX FOR MONTH 10

STA	110	111	
	WITH CURRENT MONTH		
110	1.000	.981	
111	.981	1.000	
	WITH PRECEDING MONTH AT ABOVE STATION		
110	.924	.853	
111	.853	.939	

CONSISTENT CORRELATION MATRIX FOR MONTH 11

STA	110	111	
	WITH CURRENT MONTH		
110	1.000	.981	
111	.981	1.000	
	WITH PRECEDING MONTH AT ABOVE STATION		
110	.924	.853	
111	.853	.939	

NOTE: Remaining months not shown

MAXIMUM VOLUMES FOR PERIOD		1 OF 5 YEARS OF RECORDED AND RECONSTITUTED FLOWS					AV MO							
STA		1	2	3	4	5	6	7	8	9	1-MO	6-MO	54-MO	AV MO
110	10	11	12	13	14	15	16	17	18	19	208	1009	2656	45
110	33	6	14	49	118	200	288	216	43	12	288	1009	2656	45
111	119	38	43	186	330	403	602	1010	270	67	1010	3579	10797	182
MINIMUM VOLUMES		1 OF 5 YEARS OF RECORDED AND RECONSTITUTED FLOWS					AV MO							
STA		1	2	3	4	5	6	7	8	9	1-MO	6-MO	54-MO	AV MO
110	10	11	12	13	14	15	16	17	18	19	208	1009	2656	45
110	33	6	14	49	118	200	288	216	43	12	288	1009	2656	45
111	119	38	43	186	330	403	602	1010	270	67	1010	3579	10797	182

GENERATED FLOWS FOR PERIOD 1

STA	YEAR	10	11	12	1	2	3	4	5	6	7	8	9	TOTAL
110	1	16	5	14	29	43	36	74	129	66	31	21	11	465
110	2	11	9	23	45	48	56	85	137	62	27	16	9	525
110	3	9	7	14	34	48	45	187	192	90	19	7	3	855
110	4	5	7	8	12	25	62	61	68	38	25	21	14	346
110	5	17	21	14	7	7	19	50	166	107	48	20	6	484
110	6	6	6	13	26	35	50	65	143	104	48	17	6	519
110	7	10	11	24	56	85	82	101	118	26	11	8	5	539
110	8	4	5	8	23	57	121	211	195	34	9	6	4	677
110	9	4	3	5	10	27	65	106	181	66	23	4	1	495
110	10	2	2	2	3	5	27	38	185	134	60	12	3	473
STA	YEAR	10	11	12	1	2	3	4	5	6	7	8	9	TOTAL
111	1	24	11	29	65	106	106	182	272	543	255	169	92	1865
111	2	43	39	49	103	124	154	222	299	529	208	136	87	1993
111	3	30	31	34	76	121	130	378	774	876	228	78	26	2790
111	4	17	23	22	32	59	137	169	163	313	187	161	83	1366
111	5	54	71	45	25	21	44	109	297	806	448	192	77	2189
111	6	28	26	29	60	90	130	174	294	791	441	173	53	2289
111	7	33	39	50	120	206	232	290	279	277	124	67	45	1754
111	8	18	19	20	49	123	269	500	475	364	95	53	44	2029
111	9	17	15	14	24	59	142	256	385	586	303	57	16	1874
111	10	7	7	5	7	13	51	92	312	975	373	138	31	2211

MAXIMUM VOLUMES FOR PERIOD 1 OF 10 YEARS OF SYNTHETIC FLOWS

STA	10	11	12	1	2	3	4	5	6	7	8	9	1-MO	6-MO	54-MO	AV MO
110	17	21	24	56	85	121	211	392	134	60	21	14	392	797	2691	45
111	54	71	50	120	208	269	500	774	975	573	192	92	975	2507	10214	170

MINIMUM VOLUMES

STA	10	11	12	1	2	3	4	5	6	7	8	9	1-MO	6-MO	54-MO	AV MO
110	2	2	2	3	5	19	38	68	28	9	4	1	1	14	1935	
111	7	7	5	7	13	44	92	163	277	95	53	16	5	56	7809	

STA	YEAR	10	11	12	1	2	3	4	5	6	7	8	9	TOTAL
111	1	76	40	124	47	59	250	284	633	991	1354	164	63	4076
111	2	114	50	100	13	29	69	163	295	297	88	46	42	1376
111	3	13	14	28	33	56	123	209	613	606	305	102	46	2148
111	4	27	21	30	43	70	227	294	577	572	327	168	71	2357
111	5	22	19	30	54	76	222	344	690	843	596	135	47	3044
111	6	05	24	30	13	37	113	208	443	303	130	24	24	1514
111	7	22	17	28	82	103	271	373	643	594	252	109	61	2555
111	8	82	31	42	181	76	217	215	535	492	201	87	19	2178
111	9	18	15	15	15	46	99	177	366	323	86	39	19	1240
111	10	9	13	19	24	71	168	281	563	411	144	46	52	1601

MAXIMUM VOLUMES FOR PERIOD 1 OF 10 YEARS OF SYNTHETIC FLOWS

STA	10	11	12	1	2	3	4	5	6	7	8	9	1-MO	6-MO	54-MO	AV MO
107	8	3	237	157	44	111	38	19	10	3	1	1	237	405	1346	21
110	26	8	29	79	129	224	267	185	31	31	10	10	267	816	2951	42
111	114	50	104	103	271	373	690	991	1354	169	71	71	1354	3681	12588	184

MINIMUM VOLUMES

STA	10	11	12	1	2	3	4	5	6	7	8	9	1-MO	6-MO	54-MO	AV MO
107	5	1	2	6	16	22	9	12	4	2	1	0	0	8	751	1712
110	2	3	4	4	9	22	31	63	45	10	5	3	2	26	1712	42
111	9	13	15	15	29	69	163	295	297	88	24	19	9	123	7668	184

TEST DATA - 723-X6-L2340
 MONTHLY STREAMFLOW SIMULATION - NOV 1970
 GENERALIZED STATISTICS FURNISHED

IVRA IHNTH IANAL MXRCS NYRG NYHXG MPASS IPCHQ IPCHS NSTA NCOHB NTNDX NCSTY IGNRL MPROJ IYRPJ MTHPJ LYRPJ
 -0 10 -0 -0 10 10 -0 -0 -0 -0 3 -0 -0 -0 1 -0 -0 -0 -0 -0 -0

INCONSISTENT CORREL MATRIX ADJUSTED 0 1 2 1.194
 INCONSISTENT CORREL MATRIX ADJUSTED 0 1 2 1.094
 INCONSISTENT CORREL MATRIX ADJUSTED 0 1 2 1.011

RAW CORRELATION COEFFICIENTS FOR MONTH 10

STA	107	110	111
			WITH CURRENT MONTH
107	1.000	.741	.744
110	.741	1.000	.965
111	.744	.965	1.000
			WITH PRECEDING MONTH AT ABOVE STATION
107	.681	.567	.570
110	.567	.913	.838
111	.570	.838	.913

RAW CORRELATION COEFFICIENTS FOR MONTH 11

STA	107	110	111
			WITH CURRENT MONTH
107	1.000	.741	.744
110	.741	1.000	.965
111	.744	.965	1.000
			WITH PRECEDING MONTH AT ABOVE STATION
107	.531	.567	.570
110	.567	.913	.838
111	.570	.838	.913

NOTE: Remaining months not shown

GENERATED FLOWS FOR PERIOD 1

STA	YEAR	10	11	12	1	2	3	4	5	6	7	8	9	TOTAL
107	1	2	9	29	13	31	25	24	10	3	1	1	1	149
107	2	1	3	14	7	53	72	32	24	7	3	1	1	218
107	3	1	2	6	5	9	15	9	13	6	4	0	1	73
107	4	1	4	7	11	20	30	36	13	9	2	1	1	134
107	5	0	2	11	20	25	56	80	22	9	2	1	1	231
107	6	1	1	3	3	22	44	18	5	2	1	0	0	100
107	7	1	1	6	12	27	43	60	37	9	2	1	1	200
107	8	2	2	5	48	30	34	9	6	3	2	1	1	145
107	9	0	1	2	4	14	20	14	5	2	1	1	0	66
107	10	0	2	6	9	20	14	14	5	2	1	1	1	76

STA	YEAR	10	11	12	1	2	3	4	5	6	7	8	9	TOTAL
110	1	19	21	34	34	40	49	94	286	63	25	7	9	670
110	2	13	4	13	13	23	34	147	411	299	129	12	3	1122
110	3	10	10	9	13	20	17	20	200	83	50	16	12	482
110	4	6	6	13	23	37	50	64	166	191	110	47	13	746
110	5	10	7	20	31	39	53	105	273	190	55	15	6	804
110	6	7	6	9	8	22	42	208	238	95	25	5	3	666
110	7	3	2	8	31	72	72	126	268	137	28	16	7	770
110	8	3	10	12	32	40	41	33	105	59	34	20	5	397
110	9	5	4	6	9	15	17	46	97	44	35	6	6	306
110	10	6	5	12	17	27	23	42	51	60	37	12	8	300
STA	YEAR	10	11	12	1	2	3	4	5	6	7	8	9	TOTAL
111	1	57	90	98	105	131	217	356	450	318	183	7	9	2589
111	2	14	22	32	45	69	132	633	1408	1034	708	33	33	4348
111	3	38	60	29	29	62	81	141	661	386	223	96	58	1997
111	4	31	35	34	34	132	221	283	649	619	470	97	305	3034
111	5	45	39	35	95	148	222	546	1259	789	283	105	48	3594
111	6	26	23	25	25	70	104	386	440	326	184	32	50	2371
111	7	14	12	13	64	217	311	376	1462	701	196	111	73	3754
111	8	33	36	33	93	119	158	132	490	272	165	129	42	1704
111	9	24	19	17	27	53	68	191	400	180	172	114	44	1309
111	10	26	29	32	57	106	99	210	190	263	170	91	52	1325

MAXIMUM VOLUMES FOR PERIOD 1 OF 10 YEARS OF SYNTHETIC FLOWS

STA	10	11	12	1	2	3	4	5	6	7	8	9	1-MO	6-MO	94-MO	AV MO
107	12	29	48	72	80	80	9	37	9	1	1	1	80	216	798	12
110	14	34	34	72	208	411	299	411	1034	47	13	13	411	1033	3759	32
111	57	98	105	311	633	1462	1034	1034	305	305	97	97	1462	4049	15176	217

MINIMUM VOLUMES

STA	10	11	12	1	2	3	4	5	6	7	8	9	1-MO	6-MO	94-MO	AV MO
107	0	1	2	3	9	14	9	5	2	1	0	0	0	6	513	13
110	3	2	6	8	15	17	28	31	46	25	3	3	2	43	2200	200
111	14	12	15	25	53	68	132	190	180	165	32	30	12	168	9433	9433

EXHIBIT 5

DEFINITIONS - 723-X6-12340

AC1	- Alienation coefficient for station 1
AC2	- Alienation coefficient for station 2
AC3	- Alienation coefficient for station 3
ADJ	- Plus sign indicates value smaller than upstream sum by tandem test
ADJ1	- Equal sign indicates value adjusted by tandem test
ALCFT(I,K)	- Alienation coefficient array
ALOG	- Computer library function of natural logarithm
ANLOG	- Number of logarithms
ANYRS	- Number of years of record
AV(I,K)	- Mean logarithm
AVG(I,K)	- Average of the generated deviates
AVGQ(I)	- Average monthly flow for a station
AVMN(I)	- Average logarithm of flow for minimum 3 consecutive months
AVMX(I)	- Average logarithm of flow for maximum 3 consecutive months
B(L)	- Beta coefficient
BETA(I,K,L)	- Beta coefficient for generation equation
BLANK	- Blank space
CROUT	- Program subroutine to solve simultaneous equations
CSTAC(KX,K)	- Coefficient by which flows are multiplied before adding in a combination
DABS	- Computer library function of absolute value of double precision number
DQ(I,K)	- Increment of flow
DTRMC	- Determination coefficient
E	- Letter E indicates estimated value
FAC	- Temporary factor
I	- Index for calendar month
IA	- Indicator in column 1 of first card for each job
IANAL	- Indicator, positive value calls for analysis
IENDF	- End of file indicator
IGNRL	- Indicator, + 2 calls for computing generalized statistics and + 1 or + 2 calls for using generalized statistics for generating flows
IMN(I)	- Month sequence number of last month of 3 driest consecutive months
IMNPH	- Calendar month number for first month of water year
IMX(I)	- Month sequence number of last month of 3 wettest consecutive months
INDC	- Transfer indicator
IP	- Month number for preceding month
IPASS	- Sequence number of pass (subset of stations)
IPCHQ	- Indicator, positive value calls for writing discharges on tape
IPCHS	- Indicator, positive value calls for punching statistics
IQ(I)	- Fixed-point conversion of flow values

IQTAP	- Tape number for storing flows
IRCON	- Indicator, positive value calls for flow reconstitution
ISKZ	- Positive value calls for varying flow increment (DQ) to make skew zero.
IST(K,L)	- Sequence number of upstream station for tandem test
ISTA(K)	- Station number
ISTAC(KX,K)	- Station number in a combination
ISTAN	- Temporary station number
ISTAP	- Station sequence number for all passes
ISTAT	- Tape number for storing statistics
ISTN(L)	- Station number of downstream tandem station
ISTT(K,L)	- Station number of upstream tandem station
ISTX(L)	- Station number of independent station for consistences test
ISTY(L)	- Station number of dependent station for consistences test
ITEMP	- Temporary variable
ITMP	- Temporary variable
ITMPP	- Temporary variable
ITP	- Temporary variable
ITRNS	- Transfer indicator
IX	- Temporary variation of I
IXX	- Argument for random number function
IYR	- Number of current year
IYRA	- First year of data
IYRPJ	- Year of start of flow projection
J	- Index for year
JA	- Sequence number of projection year
JTMP(L)	- Matrix column number
JTP	- Matrix column number
JX	- Temporary variation of J
JXTMP	- Temporary variation of J
K	- Index for station
KM	- Dimension limit for number of consecutive months
KPASS	- Dimension limit for number of passes
KSTA	- Dimension limit for total number of stations
KSTAC(KX,K)	- Index number of station in a combination
KSTAP	- Dimension limit for total number of stations
KX	- Temporary variation of K or combination sequence
KYR	- Dimension limit for number of consecutive years
L	- Index for related station
LA	- Temporary variation of L
LQTAP	- Number of records up to present position on tape IQTAP
LSTAT	- Number of records up to present position on tape ISTAT
LTMP(L)	- Matrix row number
LTP	- Matrix row number
LTRA	- Letter A
LX	- Temporary variation of L
LYRPJ	- Last year of each projection
M	- Serial number of month
MA	- Sequence number of month of projected flow

MO(I)	- Calendar month number
MPASS	- Temporary counter for number of passes
MTHPJ	- Calendar month of start of each projection
MXRCS	- Number of years in each period for which maximum and minimum recorded and reconstituted flows are desired
N	- Serial number of period of flows
NC	- Counter to prevent continuous looping
NCA	- Counter to prevent continuous looping
NCAB(I,K,L)	- Number of values and cross products used to compute correlation coefficients
NCB	- Transfer indicator
NCOMB	- Number of combinations of stations max. and min. quantities are to be computed
NCSTY	- Number of consistency tests
NINDP	- Number of independent variables in regression study
NJ	- Number of years in computation sequence
NLOG(I,K)	- Number of logarithms used to compute frequency statistics
NMNMX	- Number of months following dry season and preceding wet season
NMOMN	- Number of months following wet season and preceding dry season
NPASS	- Total number of passes in job
NPROJ	- Number of projections of future flows from present conditions
NQ	- Counter for number of flows
NQTAP	- Total number of records saved on tape IQTAP
NSMX(L)	- Number of upstream stations in tandem test
NSTA	- Number of stations in analysis
NSTAA	- NSTA + 1
NSTAC(KX)	- Number of stations in a combination
NSTAT	- Total number of records saved on tape ISTAT
NSTAX	- NSTA + NSTA
NSTNP(I)	- Number of stations in a particular pass
NSTX	- Number of stations in current pass that occurred in preceding passes
NSTXX	- NSTX + 1
NSUM(K)	- Number of stations upstream from a station for tandem test
NTNDM	- Number of tandem tests
NVAR	- Total number of variable in regression study
NYMXG	- Number of years of generated flows in each period for which maximum and minimum flows are desired
NYRG	- Total number of years of generated flows
NYRS	- Number of years of recorded flows
Q(M,K)	- Monthly flow
QM(I)	- Monthly flow
QMIN(I,K)	- Minimum flow
QPREV(I)	- Flow for previous month
QR(M,K)	- Identification symbol
QSTAP(I)	- Temporary storage of QPREV
R(K,L)	- Correlation coefficient in a given matrix
RA(I,K,L)	- Correlation coefficient
RAV(K,L)	- Average correlation coefficient for 12 calendar months

RMAX	- Maximum consistent correlation coefficient
RMIN	- Minimum consistent correlation coefficient
RNGEN(IXX)	- Program random number function
R1	- Correlation coefficient being tested
R2	- Correlation coefficient being tested
R3	- Correlation coefficient being tested
SD(I,K)	- Standard deviation of logarithms for calendar month
SDAV(K)	- Average standard deviation for 12 consecutive months
SDV(I,K)	- Standard deviation of the generated deviates
SKEW(I,K)	- Skew coefficient of logarithms for calendar month
SMQ(J,K)	- Maximum or minimum flow for month or duration
SQA(I,K,L)	- Sum of squares of first variable
SQB(I,K,L)	- Sum of squares of second variable
SUM	- Average correlation coefficient of matrix
SUMA(I,K,L)	- Sum of first variable
SUMB(I,K,L)	- Sum of second variable
T	- Large positive constant
TEMP	- Temporary variable
TMP	- Temporary variable
TMPA	- Temporary variable
TMPB	- Temporary variable
TMPP	- Temporary variable
TP	- Temporary variable
X(I)	- Value of independent variable in regression equation
XINCR(I)	- Iteration value for flow increment
XPAB(I,K,L)	- Sum of cross products of first and second variables

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C      7P3-Y6-L2340 MONTHLY STEADY STATE SIMULATION WFC, C OF F, USA NOV 1970
CA * * * * * LIMBARY FUNCTIONS ALONG, DATA * * * * * 1002
C      PROGRAM SUBROUTINE CREUT, RAGEN -- SEE COMMENTS IN HNGEN 1003
C      INDEXES IN CALENDAR MONTH J=YEAR K=STA L=RELATED STA M=SUCCESSIVE MONTH 1004
C      DIMENSION 1005
C      D(10), H(10,11), 1006
C      ,ALCFT(12,10), AV(12,10), AVG(12,10), AVGR(10), AVMN(10), AVMX(10),
C      ,BETA(12,10,10), BO(12,10), IMN(10), INX(10), IQ(15),
C      ,ISTA(10), JTMP(9), LTMP(10), MO(12), NCAB(12,10,20),
C      ,NLOG(12,10), O(1201,10), CM(12), CMIN(12,10), QPREV(10), QR(1201,10),
C      ,QRTAP(100), RA(12,10,20), KAV(10,10), SD(12,10), SDAY(10), SDV(12,10),
C      ,SKEW(12,10), SMG(30,10), SGA(12,10,20), SGP(12,12,20), SUMA(12,10,20),
C      ,SIMB(12,10,20), X(10), XINC(12), XPAW(12,10,20),
C      ,CSTAC(2,10,3), ISTAC(2,10), ISTN(10), ISTY(10,10), ISTX(10),
C      ,ISTV(10), NSTAC(2,10,5), NSMX(10), NSTAC(2,3), NSTNP(5),
C      ,NSLM(10,5), NSOMP(5), MTRCH(5), IST(10,10,5)
C      DOUBLE PRECISION R,B 1016
C      COMMON DTRNC, NINDP,B 1017
C      DATA LTPA/LNA/, BLANK/1H /, E/1HE/, ADJ/1H+, ADJ1/1H+ 1018
C      10 FORMAT(1H) 1019
C      20 FORMAT(1X,15,1916) 1020000
C      30 FORMAT(1X,17,918) 1021
C      40 FORMAT(1X,A3,9A4,10A4) 1022
C      50 FORMAT(1X,I3,I4,12F6.0) 1023
C      60 FORMAT(1X,F7.0,9F8.0) 1024
C      70 FORMAT(1X,I3,I4,12F6.3) 1025
C      80 FORMAT(1X,I7,12F6.3) 1026
C      90 FORMAT(1X,I7,12F6.1) 1027
C      100 FORMAT(1X,I4,I6,12I4,110) 1028
C      110 FORMAT(A1,A3,9A4,10A4) 1029
C      120 FORMAT(1X,I7,3F5.3,2I6) 1030000
C      130 FORMAT(/23H GENERALIZED STATISTICS//13H ST1 ST2 HAV) 1031
C      140 FORMAT(/38H STA AVMX AVMN SDAY MAXMO MINMO) 1032
C      ISTAT=8 1034
C      IOTAP=9 1035
C      KPASS=5
C      KSTAT=100 1037
C      KSTA=10 1038
C      KYR=100 1039
C      KMCKYR=12+1 1040
C      NSTA=0 1042
C      WASTE CARDS UNTIL AN A IN COLUMN 1, FIRST TITLE CARD 1043
C      ** CARD A ** 1044
C      150 READ(5,110) IA,(SMO(M,1),M=1,20) 1045
C      IF (IA.NE.LTRA) GO TO 150 1046
C      WRITE(6,10) 1049
C      READ(5,40)((SMO(M,K),M=1,20),K=2,3) 1050
C      WRITE(6,40)((SMO(M,K),M=1,20),K=1,3) 1051
C      ** CARD B CARD C ** 1052000
C      READ(5,30) IYRA, IMNTH, IANAL, MYRCS, MYRG, NYMXG, NPASS, IPCMO, IPCMS, NSTA 1053
C      , NCOMB, NTNDM, NCSTY, IGANL, NPROJ, IYRPJ, MTHPJ, LYRPJ 1055
C      TERMINATE WITH 5 PLANK CARDS, AN A IN COL 1 OF FIRST 1056
C      IYMP=IANAL+MYRG 1057
C      IF(IYMP.GT.0) GO TO 160 1058
C      STOP 1059
C      160 WRITE(6,170) AVNS, NSTA, NCOMB, IPASS 1060
C      170 FORMAT(/19H DIMENSION EXCEEDED ,5X,4HNVNS,14,5X,4HNSTA,13,5X, 1061000
C      15MNCMB,13,5X,5MIPASS,13) 1062000
C      GO TO 150 1063
C      180 WRITE(6,190) 1064
C      190 FORMAT(/108H IYRA IMNTH IANAL MYRCS MYRG NYMXG NPASS IPCMO IPCMS 1065
C      , NSTA NCOMB NTNDM NCSTY IGANL NPROJ IYRPJ MTHPJ LYRPJ ) 1066
C      WRITE(6,20) IYRA, IMNTH, IANAL, MYRCS, MYRG, NYMXG, NPASS, IPCMO, IPCMS, 1067
C      INSTA, NCOMB, NTNDM, NCSTY, IGANL, NPROJ, IYRPJ, MTHPJ, LYRPJ 1068
C      IF (LYRPJ-IYRA,GE,KYR) GO TO 160 1069
C      ** SET CONSTANTS * * * * * 1070
C      IYR=0 1071
C      NSTA=NSTA+1 1072
C      NSTA=NSTA+NSTA 1073
C      T=99999999. 1074
C      IYR=IYR+1 1075

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300 WRITE(6,310) (GSTAC(K,L,IPASS),L=1,ITP)
310 FORMAT (7Y,50WATID,8X,14F8,3)
320 IF(NTNDM,LE,0) GO TO 350
NTNDM(IPASS)=NTNDM
DO 340 LX=1,NTNDM
C
READ(5,30) ISTN(LX),ITMP,(ISTY(LX,L),L=1,ITMP)
WRITE(6,330) LX,ISTN(LX),(ISTY(LX,L),L=1,ITMP)
340 FORMAT (/13H TANDEM GROUP,13.6X,14H00HSTREAM STA,15.6X,
11SHUPSTREA STA(S),1015)
340 NSHX(LX)=ITMP
350 IF(IPASS,EG,1)NYRS=0
DO 360 K=NTYX,KSTA
NRUM(K,IPASS)=0
ISTA(K)=1000-K
C
INITIATE -1, NO RECORD FOR ALL FLOWS
DO 360 M=1,KM
360 I(M,K)=-1.
DO 370 I=1,12
NLOG(I,K)=0
DO(I,K)=0.
MIN(I,K)=T
370 CONTINUE
380 CONTINUE
IF(NCSTY,LE,0) GO TO 420
WRITE(6,390)
390 FORMAT (/30Y,8HSTATIONS/17H CONSISTENCY TEST,5X,23MINDEPENDENT DE
PENDENT)
DO 400 L=1,NCSTY
C
READ (5,30) ISTX(L),ISTY(L)
400 WRITE(6,410) L,ISTX(L),ISTY(L)
410 FORMAT(13X,13.8X,15.8X,15)
420 IF(IANAL,LE,0)GO TO 1570
CC * * * * * READ AND PROCESS I STATION-YEAR OF DATA * * * * *
C
430 READ(5,50) ISTAT,IYR,(CM(I),I=1,12)
C
BLANK CARD INDICATES END OF FLOW DATA
IF(ISTAT,LT,1)GO TO 500
IF(INSTA,LT,1)GO TO 450
C
ASSIGN SUBSCRIPT TO STATION
DO 440 K=NSTYX,NSTA
IF(ISTAT,EG,1)ISTA(K)GO TO 460
440 CONTINUE
450 NSTA=NSTA+1
IF(NSTA,GT,KSTA) GO TO 160
K=NSTA
ISTA(K)=ISTAT
C
ASSIGN SUBSCRIPT TO YEAR
460 J=IYR-IYRA
IF(NYRS,LT,J,AND,IPASS,EG,1)NYRS=J
IF(J,GT,0,AND,J,LE,NYRS) GO TO 480
WRITE (6,470)IYR
470 FORMAT (/13H UNACCEPTABLE YEAR,15)
GO TO 150
C
STORE FLOWS IN STATION AND MONTH ARRAY
480 M=J+12-11
DO 490 I=1,12
M=M+1
IF(CM(I),LE,(-1.)) GO TO 490
IF(CM(I),LT,MIN(I,K)) MIN(I,K)=CM(I)
NLOG(I,K)=NLOG(I,K)+1
DO(I,K)=DO(I,K)+CM(I)
CM(K)=CM(I)
490 CONTINUE
GO TO 430
500 NSTA=NSTA+1
IF (NYRS,GT,XYN,OR,NSTA*ACOMB,GT,KSTA) GO TO 160
IF(NSTA,LE,0) GO TO 160
NSTNP(IPASS)=NSTA
NSTAX=NSTA+NSTA

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1144000
1145
1146
** CARD F **
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1150000
1151000
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** CARD G **
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** CARD H **
1177
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** CARD I **
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1187-2*
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1194
1195000
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1198
1199
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1212

```


	IF(NCOMB.LE.0)GO TO 540	1213
C	IDENTIFY STA SUBSCRIPTS FOR STAS IN COMBINATIONS	1214
	DO 530 KX=1,NCOMB	1215
	ITP=NSTAC(KX,IPASS)	
	LX=0	1217
	DO 520 L=1,ITP	1218
	ITEMP=ISTAC(KX,L)	1219
	DO 510 K=1,NSTA	1220
	IF(ISTA(K).NE.ITEMP)GO TO 510	1221
	LY=LX+1	1222
	KSTAC(KX,LX,IPASS)=K	
	GO TO 520	1224
510	CONTINUE	1225
520	CONTINUE	1226
C	REDUCE STATIONS TO THOSE IDENTIFIABLE	1227
	NSTAC(KX,IPASS)=LX	
530	CONTINUE	1229
C	IDENTIFY STATIONS IN TANDEM	1230
540	IF(NTNOM.LE.0) GO TO 600	1231
	DO 590 LX=1,NTNOM	1232
	DO 550 K=1,NSTA	1233
	IF(ISTA(K).EQ.ISTN(LX)) GO TO 560	1234
550	CONTINUE	1235
560	ISTN(LX)=K	1236
	NSUM(K,IPASS)=NSHX(LX)	
	ITP=NSHX(LX)	1238
	DO 580 L=1,ITP	1239
	DO 570 KY=1,NSTA	1240
	IF(ISTA(KY).EQ.ISTT(LX,L)) GO TO 580	1241
570	CONTINUE	1242
580	IST(K,L,IPASS)=KX	
590	CONTINUE	1244
C	IDENTIFY PAIRS OF STATIONS FOR CONSISTENCY TESTS	1245
600	IF(NCSTY.LE.0) GO TO 650	1246
	DO 640 L=1,NCSTY	1247
	DO 630 K=1,NSTA	1248
	IF(ISTA(K).EQ.ISTX(L)) GO TO 610	1249
	IF(ISTA(K).EQ.ISTY(L)) GO TO 620	1250
	GO TO 630	1251
610	ISTX(L)=K	1252
	GO TO 630	1253
620	ISTY(L)=K	1254
630	CONTINUE	1255
640	CONTINUE	1256
650	ITP=NSTA+NCOMB	1257
CD	***** MAX AND MIN RECORDED VOLUMES *****	1258
C	INITIATE SUMS	1259
	DO 790 K=NSTXX,ITP	1260
	AVG0(K)=0.	1261
	N=0	1262
	DO 660 I=1,15	1263
660	SM0(I,K)=T	1264
	DO 670 J=16,30	1265
670	SM0(I,K)=T	1266
	TMPO=.	1267
	TMPO=0.	1268
	M=1	1269
	N=0	1270
	DO 720 J=1,NV78	1271
	DO 770 I=1,12	1272
	M=M+1	1273
	N=N+1	1274
	IF(K.LE.NSTA)GO TO 700	1275
C	COMPUTE COMBINED FLOWS	1276
	KY=K-NSTA	1277
	ITP=NSTAC(KY,IPASS)	
	O(M,K)=0.	1279
	DO 690 L=1,ITP	1280
	ITEMP=KSTAC(KX,L,IPASS)	
C	COMBINED FLOW MISSING	1282
	IF(O(M,ITEMP).EQ.-1..OR.O(M,K).EQ.-1.) GO TO 680	1283
	O(M,K)=O(M,K)+O(M,ITEMP)+CSTAC(KX,L,IPASS)	

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GO TO 690
680 Q(M,K)=1. 1285
690 CONTINUE 1286
700 IF(Q(M,K).NE.-1.) GO TO 710 1287
C START NEW ACCUMULATIONS WHEN FLOW MISSING 1288
N#0 1289
TMP#0. 1290
TMPA#0. 1291
GO TO 770 1292
710 TEMP#Q(M,K) 1293
C 1-MONTH FLOWS 1294
IF(SMQ(I,K).LT.TEMP)SMQ(I,K)=TEMP 1295
IF(SMQ(I+15,K).GT.TEMP)SMQ(I+15,K)=TEMP 1296
IF(SMQ(13,K).LT.TEMP)SMQ(13,K)=TEMP 1297
IF(SMQ(28,K).GT.TEMP)SMQ(28,K)=TEMP 1298
C 6-MONTH FLOWS 1300
TMP#TMP+TEMP 1301
TMPA#TMPA+TEMP 1302
IF(N#6)760,730,720 1303
720 TMP#TMP-Q(M#6,K) 1304
730 IF(TMP.LT.SMQ(29,K))SMQ(29,K)=TMP 1305
IF(TMP.GT.SMQ(14,K))SMQ(14,K)=TMP 1306
C 54-MONTH FLOWS 1307
IF(N#44)760,750,740 1308
740 TMPA#TMPA-Q(M#54,K) 1309
750 IF(TMPA.LT.SMQ(30,K))SMQ(30,K)=TMPA 1310
IF(TMPA.GT.SMQ(15,K))SMQ(15,K)=TMPA 1311
C AVERAGE FLOW 1312
760 AVGO(K)=AVGO(K)+TEMP 1313
N#N#Q+1 1314
770 CONTINUE 1315
780 CONTINUE 1316
TEMP#ND 1317
AVGO(K)=AVGO(K)/TEMP 1318
790 CONTINUE 1319
WRITE(6,800) 1320
800 FORMAT(/39H MAXIMUM VOLUMES OF RECORDED FLOWS) 1321
WRITE(6,810)(MO(I),I=1,12) 1322
810 FORMAT (5H STA,12I7,35H 1=MO 6=MO 54=MO AV MO) 1323000
ITEMP#NSTA+NCONB 1324
DO 830 K=NSTXX,ITEMP 1325
ITEMP#AVGO(K)+.5 1326
DO 820 I=1,15 1327
820 IQ(I)#SMQ(I,K)+.5 1328
830 WRITE(6,840)ISTA(K),(IQ(I),I=1,15),ITEMP 1329
840 FORMAT (1X,I4,12I7,2I8,19,I8) 1330
WRITE(6,850) 1331
850 FORMAT(/16H MINIMUM VOLUMES) 1332
WRITE(6,810)(MO(I),I=1,12) 1333
DO 870 K=NSTXX,ITEMP 1334
DO 860 I=1,15 1335
860 IQ(I)#SMQ(I+15,K)+.5 1336
870 WRITE(6,840)ISTA(K),(IQ(I),I=1,15) 1337
CE * * * * * COMPUTE FREQUENCY STATISTICS * * * * * 1338
WRITE (6,890) 1339
890 FORMAT (/21H FREQUENCY STATISTICS) 1340
WRITE(6,890)(MO(I),I=1,12) 1341
890 FORMAT (/14H STA ITEM,I7,11I8) 1342000
C MISSING FLOW PRECEDING FIRST RECORO MONTH 1343
DO 900 K=NSTXX,NSTA 1344
900 U(I,K)#T 1345
IPCNN#0 1346
ITEMP # NSTA 1346100
DO 1180 K=1,ITEMP 1347000
IF (ITEMP.GT.NSTA) GO TO 1180 1347100
IF(K.LE.NSTX) GO TO 942 1347-2
910 DO 920 I=1,12 1348
TEMP#NLOG(I,K) 1349
DO(I,K)=DO(I,K)*.01/TEMP 1350
IF(DO(I,K).LT..1) DO(I,K)#.1 1351
IF(QMIN(I,K).LT.0.) DO(I,K)=DO(I,K)-QMIN(I,K) 1352
920 CONTINUE 1353

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N=0 1354
970 DO 980 J=1,12 1355
  AV(I,K)=0. 1356
  SD(I,K)=0. 1357
  SKEW(I,K)=0. 1358
  TMP=N 1359
  XINCR(I)=(DQ(I,K)+QMIN(I,K))/(16.-TMP) 1360
980 CONTINUE 1361
942 M=1 1362
  DO 970 J=1,NYRS 1363
  DO 960 I=1,12 1364
  M=M+1 1365
  IF(Q(M,K).EQ.-1.) GO TO 950 1366
  C REPLACE FLOW ARRAY WITH LOG ARRAY 1367
  TEMP=ALOG(Q(M,K)+DQ(I,K))/2.3025851 1368
  Q(M,K)=TEMP 1369
  IF(K.LE.NSTX) GO TO 960 1369-2
  C SUM, SQUARES, AND CUBES 1370
  AV(I,K)=AV(I,K)+TEMP 1371
  SD(I,K)=SD(I,K)+TEMP*TEMP 1372
  SKEW(I,K)=SKEW(I,K)+TEMP*TEMP*TEMP 1373
  GO TO 960 1374
  C MISSING FLOWS EQUATED TO T 1375
950 Q(M,K)=T 1376
  ISCON=1 1377
960 CONTINUE 1378
970 CONTINUE 1379
  IF(K.LE.NSTX) GO TO 1180 1379-2
  INDC=0 1380
  DO 1000 I=1,12 1381
  TEMP=ALOG(I,K) 1382
  IF(TEMP.LT.3.)GO TO 1120 1383
  TMP=AV(I,K) 1384
  AV(I,K)=TMP/TEMP 1385
  IF(SD(I,K).LE.0.)GO TO 980 1386
  TMPA=SD(I,K) 1387
  SD(I,K)=(SD(I,K)-AV(I,K)*TMP)/(TEMP-1.) 1388
  IF(SD(I,K).LE.0.) GO TO 980 1388-2+
  SD(I,K)=SD(I,K)**.5 1389
  IF(QD(I,K).LT..0005) GO TO 990 1390
  SKEW(I,K)=(TEMP*TEMP+SKEW(I,K)-3.*TEMP*TMP+TMPA*2.*TMP*TMP*TMP) 1391
  1/(TEMP*(TEMP-1.)*(TEMP-2.)*SD(I,K)**3) 1392
  IF(SKEW(I,K).LT.(-1).OR.SKEW(I,K).GT..1) INDC=1 1393
  IF(SKEW(I,K).GT.3.) SKEW(I,K)=3.
  IF(SKEW(I,K).LT.-3.) SKEW(I,K)=-3.
  GO TO 1000 1394
980 SD(I,K)=0. 1395
990 SKEW(I,K)=0. 1396
1000 CONTINUE 1397
  M=M+1 1398
  IF(M.GT.11)GO TO 1060 1399
  WRITE(6,1010)ISTA(K),(AV(I,K),I=1,12) 1400
1010 FORMAT (/1X,15,8H MEAN,12F8.3) 1401000
  WRITE(6,1020)(SD(I,K),I=1,12) 1402
1020 FORMAT (7X,7,8HSTD DEV,12F8.3) 1403000
  WRITE(6,1030)(SKEW(I,K),I=1,12) 1404
1030 FORMAT (10X,10,8HMSKEW,12F8.3) 1405000
  WRITE(6,1040)(DQ(I,K),I=1,12) 1406
1040 FORMAT (8X,8,8HINCRMT,F7.2,11F8.2) 1407000
  WRITE(6,1050)(ALOG(I,K),I=1,12) 1408
1050 FORMAT (9X,9,8HYEARS,12I8) 1409000
1060 IF(N.GE.14) GO TO 1180 1410
  IF(INDC.LE.0) GO TO 1180 1411
  C THE FOLLOWING ROUTINE WILL ADJUST THE INCREMENT YC 1412
  C TRY TO OBTAIN ZERO SKEW 1413
  C CHANGE THE FOLLOWING STAT TO ISKZ=1 TO ACTIVATE 1414
  ISKZ=0 1415
  IF(ISKZ.LE.0) GO TO 1180 1416
  ITP=11 1417
  DO 1110 I=1,12 1418
  M=ITP+I 1419
  DO 1080 J=1,NYRS 1420

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	M=M+1	1421
	IF (Q(M,K).EQ.T) GO TO 1070	1422
	TEMP=Q(M,K)	1423
	Q(M,K)=10.**TMP-Q(I,K)	1424
	GO TO 1080	1425
1070	Q(M,K)=1.	1426
1080	CONTINUE	1427
	TEMP=Q(M,K)	1428
	IF (TEMP.GT.(-.1).AND.TEMP.LT..1) GO TO 1110	1429
	IF (TEMP) 1090,1110,1100	1430
1090	Q(I,K)=Q(I,K)*2.	1431
	GO TO 1110	1432
1100	Q(I,K)=Q(I,K)*XINCR(I)	1433
1110	CONTINUE	1434
	GO TO 930	1435
C	* * * * * DELETE STATIONS WITH LESS THAN 3 YEARS OF DATA * * * * *	1436
1120	WRITE(6,1130)ISTA(K)	1437
1130	FORMAT (/#H STA,16,28H DELETED, INSUFFICIENT DATA)	1438000
	NSTA=NSTA+1	1439
	NSTA=NSTA+1	1440
	NSTA=NSTA+1	1441
	IF (K.GT.NSTA) GO TO 1180	1442
C	REDUCE SUBSCRIPTS OF SUBSEQUENT STATIONS	1443
	DO 1170 KX=K,NSTA	1444
	ISTA(KX)=ISTA(KX+1)	1445
	M=1	1446
	DO 1150 J=1,NYRS	1447
	DO 1140 I=1,12	1448
	M=M+1	1449
1140	Q(M,KX)=Q(M,KX+1)	1450
1150	CONTINUE	1451
	DO 1160 I=1,12	1452
	QMIN(I,KX)=QMIN(I,KX+1)	1453
	MLOG(I,KX)=MLOG(I,KX+1)	1454
1160	Q(I,KX)=Q(I,KX+1)	1455
1170	CONTINUE	1456
	GO TO 910	1457
1180	CONTINUE	1458
	ITRMS=0	1459
	IF (TRCON.LE.0) GO TO 1370	1460
CF*	* * * * * ADJUSTMENT OF FREQUENCY STATISTICS TO LONG TERM * * * * *	1461
	DO 1190 I=1,12	1462
	DO 1190 K=1,NSTA	1463
	DO 1190 L=1,NSTAX	1464
	NCAR(I,K,L)=0	1465
	SUMA(I,K,L)=0.	1466
	SUMH(I,K,L)=0.	1467
	SQA(I,K,L)=0.	1468
	SOH(I,K,L)=0.	1469
	XPAR(I,K,L)=0.	1470
	PA(I,K,L)=4.	1471
1190	CONTINUE	1472
	DO 1220 K=1,NSTA	1473
	KX=K+1	1474
	M=1	1475
	DO 1220 J=1,NYRS	1476
	DO 1210 I=1,12	1477
	M=M+1	1478
	TEMP=Q(M,K)	1479
	IF (TEMP.EQ.T) GO TO 1210	1480
	DO 1200 L=KX,NSTAX	1481
	LY=L-NSTA	1482
	IF (LY.LT.1) TEMP=Q(M,L)	1483
	IF (LY.GT.0) TEMP=Q(M-1,LY)	1484
	IF (TEMP.EQ.T) GO TO 1200	1485
	NCAR(I,K,L)=NCAR(I,K,L)+1	1486
	SUMA(I,K,L)=SUMA(I,K,L)+TEMP	1487
	SUMH(I,K,L)=SUMH(I,K,L)+TEMP	1488
	SQA(I,K,L)=SQA(I,K,L)+TEMP*TEMP	1489
	SOH(I,K,L)=SOH(I,K,L)+TEMP*TEMP	1490
	XPAR(I,K,L)=XPAR(I,K,L)+TEMP*TEMP	1491
	IF (L.GT.NSTA) GO TO 1200	1492

NCAR(I,L,K)=NCAR(I,K,L)	1493
SUMA(I,L,K)=SUMA(I,K,L)	1494
SUMR(I,L,K)=SUMR(I,K,L)	1495
SQA(I,L,K)=SQR(I,K,L)	1496
SQR(I,L,K)=SQA(I,K,L)	1497
XPAB(I,L,K)=XPAB(I,K,L)	1498
1200 CONTINUE	1499
1210 CONTINUE	1500
1220 CONTINUE	1501
INDC=0	1502
DO 1260 K=1,NSTA	1503
KX=K+1	1504
DO 1260 I=1,12	1505
RA(I,K,K)=1.	1506
DO 1250 L=KX,NSTAX	1507
IF(NCAR(I,K,L).LE.2) GO TO 1250	1508
TEMP=NCAR(I,K,L)	1509
TMPR=SQA(I,K,L)	1510
TPR=SQR(I,K,L)	1511
TMPA=SUMA(I,K,L)	1512
TMPB=(TMP-TMPA**2/TEMP)/TEMP	1513
IF(TMPR.LT.0.) TMPR=0.	1514
SQA(I,K,L)=TMPR**5	1515
TMPR=SUMR(I,K,L)	1516
TMPB=(TP-TMPB**2/TEMP)/TEMP	1517
IF(TMPR.LT.0.) TMPR=0.	1518
SQR(I,K,L)=TMPR**5	1519
TMPB=(TMP-TMPA**2/TEMP)*(TP-TMPB**2/TEMP)	1520
IF(TMP.LE.0.) GO TO 1230	1521
TMPA=XPAB(I,K,L)=TMPA*TMPB/TEMP	1522
TMPR=1.	1523
IF(TMPA.LT.0.) TMPB=-TMPB	1524
TMPA=TMPA*TMPA/TMP	1525
TMPA=1.-(1.-TMPA)*(TEMP=1.)/(TEMP=2.)	1526
IF(TMPA.LT.0.) TMPA=0.	1527
RA(I,K,L)=TMPB*TMPA**5	1528
(TPR)	
LA=1	
LY=L-NSTA	
IF(L.LE.NSTA) GO TO 1235	
ITP=-1	
IF(ITP.LT.1) ITP=12	
LA=LY	
1235 IF(10(I,K).LT..0001.OR.SD(ITP,LA).LT..0001) GO TO 1230	1529
GO TO 1240	1530
1230 RA(I,K,L)=0.	1531
1240 IF(L.GT.NSTA) GO TO 1250	1532
SQA(I,L,K)=SQR(I,K,L)	1533
SQR(I,L,K)=SQA(I,K,L)	1534
RA(I,L,K)=RA(I,K,L)	1535
1250 CONTINUE	1536
1260 CONTINUE	1537
DO 1280 K=1,NSTA	1538
DO 1280 I=1,12	1539
TEMP=NLOG(I,K)	1540
LY=0	1541
DO 1270 L=1,NSTA	1542
IF(L.EQ.K.OR.RA(I,K,L).LE.=4.) GO TO 1270	1543
IF(NLOG(I,L).LE.NLOG(I,K)) GO TO 1270	1544
TMPA=NCAR(I,K,L)	1545
TMPB=NLOG(I,L)	1546
YB=TMPA/(1.-(TMPB-TMPA)*RA(I,K,L)**2/TMPB)	1547
IF(TP.LE.TEMP) GO TO 1270	1548
LY=1	1549
TEMP=TP	1550
TMPR=TMPA	1551
1270 CONTINUE	1552
IF(LY.LE.0) GO TO 1280	
IF(SQA(I,K,LX).LE..0001.OR.SQB(I,K,LX).LE..0001) GO TO 1280	
INDC=1	1553
TMPR=SQA(I,K,LX)/SQR(I,K,LX)	1554
TMPA=SUMA(I,K,LX)/TMPR	1555

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      TMR=SUMR(I,K,LX)/TMP#
      AV(I,K)=TMP#*(AV(I,LX)-TMR)+RA(I,K,LX)+TMP
      SF(I,K)=SQA(I,K,LX)+(SD(I,LX)-SOB(I,K,LX))*RA(I,K,LX)**2+TMP
12#0 CONTINUE
C      ADJUST STANDARD DEVIATIONS FOR CONSISTENCY
      IF(NCSTY.LE.0) GO TO 1340
C      TRANSFER FROM 1011
1290 DO 1330 LX=1,NCSTY
      K=ISTX(LX)
      L=ISTY(LX)
      DO 1320 I=1,12
      TEMP=(AV(I,K)-AV(I,L))/3.
      IF(AV(I,K).GT.AV(I,L)) GO TO 1300
      TEMP=TEMP+SD(I,K)
      IF(SD(I,L).LT.TEMP) GO TO 1310
      TEMP=SD(I,K)*2.-TEMP
      IF(SD(I,L) = TEMP) 1320,1320,1310
1300 TEMP=TEMP+SD(I,K)
      IF(SD(I,L).GT.TEMP) GO TO 1310
      TEMP=SD(I,K)*2. = TEMP
      IF(SD(I,L).GE.TEMP) GO TO 1320
1310 SD(I,L)=TEMP
1320 CONTINUE
1330 CONTINUE
      IF(ITRNS.GT.0) GO TO 2820
1340 IF(TADC.LE.0.AND.NCSTY.LE.0) GO TO 1370
      WRITE(6,1350)
1350 FORMAT(/39H FREQUENCY STATISTICS AFTER ADJUSTMENTS )
      WRITE(6,890)(MC(I),I=1,12)
      DO 1360 K=1,NSTA
      WRITE(6,1010)ISTA(K),(AV(I,K),I=1,12)
      WRITE(6,1020)(SD(I,K),I=1,12)
      WRITE(6,1030)(SKEW(I,K),I=1,12)
      WRITE(6,1040)(DO(I,K),I=1,12)
1360 CONTINUE
CG * * * * * TRANSFORM TO STANDARDIZED VARIATES * * * * *
1370 DO 1420 K=1,NSTA
      M=1
      DO 1410 J=1,NYSR
      DO 1400 I=1,12
      M=M+1
      OR(M,K)=BLANK
      IF(O(M,K).EQ.T)GO TO 1400
      IF(SD(I,K).EQ.0.)GO TO 1390
      Z(M,K)=(O(M,K)-AV(I,K))/SD(I,K)
C      PEARSON TYPE III TRANSFORM
      IF(SKEW(I,K).EQ.0.)GO TO 1400
      TEMP=.5*SKEW(I,K)*O(M,K)+1.
      TMP=1.
      IF(TEMP.GE.0.)GO TO 1380
      TEMP=-TEMP
      TMR=-1.
1380 G(M,K)=6.*(TMP*TEMP**(1./3.)-1.)/SKEW(I,K)+SKEW(I,K)/6.
      GO TO 1400
1390 O(M,K)=0.
1400 CONTINUE
1410 CONTINUE
1420 CONTINUE
C * * * * * COMPUTE SUMS OF SQUARES AND CROSS PRODUCTS * * * * *
      DO 1450 M=1,NSTA
      DO 1440 I=1,12
      DO 1430 L=1,NSTAX
      RA(I,K,L)=(-4.)
      SUMA(I,K,L)=0.
      SUMR(I,K,L)=0.
      SQA(I,K,L)=0.
      SD(I,K,L)=0.
      XPAR(I,K,L)=0.
1430 NCAR(I,K,L)=0
      RA(I,K,K)=1.
1440 CONTINUE
1450 CONTINUE

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    DN 1540 K=1,NSTA
    KY=K+1
    M=1
    DN 1480 J=1,NYRS
    DN 1470 I=1,12
    M=M+1
    TEMP=Q(M,K)
    IF(TEMP.EQ.T)GO TO 1470
    DN 1460 L=KX,NSTAX
C     SUBSCRIPTS EXCEEDING NSTA RELATE TO PRECEDING MONTH
    LY=L-NSTA
    IF(LY.LT.1) TMP=Q(M,L)
    IF(LY.GT.0) TMP=Q(M-1,LY)
    IF(TMP.EQ.T)GO TO 1460
C     COUNT AND USE ONLY RECORDED PAIRS
    NCAR(I,K,L)=NCAR(I,K,L)+1
    SUMA(I,K,L)=SUMA(I,K,L)+TEMP
    SUMR(I,K,L)=SUMR(I,K,L)+TMP
    SQA(I,K,L)=SQA(I,K,L)+TEMP*TEMP
    SQR(I,K,L)=SQR(I,K,L)+TMP*TMP
    XPAR(I,K,L)=XPAR(I,K,L)+TEMP*TMP
    IF(L.GT.NSTA) GO TO 1460
    NCAR(I,L,K)=NCAR(I,K,L)
    SUMA(I,L,K)=SUMA(I,K,L)
    SUMR(I,L,K)=SUMR(I,K,L)
    SQA(I,L,K)=SQA(I,K,L)
    SQR(I,L,K)=SQR(I,K,L)
    XPAR(I,L,K)=XPAR(I,K,L)
1460 CONTINUE
1470 CONTINUE
1480 CONTINUE
C * * * * * COMPUTE CORRELATION COEFFICIENTS * * * * *
    DN 1530 I=1,12
    DN 1520 L=KX,NSTAX
    LY=L-NSTA
C     ELIMINATE PAIRS WITH LESS THAN 3 YRS DATA
    IF(NCAR(I,K,L).LE.2) GO TO 1510
    TEMP=NCAR(I,K,L)
    TMP=(SQA(I,K,L)-SUMA(I,K,L)*SUMA(I,K,L)/TEMP)*(SQR(I,K,L)-SUMR
1(I,K,L)*SUMR(I,K,L)/TEMP)
C     ELIMINATE PAIRS WITH ZERO VARIANCE PRODUCT
    IF(TMP.LE.0.) GO TO 1500
    TMPB=1.
    TMPA=XPAR(I,K,L)-SUMA(I,K,L)*SUMR(I,K,L)/TEMP
C     RETAIN ALGEBRAIC SIGN
    IF(TMPA.LT.0.)TMPB=-TMPB
    TMPA=TMPA*TMPB/TMP
    R(I,K,L)=TMPB*ATMPA**.5
    ITP=I
    LA=L
    IF(I.LE.NSTA) GO TO 1490
    ITP=I-1
    IF(ITP.LT.1) ITP=12
    L=IX
1490 IF(QD(I,K).LT..0001.OR.SD(ITP,LA).LT..0001) RA(I,K,L)=0.
    GO TO 1510
1500 RA(I,K,L)=0.
1510 IF(L.GT.NSTA) GO TO 1520
    RA(I,L,K)=RA(I,K,L)
1520 CONTINUE
1530 CONTINUE
1540 CONTINUE
    GO TO 2170
1550 WRITE(6,1560)
1560 FORMAT(/18H DATA OUT OF ORDER)
    GO TO 150
C * * * * * READ CORRELATION COEFFICIENTS * * * * *
1570 DN 1630 K=1,NSTA
    IF(K.EQ.1)GO TO 1600
    ITP=K-1
    DN 1590 L=1,ITP
C     CURRENT MONTH CORRELATION

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C		** CARD L **	1701
	READ(5,70)ITMP,ITEMP,(RA(I,K,L),I=1,12)		1702
	RAV(K,L)=RA(1,K,L)		1703
	IF (IGNRL.EQ.1)ISTA(K)=ITMP		1704
	IF (ITMP.NE.ISTA(K))GO TO 1550		1705
	IF (ITEMP.NE.ISTA(L))GO TO 1550		1706
	DO 1540 I=1,12		1707
1580	RA(I,L,K)=RA(I,K,L)		1708
1590	CONTINUE		1709
C	PRECEDING MONTH CORRELATION		1710
1600	LX=NSTAX		1711
	IF (IGNRL.EQ.1) LX=NSTA*K		1712
	LA=NSTAX		1713
	IF (IGNRL.EQ.1) LA=LX		1714
	DO 1610 L=LX,LA		1715
	ITP=L-NSTA		1716
C		** CARD K OR M **	1717
	READ(5,70)ITMP,ITEMP,(RA(I,K,L),I=1,12)		1718
	IF (K.EQ.1)ISTA(K)=ITMP		1719
	IF (K.EQ.1)ISTA(ITP)=ITEMP		1720
	IF (IGNRL.EQ.1) RAV(K,K)=RA(1,K,L)		1721
	IF (ITMP.NE.ISTA(K))GO TO 1550		1722
	IF (ITEMP.NE.ISTA(ITP))GO TO 1550		1723
1610	CONTINUE		1724
	DO 1620 I=1,12		1725
1620	RA(I,K,K)=1.		1726
1630	CONTINUE		1727
C	* * * * * READ FREQUENCY STATISTICS * * * * *		1728
	DO 1640 K=1,NSTA		1729
C		** CARD N CP O **	1730
	READ(5,80)ITP,(AV(I,K),I=1,12)		1731
	IF (ITP.NE.ISTA(K))GO TO 1550		1732
C	GENERALIZED STATISTICS ON ONE CARD PER STATION		1733
	AVMY(K)=AV(1,K)		1734
	AVMN(K)=AV(2,K)		1735
	SOAV(K)=AV(3,K)		1736
	ITMP=AV(4,K)+.1		1737 *
	IMX(K)=ITMP-MO(12)		1738 *
	ITMP=AV(5,K)+.1		1738-2*
	IMN(K)=ITMP-MO(12)		1739 *
	IF (IMX(K).LT.1) IMX(K)=IMX(K)+12		1740
	IF (IMN(K).LT.1) IMN(K)=IMN(K)+12		1741
	IF (IGNRL.EQ.1)GO TO 1640		1742
C		** CARD P **	1743
	READ(5,80)ITP,(90(I,K),I=1,12)		1744
	IF (ITP.NE.ISTA(K))GO TO 1550		1745
C		** CARD Q **	1746
	READ(5,80)ITP,(9KFW(I,K),I=1,12)		1747
	IF (ITP.NE.ISTA(K))GO TO 1550		1748
C		** CARD R **	1749
	READ(5,90)ITP,(DO(I,K),I=1,12)		1750
	IF (ITP.NE.ISTA(K))GO TO 1550		1751
1600	CONTINUE		1752
C	* * * * * ESTIMATE MISSING CORRELATION COEFFICIENTS * * * * *		1753
1650	IF (IGNRL.EQ.1)GO TO 1620		1754
	IF (NSTA.LE.1)GO TO 2310		1755
	DO 1720 I=1,12		1756
	IP=I-1		1757
	IF (IP.LT.1)IP=12		1758
	DO 1710 K=1,NSTA		1759
	ITP=K+1		1760
	DO 1700 L=ITP,NSTAX		1761
C	L AND K CORRELATION POSSIBLY MISSING		1762
	IF (RA(I,K,L).GE.(-1.)) GO TO 1700		1763
	RMAX=1.		1764
	RMIN=-1.		1765
C	LX SEARCHES ALL RELATED CORRELATIONS EXCEPT FOLLOWING WITH		1766
	DO 1690 LX=1,NSTAX		1767
	IF (LX.EQ.K)GO TO 1690		1768
	IF (L.EQ.LX)GO TO 1690		1769
	TEMP=RA(I,K,LX)		1770
	IF (L.LE.NSTA)GO TO 1660		1771

	IF(LX.LE.NSTA)GO TO 1670	1772
C	BOTH L AND LX REPRESENT PRECEDING MONTH	1773
	ITMP=L-NSTA	1774
	ITEMP=LX-NSTA	1775
	TMP=RA(IP,ITMP,ITEMP)	1776
	GO TO 1680	1777
C	L REPRESENTS CURRENT MONTH	1778
1680	TMP=RA(I,L,LX)	1779
	GO TO 1680	1780
C	LX AND NOT L REPRESENTS CURRENT MONTH	1781
1670	TMP=RA(I,LX,L)	1782
1680	IF (TMP+TEMP.LT.=2.0) GO TO 1690	1783
	TMPA=((1.-TEMP+TEMP)*(1.-TMP+TMP))	1784
	IF (TMPA.LT.0.)TMPA=0.	1785
	TMPA=TMPA*.5	1786
	TMPR=TMP+TEMP+TMPA	1787
	IF (TMPR.LT.RMAX)RMAX=TMPR	1788
	TMPB=TMPB-TMPA-TMPA	1789
	IF (TMPB.GT.RMIN)RMIN=TMPR	1790
1690	CONTINUE	1791
C	AVERAGE SMALLEST MAX AND LARGEST MIN CONSISTENT VALUE	1792
	RA(I,K,L)=(RMAX+RMIN)*.5	1793
	IF (L.LE.NSTA)RA(I,L,K)=RA(I,K,L)	1794
1700	CONTINUE	1795
1710	CONTINUE	1796
1720	CONTINUE	1797
	GO TO 2310	1798
CJ	***** TEST FOR TRIAD CONSISTENCY *****	1799
1730	NCA=0	1800
1740	FAC=1.	1801
	NCA=NCA+1	1802
	IF (NCA.LT.NSTA+12) GO TO 1750	1803
	WRITE(6,1840)	1804
	GO TO 150	1805
1750	NCA=0	1806
	NCA=0	1807
1760	INDC=0	1808
	DO 1810 I=1,12	1809
	IP=I-1	1810
	IF (IP.LT.1)IP=12	1811
C	K, L, AND LX SEARCH ALL RELATED TRIOS OF CORREL COEFS	1812
	DO 1820 K=1,NSTA	1813
	ITMP=K+1	1814
	DO 1810 L=ITMP,NSTAX	1815
	IF (L.EQ.NSTAX)GO TO 1810	1816
	LA=L-NSTA	1817
	RI=RA(I,K,L)	1818
	ITMEL=1	1819
	DO 1800 LY=ITP,NSTAX	1820
	ITEMP=LY-NSTA	1821
	R2=RA(I,K,LY)	1822
	IF (L.LE.NSTA)R3=RA(I,L,LY)	1823
C	BOTH L AND LX REPRESENT PRECEDING MONTH	1824
	IF (L.GT.NSTA)R3=RA(IP,LA,ITEMP)	1825
C	RAISE LOWEST COEFFICIENT IF INCONSISTENT	1826
	AC1=(1.-R1+R1)*.5	1827
	AC2=(1.-R2+R2)*.5	1828
	AC3=(1.-R3+R3)*.5	1829
	IF (R1.GT.R2) GO TO 1770	1830
	IF (R1.GT.R3) GO TO 1780	1831
	R1=(R2+R3-AC2-AC3)*FAC	1832
	IF (RMIN.LT.-1.) RMIN=-1.	1833
	IF (R1.GE.RMIN) GO TO 1800	1834
	INDC=1	1835
	RA(I,K,L)=RMIN	1836
	IF (L.LE.NSTA) RA(I,L,K)=RMIN	1837
	GO TO 1800	1838
1770	IF (R2.GT.R3) GO TO 1780	1839
	RMIN=(R3-AC1-AC3)*FAC	1840
	IF (RMIN.LT.-1.) RMIN=-1.	1841
	IF (R2.GE.RMIN) GO TO 1800	1842
	INDC=1	1843

	RA(I,K,LX)=RMIN	1844
	IF (LY.LE.NSTA) RA(I,LX,K)=RMIN	1845
	GO TO 1800	1846
1740	RMIN=R1+R2-AC1+AC2+FAC	1847
	IF(RMIN.LT.-1.) RMIN=-1.	1848
	IF(R3.GE.RMIN) GO TO 1800	1849
	INDC=1	1850
	IF (L.GT.NSTA) GO TO 1790	1851
	RA(I,L,LX)=RMIN	1852
	IF (LY.LE.NSTA) RA(I,LX,L)=RMIN	1853
	GO TO 1800	1854
1790	RA(IP,LA,ITEMP)=RMIN	1855
	RA(IP,ITEMP,LA)=RMIN	1856
1800	CONTINUE	1857
1810	CONTINUE	1858
1820	CONTINUE	1859
1830	CONTINUE	1860
	NC=NC+1	1861
	IF(NC.LE.NSTA+12) GO TO 1850	1862
	WRITE(6,1840)	1863
1840	FORMAT(32H CORRELATION MATRIX INCONSISTENT)	1864
	GO TO 150	1865
1850	IF(INDC.EQ.1) GO TO 1760	1866
OK	* * * * * TEST FOR OVER-ALL CONSISTENCY * * * * *	1867
	ITEMP=0	1868
	GO TO 1870	1869
1860	ITEMP=1	1870
C	WHEN ITEMPI, CURRENT MONTH USED FOR ALL INDEPENDENT STAS	1871
C	OTHERWISE, PREC MTH USED FOR CURRENT AND SUBSEQUENT STAS	1872
1870	NINDP=NSTA	1873
	NVAR=NINDP+1	1874
	DO 2150 I=1,12	1875
	IP=I-1	1876
	IF(IP.LT.1)IP=12	1877
C	CONSTRUCT COMPLETE CORREL MATRIX FOR EACH MONTH AND STA	1878
	DO 2150 K=1,NSTA	1879
C	L IS ROW NUMBER, J IS COLUMN NUMBER	1880
	DO 2020 L=1,NSTA	1881
	LX=L+NSTA	1882
	DO 1980 J=1,NSTA	1883
	JY=J+NSTA	1884
	IF(I=K) 1880,1920,1960	1885
1880	IF(I=K) 1890,1910,1900	1886
1890	R(L,J) = DBLE(RA(I,L,J))	1887000
	LTMP(L)=L	1888
	JTMP(J)=J	1889
	GO TO 1970	1890
1900	IF(ITEMP) 1910,1910,1890	1891
1910	R(L,J) = DBLE(RA(I,L,JX))	1892000
	LTMP(L)=L	1893
	JTMP(J)=JX	1894
	GO TO 1970	1895
1920	IF(I=K) 1930,1940,1950	1896
1930	R(L,J) = DBLE(RA(I,J,LX))	1897000
	LTMP(L)=J	1898
	JTMP(J)=LX	1899
	GO TO 1970	1900
1940	R(L,J) = DBLE(RA(IP,L,J))	1901000
	LTMP(L)=LX	1902
	JTMP(J)=JX	1903
	GO TO 1970	1904
1950	IF(ITEMP) 1940,1940,1930	1905
1960	IF(ITEMP) 1920,1920,1880	1906
1970	R(J,L)=R(L,J)	1907
1980	CONTINUE	1908
	LTMP(L)=K	1909
C	SPECIAL SUBSCRIPT FOR DEPENDENT VARIABLE	1910
	IF (L=K) 1990,2010,2000	1911
1990	R(L,NSTAA) = DBLE(RA(I,K,L))	1912000
	JTMP(NSTAA)=L	1913
	GO TO 2020	1914
2000	IF (ITEMP.GT.0) GO TO 1990	1915

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2010 R(L,NSTAA) = DBLE(RA(I,K,LX))
      JTMP(NSTAA)=LX
2020 CONTINUE
C      MATRIX CONSISTENT IF CORREL DOES NOT EXCEED 1.0
      N=0
      NCR0
C      =====
2030 CALL CROUT(R)
C      =====
      IF(DTRMC.LE.1.) GO TO 2130
      WRITE(6,2040) N,I,K,DTRMC
2040 FORMAT (/36H INCONSISTENT CORREL MATRIX ADJUSTED,314,F12.3)
C      WITHDRAW 1925-1931
      FAC=FAC-.2
      IF(FAC.GT.-.1)GO TO 1750
      NCR0=1
      N=N+1
      IF(N.GT.10) GO TO 150
      SUM=0.
      DO 2040 L=1,NINDP
      DO 2070 LX=1,NVAR
      IF(L.EQ.LX) GO TO 2070
      TMRP=R(L,LX)
      SUM=SUM+TMRP
2070 CONTINUE
2080 CONTINUE
      TMRP=NINDP*NINDP
      SUM=SUM/TMRP
      TEMP=DTRMC-1.
      IF(TEMP.GT..1) TEMP=.1
      TMP=1.-TEMP
      DO 2120 L=1,NINDP
      LTP=L+1
      DO 2110 LX=LTP,NVAR
      R(L,LX) = DBLE(TMRP*TMP + SUM*TEMP)
      IF(LX.LE.NINDP) R(LX,L)=R(L,LX)
      LTP=LTP/L
      JTP=JTP/LX
      IF(LTP.LE.NST4) GO TO 2100
      IF(JTP.LE.NST4) GO TO 2090
      LTP=LTP-NST4
      JTP=JTP-NST4
      RA(IP,LTP,JTP)=R(L,LX)
      RA(JP,JTP,LTP)=R(L,LX)
      GO TO 2110
2090 LTP=LTP
      LTP=JTP
      JTP=JTP
2100 RA(I,LTP,JTP)=R(L,LX)
      IF(JTP.LE.NST4) RA(I,JTP,LTP)=R(L,LX)
2110 CONTINUE
2120 CONTINUE
      GO TO 2030
2130 IF(DTRMC.GE.0.) GO TO 2140
      WRITE(6,70)I,K,DTRMC
      DTRMC=0.
2140 IF(NCR0.GT.0) GO TO 1740
2150 CONTINUE
2160 CONTINUE
      IF (ITEMP.EQ.0) GO TO 1860
      IF (ITRNS.EQ.2) GO TO 3100
2170 WRITE(5,10)
C * * * * * PRINT CORRELATION MATRIX * * * * *
      DO 2260 I=1,12
      IF (ITRNS.LE.0) WRITE(6,2180)MO(I)
2180 FORMAT (/39H RAH CORRELATION COEFFICIENTS FOR MONTH,13)
      IF (ITRNS.GT.0) WRITE(6,2190) MO(I)
2190 FORMAT (/40H CONSISTENT CORRELATION MATRIX FOR MONTH,13)
      WRITE(6,2200)(ISTA(K),K=1,NST4)
2200 FORMAT (/3X,3HSTA,10I7)
      WRITE(5,2210)
2210 FORMAT(20X,19H WITH CURRENT MONTH)

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	DO 2220 K=1,NSTA	1991
2220	WRITE(6,2230) ISTA(K), (RA(I,K,L),L=1,NSTA)	1992
2230	FORMAT (1X,15,10F7,3)	1993000
	WRITE(6,2240)	1994
2240	FORMAT (20X,36H WITH PRECEDING MONTH AT ABOVE STATION)	1995000
	ITP=NSTA+1	1996
	DO 2250 K=1,NSTA	1997
2250	WRITE(6,2230) ISTA(K), (RA(I,K,L),L=ITP,NSTAX)	1998
2260	CONTINUE	1999
	IF (IANAL.LE.0) GO TO 3100	2000
	IF (ITRNS.LE.0) GO TO 1650	2001
	IF (IPCNS.LE.0) GO TO 2070	2002
C	PUNCH ESSENTIAL ELEMENTS OF MATRIX	2003
	DO 2300 K=1,NSTA	2004
	IF (K.EQ.1) GO TO 2260	2005
	ITP=K-1	2006
	DO 2270 L=1,ITP	2007
2270	WRITE(7,70) ISTA(K), ISTA(L), (RA(I,K,L),I=1,12)	2008
2280	DO 2290 L=NSTAA,NSTAX	2009
	ITEMP=L-NSTA	2010
2290	WRITE(7,70) ISTA(K), ISTA(ITEMP), (RA(I,K,L),I=1,12)	2011
2300	CONTINUE	2012
	GO TO 2850	2013
CL	* * * * * RECONSTITUTE MISSING DATA * * * * *	2014
2310	IF (IANAL.LE.0) GO TO 3100	2015
	IF (TRCGN.LE.0) GO TO 2610	2016
	SVAP=NSTA+1	2017
	M=1	2018
	DO 2600 J=1,NYRS	2019
	DO 2590 I=1,12	2020
	IX=I-1	2021
	IF (IX.LT.1) IX=12	2022
	M=M+1	2023
	DO 2580 K=1,NSTA	2024
	IF (O(M,K).NE.T) GO TO 2580	2025
C	PUNCH CORRELATION MATRIX FOR EACH MISSING FLOW	2026
	NTNDP=0	2027
	DO 2390 L=1,NSTA	2028
	LY=1-NSTA	2029
	IF (O(M,L).NE.T) GO TO 2320	2030
	IF (O(M-1,L).EQ.T) GO TO 2390	2031
	NTNDP=NTNDP+1	2032
	ITEMP=NTNDP	2033
	X(NTNDP)=O(M-1,L)	2034
	R(NTNDP,NVAR) = DBLE(RA(I,K,LY))	2035000
	GO TO 2330	2036
2320	NTNDP=NTNDP+1	2037
	ITEMP=NTNDP	2038
	X(NTNDP)=O(M,L)	2039
	R(NTNDP,NVAR) = DBLE(RA(I,K,L))	2040000
2330	R(NTNDP,NTNDP) = 1.000	2041000
	IF (L.EQ.NSTA) GO TO 2390	2042
	ITP=L+1	2043
	DO 2380 LA=ITP,NSTA	2044
	JX=1-NSTA	2045
	IF (O(M,L).EQ.T) GO TO 2350	2046
	IF (O(M,LA).EQ.T) GO TO 2340	2047
	ITEMP=ITEMP+1	2048
	R(NTNDP,ITEMP) = DBLE(RA(I,L,LA))	2049000
	GO TO 2370	2050
2340	IF (O(M-1,LA).EQ.T) GO TO 2380	2051
	ITEMP=ITEMP+1	2052
	R(NTNDP,ITEMP) = DBLE(RA(I,L,JX))	2053000
	GO TO 2370	2054
2350	IF (O(M,LA).EQ.T) GO TO 2360	2055
	ITEMP=ITEMP+1	2056
	R(NTNDP,ITEMP) = DBLE(RA(I,LA,LX))	2057000
	GO TO 2370	2058
2360	IF (O(M-1,LA).EQ.T) GO TO 2380	2059
	ITEMP=ITEMP+1	2060
	R(NTNDP,ITEMP) = DBLE(RA(IX,L,LA))	2061000
C	ADD SYMMETRICAL ELEMENTS	2062

237C	R(ITEMP,NINDP)=R(NINDP,ITEMP)	2063
238C	CONTINUE	2064
239C	CONTINUE	2065
	IF(NINDP.GT.0) GO TO 2400	2066
	NINDP=1	2067
	X(1)=0.	2068
	R(1,1) = 1.000	2069000
	LY=N+NSTA	2070
	R(1,NVAR) = DBLE(RA(I,K,LX))	2071000
240C	ITEMP=NINDP+1	2072
	DO 2410 L=1,NINDP	2073
241C	R(L,ITEMP)=R(L,NVAR)	2074
C	=====	2075
242C	CALL CROUT (R)	2076
C	=====	2077
	ITEMP=NINDP+1	2078
	TEMP=1.	2079
	INDC=0	2080
	DO 2440 L=1,NINDP	2081
	TEMP=DABS(R(L,ITEMP))	2082
	IF(TEMP.GT.TEMP) GO TO 2430	2083
	TEMP=TEMP	2084
	ITP=L	2085
243C	IF(R(L,ITEMP).LE.0..AND,B(L).GT.(-1.5).AND,B(L).LT.0.5) GO TO 2440	2086
	IF(R(L,ITEMP).GE.0..AND,B(L).GT.(-0.5).AND,B(L).LT.1.5) GO TO 2440	2087
	INDC=1	2088
244C	CONTINUE	2089
	IF(INDC.GT.0) GO TO 2450	2090
	IF(DTRMC.LE.1..AND,DTRMC.GE.0.) GO TO 2510	2091
C	IF MATRIX INCONSISTENT, OMIT VARIABLE WITH LEAST	2092
C	CORRELATION	2093
245C	ITMP=NINDP-1	2094
	IF(ITP.GT.ITMP) GO TO 2480	2095
	DO 2470 L=ITP,ITMP	2096
	DO 2460 LA=1,ITEMP	2097
246C	R(L,LA)=R(L+1,LA)	2098
247C	X(L)=X(L+1)	2099
248C	DO 2500 L=1,ITMP	2100
	DO 2490 LA=ITP,NINDP	2101
249C	R(L,LA)=R(L,LA+1)	2102
250C	CONTINUE	2103
	NINDP=ITMP	2104
	GO TO 2420	2105
C	ADD RANDOM COMPONENT TO PRESERVE VARIANCE	2106
251C	TEMP=0.	2107
	DO 2520 L=1,6	2108
	TEMP=TEMP+RNGEN(IXX)	2109
252C	TEMP=TEMP+RNGEN(IXX)	2110
C	COMPUTE FLOW	2111
	AL=(1.-DTRMC)**.5	2112
	TEMP=TEMP*AL	2113
	DO 2530 L=1,NINDP	2114
253C	TEMP=TEMP+B(L)*X(L)	2115
	Q(M,K)=TEMP	2116
	DO(M,K)=E	2117
	TQ=Q(M,K)	2118
C	ADD NEW VALUE TO SUMS OF SQUARES AND CROSS PRODUCTS	2119
	DO 2560 L=1,NSTAX	2120
	IF(L.EQ.K) GO TO 2560	2121
C	SUBSCRIPTS EXCEEDING NSTA RELATE TO PRECEDING MONTH	2122
	LY=N-NSTA	2123
	IF(LX.LT.1) TMP=Q(M,L)	2124
	IF(LX.GT.0) TMP=Q(M+1,LX)	2125
	IF (TMP.EQ.T) GO TO 2560	2126
C	COUNT AND USE ONLY RECORDED PAIRS	2127
	NCAB(I,K,L)=NCAB(I,K,L)+1	2128
	SUMA(I,K,L)=SUMA(I,K,L)+TP	2129
	SUMR(I,K,L)=SUMR(I,K,L)+TMP	2130
	SQA (I,K,L)=SQA (I,K,L)+TP*TP	2131
	SRH (I,K,L)=SRH (I,K,L)+TMP*TMP	2132
	XPAR(I,K,L)=XPAR(I,K,L)+TP*TMP	2133
	IF(L.GT.NSTA) GO TO 2540	2134

	NCAR(I,L,K)=NCAR(I,K,L)	2135
	SUMA(I,L,K)=SUMA(I,K,L)	2136
	SUMB(I,L,K)=SUMB(I,K,L)	2137
	SGA(I,L,K)=SGA(I,K,L)	2138
	SGR(I,L,K)=SGR(I,K,L)	2139
	XPAB(I,L,K)=XPAB(I,K,L)	2140
C	RECOMPUTE CORRELATION COEFFICIENTS TO INCLUDE NEW DATA	2141
2540	IF(NCAR(I,K,L).LE.2) GO TO 2560	2142
	TEMP=NCAR(I,K,L)	2143
	TMP=(SGA(I,K,L)-SUMA(I,K,L)*SUMA(I,K,L)/TEMP)*(SGR(I,K,L)-SUMB	2144
	I(I,K,L)*SUMB(I,K,L)/TEMP)	2145
C	ELIMINATE PAIRS WITH ZERO VARIANCE PRODUCT	2146
	IF(TMP.LE.0.) GO TO 2560	2147
	TMPI=1.	2148
	TMPI=XPAB(I,K,L)-SUMA(I,K,L)*SUMB(I,K,L)/TEMP	2149
C	RETAIN ALGEBRAIC SIGN	2150
	IF(TMPI.LT.0.) TMPI=-TMPI	2151
	TMPI=TMPI*TMPI/TMP	2152
	RA(I,K,L)=TMPI*TMPI**5	2153
	ITP=1	2154
	LA=L	2155
	IF(L.LE.NSTA) GO TO 2550	2156
	ITP=ITP+1	2157
	IF(ITP.LT.1) ITP=12	2158
	LA=LY	2159
2550	IF(SD(I,K).LT..0001.OR.SD(ITP,LA).LT..0001) RA(I,K,L)=0.	2160
	IF(L.GT.NSTA) GO TO 2560	2161
	RA(I,L,K)=RA(I,K,L)	2162
2560	CONTINUE	2163
	ITMP=NYRS*12+1	2164
	IF(M.GE.ITMP) GO TO 2580	2165
	TEMP=C(M,K)	2166
	DO 2570 L=1,NSTA	2167
	TMPI(I,L)=TEMP	2168
	IF(TMP.EQ.0.) GO TO 2570	2169
	LY=L+NSTA	2170
	ITP=ITP+1	2171
	IF(ITP.GT.12) ITP=1	2172
	NCAR(ITP,L,LX)=NCAR(ITP,L,LX)+1	2173
	SUMA(ITP,L,LX)=SUMA(ITP,L,LX)+TMP	2174
	SUMB(ITP,L,LX)=SUMB(ITP,L,LX)+TP	2175
	SGA(ITP,L,LX)=SGA(ITP,L,LX)+TMPI*TMP	2176
	SGR(ITP,L,LX)=SGR(ITP,L,LX)+TP*TMP	2177
	XPAB(ITP,L,LX)=XPAB(ITP,L,LX)+TP*TMP	2178
	IF(NCAR(ITP,L,LX).LE.2) GO TO 2570	2179
	TEMP=NCAR(ITP,L,LX)	2180
	TMP=(SGA(ITP,L,LX)-SUMA(ITP,L,LX)*SUMA(ITP,L,LX)/TEMP)*	2181
	I(SGR(ITP,L,LX)-SUMB(ITP,L,LX)*SUMB(ITP,L,LX)/TEMP)	2182
	IF(TMP.LE.0.) GO TO 2570	2183
	TMPI=1.	2184
	TMPI=XPAB(ITP,L,LX)-SUMA(ITP,L,LX)*SUMB(ITP,L,LX)/TEMP	2185
	IF(TMPI.LT.0.) TMPI=-TMPI	2186
	TMPI=TMPI*TMPI/TMP	2187
	RA(ITP,L,LX)=TMPI*TMPI**5	2188
	IF(SD(I,K).LT..0001.OR.SD(ITP,L).LT..0001) RA(ITP,L,LX)=0.	2189
2570	CONTINUE	2190
2580	CONTINUE	2191
2590	CONTINUE	2192
2600	CONTINUE	2193
2610	IF(TANAL.LE.0) GO TO 3100	2194
CM	***** CONVERT STANDARD DEVIATES TO FLOWS *****	2195
	IF(IPASS.LE.1) GO TO 2630	2196
	ITMP=NYRS*12+1	2197
	DO 2620 ITP=1,100	2198
	IF(LOTAP.EQ.NOTAP) GO TO 2630	2199
	IFAP(ITP)	2200
2620	LOTAP=LOTAP+1	2201
2630	WRITE(6,10)	2202
	WRITE(6,2640)	2203
2640	FORMAT(3H RECORDED AND RECONSTITUTED FLOWS)	2204
	IF(IPASS.GT.1) WRITE(6,2650) IPASS	2205
2650	FORMAT(5H PASS, I3)	2206

	ANYRS=NYRS	2207
	DO 2610 K=1,NSTA	2208
	IF(K.GT.NSTX) WRITE(6,2660) (MO(I),I=1,12)	2209
2660	FORMAT (/11H STA YEAR,(21A,6X,5HTOTAL)	2210000
	M=1	2211
	DO 2760 J=1,NYRS	2212
	ITP=0	2213
	DO 2720 I=1,12	2214
	M=M+1	2215
	TEMP=0(M,K)	2216
	TMP=SKEW(I,K)	2217
	IF(TMP.NE.0.) TEMP=((TMP*(TEMP-TMP/6.)/6.+1.)**3 -1.)**2./TMP	2218
	IF(OR(M,K).NE.E) GO TO 2690	2219
	IF(TEMP.GT.2..AND.SD(I,K).GT..3) TEMP=2.+(TEMP-2.)*.3/SD(I,K)	2220
	IF(TMP.LT.-.0001.OR.TMP.GT..0001) TMP=(+2.)/TMP	
	IF(SKEW(I,K)) 2670,2690,2680	2222
2670	IF(TEMP.GT.TMP) TEMP=TMP	2223
	GO TO 2690	2224
2680	IF(TEMP.LT.TMP) TEMP=TMP	2225
2690	TMP=TEMP+SD(I,K)*AV(I,K)	2226
	Q(M,K)=10.*TMP=0(I,K)	2227
	IF(OR(M,K).LT.0..AND.QM(I,K).GE.0.) Q(M,K)=0.	2228
	Q(I)=OR(M,K)	2229
	ITMP=NSUM(K,IPASS)	
	IF(ITMP.LE.0) GO TO 2710	
	TEMP=0.	2232
	DO 2700 L=1,ITMP	2233
	LY=19T(K,L,IPASS)	
2700	TEMP=TEMP+Q(M,LY)	2235
	IF(Q(M,K).GT.TEMP) GO TO 2710	2236
	Q(I)=ADJ	2237
	IF(OR(M,K).NE.E) GO TO 2710	2238
	Q(I)=ADJ1	2239
	Q(M,K)=TEMP	2240
2710	IO(I)=Q(M,K)+.5	2241
2720	ITP=ITP+IO(I)	2242
	IY=IYRA+J	2243
	TR(K,LE,NSTX) GO TO 2760	2244
	IF(IPCHO,LE.0) GO TO 2740	2245
	WRITE(7,2730) IYR(K),IYR,(IO(I),I=1,12)	2246
2730	FORMAT(214,12I6)	2247
2740	WRITE(6,2750) ISFA(K),IYR,(IO(I),Q(I),I=1,12),ITP	2248
2750	FORMAT(1X,14,16,18,A1,11(17,A1),110)	2249
2760	CONTINUE	2250
	IF(IPASS,LE.1) GO TO 2765	2250-1
	WRITE(IOTAP) ISFA(K), (C(M,K),M=1,ITMP)	2251
	IOTAP=IOTAP+1	2252
2765	IF(IPCON,LE.0) GO TO 2810	2253
GN * * * * *	RECOMPUTE MEAN AND STANDARD DEVIATION * * * * *	2254
	DO 2770 I=1,12	2255
	AV(I,K)=0.	2256
	SKW(I,K)=0.	2257
2770	SD(I,K)=0.	2258
	M=1	2259
	DO 2790 J=1,NYRS	2260
	DO 2780 I=1,12	2261
	M=M+1	2262
	TEMP=ALOG(Q(M,K)+Q(I,K))*0.4342945	2263
	AV(I,K)=AV(I,K)+TEMP	2264
	SKW(I,K)=SKW(I,K)+TEMP**3	2265
2780	SD(I,K)=SD(I,K)+TEMP*TEMP	2266
2790	CONTINUE	2267
	DO 2800 I=1,12	2268
	TEMP=AV(I,K)	2269
	TMP=SD(I,K)	2270
	TMP=(SD(I,K)-TEMP*TEMP/ANYRS)/(ANYRS-1.)	2271
	IF(TMP.LT.0.) TMP=0.	2272
	AV(I,K)=TEMP/ANYRS	2273
	SD(I,K)=TMP**3	2274
	TMP=SKW(I,K)	2275
	SKW(I,K)=0.	2276
	IF(Q(I,K).LE..0005) GO TO 2800	2277

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      SKEW(I,K)=(ANYRS**2*TMP-3.*ANYRS*TEMP*TMPA+2.*TEMP**3)
      1/(ANYRS*(ANYRS-1.)*(ANYRS-2.))*SD(I,K)**3)
2800 CONTINUE
2810 CONTINUE
      LOTAP=NOTAP
      ITRNS=1
      IF(IRCON.LE.0) GO TO 2930
      IF(NCSTV.GT.0) GO TO 1290
C      PRINT ADJUSTED FREQUENCY STATISTICS
2820 WRITE(6,10)
      WRITE(6,2830)
2830 FORMAT(/30H ADJUSTED FREQUENCY STATISTICS)
      WRITE (6,890) (NO(I),I=1,12)
      DO 2840 K=NSTXX,NSTA
      WRITE (6,1010) ISTA(K), (AV(I,K),I=1,12)
      WRITE (6,1020) (SD(I,K),I=1,12)
      WRITE (6,1030) (SKEW(I,K),I=1,12)
      WRITE (6,1040) (DQ(I,K),I=1,12)
2840 CONTINUE
C      PRINT CONSISTENT CORRELATION MATRIX
      ITRNS=1
      GO TO 2170
2850 IF (IPCHS.LE.0) GO TO 2870
C      PUNCH FREQUENCY STATISTICS
      DO 2860 K=NSTXX,NSTA
      WRITE(7,80) ISTA(K), (AV(I,K),I=1,12)
      WRITE(7,80) ISTA(K), (SD(I,K),I=1,12)
      WRITE(7,80) ISTA(K), (SKEW(I,K),I=1,12)
      WRITE(7,90) ISTA(K), (DQ(I,K),I=1,12)
2860 CONTINUE
C      COMPUTE COMBINATION FLOWS
C
2870 IF(NCQMR.LE.0) GO TO 2910
      ITMP=12*NYRS+1
      DO 2890 M=2,ITMP
      DO 2890 KX=1,NCQMR
      K=KX+NSTA
      ITR=NSTAC(KX,IPASS)
      J(K,K)=0.
      DO 2890 LY=1,ITP
      ITEMP=KSTAC(KX,L,IPASS)
      2880 J(M,K)=G(M,K)*G(M,ITEMP)*CSTAC(KX,L,IPASS)
2890 CONTINUE
2900 CONTINUE
C
C ***** MAX AND MIN RECONSTITUTED FLOWS *****
2910 M=0
      ITRNS=1
      IF(MXRCS.LE.0) GO TO 2930
      ITMP=NYRS
2920 IF(ITMP.LE.0) GO TO 2930
      M=M+1
      NI=MXRCS
      ITMP=ITMP-MXRCS
      IF(ITMP.GE.0) GO TO 2930
      ITMP=MXRCS+ITMP
      NI=ITMP
      ITMP=0
      GO TO 2930
2930 IF(IGNRL.NE.?) GO TO 3020
C ***** COMPUTE GENERALIZED STATISTICS *****
      WRITE(6,130)
      DO 3000 K=1,NSTA
C      AVERAGE CORRELATION COEFFICIENT
      DO 2950 L=1,K
      LY=L+NSTA
      RAV(K,L)=0.
      DO 2960 I=1,12
      TMP=RA(I,K,L)
      IF(L.GE.K) TMP=RA(I,K,LX)
2940 RAV(K,L)=RAV(K,L)+TMP
      RAV(K,L)=RAV(K,L)/12.

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	WRITE(6,70)ISTA(K),ISTA(L),RAV(K,L)	2350
2950	CONTINUE	2351
C	AVERAGE LOGS FOR WET AND DRY SEASONS	2352
	AVMX(K)=AV(11,K)+AV(12,K)+AV(1,K)	2353
	IMX(K)=1	2354
	AVMN(K)=AVMX(K)	2355
	IMN(K)=1	2356
	TMP=AV(12,K)+AV(1,K)+AV(2,K)	2357
	IF(AVMX(K).GE.TMP)GO TO 2960	2358
	AVMX(K)=TMP	2359
	IMX(K)=2	2360
	GO TO 2970	2361
2960	AVMN(K)=TMP	2362
	IMN(K)=2	2363
C	AND AVERAGE STANDARD DEVIATION	2364
2970	SDAV(K)=SD(1,K)+SD(2,K)	2365
	DO 2990 I=3,12	2366
	SDAV(K)=SDAV(K)+SD(I,K)	2367
	TMP=AV(I=2,K)+AV(I=1,K)+AV(I,K)	2368
	IF(AVMX(K).GE.TMP)GO TO 2980	2369
	AVMX(K)=TMP	2370
	IMX(K)=I	2371
2980	IF(AVMN(K).LE.TMP)GO TO 2990	2372
	AVMN(K)=TMP	2373
	IMN(K)=I	2374
2990	CONTINUE	2375
	AVMX(K)=AVMX(K)/3.	2376
	AVMN(K)=AVMN(K)/3.	2377
	SDAV(K)=SDAV(K)/12.	2378
3000	CONTINUE	2379
	WRITE(6,140)	2380
	DO 3010 K=1,NSTA	2381
	ITP=IMX(K)	2382
	ITMP=IMN(K)	2383
3010	WRITE(6,120)ISTA(K),AVMX(K),AVMN(K),SDAV(K),MO(ITP),MO(ITMP)	2384
C	***** APPLY GENERALIZED STATISTICS*****	2385
3020	IF(IGNRL.LE.0)GO TO 3100	2386
	DO 3080 K=1,NSTA	2387
	KX=K+NSTA	2388
C	INTERMEDIATE MONTHS	2389
	IMXMN=IMN(K)-IMX(K)+3	2390
	IF(NMXMN.LT.0)NMXMN=NMXMN+12	2391
	NMXMX=6-NMXMN	2392
	DO 3040 I=1,12	2393
C	STANDARD DEVIATION UNIFORM, SKEW ZERO	2394
	SKEW(I,K)=0.	2395
	SD(I,K)=0.	2396
	SD(I,K)=SDAV(K)	2397
	DO 3030 L=1,NSTA	2398
C	ZERO CORRELATION WITH OTHER STATIONS AND PRECEDING MONTH	2399
	LY=L+NSTA	2400
	R4(I,K,LX)=0.	2401
	IF(L.GE.K)GO TO 3030	2402
C	UNIFORM SERIAL CORREL INTERMEDIATE MONTHS AND INTER-STA	2403
	R4(I,K,L)=RAV(K,L)	2404
	R4(I,L,K)=R4(I,K,L)	2405
3030	CONTINUE	2406
	R4(I,K,KX)=RAV(K,K)	2407
	R4(I,K,K)=1.	2408
3040	CONTINUE	2409
C	MEAN AND SERIAL CORREL. WET AND DRY SEASONS	2410
	TMP=RAV(K,K)+.15	2411
	TEMP=TMP+.3	2412
	IF(TMP.GT.98)TEMP=.98	2413
	IF(TEMP.LT.0)TEMP=0.	2414
	ITP=IMX(K)	2415
	AV(ITP,K)=AVMX(K)+.1	2416
	RA(ITP,K,KX)=TEMP	2417
	ITP=IMX(K)-1	2418
	IF(ITP.LT.1)ITP=12	2419
	AV(ITP,K)=AVMX(K)+.2	2420
	RA(ITP,K,KX)=TEMP	2421

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IYP=IMX(K)-2
IF (IYP.LT.1) IYP=IYP+12
AV(IYP,K)=AVMX(K)-.1
WA(IYP,K,KX)=TEMP
IYP=IMN(K)
AV(IYP,K)=AVMN(K)
RA(IYP,K,KX)=TMP
IYP=IMN(K)-1
IF (IYP.LT.1) IYP=12
AV(IYP,K)=AVMN(K)
RA(IYP,K,KX)=TMP
IYP=IMN(K)-2
IF (IYP.LT.1) IYP=IYP+12
AV(IYP,K)=AVMN(K)
RA(IYP,K,KX)=TMP
C MEANS FOR MONTHS FOLLOWING WET SEASON
IF (NMXMN.LT.1) GO TO 3060
IYP=IMX(K)
TEMP=NMXMN+1
TEMP=(AVMX(K)-.1-AVMN(K))/TEMP
DO 3050 IX=1,NMXMN
TMP=IX
I=IMX(K)+IX
IF (I.GT.12) I=I-12
3050 AV(I,K)=AV(IYP,K)+TEMP*TMP
C MEANS FOR MONTHS FOLLOWING DRY SEASON
3060 IF (NMNMX.LT.1) GO TO 3090
IYP=IMN(K)
TEMP=NMNMX+1
TEMP=(AVMX(K)-.1-AVMN(K))/TEMP
DO 3070 IX=1,NMNPX
TMP=IX
I=IMN(K)+IX
IF (I.GT.12) I=I-12
3070 AV(I,K)=AV(IYP,K)+TEMP*TMP
3080 CONTINUE
3090 IGRPL=0
IQCON=0
GO TO 1730
3100 IF (MYRG.LE.0.AND.NPROJ.LE.0.AND.NPASS.LE.1) GO TO 150
CP * * * * * FLOW GENERATION EQUATIONS * * * * *
NINDP=NSTA
NVAR=NSTA+1
DO 3200 I=1,12
IP=I-1
IF (IP.LT.1) IP=12
DO 3190 K=1,NSTA
DO 3190 L=1,NSTA
C CORRELATIONS IN CURRENT MONTH
IF (L.GE.K) GO TO 3120
R(L,NVAR) = DBLE(RA(I,K,L))
DO 3110 LA=L,NSTA
LY=LA+NSTA
IF (LA.LT.K) R(L,LA) = DBLE(RA(I,L,LA))
IF (LA.GE.K) R(L,LA) = DBLE(RA(I,L,LX))
3110 R(LA,L)=R(L,LA)
GO TO 3140
C CORRELATIONS WITH PRECEDING MONTH
3120 LX=L+NSTA
R(L,NVAR) = DBLE(RA(I,K,LX))
DO 3130 LA=L,NSTA
R(L,LA) = DBLE(RA(IP,L,LA))
3130 R(LA,L)=R(L,LA)
3140 CONTINUE
C *****
CALL CRDUT(M)
*****
C *****
DO 3150 L=1,NSTA
3150 RFTA(I,K,L)=R(L)
IF (OTPRC.LE.1.) GO TO 3170
WRITE(6,3160)I,K,OTPRC
3160 FORMAT (10H INCONSISTENT CORREL MATRIX FOR I=,I3,4H K=,I2,

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1300	DTRMS=F6.3)	2494000
	ITRMS=2	2495
	GO TO 1730	2496
3170	IF(DTRMC,GE.0.) GO TO 3180	2497
	WRITE(6,70)I,K,DTRMC	2498
	DTRMC=0.	2499
3180	ALCFY(I,K)=(1.-DTRMC)**.5	2500
3190	CONTINUE	2501
3200	CONTINUE	2502
C	***** GENERATE FLOWS *****	2503
	IF(NPASS,LE.1) GO TO 3240	2504
3210	IF(LSTAT,EQ.NSTAT) GO TO 3220	2505
	READ (ISTAT)	2506
	LSTAT=LSTAT+1	2507
	GO TO 3210	2508
3220	WRITE(ISTAT)NSTXX,NSTA,(ISTA(K),K=1,NSTA)	2509
	LSTAT=NSTAT+1	2510
	LSTAT=NSTAT	2511
	DO 3230 K=1,NSTA	2512
	WRITE(ISTAT) ISTA(K),(AV(I,K),SD(I,K),SKEW(I,K),DG(I,K),	2513
	BETA(I,K,L),L=1,NSTA),ALCFY(I,K),I=1,12)	2514
3230	NSTAT=NSTAT+1	2515
	LSTAT=NSTAT	2516
	IF(IPASS,LT.NPASS) GO TO 200	2517
3240	JA=1	2518
	IPASS=1	2519
	MA=0	2520
	MA=0	2521
	IF (NPROJ,LE.0) GO TO 3310	2522
C	***** PROJECTED FLOW SEQUENCES *****	2523
3250	JA=TYRPPJ-IYRA	2524
	M=LYRPPJ-IYRA	2525
	ITMP=0	2526
	ITPMTHPPJ=IMNTH=1	2527
	IF(ITP,NE.0) GO TO 3260	2528
	ITMP=12	2529
3260	IF (ITP,LT.1) ITP=ITP+12	2531
	MA=(JA-1)+12+ITP+1-ITMP	2532
	DO 3290 K=1,NSTA	2533
	IF (SD(ITP,K),EQ.0.,OR.MA,EQ.1) GO TO 3280	2534
	TEMP=ALOG(D(MA,K)+DG(ITP,K))+.4342945	2535
	DPREV(K)=(TEMP-AV(ITP,K))/SD(ITP,K)	2536
	IF (SKEW(ITP,K),EQ.0.) GO TO 3290	2537
	TEMP=.5*SKEW(ITP,K)*DPREV(K)+1.	2538
	TEMP=1.	2539
	IF (TEMP,GE.0.) GO TO 3270	2540
	TEMP=(-TEMP)	2541
	TEMP=(-TEMP)	2542
3270	DPREV(K)=6.*(ITP*TEMP+(1./3.)*1.)/SKEW(ITP,K)+SKEW(ITP,K)/6.	2543
	GO TO 3290	2544
3280	DPREV(K)=0.	2545
3290	CONTINUE	2546
	JX=TYRPPJ-1	2547
C	N = SEQUENCE NO., M = MONTH NO., JX = YEAR NO.	2548
3300	MA=+1	2549
	GO TO 3330	2550
C	START WITH ZERO DEVIATION AT ALL STATIONS	2551
3310	DO 3320 K=1,KSTA	2552
3320	DPREV(K)=0.	2553
C	GENERATE 2 YEARS FOR DISCARDING	2554
	MYR=2	2555
	JY=-2	2556
3330	IF(NPASS,LE.1) GO TO 3400	2557
	IF(IPASS,GT.1) GO TO 3340	2558
	READ(ISTAT)	2559
	ISTAP=0	2560
	ISTAP=0	2561
3340	REWIND IOSTAP	2562
	LSTAT=0	2563
	READ(ISTAT)NSTXX,NSTA,(ISTA(K),K=1,NSTA)	2564
	NSTXENSTX=1	2565
	IF(NSTX,LE.0) GO TO 3360	2566

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      ITP=NJ+12+1
      DO 3370 K=1,NSTX
      IF(IPASS.LE.1) GO TO 3360
3390 READ(IOTAP) ITEMP,(Q(M,K),M=2,ITP)
      LOTAP=LOTAP+1
      IF(ITEMP.NE.ISTA(K)) GO TO 3350
3360 READ(ISTAT) IP,(AV(I,K),SD(I,K),SKEW(I,K),DQ(I,K),(BETA(I,K,L),L=1
      ,NSTA),ALCFT(I,K),I=1,12)
3370 CONTINUE
3380 DO 3390 K=NSTXX,NSTA
      ISTAT=ISTAT+1
      IF(N.GT.0) QPREV(K)=QSTAT(ISTAT)
3390 READ(ISTAT) IP,(AV(I,K),SD(I,K),SKEW(I,K),DQ(I,K),(BETA(I,K,L),L=1
      ,NSTA),ALCFT(I,K),I=1,12)
CR * * * * * GENERATE CORRELATED STANDARD DEVIATE * * * * *
3400 IF(IPASS.EQ.1) JXTHP=JX
      NCOHR=NCORR(IPASS)
      NTADE=HTNDN(IPASS)
      DO 3420 K=1,NSTA
      DO 3410 I=1,12
      AVG(I,K)=0.
      SDV(I,K)=0.
3410 CONTINUE
3420 CONTINUE
      IF(N.LE.0) GO TO 3440
      WRITE(6,10)
      WRITE(6,3430) N
3430 FORMAT(27H GENERATED FLOWS FOR PERIOD,I3)
      IF(NPASS.GT.1) WRITE(6,2650) IPASS
3440 DO 3510 J=JA,NJ
      I=12*(J-1)+1
      DO 3500 I=1,12
      I=I+1
      IF(NSTX.LE.0) GO TO 3460
      DO 3450 K=1,NSTX
3450 QPREV(K)=Q(M,K)
3460 IF (M.LE.MA) GO TO 3500
      DO 3490 K=NSTXX,NSTA
      C
      RANDOM COMPONENT
      TEMPR=0.
      DO 3470 L=1,6
      TEMPR=TEMPR+RNGEN(IXX)
3470 TEMPR=TEMPR+RNGEN(IXX)
      TEMPR=TEMPR+ALCFT(I,K)
      DO 3480 LE=1,NSTA
3480 TEMPR=TEMPR+BETA(I,K,L)*QPREV(L)
      AVG(I,K)=AVG(I,K)+TEMPR
      SDV(I,K)=SDV(I,K)+TEMPR*TEMPR
      SKEW(K)=SKEW(K)+TEMPR
      QPREV(K)=TEMPR
3490 CONTINUE
3500 CONTINUE
3510 CONTINUE
      IF(NPASS.LE.1) GO TO 3550
3520 IF(LOTAP.EQ.NOTAP) GO TO 3530
      READ(IOTAP)
      LOTAP=LOTAP+1
      GO TO 3520
3530 ITP=NJ+12+1
      ISTAT=ISTAT+NSTA+NSTX
      DO 3540 K=NSTXX,NSTA
      WRITE(IOTAP) ISTAT(K),(Q(M,K),M=2,ITP)
      NOTAP=NOTAP+1
      ISTAT=ISTAT+1
      IF (ISTAT.GT.KSTAT) GO TO 160
3540 ISTAT(ISTAT)=Q(ITP,K)
3550 ANLOG=NJ-JA+1
      DO 3670 K=NSTXX,NSTA
      IF(NJ+JXTHP.GT.0) WRITE(6,2660) (NO(I),I=1,12)
      DO 3560 I=1,12
      AVG(I,K)=AVG(I,K)/ANLOG
      SDV(I,K)=(SDV(I,K)-AVG(I,K)**2*ANLOG)/ANLOG**3

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3560	CONTINUE	2638
	JV=JXTMP	2640
	DO 3660 J=JA,NJ	2641
	JV=JX+1	2642
	M=12+J-11	2643
	IF (JX.LE.0) GO TO 3660	2644
	ITP=0	2645
	DO 3680 I=1,12	2646
	IRM=1	2647
	IF (M.LE.MA) GO TO 3640	2648
C	TRANSFORM TO LOG PEARSON TYPE III VARIATE (FLOW)	2649
	TEMP=SKEN(I,K)	2650
	IF (ANLOG.GT.19..AND.SDV(I,K).GT.0.)	
	Q(M,K)=(O(M,K)-AVG(I,K))/SDV(I,K)	2651
	IF (TMP.EQ.0.) GO TO 3600	2652
C		WITHDREW
	TEMP=((TMP*(O(M,K)-TMP/6.)/6.+1.)*3-1.)*2./TMP	2653
	TEMP=(-2.)/SKEN(I,K)	2654
	IF (SKEN(I,K)) 3580,3600,3590	2655
3580	IF (TMP.GT.TEMP) TMP=TEMP	2656
	GO TO 3610	2657
3590	IF (TMP.LT.TEMP) TMP=TEMP	2658
	GO TO 3610	2659
3600	TEMP=Q(M,K)	2660
3610	IF (TMP.GT.2..AND.SD(I,K).GT..3) TMP=2.+(TMP-2.)*.3/SD(I,K)	2661
	TEMP=TEMP*Q(I,K)+AV(I,K)	2662
	Q(M,K)=10.**TMP-0Q(I,K)	2663
	ITP=NSUM(K,IPASS)	
	IF (ITP.LE.0) GO TO 3630	
	TEMP=0.	2666
	DO 3620 L=1,ITP	2667
	LY=IST(K,L,IPASS)	
3620	TEMP=TEMP+Q(M,LY)	2669
	IF (O(M,K).LT.TEMP) O(M,K)=TEMP	2670
3630	IF (O(M,K).LT.0..AND.QMIN(I,K).GE.0.) O(M,K)=0.	2671
3640	ITP=ITP+O(M,K)*.5	2672
	ITP=ITP+O(I)	2673
3650	CONTINUE	2674
C		WITHDREW
	IO(I,3)=ITP	2676
	WRITE (6,100) ISTA(K),JX,(IO(I),I=1,13)	2677
	IF (INCON.LE.0) GO TO 3660	2678
	WRITE (7,2730) ISTA(K),JX,(IO(I),I=1,12)	2679
3660	CONTINUE	2680
3670	CONTINUE	2681
	IF (NCONR.LE.0) GO TO 3720	2682
	DO 3710 J=JA,NJ	2683
	M=12+J-11	2684
	DO 3700 I=1,12	2685
	IRM=1	2686
C	COMPUTE COMBINATION FLOWS	2687
	DO 3690 K=1,NCONR	2688
	KK=K+NSTA	2689
	ITP=NSTAC(KK,IPASS)	
	Q(M,K)=0.	2691
	DO 3680 L=1,ITP	2692
	ITP=PKBTAC(KK,L,IPASS)	
3680	Q(M,K)=Q(M,K)+Q(M,ITP)+COTAC(KK,L,IPASS)	2695
3690	CONTINUE	2696
3700	CONTINUE	2697
3710	CONTINUE	2698
3720	IF (N.LT.NVHXG) GO TO 3250	2699
	IF (NVHXG.LE.0) GO TO 3400	2700
C	MAX AND MIN GENERATED FLOWS	2701
	IF (JX.LE.0) GO TO 3670	2702
C	SKIP MAXMIN IF REMAINING YEARS INSUFFICIENT	2703
	IF (JX.GT.0..AND.NJ.LT.NVHXG) GO TO 150	2704
	ITP=NSO	2705
3730	ITP=NSTA+NCONR	2706
	DO 3800 K=1,ITP	2707
C	MAX CALENDAR MO 1-12, MAX MO 13, 6-MO 14, 36-MO 15	2708
	DO 3740 I=1,15	

3740	SMO(I,K)=T	2709
C	MIN CALENDAR MO 16-27, MIN MO 28, 6-MO 29, 54-MO 30	2710
	DO 3750 I=16,30	2711
3750	SMO(I,K)=T	2712
C	TMP = 6-MO, TEMP = 54-MO VOLUME, TMPA = 1-MO	2713
	TEMP=0.	2714
	TMP=0.	2715
	AVGO(K)=0.	2716
	ND=0	2717
	M=1	2718
	IF(ITRNS.GT.0) M=(M-1)+MXRCS+12+1	2719
	DO 3790 J=1,NJ	2720
	DO 3780 I=1,12	2721
	IX=I+15	2722
	M=M+1	2723
	TMPA=0(M,K)	2724
	AVGO(K)=AVGO(K)+TMPA	2725
	ND=ND+1	2726
	IF(TMPA.GT.SMO(I,K))SMO(I,K)=TMPA	2727
	IF(TMPA.LT.SMO(IX,K))SMO(IX,K)=TMPA	2728
	IF(TMPA.GT.SMO(13,K))SMO(13,K)=TMPA	2729
	IF(TMPA.LT.SMO(26,K))SMO(26,K)=TMPA	2730
	TMP=TMP+TMPA	2731
	TEMP=TEMP+TMPA	2732
	IF(M.LT.8)GO TO 3760	2733
	TMP=TMP-0(M-6,K)	2734
	IF(TMP.GT.SMO(14,K))SMO(14,K)=TMP	2735
	IF(TMP.LT.SMO(29,K))SMO(29,K)=TMP	2736
	IF(M.LT.56)GO TO 3770	2737
	TEMP=TEMP-0(M-54,K)	2738
	IF(TEMP.GT.SMO(15,K))SMO(15,K)=TEMP	2739
	IF(TEMP.LT.SMO(30,K))SMO(30,K)=TEMP	2740
	GO TO 3780	2741
3760	SNO(14,K)=TMP	2742
3770	SNO(15,K)=TEMP	2743
3780	CONTINUE	2744
3790	CONTINUE	2745
C	AVERAGE MONTHLY FLOW	2746
	TEMP=ND	2747
	AVGO(K)=AVGO(K)/TEMP	2748
3800	CONTINUE	2749
	WRITE(6,10)	2750
	IF(ITRNS.GT.0)WRITE(6,3810)N,NJ	2751
3810	FORMAT (/2TH MAXIMUM VOLUMES FOR PERIOD,13,3H OF,14,	2752000
	12TH YEARS OF RECORDED AND RECONSTITUTED FLOWS)	2753000
	IF(ITRNS.LE.0)WRITE(6,3820)N,NJ	2754
3820	FORMAT (/2TH MAXIMUM VOLUMES FOR PERIOD,13,3H OF,14,	2755000
	12TH YEARS OF SYNTHETIC FLOWS)	2756000
	WRITE(6,110)(MO(I),I=1,12)	2757
	IF(NRSTA+NCORR	2758
	DO 3840 K=NRSTXX,ITP	2759
	ITEMP=AVGO(K)+.5	2760
	DO 3830 I=1,15	2761
3830	IO(I)=SNO(I,K)+.5	2762
	WRITE(6,840)ISTA(K),(IO(I),I=1,15),ITEMP	2763
3840	CONTINUE	2764
	WRITE(6,850)	2765
	WRITE(6,810)(MO(I),I=1,12)	2766
	DO 3860 K=NRSTXX,ITP	2767
	DO 3850 I=1,15	2768
3850	IO(I)=SNO(I+15,K)+.5	2769
	WRITE(6,840)ISTA(K),(IO(I),I=1,15)	2770
3860	CONTINUE	2771
C	TRANSFER BACK TO RECONSTITUTED FLOWS	2772
	IF(ITRNS.GT.0)GO TO 2920	2773
3870	IT = NYMXG	2774
	GO TO 3190	2775
3880	NJ = KYR	2776
3890	IF(NPASS.LE.1) GO TO 3900	2777
	TRASS=IPASS+1	2778
	IF(N.EQ.0.AND.IPASS.LE.NPASS) GO TO 3310	2779
	IF(IPASS.LE.NPASS) GO TO 3340	2780

```

C      IPAS3=1                                2781
3900  IF(NYRG.LE.0) GO TO 150                  2782
      IF(NJ.GT.NYRG)NJ=NYRG                  2783
      NYRG=NYRG-NJ                            2784
      GO TO 3300                              2785
      END                                     2786
      SUBROUTINE CROUT(RX)                    2787
      DIMENSION R(10),R(10,11),RX(10,11)    1001
      DOUBLE PRECISION R,R,RX                1002
      COMMON OTRMC,NINDP,B                   1003
      NVAR=NINDP+1                           1004
      DO 20 J=1,NINDP                         1005
        R(J)=0.                               1006
      DO 10 K=1,NVAR                           1007
10    R(J,K)=RX(J,K)                          1008
20    CONTINUE                                1009
      IF(NINDP.GT.1)GO TO 30                 1010
      R(1)=R(1,2)/R(1,1)                    1011
      OTRMC=R(1)*B(1)                        1012
      RETURN                                  1013
C      * * * * * DERIVED MATRIX * * * * *    1014
30    DO 40 K=2,NVAR                          1015
40    R(1,K)=R(1,K)/R(1,1)                  1016
      DO 60 J=2,NINDP                         1017
        ITP=K-1                              1018
        DO 50 I=1,ITP                        1019
          LTX=I                               1020
50    R(J,K)=R(J,K)-R(J,L)*R(L,K)          1021
          IF(J.EQ.K) GO TO 60                1022
          R(K,J)=R(L,K)/R(K,K)              1023
60    CONTINUE                                1024
      DO 70 I=1,ITP                          1025
        LTX=I                               1026
70    R(K,NVAR)=R(K,NVAR)-R(L,NVAR)*R(K,L) 1027
        RMP=DABS(R(K,K))                    1028
        IF(FEHP.GT..000001) GO TO 80        1029
        OTRMC=1.5                            1030
        RETURN                                1031
80    R(K,NVAR)=R(K,NVAR)/R(K,K)            1032
C      * * * * * BACK SOLUTION * * * * *    1033
90    R(K,NVAR)=R(K,NVAR)/R(K,K)            1034
100   R(NINDP)=R(NINDP,NVAR)                1035
      DO 100 I=2,NINDP                       1036
        J=NVAR-I                             1037
        IY=I-1                               1038
        R(J)=R(J,NVAR)                      1039
        DO 90 L=1,IX                         1040
          R(J)+L                             1041
90    R(I)=R(J)-R(K)*R(J,K)                 1042
100   CONTINUE                              1043
      OTRMC=0.                               1044
      DO 110 J=1,NINDP                      1045
110   OTRMC=OTRMC+R(J)*RX(J,NVAR)          1046
      RETURN                                  1047
      END                                     1048
C      FUNCTION RGEN(IX)                     1049
      RANDOM NUMBER SUBROUTINE FOR A BINARY MACHINE 1001
      GENERATES UNIFORM RANDOM NUMBERS IN THE INTERVAL 0 TO 1 1002
      GENERAL USAGE IS AS FOLLOWS          1003
      R=RGEN(IX)                            1004
      IX SHOULD BE INITIALIZED TO ZERO IN THE PROGRAM 1005
      IX CAN BE ANY LARGE, EVEN INTEGER   1006
      CONSTANTS MUST BE COMPUTED BY FOLLOING EQUATIONS 1007
      * * * * * ICM1=(2**((P+1)/2))*3 * * * * 1008
      * * * * * ICM2=(2**B)-1 * * * * *    1009
      * * * * * FCM3=1./(2.**B) * * * * *   1010
      WHERE B= NUMBER OF BITS IN THE INTEGER WORD 1011
C      DATA IARG/759821/                    1012
      IF(IARG.EQ.IX) GO TO 10               1013
      IX=IARG                                1014

```

IV=IX	1017
ICON1=16777219	1018
10 IV=IV*ICON1	1019
ICON2=281474976710655	1020
IF (IV.LT.0) IV=IV+ICON2+1	1021
RNGEN=IV	1022
FCON3=.3552713678E-14	1023
RNGEN=RNGEN*FCON3	1024
RETURN	1025
END	1026

EXHIBIT 7

INPUT DATA 723-X6-L2340

<u>CARD</u>	<u>VARIABLE</u>	<u>COMMENTS</u>
A		Three title cards, first must have A in column 1.
B		First specification card.
	1. IYRA	- Earliest year of record at any station.
	2. IMNTH	- Calendar month number of first month of water year.
	3. IANAL	- Indicator, positive value calls for statistical analysis routines.
	4. MKRCS	- Number of years in each period of recorded and re-constituted flows for which maximum and minimum values are to be obtained, dimensioned for 100.
	5. NYRG	- Total number of years of hypothetical flows to be generated.
	6. NYMXG	- Number of years in each period of generated flows which maximum and minimum values are to be obtained, dimensioned for 100.
	7. NPASS	- Number of consecutive passes, each pass consisting of a new group of stations which can be correlated with specified stations in previous passes, dimensioned for 5.
	8. IPCHQ	- Indicator, positive value calls for writing recorded and reconstituted flows and generated flows on Tape 7.
	9. IPCHS	- Indicator, positive value calls for writing statistics on Tape 7.
	10. NSTA	- Number of stations at which flows are to be generated, not required if flow data are supplied. NSTA + NCOMB (C-1) dimensioned for 10.
C		Second specification card.
	1. NCOMB	- Number of combinations of stations, the totals of which are used to obtain maximum and minimum flows, dimensioned for 2. If positive, provide D and E cards.
	2. NTNDM	- Number of tandem situations, compares sum of monthly values of upstream stations with downstream station and adjusts if value is less than sum and that station's value has been estimated or generated, dimension for 10. If positive, provide F card.
	3. NCSTY	- Number of consistency tests. Adjusts standard deviation of a dependent station in tandem with an independent station to prevent frequency curves from crossing, dimensioned for 10. If positive, provide G card.

<u>CARD</u>	<u>VARIABLE</u>	<u>COMMENTS</u>
C (Cont'd)		
	4. IGNRL	- Indicator, + 1 calls for reading generalized statistics and using for generation, + 2 calls for computing generalized statistics from flow data and using for generation.
	5. NPROJ	- Number of projections of future flows from present conditions, usually 0.
	6. IYRPJ	- Year of start of each projection.
	7. MTHPJ	- Calendar month of start of each projection.
	8. LYRPJ	- Last year of each projection, number of recorded and reconstituted years plus number of projected years dimensioned for 100.
D		Identification of combination, NCOMB (C-1) sets of D and E cards.
	1. NSTAC	- Number of stations in this combination, dimensioned for 10.
	2. ISTAC	- Station number (NSTAC values).
E		Combining coefficients, NCOMB (C-1) sets of D and E cards.
	1. NSTAC	- Same as D-1.
	2. CSTAC	- Coefficient of flow used for adding, corresponds to respective items in D-2.
F		Identification of tandem situation, NTNDM (C-2) cards.
	1. ISTN	- Station number of downstream station.
	2. NSMX	- Number of upstream stations, dimensioned for 10.
	3. ISTT	- Station number of upstream station (NSMX values).
G		Identification of consistency test, NCSTY (C-3) cards.
	1. ISTX	- Independent station number.
	2. ISY	- Dependent station number.
H		Flow data, cards in any order, omit if IANAL (B-3) is not positive, follow all flow data cards by 1 blank card (I card).
	1. Cols 2-4, Station number	
	2. Cols 5-8, Year number.	

<u>CARD</u>	<u>VARIABLE</u>	<u>COMMENTS</u>
H (Cont'd)		
	3.	Cols 9-14, 15-20, etc., Flow in desired units. Units should be selected so generated flows will not exceed 999,999. Use -1 for missing record. If record for entire year is missing, omit card for that year.
I		Card blank after Col 1 to indicate end of flow data, omit if IANAL (B-3) is not positive.
J		Identification of stations in previous passes to be used in current pass, supply only if NPASS (B-7) is greater than 1. The variables NCOMB, NTNDM, and NCSTY apply to the current pass only.
	1. NCOMB	- Number of combinations of stations, the totals of which are used to obtain maximum and minimum flows, dimensioned for 2. If positive, provide D and E cards.
	2. NTNDM	- Number of tandem situations, compares sum of monthly values of upstream stations with downstream station and adjusts if value is less than sum and that station's value has been estimated or generated, dimension for 10. If positive, provide F card.
	3. NCSTY	- Number of consistency tests. Adjusts standard deviation of a dependent station in tandem with an independent station to prevent frequency curves from crossing, dimensioned for 10. If positive, provide G card.
	4. NSTX	- Number of stations from previous passes which are to be used with the additional data in current pass as a means of maintaining consistent flows between groups of stations, number of stations from previous passes plus number of new stations dimensioned for 10.
	5. ISTA	- Station number of station in a previous pass which is to be used in current pass (NSTX values). Must be in same order as stations first appear.
		Note: Flow data for current pass supplied as described for H card and follow data with a blank card (I card), supply NPASS-1 sets of J, H, and I cards (also D,E,F, and G, if necessary) when NPASS greater than 1.
K		Preceding-month correlation coefficients for first station, omit if IANAL (B-3) is positive (NSTA cards).
	1. ISTA(K)	- Cols 2-4, Number of first station.
	2. ISTA(L)	- Cols 5-8, Number of station from 1 to NSTA (B-10) on successive cards. If IGNRL (C-4) = 1, only first card is used.
	3. RA(I,K,LX)	- Cols 9-14, 15-20, etc., Correlation coefficients for successive months between flows at first station and preceding-month flows at stations from 1 to NSTA (B-10) on separate cards. If IGNRL (C-4) = 1, only generalized coefficient (in cols 9-14) is given.

<u>CARD</u>	<u>VARIABLE</u>	<u>COMMENTS</u>
L*		Current-month correlation coefficients, omit if IANAL (B-3) is positive, (NSTA-1) pairs of L and M cards.
	1. ISTA(K)	- Cols 2-4, Number of station, progressing from K = 2 through NSTA (B-10) stations on different sets of L and M cards.
	2. ISTA(L)	- Cols 5-8, Number of station, progressing on different cards through all stations from L = 1 to K-1.
	3. RA(I,K,L)	- Cols 9-14, 15-20, etc., Correlation coefficient for each successive calendar month between flows at station K and concurrent flows at station L (12 items). If IGNRL (C-4) = 1, only generalized coefficient in cols 9-14 is given.
M*		Preceding-month correlation coefficients for remaining stations, omit if IANAL (B-3) is positive. Paired with L card.
	1. ISTA(K)	- Cols 2-4, Same station number as on corresponding L card (L-1).
	2. ISTA(L)	- Cols 5-8, Number of station, progressing in same order on different cards through all stations from L = 1 to NSTA (B-10). If IGNRL (C-4) = 1, only card with L = K is used.
	3. RA(I,K,LX)	- Cols 9-14, 15-20, etc., Correlation coefficient for each successive calendar month between flows at station K and flows in preceding month at station L (12 items). If IGNRL (C-4) = 1, only generalized coefficient in Cols 9-14 is given.
N		Generalized frequency statistics, omit if IANAL (B-3) is positive or IGNRL (C-4) does not equal 1.
	1. ISTA(K)	- Cols 2-8, Station number for NSTA (B-10) stations on successive cards in same order as supplied by L cards (L-1).
	2. AVMX(K)	- Cols 9-14, Average mean logarithm for wet season (3 months).
	3. AVMN(K)	- Cols 15-20, Average mean logarithm for dry season (3 months).
	4. SDAV(K)	- Cols 21-26, Average standard deviation for the 12 months.

* Sets of L and M cards are required for each station from K = 2 to NSTA.

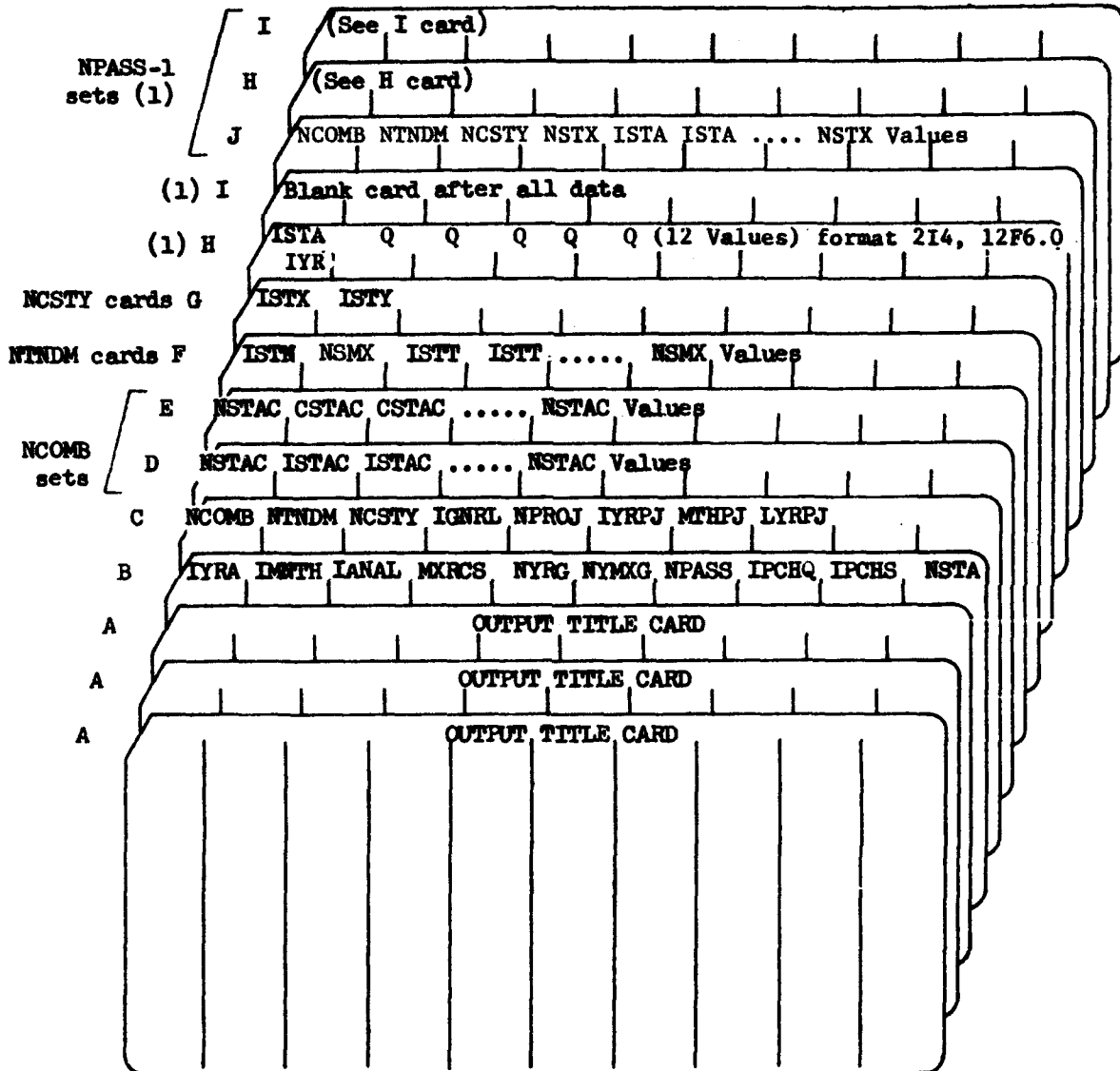
<u>CARD</u>	<u>VARIABLE</u>	<u>COMMENTS</u>
N (Cont'd)		
	5. MOMX(K)	- Calendar number of last month of wet season.
	6. MOMN(K)	- Calendar number of last month of dry season.
O		Mean logarithms, omit if IANAL (B-3) is positive or IGNRL (C-4) equals 1.
	1. ISTA(K)	- Same as (M-1).
	2. AV(I,K)	- Cols 9-14, 15-20, etc., Mean logarithms for successive calendar months.
P		Standard deviations, omit if IANAL (B-3) is positive or IGNRL (C-4) equals 1.
	1. ISTA(K)	- Same as (M-1).
	2. SD(I,K)	- Cols 9-14, 15-20, etc., Standard deviations for successive calendar months.
Q		Skew coefficients, omit if IANAL (B-3) is positive or IGNRL (C-4) equals 1.
	1. ISTA(K)	- Same as (M-1).
	2. SKEW(I,K)	- Cols 9-14, 15-20, etc., Skew coefficients for successive calendar months.
R		Flow increments, omit if IANAL (B-3) is positive or IGNRL (C-4) equals 1.
	1. ISTA(K)	- Same as (M-1).
	2. DQ(I,K)	- Cols 9-14, 15-20, etc., Flow increments for successive calendar months.

Five blank cards with A in Col 1 of first should follow last job.

Note: Cards K through R are not required if cards H and I are supplied. Cards K through R are as punched by computer when IPCHS is positive.

EXHIBIT 8

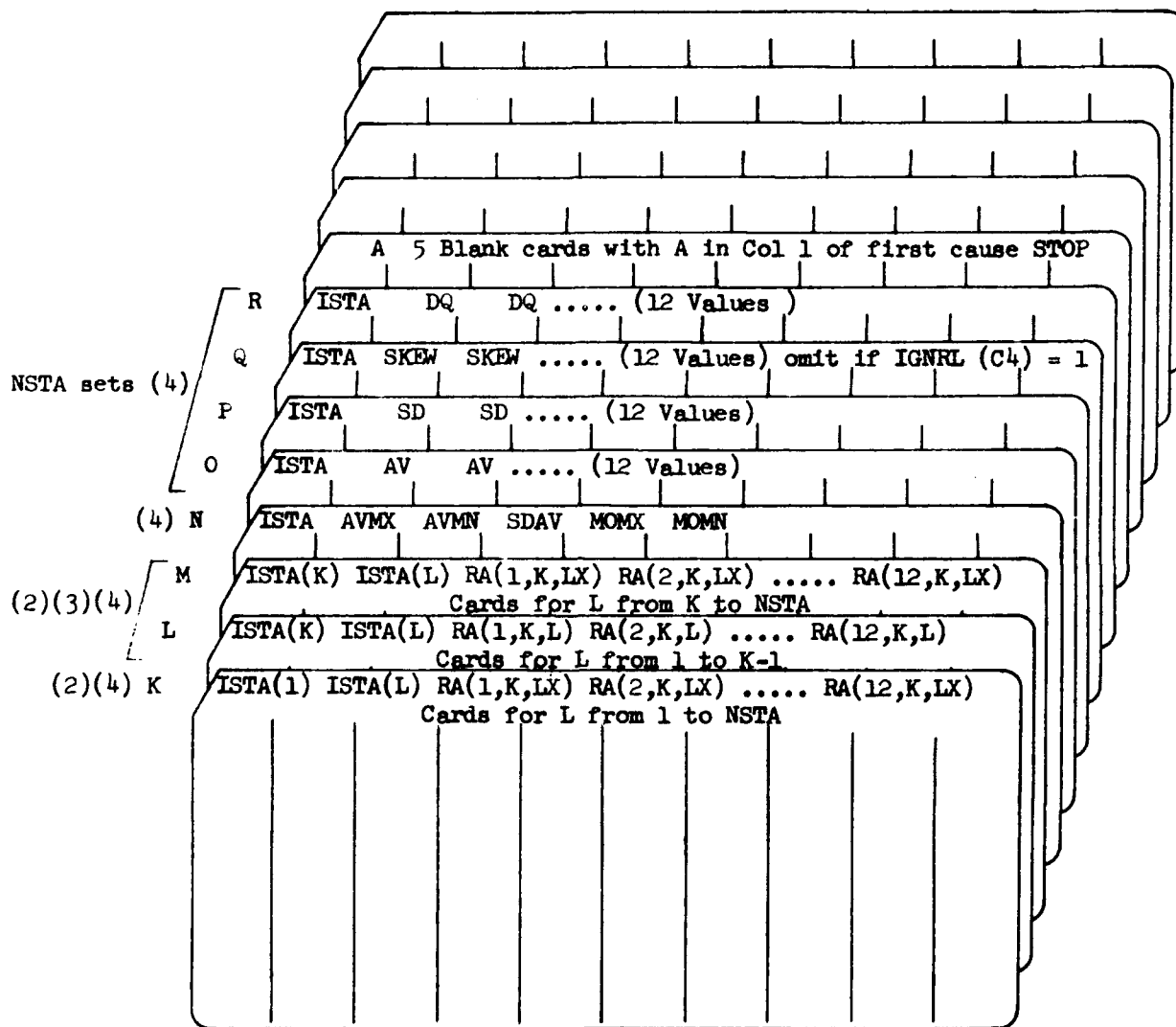
SUMMARY OF REQUIRED CARDS
723-X6-12340



Notes:

- (1) Supply only if IANAL (B3) is positive. Repeat H card for each station-year of data before supplying I card.

SUMMARY OF REQUIRED CARDS
Continued
723-X6-L2340



- (2) L designates correlation with current month and LX with preceding month. If $IGNRL(C4) = 1$, only one (generalized) coefficient is given following station numbers on each card and only 1 K and M card is used for each K station, with $L = K$. Use same format as H card.
- (3) Repeat set of L and M cards for each K station except first.
- (4) Omit if IANAL (B3) is positive.