

4.6 ADAPS STATISTICAL APPLICATIONS

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This section presents the programs that are used to obtain statistics, perform analyses, inventory, and manipulate daily-values data.

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DVMAS ----	Daily-Values monthly and annual statistics ...	4.6.1
DVSTAT ----	Daily-Values duration and N-day low/high value analysis	4.6.2
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Selected application programs in ADAPS, such as DVMAS and DVSTAT (and in other water data processing systems), may optionally create a data output file, called Application Programs Transfer File (APTRAF). This file contains records of several different data types that are suitable for the processing of hydrologic data from several different sources. The file is a stand-alone file containing the information necessary for further analytical analyses, and it is usable by a variety of different computer programs. The file is meant to accommodate many different types of data, thereby simplifying and generalizing the processing of data via use of one commonly formatted file. The created file may subsequently be processed by other application programs, which in turn create other APTRAF records, and so on, until no further processing and analyses are desired.

The APTRAF records are conceptually a collection of one or more alphanumeric and/or numeric valued data sets of hydrologic data that may be stored (displayed) in tabular form (a matrix of rows and columns). The table contains title lines (headings), column and sub-column headings, a body of labeled or unlabeled (row names) numeric data stored in rows and columns, auxiliary data that may be needed or that supplements the tabular data, and information such as footnotes to a table, which describe the column headings. Fortran subroutines for reading and printing APTRAF files and a simple demonstration program are available from NWIS. Because NWIS and transfer of data to applications programs are still evolving, Districts are advised to consult with NWIS regarding the data format before developing software to process these files and to design any software to be adaptable to changes in data formats.

ADAPS uses the Data Descriptor File to provide for alternate rounding specifications of numeric data. If the user does not specify alternate rounding, then the Parameter Code File rounding specifications are used. These rounding specifications include a maximum number of decimal specifications. The ADAPS application programs output numeric data in machine-readable APTRAF records with the maximum number of decimals, regardless of the magnitude of the number, as specified in the DD File if alternate rounding is specified, or as specified in the

Parameter Code File if alternate rounding is not specified. Data are retrieved and output according to the maximum number of decimals for most values. Some values such as logarithmic data may be output with greater precision.

4.6.1 Daily-Values Monthly and Annual Statistics

The DVMAS program allows the user to perform monthly and annual statistical calculations using daily-values data. The kinds of calculations made and how they are made are explained below. The DVMAS application consists of a preprocessor and computation programs. The DVMAS application uses user-input and daily-values data to compute and report monthly and annual statistics.

Examples of the statistical information computed include: (1) a zero and missing values summary, (2) the monthly and annual means, (3) uni-variate statistics of monthly and annual means, (4) a monthly correlation matrix, (5) the monthly serial correlation (autocorrelation) coefficients for lags up to one-fourth of the number of years in the retrieval period, and (6) the quartiles of monthly and annual means. The program also has computational options, which allow for the exclusion of zero-value and missing days and for the transformation of data to a logarithmic base. The computed statistical information is output as either printed output and/or as APTRAF records. The APTRAF records are suitable for processing by a frequency-analysis program. The interactive preprocessor program runs before the computation program and queries the user for the necessary information to create a control file that subsequently drives the computation program as a batch job. When the batch job is run, and the user is queried to choose a batch queue on the node, a queue that allows a large time period for execution should be selected. This is particularly necessary if the job has a large number of stations to process and statistics to compute.

DVMAS Preprocessor Program

The DVMAS preprocessor program takes the user through a series of menu selections. The menu selections and user-supplied answers are used to create a control file that is used by the DVMAS computation program (next section). The user either supplies a name for the control file or accepts the default name. Assistance for answers may be available and accessed by keying a “?” or “HELP.” Essential choices made in the preprocessor step are:

1. Accept or reject information from User File.
2. Specify control file name or accept default name for use by the computation program.
3. Specify desired printed statistical output (options are described in the next section).
4. Specify desired machine-readable statistical output.
5. Specify desired computation/transformation options.
6. Specify statistic codes.
7. Specify output data name if APTRAF formatted data are selected.
8. Specify maximum number of no-value days allowed.
9. Select computational period and begin month of annual period.

Specify individual station ID/data descriptor/statistic code combinations and computational periods if desired.

Control files created by the DVMAS preprocessor program for the computation program are in ASCII format so they can be edited and modified manually if desired. However, if an existing control file requires extensive changing to meet new or different needs, use the preprocessor to create a new control file.

If an existing computation program control file is to be used, invoke the preprocessor program, supply the name of the existing control file, and indicate to the preprocessor that the existing control file is to be executed. The computation program is then invoked as a batch job and the preprocessor program terminates.

The control file records created by the preprocessor program and those required by the computation program are discussed in [Section 6.2](#). Refer to [Section 6.2](#) for record formats to manually edit records in the control file.

DVMAS Computation Program

The DVMAS computation program uses the specifications from the control file created by the preprocessor program and retrieves the daily-values data. The program then computes the desired statistics and writes them to files that are either saved, or spooled and deleted.

Descriptions of Printed Output Statistics (PO menu option)

The possible output statistics produced by the computation program are discussed in the following sections. Each section gives the option number from the PO menu (as shown on the screen) in parentheses.

Zero-Value/No-Value Summary

This option (1) is a tabular summary of zero-value and no-value time units (daily, monthly, yearly) expressed as counts and percentages. A zero-value time unit is a day, month, or year during which the variable is stored as a zero. A no-value time unit is one where the value of the variable is unknown.

Monthly Mean Values

This option (2) is a table of monthly mean values for each year of data retrieved. The monthly mean is computed as the sum of the daily values for each month divided by the number of days in each month. Normally, a monthly mean is not computed if there are missing days.

Statistics of Monthly Mean Values

This option (3) is a table of statistics computed using monthly mean values. The statistics and the equations used to compute them are given below:

o Number (N) = the total number of months used in the analysis.

$$\text{o Mean (M)} = \frac{1}{N} * \sum_{i=1}^N \hat{M}(i)$$

$$\text{o Variance (V)} = \frac{\sum_{i=1}^N (\hat{M}(i))^2 - \frac{1}{N} * (\sum_{i=1}^N \hat{M}(i))^2}{N-1}$$

$$\text{o Standard Deviation (SD)} = \sqrt{V}$$

o Skewness =

$$\frac{\sum_{i=1}^N \hat{M}(i)^3 - 3 * \sum_{i=1}^N \hat{M}(i) * \sum_{i=1}^N \hat{M}(i)^2 + 2 * (\sum_{i=1}^N \hat{M}(i))^3}{N * (N-1) * (N-2) * SD^3}$$

o Coefficient of variation = SD/M

$$\text{o Percent of Annual Total} = \frac{100 * \sum_{k=1}^{12} M(k)}{\sum_{k=1}^{12} \hat{M}(k)}$$

(Note: This quantity is computed only for parameters for which it is meaningful to compute an annual total.)

where: $\hat{\Sigma}$ Indicates summation,
 N = Number of years used,
 M = Monthly mean (statistic),
 i = A year index,
 k = A month index,
 V = Variance (statistic), and
 SD = Standard deviation (statistic).

Correlation of Monthly Mean Values

This option (4) is a table of the upper half of a symmetric correlation coefficient matrix. The correlation coefficient is a measure of the strength of the linear relationship between two variables. Herein, the variables are the mean values of data for 2 months, X_i , Y_i , for the period retrieved. The correlation coefficient is computed by the product-moment formula. The formula is given below:

$$\frac{\sum_{i=1}^N \hat{X}(i) * Y(i) - \hat{X} * \hat{Y}}{\sqrt{\left(\sum_{i=1}^N \hat{X}(i)^2 - N * \hat{X}^2 \right) * \left(\sum_{i=1}^N \hat{Y}(i)^2 - N * \hat{Y}^2 \right)}}$$

where: $\hat{}$ Indicates summation,
 N = Number of years used,
 X = Mean for month X (statistic),
 Y = Mean for month Y (statistic), and
 i = A year index.

Serial Autocorrelation of Monthly Mean Values

This option (5) is a table of the 1- to n-year lag serial correlation (or autocorrelation) coefficient for each month. The maximum value of n is equal to one-fourth of the number of years in the retrieved period. The serial auto correlation coefficient is analogous to the correlation coefficient computed by the product-moment formula except that the series is divided into two sets of data, X_i and X_{i+n} , one lagging the other by n time units. The serial autocorrelation coefficient for a lag of n years is computed using the formula given below:

$$\frac{\sum_{i=1}^N \hat{X}(i) * X(i+n) - \hat{X} * \hat{X}(i+n)}{\sqrt{\left(N * \sum_{i=1}^N \hat{X}(i)^2 - \left(\sum_{i=1}^N \hat{X}(i) \right)^2 \right) * \left(N * \sum_{i=1}^N \hat{X}(i+n)^2 - \left(\sum_{i=1}^N \hat{X}(i+n) \right)^2 \right)}}$$

where: $\hat{}$ Indicates summation,
 N = Number of years used (years in period retrieved - n),
 n = Number of years of lag,
 X = Monthly mean (statistic), and
 i = A year index.

Quartiles of Monthly Mean Values

This option (6) is a ranking of monthly means in ascending order and a determination of the median (Q2) and first (Q1) and third (Q3) quartiles of the data. In a set of ranked monthly means, the first quartile is the value such that 25 percent of the values are less than that value, and 75

percent of the values are greater than that value. The median or second quartile is the middle value in the ranked data set. The third quartile is the value such that 75 percent of the values are less than that value, and 25 percent of the values are greater than that value. The quartiles divide the ranked data set into four equal parts. The position of the quartiles in the ranked data is computed using the following formulas:

$$Q1 = \frac{N+1}{4}, \quad Q2 = \frac{2(N+1)}{4}, \quad Q3 = \frac{3(N+1)}{4},$$

where N is the number of items in the data set. The monthly means are printed in ranked order along with the year that designates chronological order. Quartiles and medians are printed for each of these sets of months for a period of years.

Quartiles of Cumulative Monthly Runoff (Inches)

This option (7) is a computation of cumulative monthly runoff in inches. Runoff in inches is computed as the total cubic feet per second (cfs) - days multiplied by 0.0372 and divided by the drainage area in square miles. The value for each month is the cumulative runoff for that month plus each preceding month's runoff throughout the water year. This option also computes the cumulative runoff for April through September. The median and first and third quartiles are computed for each month of cumulative runoff and for the April through September runoff.

Quartiles of Cumulative Monthly Runoff (Acre-feet)

This option (8) is a computation of cumulative monthly runoff in acre-feet. Runoff in acre-feet is computed as the sum of daily discharges (total cfs-days) multiplied by 1.9835. The value for each month is the cumulative runoff for that month plus each preceding month's runoff throughout the water year. This option also computes the value of runoff for April through September. The median and first and third quartiles are computed for each month of cumulative runoff and for the April through September runoff.

Annual Mean Values

This option (9) is a table of annual mean values for the period retrieved.

Statistics of Annual Mean Values

This option (10) is a table of statistics computed from annual mean values. The statistics are the number, mean, variance, standard deviation, skewness, coefficient of variation, and 1- to n-year serial correlation autocorrelation coefficients.

Quartiles of Annual Mean Values

This option (11) is a ranking of annual mean values in ascending order and a determination of the median and first and third quartiles of the data. The annual means are printed in ranked order along with the year designating chronological order. The median and quartiles are printed for a period of years.

Computational Options (PC menu option)

The computational options (numbered as 1 through 4 below) determine whether or not the statistical computations described in the above section are based on the following:

1. All days, untransformed
2. Non-zero days, untransformed
3. Log transformed all day's means
4. Log transformed non-zero day's means

The log transformation is base 10. Any or all of these options may be chosen. If both options 1 and 2, or both 3 and 4 are chosen and there are no zero-valued days for the period retrieved, printout for 2 and/or 4 is suppressed since it would duplicate printout for options 1 and 3.

Program Output (DO menu option)

Output from the DVMAS application program in APTRAF format (numbered as 1 through 4 below) is available for monthly and annual means and the statistical data (number, mean, variance, standard deviation, etc.). The program output options are as follows:

1. Monthly mean values
2. Statistics of monthly mean values
3. Annual mean values
4. Statistics of annual mean values

No-Value Option (ND menu option)

The maximum number of no-value days option allows the user to select the maximum number of no-value days that are permitted within a month before that month is excluded from the statistical computations. If the maximum number of no-value days is exceeded, the monthly mean is not computed and the year in which that month occurs is not included in the annual computations. A year is excluded from annual computations if a single month is missing.

Computation Period (PR menu option)

The actual begin water year of computation will be the first water year found that is equal to or greater than the begin water year entered. The actual end water year of computation will be the last water year found that is less than or equal to the water year entered (this the default option).

To specify beginning or end of period of record for begin or end water year, respectively, leave the appropriate side of the comma blank. Entry of a single comma will default to entire period of record.

Annual Computations Done on Water Years (MO menu option)

This is the begin month for the annual period to be used for annual means and for statistics on annual means. An answer of 0 or <CR> will cause standard water years to be used. If any other month is selected (including 10), the years are years beginning with the month and year combination. For example, begin month 0, year 1985 is the 1985 water year. Begin month 10, year 1985 is the 1986 water year (year beginning October, 1985.)

Process Statistic Code(s): (SC menu option)

For all station/DD combinations that do not have their own statistic code list, enter up to 10 five-digit statistic codes that are valid for Daily Values processing. The most commonly used code is 00003 for daily mean values. A response of "L" will display a list of valid codes.

All Station/DDS Use the Same Computation Period (AD menu option)

The above option is the default and to change to. Allow a different period of record for each Station/DD – key in AD.

All Station/DDS Use the Same Statistic Code List (AS menu option)

The above option is the default and to change to. Allow a different statistic code list for each Station/DD – key in AS.

4.6.2 Daily-Values Duration and N-Day Low/High Value Analysis

The DVSTAT program allows the user to perform duration and N-day low- and high-value analyses using daily-values data. This application consists of preprocessor and computation programs. The DVSTAT application uses user-input and daily-values data to: (1) perform a duration analysis and compute statistics, (2) do N-day low- and/or N-day high-value analysis, (3) produce data sums for each period selected for duration analysis, and (4) compute means for each period(s) selected for low- and/or high-value analyses. These analyses are done on a yearly or partial-year basis, or on a monthly basis. The duration analysis is based on a series of class limits computed by the program (default) or specified by the user. Low-value analyses are based on up to nine selective periods of N-consecutive days. These analyses determine the lowest N-day mean value for each period selected. The high-value analyses are based on similar selective periods of N-consecutive days and determine the highest mean values for each of the periods selected.

The interactive preprocessor program runs before the computation program and queries the user for the necessary information to create a control file that subsequently drives the computation program as a batch job. When the user runs the batch job and is queried to choose a batch queue

on the specified node, a queue that is set up with an unlimited (or large) time period for execution should be selected. This is particularly necessary for jobs that are for multiple stations or have a large number of computations to perform.

Historically, it has been possible to perform a log-Pearson Type-III analysis on low- and high-value data in the same job; therefore the preprocessor program also queries for enough information to create a separate control file for a later frequency analysis if desired. The user is asked to supply file names for each control file created. In addition, the user has the choice of making or not making a logarithmic transformation of the data.

Note: In the current release of ADAPS, a Pearson frequency-analysis program is not available in NWIS. Therefore, although the appropriate questions are asked and a Pearson control file can be created, processing of that control file in this release is not possible within NWIS.

DVSTAT Preprocessor Program

The DVSTAT preprocessor program takes the user through a series of menu selections, questions, and answers. The user's menu selections and answers to specific queries are used to create the control file that drives the computation program. Assistance for answers may be available by keying a “?” or “HELP.”

Initial choices made in the preprocessor step are:

1. Specify control file name(s).
2. Accept or reject information from user file.
3. Specify overall analysis years and months.
4. Specify statistic codes (normally 00003).

Specify analysis period as yearly/partial years, or on a monthly basis. (This entry is mandatory; the type of statistics must be specified in order for processing to continue. Enter a “1” for a yearly or partial year statistics, or enter a “2” for monthly statistics. The user may enter “QUIT” or “EXIT” to exit program, or “OOPS” to back up one query.)

These options are displayed after the entry of one of the above analysis year period options:

- 1) --> Include duration table in spool file
--> Do plots of duration data
--> Include high-value data in spool file
--> Include low-value data in spool file
--> Include annual, semiannual, or monthly values table in spool file
- 2) --> Include duration data in Application Program Records (APTRAF) file
--> Include high-value data in APTRAF file
--> Include low-value data in APTRAF file

--> Include annual, semiannual or monthly values table in APTRAF file

Enter "1" and/or "2," or "ALL," ([CR] to select options independently from an all-inclusive list)

(Enter the number(s) of the grouped selections. A choice of 1 and/or 2 will bypass the detailed shopping list selection and begin the initialization of variables; [CR] will generate the "detailed menu," which includes all options listed in "1" and "2" and more. Enter "QUIT" or "EXIT" to exit program, or "OOPS" to backup one query.

Specify APTRAF File Name (optional)

After the initial choices, further multiple choice type menus are displayed. Selections available at this point relate to output types, analysis instructions, and the availability of Pearson analysis frequency postprocessing. The user specifies one of the default menu selection groups provided, or selects options independently from an all-inclusive menu list. After selecting from these menu options, there is a query for the begin/end year periods for the duration analysis, the low-value analysis, and the high-value analysis. If no begin/end year period is given for a particular analysis, that analysis is not performed and subsequent menu selections relating to that type of analysis are not displayed. Once the menu options are selected and begin/end years are specified, the user is queried on whether to retain or to override program defaults as follows:

For Duration Analysis

Specify maximum number of no-value days allowed or accept default. The maximum number of no-value days considered acceptable for duration analysis is set to zero on [CR]. The user may enter any value desired. Enter "QUIT" or "EXIT" to exit the program or "OOPS" to back up one query.

Specify class limits or accept default (accept defaults or enter your own call limits.) Enter "QUIT" or "EXIT" to exit program, or "OOPS" to back up one query.

Select duration plot type. The type of duration plot must be specified. Enter "1" for a log-normal probability plot, enter "2" for a rectangular plot, or enter "3" for an arithmetic-normal plot. Enter "QUIT" or "EXIT" to exit program, or "OOPS" to back up one query.

For Low-Value Analysis

Specify low-value consecutive day (N-day) values or accept default. (See DVSTAT computation programs section below for further explanation of types of analyses.)

For High-Value Analysis

Specify high-value consecutive day (N-day) values or accept default. (See DVSTAT computation programs section below for further explanation of types of analyses.)

If a Pearson frequency analysis of the low- and/or high-value data generated by DVSTAT is desired and the appropriate menu selection has been made earlier, the preprocessor program queries the user for the appropriate information to create a control file to later drive the Pearson program. The user is also asked to provide a name for the Pearson control file. The Pearson processor subsequently reads the low- and/or high-value data from generated APTRAF records. The user must have selected low- and/or high-value analyses in the previous menus in order for a frequency analysis to be done. If the user wishes the Pearson program to generate APTRAF records, the DVSTAT preprocessor program requests a file name.

Control files for both the computation program and the Pearson frequency-analysis program that may be created or constructed by DVSTAT are completely annotated so that they can manually be edited and modified if desired. However, if an existing control file requires extensive changing to meet new or different needs, it is suggested that the preprocessor be used to create a new control file. If an existing DVSTAT control file is to be executed, the user should invoke the preprocessor program, supply the name of the existing control file, and indicate to the preprocessor that the existing control file is to be executed. The DVSTAT computation program is then invoked as a batch job and the preprocessor program terminates. Existing control files for the Pearson frequency-analysis program are handled in a similar fashion. The control file records created by the preprocessor program and those required by the computation program are discussed in [Section 6.2](#) of the manual. Refer to [Section 6.2](#) for record formats to manually edit records in the control file.

DVSTAT Computation Program

The DVSTAT computation program is invoked as a batch job by the DVSTAT preprocessor program and is driven by the control file that was created by the preprocessor. The control file reflects the user's choices and specifications with respect to the analysis types to be performed, sites selected, types of output desired, etc. The computation program does the duration analysis and/or the low-value analysis, and the high-value analysis as requested by the user. These analysis types are requested on a yearly or partial-year basis, or on a monthly basis.

Note that for the duration analysis, missing days are allowed. The user is queried to supply the number of allowable missing days. On the other hand, missing days are not allowed for the low- and high-value analyses. This is because the determination of the low and high values is based on a "sliding" algorithm (for example, the 3-day low or high uses groups of days such as October 1, 2, 3, October 2, 3, 4, October 3, 4, 5.)

Duration Analysis

The duration analysis includes the following determinations: (1) a count of the number of daily values in each of a maximum of 35 magnitude classes, (2) a total parameter value summation for a specified period, (3) a summary of the number of days in each class for specified periods within the period of record analyzed, (4) the accumulative number of days having a value greater than or equal to each class limit, and (5) the percent of all days in which a class limit was equaled or exceeded.

Class limits may be supplied by the user or are computed by the program. If the class limits are computed by default by the program, they are based on a geometric progression between the lowest non-zero value and the second highest value for the specified periods within the period of record analyzed. The computed class limits can range from zero to the second highest value. The duration analysis also provides interpolated values for user-supplied or default-exceedance percentages, based upon the actual class limits and the percent of all days in which a class limit was equaled or exceeded.

If duration plots are requested, the computation program provides them. The type of plot is either rectangular, log-normal, or arithmetic-normal. The parameter values are plotted on the ordinate (Y) scale and the corresponding percentage of time that the value was equaled or exceeded is plotted on the abscissa (X) scale. In the current release of ADAPS, these plots are designed only for line-printer output. If any parameter values are negative, only a rectangular plot will be done.

If a duration plot is requested, the user also may compute supplementary duration-curve statistical characteristics. If supplementary duration-curve statistical characteristics are requested, the mean, the standard deviation, the coefficient of variation, and the coefficient of skew are computed for the interpolated values corresponding to 19 exceedance percentages (95,90,85,....,5) supplied by the program.

If a log-normal plot type is selected, the data will be transformed to logarithmic (base 10) values before the supplementary statistics are computed. If the data are transformed, the standard deviation may be referred to as the variability index (Searcy, 1959). For certain data the coefficient of variation may be negative (if the mean is negative), in which case the statistic has little meaning. The user is responsible, as in most applications, for the interpretation and validity of the statistics. **Note:** Negative values cannot be log-transformed; therefore, an occurrence of negative values will cause an error to be written to the error file and no statistics will be computed.

Low-Value Analysis

The low-value analysis is a determination of the lowest mean daily value for a series of nine selective periods of N-consecutive days for specified periods within the period of record analyzed. The nine periods of N-consecutive days are user-specified in the preprocessor step. If the nine periods are not specified, the preprocessor defaults the periods to 1, 3, 7, 14, 30, 60, 90, 120, and 183 days.

Note that the user can supply different values if desired. The low-value analysis is done only for specified periods that have no missing days; incomplete periods are not processed and the program moves on to the next complete period. After the lowest mean values for each consecutive day period are determined, each set of data for all of the consecutive day periods are ranked sequentially from low to high. This ranking begins with one and ends with a number that is the maximum number of periods analyzed. As a part of the low-value analysis, a mean for each period analyzed is computed. Low-value analysis must be done if the user wishes to do postprocessing for low-value Pearson frequency analysis.

High-Value Analysis

The high-value analysis is a determination of the highest mean daily value for a series of nine selective periods of N-consecutive days for specified periods within the period of record analyzed. The nine periods of N-consecutive days are user-defined in the processor step. If the nine periods are not specified, the preprocessor defaults the series to 1, 3, 7, 15, 30, 60, 90, 120, and 183 days.

Note that the user can supply different values if desired. The high-value analysis is done only for specified periods that have no missing days; incomplete periods are not processed and the program moves on to the next complete period. After the highest mean values for each consecutive day period are desired, each set of data for all of the consecutive day periods are ranked sequentially from high to low. This ranking begins with one and ends with a number that represents the maximum number of periods analyzed. As a part of the high-value analysis, a mean for each period analyzed is computed. High-value analysis must be done if the user wishes to do postprocessing for high-value Pearson frequency analysis.

Program Output

In the current release of ADAPS, the DVSTAT computation program can produce two basic types of output--both as ASCII files. All output designated in the preprocessor to be a spoolable file is written to a file that can be edited or printed at the user's convenience. The spool file is named: DVSTAT.xxyyzzzz.userid - where xx is the month, yy is the day, zzzz is the time, and userid is the user's ID. All output designated in the preprocessor to be included as APTRAF records is written to a file named by the user in the preprocessor. These records may be edited and modified and can be used as input to other postprocessing programs.

4.6.3 Daily-Values Daily Summary Statistics

The DVDAYSTAT program computes, tables, and plots daily count, minimum, mean, maximum, and median values for a period of daily values; that is, the statistics are computed for all October 1 values, then for all October 2 values, and so forth, through September 30. The results are presented as a series of daily-values style tables and a single water-year hydrograph. An RDB file containing the statistics also can be produced.

Program Operation

The program first uses the standard ADAPS startup menu for selecting the output destination, database, agency, DD statistic, and retrieval period. After exiting the standard startup, the following menu is displayed:

```
DVDAYSTAT - DV DAILY SUMMARY STATISTICS
CURRENT OUTPUT OPTIONS
```

```
PO - Printed output options:
```

```
Daily Counts
Daily Minimums
Daily Means
Daily Maximums
Daily Medians
```

```
PL - Plotted output options:
```

```
Daily Minimums
Daily Means
Daily Maximums
Daily Medians
```

```
RD - Write RDB statistics to a file
```

```
RF - RDB file: DVDAYSTAT.rdb
```

```
Enter option code to change, or [CR] to continue:
```

Following is the action taken by the various menu options:

- **PO** - Select the desired statistics to be output to the printed tables.
- **PL** - Select the statistics to be plotted on the one water-year hydrograph using TKG2 graphics.
- **RD** - Flip from writing an output RDB file to NOT writing one.
- **RF** - Select the name of the output RDB file - not visible if the RD option is to NOT write an RDB file. All statistics are written to the RDB file if it is produced. If the user does not want all the statistics, RDB commands should be used to select the ones to keep.

4.6.4 Daily-Values Tables

The DVTABLE program produces tables of daily-values data. Five basic table types are available: single station/parameter code/statistic code combination tables, two statistic tables, three statistic tables, suspended-sediment discharge/concentration/load tables, and concentration/load tables. The single station/parameter code/statistic code combination tables are available in a skeleton format with various forms of monthly and annual summaries also available. Single station/parameter code/statistic code combination tables can be printed with the body of the table suppressed and with only the monthly and annual summaries shown. Metric and other conversions of table units are also available.

The DVTABLE program can run in either an interactive mode, where the terminal is tied up while the tables are being produced, or as a batch job preprocessor, where the actual table production is done as a UNIX batch job. When run in batch mode, the program produces a dvtable control file. The control files are written in ASCII format so they can be manually edited and modified if desired. However, if an existing control file requires extensive changing to meet new needs, it is suggested that the DVTABLE program be used to create a new control file.

Program Operation

The DVTABLE program operation is controlled through a series of three menu screens. The first menu screen controls the tabling options. The menu displays the user's current settings, each option category identified with a two-character identifier. Any of the options can be changed by entering the two-character identifier for the option to be changed. The options available and the table types to which the options apply are:

- **TY** - (all table types) - Select table type.
- **SU** - (type 1 only) - Select table summary options.
- **RM** - (all table types) - Turn printing of remark codes on/off.
- **RN** - (all table types) - Turn rounding of values on/off.
- **BD** - (type 1 only) - Turn suppression of body of table on/off.
- **MO** - (type 1 only) - Turn suppression of monthly summaries off.
- **AN** - (type 1 only) - Turn suppression of annual summaries on/off.
- **ST** - (type 1 only) - Turn suppression of statistical summaries on/off.
- **SS** - (all table types) - Turn summary suppression when data are missing on/off.
- **SD** - (type 1 only) - Turn statistical summary monthly maximum/minimum years on/off.
- **PR** - (all table types)- Specify if a group is used, whether all of the station/DD combinations should use the same retrieval period.
- **SC** - (types 1, 2, 3, and 5) - Specify statistic codes to use.
- **DS** - (type 1 only) - Specify if a group is used, whether all of the station/DD combinations should use the same statistic code list.
- **FM** - (type 1 only) - Specify the first month to print when a narrow (6-month) table is printed. A narrow table will be printed when the user routes print to either an 80-column terminal or an 80-column printer.
- **PC** - (type 5 only) - Specify the concentration parameter code.
- **PL** - (type 5 only) - Specify the load parameter code.
- **CU** - (all table types) - Turn units conversion on/off. The selection of conversions will be done in the third menu screen.

The second menu screen is the standard ADAPS startup menu. Select an option from the menu such as batch/interactive mode, station/group, or output routing.

The third menu screen is displayed only if conversion of units was selected in the first menu screen. If selected, a list of the parameters to be tabled in the current session is displayed; specify conversion for any or all of them.

4.6.5 Daily-Values Inventory

The DVINV program produces an inventory listing of the contents of the daily-values file for a single database. The inventory is a report of all daily-values data contained in the selected database and cannot, at this time, be restricted to a single station or combination of selected stations.

For each agency/station/data descriptor/statistic combination encountered in the file, a report line is produced for each contiguous period of record found. A contiguous period of record is defined as the longest period that does not contain any “missing” months, (i.e. each month in the period contains at least one nonmissing day of data.) Each report line contains the following information about the contiguous period: parameter code, statistic code, begin year and month, end year and month, number of no missing days, number of missing days, number of water years flagged provisional, number of water years flagged final, total number of water years, maximum value, minimum value, and mean value.

The program is a preprocessor that uses the standard startup menu to let the user select the database, batch queue, and output destination, after which a batch job is submitted to process the daily-values file (for the particular database) and produce the report.

4.6.6 Daily-Values Manipulation

See [Section 4.5.10](#) for the description of Daily-Values Manipulation.