V.3.3-ADD/SUB ADD OR SUBTRACT TIME SERIES OPERATION

Identifier: ADD/SUB

Application: All programs

Description: This Operation adds or subtracts one time series from another.

The most common use of the Operation is to add or subtract instantaneous discharge time series, such as adding upstream inflows together before routing or subtracting out diversions. However, the Operation can be used with other types of data besides instantaneous discharge.

The following rules and options apply to this Operation:

   1. Both time series must have the same dimensions and the same
       units.

   2. The user can specify if negative values are allowed in the
       resulting output time series.

   3. If either of the time series contains a missing value for a
       given time period, the result for that time period is set to
       missing.

   4. The time intervals of the two time series do not have to be
       the same.

The equation for this Operation is:

   $vB = vB \pm vA$

   where vB is the values of the time series where the result of the
             addition or subtraction are stored
         vA is the values of the time series that are added or
             subtracted from vB

If the time interval of time series A (dtA) differs from the time interval of time series B (dtB) the time interval of time series A is automatically changed to dtB before the time series are added or subtracted. The change in time interval is accomplished by linear interpolation between values of time series A that do not correspond in terms of time to values in time series B. Only time series containing instantaneous data values should be added or subtracted if dtA is not equal to dtB.

If several time series need to be added together or several time series need to be subtracted from a given time series, this must be accomplished by successive applications of the ADD/SUB Operation to two time series at a time.

<u>Allowable Data Time Intervals</u>: 1, 2, 3, 4, 6, 8, 12 and 24 hours

<u>Time Series Used</u>: Time series used in this Operation are as follows:

					Form of Output T.S.	Data Time Interval	Missing Values Allowed
<u>General Type</u>	Dimn	Units	Use	Required			
Time series added or subtracted from time series B (time series A)	1/	1/	I	yes	n/a	any 2/	3/
Time series where results are stored (time series B)	any	<u>4</u>/	I/O	yes	additive	any	yes

<u>1</u>/ Same as for time series B.

<u>2</u>/ The minimum computational time interval for the Operation is the
   least common denominator of dtA and dtB. If dtA is not equal to
   dtB only time series containing instantaneous values should be
   added or subtracted.

3/ Only if time series B allows missing.

<u>4</u>/ Standard units for data type.

<u>Input Summary</u>: The card input for this Operation is as follows:

Card	Format	Columns	Contents
1	2X,2A4	3-10	Internal identifier for the time series where the results are to be stored (time series B)
	1X,A4	12-15	Data type code for time series B
	3X,I2	19-20	Time interval in hours for time series B
	2X,2A4	23-30	Internal identifier for the time series that is to be added or subtracted from time series B (time series A)
	1X,A4	32-35	Data type code for time series A
	3X,I2	39-40	Time interval in hours for time series A
	2X,A3	43-45	Add/subtract indicator. Default is to add the time series. Enter 'SUB' if time series A should be subtracted from

Card	Format	Columns	Contents
			time series B.
	2X,A3	48-50	Negative result indicator. Default is result not allowed to be negative. Enter 'YES' if the result can contain negative values.
	7X,A3	58-60	Read carryover indicator. Carryover only needed if dtB is less than dtA. Default is to set carryover to zero. Enter 'YES' if carryover is to be read from the card.
	F10.0	61-70	Initial carryover value. The previous value in time series A.

Sample Input and Output: Sample input is shown in Figure 1. Sample output from the parameter print routine is shown in Figure 2. There is no execution routine output.

Error and Warning Messages: The error and warning messages generated by this Operation and the corrective action to take when they occur are as follows:

  A. Messages that can occur during setup:

    1. **ERROR** TIME SERIES TO BE ADDED OR SUBTRACTED DO NOT HAVE THE SAME UNITS (XXXX AND XXXX].

       Action: Make sure both time series have the same dimensions and the same units.

    2. **WARNING** CHECK THAT BOTH TIME SERIES CONTAIN INSTANTANEOUS DATA. ONLY TIME SERIES CONTAINING INSTANTANEOUS VALUES SHOULD BE ADDED OR SUBTRACTED WHEN THE TIME INTERVALS DIFFER.

       Action: Check to make sure that time series contain instantaneous data values and not means or totals.

  B. Messages that occur during execution: None

Carryover Transfer Rules: The Operation only has carryover when dtB is less than dtA. In carryover transfer the old carryover value is used for the new Operation if:

  1. carryover is needed by both Operations and

  2. time series A has the same dimensions and units in both Operations

If these conditions do not true, the carryover specified on the input card is used.

<u>Punched Card Limitations</u>: None

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                 Figure 1.  Sample Card Input For Operation ADD/SUB


                                    - Column -
         5   10   15   20   25   30   35   40   45   50   55   60   65   70   75   80
        ----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+

      ADD/SUB     BRLG
        BLUWE     SQIN    6  BRLG      SQIN      6

      ADD/SUB     BRLDIV
        BLUWE     SQIN    6  CBTWE     DQIE      6  SUB
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           Figure 2.  Sample Output From Operation ADD/SUB Print Parameter
                       Routine



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      ADD/SUB  OPERATION     NAME=BRLG         PREVIOUS NAME=

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              TIME SERIES (I.D.=BRLG      TYPE=SQIN   TIME INTERVAL= 6 HOURS) IS ADDED TO
                  TIME SERIES (I.D.=BLUWE      TYPE=SQIN   TIME INTERVAL= 6 HOURS).

                  RESULT IS NOT ALLOWED TO BE NEGATIVE.



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      ADD/SUB  OPERATION     NAME=BRLDIV       PREVIOUS NAME=

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

              TIME SERIES (I.D.=CBTWE     TYPE=DQIE   TIME INTERVAL= 6 HOURS) IS SUBTRACTED FROM
                  TIME SERIES (I.D.=BLUWE      TYPE=SQIN   TIME INTERVAL= 6 HOURS).

                  RESULT IS NOT ALLOWED TO BE NEGATIVE.
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