V.3.3-WEIGH-TS   WEIGHT TIME SERIES OPERATION

Identifier: WEIGH-TS

Application: All programs

Description: This Operation takes an unlimited number of input times
series, weights by a weighting factor, and produces a weighted output
time series. The weighting factors can either be supplied by the
user or can be computed based on the area represented by each time
series, where the area is obtained from preceding UNIT-HG Operations.

This Operation can be expressed as:

$$V_w = \sum_{i=1}^{N} W_i * V_i \qquad\qquad (1)$$

> where V_w is the values of the weighted output time series
>   N   is total number of input time series
>   V   is values of each input time series
>   W   is weight applied to each input time series

The weight can be supplied by the user or calculated as:

$$W_i = \frac{A_i}{\displaystyle\sum_{i=1}^{N} A_i} \qquad\qquad (2)$$

> where A is area represented by each input time series

The following rules and options apply to this Operation:

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

  2. The input time series can contain missing values only if
     missing values are allowed in the output time series (if any of
     the input time series contains a missing value for a given time
     interval, the value of the output time series is set to
     missing).

  3. All time series must have the same number of values per time
     interval (more than one value per time interval is allowed).

  4. All time series must have the same time interval.

  5. There is no limit on the number of input time series.

The most common use of this Operation is for computing weighted time series for display from a catchment that has been divided into more than one subarea. For example, the Operation is used to weight runoff components and rain+melt for each subarea to produce weighted time series that can be displayed on a daily flow plot.

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

Time Series Used: Time series used in this Operation are as follows:

General Type	Dimn	Units	Use	Required	Form of Output T.S.	Data Time Interval	Missing Values Allowed
Output	any	any	O	yes	replaces	any	yes
Input	any 1/	any 1/	I	yes	n/a	any 1/	yes 1/

1/ Input time series information must match output time series information.

Input Summary: The card input for this Operation is as follows:

Card	Format	Columns	Contents
1	I5	1-5	Number of time series to be weighted (i.e., number of input time series)
	1X,A4	7-10	Switch indicating how weights are determined; default is weights supplied by user; enter 'AREA' to have weights computed from areas assigned to UNIT-HG Operations
	2X,2A4	13-20	Identifier of output time series
	1X,A4	22-25	Data type of output time series
	26-30	I5	Data time interval (applies to all time series)
2	2A4,2X	1-8	Identifier of input time series
	A4,1X	11-14	Data type of input time series
	F10.3	16-25	Weighting factor
	or		
	2A4	16-13	Name of UNIT-HG Operation to get area from to compute weight

   Repeat card 2 for each input time series.

Sample Input and Output: Sample input for this Operation and a
sample of the output from the parameter print routine are shown in
Figure 1. There is no output from the execution routine.

Error and Warning Messages: Error and warning messages that can be
generated by this Operation during setup and the corrective measure
to take are as follows:

  1. **ERROR** WEIGHTING FACTOR SWITCH(XXXX) IS NOT EQUAL TO XXXX OR
      XXXX.

      Action: Read '   ' or 'AREA' in column 7-10 on first data
      input card.

  2. **ERROR** UNITS FOR INPUT TIME SERIES (I.D. = XXXXXXXX, TYPE =
      XXXX) (XXXX) DOES NOT MATCH UNITS FOR THE OUTPUT TIME SERIES
      (XXXX).

      Action: Units of all input time series must match those of the
      output time series.

  3. **ERROR** UNIT-HG OPERATION NAME = XXXXXXXX DOES NOT EXIST.

      Action: All 'UNIT-HG ' Operations must exist. Check names of
      preceding 'UNIT-HG ' Operations.

  4. **ERROR** ALL INPUT TIME SERIES HAVE ZERO WEIGHTS.

      Action: Check weights (if read in) or the areas associated
      with the 'UNIT-HG ' Operations.

  5. **ERROR** DUE TO PRECEDING ERRORS WEIGHTS CANNOT BE COMPUTED.

      Action: All 'UNIT-HG ' Operations must exist before any
      weights can be computed.

  6. **ERROR** DUE TO PRECEDING ERRORS THIS OPERATION IS SKIPPED.

      Action: One or more of the above error messages was generated.
      Take appropriate action and resubmit.

  7. **WARNING** XXXXX INPUT TIME SERIES HAVE ZERO WEIGHTS.

      Action: Check weighting factors to be sure there should be
      zero values.

Carryover Transfer Rules: This Operation has no carryover.

Punched Card Limitations: The values on the cards generated by the
punch card subroutine should be identical to the original card input
for the Operation.

Figure 1. Sample Card Input For Operation WEIGH-TS

```
                                   - Column -
      5   10   15   20   25   30   35   40   45   50   55   60   65   70   75   80
   ----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
   WEIGH-TS    MAP
      2 AREA  TAO+KEY  MAP       6
   TAOSW      MAP  TAOSW
   KEYSW      MAP  KEYSW
```

Figure 2. Sample Output From Operation WEIGH-TS Print Parameter
          Routine

```
 ********************

  WEIGH-TS OPERATION      NAME=MAP          PREVIOUS NAME=

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

          WEIGHT TIME SERIES OPERATION

              2 TIME SERIES ARE TO BE WEIGHTED.
          THE WEIGHTING FACTORS WERE CALCULATED USING UNIT-HG AREAS.

          GENERAL TIME SERIES INFORMATION

              TIME INTERVAL                   6
              UNITS                         MM
              MISSING DATA ALLOWED          NO
              VALUES PER TIME INTERVAL       1

          OUTPUT TIME SERIES INFORMATION

              ID.            TAO+KEY
              DATA TYPE      MAP

          INPUT TIME SERIES INFORMATION

              T.S. NO.    ID.    DATA   UNIT-HG    WEIGHT
                                 TYPE   OPERATION

                  1    TAOSW     MAP    TAOSW      0.421
                  2    KEYSW     MAP    KEYSW      0.579
```