

V.3.3-WY-PLOT WATER YEAR MEAN DAILY FLOW PLOT OPERATION

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Application: Calibration programs only

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Description: This Operation plots mean daily discharge time series on a water year basis.

Three types of plot scales are available:

1. arithmetic - units are CMSD
2. semi-log - units are MM over the drainage area
3. modified arithmetic - units are (CMSD/KM2)*100.0

If hydrographs are plotted in English units, the units are CFSD, IN and CFSD/MI², respectively. The output units are set on the MCP3 input card A2 (see Section IV.4.1-MCP3).

The user selects the plotting symbol to be used for each time series.

Besides plotting mean daily discharge time series, the Operation tabulates the following other daily time series next to the plotted values:

1. the first two daily discharge time series
2. rain+melt or precipitation (optional)
3. soil-moisture contents from Sacramento soil-moisture accounting Operation - 5 values/day (optional)
4. total runoff from Sacramento soil-moisture accounting Operation and the breakdown of the runoff into components - 7 values/day (optional)
5. Antecedent Precipitation Index (API) contents from Continuous API Operation - 5 values/day (optional)

At the beginning of each plot, the monthly runoff volume for each of the discharge time series is computed and tabulated for the water year.

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Allowable Data Time Intervals: 24 hours

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

<u>General Type</u>	<u>Dimn</u>	<u>Units</u>	<u>Use</u>	<u>Required</u>	<u>Form of Output T.S.</u>	<u>Data Time Interval</u>	<u>Missing Values Allowed</u>
Mean daily discharge	L3	CMSD	I	yes <u>1/</u>	n/a	24	yes
Precipitation (rain+melt)	L	MM	I	no	n/a	any	yes
Sacramento model soil moisture storages (SMZC)	L	MM	I	no	n/a	24	no
Sacramento model runoff components (SMZC)	L	MM	I	no	n/a	24	no
Continuous API model storages and indices (APIC)	L	MM	I	no	n/a	24	no

1/ At least one mean daily discharge time series must be input. There is no limit to the total number that can be plotted.

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

<u>Card</u>	<u>Format</u>	<u>Columns</u>	<u>Contents</u>
1	5A4	1-20	Name of flow-point being plotted
	I5	21-25	Number of mean daily discharge time series to be plotted
	1X,A4	27-30	Plotting scale to be used: 'SLOG' = semi-log 'MODS' = modified arithmetic (default)
	F10.0	31-40	Drainage area in KM2
	F5.0	41-45	Maximum plot ordinate: o arithmetic scale - units are CMSD o modified arithmetic scale - units (CMSD/KM2)*100 o semi-log scale - maximum plot ordinate is automatically selected for the semi-log scale Default is 0.3 CMSD/KM2
	2X,A3	48-50	Indicator if either rain+melt, soil-moisture storage, API contents or runoff component time series are to be tabulated: 'YES' = any are to be tabulated 'NO ' = none are to be tabulated (default)

Repeat card 2 for each mean daily discharge time series to be plotted.

2	2X,2A4	3-10	Internal identifier for the mean daily discharge time series
	1X,A4	12-15	Data type code for the daily discharge time series
	8X,3A4	24-35	General information about the time series (e.g., OBSERVED, SIMULATED, ROUTED, etc.)
	4X,A1	40	Plotting symbol to use for the time series

Card 3 only needed if rain+melt, soil-moisture storage, API contents or runoff component time series are to be tabulated.

3	2X,2A4	3-10	Internal identifier for the rain+melt time series (leave blank if no rain+melt time series used)
---	--------	------	--------------------------------------------------------------------------------------------------

<u>Card</u>	<u>Format</u>	<u>Columns</u>	<u>Contents</u>
	1X,A4	12-15	Data type code for the rain+melt time series
	3X,I2	19-20	Time interval in hours for the rain+melt time series
	12X,2A4	33-40	Internal identifier for the runoff component time series (leave blank if no runoff component time series used)
	12X,2A4	53-60	Internal identifier for the soil-moisture storage or API contents time series (leave blank if none used)
	1X,A4	62-65	Data type code for the soil-moisture storage (SMZC) or API contents (APIC) time series - default is SMZC

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Sample Input and Output: Sample input is shown in Figure 1 [\[Bookmark\]](#). Sample output from the parameter print routine is shown in Figure 2 [\[Bookmark\]](#). Sample output from the execution routine is shown in Figure 3 [\[Bookmark\]](#).

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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**** THE NUMBER OF TIME SERIES TO BE PLOTTED (nnnnn) IS INCORRECT. THIS OPERATION CANNOT BE EXECUTED.

Action: The number of time series to be plotted must be greater than zero.

2. ****ERROR**** THE AREA IS NOT DEFINED.

Action: Define the drainage area on card 1.

3. ****ERROR**** THE MAXIMUM PLOT ORDINATE IS NOT DEFINED AND CANNOT BE COMPUTED.

Action: Specify the maximum plot ordinate or the drainage area on card 1.

B. Messages that occur during execution: None

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Carryover Transfer Rules: This Operation has no carryover.

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Card Punch Limitations: This Operation currently has no punch parameter subroutine.

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Figure 1. Sample Card Input For Operation WY-PLOT

```
-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+
      10      20      30      40      50      60      70      80
WY-PLOT      BLANTYRE
FRENCH BROAD-BLANTYRE      2      767.0 200. YES
  BLANTYRE QME      OBSERVED      +
  BLANTYRE SQME      SIMULATED      *
  BLANTYRE RAIM      6      BLANTYRE      BLANTYRE
```

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Figure 2. Sample Output From Operation WY-PLOT Print Parameter Routine

```
PLOT MEAN DAILY FLOWS FOR FRENCH BROAD-BLANTYRE
      AREA ABOVE FLOW-POINT=      767.0 KM2
      PLOT SCALE IS ARITHMETIC      MAX. ORDINATE= 200. CMSD
      2 DAILY FLOW TIME SERIES ARE PLOTTED
      T.S. I.D.      DATE TYPE      NAME      PLOT SYMBOL
      BLANTYRE      QME      OBSERVED      +
      BLANTYRE      SQME      SIMULATED      *
      DAILY TOTALS OF THE FOLLOWING TIME SERIES ARE TABULATED ON THE PLOT.
      T.S. I.D.      DATA TYPE      TIME INTERVAL
      BLANTYRE      RAIM      6 HOURS
      BLANTYRE      ROCL      24 HOURS
      BLANTYRE      SMZC      24 HOURS
      OPERATION USES RECORDS      1 THRU      24 ON SCRATCH FILE 10.
```

Figure 3. Sample Output From Operation WY-PLOT Execution Routine

```

WATER YEAR 1954      MEAN DAILY FLOW PLOT FOR FRENCH BROAD-BLANTYE      AREA=      767.0 SQ.KM      UNITS ARE CMSD
                                PCN=PRECIP. OR RAIN+MELT (MM)
                                INFW=RUNOFF OR CHANNEL INFLOW (MM)

      NUM.    T.S. I.D.    TYPE      NAME      SYM
      1      BLANTYRE    QME      OBSERVED  +
      2      BLANTYRE    SQME     SIMULATED  *

STREAMFLOW VOLUME SUMMARY

      OCT      NOV      DEC      JAN      FEB      MAR      APR      MAY      JUN      JUL      AUG      SEP      ANNUAL
Q(1)    277.    317.    880.    1248.    0.      0.      0.      0.      0.      0.      0.      0.      2722. CMSD
      31.2    35.7    99.1    140.5    .0      .0      .0      .0      .0      .0      .0      .0      306.6  MM
Q(2)    248.    283.    834.    1188.    0.      0.      0.      0.      0.      0.      0.      0.      2554. CMSD
      27.9    31.9    94.0    133.9    .0      .0      .0      .0      .0      .0      .0      .0      287.7  MM
Q(2)-Q(1) -3.3    -3.8    -5.1    -6.7    .0      .0      .0      .0      .0      .0      .0      .0      -18.9  MM

                                 RUNOFF COMPONENTS
                                 % OF TOTAL.
      OCT, 1953 - NOV, 1953
DAY  PCN  Q(1)  Q(2)      20.0      40.0      60.0      80.0      100.0      120.0      140.0      160.0  INFW  SUP  DIR  INT
1 .000 11.7  2.1  . *  + . . . . . 17.7 .000 50.3 .000 248. 1.05 100 0 0 0 0 0
2 .000 11.1  8.3  . * + . . . . . 19.7 .000 50.6 .000 247. 1.05 100 0 0 0 0 0
3 .000 10.6  8.9  . * + . . . . . 23.2 .000 51.1 .000 246. 1.01 100 0 0 0 0 0
4 .000 8.67  8.82 . * . . . . . 26.4 .000 51.8 .000 245. .999 100 0 0 0 0 0
5 .000 9.85  8.64 . * + . . . . . 29.3 .000 52.4 .000 243. .989 100 0 0 0 0 0
6 .000 10.3  8.5  . * + . . . . . 32.0 .000 53.1 .000 242. .977 100 0 0 0 0 0
7 .000 8.92  8.37 . * . . . . . 34.2 .000 53.8 .000 241. .975 100 0 0 0 0 0
8 .000 9.09  8.30 . * + . . . . . 36.1 .000 54.4 .000 240. .976 100 0 0 0 0 0
9 .000 8.58  8.28 . * . . . . . 38.1 .000 55.2 .000 238. .956 100 0 0 0 0 0
10 .000 8.83  8.20 . * . . . . . 40.1 .000 55.9 .000 237. .947 100 0 0 0 0 0
11 .000 8.64  8.10 . * . . . . . 41.9 .000 56.7 .000 236. .938 100 0 0 0 0 0
12 .000 8.33  7.98 . * . . . . . 43.8 .000 57.6 .000 235. .922 100 0 0 0 0 0
13 .000 8.18  7.86 . * . . . . . 45.6 .000 58.5 .000 234. .913 100 0 0 0 0 0
14 9.40 8.38  8.48 . * . . . . . 36.4 .000 58.6 .000 233. 1.33  75 0 25 0 0 0
15 1.02 9.43  9.58 . * . . . . . 35.8 .000 58.7 .000 231. 1.03  97 0  3 0 0 0
16 .000 8.83  8.86 . * . . . . . 37.6 .000 59.4 .000 230. .928 100 0 0 0 0 0
17 .000 8.24  8.13 . * . . . . . 39.2 .000 60.0 .000 229. .925 100 0 0 0 0 0
18 .000 8.44  7.87 . * . . . . . 40.8 .000 60.6 .000 228. .917 100 0 0 0 0 0
19 .000 9.40  7.76 . * + . . . . . 42.3 .000 61.2 .000 227. .910 100 0 0 0 0 0
20 .000 10.5  7.7  . * + . . . . . 43.9 .000 62.0 .000 226. .896 100 0 0 0 0 0
21 .000 10.2  7.5  . * + . . . . . 45.8 .000 62.9 .000 225. .861 100 0 0 0 0 0
22 .000 7.02  7.44 . * . . . . . 46.8 .000 63.4 .000 223. .906 100 0 0 0 0 0
23 .000 6.91  7.57 . * + . . . . . 48.0 .000 64.1 .000 222. .879 100 0 0 0 0 0
24 .000 8.38  7.46 . * . . . . . 49.4 .000 64.9 .000 221. .865 100 0 0 0 0 0
25 .000 8.13  7.33 . * . . . . . 50.3 .000 65.5 .000 220. .879 100 0 0 0 0 0
26 5.08 7.99  7.32 . * . . . . . 50.8 .000 66.1 .000 219. .891  98 0  2 0 0 0
27 13.7 7.90  8.13 . * . . . . . 37.4 .000 66.2 .000 218. 1.41  66 0 34 0 0 0
28 1.02 10.2 10.4 . * . . . . . 37.0 .000 66.4 .000 217. .953  96 0  4 0 0 0
29 .000 8.89  8.77 . * . . . . . 38.0 .000 66.8 .000 216. .892 100 0 0 0 0 0
30 .000 8.04  7.76 . * . . . . . 39.2 .000 67.2 .000 215. .880 100 0 0 0 0 0
31 .000 7.50  7.42 . * . . . . . 40.4 .000 67.7 .000 214. .868 100 0 0 0 0 0
1 .000 6.63  7.29 . * + . . . . . 41.5 .000 68.1 .000 212. .868 100 0 0 0 0 0
2 .000 7.02  7.24 . * . . . . . 42.7 .000 68.6 .000 211. .856 100 0 0 0 0 0
3 .000 8.13  7.15 . * . . . . . 43.9 .000 69.1 .000 210. .843 100 0 0 0 0 0
4 .000 7.65  7.07 . * . . . . . 44.7 .000 69.5 .000 209. .862 100 0 0 0 0 0
5 .000 7.28  7.13 . * . . . . . 45.5 .000 69.8 .000 208. .857 100 0 0 0 0 0
6 .000 7.22  7.11 . * . . . . . 46.3 .000 70.2 .000 207. .845 100 0 0 0 0 0
7 .000 7.16  7.07 . * . . . . . 46.9 .000 70.5 .000 206. .853 100 0 0 0 0 0
8 .000 6.46  7.10 . * + . . . . . 47.5 .000 70.8 .000 205. .855 100 0 0 0 0 0
9 .000 6.77  7.06 . * + . . . . . 48.3 .000 71.3 .000 204. .823 100 0 0 0 0 0
10 .000 6.94  6.91 . * . . . . . 49.3 .000 71.8 .000 203. .811 100 0 0 0 0 0
11 .000 7.08  6.82 . * + . . . . . 50.0 .000 72.2 .000 202. .819 100 0 0 0 0 0
12 .000 7.08  6.84 . * + . . . . . 50.8 .000 72.7 .000 201. .807 100 0 0 0 0 0
13 .000 7.08  6.78 . * + . . . . . 51.5 .000 73.1 .000 200. .809 100 0 0 0 0 0
14 .000 6.80  6.76 . * . . . . . 52.1 .000 73.5 .000 199. .811 100 0 0 0 0 0
15 .000 6.23  6.76 . * . . . . . 52.8 .000 74.0 .000 198. .792 100 0 0 0 0 0
16 .000 6.23  6.66 . * . . . . . 53.6 .000 74.5 .000 197. .780 100 0 0 0 0 0
17 .000 6.80  6.59 . * . . . . . 54.3 .000 75.0 .000 196. .782 100 0 0 0 0 0
18 .000 6.80  6.57 . * . . . . . 54.8 .000 75.3 .000 195. .798 100 0 0 0 0 0
19 .000 6.94  6.57 . * . . . . . 55.5 .000 75.8 .000 194. .771 100 0 0 0 0 0
20 46.7 9.34  6.59 . * + . . . . . 8.96 .000 75.9 .000 193. 2.46  34 0 66 0 0 0
21 2.03 17.6 16.7 . * + . . . . . 7.45 .000 75.9 .000 192. .905  92 0  8 0 0 0
22 45.2 35.7 15.7 . * . . . . . .048 .753 47.2 2.14 196. 4.85  17 1 33 32 0 17
23 .000 34.8 37.0 . * . . . . . 1.37 .000 46.6 1.97 195. 1.04  82 18 0 0 0 0
24 4.32 18.1 17.1 . * . . . . . .000 2.01 46.6 1.77 194. 1.27  67 13 12 8 0 0
25 .330 14.4 12.5 . * + . . . . . .809 .000 45.0 1.71 194. 1.02  83 16 1 0 0 0
26 .000 12.9 10.4 . * + . . . . . 1.94 .000 45.0 1.54 193. .986  85 15 0 0 0 0
27 .000 11.9  9.5  . * + . . . . . 3.23 .000 45.1 1.38 192. .966  86 14 0 0 0 0
28 .000 10.6  9.0  . * . . . . . 4.51 .000 45.1 1.24 191. .948  87 13 0 0 0 0
29 .000 9.77  8.69 . * + . . . . . 5.58 .000 45.1 1.12 190. .931  88 12 0 0 0 0
30 .000 9.49  8.50 . * + . . . . . 6.65 .000 45.2 1.01 189. .916  89 11 0 0 0 0
      UZTD AND LZTD=TENSION WATER DEFICITS      UZTD  UZFW  LZTD  LZFS  LZFP
      UNITS ARE MM
DEC, 1953 - JAN, 1954
DAY  PCN  Q(1)  Q(2)      20.0      40.0      60.0      80.0      100.0      120.0      140.0      160.0  INFW  SUP  IMP  SUR  INT
1 .000 9.34  8.37 . * + . . . . . 7.69 .000 45.2 .906 188. .901  90 10 0 0 0 0
2 .000 9.68  8.25 . * + . . . . . 8.73 .000 45.3 .816 187. .888  91  9 0 0 0 0
3 22.4 9.54  8.01 . * + . . . . . .000 6.68 40.2 1.12 187. 2.44  33 3 32 28 0 4
4 41.7 32.8 35.6 . * . . . . . .000 .000 2.76 3.65 192. 6.40  13 4 23 40 0 20
5 .254 34.0 32.8 . * . . . . . .316 .000 2.76 3.28 191. 1.16  72 27 1 0 0 0
6 39.9 33.7 28.3 . * . . . . . .048 .142 .000 13.1 215. 6.84  13 10 20 42 0 14
7 .000 52.4 43.1 . * . . . . . 1.18 .000 .004 11.9 214. 2.07  45 55 0 0 0 0
    
```

8	.254	29.7	24.6	.	.	*	+	.	.	.	.	.	2.05	.000	.018	10.7	213.	1.96	47	52	0	0	0	0
9	44.4	34.5	28.7	.	.	.	*	+	.	.	.	.	.000	5.37	.000	19.9	237.	8.28	12	15	19	42	0	12
10	.000	61.2	57.4	.	.	.	.	.	.	*	.	.	1.33	.000	.004	19.4	239.	2.93	35	63	0	0	0	2
11	.508	38.2	33.4	.	.	.	*	+	.	.	.	.	1.38	.000	.011	17.5	238.	2.73	38	61	1	0	0	0
12	31.5	45.9	41.8	*	+048	.000	.000	24.1	257.	7.57	14	26	15	35	0	10
13	19.6	48.1	44.0	*	+	.	.	.000	6.54	.000	25.4	264.	5.99	19	36	11	29	0	5

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