8. Results of test run

(1)Test Run 1: Flood Control Plan of Hake River(Japan)

An example of calculations of the run-off from 4 single basins due to rainfall made at once.

(2)Test Run 2:Flood Control plan of Hake River(Japan)

An example of flood traced in succesion from the upstream basin to the downstream standard point.

(3)Test Run 3:Basic discharge including Maki Dam(Japan)

An example of the calculation of the basic discharge in the dam plan.

(4)Test Run 4:Design discharge including Maki Dam(Japan)

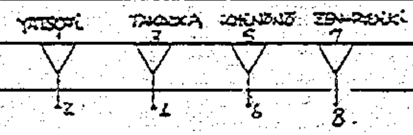
An Example of the design dischange and control calculations based on the basic dischange calculation results,incorporating the regulation dam.

Test Run - 1

```
**********************
*  INPUT CARD LIST   *
**********************

           1       2       3       4       5       6       7       8
    ********************************************************************
0---RUN
1---HAKE-GAWA HYDRO GRAPH   1.YATSUJI  2.TAKAOKA  3.  ICHINONO  NO.4
2---       3
3---       0
4---       4       0      -1      -1
5---YATSUJI
6---10.0   10.0    10.0
7---25.0   0.5
8---100.0  0.5     1.0
9---       1
10---TAKAOKA
11---10.0  10.0    10.0
12---25.0  0.5
13---100.0 0.5     1.0
14---      1
15---ICHINONO
16---10.0  10.0    10.0
17---25.0  0.5
18---100.0 0.5     1.0
19---      1
20---ZEN-RYUIKI
21---72.53 10.0    10.0
22---25.0  0.5
23---100.0 0.5     1.0
24---      1
25---900.0
26---      1       91      3       91      5       91      7       91
27---      1       3       5       7
28--- YAJI-R   YAJI-Q   TAKAO-R   TAKAO-Q   ICHINO-R  ICHINO-Q  ZEN-R   ZEN-Q
29---      0
30---   550.NEN. 8.GATSU.  16.NICHI. - 17.NICHI.
31---     288      1       4
32---      3       22  3400.0
33---     16   6.0
34---YATSUJI
35---1.0   1.0     0.5             0.5             3.0     4.0
36---0.5   0.5     0.5                     0.5     1.0     7.5
37---0.5   5.5             9.0     6.5     12.0    15.0    60.0
38---9.0   12.0    26.0    22.0    16.0    45.0    61.0    50.0
39---70.0  95.0    40.0    8.0     39.0    15.0    1.0
40---
41---
42---
43---
44---TAKAOKA
45---                                      0.5     1.0     1.0
    ********************************************************************
           1       2       3       4       5       6       7       8
```

Flood trace system chart



```
                    1         2         3         4         5         6         7         8
             ......................................................................................
46---1.0      1.0       1.0       1.0       1.0       1.0       1.0       1.0
47---5.5      1.0       9.0       0.5       8.0       4.0       13.5      8.5
48---59.0     6.0       12.0      23.5      14.0      13.5      38.0      3.5
49---14.5     28.0      58.0      117.0     56.0      36.0      5.5
50---
51---
52---
53---
54---ICHINONO
55---         1.5       1.5                 0.5                 0.5       1.5
56---6.0                2.5                                     0.5       0.5
57---7.0      0.5       5.5       1.0       5.0       9.5       15.0      32.0
58---38.5     9.5       12.0      11.0      19.0      10.0      41.0      60.0
59---44.0     100.0     63.0      36.0      8.0       32.0      7.0       0.5
60---
61---
62---
63---
64---         24        1
65---0.0
66---         1         1
67---1.0
68---0.0
69---         1         2
70---1.0
71---0.0
72---         1         3
73---1.0
74---0.0
75---         3         1         2         3
76---0.135     0.458     0.407
77---END
             ......................................................................................
                    1         2         3         4         5         6         7         8

         TOTAL CARD =   77
```

MAKE-GAWA HYDRO GRAPH   YATSUJI 2.TAKAOKA 3. ICHINONO NO.

550.NEN. 8.GATSU. 16.NICHI. — 17.NICHI.

YATSUJI

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
1.0	1.0	0.5	0.	0.5	0.	3.0	4.0	0.5	0.5	0.5	0.	0	0.5	1.0	7.5	0.5	5.5	0.	9.0	6.5	12.0	15.0	60.0
9.0	12.0	24.0	22.0	16.0	45.0	61.0	50.0	70.0	95.0	40.0	8.0	39.0	15.0	1.0	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.

SIGMA-R = 636.0

TAKAOKA

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
0.	0.	0.	0.	0.	0.5	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	5.5	5.0	9.0	0.5	8.0	4.0	13.5	8.5
59.0	6.0	12.0	23.5	14.0	13.5	38.0	8.5	14.5	28.0	58.0	117.0	56.0	36.0	5.5	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.

SIGMA R = 550.0

ICHINONO

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
0.	1.5	1.5	0.	0.5	0.	0.5	1.5	6.0	0.	2.5	0	0.	0.	0.5	0.5	7.0	0.5	5.5	1.0	5.0	9.5	15.0	32.0
38.5	9.5	12.0	11.0	19.0	10.0	41.0	60.0	44.0	100.0	63.0	36.0	8.0	32.0	7.0	0.5	0.	0.	0.	0.	0.	0.	0.	0.
0	0.	0	0	0.	0.	0	0	0.	0.	0.	0	0	0	0.	0	0.	0	0.	0	0	0.	0.	0.

SIGMA R = 582.0

	24 HR.URYO	TIME OF MAX	KAKURITSU URYO	HIKINOBASHI-RITSU	MAX RAINFALL 1.HR	3.HR	6.HR
YATSUJI	623.00	16	623.00	1.000	95.00	215.00	361.00
TATAOKA	540.50	16	540.50	1.000	117.00	231.00	309.50
ICHINONO	567.00	17	567.00	1.000	100.00	207.00	344.00
ZEN-RYUIKI	562.42	16	562.42	1.000	69.32	193.27	304.66

NAKE-GAWA HYDRO GRAPH 1.YATSUJI 2.TAKAOKA 3. ICHINONO NO.4

550.NEN. 8.GATSU. 16.NICHI. - 17.NICHI.

INPUT DATA LIST

RYUIKI	K	P	TL	F1	A	QB	RSA	RAVE
YATSUJI	25.000	0.500	0.	0.500	10.000	0.400	100.000	636.000
TATAOKA	25.000	0.500	0.	0.500	10.000	0.400	100.000	550.000
ICHINONO	25.000	0.500	0.	0.500	10.000	0.400	100.000	582.000
ZEN-RYUIKI	25.000	0.500	0.	0.500	72.530	2.901	100.000	574.634

KADO	K	P	TL
000000000000	0.	0.	0.

KAISEKI SHUHO TOSHITE ORESEN-HO O MOCHIIRU.

NAKE-GAWA HYDRO GRAPH 1.YATSUJI 2.TAKAOKA 3. ICHINO-O NO.4
550.NEN..8.GATSU. 16.NICHI.-- 17.NICHI.

TIME	TAJI-R	TAJI-Q	TAKAO-R	TAKAO-Q	ICHINO-R	ICHINO-Q	ZEN-R	ZEN-Q
17. 6. 0	9.00	29.05	59.00	7.21	38.50	14.43	43.91	87.80
17. 6.15	9.00	28.22	59.00	10.84	38.50	17.13	43.91	109.63
17. 6.30	9.00	27.53	59.00	15.07	38.50	20.04	43.91	133.49
17. 6.45	9.00	26.94	59.00	19.79	38.50	23.30	43.91	160.04
17. 7. 0	12.00	26.45	6.00	25.55	9.50	26.94	8.23	191.08
17. 7.15	12.00	26.51	6.00	24.53	9.50	26.43	8.23	186.19
17. 7.30	12.00	26.62	6.00	23.60	9.50	25.99	8.23	181.75
17. 7.45	12.00	26.73	6.00	22.71	9.50	25.61	8.23	177.75
17. 8. 0	24.00	26.82	12.00	22.00	12.00	25.31	13.62	173.99
17. 8.15	24.00	28.95	12.00	22.17	12.00	25.44	13.62	176.53
17. 8.30	24.00	31.09	12.00	22.38	12.00	25.59	13.62	179.63
17. 8.45	24.00	33.29	12.00	22.64	12.00	25.74	13.62	182.94
17. 9. 0	22.00	35.41	23.50	22.96	11.00	25.93	18.21	186.33
17. 9.15	22.00	37.08	23.50	24.94	11.00	26.04	18.21	194.65
17. 9.30	22.00	38.71	23.50	26.91	11.00	26.20	18.21	203.29
17. 9.45	22.00	40.26	23.50	28.98	11.00	26.39	18.21	212.01
17.10. 0	16.00	41.72	14.00	31.06	19.00	26.58	16.31	221.10
17.10.15	16.00	41.95	14.00	31.49	19.00	28.09	16.31	227.69
17.10.30	16.00	42.24	14.00	31.93	19.00	29.56	16.31	233.97
17.10.45	16.00	42.56	14.00	32.37	19.00	30.95	16.31	239.75
17.11. 0	45.00	42.90	13.50	32.78	10.00	32.28	16.33	245.65
17.11.15	45.00	49.42	13.50	33.04	10.00	31.91	16.33	251.55
17.11.30	45.00	56.04	13.50	33.31	10.00	31.65	16.33	257.26
17.11.45	45.00	62.46	13.50	33.60	10.00	31.45	16.33	262.65
17.12. 0	61.00	68.59	38.00	33.89	41.00	31.31	42.33	267.61
17.12.15	61.00	78.83	38.00	38.88	41.00	36.86	42.33	311.33
17.12.30	61.00	88.58	38.00	43.93	41.00	42.64	42.33	354.09
17.12.45	61.00	97.74	38.00	48.89	41.00	48.21	42.33	397.42
17.13. 0	50.00	106.19	8.50	53.80	60.00	53.86	35.06	439.77
17.13.15	50.00	110.33	8.50	51.47	60.00	64.03	35.06	465.99
17.13.30	50.00	114.00	8.50	49.27	60.00	74.10	35.06	491.28
17.13.45	50.00	117.24	8.50	47.34	60.00	83.87	35.06	515.11
17.14. 0	70.00	120.20	14.50	45.68	44.00	92.98	34.00	537.00
17.14.15	70.00	129.85	14.50	45.47	44.00	96.58	34.00	554.60
17.14.30	70.00	138.42	14.50	45.27	44.00	99.84	34.00	570.11
17.14.45	70.00	146.14	14.50	45.09	44.00	102.75	34.00	584.06
17.15. 0	95.00	153.07	28.00	44.93	100.00	105.31	66.35	596.57
17.15.15	95.00	169.06	28.00	47.63	100.00	126.52	66.35	678.21
17.15.30	95.00	184.83	28.00	50.21	100.00	146.54	66.35	754.56
17.15.45	95.00	199.67	28.00	52.64	100.00	165.03	66.35	824.59
17.16. 0	40.00	213.02	58.00	54.99	63.00	183.17	57.61	889.90
17.16.15	40.00	199.68	58.00	64.91	63.00	183.66	57.61	926.70
17.16.30	40.00	188.13	58.00	74.62	63.00	184.10	57.61	958.88
17.16.45	40.00	177.79	58.00	83.62	63.00	184.51	57.61	986.45
17.17. 0	8.00	168.26	117.00	92.26	36.00	184.89	69.32	1010.21
17.17.15	8.00	148.12	117.00	119.52	36.00	173.02	69.32	1063.86
17.17.30	8.00	131.81	117.00	146.28	36.00	162.71	69.32	1111.83
17.17.45	8.00	118.38	117.00	171.95	36.00	154.26	69.32	1153.63

HAKE-GAWA HYDRO GRAPH 1.TATSUJI 2.TAKAOKA 3. ICHINONO NO.4

550.NEN 8.GATSU 16.NICHI - 17.NICHI

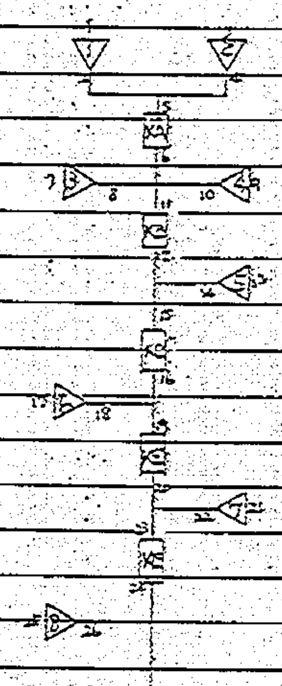
TIME	TAJI-R	TAJI-Q	TAKAO-R	TAKAO-Q	ICHINO-R	ICHINO-Q	ZEN-R	ZEN-Q
17.18. 0	39.00	107.18	56.00	197.56	8.00	147.11	34.17	1139.25
17.18.15	39.00	107.58	56.00	193.51	8.00	131.00	34.17	1121.41
17.18.30	39.00	107.93	56.00	189.89	8.00	117.69	34.17	1064.17
17.18.45	39.00	108.22	56.00	186.63	8.00	106.63	34.17	1014.44
17.19. 0	15.00	108.46	36.00	183.67	32.00	97.53	31.54	973.66
17.19.15	15.00	103.24	36.00	171.90	32.00	97.08	31.54	933.06
17.19.30	15.00	95.08	36.00	161.80	32.00	96.68	31.54	898.51
17.19.45	15.00	89.63	36.00	153.51	32.00	96.32	31.54	868.45
17.20. 0	1.00	84.66	5.50	146.47	7.00	96.01	5.50	841.79
17.20.15	1.00	76.85	5.50	129.62	7.00	87.99	5.50	758.30
17.20.30	1.00	70.34	5.50	115.63	7.00	81.11	5.50	688.95
17.20.45	1.00	64.64	5.50	104.20	7.00	75.52	5.50	628.18
17.21. 0	0.	59.41	0.	94.69	0.50	70.77	0.20	577.45
17.21.15	0.	54.41	0.	84.64	0.50	64.90	0.20	525.67
17.21.30	0.	50.18	0.	76.57	0.50	59.52	0.20	481.09
17.21.45	0.	46.42	0.	69.84	0.50	54.62	0.20	440.80
17.22. 0	0.	42.94	0.	63.92	0.	50.46	0.	403.15
17.22.15	0.	39.97	0.	58.47	0.	46.68	0.	371.25
17.22.30	0.	37.44	0.	53.63	0.	43.19	0.	343.27
17.22.45	0.	35.22	0.	49.50	0.	40.17	0.	317.67
17.23. 0	0.	33.19	0.	45.80	0.	37.62	0.	295.05
17.23.15	0.	31.28	0.	42.36	0.	35.37	0.	276.01
17.23.30	0.	29.43	0.	39.48	0.	33.33	0.	259.38
17.23.45	0.	27.67	0.	37.02	0.	31.42	0.	244.36
18. 0. 0	0.	26.14	0.	34.83	0.	29.57	0.	230.35
18. 0.15	0.	24.76	0.	32.83	0.	27.79	0.	216.86
18. 0.30	0.	23.49	0.	30.94	0.	26.24	0.	203.62
18. 0.45	0.	22.27	0.	29.09	0.	24.86	0.	192.16
18. 1. 0	0.	21.11	0.	27.38	0.	23.57	0.	181.94
18. 1.15	0.	20.11	0.	25.88	0.	22.36	0.	172.53
18. 1.30	0.	19.24	0.	24.52	0.	21.18	0.	163.64
18. 1.45	0.	18.46	0.	23.26	0.	20.17	0.	155.00
18. 2. 0	0.	17.75	0.	22.06	0.	19.30	0.	147.52
18. 2.15	0.	17.07	0.	20.92	0.	18.51	0.	141.02
18. 2.30	0.	16.43	0.	19.95	0.	17.79	0.	135.22
18. 2.45	0.	15.81	0.	19.10	0.	17.12	0.	129.93
18. 3. 0	0.	15.18	0.	18.33	0.	16.47	0.	124.99
18. 3.15	0.	14.55	0.	17.63	0.	15.85	0.	120.29
18. 3.30	0.	13.96	0.	16.96	0.	15.22	0.	115.73
18. 3.45	0.	13.43	0.	16.32	0.	14.59	0.	111.21
18. 4. 0	0.	12.97	0.	15.70	0.	13.99	0.	106.63
18. 4.15	0.	12.54	0.	15.07	0.	13.47	0.	102.20
18. 4.30	0.	12.14	0.	14.43	0.	13.00	0.	98.31
18. 4.45	0.	11.75	0.	13.86	0.	12.56	0.	94.83
18. 5. 0	0.	11.39	0.	13.35	0.	12.16	0.	91.66
18. 5.15	0.	11.02	0.	12.89	0.	11.78	0.	88.70
18. 5.30	0.	10.66	0.	12.46	0.	11.41	0.	85.91
18. 5.45	0.	10.29	0.	12.07	0.	11.05	0.	3.21

Test Run - 2

```
*********************
*                   *
*  INPUT CARD LIST  *
*                   *
*********************
```

```
              1         2         3         4         5         6         7         8
         ......................................................................
0---RUN
1---       KAKE GAWA  KOUZUI  KAISEKI   KIHON  TAKAMIZU
2---          27
3---          0
4---          8          5        -1        -1
5---  1 - RYUIKI
6---10.3       10.0     10.0
7---25.0        0.5
8---100.0       0.5      1.0
9---          1
10---  2 - RYUIKI
11---7.2       10.0     10.0
12---25.0       0.5
13---100.0      0.5      1.0
14---         1
15---  3 - RYUIKI
16---12.0      10.0     10.0
17---25.0       0.5
18---100.0      0.5      1.0
19---         1
20---  4 - RYUIKI
21---9.8       10.0     10.0
22---25.0       0.5
23---100.0      0.5      1.0
24---         1
25---  5 - RYUIKI
26---7.9       10.0     10.0
27---25.0       0.5
28---100.0      0.5      1.0
29---         1
30---  6 - RYUIKI
31---6.8       10.0     10.0
32---25.0       0.5
33---100.0      0.5      1.0
34---         1
35---  7 - RYUIKI
36---17.3      10.0     10.0
37---25.0       0.5
38---100.0      0.5      1.0
39---         1
40---  8 - RYUIKI
41---1.2       10.0     10.0
42---25.0       0.5
43---100.0      0.5      1.0
44---         1
45---  A - KADO
         ......................................................................
              1         2         3         4         5         6         7         8
```

Flood trace system chart



Standard point 27

```
              1         2         3         4         5         6         7         8
46---                                        0.5
47---  B - KADO
48---                                        0.33
49---  C - KADO
50---                                        0.17
51---  D - KADO
52---                                        0.46
53---  E - KADO
54---                                        0.26
55---900.0
56---         3        91         3        91        82        93         7        91
57---         9        91        83        93        13        91        82        93
58---        17        91        82        93        21        91        82        93
59---        25        91        82
60---         1         3         7         9        13        17        21        25
61---   1 - R     1 - Q     2 - R     2 - Q    KA(IN)    KA(OU)     3 - R     3 - Q
62---   4 - R     4 - Q    XB(IN)    XB(OU)     5 - R     5 - Q    XC(IN)    XC(OU)
63---   6 - R     6 - Q    XD(IN)    XD(OU)     7 - R     7 - Q    XE(IN)    XE(OU)
64---   8 - R     8 - Q  GORYU.ST
65---         0
66---   550,NEN, 8,GATSU, 16,NICHI - 17,NICHI
67---       288         1         2
68---         6        72  3600.0
69---        16   6.0
70---TATSUJI
71---1.0       1.0       0.5                 0.5                 3.0       4.0
72---0.5       0.5       0.5                           0.5       1.0       7.5
73---0.5       5.5                 9.0       6.5       12.0      15.0      60.0
74---9.0       12.0      24.0      22.0      16.0      45.0      61.0      50.0
75---70.0      95.0      40.0      8.0       39.0      15.0      1.0
76---
77---
78---
79---
80---KENA
81---                                                            1.5       3.5
82---3.0                 1.0                                     0.5       3.5
83---                    4.0                 6.0       6.5       13.0      12.0
84---53.0      7.0       10.0      15.0      15.0      5.0       42.0      48.0
85---30.0      96.0      69.0      23.0      17.0      17.0
86---
87---
88---
89---
90---TAKAOKA
91---                                                  0.5       1.0       1.0
92---1.0       1.0       1.0       1.0       1.0       1.0       1.0       1.0
93---5.5       1.0       9.0       0.5       8.0       4.0       13.5      8.5
94---59.0      6.0       12.0      23.5      14.0      13.5      38.0      8.5
95---14.5      28.0      58.0      117.0     56.0      36.0      5.5
96---
97---
              1         2         3         4         5         6         7         8
```

		1	2	3	4	5	6	7	8
98---									
99---									
100---HIROOKA									
101---		0.5	2.0	0.5			0.5	1.0	
102---	2.5	0.5	0.5		0.5			1.0	
103---	5.0	1.0	5.0		5.0	3.0	9.0	12.0	
104---	22.5	1.0	2.5	4.0	5.0	3.0	31.0	2.0	
105---	3.0	8.0	24.0	45.0	50.0	12.0	1.5		
106---									
107---									
108---									
109---									
110---INO									
111---						0.5		2.5	
112---	1.5		2.0	2.5				4.0	
113---	3.5	3.5	6.5		4.0	3.0	8.0	11.0	
114---	36.5	11.0	9.0	15.0	13.0	9.0	48.0	8.0	
115---	7.0	13.0	45.0	66.0	74.0	34.0	7.0	2.0	
116---									
117---									
118---									
119---									
120---ICHINOKO									
121---		1.5	1.5		0.5		0.5	1.5	
122---	6.0		2.5				0.5	0.5	
123---	7.0	0.5	5.5	1.0	5.0	9.5	15.0	32.0	
124---	38.5	9.5	12.0	11.0	19.0	10.0	51.0	60.0	
125---	44.0	100.0	63.0	36.0	8.0	32.0	7.0	0.5	
126---									
127---									
128---									
129---									
130---		24	0						
131---									
132---		1	6						
133---	1.0								
134---									
135---		2	1	6					
136---	0.278	0.722							
137---									
138---		3	1	3	6				
139---	0.250	0.016	0.734						
140---									
141---		3	1	3	6				
142---	0.082	0.868	0.050						
143---									
144---		1	3						
145---	1.0								
146---									
147---		1	3						
148---	1.0								
149---									

```
                    1         2         3         4         5         6         7         8
         ........................................................................
150---              1         3
151---1.0
152---
153---              1         3
154---1.0
155---END
         ........................................................................
                    1         2         3         4         5         6         7         8

         TOTAL CARD =  155
```

MAKE GAWA KOUZUI AISEKI KIKON TAKAMIZU

S50.NEN. 8.GATSU. 16.NICHI. = 17.NICHI.

TATSUJI

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
1.0	1.0	0.5	0.	0.5	0.	3.0	4.0	0.5	0.5	0.5	0.	0.	0.5	1.0	7.5	0.5	5.5	0.	9.0	6.5	12.0	15.0	60.0
9.0	12.0	24.0	22.0	16.0	45.0	61.0	50.0	70.0	95.0	40.0	8.0	39.0	15.0	1.0	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.

SIGMA R = 636.0

KEWA

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
0.	0.	0.	0.	0.	0.	1.5	3.5	3.0	0.	1.0	0.	0.	0.	0.5	3.5	0.	0.	4.0	0.	6.0	6.5	13.0	12.0
53.0	7.0	10.0	15.0	15.0	5.0	42.0	48.0	30.0	96.0	69.0	23.0	17.0	17.0	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.

SIGMA R = 501.5

TAKAOKA

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
0.	0.	0.	0.	0.	0.5	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	5.5	1.0	9.0	0.5	8.0	4.0	13.5	3.5
59.0	6.0	12.0	23.5	14.0	13.5	38.0	8.5	14.5	28.0	58.0	117.0	56.0	36.0	5.5	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.

SIGMA R = 550.0

HIROOKA

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
0.	0.5	2.0	0.5	0.	0.	0.5	1.0	2.5	0.5	0.5	0.	0.5	0.	0.	1.0	5.0	1.0	5.0	0.	5.0	3.0	9.0	12.0
22.5	1.0	2.5	4.0	5.0	3.0	31.0	2.0	3.0	8.0	24.0	45.0	50.0	12.0	1.5	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.

SIGMA R = 264.0

36.5	11.0	9.0	15.0	13.0	9.0	48.0	8.0	7.0	11.0	45.0	66.0	74.0	33.0	7.0	7.0	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.

SIGMA R = 450.0

ICHINOKO

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
0.	1.5	1.5	0.	0.5	0.	0.5	1.5	6.0	0.	2.5	0.	0.	0.	0.5	0.5	7.0	0.5	5.5	1.0	5.0	9.5	15.0	32.0
38.5	9.5	12.0	11.0	19.0	10.0	41.0	60.0	44.0	100.0	63.0	36.0	8.0	32.0	7.0	0.5	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.

SIGMA R = 582.0

	24 HR URYO Maximum 24-hour rainfall	TIME OF MAX Occurrence time of the maximum 24-hour rainfall	KAKURITSU URYO Probable 24-hour rainfall	HIKINOBASHI-RITSU Enlargement rate	MAX RAINFALL Maximum short-time rainfall (after enlargement) 1 HR	3 HR	6 HR
1 - RYUIKI	567.00	17	567.00	1.000	100.00	207.00	344.00
2 - RYUIKI	582.57	16	582.57	1.000	98.61	207.06	338.44
3 - RYUIKI	580.58	16	580.58	1.000	97.60	204.80	337.72
4 - RYUIKI	548.59	16	548.59	1.000	104.01	212.99	304.69
5 - RYUIKI	540.50	16	540.50	1.000	117.00	231.00	309.50
6 - RYUIKI	540.50	16	540.50	1.000	117.00	231.00	309.50
7 - RYUIKI	540.50	16	540.50	1.000	117.00	231.00	309.50
8 - RYUIKI	540.50	16	540.50	1.000	117.00	231.00	309.50

HAKE GAWA KOUZUI KAISEKI KIHON TAKAMIZU

550.NEN. 8.GATSU. 16.NICHI. - 17.NICHI.

INPUT DATA LIST

RYUIKI	K	P	TL	F1	A	Q8	RSA	RAVE
1 - RYUIKI	25.000	0.500	0.	0.500	10.300	0.412	100.000	582.000
2 - RYUIKI	25.000	0.500	0.	0.500	7.200	0.288	100.000	597.012
3 - RYUIKI	25.000	0.500	0.	0.500	12.000	0.480	100.000	594.988
4 - RYUIKI	25.000	0.500	0.	0.500	9.800	0.392	100.000	558.652
5 - RYUIKI	25.000	0.500	0.	0.500	7.900	0.316	100.000	550.000
6 - RYUIKI	25.000	0.500	0.	0.500	6.800	0.272	100.000	550.000
7 - RYUIKI	25.000	0.500	0.	0.500	17.300	0.692	100.000	550.000
8 - RYUIKI	25.000	0.500	0.	0.500	1.200	0.048	100.000	550.000

KADO	K	P	TL
A - KADO	0.	0.	0.500
B - KADO	0.	0.	0.330
C - KADO	0.	0.	0.170
D - KADO	0.	0.	0.460
E - KADO	0.	0.	0.260

KAISEKI SHUHO TOSHITE ORESEN-HO O MOCHIIRU.

NAKE GAWA KOUZUI KAISEKI KIHON TAKAMIZU

550.NEN. 8.GATSU. -16.NICHI. --17.NICHI.

TIME	1 - R	1 - Q	2 - R	2 - Q	XA(IN)	XA(OU)	3 - R	3 - Q	4 - R	4 - Q	XB(IN)	XB(OU)	5 - R
17. 6. 0	38.50	14.86	30.30	12.84	27.70	19.74	31.45	20.76	53.88	8.58	49.08	39.22	59.00
17. 6.15	38.50	17.64	30.30	14.34	31.98	23.65	31.45	23.30	53.88	12.04	59.00	46.65	59.00
17. 6.30	38.50	20.64	30.30	15.89	36.54	27.70	31.45	25.97	53.88	15.94	69.61	55.82	59.00
17. 6.45	38.50	24.00	30.30	17.64	41.64	31.98	31.45	28.97	53.88	20.15	81.10	66.21	59.00
17. 7. 0	9.50	27.75	10.20	19.52	47.27	36.54	10.07	32.21	6.67	25.24	93.99	77.42	6.00
17. 7.15	9.50	27.22	10.20	19.25	46.47	41.61	10.07	31.73	6.67	24.33	97.70	89.86	6.00
17. 7.30	9.50	26.77	10.20	19.05	45.82	47.27	10.07	31.32	6.67	23.49	102.08	96.51	6.00
17. 7.45	9.50	26.38	10.20	18.90	45.28	46.47	10.07	31.02	6.67	22.71	100.20	100.68	6.00
17. 8. 0	12.00	26.06	15.34	18.79	44.85	45.82	15.00	30.79	12.98	22.05	98.65	100.80	12.00
17. 8.15	12.00	26.20	15.34	19.26	45.46	45.28	15.00	31.52	12.98	22.29	99.09	99.15	12.00
17. 8.30	12.00	26.36	15.34	19.73	46.09	44.85	15.00	32.22	12.98	22.59	99.67	98.95	12.00
17. 8.45	12.00	26.51	15.34	20.23	46.74	45.46	15.00	32.97	12.98	22.93	101.36	99.48	12.00
17. 9. 0	11.00	26.71	14.06	20.73	47.44	46.09	13.95	33.74	22.75	23.35	103.18	100.82	23.50
17. 9.15	11.00	26.83	14.06	21.05	47.88	46.74	13.95	34.28	22.75	25.14	106.17	102.60	23.50
17. 9.30	11.00	26.99	14.06	21.41	48.40	47.44	13.95	34.82	22.75	27.01	109.26	105.21	23.50
17. 9.45	11.00	27.18	14.06	21.78	48.97	47.88	13.95	35.41	22.75	28.91	112.19	108.27	23.50
17.10. 0	19.00	27.38	18.17	22.15	49.53	48.40	18.17	36.02	14.41	30.84	115.26	111.25	14.00
17.10.15	19.00	28.93	18.17	23.03	51.96	48.97	18.17	37.52	14.41	31.34	117.82	114.28	14.00
17.10.30	19.00	30.44	18.17	23.87	54.31	49.53	18.17	38.94	14.41	31.83	120.30	117.00	14.00
17.10.45	19.00	31.88	18.17	24.72	56.59	51.96	18.17	40.35	14.41	32.30	124.61	119.51	14.00
17.11. 0	10.00	33.24	19.73	25.55	58.79	54.31	18.81	41.76	15.91	32.72	128.79	123.23	13.50
17.11.15	10.00	32.87	19.73	26.55	59.42	56.59	18.81	43.26	15.91	33.42	133.27	127.45	13.50
17.11.30	10.00	32.60	19.73	27.51	60.11	58.79	18.81	44.68	15.91	34.11	137.59	131.84	13.50
17.11.45	10.00	32.39	19.73	28.48	60.87	59.42	18.81	46.07	15.91	34.80	140.29	136.21	13.50
17.12. 0	41.00	32.24	46.56	29.44	61.68	60.11	45.95	47.46	40.04	35.45	143.02	139.42	38.00
17.12.15	41.00	32.97	46.56	34.33	72.30	60.87	45.95	55.53	40.04	40.82	157.23	142.15	38.00
17.12.30	41.00	43.92	46.56	39.37	83.28	61.68	45.95	63.69	40.04	46.14	171.51	152.68	38.00
17.12.45	41.00	49.65	46.56	44.31	93.96	72.30	45.95	71.85	40.04	51.39	195.54	166.94	38.00
17.13. 0	60.00	55.47	57.22	49.09	104.56	83.28	56.68	79.64	14.48	56.66	219.58	187.85	8.50
17.13.15	60.00	65.95	57.22	55.68	121.63	93.96	56.68	90.50	14.48	55.55	240.02	211.89	8.50
17.13.30	60.00	76.32	57.22	61.99	138.31	104.56	56.68	100.99	14.48	54.53	260.09	233.48	8.50
17.13.45	60.00	86.38	57.22	67.87	154.26	121.63	56.68	110.68	14.48	53.58	285.89	253.66	8.50
17.14. 0	44.00	95.77	51.23	73.34	169.11	138.31	50.03	119.79	20.53	52.67	310.77	277.63	14.50
17.14.15	44.00	99.47	51.23	76.88	176.35	154.26	50.03	125.51	20.53	53.24	333.00	302.81	14.50
17.14.30	44.00	102.84	51.23	80.08	182.92	169.11	50.03	130.64	20.53	53.77	353.52	325.89	14.50
17.14.45	44.00	105.84	51.23	82.91	188.74	176.35	50.03	135.22	20.53	54.27	365.84	346.95	14.50
17.15. 0	100.00	108.46	98.61	85.49	193.96	182.92	97.60	139.26	37.09	54.72	376.90	361.89	28.00
17.15.15	100.00	130.32	98.61	99.83	230.15	188.74	97.60	162.89	37.09	59.07	410.71	373.36	28.00
17.15.30	100.00	150.94	98.61	113.27	264.21	193.96	97.60	185.12	37.09	63.34	442.42	399.89	28.00
17.15.45	100.00	169.98	98.61	125.94	295.92	230.15	97.60	205.65	37.09	67.44	503.24	432.27	28.00
17.16. 0	63.00	188.67	56.61	138.28	326.95	264.21	57.17	225.37	56.77	71.25	561.30	483.77	58.00
17.16.15	63.00	189.17	56.61	135.98	325.15	295.92	57.17	222.78	56.77	79.84	598.54	542.72	58.00
17.16.30	63.00	189.62	56.61	133.90	323.52	326.95	57.17	219.95	56.77	87.98	634.38	586.62	58.00
17.16.45	63.00	190.04	56.61	132.00	322.04	325.15	57.17	217.35	56.77	95.73	638.23	623.25	58.00
17.17. 0	36.00	190.43	28.22	130.26	320.69	323.52	30.30	214.95	104.01	102.76	641.23	637.16	117.00
17.17.15	36.00	178.21	28.22	119.57	297.78	322.04	30.30	198.50	104.01	124.97	645.52	640.27	117.00
17.17.30	36.00	167.59	28.22	110.93	278.52	320.69	30.30	185.19	104.01	146.07	651.94	644.15	117.00
17.17.45	36.00	158.88	28.22	103.66	262.54	297.78	30.30	173.98	104.01	165.65	637.41	649.89	117.00

HAKE GAWA KOUZUI KAISEKI KIHON TAKAMIZU
S50.NEN. 8.GATSU. 16.NICHI. - 17.NICHI.

TIME	1 - R	1 - Q	2 - R	2 - Q	XA(IN)	XA(OU)	3 - R	3 - Q	4 - R	4 - Q	XB(IN)	XB(OU)	5 - R
17.18. 0	8.00	151.53	16.62	97.57	249.10	278.52	16.52	164.48	52.21	185.10	628.09	642.06	56.00
17.18.15	8.00	134.93	16.62	89.65	224.58	262.54	16.52	150.92	52.21	180.32	593.79	631.07	56.00
17.18.30	8.00	121.22	16.62	82.86	204.08	249.10	16.52	139.38	52.21	175.95	564.43	604.76	56.00
17.18.45	8.00	109.83	16.62	77.18	187.01	224.58	16.52	129.63	52.21	171.89	526.10	573.82	56.00
17.19. 0	32.00	100.45	27.27	72.49	172.94	204.08	27.81	121.61	34.08	168.08	493.77	538.37	36.00
17.19.15	32.00	99.99	27.27	70.83	170.82	187.01	27.81	118.95	34.08	157.54	463.51	504.12	36.00
17.19.30	32.00	99.58	27.27	69.39	168.97	172.94	27.81	116.64	34.08	148.85	438.43	473.19	36.00
17.19.45	32.00	99.21	27.27	68.10	167.32	170.82	27.81	114.59	34.08	141.45	426.87	446.45	36.00
17.20. 0	7.00	98.89	5.33	66.95	165.84	168.97	5.48	112.76	5.21	135.10	416.83	430.57	5.50
17.20.15	7.00	90.63	5.33	61.02	151.65	167.32	5.48	102.82	5.21	120.04	390.18	420.04	5.50
17.20.30	7.00	83.55	5.33	56.21	139.76	165.84	5.48	94.63	5.21	107.38	367.86	398.71	5.50
17.20.45	7.00	77.78	5.33	52.21	130.00	151.65	5.48	87.87	5.21	97.15	336.68	375.00	5.50
17.21. 0	0.50	72.90	0.36	48.76	121.66	139.76	0.37	82.06	0.03	88.40	310.21	346.65	0.
17.21.15	0.50	66.84	0.36	44.71	111.55	130.00	0.37	75.24	0.03	79.41	284.64	318.68	0.
17.21.30	0.50	61.30	0.36	40.92	102.22	121.66	0.37	68.89	0.03	72.14	262.68	292.83	0.
17.21.45	0.50	56.25	0.36	37.68	93.93	111.55	0.37	63.39	0.03	65.93	240.87	269.71	0.
17.22. 0	0.	51.98	0.	34.87	86.84	102.22	0.	58.64	0.	60.37	221.23	247.85	0.
17.22.15	0.	48.08	0.	32.27	80.35	93.93	0.	54.27	0.	55.13	203.33	227.51	0.
17.22.30	0.	44.48	0.	29.89	74.38	86.84	0.	50.21	0.	50.73	187.79	209.06	0.
17.22.45	0.	41.38	0.	27.91	69.29	80.35	0.	46.86	0.	46.89	174.09	192.76	0.
17.23. 0	0.	38.75	0.	26.20	64.95	74.38	0.	43.97	0.	43.39	161.74	178.48	0.
17.23.15	0.	36.43	0.	24.67	61.11	69.29	0.	41.39	0.	40.25	150.94	165.69	0.
17.23.30	0.	34.33	0.	23.26	57.59	64.95	0.	39.02	0.	37.63	141.59	154.39	0.
17.23.45	0.	32.36	0.	21.91	54.27	61.11	0.	36.76	0.	35.34	133.21	144.58	0.
18. 0. 0	0.	30.45	0.	20.58	51.04	57.59	0.	34.55	0.	33.29	125.42	135.39	0.
18. 0.15	0.	28.62	0.	19.40	48.02	54.27	0.	32.54	0.	31.38	118.19	127.92	0.
18. 0.30	0.	27.03	0.	18.35	45.38	51.04	0.	30.78	0.	29.55	111.36	120.51	0.
18. 0.45	0.	25.60	0.	17.40	43.00	48.02	0.	29.17	0.	27.74	104.94	113.55	0.
18. 1. 0	0.	24.28	0.	16.50	40.79	45.38	0.	27.67	0.	26.17	99.22	106.99	0.
18. 1.15	0.	23.03	0.	15.64	38.67	43.00	0.	26.23	0.	24.77	93.99	101.05	0.
18. 1.30	0.	21.81	0.	14.86	36.67	40.79	0.	24.91	0.	23.48	89.18	95.67	0.
18. 1.45	0.	20.78	0.	14.19	34.97	38.67	0.	23.77	0.	22.27	84.71	90.72	0.
18. 2. 0	0.	19.88	0.	13.60	33.47	36.67	0.	22.77	0.	21.10	80.54	86.14	0.
18. 2.15	0.	19.07	0.	13.06	32.12	34.97	0.	21.86	0.	20.07	76.90	81.88	0.
18. 2.30	0.	18.32	0.	12.56	30.88	33.47	0.	21.02	0.	19.18	73.66	78.06	0.
18. 2.45	0.	17.63	0.	12.08	29.71	32.12	0.	20.23	0.	18.38	70.73	74.70	0.
18. 3. 0	0.	16.97	0.	11.63	28.60	30.88	0.	19.46	0.	17.66	68.00	71.67	0.
18. 3.15	0.	16.32	0.	11.18	27.50	29.71	0.	18.72	0.	16.98	65.41	68.87	0.
18. 3.30	0.	15.68	0.	10.73	26.41	28.60	0.	17.96	0.	16.34	62.90	66.24	0.
18. 3.45	0.	15.03	0.	10.27	25.29	27.50	0.	17.19	0.	15.73	60.42	63.71	0.
18. 4. 0	0.	14.41	0.	9.87	24.28	26.41	0.	16.52	0.	15.12	58.04	61.22	0.
18. 4.15	0.	13.87	0.	9.51	23.38	25.29	0.	15.92	0.	14.50	55.71	58.80	0.
18. 4.30	0.	13.39	0.	9.19	22.57	24.28	0.	15.37	0.	13.89	53.54	56.46	0.
18. 4.45	0.	12.94	0.	8.89	21.83	23.38	0.	14.87	0.	13.35	51.61	54.23	0.
18. 5. 0	0.	12.53	0.	8.61	21.13	22.57	0.	14.40	0.	12.88	49.85	52.23	0.
18. 5.15	0.	12.13	0.	8.34	20.47	21.83	0.	13.95	0.	12.44	48.22	50.41	0.
18. 5.30	0.	11.75	0.	8.08	19.83	21.13	0.	13.51	0.	12.04	46.68	48.74	0.
18. 5.45	0.	11.38	0.	7.81	19.19	20.47	0.	13.07	0.	11.66	45.20	47.17	0.

HAKE GAWA KOUZUI KAISEKI KIHON TAKAMIZU

S50 NEN 8 GATSU 16 NICHI 17 NICHI

TIME	5 - Q	XC(IN)	XC(OU)	6 - R	6 - Q	XD(IN)	XD(OU)	7 - R	7 - Q	XE(IN)	XE(OU)	8 - R	8 - Q
17. 6. 0	5.70	44.91	40.48	59.00	4.90	45.39	36.21	59.00	12.47	48.68	44.67	59.00	0.87
17. 6.15	8.57	55.22	48.21	59.00	7.32	55.58	40.79	59.00	18.76	59.56	48.52	59.00	1.30
17. 6.30	11.90	67.73	59.22	59.00	10.25	69.47	47.02	59.00	26.06	73.08	59.12	59.00	1.81
17. 6.45	15.64	81.85	72.25	59.00	13.46	85.71	57.80	59.00	34.24	92.05	72.54	59.00	2.38
17. 7. 0	20.19	97.61	86.89	6.00	17.37	104.27	72.06	6.00	44.20	116.27	91.29	6.00	3.07
17. 7.15	19.38	109.24	101.33	6.00	16.68	118.01	88.68	6.00	42.44	131.12	115.30	6.00	2.94
17. 7.30	18.44	115.15	111.13	6.00	16.05	127.18	106.47	6.00	40.82	147.29	130.52	6.00	2.83
17. 7.45	17.94	118.62	116.26	6.00	15.44	131.71	119.48	6.00	39.29	158.77	146.64	6.00	2.73
17. 8. 0	17.38	118.18	118.48	12.00	14.96	133.43	127.90	12.00	38.05	165.96	158.31	12.00	2.64
17. 8.15	17.31	116.66	117.69	12.00	15.08	132.77	131.98	12.00	38.35	170.34	165.67	12.00	2.66
17. 8.30	17.68	116.64	116.65	12.00	15.22	131.88	133.33	12.00	38.73	172.05	170.16	12.00	2.69
17. 8.45	17.89	117.37	116.87	12.00	15.40	132.27	132.62	12.00	39.17	171.79	171.98	12.00	2.72
17. 9. 0	18.14	118.95	117.88	23.50	15.61	133.49	131.94	23.50	39.71	171.65	171.81	23.50	2.75
17. 9.15	19.70	122.30	120.02	23.50	16.96	136.98	132.46	23.50	43.14	175.60	171.66	23.50	2.99
17. 9.30	21.26	126.47	123.63	23.50	18.30	141.93	134.04	23.50	46.56	180.60	175.44	23.50	3.23
17. 9.45	22.89	131.16	127.97	23.50	19.70	147.68	137.77	23.50	50.13	187.90	180.40	23.50	3.48
17.10. 0	24.54	135.79	132.65	14.00	21.12	153.77	142.85	14.00	53.73	196.59	187.61	14.00	3.73
17.10.15	24.88	139.16	136.87	14.00	21.41	158.28	148.65	14.00	54.48	203.13	196.24	14.00	3.78
17.10.30	25.23	142.23	140.14	14.00	21.72	161.85	154.49	14.00	55.25	209.74	202.87	14.00	3.83
17.10.45	25.57	145.08	143.14	14.00	22.01	165.15	158.85	14.00	56.00	214.85	209.47	14.00	3.88
17.11. 0	25.89	149.12	146.37	13.50	22.29	168.66	162.38	13.50	56.70	219.08	214.65	13.50	3.93
17.11.15	26.10	153.56	150.54	13.50	22.47	173.01	165.71	13.50	57.17	222.88	218.91	13.50	3.97
17.11.30	26.32	158.16	155.03	13.50	22.65	177.68	169.36	13.50	57.63	226.99	222.73	13.50	4.00
17.11.45	26.54	162.75	159.63	13.50	22.85	182.48	173.76	13.50	58.13	231.89	226.33	13.50	4.03
17.12. 0	26.77	166.19	163.85	38.00	23.04	186.89	178.45	38.00	58.62	237.08	231.69	38.00	4.07
17.12.15	30.72	172.86	168.33	38.00	26.44	194.77	183.18	38.00	67.27	250.45	236.87	38.00	4.67
17.12.30	34.71	187.39	177.51	38.00	29.88	207.39	188.15	38.00	76.01	264.16	249.91	38.00	5.27
17.12.45	38.62	205.57	193.21	38.00	33.25	226.45	196.79	38.00	84.58	281.37	263.61	38.00	5.87
17.13. 0	42.50	230.36	213.50	8.50	36.59	250.09	210.44	8.50	93.08	303.52	280.68	8.50	6.46
17.13.15	40.66	252.55	237.46	8.50	35.00	272.46	230.24	8.50	89.05	319.28	302.63	8.50	6.18
17.13.30	38.92	272.40	258.90	8.50	33.50	292.40	253.67	8.50	85.25	338.90	318.65	8.50	5.91
17.13.45	37.40	291.06	278.37	8.50	32.19	310.56	275.65	8.50	81.89	357.54	338.11	8.50	5.68
17.14. 0	36.09	313.72	298.31	14.50	31.06	329.38	295.31	14.50	79.03	374.34	356.80	14.50	5.48
17.14.15	35.92	338.73	321.72	14.50	30.92	352.64	313.57	14.50	78.66	392.23	373.67	14.50	5.46
17.14.30	35.77	361.65	346.06	14.50	30.79	376.85	333.10	14.50	78.32	411.42	391.51	14.50	5.43
17.14.45	35.62	382.58	368.35	14.50	30.66	399.01	356.52	14.50	78.01	434.53	410.65	14.50	5.41
17.15. 0	35.49	397.39	387.32	28.00	30.55	417.87	380.40	28.00	77.73	458.12	433.60	28.00	5.39
17.15.15	37.63	410.99	401.74	28.00	32.39	434.13	402.03	28.00	82.41	484.44	457.18	28.00	5.72
17.15.30	39.67	439.56	420.13	28.00	34.15	454.28	420.47	28.00	86.87	507.34	483.38	28.00	6.03
17.15.45	41.58	473.85	450.53	28.00	35.79	486.32	437.35	28.00	91.06	528.42	506.42	28.00	6.32
17.16. 0	43.44	527.21	490.93	58.00	37.39	528.32	459.40	58.00	95.13	554.53	527.57	58.00	6.60
17.16.15	51.28	594.00	548.59	58.00	44.14	592.72	493.04	58.00	112.29	605.34	553.48	58.00	7.79
17.16.30	58.95	645.57	610.50	58.00	50.74	661.25	538.62	58.00	129.09	667.72	603.31	58.00	8.95
17.16.45	66.06	689.31	659.57	58.00	56.86	716.43	603.69	58.00	144.66	748.34	665.22	58.00	10.03
17.17. 0	72.88	710.04	695.94	117.00	62.74	758.68	670.07	117.00	159.61	829.68	745.12	117.00	11.07
17.17.15	94.42	734.69	717.93	117.00	81.27	799.21	723.19	117.00	206.77	929.96	826.43	117.00	14.34
17.17.30	115.56	759.71	742.70	117.00	99.47	842.17	765.16	117.00	253.07	1018.23	925.95	117.00	17.55
17.17.45	135.84	785.73	768.04	117.00	116.93	884.97	806.08	117.00	297.48	1103.56	1014.70	117.00	20.63

HAKE GAWA KOUZUI KAISEKI KIHON TAKAMIZU

S50.NEN. 8.GATSU. 16.NICHI. - 17.NICHI.

TIME	5 - Q	XC(IN)	XC(OU)	6 - R	6 - Q	XD(IN)	XD(OU)	7 - R	7 - Q	XE(IN)	XE(OU)	8 - R	8 - Q
17.18. 0	156.08	798.14	789.70	56.00	134.34	924.05	849.02	56.00	341.79	1190.80	1100.35	56.00	23.71
17.18.15	152.87	783.95	793.60	56.00	131.59	925.18	891.22	56.00	334.77	1225.99	1187.31	56.00	23.22
17.18.30	150.01	754.78	774.61	56.00	129.12	903.74	924.23	56.00	328.51	1252.74	1224.58	56.00	22.79
17.18.45	147.44	721.26	744.05	56.00	126.91	870.96	921.75	56.00	322.87	1244.62	1251.67	56.00	22.40
17.19. 0	145.10	683.46	709.16	36.00	124.89	834.06	898.49	36.00	317.74	1216.24	1244.95	36.00	22.04
17.19.15	135.80	639.92	669.53	36.00	116.89	786.42	865.06	36.00	297.38	1162.44	1217.37	36.00	20.63
17.19.30	127.82	601.02	627.47	36.00	110.03	737.50	826.44	36.00	279.92	1106.36	1164.59	36.00	19.42
17.19.45	121.27	567.72	590.36	36.00	104.38	694.75	778.59	36.00	265.56	1044.16	1108.60	36.00	18.42
17.20. 0	115.71	546.28	560.86	5.50	99.60	660.46	730.66	5.50	253.39	934.05	1046.64	5.50	17.58
17.20.15	102.40	522.44	538.65	5.50	88.14	626.79	689.26	5.50	224.24	913.50	986.45	5.50	15.55
17.20.30	91.35	490.06	512.08	5.50	78.63	590.71	655.07	5.50	200.05	855.12	916.32	5.50	13.88
17.20.45	82.32	457.32	479.58	5.50	70.86	550.44	621.02	5.50	180.27	801.28	857.46	5.50	12.50
17.21. 0	74.80	421.46	445.84	0.	64.39	510.23	584.27	0.	163.81	748.07	803.44	0.	11.36
17.21.15	66.86	385.54	409.96	0.	57.55	467.52	544.00	0.	146.42	690.42	750.20	0.	10.16
17.21.30	60.49	353.32	375.23	0.	52.07	427.30	503.40	0.	132.47	635.86	692.73	0.	9.19
17.21.45	55.17	324.88	344.22	0.	47.59	391.71	461.08	0.	120.82	581.90	638.04	0.	8.38
17.22. 0	50.50	298.35	316.39	0.	43.47	359.86	421.60	0.	110.59	532.19	584.06	0.	7.67
17.22.15	46.19	273.71	290.46	0.	39.76	330.22	386.61	0.	101.16	487.77	534.18	0.	7.02
17.22.30	42.37	251.43	266.58	0.	36.47	303.05	355.12	0.	92.78	447.90	489.54	0.	6.44
17.22.45	39.30	231.86	245.17	0.	33.66	278.87	325.87	0.	85.63	411.50	449.50	0.	5.94
17.23. 0	36.18	214.66	226.36	0.	31.14	257.50	299.17	0.	79.23	378.40	412.96	0.	5.50
17.23.15	33.46	199.15	209.70	0.	28.80	238.50	275.41	0.	73.28	348.69	379.73	0.	5.08
17.23.30	31.19	185.58	194.81	0.	26.85	221.65	254.46	0.	68.30	322.76	349.88	0.	4.76
17.23.45	29.24	173.83	181.82	0.	25.17	206.99	235.80	0.	64.04	299.84	323.79	0.	4.44
18. 0. 0	27.52	163.41	170.49	0.	23.69	194.18	219.31	0.	60.26	279.57	300.76	0.	4.18
18. 0.15	25.94	153.85	160.35	0.	22.32	182.67	204.94	0.	56.30	261.74	280.38	0.	3.94
18. 0.30	24.44	144.95	151.00	0.	21.04	172.04	192.34	0.	53.52	245.86	262.45	0.	3.71
18. 0.45	22.93	136.53	142.25	0.	19.78	162.04	180.97	0.	50.33	231.30	246.49	0.	3.49
18. 1. 0	21.63	128.62	134.00	0.	18.62	152.62	170.44	0.	47.37	217.81	231.88	0.	3.29
18. 1.15	20.45	121.50	126.34	0.	17.60	143.94	160.53	0.	44.77	205.30	218.35	0.	3.11
18. 1.30	19.37	115.04	119.43	0.	16.68	136.77	151.23	0.	42.43	193.66	205.80	0.	2.94
18. 1.45	18.38	109.10	113.14	0.	15.82	128.96	142.69	0.	40.24	182.93	194.72	0.	2.79
18. 2. 0	17.42	103.56	107.33	0.	15.00	122.32	134.96	0.	38.16	173.12	183.36	0.	2.65
18. 2.15	16.53	98.41	101.91	0.	14.23	116.14	127.90	0.	36.20	164.09	173.51	0.	2.51
18. 2.30	15.76	93.83	96.94	0.	13.57	110.51	121.33	0.	34.52	155.85	164.46	0.	2.39
18. 2.45	15.09	89.79	92.54	0.	12.99	105.52	115.24	0.	33.05	148.29	156.18	0.	2.29
18. 3. 0	14.48	86.15	88.63	0.	12.47	101.09	109.71	0.	31.72	141.43	148.59	0.	2.20
18. 3.15	13.92	82.80	85.08	0.	11.99	97.07	104.82	0.	30.49	135.31	141.70	0.	2.12
18. 3.30	13.40	79.64	81.79	0.	11.53	93.32	100.45	0.	29.34	129.79	135.55	0.	2.04
18. 3.45	12.90	76.60	78.67	0.	11.10	89.77	96.47	0.	28.24	124.71	130.01	0.	1.96
18. 4. 0	12.40	73.62	75.65	0.	10.67	86.32	92.75	0.	27.16	119.91	124.91	0.	1.88
18. 4.15	11.91	70.71	72.69	0.	10.25	82.94	89.22	0.	26.08	115.29	120.10	0.	1.81
18. 4.30	11.40	67.36	69.80	0.	9.82	79.61	85.78	0.	24.97	110.75	115.48	0.	1.73
18. 4.45	10.95	65.18	67.00	0.	9.42	76.43	82.40	0.	23.97	106.38	110.93	0.	1.66
18. 5. 0	10.54	62.77	64.41	0.	9.08	73.49	79.10	0.	23.09	102.19	106.55	0.	1.60
18. 5.15	10.18	60.59	62.07	0.	8.76	70.84	75.96	0.	22.29	98.25	102.36	0.	1.55
18. 5.30	9.85	58.59	59.95	0.	8.47	68.43	73.06	0.	21.56	94.62	98.41	0.	1.50
18. 5.45	9.53	56.71	57.99	0.	8.20	66.19	70.45	0.	20.87	91.33	94.77	0.	1.45

HAKE GAWA KOUZUI KAISEKI KIHON TAKAMIZU
S50.NEN. 8.GATSU. 16.NICHI. — 17.NICHI.

TIME	GORYU.ST.
17. 6. 0	45.56
17. 6.15	49.82
17. 6.30	60.93
17. 6.45	74.92
17. 7. 0	94.36
17. 7.15	118.24
17. 7.30	133.35
17. 7.45	149.37
17. 8. 0	160.95
17. 8.15	168.33
17. 8.30	172.85
17. 8.45	174.70
17. 9. 0	174.56
17. 9.15	174.65
17. 9.30	178.67
17. 9.45	183.88
17.10. 0	191.33
17.10.15	200.02
17.10.30	206.70
17.10.45	213.36
17.11. 0	218.58
17.11.15	222.88
17.11.30	226.73
17.11.45	230.86
17.12. 0	235.76
17.12.15	241.53
17.12.30	255.19
17.12.45	269.48
17.13. 0	287.14
17.13.15	303.81
17.13.30	324.56
17.13.45	343.29
17.14. 0	362.28
17.14.15	379.12
17.14.30	396.95
17.14.45	416.07
17.15. 0	439.00
17.15.15	462.89
17.15.30	489.41
17.15.45	512.74
17.16. 0	534.17
17.16.15	561.27
17.16.30	612.26
17.16.45	675.26
17.17. 0	756.19
17.17.15	840.77
17.17.30	943.50
17.17.45	1035.33

HAKE GAWA KOUZUI KAISEKI KIHON TAKAMIZU

SSO.NEN. 8.GATSU. 16.NICHI. - 17.NICHI.

TIME	GORYU.ST.
17.18. 0	1123.86
17.18.15	1210.56
17.18.30	1247.37
17.18.45	1274.06
17.19. 0	1266.99
17.19.15	1238.00
17.19.30	1184.01
17.19.45	1127.02
17.20. 0	1064.22
17.20.15	1002.01
17.20.30	930.20
17.20.45	869.96
17.21. 0	814.80
17.21.15	760.36
17.21.30	701.92
17.21.45	646.42
17.22. 0	591.73
17.22.15	541.19
17.22.30	495.98
17.22.45	455.43
17.23. 0	418.45
17.23.15	384.81
17.23.30	354.61
17.23.45	328.24
18. 0. 0	304.94
18. 0.15	284.32
18. 0.30	266.16
18. 0.45	249.98
18. 1. 0	235.17
18. 1.15	221.45
18. 1.30	208.75
18. 1.45	196.92
18. 2. 0	186.01
18. 2.15	176.02
18. 2.30	166.85
18. 2.45	158.48
18. 3. 0	150.79
18. 3.15	143.82
18. 3.30	137.59
18. 3.45	131.97
18. 4. 0	126.79
18. 4.15	121.91
18. 4.30	117.21
18. 4.45	112.60
18. 5. 0	108.15
18. 5.15	103.91
18. 5.30	99.90
18. 5.45	96.22

Test Run - 3

Calculation of the dam plan/basic

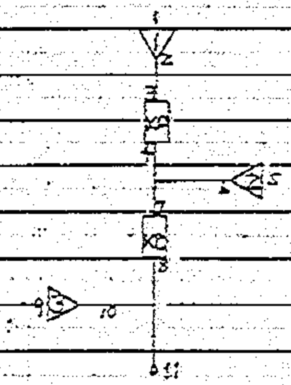
high level

```
*********************
*  INPUT CARD LIST  *
*********************

FRAFL  30W,R,TWORK/AAAA
FRAFL  32,W,R,TWORK/CCCC

                 1       2       3       4       5       6       7       8
0---RUN
1---      AKITAKEN  MAKI DAM      KOUZUI  KAISEKI   1/100    KIHON  TAKAMIZU
2---         11
3---          0
4---          3       7       1      -1
5---1 - RYUIXI
6---31.7      8.2      13.0
7---0.12
8---50.0      0.5       1.0
9---          1
10---2 - RYUIXI
11---21.9     6.6      20.0
12---0.12
13---50.0     0.5       1.0
14---         1
15---3 - RYUIXI
16---10.4     5.8     116.0
17---0.12
18---50.0     0.5       1.0
19---         1
20---1 - KIDO
21---                           0.492
22---2 - KIDO
23---                           0.537
24---1800.0
25---         1      91      81      93       5      91      82      93
26---         9      91      82
27---         1       5       9
28---   1 - 2   1 - 9   KA(IN)  KA(OU)   2 - 8   2 - 9   KB(IN)  KB(OU)
29---   3 - R   3 - Q   KIJUNTEX
30---         0
31---   SHOWA   39 NEN  8 - 12  KOUZUI                   7
32---        80       1       7
33---         1      24  3600.0
34---        12  9.0      1   0.0
35---   KAKUNODATE
36---
37---                                   7.5    54.5    53.0    21.5
38---1.5                                                0.5
39---        24       1
40---200.0
41---         1       1
42---1.0
43---200.0
44---         1       1
45---1.0
```

Flood trace system chart



Standard point

```
                 1         2         3         4         5         6         7         8
        ********************************************************************************
46---200.0
47---            1         1
48---1.0
49---EXD
        ********************************************************************************
                 1         2         3         4         5         6         7         8

        TOTAL CARD =    49
```

AKITAKEN MAKI DAM KOUZUI KAISEKI 1/100 KIHON TAKAMIZU

SHOWA 39 NEN 8 12 KOUZUI 7

KAKUNODATE

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	7.5	54.5	53.0	21.5	1.5	0.	0.	0.	0.	0.	0.5	0.

SIGMA.R.= 138.5

	24 HR.URYO	TIME OF MAX	KAKURITSU URYO	HIKINOBASHI-RITSU	MAX RAINFALL 1.HR	3.HR	6.HR
1 - RYUIKI	138.50	1	200.00	1.444	78.70	186.28	199.28
2 - RYUIKI	138.50	1	200.00	1.444	28.70	186.28	199.28
3 - RYUIKI	138.50	1	200.00	1.444	78.70	186.28	199.28

AKITAKEN HAKI DAM KOUZUI KAISEKI 1/100 KIHON TAKAMIZU

SHOWA 39 NEN 8 - 12 KOUZUI 7

INPUT DATA LIST

RYUIKI	K	P	TL	F1	A	QB	RSA	RAVE
1 - RYUIKI	24.694	0.333	0.	0.500	31.700	1.268	50.000	200.000
2 - RYUIKI	26.517	0.333	0.	0.500	21.900	0.876	50.000	200.000
3 - RYUIKI	45.635	0.333	0.	0.500	10.400	0.416	50.000	200.000

KADO	K	P	TL
A - KADO	0.	0.	0.492
B - KADO	0.	0.	0.537

KAISEKI SHUHO TOSHITE ORESEN-HO O MOCHIIRU

AKITAKEN MAKI DAM KOUZUI KAISEKI 1/100 KIHON TAKAMIZU
SHOWA 39 NEN 8 - 12 KOUZUI 7

TIME	1 - R	1 - Q	XA(IN)	XA(OU)	2 - R	2 - Q	XB(IN)	XB(OU)	3 - R	3 - Q	KIJUNTEN
12. 9. 0	0.	1.27	1.27	1.27	0.	0.88	2.14	2.14	0.	0.42	2.56
12. 9.30	0.	1.27	1.27	1.27	0.	0.88	2.14	2.14	0.	0.42	2.56
12.10. 0	0.	1.27	1.27	1.27	0.	0.88	2.15	2.14	0.	0.42	2.56
12.10.30	0.	1.36	1.36	1.27	0.	0.94	2.22	2.15	0.	0.45	2.59
12.11. 0	0.	1.53	1.53	1.37	0.	1.06	2.42	2.21	0.	0.50	2.71
12.11.30	0.	1.64	1.64	1.53	0.	1.13	2.66	2.41	0.	0.54	2.95
12.12. 0	0.	1.68	1.68	1.64	0.	1.16	2.80	2.65	0.	0.55	3.20
12.12.30	0.	1.70	1.70	1.68	0.	1.17	2.85	2.79	0.	0.56	3.35
12.13. 0	0.	1.70	1.70	1.70	0.	1.18	2.87	2.85	0.	0.56	3.41
12.13.30	0.	1.70	1.70	1.70	0.	1.18	2.88	2.87	0.	0.56	3.43
12.14. 0	0.	1.71	1.71	1.70	0.	1.18	2.88	2.88	0.	0.56	3.44
12.14.30	0.	1.71	1.71	1.71	0.	1.18	2.88	2.88	0.	0.56	3.44
12.15. 0	0.	1.71	1.71	1.71	0.	1.18	2.88	2.88	0.	0.56	3.44
12.15.30	0.	1.71	1.71	1.71	0.	1.18	2.88	2.88	0.	0.56	3.44
12.16. 0	0.	1.71	1.71	1.71	0.	1.18	2.88	2.88	0.	0.56	3.44
12.16.30	0.	1.71	1.71	1.71	0.	1.18	2.88	2.88	0.	0.56	3.44
12.17. 0	0.	1.71	1.71	1.71	0.	1.18	2.88	2.88	0.	0.56	3.44
12.17.30	0.	1.71	1.71	1.71	0.	1.18	2.88	2.88	0.	0.56	3.44
12.18. 0	0.	1.71	1.71	1.71	0.	1.18	2.88	2.88	0.	0.56	3.44
12.18.30	0.	1.71	1.71	1.71	0.	1.18	2.88	2.88	0.	0.56	3.44
12.19. 0	0.	1.71	1.71	1.71	0.	1.18	2.88	2.88	0.	0.56	3.44
12.19.30	0.	1.71	1.71	1.71	0.	1.18	2.88	2.88	0.	0.56	3.44
12.20. 0	0.	1.71	1.71	1.71	0.	1.18	2.88	2.88	0.	0.56	3.44
12.20.30	0.	1.71	1.71	1.71	0.	1.18	2.88	2.88	0.	0.56	3.44
12.21. 0	10.83	1.71	1.71	1.71	10.83	1.18	2.88	2.88	10.83	0.56	3.44
12.21.30	10.83	2.66	2.66	1.72	10.83	1.78	3.51	2.88	10.83	0.70	3.58
12.22. 0	78.70	4.40	4.40	2.69	78.70	2.86	5.55	3.46	78.70	0.91	4.37
12.22.30	78.70	58.99	58.99	5.27	78.70	35.46	40.74	5.40	78.70	5.71	11.11
12.23. 0	76.53	197.36	197.36	61.20	76.53	121.55	182.75	38.13	76.53	19.87	58.00
12.23.30	76.53	382.76	382.76	200.32	76.53	241.49	441.82	172.24	76.53	46.07	218.32
13. 0. 0	31.05	545.28	545.28	385.36	31.05	355.27	740.63	422.65	31.05	81.64	504.29
13. 0.30	31.05	381.84	381.84	542.67	31.05	241.18	803.85	718.52	31.05	81.91	800.43
13. 1. 0	2.17	326.44	326.44	380.95	2.17	226.04	606.99	799.17	2.17	83.27	882.44
13. 1.30	2.17	191.93	191.93	324.29	2.17	137.48	461.77	621.56	2.17	64.27	685.83
13. 2. 0	0.	132.63	132.63	190.98	0.	96.43	287.41	472.52	0.	51.81	524.33
13. 2.30	0.	95.94	95.94	132.04	0.	70.77	202.81	300.31	0.	42.29	342.60
13. 3. 0	0.	73.70	73.70	95.58	0.	54.74	150.33	209.07	0.	35.40	244.47
13. 3.30	0.	59.37	59.37	73.47	0.	44.08	117.55	154.21	0.	30.31	184.52
13. 4. 0	0.	49.17	49.17	59.21	0.	36.79	96.00	119.97	0.	26.19	146.17
13. 4.30	0.	41.65	41.65	49.05	0.	31.05	80.10	97.59	0.	23.05	120.64
13. 5. 0	0.	35.99	35.99	41.56	0.	26.92	68.48	81.28	0.	20.51	101.79
13. 5.30	0.	31.42	31.42	35.92	0.	23.59	59.50	69.34	0.	18.50	87.84
13. 6. 0	0.	28.16	28.16	31.36	0.	20.99	52.35	60.17	0.	16.79	76.96
13. 6.30	0.	25.63	25.63	28.12	0.	19.06	47.18	52.88	0.	15.32	68.20
13. 7. 0	0.72	23.49	23.49	25.59	0.72	17.51	43.10	47.56	0.72	14.03	61.59
13. 7.30	0.72	22.28	22.28	23.47	0.72	16.64	40.11	43.40	0.72	13.13	56.53
13. 8. 0	0.	21.12	21.12	22.26	0.	15.85	38.11	40.33	0.	12.36	52.69
13. 8.30	0.	19.28	19.28	21.09	0.	14.66	35.75	38.25	0.	11.48	49.74

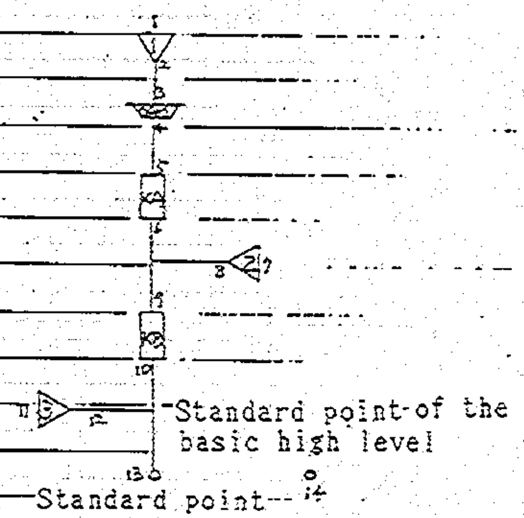
AKITAKEN MAKI DAM KOUZUI KAISEKI 1/100 KIHON TAKAMIZU
SHOWA 39 NEN 8 - 12 KOUZUI 7

TIME	1 - R	1 - O	XA(IN)	XA(OU)	2 - R	2 - O	XB(IN)	XB(OU)	3 - R	3 - O	XIJUNTEN
13. 9. 0	0.	17.72	17.72	19.25	0.	13.48	32.73	35.92	0.	10.71	46.64
13. 9.30	0.	16.41	16.41	17.70	0.	12.45	30.15	32.96	0.	10.04	43.00
13.10. 0	0.	15.24	15.24	16.39	0.	11.58	27.97	30.34	0.	9.51	39.85
13.10.30	0.	14.19	14.19	15.22	0.	10.81	26.02	28.13	0.	9.07	37.20
13.11. 0	0.	13.35	13.35	14.18	0.	10.08	24.26	26.17	0.	8.70	34.87
13.11.30	0.	12.63	12.63	13.34	0.	9.49	22.83	24.39	0.	8.37	32.76
13.12. 0	0.	12.00	12.00	12.62	0.	9.00	21.62	22.93	0.	8.07	31.00
13.12.30	0.	11.42	11.42	11.99	0.	8.57	20.56	21.71	0.	7.79	29.50
13.13. 0	0.	10.86	10.86	11.41	0.	8.18	19.59	20.64	0.	7.52	28.16
13.13.30	0.	10.30	10.30	10.85	0.	7.82	18.66	19.66	0.	7.26	26.92
13.14. 0	0.	9.79	9.79	10.29	0.	7.46	17.75	18.73	0.	6.99	25.72
13.14.30	0.	9.35	9.35	9.78	0.	7.11	16.89	17.82	0.	6.71	24.53
13.15. 0	0.	8.96	8.96	9.35	0.	6.78	16.12	16.95	0.	6.41	23.36
13.15.30	0.	8.60	8.60	8.95	0.	6.50	15.45	16.18	0.	6.13	22.31
13.16. 0	0.	8.25	8.25	8.59	0.	6.24	14.83	15.50	0.	5.86	21.36
13.16.30	0.	7.90	7.90	8.24	0.	6.01	14.25	14.88	0.	5.63	20.51
13.17. 0	0.	7.61	7.61	7.90	0.	5.78	13.68	14.29	0.	5.42	19.71
13.17.30	0.	7.37	7.37	7.61	0.	5.56	13.17	13.72	0.	5.22	18.94
13.18. 0	0.	7.15	7.15	7.36	0.	5.36	12.72	13.21	0.	5.02	18.23
13.18.30	0.	6.96	6.96	7.15	0.	5.19	12.34	12.75	0.	4.84	17.59
13.19. 0	0.	6.78	6.78	6.96	0.	5.04	12.00	12.36	0.	4.66	17.03
13.19.30	0.	6.62	6.62	6.78	0.	4.91	11.69	12.02	0.	4.51	16.54
13.20. 0	0.	6.46	6.46	6.61	0.	4.79	11.40	11.71	0.	4.39	16.10
13.20.30	0.	6.30	6.30	6.46	0.	4.68	11.14	11.43	0.	4.27	15.70
13.21. 0	0.	6.15	6.15	6.30	0.	4.58	10.88	11.16	0.	4.17	15.32
13.21.30	0.	5.99	5.99	6.15	0.	4.48	10.62	10.90	0.	4.07	14.97
13.22. 0	0.	5.82	5.82	5.99	0.	4.38	10.37	10.64	0.	3.98	14.63
13.22.30	0.	5.65	5.65	5.82	0.	4.28	10.11	10.39	0.	3.90	14.29
13.23. 0	0.	5.51	5.51	5.65	0.	4.19	9.84	10.13	0.	3.82	13.94
13.23.30	0.	5.38	5.38	5.51	0.	4.08	9.59	9.86	0.	3.73	13.59
14. 0. 0	0.	5.27	5.27	5.38	0.	3.98	9.36	9.61	0.	3.65	13.26
14. 0.30	0.	5.17	5.17	5.27	0.	3.87	9.14	9.37	0.	3.57	12.94
MAXIMUM	78.70	545.28	545.28	542.67	78.70	355.27	803.85	799.17	78.70	83.27	882.44

Test Run - 4 Calculations of dam plan/planned high level (the calculations are made by reading 30" TWSRK/AAAA file prepared in Test Run - 3).

```
                    **********************
                    *  INPUT CARD LIST   *      PRMFL  30,W,R,TWSRK/BBBB
                    **********************      PRMFL  31,W,R,TWSRK/AAAA
                                                PRMFL  32,W,R,TWSRK/CCCC
              1        2        3        4        5        6        7        8
     ********************************************************************
  0---RUN
  1---     AKITAKEN  MAKI DAM     KOUZUI  KAISEKI    1/100     KEIKAKU TAKAMIZU
  2---       16                 11
  3---       0
  4---       0        2        1        -1
  5--- A - KADO
  6---                                 0.492
  7--- B - KADO
  8---                                 0.537
  9---1800.0
 10---     2001      2002       81       94       81       93     2005     2006
 11---       82        93     2009     2010       82     2011
 12---    1 - R     1 - Q  DAM(IN)  DAM(OU)   KA(IN)   KA(OU)    2 - R    2 - Q
 13---  XB(IN)    XB(OU)    3 - R    3 - Q  KIJUNTEN  (KIHON)
 14---       1
 15---900.0
 16---       0        1
 17---       7
 18---  230.0   3625000.0
 19---  231.0   3850000.0
 20---  235.0   4500000.0
 21---  240.0   5550000.0
 22---  245.0   6750000.0
 23---  250.0   8001000.0
 24---  260.0  11202000.0
 25---3.20       3.20     1231.0
 26---    SHOWA   39 NEN  8 - 12   KOUZUI                  7
 27---      80            1        7
 28---       1           24  3400.0
 29---      12  9.0          0.0
 30---   KAKUNODATE
 31---
 32---
 33---1.5                              7.5     54.5     53.0     21.5
 34---      24            1                              0.5
 35---END
     ********************************************************************
              1        2        3        4        5        6        7        8
```

Flood trace system chart



AKITAKEN MAKI DAM KOUZUI KAISEKI 1/100 KEIKAKU TAKAMIZU

SHOWA 39 NEN 8 - 12 KOUZUI 7

KAKUNODATE

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	7.5	54.5	53.0	21.5	1.5	0.	0.	0.	0.	0.	0.5	0.

SIGMA-R = 138.5

X – Y CURVE

230.000	0.367500E 07	235.000	0.450000E 07	245.000	0.675000E 07	260.000	0.112020E 08
231.000	0.385000E 07	240.000	0.555000E 07	250.000	0.800100E 07		

X – Q CURVE

231.000	0.	237.000	0.855851E 02	243.000	0.131579E 03	249.000	0.165232E 03	255.000	0.193106E 03
231.200	0.572437E 00	237.200	0.875086E 02	243.200	0.132839E 03	249.200	0.166236E 03	255.200	0.193966E 03
231.400	0.161910E 01	237.400	0.893907E 02	243.400	0.134086E 03	249.400	0.167235E 03	255.400	0.194822E 03
231.600	0.297447E 01	237.600	0.912340E 02	243.600	0.135322E 03	249.600	0.168227E 03	255.600	0.195675E 03
231.800	0.457949E 01	237.800	0.930408E 02	243.800	0.136546E 03	249.800	0.169214E 03	255.800	0.196524E 03
232.000	0.640004E 01	238.000	0.948131E 02	244.000	0.137760E 03	250.000	0.170195E 03	256.000	0.197369E 03
232.200	0.841302E 01	238.200	0.965530E 02	244.200	0.138963E 03	250.200	0.171170E 03	256.200	0.198211E 03
232.400	0.106017E 02	238.400	0.982620E 02	244.400	0.140156E 03	250.400	0.172140E 03	256.400	0.199049E 03
232.600	0.129528E 02	238.600	0.999418E 02	244.600	0.141339E 03	250.600	0.173104E 03	256.600	0.199884E 03
232.800	0.154558E 02	238.800	0.101594E 03	244.800	0.142512E 03	250.800	0.174063E 03	256.800	0.200715E 03
233.000	0.181020E 02	239.000	0.103219E 03	245.000	0.143675E 03	251.000	0.175017E 03	257.000	0.201542E 03
233.200	0.208841E 02	239.200	0.104820E 03	245.200	0.144829E 03	251.200	0.175966E 03	257.200	0.202367E 03
233.400	0.237957E 02	239.400	0.106396E 03	245.400	0.145974E 03	251.400	0.176909E 03	257.400	0.203188E 03
233.600	0.268313E 02	239.600	0.107949E 03	245.600	0.147110E 03	251.600	0.177848E 03	257.600	0.204005E 03
233.800	0.299861E 02	239.800	0.109481E 03	245.800	0.148238E 03	251.800	0.178781E 03	257.800	0.204820E 03
234.000	0.332556E 02	240.000	0.110991E 03	246.000	0.149356E 03	252.000	0.179710E 03	258.000	0.205631E 03
234.200	0.366359E 02	240.200	0.112481E 03	246.200	0.150467E 03	252.200	0.180634E 03	258.200	0.206439E 03
234.400	0.401237E 02	240.400	0.113951E 03	246.400	0.151569E 03	252.400	0.181553E 03	258.400	0.207244E 03
234.600	0.437156E 02	240.600	0.115403E 03	246.600	0.152664E 03	252.600	0.182468E 03	258.600	0.208045E 03
234.800	0.474087E 02	240.800	0.116836E 03	246.800	0.153750E 03	252.800	0.183378E 03	258.800	0.208844E 03
235.000	0.510808E 02	241.000	0.118253E 03	247.000	0.154829E 03	253.000	0.184284E 03	259.000	0.209640E 03
235.200	0.547328E 02	241.200	0.119652E 03	247.200	0.155901E 03	253.200	0.185185E 03	259.200	0.210432E 03
235.400	0.583848E 02	241.400	0.121036E 03	247.400	0.156965E 03	253.400	0.186081E 03	259.400	0.211222E 03
235.600	0.620368E 02	241.600	0.122403E 03	247.600	0.158022E 03	253.600	0.186974E 03	259.600	0.212008E 03
235.800	0.656888E 02	241.800	0.123756E 03	247.800	0.159072E 03	253.800	0.187862E 03	259.800	0.212792E 03
236.000	0.693408E 02	242.000	0.125094E 03	248.000	0.160115E 03	254.000	0.188746E 03	260.000	0.213573E 03
236.200	0.729928E 02	242.200	0.126417E 03	248.200	0.161151E 03	254.200	0.189626E 03		
236.400	0.766448E 02	242.400	0.127728E 03	248.400	0.162181E 03	254.400	0.190502E 03		
236.600	0.802968E 02	242.600	0.129024E 03	248.600	0.163204E 03	254.600	0.191374E 03		
236.800	0.836173E 02	242.800	0.130308E 03	248.800	0.164221E 03	254.800	0.192242E 03		

1 AKITAKEN MAKI DAM KOUZUI KAISEKI 1/100 KEIKAKU TAKAMIZU

SHOWA 39 NEN 8 - 12 KOUZUI 7

PAGE. 1

DAY TIME	WATER DEPTH	INFLOW	DISCHARGE	VOLUME
12. 9. 0.	231.333	1.268	0.	3904098.3
12. 9.15.	231.336	1.268	1.286	3904660.7
12. 9.30.	231.336	1.268	1.286	3904644.6
12. 9.45.	231.336	1.270	1.285	3904629.9
12.10. 0.	231.336	1.272	1.285	3904617.6
12.10.15.	231.336	1.318	1.285	3904626.8
12.10.30.	231.336	1.363	1.287	3904675.7
12.10.45.	231.337	1.447	1.290	3904780.6
12.11. 0.	231.338	1.531	1.296	3904952.3
12.11.15.	231.340	1.584	1.303	3905189.9
12.11.30.	231.341	1.638	1.312	3905463.0
12.11.45.	231.343	1.660	1.322	3905761.7
12.12. 0.	231.345	1.682	1.332	3906071.3
12.12.15.	231.347	1.690	1.342	3906385.4
12.12.30.	231.349	1.697	1.352	3906697.4
12.12.45.	231.351	1.700	1.362	3907005.3
12.13. 0.	231.353	1.703	1.371	3907306.7
12.13.15.	231.354	1.704	1.381	3907601.0
12.13.30.	231.356	1.705	1.390	3907887.8
12.13.45.	231.358	1.705	1.399	3908166.9
12.14. 0.	231.360	1.705	1.408	3908438.3
12.14.15.	231.361	1.705	1.416	3908702.1
12.14.30.	231.363	1.705	1.425	3908958.4
12.14.45.	231.364	1.705	1.433	3909207.5
12.15. 0.	231.366	1.705	1.440	3909449.5
12.15.15.	231.367	1.705	1.448	3909684.6
12.15.30.	231.369	1.705	1.455	3909913.0
12.15.45.	231.370	1.705	1.462	3910134.8
12.16. 0.	231.371	1.705	1.469	3910350.4
12.16.15.	231.373	1.705	1.476	3910559.8
12.16.30.	231.374	1.705	1.483	3910763.2
12.16.45.	231.375	1.705	1.489	3910960.8
12.17. 0.	231.376	1.705	1.495	3911152.8
12.17.15.	231.377	1.705	1.501	3911339.2
12.17.30.	231.379	1.705	1.507	3911520.3
12.17.45.	231.380	1.705	1.513	3911696.2
12.18. 0.	231.381	1.705	1.518	3911867.2
12.18.15.	231.382	1.705	1.524	3912033.2
12.18.30.	231.383	1.705	1.529	3912194.5
12.18.45.	231.384	1.705	1.534	3912351.3
12.19. 0.	231.385	1.705	1.539	3912503.5
12.19.15.	231.386	1.705	1.543	3912651.4
12.19.30.	231.386	1.705	1.548	3912795.0
12.19.45.	231.387	1.705	1.553	3912934.6
12.20. 0.	231.388	1.705	1.557	3913070.1
12.20.15.	231.389	1.705	1.561	3913201.8
12.20.30.	231.390	1.705	1.565	3913329.7
12.20.45.	231.390	1.705	1.569	3913453.9
12.21. 0.	231.391	1.705	1.573	3913574.6
12.21.15.	231.393	2.184	1.584	3913904.3

AKITAKEN MAKI DAM KOUZUI KAISEKI 1/100 KEIK. J TAKAMIZU

SHOWA 39 NEN 8 - 12 KOUZUI 7 PAGE. 2.

DAY . TIME	WATER DEPTH	INFLOW	DISCHARGE	VOLUME
12.21.30.	231.398	2.663	1.608	3914649.5
12.21.45.	231.406	3.532	1.659	3915967.0
12.22. 0.	231.418	4.400	1.744	3918004.6
12.22.15.	231.507	31.694	2.345	3932406.9
12.22.30.	231.740	58.989	4.103	3970313.6
12.22.45.	232.223	128.173	8.668	4048790.1
12.23. 0.	233.049	197.357	18.780	4182926.6
12.23.15.	234.243	290.059	37.386	4376988.9
12.23.30.	235.641	382.761	62.791	4634678.5
12.23.45.	237.135	464.021	86.884	4948376.7
13. 0. 0.	238.892	545.281	102.345	5317409.6
13. 0.15.	240.515	463.558	114.788	5673677.8
13. 0.30.	241.655	381.836	122.775	5947201.9
13. 0.45.	242.563	354.138	128.786	6165187.6
13. 1. 0.	243.347	326.440	133.756	6353303.6
13. 1.15.	243.937	259.185	137.376	6494825.1
13. 1.30.	244.264	191.929	139.343	6573302.5
13. 1.45.	244.404	162.280	140.178	6606912.1
13. 2. 0.	244.431	132.631	140.338	6613390.1
13. 2.15.	244.368	114.285	139.966	6598365.8
13. 2.30.	244.239	95.940	139.195	6567344.4
13. 2.45.	244.058	84.818	138.108	6523898.5
13. 3. 0.	243.840	73.696	136.787	6471526.6
13. 3.15.	243.593	66.535	135.275	6412202.5
13. 3.30.	243.324	59.374	133.614	6347861.6
13. 3.45.	243.040	54.274	131.830	6279553.4
13. 4. 0.	242.743	49.174	129.942	6208307.7
13. 4.15.	242.437	45.413	127.965	6134813.3
13. 4.30.	242.124	41.652	125.914	6059746.7
13. 4.45.	241.807	38.821	123.800	5983588.5
13. 5. 0.	241.487	35.991	121.628	5906811.4
13. 5.15.	241.165	33.704	119.410	5829706.7
13. 5.30.	240.844	31.416	117.148	5752559.6
13. 5.45.	240.524	29.789	114.849	5675703.6
13. 6. 0.	240.206	28.162	112.525	5599463.4
13. 6.15.	239.877	26.894	110.059	5524076.1
13. 6.30.	239.523	25.625	107.353	5449874.8
13. 6.45.	239.176	24.558	104.632	5377064.4
13. 7. 0.	238.837	23.491	101.894	5305750.3
13. 7.15.	238.505	22.883	99.148	5236150.1
13. 7.30.	238.183	22.276	96.407	5168472.1
13. 7.45.	237.870	21.699	93.662	5102729.7
13. 8. 0.	237.566	21.122	90.924	5038935.7
13. 8.15.	237.271	20.200	88.178	4976935.1
13. 8.30.	236.984	19.277	85.425	4916578.8
13. 8.45.	236.706	18.500	82.053	4858213.8
13. 9. 0.	236.442	17.723	77.406	4802757.8
13. 9.15.	236.194	17.067	72.886	4750781.8
13. 9.30.	235.963	16.511	68.658	4702152.1
13. 9.45.	2[illegible]5.746	15.823	64.701	465[illegible].1

AKITAKEN MAKI DAM KOUZUI KAISEKI 1/100 KEI. U TAKAMIZU

SHOWA 39 NEN 8 - 12 KOUZUI 7 PAGE. 3.

DAY TIME	WATER DEPTH	INFLOW	DISCHARGE	VOLUME
13.10. 0.	235.543	15.235	60.998	4614057.9
13.10.15.	235.353	14.712	57.532	4574196.0
13.10.30.	235.176	14.190	54.288	4536883.1
13.10.45.	235.009	13.768	51.252	4501971.3
13.11. 0.	234.813	13.347	47.653	4469665.8
13.11.15.	234.632	12.990	44.299	4440138.9
13.11.30.	234.466	12.633	41.300	4413149.4
13.11.45.	234.313	12.317	38.612	4388416.2
13.12. 0.	234.174	12.001	36.188	4365698.9
13.12.15.	234.045	11.709	34.012	4344777.9
13.12.30.	233.926	11.437	32.044	4325459.2
13.12.45.	233.816	11.137	30.245	4307578.4
13.13. 0.	233.714	10.857	28.625	4290984.1
13.13.15.	233.619	10.578	27.126	4275541.6
13.13.30.	233.530	10.299	25.769	4261132.9
13.13.45.	233.447	10.045	24.511	4247661.0
13.14. 0.	233.370	9.791	23.352	4235043.4
13.14.15.	233.297	9.572	22.292	4223223.3
13.14.30.	233.228	9.353	21.298	4212121.5
13.14.45.	233.164	9.157	20.387	4201692.5
13.15. 0.	233.104	8.961	19.547	4191875.3
13.15.15.	233.047	8.779	18.754	4182622.7
13.15.30.	232.993	8.597	18.012	4173897.0
13.15.45.	232.942	8.423	17.340	4165647.4
13.16. 0.	232.894	8.249	16.704	4157829.6
13.16.15.	232.849	8.076	16.100	4150413.7
13.16.30.	232.805	7.903	15.527	4143371.8
13.16.45.	232.764	7.758	15.007	4136678.7
13.17. 0.	232.725	7.613	14.517	4130309.5
13.17.15.	232.688	7.490	14.050	4124250.5
13.17.30.	232.652	7.367	13.607	4118490.3
13.17.45.	232.619	7.259	13.185	4113015.8
13.18. 0.	232.587	7.152	12.794	4107810.2
13.18.15.	232.556	7.056	12.435	4102850.1
13.18.30.	232.527	6.959	12.093	4098118.9
13.18.45.	232.499	6.871	11.767	4093605.6
13.19. 0.	232.473	6.783	11.455	4089299.8
13.19.15.	232.447	6.700	11.158	4085190.9
13.19.30.	232.423	6.617	10.874	4081268.9
13.19.45.	232.400	6.538	10.603	4077523.5
13.20. 0.	232.378	6.458	10.362	4073937.3
13.20.15.	232.357	6.381	10.130	4070493.6
13.20.30.	232.337	6.303	9.907	4067184.6
13.20.45.	232.317	6.225	9.693	4064002.4
13.21. 0.	232.298	6.148	9.486	4060939.8
13.21.15.	232.280	6.069	9.288	4057988.9
13.21.30.	232.262	5.990	9.096	4055142.5
13.21.45.	232.245	5.907	8.911	4052393.1
13.22. 0.	232.229	5.825	8.732	4049733.4
13.22.15.	232.213	5.739	8.558	4047156.9

AKITAKEN MAKI DAM KOUZUI KAISEKI 1/100 KEIKAKU TAKAMIZU

SHOWA 39 NEN 8 - 12 KOUZUI 7

PAGE 4.

DAY TIME	WATER DEPTH	INFLOW	DISCHARGE	VOLUME
13.22.30.	232.198	5.654	8.392	4044656.5
13.22.45.	232.183	5.581	8.241	4042227.5
13.23. 0.	232.168	5.508	8.095	4039866.5
13.23.15.	232.154	5.445	7.953	4037573.8
13.23.30.	232.141	5.381	7.815	4035350.0
13.23.45.	232.127	5.325	7.682	4033194.1
14. 0. 0.	232.114	5.268	7.552	4031105.6
14. 0.15.	232.102	5.217	7.427	4029083.1
14. 0.30.	232.090	5.165	7.306	4027125.1
14. 0.45.	232.078	5.114	7.188	4025228.3
14. 1. 0.	232.067	5.062	7.074	4023389.2

MAXIMAM OF WATER ELEVATION = 244.431
MAXIMAM OF INFLOW = 545.281
MAXIMAM OF DISCHARGE = 140.338
MAXIMAM OF VOLUME = 6613390.063

KOUZUI CHOSETSU TORYO
1.2 * 2763390.1 = 3400000.0

KOUZUI JI MANSUI I
246.998

AKITAKEN MAKI DAM KOUZUI KAISEKI . 1/100 KEIKAKU TAKAMIZU
SHOWA 39 NEN 8 - 12 KOUZUI 7

TIME	1 - R	1 - Q	DAM(IN)	DAM(OU)	XA(IN)	XA(OU)	2 - R	2 - Q	XB(IN)	XB(OU)	3 - R	3 - Q	KIJUNTEN
12. 9. 0	0.	1.27	1.27	0.	0.	0.	0.	0.88	0.88	0.88	0.	0.42	1.29
12. 9.30	0.	1.27	1.27	1.29	1.29	0.02	0.	0.88	0.90	0.88	0.	0.42	1.29
12.10. 0	0.	1.27	1.27	1.28	1.28	1.29	0.	0.88	2.16	0.90	0.	0.42	1.31
12.10.30	0.	1.36	1.36	1.29	1.29	1.28	0.	0.94	2.23	2.07	0.	0.45	2.52
12.11. 0	0.	1.53	1.53	1.30	1.30	1.29	0.	1.06	2.34	2.22	0.	0.50	2.72
12.11.30	0.	1.64	1.64	1.31	1.31	1.30	0.	1.13	2.43	2.34	0.	0.54	2.87
12.12. 0	0.	1.68	1.68	1.33	1.33	1.31	0.	1.16	2.47	2.42	0.	0.55	2.97
12.12.30	0.	1.70	1.70	1.35	1.35	1.33	0.	1.17	2.50	2.47	0.	0.56	3.03
12.13. 0	0.	1.70	1.70	1.37	1.37	1.35	0.	1.18	2.53	2.50	0.	0.56	3.06
12.13.30	0.	1.70	1.70	1.39	1.39	1.37	0.	1.18	2.55	2.53	0.	0.56	3.09
12.14. 0	0.	1.71	1.71	1.41	1.41	1.39	0.	1.18	2.57	2.55	0.	0.56	3.11
12.14.30	0.	1.71	1.71	1.42	1.42	1.41	0.	1.18	2.59	2.57	0.	0.56	3.13
12.15. 0	0.	1.71	1.71	1.44	1.44	1.42	0.	1.18	2.60	2.58	0.	0.56	3.14
12.15.30	0.	1.71	1.71	1.46	1.46	1.44	0.	1.18	2.62	2.60	0.	0.56	3.16
12.16. 0	0.	1.71	1.71	1.47	1.47	1.46	0.	1.18	2.63	2.62	0.	0.56	3.18
12.16.30	0.	1.71	1.71	1.48	1.48	1.47	0.	1.18	2.65	2.63	0.	0.56	3.19
12.17. 0	0.	1.71	1.71	1.50	1.50	1.48	0.	1.18	2.66	2.65	0.	0.56	3.21
12.17.30	0.	1.71	1.71	1.51	1.51	1.50	0.	1.18	2.67	2.66	0.	0.56	3.22
12.18. 0	0.	1.71	1.71	1.52	1.52	1.51	0.	1.18	2.69	2.67	0.	0.56	3.23
12.18.30	0.	1.71	1.71	1.53	1.53	1.52	0.	1.18	2.70	2.68	0.	0.56	3.24
12.19. 0	0.	1.71	1.71	1.54	1.54	1.53	0.	1.18	2.71	2.70	0.	0.56	3.26
12.19.30	0.	1.71	1.71	1.55	1.55	1.54	0.	1.18	2.72	2.71	0.	0.56	3.27
12.20. 0	0.	1.71	1.71	1.56	1.56	1.55	0.	1.18	2.73	2.72	0.	0.56	3.28
12.20.30	0.	1.71	1.71	1.57	1.57	1.56	0.	1.18	2.74	2.73	0.	0.56	3.29
12.21. 0	10.83	1.71	1.71	1.57	1.57	1.57	10.83	1.18	2.74	2.73	10.83	0.56	3.29
12.21.30	10.83	2.66	2.66	1.61	1.61	1.57	10.83	1.78	3.36	2.74	10.83	0.70	3.44
12.22. 0	78.70	4.40	4.40	1.74	1.74	1.61	78.70	2.86	4.47	3.31	78.70	0.91	4.22
12.22.30	78.70	58.99	58.99	4.10	4.10	1.78	78.70	35.46	37.25	4.39	78.70	5.71	10.10
12.23. 0	76.53	197.36	197.36	18.78	18.78	4.34	76.53	121.55	125.89	34.87	76.53	19.87	54.69
12.23.30	76.53	382.76	382.76	62.79	62.79	19.48	76.53	241.49	260.98	119.33	76.53	46.07	165.40
13. 0. 0	31.05	545.28	545.28	102.34	102.34	63.42	31.05	355.27	418.69	250.98	31.05	81.64	332.62
13. 0.30	31.05	381.84	381.84	122.77	122.77	102.67	31.05	261.18	363.85	407.02	31.05	81.91	488.93
13. 1. 0	2.17	326.44	326.44	133.76	133.76	122.95	2.17	226.04	348.99	367.91	2.17	83.27	451.19
13. 1.30	2.17	191.93	191.93	139.34	139.34	133.85	2.17	137.48	271.33	350.09	2.17	64.27	414.36
13. 2. 0	0.	132.63	132.63	140.34	140.34	139.36	0.	96.43	235.78	277.08	0.	51.81	328.89
13. 2.30	0.	95.94	95.94	139.20	139.20	140.32	0.	70.77	211.09	238.42	0.	42.29	280.71
13. 3. 0	0.	73.70	73.70	136.79	136.79	139.16	0.	54.74	193.90	212.91	0.	35.40	248.33
13. 3.30	0.	59.37	59.37	133.61	133.61	136.74	0.	44.08	180.82	195.17	0.	30.31	225.48
13. 4. 0	0.	49.17	49.17	129.94	129.94	133.56	0.	36.79	170.34	181.79	0.	26.19	207.98
13. 4.30	0.	41.65	41.65	125.91	125.91	129.88	0.	31.05	160.93	171.12	0.	23.05	194.17
13. 5. 0	0.	35.99	35.99	121.63	121.63	125.85	0.	26.92	152.77	161.62	0.	20.51	182.13
13. 5.30	0.	31.42	31.42	117.15	117.15	121.56	0.	23.59	145.14	153.37	0.	18.50	171.87
13. 6. 0	0.	28.16	28.16	112.53	112.53	117.07	0.	20.99	138.06	145.71	0.	16.79	162.50
13. 6.30	0.	25.63	25.63	107.35	107.35	112.44	0.	19.06	131.50	138.58	0.	15.32	153.90
13. 7. 0	0.72	23.49	23.49	101.89	101.89	107.27	0.72	17.51	124.78	131.99	0.72	14.03	146.01
13. 7.30	0.72	22.28	22.28	96.41	96.41	101.83	0.72	16.64	118.44	125.27	0.72	13.13	138.40
13. 8. 0	0.	21.12	21.12	90.92	90.92	96.32	0.	15.85	112.17	118.91	0.	12.36	131.27
13. 8.30	0.	19.28	19.28	85.42	85.42	90.84	0.	14.66	105.49	112.63	0.	11.48	124.12

AKITAKEN MAKI DAM KOUZUI KAISEKI 1/100 KEIKAKU TAKAMIZU

SHOWA 39 NEN 8 12 KOUZUI 7

TIME	1 - R	1 - O	DAM(IN)	DAM(OU)	KA(IN)	KA(OU)	2 - R	2 - O	KB(IN)	KB(OU)	3 - R	3 - O	KIJUNTEN
13. 9. 0	0.	17.72	17.72	77.41	77.41	85.30	0.	13.48	98.78	105.99	0.	10.71	116.70
13. 9.30	0.	16.41	16.41	68.66	68.66	77.27	0.	12.45	89.71	99.27	0.	10.04	109.31
13.10. 0	0.	15.24	15.24	61.00	61.00	68.54	0.	11.58	80.11	90.38	0.	9.51	99.89
13.10.30	0.	14.19	14.19	54.29	54.29	60.89	0.	10.81	71.70	80.82	0.	9.07	89.90
13.11. 0	0.	13.35	13.35	47.65	47.65	54.18	0.	10.08	64.26	72.32	0.	8.70	81.02
13.11.30	0.	12.63	12.63	41.30	41.30	47.55	0.	9.49	57.04	64.81	0.	8.37	73.18
13.12. 0	0.	12.00	12.00	36.19	36.19	41.22	0.	9.00	50.22	57.58	0.	8.07	65.65
13.12.30	0.	11.42	11.42	32.04	32.04	36.12	0.	8.57	44.69	50.72	0.	7.79	58.51
13.13. 0	0.	10.86	10.86	28.63	28.63	31.99	0.	8.18	40.17	45.10	0.	7.52	52.62
13.13.30	0.	10.30	10.30	25.77	25.77	28.58	0.	7.82	36.40	40.50	0.	7.26	47.76
13.14. 0	0.	9.79	9.79	23.35	23.35	25.73	0.	7.46	33.19	36.68	0.	6.99	43.66
13.14.30	0.	9.35	9.35	21.30	21.30	23.32	0.	7.11	30.42	33.43	0.	6.71	40.14
13.15. 0	0.	8.96	8.96	19.55	19.55	21.27	0.	6.78	28.05	30.63	0.	6.41	37.04
13.15.30	0.	8.60	8.60	18.01	18.01	19.52	0.	6.50	26.02	28.22	0.	6.13	34.35
13.16. 0	0.	8.25	8.25	16.70	16.70	17.99	0.	6.24	24.23	26.17	0.	5.86	32.03
13.16.30	0.	7.90	7.90	15.53	15.53	16.69	0.	6.01	22.69	24.37	0.	5.63	30.00
13.17. 0	0.	7.61	7.61	14.52	14.52	15.51	0.	5.78	21.29	22.81	0.	5.42	28.23
13.17.30	0.	7.37	7.37	13.61	13.61	14.50	0.	5.56	20.06	21.40	0.	5.22	26.62
13.18. 0	0.	7.15	7.15	12.79	12.79	13.59	0.	5.36	18.95	20.16	0.	5.02	25.18
13.18.30	0.	6.96	6.96	12.09	12.09	12.78	0.	5.19	17.97	19.03	0.	4.84	23.87
13.19. 0	0.	6.78	6.78	11.46	11.46	12.08	0.	5.04	17.12	18.04	0.	4.66	22.71
13.19.30	0.	6.62	6.62	10.87	10.87	11.45	0.	4.91	16.35	17.18	0.	4.51	21.70
13.20. 0	0.	6.46	6.46	10.36	10.36	10.87	0.	4.79	15.66	16.41	0.	4.39	20.80
13.20.30	0.	6.30	6.30	9.91	9.91	10.35	0.	4.68	15.04	15.71	0.	4.27	19.98
13.21. 0	0.	6.15	6.15	9.49	9.49	9.90	0.	4.58	14.48	15.08	0.	4.17	19.25
13.21.30	0.	5.99	5.99	9.10	9.10	9.48	0.	4.48	13.96	14.52	0.	4.07	18.59
13.22. 0	0.	5.82	5.82	8.73	8.73	9.09	0.	4.38	13.47	14.00	0.	3.98	17.98
13.22.30	0.	5.65	5.65	8.39	8.39	8.73	0.	4.28	13.01	13.51	0.	3.90	17.41
13.23. 0	0.	5.51	5.51	8.10	8.10	8.39	0.	4.19	12.57	13.05	0.	3.82	16.86
13.23.30	0.	5.38	5.38	7.82	7.82	8.09	0.	4.03	12.18	12.61	0.	3.73	16.34
14. 0. 0	0.	5.27	5.27	7.55	7.55	7.81	0.	3.98	11.79	12.20	0.	3.65	15.86
14. 0.30	0.	5.17	5.17	7.31	7.31	7.55	0.	3.87	11.42	11.82	0.	3.57	15.38
MAXIMUM	78.70	545.28	545.28	140.34	140.34	140.32	78.70	355.27	418.69	407.02	78.70	83.27	488.93

AKITAKEN MAKI DAM KOUZUI KAISEKI 1/100 KEIKAKU TAKAMIZU
SHOWA 39 NEN 8 - 12 KOUZUI 7

TIME	(KIHON)
12. 9. 0	2.56
12. 9.30	2.56
12.10. 0	2.56
12.10.30	2.59
12.11. 0	2.71
12.11.30	2.95
12.12. 0	3.20
12.12.30	3.35
12.13. 0	3.41
12.13.30	3.43
12.14. 0	3.44
12.14.30	3.44
12.15. 0	3.44
12.15.30	3.44
12.16. 0	3.44
12.16.30	3.44
12.17. 0	3.44
12.17.30	3.44
12.18. 0	3.44
12.18.30	3.44
12.19. 0	3.44
12.19.30	3.44
12.20. 0	3.44
12.20.30	3.44
12.21. 0	3.44
12.21.30	3.58
12.22. 0	4.37
12.22.30	11.11
12.23. 0	58.00
12.23.30	218.32
13. 0. 0	504.29
13. 0.30	800.43
13. 1. 0	882.44
13. 1.30	635.83
13. 2. 0	524.33
13. 2.30	342.60
13. 3. 0	244.47
13. 3.30	184.52
13. 4. 0	146.17
13. 4.30	120.64
13. 5. 0	101.79
13. 5.30	87.84
13. 6. 0	76.96
13. 6.30	68.20
13. 7. 0	61.59
13. 7.30	56.53
13. 8. 0	52.69
13. 8.30	49.74

AKITAKEN MAKI DAM KOUZUI KAISEKI 1/100 KEIKAKU TAKAMIZU
SHOWA 39 NEN 8 12 KOUZUI 7

TIME	(KIHON)
13. 9. 0	46.64
13. 9.30	43.00
13.10. 0	39.85
13.10.30	37.20
13.11. 0	34.87
13.11.30	32.76
13.12. 0	31.00
13.12.30	29.50
13.13. 0	28.16
13.13.30	26.92
13.14. 0	25.72
13.14.30	24.53
13.15. 0	23.36
13.15.30	22.31
13.16. 0	21.36
13.16.30	20.51
13.17. 0	19.71
13.17.30	18.94
13.18. 0	18.23
13.18.30	17.59
13.19. 0	17.03
13.19.30	16.54
13.20. 0	16.10
13.20.30	15.70
13.21. 0	15.32
13.21.30	14.97
13.22. 0	14.63
13.22.30	14.29
13.23. 0	13.94
13.23.30	13.59
14. 0. 0	13.26
14. 0.30	12.94
MAXIMUM	882.44

THE REPUBLIC OF VENEZUELA

STUDY ON COMPREHENSIVE IMPROVEMENT OF THE APURE RIVER BASIN

USER'S MANUAL OF COMPUTER PROGRAM

RUNOFF CALCULATION
TANK MODEL METHOD

JANUARY 1993

JAPAN INTERNATIONAL COOPERATION AGENCY

USER'S MANUAL

RUNOFF CALCULATION

TANK MODEL METHOD

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1. Introduction

The tank model method represents a run-off calculation method where river basins are replaced with a combination of several storage-type model containers (tanks), which method was proposed by Mr. Masami Sugawara, Science and Technology Agency. For instance, let's assume the 4 tanks which are arranged in series as shown in Fig. 1. The right-side holes of each tank represent run-off and the bottom hole infiltration.

Rainfall R(f) at an arbitrary time enters the uppermost tank V_1, and the water collected in V_1 moves into the tank V_2. The tank V_2 receives water from V_1, discharges it through the right-side holes or infiltrate it through the bottom hole, thus transferring water into the 3rd tank V_3. The same is repeated thereafter.

This model is easier to understand if it is compared with a model of the basin's run-off mechanism shown in Fig. 2.

When it rains, it wets the soil layer of ground surface. After the surface layer is impregnated with water to some extent, water turns to run off over the ground surface. This corresponds to the lower right hole of the tank model V_1 in Fig. 1 which is located somewhat above the bottom surface.

If it further rains to give the surface layer more sufficient water, it would accelerate the surface run-off. This corresponds to the upper right run-off hole of the tank model V_1 in Fig. 1.

The water contained in the ground surface layer always infiltrates downwards. This corresponds to the bottom hole of tank model V_1.

The water infiltrated downwards from the surface layer is collected at the first acquifer. Some volume collected there, the run-off begins from this acquifer and becomes the springs from mountain sides, etc., which correspond to the run-off from the tank model V_2.

Fig.1:Model of 4 tanks in series

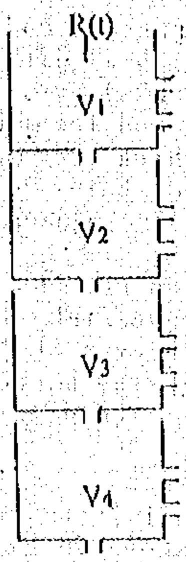
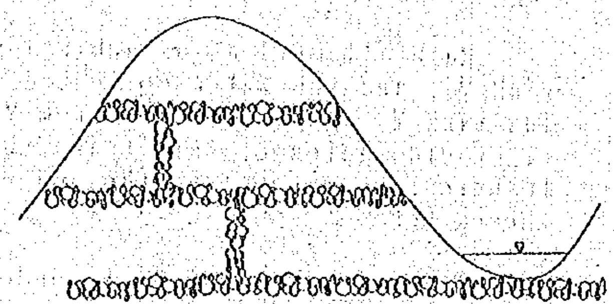


Fig.2: Schematic view of run-off mechanism at basin



The water infiltrated downwards from the first acquifer is collected at the second acquifer, repeats the same phenomenon as at the first acquifier and becomes the springs from mountain feet which correspond to the run-off from the tank model V_3.

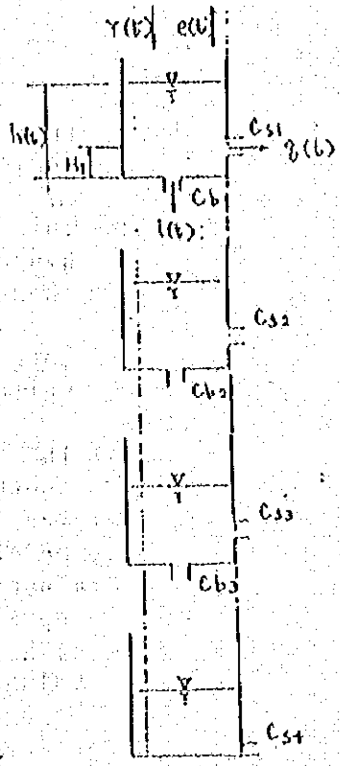
The water infiltrated further downwards becomes stable underground water and gradually runs off over river beds when rivers are at a low level or droughty. This corresponds to the run-off from the tank model V_4.

Eventually, the total volume of water running off through the right-side holes of said 4 tank models is the calculated outflow from a river basin.

Thus when these tanks models are compared with the outflow components, it can generally be said that the top tank V_1 corresponds to the surface run-off, the second top tank V_2 to the intermediate run-off, the 3rd and bottom tanks V_3 and V_4 to the base run-off.

Most tank models generally consist of 3 or 4 tanks arranged in series as mentioned above, but their number and how to arrange them may be freely decided according to the characteristics of river basin.

The discharge and infiltration are as follows:



$q(t) = (h(t) - H_1) \times C_{s1}$

$i(t) = h(t) \times C_{b1}$

Continuous equation is as follows:

$r(t) - e(t) - q(r) - i(r) = dh/dt$

where, $r(t)$: rainfall (mm/day)
$e(t)$: evapotranspiration (mm/day)
$q(t)$: discharge (mm/day)
$i(t)$: infiltration (mm/day)
$h(t)$: water depth (mm)
H_1: height of side hole (mm)
C_{s1}: coefficient of side hole
C_{b1}: coefficient of bottom hole

1.1 Characteristics of the tank model method

The tank model method can be characterized as follows.

1) The phenomenon that the initial loss and the amount of loss change according to the rainfall history is automatically included in the model (the change depends on the run-off and infiltration holes of the top tank).

2) The characteristic of non-linearity that as rainfall increases, run-off volume acceleratedly increases is included in the model (the run-off increase depends on the plural run-off holes provided at the top tank).

3) The tanks are so made that if the rainfall strength is large, the storage volume in the top tank can increase to increase the outflow, and if the rainfall strength is small, most storage volume can infiltrate downwards and gradually run off (this is enabled by the storage-type tanks arranged in series).

4) The run-off from each tank shows its own reduction curve, so the total outflow can be represented by the total of plural run-off components each with its own reduction characteristics (because plural tanks are combined together).

5) A time lag is automatically given while water passes tanks and flows down. Time lag naturally occurs to the run-off

from lower tanks (due to the storage-type tanks arranged in series).

6) This method has many common characteristics to the unit hydrograph, the run-off and storage function methods, and these characteristics are combined together in this method.

7) Both flood run-off and low-level run-off can be shown in a uniform model.

8) The run-off calculations can be done only by addition, subtraction and multiplication.

9) The largest disadvantage of the tank model method is that the predetermined figures cannot apply to this method as it is of a non-linear type, so that many trials and errors have to be repeated to grope for the assumed constants (the multiplier of each tank hole, its height and the initial value of storage volume of each tank) in order to determine the best model to be used. Some intuition and experience are required for it. A large number of times of trials and errors, a tremendous volume of calculations and severe patience are necessary.

10) The propagation of flow water (flood waves) cannot be shown by this method. In the basin with a long flow-down distance, another tank model for the flow-down is required, but its precision is low.

11) This method has, as a matter of fact, been able to produce good precision in both flood run-off and low-level run-off calculations.

1.2 Calculations of run-off and infiltration volume from tanks

If one of the tank models is as shown in Fig. 3, the run-off and infiltration volume from this tank is calculated as follows.

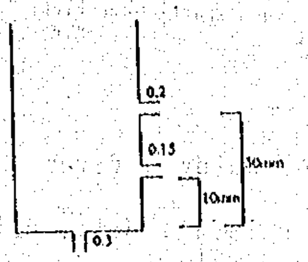
The water injected into this tank from above at any time (rainfall R(t) in the case of the top tank, and the infiltration from the tank just above it in the case of other tanks) is added to the storage water already collected in this tank. The out-flow and infiltration volume from the holes of this tank are determined by the storage volume of this tank multiplied by the multiplier of each hole. (The storage, run-off and infiltration volumes are all shown in mm.) For instance, after water was injected into the tank in Fig. 3:

*If the storage volume becomes 50mm,
Run-off volume (2 holes put together):
$(50-30) \times 0.2 + (50-10) \times 0.15 = 10$ (mm)
Infiltration volume: $50 \times 0.3 = 15$ (mm)

*If the storage volume becomes 25mm,
Run-off volume (2 holes put together):
$(25-10) \times 0.15 = 2.25$ (mm)
Infiltration volume: $25 \times 0.3 = 7.5$ (mm)

*If the storage volume becomes 5mm,
Run-off volume (2 holes put together):
$0 + 0 = 0$ (mm)
Infiltration volume: $5 \times 0.3 = 1.5$ (mm)

Fig. 3: An example of tank



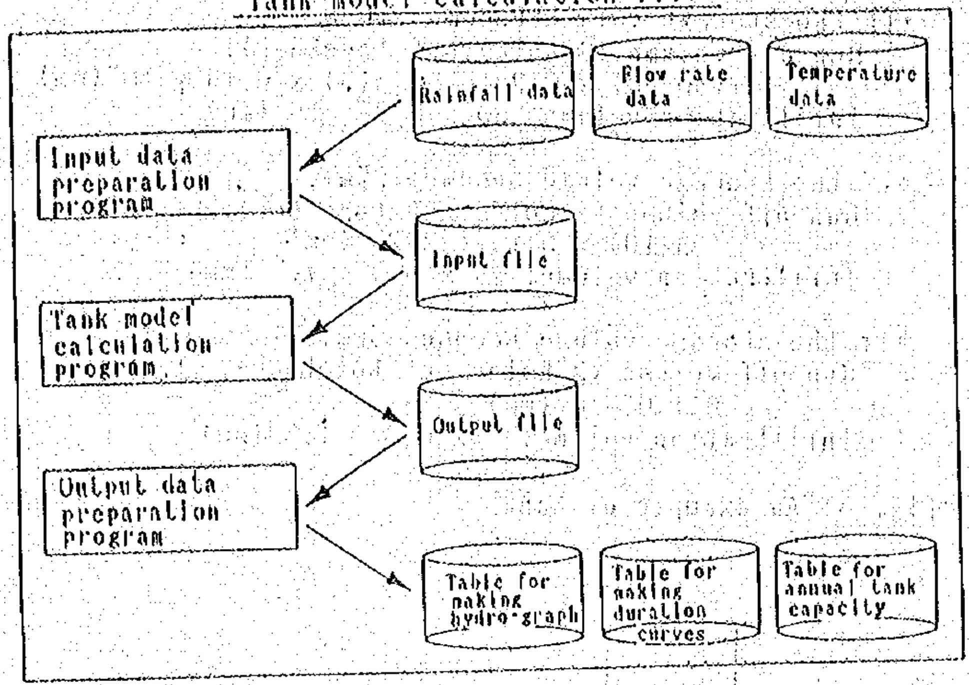
The remaining storage volume after running off and infiltration is determined by subtracting the thus obtained run-off, infiltration and evaporation volumes from the original storage volume. By this, the run-off calculation of this tank at this time is complete.

The above procedure can repeatedly apply to the run-off calculations of subsequent tanks at subsequent times.

2. Program Construction

This program is carried out in the following environment.

Tank model calculation flow



3. Explanation of files

This program uses the following 3 files.

1) Input data file: Observed rainfall data, outflow data and temperature data.

2) Parameter file: Various kinds of parameter control data necessary for calculations.

3) Output data file: Estimated outflow (TANK 1.OUT)
Annual tank capacity (TANK 2.OUT)
Flow duration curve data (TANK 3.OUT)

3.1 Input Data File

The physical form of making files requires that they be made in a sequential formation.

As the measured rainfall data, 12 x 31 records should be prepared annually. ("0" should be entered for such dates as February 30 which does not exist.) Being a free format to be read, some blanks or tabs should be inserted between data when they are input. This is also the case for the following measured outflow and temperature data.

In this tank model calculation program, regarding the measured rainfall data, all data are regarded as available (i.e., there is no lack of measurement). Since there is no program for dealing with any lack of measured rainfall data in this program, care should be taken to eliminate the omission of measurement in preparing these data.

The measured outflow data are not directly involved in the tank model calculations. The measured outflow data written in input data files are only copied directly into the output data files. (Enter -1 in case of measurement omission, and 0 or -1 for the date which does not exist.)

The temperature data are necessary for a 4-step 1-row tank model and when snowmelt is dealt with. In other cases, no temperature data file need to be prepared.

The parameter file consists of the following 6 records.

The 1st record: Common part data

The 2nd record: 4-step 4-row model data

The 3rd record: 4-step 1-row model data

The 4th record: Snowmelt data

The 5th record: Rainfall proportional increase data

The 6th record: Water recycling paddy field data

(1) The 1st record: Common part data

No.	Name of variable	Format type	Contents
1	IMDLSW	Integer	Model selection (0...4-step 4-row, 1...4-step 1-row)
2	IOUTSW1	Integer	Hydrograph output (0...no output, 1... output)
3	IOUTSW2	Integer	Duration curve output (0...no output 1...output)
4	IOUTSW3	Integer	Output of annual tank capacity (0... no output, 1...output)
5	IRVCSW	Integer	River channel selection (0...no selection, 1...selection)
6	INIDPT	Integer	Initial tank capacity integration (0...no integration, 1...integration)*1
7	IIS	Integer	Start year of tank storage capacity integration calculations (in Christ year)
8	IIE	Integer	End year of tank storage capacity integration calculations (in Christ year)
9	IS	Integer	Start year of the calculations (in Christ year)
10	IE	Integer	End year of the calculations (in Christ year)
11	CA	Real	River basin area (km^2)
12	EE	Real	Monthly evaporation volume (x 12)
13	CORV	Real	Correction coefficient of evaporation volume*2
14	TNKPRM	Real	Infiltration coefficient, hole height, etc. of each tank (4 x 5)
15	TNKDPT	Real	Initial remains in tank (4 x 4)*3
16	CLR	Real	Run-off coefficient of river channel bottom hole*4
17	CUR	Real	Run-off coefficient of river channel upper hole*4
18	HUR	Real	River channel upper hole height*4
19	RVC	Real	Initial remains at river channel*4

*1 0...the value specified by TNKDPT parameter is used as the initial storage value of each tank.
1...A dummy tank model calculation is done twice over a specified period of time (IIS~IIE) with the initial storage value of each tank set at 0, and the remaining storage value of each tank then is used as the initial storage value in this integration calculation. If no period of time is specified, the initial 3 years (pursuant to IIS~IIE) is used in the calculations which are done twice.

*2 If no correction is done, input 1.0.

*3 Input it if INIDPT in 6 is 0, and input a dummy (0.0) if said INIDPT is 1.

*4 Input it if IRVCSW in 5 is 1, and input a dummy (0.0) if it is 0.

(2) The 2nd record: 4-step 4-row tank model data (unnecessary for the 4-step 1-row tank model)

No.	Name of variable	Format type	Contents
20	PS	Real	Primary soil moisture saturation volume*4
21	SS	Real	Secondary soil moisture saturation volume*4
22	TB	Real	Coefficient for T1 calculation*4, *5
23	TC	Real	Coefficient for T2 calculation*4, *6
24	ZA	Real	Zone areal ratio*4, *7
25	XSPRM	Real	Initial value of the present 2ndary soil moisture content of the 1st-step tank (x 4) *4, *8

*4 Input if the IMDLSW in 1 is 0.
*5 T1 = TBx (1-XP/PS)
*6 T2 = TCx (XP/PS - XS/SS)
XP: Primary soil moisture storage volume
XS: Secondary soil moisture storage volume
*7 The constant of areal ratio when each row of the subject model is classified as a zone. It is usually set at (3)
*8 The initial value of XS above, which is set for each row of the model.

(3) The 3rd record: 4-step 1-row tank model data (unnecessary for the 4-step 4-row tank model)

No.	Name of variable	Format type	Contents
26	ISNOW	Integer	Selection of snowmelt (0...no selection, 1...selection)
27	IPREMI	Integer	Selection of rainfall proportional increase (0...no selection, 1...selection)
28	ISUID	Integer	Selection of water recycling paddy field (0...no selection, 1...selection)
29	IDEV4	Integer	The 4th step tank evaporation volume (0...no deduction, 1...deduction)

(4) The 4th record: Snowmelt data (unnecessary for the 4-step 4-row tank data and no selection of snowmelt)

No.	Name of variable	Format type	Contents
30	ONDO1	Real	Temperature difference of each divided zone (the 1st step tank)
31	ONDO2	Real	Temperature difference of each divided zone (the 2nd step tank)
32	ONDO3	Real	Temperature difference of each divided zone (the 3rd step tank)
33	ONDO4	Real	Temperature difference of each divided zone (the 4th step tank)
34	C1	Real	Rainfall proportional increase rate by altitude of each divided zone (the 1st step tank)
35	C2	Real	Rainfall proportional increase rate by altitude of each divided zone (the 2nd step tank)
36	C3	Real	Rainfall proportional increase rate by altitude of each divided zone (the 3rd step tank)
37	C4	Real	Rainfall proportional increase rate by altitude of each divided zone (the 4th step tank)
38	CMENS1	Real	Areal ratio of each divided zone (the 1st step tank)
39	CMENS2	Real	Areal ratio of each divided zone (the 2nd step tank)
40	CMENS3	Real	Areal ratio of each divided zone (the 3rd step tank)
41	CMENS4	Real	Areal ratio of each divided zone (the 4th step tank)
42	SNOW1	Real	Initial snow depth of each divided zone (the 1st step tank)
43	SNOW2	Real	Initial snow depth of each divided zone (the 2nd step tank)
44	SNOW3	Real	Initial snow depth of each divided zone (the 3rd step tank)
45	SNOW4	Real	Initial snow depth of each divided zone (the 4th step tank)
46	CMELT	Real	Snowmelt constant
47	TINETU	Real	Terrestrial heat constant
48	R1	Real	Rainfall on the previous day when the calculations started.
49	TEMP1	Real	Temperature on the previous day when the calculations started.

(5) The 5th record: Rainfall proportional increase data (unnecessary for the 4-step 4-row tank model and no selection of rainfall proportional increase)

No.	Name of variable	Format type	Contents
50	AREAS	Real	Areal rate of each divided zone (the 1st step tank)
51	AREAS	Real	Areal rate of each divided zone (the 2nd step tank)
52	AREAS	Real	Areal rate of each divided zone (the 3rd step tank)
53	AREAS	Real	Areal rate of each divided zone (the 4th step tank)
54	ADHOS	Real	Rainfall proportional increase by altitude of each divided zone (the 1st step tank)
55	ADHOS	Real	Rainfall proportional increase by altitude of each divided zone (the 2nd step tank)
56	ADHOS	Real	Rainfall proportional increase by altitude of each divided zone (the 3rd step tank)
57	ADHOS	Real	Rainfall proportional increase by altitude of each divided zone (the 4th step tank)
58	ADMOS	Real	Monthly correction coefficient (Jan)
59	ADMOS	Real	Monthly correction coefficient (Feb)
60	ADMOS	Real	Monthly correction coefficient (Mar)
61	ADMOS	Real	Monthly correction coefficient (Apr)
62	ADMOS	Real	Monthly correction coefficient (May)
63	ADMOS	Real	Monthly correction coefficient (Jun)
64	ADMOS	Real	Monthly correction coefficient (Jul)
65	ADMOS	Real	Monthly correction coefficient (Aug)
66	ADMOS	Real	Monthly correction coefficient (Sept)
67	ADMOS	Real	Monthly correction coefficient (Oct)
68	ADMOS	Real	Monthly correction coefficient (Nov)
69	ADMOS	Real	Monthly correction coefficient (Dec)

(6) The 6th record: Water recycling paddy field data (unnecessary for the 4-step 4-row tank model and no selection of water recycling paddy field)

No.	Name of variable	Format type	Contents
70	CAN	Real	Water recycling paddy field area(km^2)
71	RN	Real	Recycling rate
72	QN	Real	Water reduction depth (Jan.1)~(Dec.3

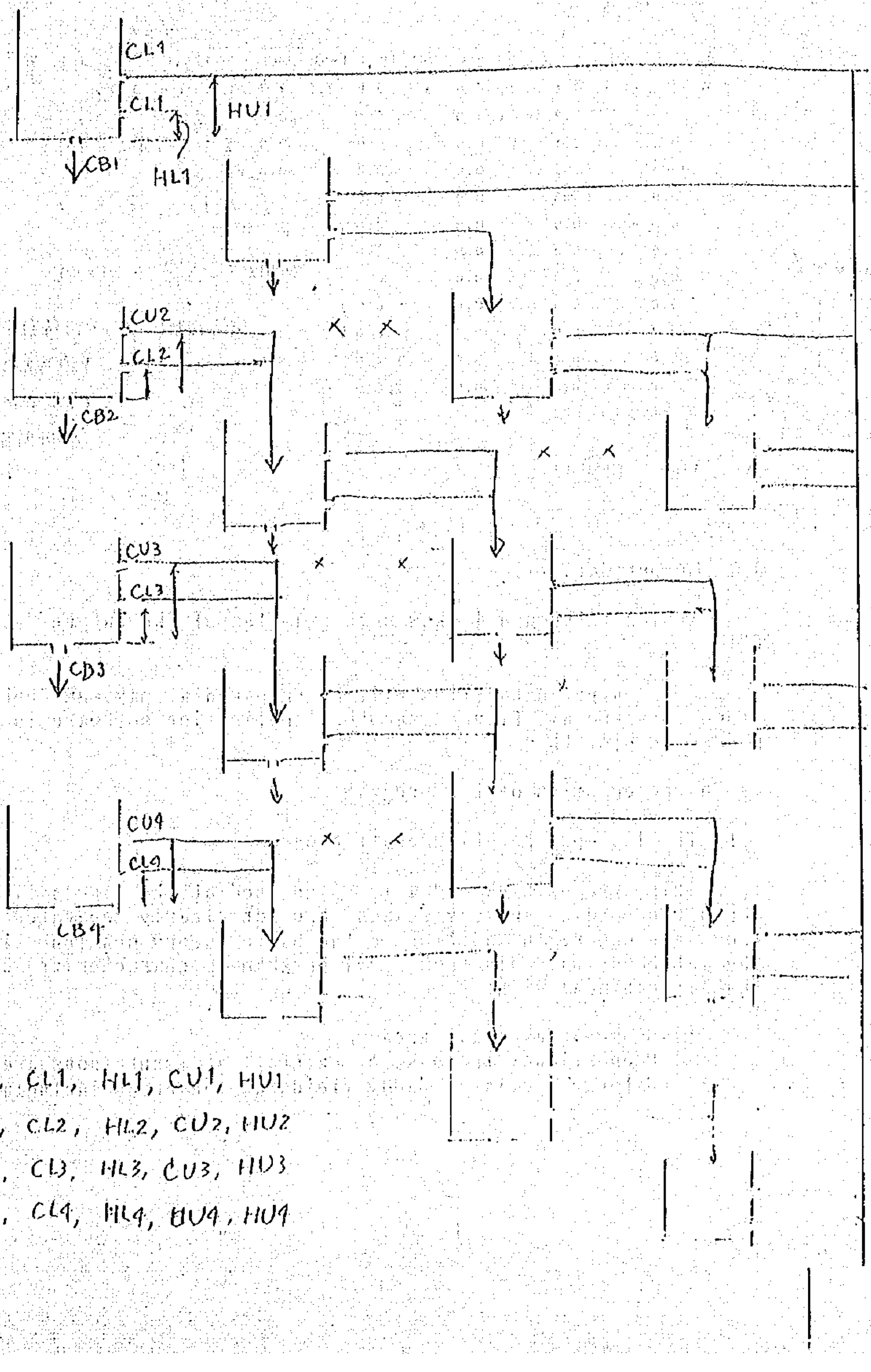
3.2 An Example of Input Format

3.2.1 Rainfall data file

1961												
1	0.0	2.0	0.0	0.0	1.0	0.0	0.0	0.0	36.0	6.0	0.0	0.5
2	9.5	0.0	0.0	5.0	0.0	4.0	0.0	0.0	0.0	3.5	5.5	50.5
3	0.0	0.0	0.0	5.0	4.0	0.0	0.0	0.0	13.0	22.5	16.0	0.0
4	1.5	0.0	0.0	3.5	43.5	0.0	0.0	0.0	17.5	0.0	7.5	0.0
5	0.0	0.0	26.0	16.5	6.5	0.0	0.0	0.0	0.5	0.0	35.5	0.0
6	21.0	0.0	19.5	10.0	0.0	0.0	0.0	5.0	10.0	1.5	4.5	0.0
7	4.5	0.0	7.0	4.5	22.5	0.0	0.0	25.5	0.5	20.0	5.0	0.0
8	0.0	0.0	23.0	0.5	3.0	0.0	0.0	11.5	25.5	2.5	0.0	0.0
9	19.5	2.5	46.5	0.0	37.5	0.0	15.5	0.0	0.0	0.0	13.0	0.5
10	5.5	6.5	5.0	0.0	5.5	0.0	0.0	1.0	0.0	14.5	15.5	0.0
11	0.5	2.0	32.0	0.0	18.0	22.0	2.0	9.0	19.5	39.0	7.0	0.0
12	38.0	0.0	1.0	47.0	0.5	37.0	63.0	13.5	0.0	43.5	32.0	0.0
13	0.0	4.0	1.5	56.5	5.5	2.5	2.0	1.5	4.5	15.5	5.0	3.0
14	0.0	1.0	0.0	0.0	0.0	9.0	2.0	0.0	0.0	7.0	26.0	54.5
15	0.5	30.0	0.0	17.5	0.0	45.5	0.0	1.5	0.0	27.0	38.0	0.0
16	0.0	20.0	13.0	20.5	5.5	15.0	8.5	0.0	0.5	4.5	8.5	9.0
17	0.0	38.5	16.5	23.0	0.5	0.0	0.0	0.0	0.5	18.0	1.5	3.5
18	0.0	13.0	3.5	0.0	0.0	0.5	5.0	0.0	10.5	48.0	29.5	55.5
19	0.0	10.5	4.5	0.0	0.0	6.0	0.0	0.0	0.5	15.0	5.0	23.0
20	0.0	9.0	0.0	5.5	0.0	26.0	0.0	0.0	0.0	2.0	10.0	7.5
21	0.0	13.5	7.0	1.0	0.0	0.0	3.5	0.0	0.0	3.0	17.0	21.5
22	0.0	48.5	12.0	7.5	0.0	0.0	6.0	0.0	0.5	11.5	8.5	0.0
23	0.0	2.0	3.0	0.0	0.0	15.5	9.5	0.0	32.5	22.5	8.5	29.5
24	0.0	0.0	17.5	39.5	0.0	0.0	0.0	0.0	0.5	5.5	15.5	0.0
25	0.0	0.5	61.5	0.0	0.0	0.0	63.0	0.0	2.0	24.5	20.0	0.5
26	0.0	0.0	0.0	27.0	0.0	0.0	0.0	0.0	8.5	18.5	1.0	4.5
27	0.0	0.0	8.0	8.0	0.0	2.5	3.0	2.5	0.0	11.0	0.0	0.0
28	0.0	5.5	6.5	2.5	0.0	0.0	29.5	0.0	0.0	3.0	7.5	31.5
29	0.0	0.0	40.5	0.5	0.0	0.0	2.0	0.0	3.0	1.0	1.0	6.0
30	0.0	0.0	0.5	8.0	0.0	0.0	6.0	15.0	23.0	40.0	30.5	8.0
31	26.5	0.0	0.0	0.0	2.0	0.0	0.0	0.5	0.0	5.5	0.0	15.5
1962												
1	19.0	0.0	4.5	29.0	2.5	0.0	0.0	0.5	10.5	21.0	0.5	2.5
2	23.0	0.0	1.0	6.0	29.0	0.0	17.5	3.5	50.0	0.0	0.0	19.5
3	6.0	0.0	0.0	0.0	2.0	0.5	16.0	0.0	0.0	8.5	3.5	5.0
4	50.5	0.0	0.0	9.0	8.5	11.5	3.5	0.0	28.5	0.0	0.0	18.5

3.2.2 Flow rate data file

1961												
1	7,7	3,5	3,4	4,9	6,7	3,0	2,2	3,2	1,9	3,7	5,4	30,3
2	6,2	3,2	3,3	4,2	6,2	2,6	2,2	2,7	2,8	3,8	4,7	16,1
3	5,9	3,1	3,5	4,1	5,1	2,7	2,2	2,4	2,2	5,4	5,7	27,4
4	5,3	3,2	3,2	3,9	5,6	2,7	2,0	2,4	3,7	4,8	7,9	13,7
5	5,3	2,8	3,0	4,1	11,3	2,4	2,0	2,2	2,6	2,9	11,6	10,3
6	6,3	2,8	3,2	5,2	8,2	2,5	1,8	2,3	2,1	2,5	23,7	8,2
7	7,8	2,7	3,7	7,2	6,7	2,3	1,8	3,4	2,4	2,9	13,3	6,4
8	6,2	2,6	4,1	4,5	11,7	2,2	1,8	6,2	2,2	3,1	9,4	5,7
9	6,1	2,4	5,7	3,7	7,3	2,2	1,9	4,6	3,4	2,5	7,3	6,1
10	8,4	2,6	8,5	3,4	12,6	2,2	2,1	3,0	3,0	2,4	11,2	6,4
11	5,9	2,6	5,2	3,2	12,3	2,2	2,2	2,8	2,7	3,9	19,8	6,2
12	7,0	2,7	7,1	3,2	10,9	2,7	2,7	2,9	3,8	6,7	15,0	6,2
13	9,1	2,6	5,7	7,1	8,1	3,9	6,6	3,4	2,9	18,0	21,2	5,6
14	5,3	3,6	4,6	13,4	7,8	4,0	2,9	2,9	2,4	16,0	10,3	5,8
15	4,6	3,1	4,6	8,8	6,2	3,4	2,9	2,8	2,2	8,1	14,2	5,7
16	4,3	8,1	4,8	6,0	5,9	5,8	3,5	3,0	2,2	7,0	25,4	5,7
17	3,9	7,1	4,8	5,5	5,7	3,9	4,1	2,5	2,1	11,6	19,3	9,2
18	3,8	8,0	5,3	6,2	4,8	3,1	2,9	2,4	1,8	9,5	14,5	13,8
19	3,4	5,7	4,7	5,1	4,7	2,8	2,6	2,2	2,5	9,4	10,4	21,5
20	3,7	5,7	4,0	5,6	4,3	3,0	2,4	2,2	2,4	8,9	16,8	24,6
21	3,4	4,3	3,9	5,2	3,8	4,5	2,4	2,0	2,1	9,7	12,8	15,8
22	3,4	4,9	4,1	5,4	3,5	3,4	2,4	1,9	1,8	7,9	11,9	17,6
23	3,4	6,3	3,7	7,0	3,4	3,0	2,7	1,8	2,3	7,9	12,4	11,0
24	3,4	5,6	3,7	6,1	3,3	3,1	2,6	1,8	7,6	10,7	15,5	14,8
25	3,4	4,6	5,6	14,2	3,3	2,8	2,7	1,8	4,0	7,3	13,9	10,2
26	3,4	3,9	8,9	7,5	3,3	2,2	13,7	1,7	2,8	6,7	18,3	9,4
27	3,2	3,5	4,7	10,5	3,2	2,2	5,5	1,6	2,8	7,5	13,1	8,3
28	3,1	3,7	5,6	9,5	3,2	2,2	5,3	1,6	2,4	8,7	10,4	10,2
29	2,9	-1,0	6,0	6,9	3,0	2,2	6,3	1,5	2,2	7,1	11,0	14,3
30	3,2	-1,0	14,2	6,5	3,0	2,4	3,9	1,7	2,4	5,4	9,9	10,4
31	4,1	-1,0	7,6	-1,0	3,0	-1,0	5,2	1,9	-1,0	6,6	-1,0	11,1
1962												
1	18,8	7,0	4,6	5,7	6,0	4,8	5,5	6,6	4,3	7,8	11,9	6,5
2	22,7	7,0	4,4	7,2	6,4	4,8	5,2	5,3	5,4	6,8	11,4	7,6
3	20,4	6,6	4,6	5,2	8,3	4,8	6,8	4,8	6,4	3,8	11,0	13,6
4	19,8	6,4	4,6	5,5	6,9	4,9	7,1	4,6	4,5	4,2	9,4	8,1



CB1, CL1, HL1, CU1, HU1
CB2, CL2, HL2, CU2, HU2
CB3, CL3, HL3, CU3, HU3
CB4, CL4, HL4, BU4, HU4

3.2.3 Parameter file

```
  0    1    1    1    1    1 1961 1963 1961 1900     129.0
3.6  4.1  4.3  4.1  3.9  4.0  3.9  3.8  3.9  3.7  3.5  3.4  1.0
      0.25      0.2       3.0       0.4      20.0
      0.1       0.1       0.0       0.0       0.0
      0.05      0.05      0.0       0.0       0.0
      0.0       0.03      0.0       0.0       0.0
      0.0       0.0       0.0       0.0
      0.0       0.0       0.0       0.0
      0.0       0.0       0.0       0.0
      0.0       0.0       0.0       0.0
     46.3       0.0       0.0       0.0
     50.0     250.0       3.0       4.0
     50.0      50.0     100.0     200.0
  0    0    0    0
```

3.3 Output data file

Tables 1 through 4 show some examples of the output data file.

Four output data files will be prepared at maximum, but since they are all figures, another application software is needed to plot them.

4. Characteristics of the program

4.1 The 4-step 1-row tank model program

This type of tank model is often used at the places like Japan where rainy and dry seasons are not clearly separated from each other. In addition to the basic theory mentioned in the introduction, this tank model program is characterized by that it can deal with:

1) Snowmelt at snowy areas.
2) Proportional increase of rainfall at mountainous areas.
3) Water recycling paddy fields at the areas including

paddy fields.

4.1.1. Estimation of snowmelt in the low-level run-off calculations

Since snowmelt is the phenomenon that the rainfall as snow which occurred during winter is stored as snow at river basins for a long time and then is melt and runs off in spring, it is desirable to introduce the effects of snow and snowmelt into the run-off calculations. Generally, new snow is recorded in terms of an equivalent water depth as the observed value of daily rainfall. Average snow and snowmelt at a river basin are therefore estimated as follows based on the daily average temperature at a place in the river basin.

First, a river basin is divided (e.g., into 4 parts) by altitude considering the temperature changes by altitude within the basin. The daily average temperature of each divided part is estimated based on the temperature at the temperature measuring point considering the altitude difference between the temperature measuring point and each divided part which affects the temperature change between the two places. Temperature generally lowers by -0.5 or -0.6°C per 100m altitude. After assuming the daily average temperature at each divided area,

1) If it is above 0°C, snowmelt volume is assumed to be fixed at every 1°C (about 5mm/day) in the calculations. If it rains, the snowmelt is estimated to be (Rainfall) x (Temperature) ÷ 80, assuming that the rain temperature is equal to atmospheric temperature. The entire snowmelt is the total of snowmelt by temperature and that by rainfall.

2) If it is below 0°C, there is no snowmelt and the snow depth (which is shown by the equivalent water depth) increases by rainfall.

According to the recent studies on snowmelt, representing the daily temperature changes which include below and above 0°C temperatures by a single daily average value tends to produce a large error, but errors are also unavoidable in using the observed temperature at a point in a river basin as the average temperature over the entire basin. So the above-mentioned method to estimate snowmelt is considered satisfactory in the low-level run-off calculations.

The snowmelt of each divided area obtained by the above method is multiplied by the area ratio of said divided area, then added together and regarded as the average snowmelt at this river basin. The equivalent volume of water is injected into the top tank, assuming that this volume of rainfall actually occurred.

The constants assumed in the snowmelt calculation are the temperature reduction rate by altitude and the snowmelt per 1°C. Unexpectedly, the former has a larger effect on the run-off during the snowmelt season (spring) than the latter.

4.1.2 Proportional increase of rainfall at mountainous areas

When the total rainfall and outflow during a flood or a long-term low-level period are surveyed, the total outflow sometimes exceeds the total rainfall or otherwise the difference between them is very small even if the usually conceivable losses (caused by evaporation, etc.) are taken into account. The reasons for it are:

1) Accuracy of the observation of local rainfall (the rainfall over an entire river basin represented by the point rainfall),

2) Accuracy of the observation of flow rate during flood or low-level period, and

3) Inflow of underground water from other river basins.

The items 2) and 3) will separately be studied. There are some study results for the item 1) as follows.

Conventionally a rain gauge was usually installed at every area with 50km², and its measured values are used to obtain the average rainfall at a river basin using the Thiessen method. This method attaches importance to the fact that rainfall is distributed laterally (plane), but it is also done vertically (altitude) from the meteorological viewpoint. Generally it rains more at mountainous areas than plains. Especially at mountainous areas, importance must also be attached to the rainfall distribution by altitude (and therefore the installation of rain gauges by altitude). According to the rainfall observation results at Chubu District, annual rainfall increases by 1,000mm in average as the altitude increases by 500m.

In a run-off analysis at Shogawa River, it was recognized that rainfall increases 8.1% more than that at the flatland as the altitude increases by 100m. In other reports, rainfall increases by 5-10% at every altitude rise of 100m.

In the run-off calculations at a mountainous river basin, if the rainfall observed at a flatland is smaller than the outflow, it is recommended to give it an appropriate proportional increase by considering the estimated rainfall at the mountainous area.

4.1.3 Estimation of agricultural water volume in the low-level run-off calculations

In the low-level run-off calculations, it is not easy to handle the intake volume of various service water in a river basin. Most difficult is the agricultural water of which intake and recycling volumes are hardest to determine.

If the low-level run-off calculations are done in disregard of agricultural water, the result shows obviously larger calculated values than the measured ones. This difference is far greater than the total volume of agricultural water officially approved as the water rights throughout the river basin. (There are even the river basins where the total volume of officially approved agricultural water is larger than the total outflow during irrigation period.) This is because agricultural water is used repeatedly through recycling ; and in the low-level run-off calculations, therefore, the officially approved water rights cannot be used as the agricultural water volume.

Many agriculturalists are engaged in the investigation and research on the actual conditions of use of agricultural water. The practical methods to estimate its volume are:

1) Water income and outgo method:

The measured outflow is compared with the calculated outflow considering no agricultural water volume to determine the reduction in the river flow rate. This method can produce fairly accurate results unless there is no water intake for other purposes within the river basin. Since the agricultural work (plowing rice fields, planting rice, etc.) is the same every year, the values obtained by this method can be used in the low-level run-off calculations as far as there is no serious drought or change of river basin.

2) Reduced water depth method

The agricultural water volume is determined by multiplying the reduced water depth at a rice and other agricultural field (about 10-15mm/day at paddy fields during irrigation season) by the field area, but as this method disregards the repeated use of water through recycling , the volume of water used is often overestimated.

4.1.4 Concepts of evaporation and water course

1) Concept of evaporation

It is so programmed that evaporation volume can be reduced if rainfall is more than 0.5mm. However since the evaporation coefficient is defined to be 1.0 in the program, a certain volume of evaporation is subtracted every day irrespective of rainfall.

In the evaporation process of each tank, the evaporation volume is subtracted before the run-off calculations of the 1st tank, then the evaporation subtraction and run-off calculations of the 2nd tank..., this is repeated.

At the 4th tank which is given the position to produce the outflow for underground base flow, the user can decide at his discretion whether the evaporation volume is subtracted or not.

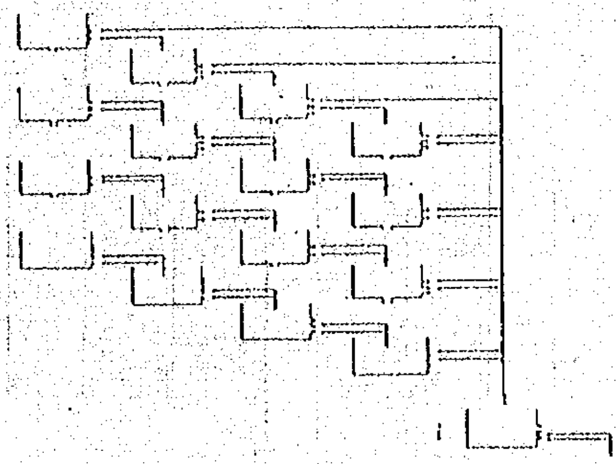
2) Concept of water course

In addition to the run-off from the 4 tanks, another one can be added as a river channel in order to represent the time lag in flow-out at water course.

4.2 4-step 4-row tank model program

This type of tank model is used in the low-level analysis of the subtropical regions where rainy and dry seasons are clearly separated from each other. The following figure shows a conceptual view of the tank arrangement and run-off.

4-step 4-row tank model



Besides the basin theory as mentioned in the Introduction, this program is characterized by that it can handle:

1) Tanks arranged in 4 rows, and
2) Model of soil ingredients.

But this 4-step 4-row model cannot handle the snowmelt, rainfall proportional increase at mountainous areas and water recycling rice fields.

4.2.1 4-step tank model

The time lag in the inflow of rain water into rivers is reportedly able to be expressed by assembling a group of 4-row tank models. This time lag is expressed by the distribution of rainfall among the top tank in each row. For example, if $A = 3$ is assumed, the rainfall distribution among the top tanks is:

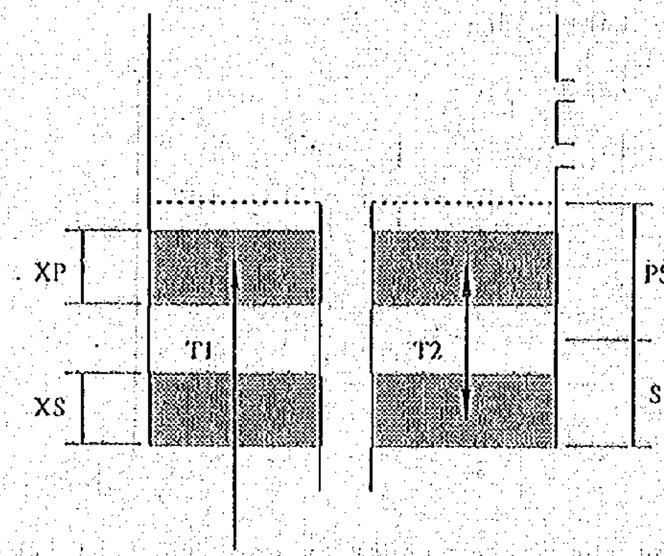
In the 1st row, $1/A^1 = 1/3$,
2nd ---- $1/A^2 = 1/9$,
3rd ---- $1/A^3 = 1/27$, and
4th ---- $1/A^4 = 1/81$.

$A = 3$ is usually adopted.

There is no such concept in the 4-step 1-row tank model.

4.2.2 Soil moisture model

In the 4-step 4-row tank model, the top tank in each row is used as the soil moisture model. The concept of this model is as shown below.



Soil moisture model

*See the data for 4-step 4-row tank model in Chapter 3.1 (2) for the relevant coefficients. Page 9.

5. How to start

This program is divided into two sub-programs of calculation and output parts, with the batch so constructed that the sub-programs can operate with the same type of commands. For running the system, copy two floppy disks with the hard disk and start TANK.BAT. When the display changed as shown in Fig. 4, input the input and output files into the screen.

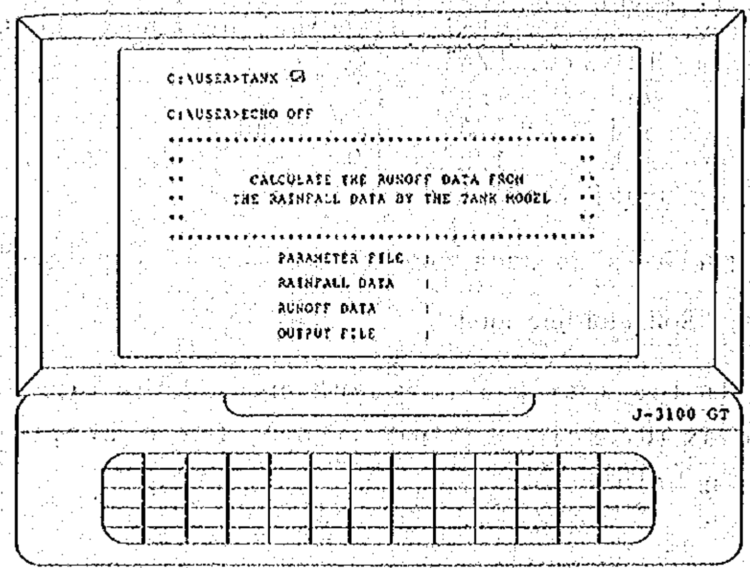


Fig. 4: Start of TANK MODEL

outf

Table - I Estimated Discharge

YEAR	MONTH	DAY	OVSERVED	SIMULATED
1963/	10	/ 1	2.3	2.6
1963/	10	/ 2	2.3	2.5
1963/	10	/ 3	2.3	2.9
1963/	10	/ 4	2.4	3.2
1963/	10	/ 5	2.5	5.7
1963/	10	/ 6	5.5	11.6
1963/	10	/ 7	13.9	14.4
1963/	10	/ 8	12.1	15.1
1963/	10	/ 9	11.2	23.4
1963/	10	/10	30.2	18.8
1963/	10	/11	9.3	14.1
1963/	10	/12	6.1	11.4
1963/	10	/13	7.5	8.9
1963/	10	/14	7.4	7.3
1963/	10	/15	8.4	8.7
1963/	10	/16	11.5	7.2
1963/	10	/17	8.5	6.1
1963/	10	/18	7.8	5.3
1963/	10	/19	7.9	4.7
1963/	10	/20	6.0	4.3
1963/	10	/21	6.2	5.6
1963/	10	/22	8.3	5.3
1963/	10	/23	6.4	8.9
1963/	10	/24	9.7	11.9
1963/	10	/25	10.3	9.6
1963/	10	/26	7.6	7.8
1963/	10	/27	6.7	9.8
1963/	10	/28	17.5	11.5
1963/	10	/29	21.8	11.1
1963/	10	/30	23.2	9.6
1963/	10	/31	14.9	9.8
1963/	11	/ 1	15.5	8.2
1963/	11	/ 2	10.3	7.3
1963/	11	/ 3	8.9	7.3
1963/	11	/ 4	9.4	7.3
1963/	11	/ 5	10.9	6.7
1963/	11	/ 6	9.5	6.1
1963/	11	/ 7	7.5	6.7
1963/	11	/ 8	11.3	7.5
1963/	11	/ 9	15.6	15.0
1963/	11	/10	21.6	17.1
1963/	11	/11	24.6	15.6
1963/	11	/12	22.3	21.0
1963/	11	/13	57.1	28.1
1963/	11	/14	48.4	24.7
1963/	11	/15	26.6	23.5
1963/	11	/16	33.2	23.3
1963/	11	/17	26.9	34.5
1963/	11	/18	45.6	27.3
1963/	11	/19	28.1	25.6
1963/	11	/20	29.8	20.2
1963/	11	/21	20.2	16.0
1963/	11	/22	16.6	13.1
1963/	11	/23	16.3	11.1
1963/	11	/24	15.3	9.7
1963/	11	/25	13.8	8.9
1963/	11	/26	13.3	8.2
1963/	11	/27	12.8	7.6
1963/	11	/28	12.3	7.2

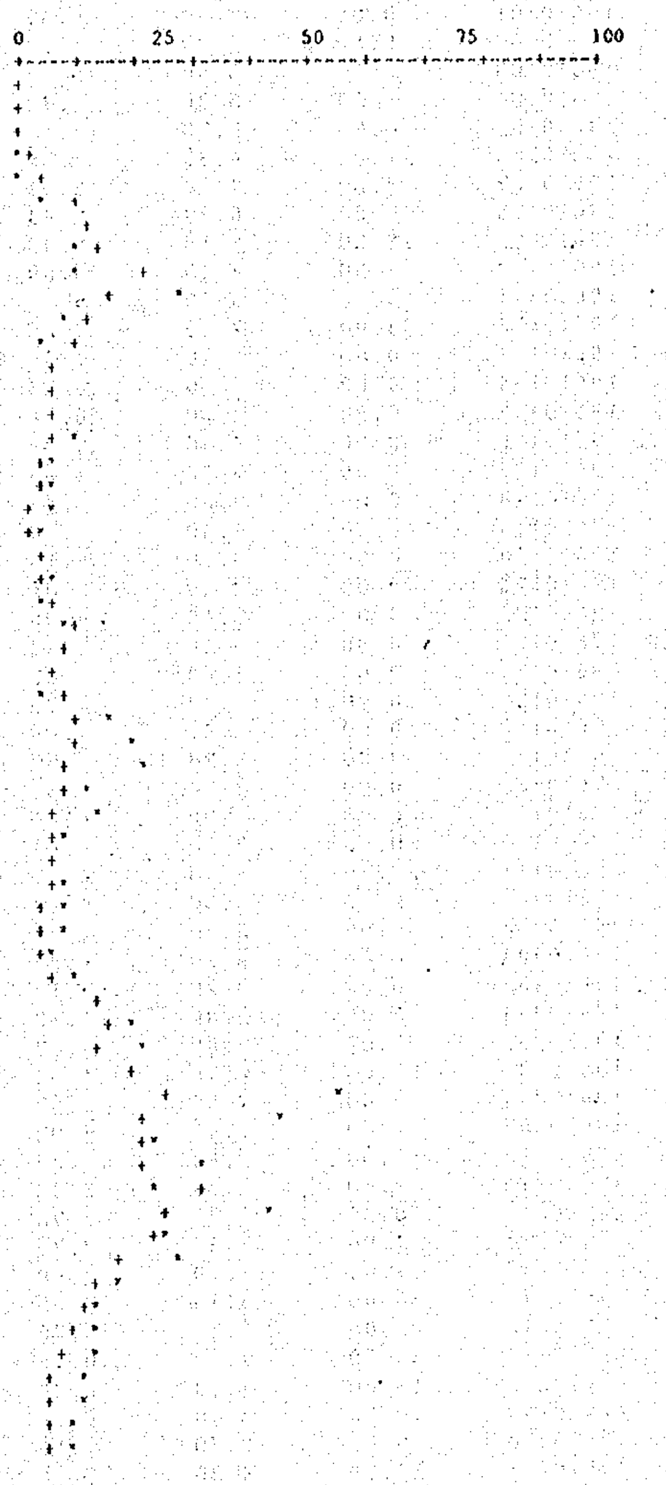


Table - 2 Estimated Discharge for Hydrograph

file name : TANK1.OUT

19610101	0.00	7.70	6.07
19610102	9.50	6.20	5.93
19610103	0.00	5.90	5.82
19610104	1.50	5.30	5.72
19610105	0.00	5.30	5.64
19610106	21.00	6.30	5.58
19610107	4.50	7.80	5.51
19610108	0.00	6.20	5.44
19610109	19.50	6.10	5.43
19610110	5.50	8.40	5.39
19610111	0.50	5.90	5.33
19610112	38.00	7.00	8.25
19610113	0.00	9.10	7.39
19610114	0.00	5.30	6.73
19610115	0.50	4.60	6.24
19610116	0.00	4.30	5.89
19610117	0.00	3.90	5.63
19610118	0.00	3.80	5.43
19610119	0.00	3.40	5.28
19610120	0.00	3.70	5.15
19610121	0.00	3.40	5.05
19610122	0.00	3.40	4.96
19610123	0.00	3.40	4.87
19610124	0.00	3.40	4.80
19610125	0.00	3.40	4.73
19610126	0.00	3.40	4.66
19610127	0.00	3.20	4.60
19610128	0.00	3.10	4.54
19610129	0.00	2.90	4.48
19610130	0.00	3.20	4.43
19610131	26.50	4.10	4.37
19610201	2.00	3.50	4.32
19610202	0.00	3.20	4.27
19610203	0.00	3.10	4.22
19610204	0.00	3.20	4.17
19610205	0.00	2.80	4.12
19610206	0.00	2.80	4.07
19610207	0.00	2.70	4.02
19610208	0.00	2.60	3.97
19610209	2.50	2.40	3.92
19610210	6.50	2.60	3.87
19610211	2.00	2.60	3.83
19610212	0.00	2.70	3.78
19610213	4.00	2.60	3.73
19610214	1.00	3.60	3.68
19610215	30.00	3.10	3.65
19610216	28.00	8.10	4.79
19610217	38.50	7.10	10.79
19610218	13.00	8.00	10.20
19610219	10.50	5.70	8.86
19610220	9.00	5.70	7.56
19610221	13.50	4.30	7.00

Table - 3 Storage Volume of Tank for each year

file name : TANK2.OUT

Unit:mm

Year	Stage	Top Tank	2nd Tank	3rd Tank	4th Tank
1961	1	61.4	63.7	65.1	66.1
	2	14.9	47.4	104.1	193.4
	3	16.0	74.0	219.0	533.8
	4	27.2	202.7	893.4	3036.4
1962	1	35.7	36.2	36.8	37.2
	2	0.0	0.1	6.6	25.0
	3	0.0	16.2	69.2	212.7
	4	16.1	154.0	815.6	3213.3
1963	1	42.6	43.9	45.2	46.1
	2	1.9	9.9	28.7	68.3
	3	6.8	43.6	167.7	497.1
	4	30.6	244.6	1111.6	3796.0
1964	1	44.1	44.7	45.0	45.3
	2	0.2	1.3	2.9	4.5
	3	0.3	1.3	17.6	90.5
	4	5.0	120.9	761.3	3302.3
1965	1	40.5	41.5	42.2	43.1
	2	6.9	38.6	112.4	243.2
	3	21.9	108.3	317.8	741.2
	4	36.1	255.2	1107.5	3774.8
1966	1	42.9	44.5	45.8	46.7
	2	5.5	25.1	67.2	144.4
	3	13.2	69.4	223.5	571.6
	4	29.8	222.6	990.5	3432.5
1967	1	33.8	34.6	35.3	35.7
	2	0.0	0.0	0.8	7.3
	3	0.0	8.7	63.0	234.6
	4	12.1	158.8	818.5	3091.4
1968	1	51.6	53.6	55.9	57.9
	2	6.2	17.0	34.0	63.3
	3	3.9	24.2	85.2	239.5
	4	12.1	125.4	661.0	2555.9
1969	1	48.0	49.4	50.5	51.6
	2	2.0	9.2	24.0	51.4
	3	4.2	24.3	87.5	253.8
	4	18.0	159.9	811.7	3099.9
1970	1	54.1	57.7	60.6	61.9
	2	14.6	46.4	94.3	160.9
	3	13.7	63.4	202.0	549.9
	4	34.4	282.1	1329.1	4723.4
1971	1	48.6	50.8	52.4	53.5
	2	13.2	50.7	123.2	243.0
	3	21.1	97.3	274.2	611.7
	4	24.2	170.3	762.4	2758.5

Table - 4 Data for Duration Curve

file name : TANK3.OUT

Year : 1961

	Observed		Observed		Simulated		Simulated
1	25.4	51	5.3	1	16.5	51	5.8
2	21.5	52	5.2	2	15.4	52	5.7
3	19.3	53	5.1	3	14.8	53	5.6
4	18.3	54	4.8	4	14.3	54	5.5
5	16.8	55	4.8	5	13.7	55	5.4
6	15.8	56	4.7	6	13.2	56	5.4
7	14.8	57	4.6	7	12.9	57	5.3
8	14.2	58	4.6	8	12.0	58	5.3
9	13.9	59	4.3	9	11.9	59	5.2
10	13.7	60	4.2	10	11.4	60	5.0
11	13.1	61	4.1	11	11.2	61	5.0
12	12.4	62	4.1	12	11.0	62	4.9
13	11.8	63	4.0	13	10.8	63	4.8
14	11.6	64	3.9	14	10.7	64	4.8
15	11.1	65	3.9	15	10.4	65	4.7
16	10.7	66	3.8	16	10.2	66	4.6
17	10.4	67	3.8	17	9.9	67	4.5
18	10.2	68	3.7	18	9.7	68	4.5
19	9.5	69	3.7	19	9.5	69	4.4
20	9.4	70	3.6	20	9.3	70	4.3
21	9.1	71	3.5	21	9.2	71	4.3
22	8.8	72	3.4	22	9.1	72	4.2
23	8.4	73	3.4	23	9.0	73	4.2
24	8.2	74	3.4	24	8.9	74	4.1
25	8.1	75	3.4	25	8.7	75	4.1
26	7.9	76	3.4	26	8.6	76	4.0
27	7.8	77	3.3	27	8.5	77	4.0
28	7.5	78	3.3	28	8.4	78	4.0
29	7.3	79	3.2	29	8.2	79	3.9
30	7.1	80	3.2	30	8.0	80	3.9
31	7.1	81	3.2	31	8.0	81	3.8
32	7.0	82	3.1	32	7.8	82	3.8
33	6.7	83	3.1	33	7.7	83	3.8
34	6.6	84	3.0	34	7.6	84	3.7
35	6.4	85	3.0	35	7.6	85	3.7
36	6.3	86	3.0	36	7.4	86	3.6
37	6.2	87	3.0	37	7.2	87	3.5
38	6.2	88	2.9	38	7.0	88	3.4
39	6.2	89	2.9	39	7.0	89	3.3
40	6.1	90	2.9	40	6.9	90	3.3
41	5.9	91	2.8	41	6.8	91	3.2
42	5.8	92	2.8	42	6.7	92	3.2
43	5.7	93	2.8	43	6.6	93	3.1
44	5.7	94	2.7	44	6.4	94	3.1
45	5.7	95	2.7	45	6.3	95	3.0
46	5.6	96	2.7	46	6.2	96	3.0
47	5.6	97	2.6	47	6.1	97	3.0
48	5.5	98	2.6	48	6.0	98	2.9
49	5.4	99	2.6	49	5.9	99	2.9
50	5.3	100	2.5	50	5.8	100	2.8

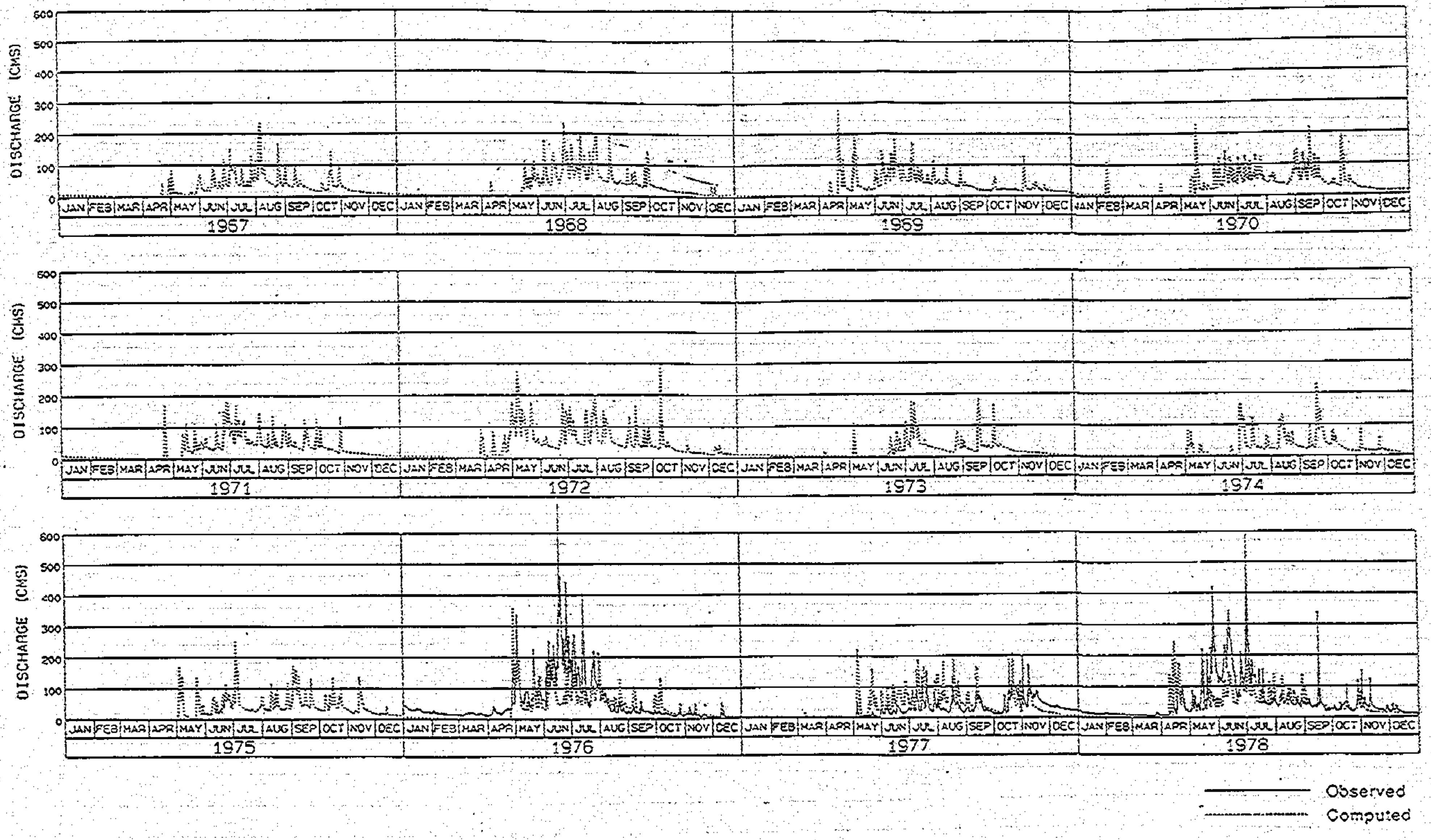


Fig.5 : Simulation of Daily Runoff using Tank Model Method (1)

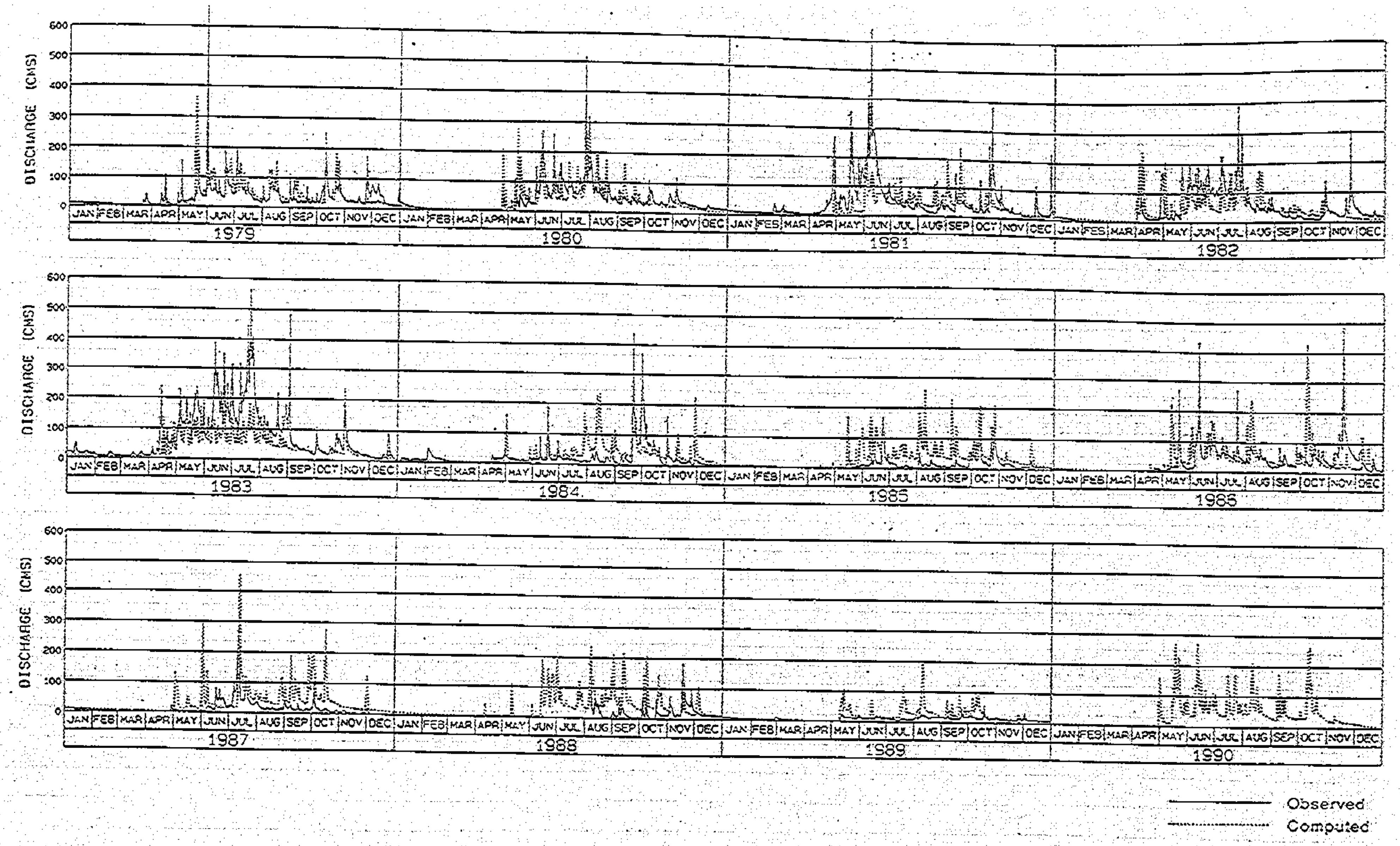


Fig.5 : Simulation of Daily Runoff using Tank Model Method (2)
(Station : Puente Acarigua, River:Acarigua)

```
      PROGRAM    TNK

      CHARACTER*20  PDATA,OUTF

C -------------------- correction ---------------------------

C  ***  COMMON DATA DEFINITION FOR TANK MODEL  ***
C
       INTEGER    SYMSUC,SYMERR,INPFIL,PRMFIL,OUTFIL
       PARAMETER    (SYMSUC=1,SYMERR=0)
       PARAMETER   (INPFIL=10, PRMFIL=11, OUTFIL=12)

       REAL    RA(31), RF(31), TP(31)
       REAL    EE(12), TNKPRM(5,4), TNKDPT(4,4)
       REAL    XSPRM(4), AREAS(4), ADHOS(4), ADMOS(12), QN(31,12)
       REAL    TNKIOW(4,4,4), TOPTNK(4,4), RVCTNK(3)
       REAL    R(4),S(4)

       REAL     CA, COEV, CLR, CUR, HUR, RVC, PS, SS, TB, TC, ZA
       REAL     ONDO1, ONDO2, ONDO3, ONDO4, C1, C2, C3, C4
       REAL   CMENS1, CMENS2, CMENS3, CMENS4
       REAL   SNOW1, SNOW2, SNOW3, SNOW4
       REAL   CMELT, TINETU, R1,,TEMP1, CAN, RN
       REAL   RC, HNO1

       COMMON /INP/ IDX, RA, RF, TP
       COMMON /OUT/ RC, TNKIOW, TOPTNK, RVCTNK
       COMMON /PRM/ IMDLSW, IOUTSW, IRVCSW, IDATSW, INIDPT, IS, IE,
      $       CA, EE, COEV, TNKPRM, TNKDPT, CLR,CUR,HUR,RVC,
      $         PS,SS,TB,TC,ZA,XSPRM,
      $        ISNOW,IPREMI,ISUID,IDEV4,
      $        ONDO1,ONDO2,ONDO3,ONDO4,C1,C2,C3,C4,
      $        CMENS1,CMENS2,CMENS3,CMENS4,SNOW1,SNOW2,SNOW3,SNOW4,
      $        CMELT,TINETU,R1,TEMP1,
      $        AREAS,ADHOS,ADMOS,
      $        CAN,RN,QN,IIS,IIE

      COMMON /OUT1/ IOUTSW1,IOUTSW2,IOUTSW3
       COMMON /EXT/ R, S
      COMMON /INT/ HNO1

      EQUIVALENCE  (TNKPRM(1,1),CB1),(TNKPRM(2,1),CL1),
      $       (TNKPRM(3,1),HL1),(TNKPRM(4,1),CU1),(TNKPRM(5,1),HU1)
      EQUIVALENCE  (TNKPRM(1,2),CB2),(TNKPRM(2,2),CL2),
      $       (TNKPRM(3,2),HL2),(TNKPRM(4,2),CU2),(TNKPRM(5,2),HU2)
      EQUIVALENCE  (TNKPRM(1,3),CB3),(TNKPRM(2,3),CL3),
      $       (TNKPRM(3,3),HL3),(TNKPRM(4,3),CU3),(TNKPRM(5,3),HU3)
```

```
      EQUIVALENCE  (TNKPRM(1,4),CB4),(TNKPRM(2,4),CL4),
     $            (TNKPRM(3,4),HL4),(TNKPRM(4,4),CU4),(TNKPRM(5,4),HU4)
      EQUIVALENCE  (TNKDPT(1,1),TANK1),(TNKDPT(2,1),TANK2),
     $            (TNKDPT(3,1),TANK3),(TNKDPT(4,1),TANK4)

      EXTERNAL   REDPRM,INPDAT,OUTDAT,CREDPT

      DIMENSION  IMD(12)
      REAL*4     TDPT(50,4,4)
      DATA       IMD / 31, 28, 31, 30, 31, 30, 31, 31, 30,
     $                 31, 30, 31 /

C ==================================================================
C     START EXECUTION
C ==================================================================
C +++++++++++++++++++++++ CORRECTION ++++++++++++++++++++++++++++++++
C  CALL   INITFORTRAN

      WRITE(*,*) ' '
      WRITE(*,*) ' '
      WRITE(*,*) ' ***********************************************'
      WRITE(*,*) ' **                                           **'
      WRITE(*,*) ' **       CALCULATE THE RUNOFF DATA FROM      **'
      WRITE(*,*) ' **     THE RAINFALL DATA BY THE TANK MODEL   **'
      WRITE(*,*) ' **                                           **'
      WRITE(*,*) ' ***********************************************'
      WRITE(*,*) ' '

      WRITE(*,1000)
      READ (*,1002) PDATA
 1000 FORMAT('            PARAMETER FILE   : ')
 1001 FORMAT('            OUTPUT FILE NAME : ')
 1002 FORMAT(A20)

      OPEN   (prmfil,file=PDATA,status='old')
      open   (inpfil,recl=2000,STATUS='SCRATCH')
      open   (outfil,recl=2000,file='tank1.out',status='UNKNOWN')
      OPEN   (15,FILE='para.dat',STATUS='UNKNOWN')

C ----------------------- correction ----------------------------
C
C   *** READ PARAMETER DATA ***
C
      IF ( REDPRM( DMY ) .NE. SYMSUC ) THEN
C +++++++++++++++++++++++ correction ++++++++++++++++++++++++++++++++
      close   (inpfil)
```

```
      close   (prnfil)
      close   (outfil)
C --------------------- correction ----------------------------
      STOP    '%ERR -- PARAMETER file read error'
       END IF

C   IF(IOUTSW1.EQ.1) THEN
.C     WRITE(*,1001)
C      READ (*,1002) OUTF
C      OPEN   ( 4,FILE=OUTF,STATUS='UNKNOWN')
C   ENDIF

    CALL    FILECONV (ISNOW,IE,IOUTSW1)

C   *** INITIALIZE SOME CONTROL VARIABLES ***
C
    CALL    INIVAR

    IF (INIDPT .NE. 0) THEN
C
C    *** CREATE TANK DEPTH FROM INITIAL ZERO (OPTION) ***
C
      IF ( CREDPT( DMY ) .NE. SYMSUC ) THEN
C ++++++++++++++++++++++ correction ++++++++++++++++++++++++++++++
        close   (inpfil)
        close   (prnfil)
        close   (outfil)
C --------------------- correction ----------------------------
        STOP    '%ERR -- FILE I/O error'
      END IF
    END IF

    IDUR = IDATSW / 100
C
C    *** MAIN LOOP ***
C
    DO 300 IYEAR=IS,IE
      IF (MOD(IYEAR,4) .EQ. 0) THEN
        IMD(2) = 29
      ELSE
        IMD(2) = 28
      END IF

      DO 200 IMONTH=1,12
        ITAG = (IYEAR * 10000) + (IMONTH * 100)
        IF ( INPDAT(ITAG) .NE. SYMSUC ) THEN
C ++++++++++++++++++++++ correction ++++++++++++++++++++++++++++++
```

```
      close   (inpfil)
      close   (prmfil)
      close   (outfil)
C --------------------- correction ----------------------------
      STOP    '%ERR -- INPUT DATA FILE read error'
       END IF

       IFLG = 1
       DO 100 IDAY=1,IMD(IMONTH)
      IF (IFLG .NE. 0) THEN
          IF (IMDLSW .EQ. 0) THEN
         CALL    CALEXT ( IMONTH, IDAY )
        ELSE
         CALL    CALINT ( IMONTH, IDAY )
        END IF
        IF (IDUR .NE. 0) IFLG = 0
      END IF

         IF ( OUTDAT(ITAG+IDAY, IDAY) .NE. SYMSUC ) THEN
C +++++++++++++++++++++++ correction +++++++++++++++++++++++++++++++++
        close   (inpfil)
        close   (prmfil)
        close   (outfil)
C --------------------- correction ----------------------------
        STOP    '%ERR -- OUTPUT DATA FILE write error'
      END IF
100       CONTINUE
200     CONTINUE
   DO 300 KJ=1,4
   DO 300 JK=1,4
   TDPT(IYEAR-IS+1,KJ,JK)=TNKDPT(KJ,JK)
300   CONTINUE

C +++++++++++++++++++++++ correction +++++++++++++++++++++++++++++++++
   close   (inpfil)
   close   (prmfil)
   close   (outfil)
C --------------------- correction ----------------------------
   WRITE(15,*) IS,IE,CA,IMDLSW,
    *          (((TDPT(I,J,K),I=1,30),J=1,4),K=1,4),
    *         IOUTSW1,IOUTSW2,IOUTSW3

C   STOP   '%SUC -- Normal complete'

   END
C=========================================================================
C   FUNCTION : READ ALL PARAMETER DATA FROM THE PARAMETER FILE.
```

```
C ====================================================================
C    PROGRAM, SUBROUTINE DEFINITION
C ====================================================================
      FUNCTION   REDPRM ( DMY )

C
C  ***   COMMON DATA DEFINITION FOR TANK MODEL   ***
C
      INTEGER      SYMSUC,SYMERR,INPFIL,PRMFIL,OUTFIL
      PARAMETER      (SYMSUC=1,SYMERR=0)
      PARAMETER    (INPFIL=10, PRMFIL=11, OUTFIL=12)

      REAL     RA(31), RF(31), TP(31)
      REAL     EE(12), TNKPRM(5,4), TNKDPT(4,4)
      REAL     XSPRM(4), AREAS(4), ADHOS(4), ADMOS(12), QN(31,12)
      REAL     TNKIOW(4,4,4), TOPTNK(4,4), RVCTNK(3)
      REAL     R(4),S(4)

      REAL      CA, COEV, CLR, CUR, HUR, RVC, PS, SS, TB, TC, ZA
      REAL      ONDO1, ONDO2, ONDO3, ONDO4, C1, C2, C3, C4
      REAL   CMENS1, CMENS2, CMENS3, CMENS4
      REAL   SNOW1, SNOW2, SNOW3, SNOW4
      REAL   CMELT, TINETU, R1, TEMP1, CAN, RN
      REAL   RC, HNO1

      COMMON /INP/ IDX, RA, RF, TP
      COMMON /PRM/ IMDLSW, IOUTSW, IRVCSW, IDATSW, INIDPT, IS, IE,
     $       CA, EE, COEV, TNKPRM, TNKDPT, CLR,CUR,HUR,RVC,
     $          PS,SS,TB,TC,ZA,XSPRM,
     $         ISNOW,IPREMI,ISUID,IDEV4,
     $         ONDO1,ONDO2,ONDO3,ONDO4,C1,C2,C3,C4,
     $         CMENS1,CMENS2,CMENS3,CMENS4,SNOW1,SNOW2,SNOW3,SNOW4,
     $         CMELT,TINETU,R1,TEMP1,
     $         AREAS,ADHOS,ADMOS,
     $         CAN,RN,QN,HS,HE
      COMMON /OUT/ RC, TNKIOW, TOPTNK, RVCTNK
      COMMON /OUT1/ IOUTSW1,IOUTSW2,IOUTSW3
      COMMON /EXT/ R, S
      COMMON /INT/ HNO1

      EQUIVALENCE  (TNKPRM(1,1),CB1),(TNKPRM(2,1),CL1),
     $      (TNKPRM(3,1),HL1),(TNKPRM(4,1),CU1),(TNKPRM(5,1),HU1)
      EQUIVALENCE  (TNKPRM(1,2),CB2),(TNKPRM(2,2),CL2),
     $      (TNKPRM(3,2),HL2),(TNKPRM(4,2),CU2),(TNKPRM(5,2),HU2)
      EQUIVALENCE  (TNKPRM(1,3),CB3),(TNKPRM(2,3),CL3),
     $      (TNKPRM(3,3),HL3),(TNKPRM(4,3),CU3),(TNKPRM(5,3),HU3)
      EQUIVALENCE  (TNKPRM(1,4),CB4),(TNKPRM(2,4),CL4),
```

```
     $        (TNKPRM(3,4),HL4),(TNKPRM(4,4),CU4),(TNKPRM(5,4),HU4)
      EQUIVALENCE (TNKDPT(1,1),TANK1),(TNKDPT(2,1),TANK2),
     $        (TNKDPT(3,1),TANK3),(TNKDPT(4,1),TANK4)


C    ====================================================
C      START EXECUTION
C    ====================================================
      READ   (PRMFIL,*,ERR=9900)
     $   IMDLSW,IOUTSW1,IOUTSW2,IOUTSW3,IRVCSW,INIDPT,IIS,IIE,IS,IE,
     $ CA,(EE(J),J=1,12),
     $   COEV,((TNKPRM(I,J),I=1,5),J=1,4),((TNKDPT(I,J),I=1,4),J=1,4),
     $  CLR,CUR,HUR,RVC

      IF(IMDLSW.EQ.1) GOTO 103
      READ   (PRMFIL,*,ERR=9900)
     $   PS,SS,TB,TC,ZA,(XSPRM(J),J=1,4)

 103  CONTINUE
      READ   (PRMFIL,*,ERR=9900)
     $   ISNOW,IPREMI,ISUID,IDEV4
      IF(ISNOW.EQ.0) GOTO 100

      READ   (PRMFIL,*,ERR=9900)
     $   ONDO1,ONDO2,ONDO3,ONDO4,C1,C2,C3,C4,
     $   CMENS1,CMENS2,CMENS3,CMENS4,SNOW1,SNOW2,SNOW3,SNOW4,
     $   CMELT,TINETU,R1,TEMP1

 100  IF(IPREMI.EQ.0) GOTO 101
      READ   (PRMFIL,*,ERR=9900)
     $   (AREAS(I),I=1,4),(ADHOS(I),I=1,4),(ADMOS(I),I=1,12)

 101  IF(ISUID.EQ.0) GOTO 200
      READ   (PRMFIL,*,ERR=9900)
     $   CAN,RN
      READ   (PRMFIL,*,ERR=9900) ((QN(I,J),I=1,31),J=1,6)
      READ   (PRMFIL,*,ERR=9900) ((QN(I,J),I=1,31),J=7,12)

 200  CONTINUE

      REDPRM = SYMSUC
      RETURN

9900  CONTINUE
      REDPRM = SYMERR
      RETURN
```

```
      END
C==========================================================================
C   FUNCTION : INITIALIZE THE SOME CONTROL VARIABLES, AND ARRAY.
C  ------------------------------------------------------------------
C     PROGRAM, SUBROUTINE DEFINITION
C  ------------------------------------------------------------------
      SUBROUTINE  INIVAR

C
C  ***  COMMON DATA DEFINITION FOR TANK MODEL  ***
C
       INTEGER     SYMSUC,SYMERR,INPFIL,PRMFIL,OUTFIL
       PARAMETER     (SYMSUC=1,SYMERR=0)
       PARAMETER   (INPFIL=10, PRMFIL=11, OUTFIL=12)

       REAL    RA(31), RF(31), TP(31)
       REAL    EE(12), TNKPRM(5,4), TNKDPT(4,4)
       REAL    XSPRM(4), AREAS(4), ADHOS(4), ADMOS(12), QN(31,12)
       REAL    TNKIOW(4,4,4), TOPTNK(4,4), RVCTNK(3)
       REAL    R(4),S(4)

       REAL     CA, COEV, CLR, CUR, HUR, RVC, PS, SS, TB, TC, ZA
       REAL    ONDO1, ONDO2, ONDO3, ONDO4, C1, C2, C3, C4
       REAL   CMENS1, CMENS2, CMENS3, CMENS4
       REAL   SNOW1, SNOW2, SNOW3, SNOW4
       REAL   CMELT, TINETU, R1, TEMP1, CAN, RN
       REAL   RC, HNO1

       COMMON /INP/ IDX, RA, RF, TP
       COMMON /PRM/ IMDLSW, IOUTSW, IRVCSW, IDATSW, INIDPT, IS, IE,
      $       CA, EE, COEV, TNKPRM, TNKDPT, CLR,CUR,HUR,RVC,
      $          PS,SS,TB,TC,ZA,XSPRM,
      $         ISNOW,IPREMI,ISUID,IDEV4,
      $         ONDO1,ONDO2,ONDO3,ONDO4,C1,C2,C3,C4,
      $          CMENS1,CMENS2,CMENS3,CMENS4,SNOW1,SNOW2,SNOW3,SNOW4,
      $         CMELT,TINETU,R1,TEMP1,
      $         AREAS,ADHOS,ADMOS,
      $         CAN,RN,QN,HS,HE
       COMMON /OUT/ RC, TNKIOW, TOPTNK, RVCTNK
       COMMON /OUT1/ IOUTSW1,IOUTSW2,IOUTSW3
       COMMON /EXT/ R, S
       COMMON /INT/ HNO1

       EQUIVALENCE  (TNKPRM(1,1),CB1),(TNKPRM(2,1),CL1),
      $      (TNKPRM(3,1),HL1),(TNKPRM(4,1),CU1),(TNKPRM(5,1),HU1)
       EQUIVALENCE  (TNKPRM(1,2),CB2),(TNKPRM(2,2),CL2),
```

```
$      (TNKPRM(3,2),HL2),(TNKPRM(4,2),CU2),(TNKPRM(5,2),HU2)
 EQUIVALENCE  (TNKPRM(1,3),CB3),(TNKPRM(2,3),CL3),
$      (TNKPRM(3,3),HL3),(TNKPRM(4,3),CU3),(TNKPRM(5,3),HU3)
 EQUIVALENCE  (TNKPRM(1,4),CB4),(TNKPRM(2,4),CL4),
$      (TNKPRM(3,4),HL4),(TNKPRM(4,4),CU4),(TNKPRM(5,4),HU4)
 EQUIVALENCE  (TNKDPT(1,1),TANK1),(TNKDPT(2,1),TANK2),
$      (TNKDPT(3,1),TANK3),(TNKDPT(4,1),TANK4)


C ================================================================
C   START EXECUTION
C ================================================================
   DO 10 I=1,3
     RVCTNK(I) = 0.0
10   CONTINUE

     IF (IMDLSW .EQ. 1) GOTO 200
C  ***********************
C    FOR EXTERNAL
C  ***********************
   ZB=ZA**4+ZA**3+ZA**2+ZA
   DO  100  I=1,4
     S(I)=ZA**(5-I)/ZB
     R(I)=ZA
100  CONTINUE
   R(1)=0.0
   RETURN

C  ***********************
C    FOR INTERNAL
C  ***********************
200  CONTINUE
   HNO1 = 0

   DO 240 J=2,4
     DO 220 I=1,4
       TNKDPT(I,J) = 0.0
       DO 210 L=1,4
         TNKIOW(L,I,J) = 0.0
210        CONTINUE
220      CONTINUE
240  CONTINUE

   DO 280 J=1,4
     DO 260 I=1,4
       TOPTNK(I,J) = 0.0
```

```
260     CONTINUE
280   CONTINUE

    IF (ISUID .EQ. 0) THEN
        DO 340 J=1,12
       DO 320 I=1,31
          QN(I,J) = 0.0
320       CONTINUE
340     CONTINUE
    ELSE
        DO 380 J=1,12
       DO 360 I=1,31
          QN(I,J) = QN(I,J)*CAN/CA
360       CONTINUE
380     CONTINUE
    END IF

    RETURN

    END
C==========================================================
C  FUNCTION : CREATE TANK DEPTH FROM INITIAL ZERO.
C  ==================================================
C     PROGRAM, SUBROUTINE DEFINITION
C  ==================================================
    FUNCTION   CREDPT ( DMY )

C
C  ***  COMMON DATA DEFINITION FOR TANK MODEL  ***
C
     INTEGER      SYMSUC,SYMERR,INPFIL,PRMFIL,OUTFIL
     PARAMETER      (SYMSUC=1,SYMERR=0)
     PARAMETER    (INPFIL=10, PRMFIL=11, OUTFIL=12)

     REAL    RA(31), RF(31), TP(31)
     REAL    EE(12), TNKPRM(5,4), TNKDPT(4,4)
     REAL    XSPRM(4), AREAS(4), ADHOS(4), ADMOS(12), QN(31,12)
     REAL    TNKIOW(4,4,4), TOPTNK(4,4), RVCTNK(3)
     REAL    R(4),S(4)

     REAL     CA, COEV, CLR, CUR, HUR, RVC, PS, SS, TB, TC, ZA
     REAL     ONDO1, ONDO2, ONDO3, ONDO4, C1, C2, C3, C4
     REAL   CMENS1, CMENS2, CMENS3, CMENS4
     REAL   SNOW1, SNOW2, SNOW3, SNOW4
     REAL   CMELT, TINETU, R1, TEMP1, CAN, RN
     REAL   RC, HNO1
```

```
      COMMON /INP/ IDX, RA, RF, TP
      COMMON /PRM/ IMDLSW, IOUTSW, IRVCSW, IDATSW, INIDPT, IS, IE,
     $      CA, BE, COEV, TNKPRM, TNKDPT, CLR,CUR,HUR,RVC,
     $        PS,SS,TB,TC,ZA,XSPRM,
     $       ISNOW,IPREMI,ISUID,IDEV4,
     $       ONDO1,ONDO2,ONDO3,ONDO4,C1,C2,C3,C4,
     $        CMENS1,CMENS2,CMENS3,CMENS4,SNOW1,SNOW2,SNOW3,SNOW4,
     $        CMELT,TINETU,R1,TEMP1,
     $        AREAS,ADHOS,ADMOS,
     $        CAN,RN,QN,IIS,IIE
      COMMON /OUT/ RC, TNKIOW, TOPTNK, RVCTNK
      COMMON /OUT1/ IOUTSW1,IOUTSW2,IOUTSW3
      COMMON /EXT/ R, S
      COMMON /INT/ HNO1

      EQUIVALENCE  (TNKPRM(1,1),CB1),(TNKPRM(2,1),CL1),
     $      (TNKPRM(3,1),HL1),(TNKPRM(4,1),CU1),(TNKPRM(5,1),HU1)
      EQUIVALENCE  (TNKPRM(1,2),CB2),(TNKPRM(2,2),CL2),
     $      (TNKPRM(3,2),HL2),(TNKPRM(4,2),CU2),(TNKPRM(5,2),HU2)
      EQUIVALENCE  (TNKPRM(1,3),CB3),(TNKPRM(2,3),CL3),
     $      (TNKPRM(3,3),HL3),(TNKPRM(4,3),CU3),(TNKPRM(5,3),HU3)
      EQUIVALENCE  (TNKPRM(1,4),CB4),(TNKPRM(2,4),CL4),
     $      (TNKPRM(3,4),HL4),(TNKPRM(4,4),CU4),(TNKPRM(5,4),HU4)
      EQUIVALENCE  (TNKDPT(1,1),TANK1),(TNKDPT(2,1),TANK2),
     $      (TNKDPT(3,1),TANK3),(TNKDPT(4,1),TANK4)


      REAL      SAVDPT(4,4), SAVRVC

      DIMENSION   IMD(12)
      DATA      IMD / 31, 28, 31, 30, 31, 30, 31, 31, 30,
     $             31, 30, 31 /

C  ==================================================
C    START EXECUTION
C  ==================================================

      DO 10 I=1,4
      DO 10 J=1,4
        TNKDPT(I,J) = 0.0
   10 CONTINUE
      RVC = 0.0

      IDUR = IDATSW / 100

      IF(IIS.EQ.0)  IIS=IS
      IF(IIE.EQ.0)  IIE=IS+3
```

```
      IF(IIB.GT.IE) IIE=IE

      DO 400 ICNT=1,2
      DO 300 IYEAR=IIS,IIE
        IF (MOD(IYEAR,4) .EQ. 0) THEN
          IMD(2) = 29
        ELSE
          IMD(2) = 28
        END IF

        DO 200 IMONTH=1,12
          ITAG = (IYEAR * 10000) + (IMONTH * 100)
          IF ( INPDAT(ITAG) .NE. SYMSUC ) THEN
         STOP   '%ERR - INPUT DATA FILE read error'
          END IF

          IFLG = 1
          DO 100 IDAY=1,IMD(IMONTH)
         IF (IFLG .NE. 0) THEN
              IF (IMDLSW .EQ. 0) THEN
             CALL   CALEXT ( IMONTH, IDAY )
           ELSE
             CALL   CALINT ( IMONTH, IDAY )
           END IF
           IF (IDUR .NE. 0) IFLG = 0
         END IF
100        CONTINUE
200      CONTINUE
300   CONTINUE
      REWIND    (INPFIL)
      CALL    INIVAL ( ICNT, TANK1, TANK2, TANK3, TANK4 )
400   CONTINUE

      DO 510 I=1,4
      DO 510 J=1,4
        SAVDPT(I,J) = TNKDPT(I,J)
510   CONTINUE
      SAVRVC = RVC

      REWIND    (PRMFIL)
      IF ( REDPRM( DMY ) .NE. SYMSUC ) GOTO 9900
      CALL   INIVAR

      DO 520 I=1,4
      DO 520 J=1,4
        TNKDPT(I,J) = SAVDPT(I,J)
520   CONTINUE
```

```
      RVC = SAVRVC

      CREDPT = SYMSUC
      RETURN

9900  CONTINUE
      CREDPT = SYMERR
      RETURN

      END

C     ==========================================================
C       PROGRAM, SUBROUTINE DEFINITION
C     ==========================================================
      SUBROUTINE   INIVAL (NR,XA,XB,XC,XD)

      SAVE      XA1, XB1, XC1, XD1
      FX(X1,X2) = X1 ** 2.0 / (2.0 * X1 - X2)
C
C   -- START EXECUTION --
C
      IF(NR-2) 100,200,300

100   CONTINUE
      XA1 = XA
      XB1 = XB
      XC1 = XC
      XD1 = XD
      RETURN

200   CONTINUE
      IF (XA .NE. XA1) THEN
        XA = FX(XA1,XA)
        IF (XA .LT. 0.) XA = 0.
      END IF
      IF (XB .NE. XB1) THEN
        XB = FX(XB1,XB)
        IF (XB .LT. 0.) XB = 0.
      END IF
      IF (XC .NE. XC1) THEN
        XC = FX(XC1,XC)
        IF (XC .LT. 0.) XC = 0.
      END IF
      IF (XD .NE. XD1) THEN
        XD = FX(XD1,XD)
        IF (XD .LT. 0.) XD = 0.
      END IF
```

```
300  RETURN
     END
C=====================================================================
C  FUNCTION : READ THE MONTHLY MEASURING DATA
C  ====================================================================
C    PROGRAM, SUBROUTINE DEFINITION
C  ====================================================================
     FUNCTION   INPDAT ( ITAG )

C
C  ***  COMMON DATA DEFINITION FOR TANK MODEL  ***
C
      INTEGER     SYMSUC,SYMERR,INPFIL,PRMFIL,OUTFIL
      PARAMETER     (SYMSUC=1,SYMERR=0)
      PARAMETER   (INPFIL=10, PRMFIL=11, OUTFIL=12)

      REAL    RA(31), RF(31), TP(31)
      REAL    EE(12), TNKPRM(5,4), TNKDPT(4,4)
      REAL    XSPRM(4), AREAS(4), ADHOS(4), ADMOS(12), QN(31,12)
      REAL    TNKIOW(4,4,4), TOPTNK(4,4), RVCTNK(3)
      REAL     R(4),S(4)

      REAL     CA, COEV, CLR, CUR, HUR, RVC, PS, SS, TB, TC, ZA
      REAL     ONDO1, ONDO2, ONDO3, ONDO4, C1, C2, C3, C4
      REAL   CMENS1, CMENS2, CMENS3, CMENS4
      REAL   SNOW1, SNOW2, SNOW3, SNOW4
      REAL   CMELT, TINETU, R1, TEMP1, CAN, RN
      REAL   RC, HNO1

      COMMON /INP/ IDX, RA, RF, TP
      COMMON /PRM/ IMDLSW, IOUTSW, IRVCSW, IDATSW, INIDPT, IS, IE,
     $      CA, EE, COEV, TNKPRM, TNKDPT, CLR,CUR,HUR,RVC,
     $        PS,SS,TB,TC,ZA,XSPRM,
     $       ISNOW,IPREMI,ISUID,IDEV4,
     $       ONDO1,ONDO2,ONDO3,ONDO4,C1,C2,C3,C4,
     $       CMENS1,CMENS2,CMENS3,CMENS4,SNOW1,SNOW2,SNOW3,SNOW4,
     $       CMELT,TINETU,R1,TEMP1,
     $       AREAS,ADHOS,ADMOS,
     $       CAN,RN,QN,IIS,IIE
      COMMON /OUT/ RC, TNKIOW, TOPTNK, RVCTNK
      COMMON /OUT1/ IOUTSW1,IOUTSW2,IOUTSW3
      COMMON /EXT/ R, S
      COMMON /INT/ HNO1

      EQUIVALENCE  (TNKPRM(1,1),CB1),(TNKPRM(2,1),CL1),
     $      (TNKPRM(3,1),HL1),(TNKPRM(4,1),CU1),(TNKPRM(5,1),HU1)
```

```
      EQUIVALENCE  (TNKPRM(1,2),CB2),(TNKPRM(2,2),CL2),
     $          (TNKPRM(3,2),HL2),(TNKPRM(4,2),CU2),(TNKPRM(5,2),HU2)
      EQUIVALENCE  (TNKPRM(1,3),CB3),(TNKPRM(2,3),CL3),
     $          (TNKPRM(3,3),HL3),(TNKPRM(4,3),CU3),(TNKPRM(5,3),HU3)
      EQUIVALENCE  (TNKPRM(1,4),CB4),(TNKPRM(2,4),CL4),
     $          (TNKPRM(3,4),HL4),(TNKPRM(4,4),CU4),(TNKPRM(5,4),HU4)
      EQUIVALENCE  (TNKDPT(1,1),TANK1),(TNKDPT(2,1),TANK2),
     $          (TNKDPT(3,1),TANK3),(TNKDPT(4,1),TANK4)


C ==================================================================
C     START EXECUTION
C ==================================================================
      ISW = 0
   10 CONTINUE
      READ   (INPFIL,*,END=100)
     $   IDX, (RA(I),I=1,31), (RF(I),I=1,31), (TP(I),I=1,31)

      IF (ITAG .NE. IDX) GOTO 10
      INPDAT = SYMSUC
      RETURN

  100 CONTINUE
      IF (ISW .NE. 0) GOTO 9900
      REWIND   (INPFIL)
      ISW = 1
      GOTO 10

 9900 CONTINUE
      INPDAT = SYMERR
      RETURN

      END
C-------------------------------------------------------------------------
C   FUNCTION : CALCULATE THE RUN OFF DATA FROM THE RAIN FALL DATA
C         (4 * 1 TANK MODEL - INTERNAL TYPE)
C ==================================================================
C     PROGRAM, SUBROUTINE DEFINITION
C ==================================================================
      SUBROUTINE  CALINT ( IMONTH, IDAY )

C
C  ***   COMMON DATA DEFINITION FOR TANK MODEL   ***
C
      INTEGER      SYMSUC,SYMERR,INPFIL,PRMFIL,OUTFIL
      PARAMETER     (SYMSUC=1,SYMERR=0)
```

```
      PARAMETER   (INPFIL=10, PRMFIL=11, OUTFIL=12)

      REAL    RA(31), RF(31), TP(31)
      REAL    EE(12), TNKPRM(5,4), TNKDPT(4,4)
      REAL    XSPRM(4), AREAS(4), ADHOS(4), ADMOS(12), QN(31,12)
      REAL    TNKIOW(4,4,4), TOPTNK(4,4), RVCTNK(3)
      REAL    R(4),S(4)

      REAL    CA, COEV, CLR, CUR, HUR, RVC, PS, SS, TB, TC, ZA
      REAL    ONDO1, ONDO2, ONDO3, ONDO4, C1, C2, C3, C4
      REAL  CMENS1, CMENS2, CMENS3, CMENS4
      REAL  SNOW1, SNOW2, SNOW3, SNOW4
      REAL  CMELT, TINETU, R1, TEMP1, CAN, RN
      REAL  RC, HNO1

      COMMON /INP/ IDX, RA, RF, TP
      COMMON /PRM/ IMDLSW, IOUTSW, IRVCSW, IDATSW, INIDPT, IS, IE,
     $      CA, EE, COEV, TNKPRM, TNKDPT, CLR,CUR,HUR,RVC,
     $         PS,SS,TB,TC,ZA,XSPRM,
     $        ISNOW,IPREMI,ISUID,IDEV4,
     $        ONDO1,ONDO2,ONDO3,ONDO4,C1,C2,C3,C4,
     $        CMENS1,CMENS2,CMENS3,CMENS4,SNOW1,SNOW2,SNOW3,SNOW4,
     $        CMELT,TINETU,R1,TEMP1,
     $        AREAS,ADHOS,ADMOS,
     $        CAN,RN,QN,IIS,IIE
      COMMON /OUT/ RC, TNKIOW, TOPTNK, RVCTNK
      COMMON /OUT1/ IOUTSW1,IOUTSW2,IOUTSW3
      COMMON /EXT/ R, S
      COMMON /INT/ HNO1

      EQUIVALENCE (TNKPRM(1,1),CB1),(TNKPRM(2,1),CL1),
     $      (TNKPRM(3,1),HL1),(TNKPRM(4,1),CU1),(TNKPRM(5,1),HU1)
      EQUIVALENCE (TNKPRM(1,2),CB2),(TNKPRM(2,2),CL2),
     $      (TNKPRM(3,2),HL2),(TNKPRM(4,2),CU2),(TNKPRM(5,2),HU2)
      EQUIVALENCE (TNKPRM(1,3),CB3),(TNKPRM(2,3),CL3),
     $      (TNKPRM(3,3),HL3),(TNKPRM(4,3),CU3),(TNKPRM(5,3),HU3)
      EQUIVALENCE (TNKPRM(1,4),CB4),(TNKPRM(2,4),CL4),
     $      (TNKPRM(3,4),HL4),(TNKPRM(4,4),CU4),(TNKPRM(5,4),HU4)
      EQUIVALENCE (TNKDPT(1,1),TANK1),(TNKDPT(2,1),TANK2),
     $      (TNKDPT(3,1),TANK3),(TNKDPT(4,1),TANK4)


C  ==========================================================
C     START EXECUTION
C  ==========================================================
      R2  =RA(IDAY)
```

```
      EVA2 =EE(IMONTH)*COEV
      TEMP2=TP(IDAY)
      HNO2 =QN(IDAY, IMONTH)

      IF (IPREMI .EQ. 1) THEN
        IF (ISNOW  .EQ. 0) THEN
          CALL   SUGAWA ( IMONTH, R2 )
        ELSE
          CALL   RHOSE  ( IMONTH )
        END IF
      END IF

      CALL      TANK(R2,EVA2,TEMP2,HNO2)

      RETURN
      END
C
C     ==================================================================
C
      SUBROUTINE  TANK(R2,EVA2,TEMP2,HNO2)
C
C
C     ***   COMMON DATA DEFINITION FOR TANK MODEL   ***
C
      INTEGER      SYMSUC,SYMERR,INPFIL,PRMFIL,OUTFIL
      PARAMETER     (SYMSUC=1,SYMERR=0)
      PARAMETER    (INPFIL=10, PRMFIL=11, OUTFIL=12)

      REAL     RA(31), RF(31), TP(31)
      REAL     EE(12), TNKPRM(5,4), TNKDPT(4,4)
      REAL     XSPRM(4), AREAS(4), ADHOS(4), ADMOS(12), QN(31,12)
      REAL     TNKIOW(4,4,4), TOPTNK(4,4), RVCTNK(3)
      REAL     R(4),S(4)

      REAL     CA, COEV, CLR, CUR, HUR, RVC, PS, SS, TB, TC, ZA
      REAL     ONDO1, ONDO2, ONDO3, ONDO4, C1, C2, C3, C4
      REAL   CMENS1, CMENS2, CMENS3, CMENS4
      REAL   SNOW1, SNOW2, SNOW3, SNOW4
      REAL   CMELT, TINETU, R1, TEMP1, CAN, RN
      REAL   RC, HNO1

      COMMON /INP/ IDX, RA, RF, TP
      COMMON /PRM/ IMDLSW, IOUTSW, IRVCSW, IDATSW, INIDPT, IS, IE,
     $       CA, EE, COEV, TNKPRM, TNKDPT, CLR,CUR,HUR,RVC,
     $          PS,SS,TB,TC,ZA,XSPRM,
     $         ISNOW,IPREMI,ISUID,IDEV4,
     $         ONDO1,ONDO2,ONDO3,ONDO4,C1,C2,C3,C4,
```

```
$          CMENS1,CMENS2,CMENS3,CMENS4,SNOW1,SNOW2,SNOW3,SNOW4,
$          CMELT,TINETU,R1,TEMP1,
$          AREAS,ADHOS,ADMOS,
$          CAN,RN,QN,IIS,IIE
      COMMON /OUT/ RC, TNKIOW, TOPTNK, RVCTNK
      COMMON /OUT1/ IOUTSW1,IOUTSW2,IOUTSW3
      COMMON /EXT/ R, S
      COMMON /INT/ HNO1

      EQUIVALENCE  (TNKPRM(1,1),CB1),(TNKPRM(2,1),CL1),
$          (TNKPRM(3,1),HL1),(TNKPRM(4,1),CU1),(TNKPRM(5,1),HU1)
      EQUIVALENCE  (TNKPRM(1,2),CB2),(TNKPRM(2,2),CL2),
$          (TNKPRM(3,2),HL2),(TNKPRM(4,2),CU2),(TNKPRM(5,2),HU2)
      EQUIVALENCE  (TNKPRM(1,3),CB3),(TNKPRM(2,3),CL3),
$          (TNKPRM(3,3),HL3),(TNKPRM(4,3),CU3),(TNKPRM(5,3),HU3)
      EQUIVALENCE  (TNKPRM(1,4),CB4),(TNKPRM(2,4),CL4),
$          (TNKPRM(3,4),HL4),(TNKPRM(4,4),CU4),(TNKPRM(5,4),HU4)
      EQUIVALENCE  (TNKDPT(1,1),TANK1),(TNKDPT(2,1),TANK2),
$          (TNKDPT(3,1),TANK3),(TNKDPT(4,1),TANK4)


      EV1=0.0
      EV2=0.0
      EV3=0.0
      EV4=0.0
      HKAN=HNO1*RN

      IF(ISNOW.EQ.0)    GO TO 100
      ONDO=TEMP1+ONDO1
      RT1=C1*R1
      CALL    YUSETU(ONDO,SNOW1,RT1,RIN)
      SUMRIN=RIN*CMENS1
      ONDO=TEMP1+ONDO2
      RT2=C2*R1
      CALL    YUSETU(ONDO,SNOW2,RT2,RIN)
      SUMRIN=SUMRIN+RIN*CMENS2
      ONDO=TEMP1+ONDO3
      RT3=C3*R1
      CALL    YUSETU(ONDO,SNOW3,RT3,RIN)
      SUMRIN=SUMRIN+RIN*CMENS3
      ONDO=TEMP1+ONDO4
      RT4=C4*R1
      CALL    YUSETU(ONDO,SNOW4,RT4,RIN)
      SUMRIN=SUMRIN+RIN*CMENS4
      GO  TO 110
  100 SUMRIN=R2
  110 CONTINUE
```

```
      EV=EVA2
C
      IF(SUMRIN.GE.0.5)    EV=EV/1.0
      TANK1=TANK1+SUMRIN-EV
      IF(TANK1.GE.0.0)     GO TO 120
      EV1=TANK1
      TANK1=0.0
  120 CONTINUE
      TNKIOW(1,1,1)=SUMRIN
      CALL DISTRI(DISD1,DISU1,DIS1,AINF1,TANK1,HL1,HU1,CL1,CU1,CB1)
      TNKIOW(2,1,1)=AINF1
      TNKIOW(3,1,1)=DISU1
      TNKIOW(4,1,1)=DISD1
      TANK2=TANK2+AINF1+EV1
      IF(TANK2.GE.0.0)     GO TO 130
      EV2=TANK2
      TANK2=0.0
  130 CONTINUE
      TNKIOW(1,2,1)=AINF1
      CALL DISTRI(DISD2,DISU2,DIS2,AINF2,TANK2,HL2,HU2,CL2,CU2,CB2)
      TNKIOW(2,2,1)=AINF2
      TNKIOW(3,2,1)=DISU2
      TNKIOW(4,2,1)=DISD2
      TANK3=TANK3+AINF2+EV2+HKAN
      IF(TANK3.GE.0.0)     GO TO 140
      EV3=TANK3
      TANK3=0.0
  140 CONTINUE
      TNKIOW(1,3,1)=AINF2+HKAN
      CALL DISTRI(DISD3,DISU3,DIS3,AINF3,TANK3,HL3,HU3,CL3,CU3,CB3)
      TNKIOW(2,3,1)=AINF3
      TNKIOW(3,3,1)=DISU3
      TNKIOW(4,3,1)=DISD3
      EV4=0.0
      IF(IDEV4.EQ.1)       EV4=EV3
      TANK4=TANK4+AINF3+EV4
      TNKIOW(1,4,1)=AINF3
      CALL DISTRI(DISD4,DISU4,DIS4,AINF4,TANK4,HL4,HU4,CL4,CU4,CB4)
      TNKIOW(2,4,1)=AINF4
      TNKIOW(3,4,1)=DISU4
      TNKIOW(4,4,1)=DISD4
C
      RC = DIS1+DIS2+DIS3+DIS4-HNO1
      IF (IRVCSW .EQ. 1) THEN
        XR=RC
        XL=RVC
        CALL  INTRCB  ( XL,XR,CLR,CUR,HUR,Y )
```

```
      RVCTNK(1)=XL
      RVCTNK(2)=XR
      RVCTNK(3)=Y
      RVC=XL
      RC=Y
     END IF
     R1=R2
     TEMP1=TEMP2
     HNO1 =HNO2
     RETURN
     END
C
C ===================================================================
C
     SUBROUTINE DISTRI(DISDI,DISUI,DISI,AINFI,TANKI,
     $            HLI,HUI,CLI,CUI,CBI)

      DISDI=0.0
      DISUI=0.0
     IF(TANKI.GT.HLI)  DISDI=(TANKI-HLI)*CLI
     IF(TANKI.GT.HUI)  DISUI=(TANKI-HUI)*CUI
      DISI=DISDI+DISUI
      AINFI=TANKI*CBI
      TMP = TANKI-DISI-AINFI
      IF (TMP .LT. 0.0) THEN
       AINFI=TANKI-DISI
        TANKI=0.0
      ELSE
        TANKI=TMP
      END IF
      RETURN
      END
C
C ===================================================================
C
      SUBROUTINE    YUSETU(ONDO,SNOWI,RCI,RIN)

C
C  ***  COMMON DATA DEFINITION FOR TANK MODEL  ***
C
       INTEGER      SYMSUC,SYMERR,INPFIL,PRMFIL,OUTFIL
       PARAMETER      (SYMSUC=1,SYMERR=0)
       PARAMETER    (INPFIL=10, PRMFIL=11, OUTFIL=12)

       REAL     RA(31), RF(31), TP(31)
       REAL     EE(12), TNKPRM(5,4), TNKDPT(4,4)
       REAL     XSPRM(4), AREAS(4), ADHOS(4), ADMOS(12), QN(31,12)
```

```
      REAL    TNKIOW(4,4,4), TOPTNK(4,4), RVCTNK(3)
      REAL    R(4),S(4)

      REAL    CA, COEV, CLR, CUR, HUR, RVC, PS, SS, TB, TC, ZA
      REAL    ONDO1, ONDO2, ONDO3, ONDO4, C1, C2, C3, C4
      REAL    CMENS1, CMENS2, CMENS3, CMENS4
      REAL    SNOW1, SNOW2, SNOW3, SNOW4
      REAL    CMELT, TINETU, R1, TEMP1, CAN, RN
      REAL    RC, HNO1

      COMMON /INP/ IDX, RA, RF, TP
      COMMON /PRM/ IMDLSW, IOUTSW, IRVCSW, IDATSW, INIDPT, IS, IE,
     $       CA, EE, COEV, TNKPRM, TNKDPT, CLR,CUR,HUR,RVC,
     $           PS,SS,TB,TC,ZA,XSPRM,
     $          ISNOW,IPREMI,ISUID,IDEV4,
     $          ONDO1,ONDO2,ONDO3,ONDO4,C1,C2,C3,C4,
     $          CMENS1,CMENS2,CMENS3,CMENS4,SNOW1,SNOW2,SNOW3,SNOW4,
     $          CMELT,TINETU,R1,TEMP1,
     $          AREAS,ADHOS,ADMOS,
     $          CAN,RN,QN,HS,HE
      COMMON /OUT/ RC, TNKIOW, TOPTNK, RVCTNK
      COMMON /OUT1/ IOUTSW1,IOUTSW2,IOUTSW3
      COMMON /EXT/ R, S
      COMMON /INT/ HNO1

      EQUIVALENCE  (TNKPRM(1,1),CB1),(TNKPRM(2,1),CL1),
     $       (TNKPRM(3,1),HL1),(TNKPRM(4,1),CU1),(TNKPRM(5,1),HU1)
      EQUIVALENCE  (TNKPRM(1,2),CB2),(TNKPRM(2,2),CL2),
     $       (TNKPRM(3,2),HL2),(TNKPRM(4,2),CU2),(TNKPRM(5,2),HU2)
      EQUIVALENCE  (TNKPRM(1,3),CB3),(TNKPRM(2,3),CL3),
     $       (TNKPRM(3,3),HL3),(TNKPRM(4,3),CU3),(TNKPRM(5,3),HU3)
      EQUIVALENCE  (TNKPRM(1,4),CB4),(TNKPRM(2,4),CL4),
     $       (TNKPRM(3,4),HL4),(TNKPRM(4,4),CU4),(TNKPRM(5,4),HU4)
      EQUIVALENCE  (TNKDPT(1,1),TANK1),(TNKDPT(2,1),TANK2),
     $      (TNKDPT(3,1),TANK3),(TNKDPT(4,1),TANK4)


      IF(TINETU.GT.0.00001)   GO TO 100
      IF(ONDO.LT.0.0)   GO TO 20
      IF(SNOWI.LT.ONDO*CMELT+RCI*ONDO/80.0) GO TO 10
      RIN =RCI+ONDO*CMELT+RCI*ONDO/80.0
      SNOWI=SNOWI-ONDO*CMELT-RCI*ONDO/80.0
      GO TO 30
   10 RIN=RCI+SNOWI
      SNOWI=0.0
      GO TO 30
```

```
 20 RIN=0.0
    SNOWI=RCI+SNOWI
 30 CONTINUE
    GO TO 130
100 CONTINUE
    IF(ONDO.LT.0.0)     GO TO 120
    SMELT=ONDO*CMELT+RCI*ONDO/80.0+TINETU
    IF(SNOWI.LT.SMELT)     GO TO 110
    SNOWI=SNOWI-SMELT
    RIN  =RCI+SMELT
    IF(SNOWI.GT.0.0)     GO TO 130
    RIN=SNOWI+SMELT+TINETU
    SNOWI=0.0
    GO  TO  130
110 CONTINUE
    RIN  =RCI+SNOWI
    SNOWI=0.0
    GO  TO  130
120 CONTINUE
    SNOWI=SNOWI+RCI-TINETU
    RIN  =TINETU
    IF(SNOWI.GT.0.0)     GO TO 130
    RIN=SNOWI+TINETU
    SNOWI=0.0
130 CONTINUE
    RETURN
    END
C
C   ================================================================
C
    SUBROUTINE   SUGAWA ( IMONTH, R2 )

C
C  ***   COMMON DATA DEFINITION FOR TANK MODEL   ***
C
    INTEGER     SYMSUC,SYMERR,INPFIL,PRMFIL,OUTFIL
    PARAMETER     (SYMSUC=1,SYMERR=0)
    PARAMETER   (INPFIL=10, PRMFIL=11, OUTFIL=12)

    REAL    RA(31), RF(31), TP(31)
    REAL    EE(12), TNKPRM(5,4), TNKDPT(4,4)
    REAL    XSPRM(4), AREAS(4), ADHOS(4), ADMOS(12), QN(31,12)
    REAL    TNKIOW(4,4,4), TOPTNK(4,4), RVCTNK(3)
    REAL    R(4),S(4)

    REAL    CA, COEV, CLR, CUR, HUR, RVC, PS, SS, TB, TC, ZA
    REAL    ONDO1, ONDO2, ONDO3, ONDO4, C1, C2, C3, C4
```

```
      REAL   CMENS1, CMENS2, CMENS3, CMENS4
      REAL   SNOW1, SNOW2, SNOW3, SNOW4
      REAL   CMELT, TINETU, R1, TEMP1, CAN, RN
      REAL   RC, HNO1

      COMMON /INP/ IDX, RA, RF, TP
      COMMON /PRM/ IMDLSW, IOUTSW, IRVCSW, IDATSW, INIDPT, IS, IE,
     $      CA, EE, COEV, TNKPRM, TNKDPT, CLR,CUR,HUR,RVC,
     $         PS,SS,TB,TC,ZA,XSPRM,
     $        ISNOW,IPREMI,ISUID,IDEV4,
     $        ONDO1,ONDO2,ONDO3,ONDO4,C1,C2,C3,C4,
     $        CMENS1,CMENS2,CMENS3,CMENS4,SNOW1,SNOW2,SNOW3,SNOW4,
     $        CMELT,TINETU,R1,TEMP1,
     $        AREAS,ADHOS,ADMOS,
     $        CAN,RN,QN,IIS,IIE
      COMMON /OUT/ RC, TNKIOW, TOPTNK, RVCTNK
      COMMON /OUT1/ IOUTSW1,IOUTSW2,IOUTSW3
      COMMON /EXT/ R, S
      COMMON /INT/ HNO1

      EQUIVALENCE  (TNKPRM(1,1),CB1),(TNKPRM(2,1),CL1),
     $      (TNKPRM(3,1),HL1),(TNKPRM(4,1),CU1),(TNKPRM(5,1),HU1)
      EQUIVALENCE  (TNKPRM(1,2),CB2),(TNKPRM(2,2),CL2),
     $      (TNKPRM(3,2),HL2),(TNKPRM(4,2),CU2),(TNKPRM(5,2),HU2)
      EQUIVALENCE  (TNKPRM(1,3),CB3),(TNKPRM(2,3),CL3),
     $      (TNKPRM(3,3),HL3),(TNKPRM(4,3),CU3),(TNKPRM(5,3),HU3)
      EQUIVALENCE  (TNKPRM(1,4),CB4),(TNKPRM(2,4),CL4),
     $      (TNKPRM(3,4),HL4),(TNKPRM(4,4),CU4),(TNKPRM(5,4),HU4)
      EQUIVALENCE  (TNKDPT(1,1),TANK1),(TNKDPT(2,1),TANK2),
     $      (TNKDPT(3,1),TANK3),(TNKDPT(4,1),TANK4)



      COEF=0.0
      DO  100     K=1,4
  100 COEF=COEF+AREAS(K)*ADHOS(K)*ADMOS(IMONTH)
      COEF=COEF+1.0
      R2=R2*COEF
      RETURN
      END
C
C ================================================================
C
      SUBROUTINE    RHOSE ( IMONTH )

C
C  ***  COMMON DATA DEFINITION FOR TANK MODEL  ***
```

```
C
      INTEGER     SYMSUC,SYMERR,INPFIL,PRMFIL,OUTFIL
      PARAMETER     (SYMSUC=1,SYMERR=0)
      PARAMETER   (INPFIL=10, PRMFIL=11, OUTFIL=12)

      REAL    RA(31), RF(31), TP(31)
      REAL    BB(12), TNKPRM(5,4), TNKDPT(4,4)
      REAL    XSPRM(4), AREAS(4), ADHOS(4), ADMOS(12), QN(31,12)
      REAL    TNKIOW(4,4,4), TOPTNK(4,4), RVCTNK(3)
      REAL    R(4),S(4)

      REAL     CA, COEV, CLR, CUR, HUR, RVC, PS, SS, TB, TC, ZA
      REAL     ONDO1, ONDO2, ONDO3, ONDO4, C1, C2, C3, C4
      REAL   CMENS1, CMENS2, CMENS3, CMENS4
      REAL   SNOW1, SNOW2, SNOW3, SNOW4
      REAL   CMELT, TINETU, R1, TEMP1, CAN, RN
      REAL   RC, HNO1

      COMMON /INP/ IDX, RA, RF, TP
      COMMON /PRM/ IMDLSW, IOUTSW, IRVCSW, IDATSW, INIDPT, IS, IE,
     $       CA, EE, COEV, TNKPRM, TNKDPT, CLR,CUR,HUR,RVC,
     $         PS,SS,TB,TC,ZA,XSPRM,
     $        ISNOW,IPREMI,ISUID,IDEV4,
     $        ONDO1,ONDO2,ONDO3,ONDO4,C1,C2,C3,C4,
     $        CMENS1,CMENS2,CMENS3,CMENS4,SNOW1,SNOW2,SNOW3,SNOW4,
     $        CMELT,TINETU,R1,TEMP1,
     $        AREAS,ADHOS,ADMOS,
     $        CAN,RN,QN,IIS,IIE
      COMMON /OUT/ RC, TNKIOW, TOPTNK, RVCTNK
      COMMON /OUT1/ IOUTSW1,IOUTSW2,IOUTSW3
      COMMON /EXT/ R, S
      COMMON /INT/ HNO1

      EQUIVALENCE  (TNKPRM(1,1),CB1),(TNKPRM(2,1),CL1),
     $      (TNKPRM(3,1),HL1),(TNKPRM(4,1),CU1),(TNKPRM(5,1),HU1)
      EQUIVALENCE  (TNKPRM(1,2),CB2),(TNKPRM(2,2),CL2),
     $      (TNKPRM(3,2),HL2),(TNKPRM(4,2),CU2),(TNKPRM(5,2),HU2)
      EQUIVALENCE  (TNKPRM(1,3),CB3),(TNKPRM(2,3),CL3),
     $      (TNKPRM(3,3),HL3),(TNKPRM(4,3),CU3),(TNKPRM(5,3),HU3)
      EQUIVALENCE  (TNKPRM(1,4),CB4),(TNKPRM(2,4),CL4),
     $      (TNKPRM(3,4),HL4),(TNKPRM(4,4),CU4),(TNKPRM(5,4),HU4)
      EQUIVALENCE  (TNKDPT(1,1),TANK1),(TNKDPT(2,1),TANK2),
     $      (TNKDPT(3,1),TANK3),(TNKDPT(4,1),TANK4)


C
      C1=1+ADHOS(1)*ADMOS(IMONTH)
```

```
      C2=1+ADHOS(2)*ADMOS(IMONTH)
      C3=1+ADHOS(3)*ADMOS(IMONTH)
      C4=1+ADHOS(4)*ADMOS(IMONTH)
      RETURN
      END
C
C ==========================================================
C
      SUBROUTINE  INTRCB ( XL,XR,CLR,CUR,HUR,Y )
C
      XL=XL+XR
      IF(XL.GT.0.0)  GO TO  100
      XL=0.0
      Y=0.0
      RETURN
  100 CONTINUE
      Y=XL*CLR
      IF(XL.GT.HUR)  Y=Y+(XL-HUR)*CUR
      XL=XL-Y
      RETURN
      END
C=================================================================
C  FUNCTION : CALCULATE THE RUN OFF DATA FROM THE RAIN FALL DATA
C        (4 * 4 TANK MODEL - EXTERNAL TYPE)
C ======================================================
C    PROGRAM, SUBROUTINE DEFINITION
C ======================================================
      SUBROUTINE CALEXT ( IMONTH, IDAY )

C
C  ***  COMMON DATA DEFINITION FOR TANK MODEL  ***
C
      INTEGER     SYMSUC,SYMERR,INPFIL,PRMFIL,OUTFIL
      PARAMETER    (SYMSUC=1,SYMERR=0)
      PARAMETER   (INPFIL=10, PRMFIL=11, OUTFIL=12)

      REAL     RA(31), RF(31), TP(31)
      REAL     EE(12), TNKPRM(5,4), TNKDPT(4,4)
      REAL     XSPRM(4), AREAS(4), ADHOS(4), ADMOS(12), QN(31,12)
      REAL     TNKIOW(4,4,4), TOPTNK(4,4), RVCTNK(3)
      REAL     R(4),S(4)

      REAL     CA, COEV, CLR, CUR, HUR, RVC, PS, SS, TB, TC, ZA
      REAL     ONDO1, ONDO2, ONDO3, ONDO4, C1, C2, C3, C4
      REAL   CMENS1, CMENS2, CMENS3, CMENS4
      REAL   SNOW1, SNOW2, SNOW3, SNOW4
      REAL   CMELT, TINETU, R1, TEMP1, CAN, RN
```

```
      REAL   RC, HNO1

      COMMON /INP/ IDX, RA, RF, TP
      COMMON /PRM/ IMDLSW, IOUTSW, IRVCSW, IDATSW, INIDPT, IS, IE,
     $        CA, EE, COEV, TNKPRM, TNKDPT, CLR,CUR,HUR,RVC,
     $          PS,SS,TB,TC,ZA,XSPRM,
     $         ISNOW,IPREMI,ISUID,IDEV4,
     $         ONDO1,ONDO2,ONDO3,ONDO4,C1,C2,C3,C4,
     $         CMENS1,CMENS2,CMENS3,CMENS4,SNOW1,SNOW2,SNOW3,SNOW4,
     $         CMELT,TINETU,R1,TEMP1,
     $         AREAS,ADHOS,ADMOS,
     $         CAN,RN,QN,IIS,IIE
      COMMON /OUT/ RC, TNKIOW, TOPTNK, RVCTNK
      COMMON /OUT1/ IOUTSW1,IOUTSW2,IOUTSW3
      COMMON /EXT/ R, S
      COMMON /INT/ HNO1

      EQUIVALENCE  (TNKPRM(1,1),CB1),(TNKPRM(2,1),CL1),
     $       (TNKPRM(3,1),HL1),(TNKPRM(4,1),CU1),(TNKPRM(5,1),HU1)
      EQUIVALENCE  (TNKPRM(1,2),CB2),(TNKPRM(2,2),CL2),
     $       (TNKPRM(3,2),HL2),(TNKPRM(4,2),CU2),(TNKPRM(5,2),HU2)
      EQUIVALENCE  (TNKPRM(1,3),CB3),(TNKPRM(2,3),CL3),
     $       (TNKPRM(3,3),HL3),(TNKPRM(4,3),CU3),(TNKPRM(5,3),HU3)
      EQUIVALENCE  (TNKPRM(1,4),CB4),(TNKPRM(2,4),CL4),
     $       (TNKPRM(3,4),HL4),(TNKPRM(4,4),CU4),(TNKPRM(5,4),HU4)
      EQUIVALENCE  (TNKDPT(1,1),TANK1),(TNKDPT(2,1),TANK2),
     $       (TNKDPT(3,1),TANK3),(TNKDPT(4,1),TANK4)


C    =======================================================
C      START EXECUTION
C    =======================================================
       PJ=RA(IDAY)
       YA=0.0
       Y1=0.0
       YB=0.0
       YC=0.0
       YD=0.0
C     *** FOR  4  ZONES
       DO  300  N=1,4
       XA=TNKDPT(1,N)
       XB=TNKDPT(2,N)
       XC=TNKDPT(3,N)
       XD=TNKDPT(4,N)
       XS=XSPRM(N)
C--------
```

```
      CALL  EVAP ( EE(IMONTH),COEV,PS,SS,XA,XB,XC,XD,TB,TC,XP,XS,T1,T2 )
      TOPTNK(1,N)=XP
      TOPTNK(2,N)=XS
      TOPTNK(3,N)=T1
      TOPTNK(4,N)=T2
      TNKDPT(1,N)=XA
      TNKDPT(2,N)=XB
      TNKDPT(3,N)=XC
      TNKDPT(4,N)=XD
      XSPRM(N)=XS
      P=PJ+Y1*R(N)
      CBI=TNKPRM(1,1)
      CLI=TNKPRM(2,1)
      HLI=TNKPRM(3,1)
      CUI=TNKPRM(4,1)
      HUI=TNKPRM(5,1)
C---------
      TNKIOW(1,1,N) = P
      CALL  TTB( XA,P,PS,HS,CBI,CLI,HLI,CUI,HUI,Y0,Y1,Y2 )
      TNKIOW(2,1,N) = Y0
      TNKIOW(3,1,N) = Y2*S(N)
      TNKIOW(4,1,N) = Y1*S(N)
      TNKDPT(1,N)=XA
      YA=YA+Y2*S(N)
      P=Y0+YB*R(N)
      XL=TNKDPT(2,N)
      CBI=TNKPRM(1,2)
      CLI=TNKPRM(2,2)
      HLI=TNKPRM(3,2)
      CUI=TNKPRM(4,2)
      HUI=TNKPRM(5,2)
C---------
      TNKIOW(1,2,N) = P
      CALL  LTB  ( XL,P,CBI,CLI,HLI,CUI,HUI,Y0,YL,YH)
      TNKIOW(2,2,N) = Y0
      TNKIOW(3,2,N) = YH*S(N)
      TNKIOW(4,2,N) = YL*S(N)
      TNKDPT(2,N)=XL
      YB=YL+YH
      P=Y0+YC*R(N)
      XL=TNKDPT(3,N)
      CBI=TNKPRM(1,3)
      CLI=TNKPRM(2,3)
      HLI=TNKPRM(3,3)
      CUI=TNKPRM(4,3)
      HUI=TNKPRM(5,3)
C---------
```

```
      TNKIOW(1,3,N) = P
      CALL  LTB  ( XL,P,CBI,CLI,HLI,CUI,HUI,Y0,YL,YH)
      TNKIOW(2,3,N) = Y0
      TNKIOW(3,3,N) = YH*S(N)
      TNKIOW(4,3,N) = YL*S(N)
      TNKDPT(3,N)=XL
      YC=YL+YH
      P=Y0+YD*R(N)
      XL=TNKDPT(4,N)
      CBI=TNKPRM(1,4)
      CLI=TNKPRM(2,4)
      HLI=TNKPRM(3,4)
      CUI=TNKPRM(4,4)
      HUI=TNKPRM(5,4)
C--------
      TNKIOW(1,4,N) = P
      CALL  LTB  ( XL,P,CBI,CLI,HLI,CUI,HUI,Y0,YL,YH)
      TNKIOW(2,4,N) = Y0
      TNKIOW(3,4,N) = YH*S(N)
      TNKIOW(4,4,N) = YL*S(N)
      TNKDPT(4,N)=XL
      YD=YL+YH
  300 CONTINUE

      YA=YA+Y1*S(4)
      YB=YB*S(4)
      YC=YC*S(4)
      YD=YD*S(4)
      XR=YA+YB+YC+YD
      XL=RVC

      IF (IRVCSW .EQ. 0) THEN
        RC = XR
      ELSE
C--------
        CALL  RCB  ( XL,XR,CLR,CUR,HUR,Y )
        RVCTNK(1)=XL
        RVCTNK(2)=XR
        RVCTNK(3)=Y
        RVC=XL
        RC=Y
      ENDIF
C
      RETURN
      END
C
C ==================================================================
```

```
C
      SUBROUTINE  EVAP ( EA,COEV,PS,SS,XA,XB,XC,XD,TB,TC,XP,XS,T1,T2)

      XA=XA-EA*COEV
      XP=XA
      IF(XA.LT.0.0)  XP=0.0
      IF(XA.GE.PS)   XP=PS
      T2=TC*(XP/PS-XS/SS)
      XS=XS+T2
      IF(XS.LT.0.0) T2=T2-XS
      IF(XS.LT.0.0) XS=0.0
      IF(XS.GT.SS)  T2=T2-XS+SS
      IF(XS.GT.SS)  XS=SS
      T1=TB*(1.0-XP/PS)
      XA=XA+T1-T2
      IF(XA.LT.0.0)  XA=0.0
      XB=XB-T1
      IF(XB.GT.0.0)  RETURN
      XC=XC+XB
      XB=0.0
      IF(XC.GT.0.0)  RETURN
      XD=XD+XC
      XC=0.0
      IF(XD.GT.0.0)  RETURN
      XD=0.0
      RETURN
      END
C
C     =================================================================
C
      SUBROUTINE  TTB ( XA,P,PS,HS,CBI,CLI,HLI,CUI,HUI,Y0,Y1,Y2 )

      XA=XA+P
      Y0=0.0
      Y1=0.0
      Y2=0.0
      IF(XA.LE.PS)  RETURN
      XF=XA-PS
      IF(XF.LE.HLI)   GO TO  100
      Y1=(XF-HLI)*CLI
      IF(XF.LE.HUI)   GO TO  100
      Y2=(XF-HUI)*CUI
      Y0=XF*CBI
  100 CONTINUE
C     IF(XF.GE.HS)  XF=HS             ! DELETE
      Y0=XF*CBI
      XA=XA-Y0-Y1-Y2
```

```
      RETURN
      END
C
C  ==================================================================
C
      SUBROUTINE  LTB ( XL,P,CBI,CLI,HLI,CUI,HUI,Y0,YL,YH)
C
      XL=XL+P
      YL=0.0
      YH=0.0
      IF(XL.LE.HLI)  GOTO 100
      YL=(XL-HLI)*CLI
      IF(XL.GT.HUI) YH=(XL-HUI)*CUI
  100 CONTINUE
      Y0=XL*CBI
      XL=XL-Y0-YL-YH
      RETURN
      END
C
C  ==================================================================
C
      SUBROUTINE  RCB ( XL,XR,CLR,CUR,HUR,Y )
C
      XL=XL+XR
      IF(XL.GT.0.0)  GO TO  100
      XL=0.0
      Y=0.0
      RETURN
  100 CONTINUE
      Y=XL*CLR
      IF(XL.GT.HUR)  Y=Y+(XL-HUR)*CUR
      XL=XL-Y
      RETURN
      END
C=========================================================================
C  FUNCTION : WRITE THE DAILY CALCULATED DATA TO THE OUTPUT FILE.
C  ==================================================================
C     PROGRAM, SUBROUTINE DEFINITION
C  ==================================================================
      FUNCTION   OUTDAT ( IDATE, IDAY )

C  ***   COMMON DATA DEFINITION FOR TANK MODEL   ***
C
      INTEGER      SYMSUC,SYMERR,INPFIL,PRMFIL,OUTFIL
      PARAMETER      (SYMSUC=1,SYMERR=0)
      PARAMETER    (INPFIL=10, PRMFIL=11, OUTFIL=12)
```

```
      REAL    RA(31), RF(31), TP(31)
      REAL    EE(12), TNKPRM(5,4), TNKDPT(4,4)
      REAL    XSPRM(4), AREAS(4), ADHOS(4), ADMOS(12), QN(31,12)
      REAL    TNKIOW(4,4,4), TOPTNK(4,4), RVCTNK(3)
      REAL    R(4),S(4)

      REAL    CA, COEV, CLR, CUR, HUR, RVC, PS, SS, TB, TC, ZA
      REAL    ONDO1, ONDO2, ONDO3, ONDO4, C1, C2, C3, C4
      REAL  CMENS1, CMENS2, CMENS3, CMENS4
      REAL  SNOW1, SNOW2, SNOW3, SNOW4
      REAL  CMELT, TINETU, R1, TEMP1, CAN, RN
      REAL  RC, HNO1

      COMMON /INP/ IDX, RA, RF, TP
      COMMON /OUT/ RC, TNKIOW, TOPTNK, RVCTNK
      COMMON /PRM/ IMDLSW, IOUTSW, IRVCSW, IDATSW, INIDPT, IS, IE,
     $       CA, EE, COEV, TNKPRM, TNKDPT, CLR,CUR,HUR,RVC,
     $         PS,SS,TB,TC,ZA,XSPRM,
     $        ISNOW,IPREMI,ISUID,IDEV4,
     $        ONDO1,ONDO2,ONDO3,ONDO4,C1,C2,C3,C4,
     $        CMENS1,CMENS2,CMENS3,CMENS4,SNOW1,SNOW2,SNOW3,SNOW4,
     $        CMELT,TINETU,R1,TEMP1,
     $        AREAS,ADHOS,ADMOS,
     $        CAN,RN,QN,HS,HE

      COMMON /OUT1/ IOUTSW1,IOUTSW2,IOUTSW3
      COMMON /EXT/ R, S
      COMMON /INT/ HNO1

      EQUIVALENCE (TNKPRM(1,1),CB1),(TNKPRM(2,1),CL1),
     $      (TNKPRM(3,1),HL1),(TNKPRM(4,1),CU1),(TNKPRM(5,1),HU1)
      EQUIVALENCE  (TNKPRM(1,2),CB2),(TNKPRM(2,2),CL2),
     $      (TNKPRM(3,2),HL2),(TNKPRM(4,2),CU2),(TNKPRM(5,2),HU2)
      EQUIVALENCE  (TNKPRM(1,3),CB3),(TNKPRM(2,3),CL3),
     $      (TNKPRM(3,3),HL3),(TNKPRM(4,3),CU3),(TNKPRM(5,3),HU3)
      EQUIVALENCE  (TNKPRM(1,4),CB4),(TNKPRM(2,4),CL4),
     $      (TNKPRM(3,4),HL4),(TNKPRM(4,4),CU4),(TNKPRM(5,4),HU4)
      EQUIVALENCE  (TNKDPT(1,1),TANK1),(TNKDPT(2,1),TANK2),
     $      (TNKDPT(3,1),TANK3),(TNKDPT(4,1),TANK4)


C     ==================================================
C      START EXECUTION
C     ==================================================
      RC = RC * CA / 86.4
      IF (IOUTSW .EQ. 0) THEN
        WRITE (OUTFIL,10,ERR=9900) IDATE, RA(IDAY), RF(IDAY), RC
```

```
      ELSE
        WRITE (OUTFIL,*,ERR=9900) IDATE, RA(IDAY), RF(IDAY), RC,
     $        ((TNKDPT(I,J),I=1,4),J=1,4),
     $        (((TNKIOW(I,J,L),I=1,4),J=1,4),L=1,4),
     $        ((TOPTNK(I,J),I=1,4),J=1,4),(RVCTNK(I),I=1,3)
      END IF

      OUTDAT = SYMSUC
      RETURN

   10 FORMAT(I10,3F10.2)
 9900 CONTINUE
      OUTDAT = SYMERR
      RETURN

      END
```

```
      SUBROUTINE   FILECONV (ISNOW,IE,IOUTSW1)

      INTEGER*4    YEAR,DAY,FIELD,ISNOW
      CHARACTER*20  RDATA,DDATA,ODATA
      REAL*4       RD(12,31),DD(12,31),OD(12,31)

      IJK=0

      WRITE(*,1000)
      READ (*,1003) RDATA
      WRITE(*,1001)
      READ (*,1003) DDATA
      IF(ISNOW.EQ.1) WRITE(*,1002)
      IF(ISNOW.EQ.1) READ (*,*) ODATA
 1000 FORMAT('            RAIN DATA        : ')
 1001 FORMAT('            RUNOFF DATA      : ')
 1002 FORMAT('            TEMPERATURE DATA : ')
 1003 FORMAT(A20)

      OPEN (1,FILE=RDATA,STATUS='OLD')
      OPEN (2,FILE=DDATA,STATUS='OLD')
      IF(ISNOW.EQ.1) OPEN (3,FILE=ODATA,STATUS='OLD')

  200 CONTINUE

      READ (1,*,END=9000) YEAR
      IF(YEAR-1.EQ.IE) GOTO 9000
      IF(IJK.EQ.0) READ (2,*,END=9001) YEAR
      IF(ISNOW.EQ.1) READ (3,*) YEAR
```

```
      DO 100 I=1,31
       DO 101 IJ=1,12
        RD(IJ,I)=0.0
        DD(IJ,I)=0.0
        OD(IJ,I)=0.0
101     CONTINUE
       READ (1,*) DAY,(RD(J,I),J=1,12)
       IF(IJK.EQ.0)  READ (2,*) DAY,(DD(J,I),J=1,12)
       IF(ISNOW.EQ.1) READ (3,*) DAY,(OD(J,I),J=1,12)
100   CONTINUE
      DO 300 I=1,12
       FIELD=YEAR*10000+I*100
       WRITE(10,*) FIELD,(RD(I,J),J=1,31),(DD(I,J),J=1,31),
     *            (OD(I,J),J=1,31)
300   CONTINUE

      GOTO 200

9001  CONTINUE
      IJK=1
      GOTO 200

9000  CONTINUE

      CLOSE(1)
      CLOSE(2)
      IF(ISNOW.EQ.1) CLOSE(3)
      REWIND 10

      RETURN
      END
```