Technical Bulletin

Bulletin No.   033
Subject: **Definition and Practical Application of Water Days**
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Product Applicability: **Evolution Controllers, Evolution DX2 Controllers, Evolution 2000 Central Control System Software**
Engineering Release: **R. A. Olson**
Engineering Release Date: **June 19, 2003**
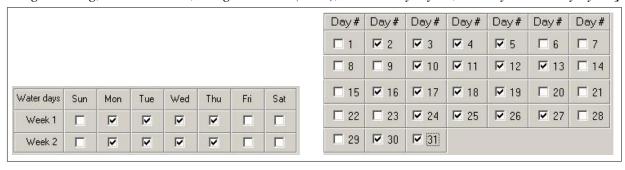**Distribution:**   **APPROVED FOR GENERAL RELEASE**

1.0 INTRODUCTION

The Evolution 2000 Central Control System Software provides the User with several methods for creating Irrigation Schedules. An important consideration of the Irrigation Schedule is assigning "Allowable Water Days" and "NO Water Days". Each of the Programming Types has its own unique definition of what a Water Day is. This Document provides definition and clarification of a Water Day as it pertains to each of the Programming Options. Where appropriate, practical application examples have been provided.

2.0 WHAT IS A WATER DAY?

What is the definition of a Water Day as it pertains to each of the following Program types?

2.1 A CONVENTIONAL PROGRAM, either 14 day or 31 day schedule. [*The Menu path flow is – Programming, Conventional, Program Num (1-12), Water Day Cycle, 14 Day or 31 Day cycle*].
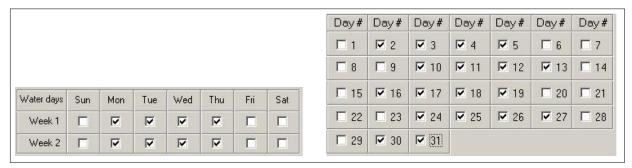

- **A CONVENTIONAL PROGRAM Water Day is Midnight to Midnight.**
- It does NOT matter what time the scheduled events occur.
- This makes it very easy to keep track of Water Days and NO Water Days, simply select SUN, MON, TUE, WED, THU, FRI, or SAT.

NOTE: **A program that starts before Midnight on an Allowable Water Day and finishes after Midnight, WILL complete its full program cycle, even if, the program's end time carries it over into a NO Water Day.**

2.2 A BASIC ET (EvapoTranspiration) PROGRAM. [*For BASIC ET, the Menu path flow is – Programming, Basic ET, Program Num (1-12), Water Day Cycle, 14 Day or 31 Day cycle*].

Day #	Day #	Day #	Day #	Day #	Day #	Day #
☐ 1	☑ 2	☑ 3	☑ 4	☑ 5	☐ 6	☐ 7
☐ 8	☐ 9	☑ 10	☑ 11	☑ 12	☑ 13	☐ 14
☐ 15	☑ 16	☑ 17	☑ 18	☑ 19	☐ 20	☐ 21
☐ 22	☐ 23	☑ 24	☑ 25	☑ 26	☑ 27	☐ 28
☐ 29	☑ 30	☑ 31				

Water days	Sun	Mon	Tue	Wed	Thu	Fri	Sat
Week 1	☐	☑	☑	☑	☑	☐	☐
Week 2	☐	☑	☑	☑	☑	☐	☐

- **A BASIC ET PROGRAM Water Day is a scheduled event (program download) to a scheduled event (program download).**
- This is not as easy to keep Water Days and NO Water Days straight. For example, a Water Day may start at 6 PM Tuesday and finish at 6 PM Wednesday. In this case, if irrigation is not allowed Wednesday morning because it is a mow day, then TUESDAY must be set as a NO Water Day (because at 6 PM Tuesday, you are downloading the irrigation schedule for the next 24 hours).

2.3 AN ADVANCED ET (EvapoTranspiration) PROGRAM. [*For ADVANCED ET, the Menu path flow is – Programming, Advanced ET, Operating Constraints*].

Available Water Days	Sun	Mon	Tue	Wed	Thu	Fri	Sat
Week 1	☐	☑	☑	☑	☑	☑	☐
Week 2	☐	☑	☑	☑	☑	☐	☐

NOTE: **The 31 Day irrigation cycle is NOT available with ADVANCED ET.**

- **An ADVANCED ET Water Day is a scheduled event (program download) to a scheduled event (program download).**
- This is not as easy to keep Water Days and NO Water Days straight. For example, a Water Day may start at 6 PM Monday and finish at 6 PM Tuesday. In this case, if irrigation is not allowed Tuesday morning because it is a mow day, then MONDAY must be set as a NO Water Day (because at 6 PM Monday, you are downloading the irrigation schedule for the next 24 hours).

2.4 AN AIM (Advanced Irrigation Management) PROGRAM. [*For AIM, the Menu path flow is – Programming, Advanced IM, Programming, **Satellite** Programming*].

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Or

[*For AIM, the Menu path flow is – Programming, Advanced IM, Programming, **Global Programming**].*

NOTE: **The 31 Day irrigation cycle is NOT available with AIM.**

- **An AIM Water Day is a scheduled event (program download) to a scheduled event (program download).**
- This is not as easy to keep Water Days and NO Water Days straight. For example, a Water Day may start at 6 PM Thursday and finish at 6 PM Friday. In this case, if irrigation is not allowed Friday morning because it is a mow day, then THURSDAY must be set as a NO Water Day (because at 6 PM Thursday, you are downloading the irrigation schedule for the next 24 hours).

2.5 A SKIP-BY-DAY CONVENTIONAL PROGRAM. [*The Menu path flow is – Programming, Conventional, Program Num (1-12), Water Day Cycle, Skip-by-Day*].

NOTE: **Skip-by-Day can ONLY be used with a Conventional Program.**

NOTE: **Using the Skip-by-Day method it is very important that the Scheduled Event Program Download Type be set to "ALL MODIFIED". If the Program Download Type is set to "ALL" or "ALL VALID", the Skip Day counter will never countdown because it is always being overwritten (reset).**

- **A Skip-by-Day Water Day is Midnight to Midnight with one exception. When a program is converted to Skip-by-Day or a change is made to the Skip-by-Day schedule and downloaded to the controller for the first time, that first water day is scheduled event (program download) to midnight. All subsequent days are then Midnight to Midnight.**

- Skip-by-Day Programming is best illustrated with a practical example, using four Skip-by-Day programs as shown in ATTACHMENT A and ATTACHMENT B.

- The Scheduled events are set as follows;

        ET Acquisition   = NO
        Statistics Upload   = Yes, at 5 PM
        Automatic Recalculation   = Yes after statistics upload
        Program Download   = Yes after automatic recalculation
        Program Download Type   = ALL MODIFIED (this is very important)

2.5.1   What Skip-by-Day programs irrigated and when?
Day ONE - Friday 4/4/03 (programs are downloaded at 5 PM)

NOTE: Abbreviation: "Number of days until First Water" = FW
**   Abbreviation: "Number of Skip Days" = SD**

- PROGRAM 1 IRRIGATED at 9 PM. This program irrigated because FW = 0. This program Will NOT water the next three days because SD = 3.

- PROGRAM 2 did NOT irrigate at 10 PM. This program did not irrigate because FW = 1. This program WILL water tomorrow at 10 PM.

- PROGRAM 3 did NOT irrigate at 2 AM. FW was set to 0, so why didn't it water? Because the programs were downloaded at 5 PM and the first day ends at Midnight. This program's start time is 2 AM, which happens to be the next day, Saturday. No water tonight and no water the next three days because SD = 3.

- PROGRAM 4 IRRIGATED at 3 AM. FW was set to 1, why did it water? Because the programs were downloaded at 5 PM and the first day ends at Midnight. This program's start time is 3 AM, which happens to be the next day, Saturday. This program will NOT water the next three days because SD = 3.

2.5.2   Day TWO - Saturday 4/5/03
- PROGRAM 1 did NOT irrigate at 9 PM. This is the first of three skip days, now SD = 2.

- PROGRAM 2 IRRIGATED at 10 PM and will NOT water for the next three days, SD = 3.

- PROGRAM 3 did NOT irrigate 2 AM. This is the first of three skip days, now SD = 2.

- PROGRAM 4 IRRIGATED at 3 AM and will NOT water for the next three days, SD = 3.

2.5.3   Day THREE - Sunday 4/6/03
- PROGRAM 1 did NOT irrigate at 9 PM. This is the second of three skip days, now SD = 1.

- PROGRAM 2 did NOT irrigate at 10 PM. This is the first of three skip days, now SD = 2.

- PROGRAM 3 did NOT irrigate at 2 AM. This is the second of three skip days, now SD = 1.

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2.5.4   Day FOUR - Monday 4/7/03
- PROGRAM 1 did NOT irrigate at 9 PM. This is the third of three skip days, now SD = 0.
  WILL water tomorrow.

- PROGRAM 2 did NOT irrigate at 10 PM. This is the second of three skip days, now SD = 1.

- PROGRAM 3 did NOT irrigate at 2 AM. This is the third of three skip days, now SD = 0.
  WILL water tomorrow.

- PROGRAM 4 did NOT irrigate at 3 AM. This is the second of three skip days, now SD = 1.

2.5.5   Day FIVE - Tuesday 4/8/03
- PROGRAM 1 IRRIGATED at 9 PM and Will NOT water the next three days, SD = 3.

- PROGRAM 2 did NOT irrigate at 10 PM. This is the third of three skip days, now SD = 0.
  WILL water tomorrow.

- PROGRAM 3 IRRIGATED at 2 AM and Will NOT water the next three days, SD = 3.

- PROGRAM 4 did NOT irrigate at 3 AM. This is the third of three skip days, now SD = 0.
  WILL water tomorrow.

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ATTACHMENT A – SKIP-BY-DAY PROGRAMS

006-00

```
 PROGRAM NAME:                                PROGRAM NUMBER:   1

  START TIME 1:   9:00 PM                           PERCENT: 100
  START TIME 2:                      IS A   PUMP USED: YES
  START TIME 3:                MASTER VALVE SELECTED: MV1
  START TIME 4:       MASTER VALVE ON BETWEEN STATIONS: YES
  START TIME 5:             MASTER VALVE DELAY:   0 SEC
  START TIME 6:             OVER LAP PROTECTION: ON
  START TIME 7:             INTER STATION DELAY:   0 SEC
  START TIME 8:             RAIN SHUTDOWN EFFECT: ON
                           OMIT BY DATE EFFECT: ON
                            OVER WATER LIMIT: GIVE WARNING

              STATION RUN TIMES (HH:MM)

  1 00:05                              25 *****
  2 00:05                              26 *****
  3 00:05                              27 *****
  4                                    28 *****
  5                                    29 *****
  6                                    30 *****
  7                                    31 *****
  8                                    32 *****
  9                                    33 *****
 10                                    34 *****
 11                                    35 *****
 12                                    36 *****
 13 *****                              37 *****
 14 *****                              38 *****
 15 *****                              39 *****
 16 *****                              40 *****
 17 *****                              41 *****
 18 *****                              42 *****
 19 *****                              43 *****
 20 *****                              44 *****
 21 *****                              45 *****
 22 *****                              46 *****
 23 *****                              47 *****
 24 *****                              48 *****

                     WATER DAYS
 SKIP DAYS: 3 DAYS TILL FIRST WATER: 0

  RUN TIME PER WATER DAY:   0 HRS AND 15 MINUTES
  (SUM OF STATIONS) x (%) x (the number OF START TIMES)

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

NOTE: **PROGRAM 1 start time = 9 PM, the number of days until First Water = 0, the number of Skip Days = 3.**

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ATTACHMENT A – SKIP-BY-DAY PROGRAMS

```
006-00

 PROGRAM NAME:                              PROGRAM NUMBER:  2

  START TIME 1: 10:00 PM                         PERCENT: 100
  START TIME 2:                        IS A  PUMP USED: YES
  START TIME 3:                 MASTER VALVE SELECTED: MV1
  START TIME 4:    MASTER VALVE ON BETWEEN STATIONS: YES
  START TIME 5:              MASTER VALVE DELAY:   0 SEC
  START TIME 6:               OVER LAP PROTECTION: ON

  START TIME 7:               INTER STATION DELAY:   0 SEC
  START TIME 8:               RAIN SHUTDOWN EFFECT: ON
                             OMIT BY DATE EFFECT: ON
                               OVER WATER LIMIT: GIVE WARNING

                   STATION RUN TIMES (HH:MM)

 1                              25 *****
 2                              26 *****
 3                              27 *****
 4 00:05                        28 *****
 5 00:05                        29 *****
 6 00:05                        30 *****
 7                              31 *****
 8                              32 *****
 9                              33 *****
10                              34 *****
11                              35 *****
12                              36 *****
13 *****                        37 *****
14 *****                        38 *****
15 *****                        39 *****
16 *****                        40 *****
17 *****                        41 *****
18 *****                        42 *****
19 *****                        43 *****
20 *****                        44 *****
21 *****                        45 *****
22 *****                        46 *****
23 *****                        47 *****
24 *****                        48 *****

                       WATER DAYS
 SKIP DAYS: 3 DAYS TILL FIRST WATER: 1

  RUN TIME PER WATER DAY:  0 HRS AND 15 MINUTES
  (SUM OF STATIONS) x (%) x (the number OF START TIMES)

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

NOTE: **PROGRAM 2 start time = 10 PM, the number of days until First Water = 1, the number of Skip Days = 3.**

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ATTACHMENT A – SKIP-BY-DAY PROGRAMS

006-00

PROGRAM NAME: `_____` <mark>PROGRAM NUMBER: 3</mark>

<mark>START TIME 1: 2:00 AM</mark>   PERCENT: 100
START TIME 2:   IS A   PUMP USED: YES
START TIME 3:   MASTER VALVE SELECTED: MV1
START TIME 4:   MASTER VALVE ON BETWEEN STATIONS: YES
START TIME 5:   MASTER VALVE DELAY: 0 SEC
START TIME 6:   OVER LAP PROTECTION: ON
START TIME 7:   INTER STATION DELAY: 0 SEC
START TIME 8:   RAIN SHUTDOWN EFFECT: ON
                               OMIT BY DATE EFFECT: ON
                               OVER WATER LIMIT: GIVE WARNING

                    STATION RUN TIMES (HH:MM)

```
 1                             25 *****
 2                             26 *****
 3                             27 *****
 4                             28 *****
 5                             29 *****
 6                             30 *****
 7 00:05                       31 *****
 8 00:05                       32 *****
 9 00:05                       33 *****
10                             34 *****
11                             35 *****
12                             36 *****
13 *****                       37 *****
14 *****                       38 *****
15 *****                       39 *****
16 *****                       40 *****
17 *****                       41 *****
18 *****                       42 *****
19 *****                       43 *****
20 *****                       44 *****
21 *****                       45 *****
22 *****                       46 *****
23 *****                       47 *****
24 *****                       48 *****
```

                         WATER DAYS
<mark>SKIP DAYS: 3 DAYS TILL FIRST WATER: 0</mark>

  RUN TIME PER WATER DAY: 0 HRS AND 15 MINUTES
  (SUM OF STATIONS) x (%) x (the number OF START TIMES)

****

NOTE: **PROGRAM 3 start time = 2 AM, the number of days until First Water = 0, the number of Skip Days = 3.**

ATTACHMENT A – SKIP-BY-DAY PROGRAMS

```
006-00

  PROGRAM NAME:                              PROGRAM NUMBER:   4

   START TIME 1:   3:00 AM                          PERCENT: 100
   START TIME 2:                        IS A  PUMP USED: YES
   START TIME 3:                  MASTER VALVE SELECTED: MV1
   START TIME 4:       MASTER VALVE ON BETWEEN STATIONS: YES
   START TIME 5:              MASTER VALVE DELAY:   0 SEC
   START TIME 6:              OVER LAP PROTECTION: ON
   START TIME 7:              INTER STATION DELAY:   0 SEC
   START TIME 8:              RAIN SHUTDOWN EFFECT: ON
                             OMIT BY DATE EFFECT: ON
                             OVER WATER LIMIT: GIVE WARNING

                 STATION RUN TIMES (HH:MM)

   1                              25 *****
   2                              26 *****
   3                              27 *****
   4                              28 *****
   5                              29 *****
   6                              30 *****
   7                              31 *****
   8                              32 *****
   9                              33 *****
  10 00:05                        34 *****
  11 00:05                        35 *****
  12 00:05                        36 *****
  13 *****                        37 *****
  14 *****                        38 *****
  15 *****                        39 *****
  16 *****                        40 *****
  17 *****                        41 *****
  18 *****                        42 *****
  19 *****                        43 *****
  20 *****                        44 *****
  21 *****                        45 *****
  22 *****                        46 *****
  23 *****                        47 *****
  24 *****                        48 *****

                    WATER DAYS
SKIP DAYS: 3 DAYS TILL FIRST WATER: 1

  RUN TIME PER WATER DAY:  0 HRS AND 15 MINUTES
  (SUM OF STATIONS) x (%) x (the number OF START TIMES)

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

NOTE: **PROGRAM 4 start time = 3 AM, the number of days until First Water = 1, the number of Skip Days =3.**

ATTACHMENT B – SKIP-BY-DAY PROGRAMS

```
Generation Date:  04/09/03  8:17 AM

                    SATELLITE EVENT REPORT

FROM:04/04/03        SORT BY: Time         MEASURED-Yes
TO:  04/09/03        UNITS: Gallons        WARNINGS-No
```

`04/04/03 DAY 1`
```
ADDR: 006-00  NAME: Rain Master        LOC: Tech Support
TIME DATE STAMP 04/04/03 00:00
WATER USAGE Station  9  00:08 to 00:25 (17 minutes)          0 gallons
```
```
    PROGRAM 1
WATER USAGE Station  1  21:00 to 21:05 (5 minutes)          0 gallons
WATER USAGE PUMP        21:00 to 21:15 (15 minutes)
WATER USAGE MV1         21:00 to 21:15 (15 minutes)
WATER USAGE Station  2  21:05 to 21:10 (5 minutes)          0 gallons
WATER USAGE Station  3  21:10 to 21:15 (5 minutes)          0 gallons
```
```
EVAPOTRANS.             00:00 to 23:59 (1440 minutes)     0.01 inches
FLOW METER 1            00:00 to 23:59 (1440 minutes)        3 gallons
FLOW METER 2            00:00 to 23:59 (1440 minutes)        0 gallons
RAINFALL                00:00 to 23:59 (1440 minutes)     0.00 inches
```

`04/05/03 DAY 2`
```
ADDR: 006-00  NAME: Rain Master        LOC: Tech Support
TIME DATE STAMP 04/05/03 00:00
```
```
    PROGRAM 4
WATER USAGE Station 10  03:00 to 03:05 (5 minutes)          0 gallons
WATER USAGE PUMP        03:00 to 03:15 (15 minutes)
WATER USAGE MV1         03:00 to 03:15 (15 minutes)
WATER USAGE Station 11  03:05 to 03:10 (5 minutes)          0 gallons
WATER USAGE Station 12  03:10 to 03:15 (5 minutes)          0 gallons
```
```
    PROGRAM 2
WATER USAGE Station  4  22:00 to 22:05 (5 minutes)          0 gallons
WATER USAGE PUMP        22:00 to 22:15 (15 minutes)
WATER USAGE MV1         22:00 to 22:15 (15 minutes)
WATER USAGE Station  5  22:05 to 22:10 (5 minutes)          0 gallons
WATER USAGE Station  6  22:10 to 22:15 (5 minutes)          0 gallons
EVAPOTRANS.             00:00 to 23:59 (1440 minutes)     0.00 inches
FLOW METER 1            00:00 to 23:59 (1440 minutes)        0 gallons
FLOW METER 2            00:00 to 23:59 (1440 minutes)        0 gallons
RAINFALL                00:00 to 23:59 (1440 minutes)     0.00 inches
```

`04/06/03 DAY 3`
```
ADDR: 006-00  NAME: Rain Master        LOC: Tech Support
TIME DATE STAMP 04/06/03 00:00
EVAPOTRANS.             00:00 to 23:59 (1440 minutes)     0.00 inches
FLOW METER 1            00:00 to 23:59 (1440 minutes)        0 gallons
FLOW METER 2            00:00 to 23:59 (1440 minutes)        0 gallons
RAINFALL                00:00 to 23:59 (1440 minutes)     0.00 inches
```

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ATTACHMENT B – SKIP-BY-DAY PROGRAMS

<mark>04/07/03 DAY 4</mark>
```
ADDR: 006-00  NAME: Rain Master        LOC: Tech Support
TIME DATE STAMP 04/07/03 00:00
EVAPOTRANS.              00:00 to 23:59 (1440 minutes)      0.00 inches
FLOW METER 1            00:00 to 23:59 (1440 minutes)          0 gallons
FLOW METER 2            00:00 to 23:59 (1440 minutes)          0 gallons
RAINFALL               00:00 to 23:59 (1440 minutes)      0.00 inches
```

<mark>04/08/03 DAY 5</mark>
```
ADDR: 006-00  NAME: Rain Master        LOC: Tech Support
TIME DATE STAMP 04/08/03 00:00
```
```
   PROGRAM 3
WATER USAGE Station  7  02:00 to 02:05 (5 minutes)          0 gallons
WATER USAGE PUMP        02:00 to 02:15 (15 minutes)
WATER USAGE MV1         02:00 to 02:15 (15 minutes)
WATER USAGE Station  8  02:05 to 02:10 (5 minutes)          0 gallons
WATER USAGE Station  9  02:10 to 02:15 (5 minutes)          0 gallons

   PROGRAM 1
WATER USAGE Station  1  21:00 to 21:05 (5 minutes)          0 gallons
WATER USAGE PUMP        21:00 to 21:15 (15 minutes)
WATER USAGE MV1         21:00 to 21:15 (15 minutes)
WATER USAGE Station  2  21:05 to 21:10 (5 minutes)          0 gallons
WATER USAGE Station  3  21:10 to 21:15 (5 minutes)          0 gallons
```
```
EVAPOTRANS.              00:00 to 23:59 (1440 minutes)      0.00 inches
FLOW METER 1            00:00 to 23:59 (1440 minutes)          0 gallons
FLOW METER 2            00:00 to 23:59 (1440 minutes)          0 gallons
RAINFALL               00:00 to 23:59 (1440 minutes)      0.00 inches
```

<mark>04/09/03 DAY 6</mark>
```
ADDR: 006-00  NAME: Rain Master        LOC: Tech Support
TIME DATE STAMP 04/09/03 00:00
```
```
   PROGRAM 4
WATER USAGE Station 10  03:00 to 03:05 (5 minutes)          0 gallons
WATER USAGE PUMP        03:00 to 03:15 (15 minutes)
WATER USAGE MV1         03:00 to 03:15 (15 minutes)
WATER USAGE Station 11  03:05 to 03:10 (5 minutes)          0 gallons
WATER USAGE Station 12  03:10 to 03:15 (5 minutes)          0 gallons
```

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