## Aqua4Plus v2.2 Warning: Invalid Date Sequence, Record # N

Shown when using Aqua4Plus v2.2 and importing a logging session from an Environmental Sensor or loading an Aqua4Plus A4D file that contains a Logging Session with Data that crosses the Daylight Savings Spring adjustment period.

### CAUSE
Aqua4Plus v2.2 automatically adjusts the time of datapoints that occur in the Spring first during the first hour after Daylight Savings by adding 1 hour to the time of those records – both when importing data from a sensor and when loading data from an A4D file; it should not.  Aqua4Plus v2.2 correctly does not adjust the times during the 'Fall Back' Daylight Savings event.
The update of the DateTime on records in the Spring happens to every record saved during the hour of the Spring DST  adjustment (from 2am – 3am) for every sensor type.
NOTE: Aqua4Plus Factory/Standard v1.x does not adjust the times in either the Spring or the Fall; the date/time shown on the record is as it was recorded both when importing from a sensor and when reading an A4D file.

### AFFECTED PROGRAM VERSION(S)
Aqua4Plus v2.2

### AFFECTED SENSOR(S)
The imported data from all sensors are affected.

### CORRECTED PROGRAM VERSION(S)
TBD – this bulletin will be updated when the problem is solved in Aqua4Plus.

### ERROR(S) SHOWN TO USER
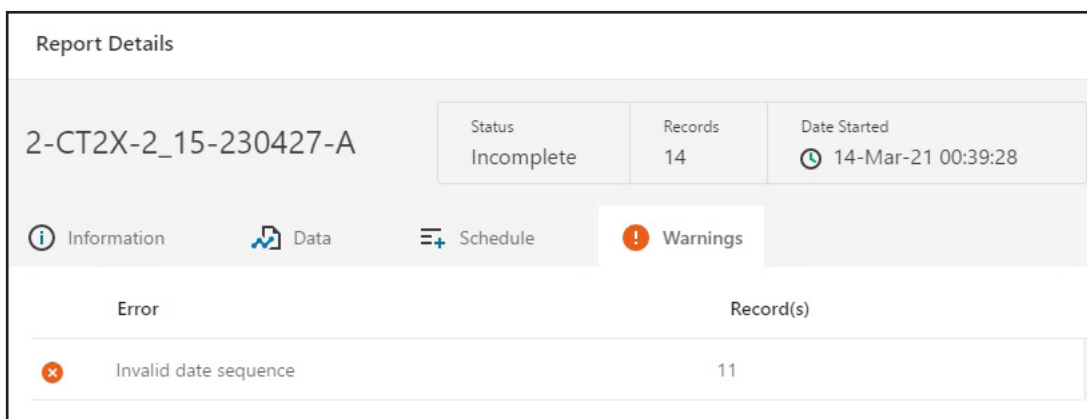"Invalid date sequence" with a single Record # on the Data tab:



*Figure 1.  Aqua4Plus v2.2 Warning Tab Showing "Invalid date sequence"*

A red X Icon is shown next to the record where the "Invalid date sequence" beings; this is the first record *after* the records have been adjusted forward during the first hour of Daylight Savings in the Spring.

In the following file Records #7-10 have been automatically adjusted forward, as a result Record #11 is *before* the date/time of Record #10 resulting in an "Invalid date sequence" as shown below.



*Figure 2.  Aqua4Plus v2.2 Data Tab, Data Listing Showing Adjusted Date/Times*

| File Display - 2-CT2X-2_15-230427-A.a4d | | | | | | |
|---|---|---|---|---|---|---|

| Sensor SN | Sensor Type | Sensor Name | File | Records | | |
|---|---|---|---|---|---|---|
| 21912015 | CT2X | INW Smart Sensor | 2-CT2X-2_15-230427-A | 16 | | |

| Rec# | Date/Time | Temperature(degC) | Conductivity(µS/cm) | Pressure(psi) | Salinity(PSU) | TDS(mg/L) |
|---|---|---|---|---|---|---|
| | Sensor Range | 150K ohm | 0-300 mS/cm | 15 psig | | |
| | Minimum | 21.43 | 419.7 | -0.0117 | 0.2161 | 205.7 |
| | Maximum | 22.05 | 431.8 | -0.0112 | 0.2245 | 211.6 |
| | Mean | 21.69 | 421.5 | -0.0115 | 0.2179 | 206.5 |
| | Variance | 0.022 | 7.57 | 0.00000 | 0.00000 | 1.82 |
| | Std Deviation | 0.149 | 2.75 | 0.00025 | 0.00179 | 1.35 |
| | Element/Ref Temp | 30K -5 to 100 | 25 °C / TC= 0.00 | | | |
| | Field Cal Date | unknown | 28-Sep-22 12:10 | unknown | unknown | unknown |
| 1 | 14-Mar-21 00:39:28 | 21.43 | 431.8 | -0.0112 | 0.2245 | 211.6 |
| 2 | 14-Mar-21 00:54:28 | 21.54 | 420.2 | -0.0112 | 0.2180 | 205.9 |
| 3 | 14-Mar-21 01:09:28 | 21.56 | 421.1 | -0.0117 | 0.2183 | 206.3 |
| 4 | 14-Mar-21 01:24:28 | 21.57 | 420.9 | -0.0117 | 0.2181 | 206.2 |
| 5 | 14-Mar-21 01:39:28 | 21.60 | 420.4 | -0.0112 | 0.2178 | 206.0 |
| 6 | 14-Mar-21 01:54:28 | 21.62 | 420.0 | -0.0112 | 0.2174 | 205.8 |
| 7 | 14-Mar-21 02:09:28 | 21.64 | 420.0 | -0.0112 | 0.2174 | 205.8 |
| 8 | 14-Mar-21 02:24:28 | 21.65 | 421.1 | -0.0112 | 0.2179 | 206.4 |
| 9 | 14-Mar-21 02:39:28 | 21.67 | 419.7 | -0.0117 | 0.2171 | 205.7 |
| 10 | 14-Mar-21 02:54:28 | 21.69 | 421.5 | -0.0112 | 0.2179 | 206.5 |
| 11 | 14-Mar-21 03:09:28 | 21.71 | 419.9 | -0.0117 | 0.2170 | 205.8 |
| 12 | 14-Mar-21 03:24:28 | 21.74 | 422.3 | -0.0117 | 0.2181 | 206.9 |
| 13 | 14-Mar-21 03:39:28 | 21.77 | 421.1 | -0.0117 | 0.2173 | 206.3 |
| 14 | 14-Mar-21 03:54:28 | 21.83 | 421.0 | -0.0117 | 0.2170 | 206.3 |
| 15 | 14-Mar-21 04:09:28 | 21.93 | 421.6 | -0.0117 | 0.2169 | 206.6 |
| 16 | 14-Mar-21 04:24:28 | 22.05 | 421.2 | -0.0117 | 0.2161 | 206.4 |

*Figure 3.  Aqua4Plus v1.x (Standard/Factory) Data, Data Listing Showing Original Date/Times*

## MITIGATION
Option 1.  Export the data from Aqua4Plus v2.2 to a CSV file and adjust the date/time for the affected records.
Option 2.  Import the Sensor data using Aqua4Plus v1.x.

## LONG TERM SOLUTION
This issue will be corrected in the next release of Aqua4Plus v2; date TBD.  This document will be updated when the issue is corrected in Aqua4Plus v2.x

## STEPS TO DUPLICATE ISSUE

We will be setting a sensor to a specific date right before the beginning of Daylight Savings in the Spring. For this example, we will be using March 14th, 2021 which is the beginning of Daylight Savings in 2021. In our data file any record read by the sensor that is marked with a date from 2am to 3am will be automatically (and erroneously) adjusted forward 1 hour.

1. Requirements:
   a. Aqua4Plus v2.2
   b. One (1) Environmental Sensor with no data/sessions currently saved internally in the sensor; Export and Delete and existing data/sessions
   c. One (1) Environmental Sensor PC Cable

2. Using Aqua4Plus v2.2:
   a. Set the Senor Date/Time to Just Before DST Spring 2021
      i. On the "Sensors" tab, Select the Sensor
      ii. In the Upper-Right corner of the window, select the Gear Icon "Sensor Settings"
      iii. Set the Sensor Date to "Saturday March 14, 2021" (Spring DST 2021)
      iv. Set the Sensor Time to "01:30:00" (1:30 AM)
      v. Select "Set Time"
   b. Setup a Logging Session on the Sensor
      i. 100 Readings (default)
      ii. 15 minute interval (default)
      iii. Do NOT set/sync sensor clock to PC clock
   c. Let at least ~2 hours elapse; meanwhile the sensor will be logging data
   d. Download the data from the selected sensor - it does not matter if the logging session is complete, only that:
      i. At least 1 reading was saved prior to 2am, and
      ii. At least 1 reading was saved during the 2am-3am time period, and
      iii. At least 1 reading was saved after 3am.
   e. When the data is viewed there will be:
      i. All records initially saved from 2am-3am will have had 1 hour added to the date/time, resulting in times from 3am-4am.
      ii. A Warning about "Invalid date sequence" and the resulting Record # on the Warning Tab, that Record # will be the 1st record initially saved after the 2am-3am time window.
      iii. A Rex "X" icon in the Warning column of the Data Report for the 1st record saved after the 2am-3am time window.
      iv. Examples of both the Warning and the associated Warning Symbols are shown in the earlier screen captures in this document.

## REVISION HISTORY

| | | |
|---|---|---|
| 2023-04-28 | Bart Schaefer | Initial document creation. |
| 2023-05-01 | Bart Schaefer | Factory/Standard notes, clarification that both importing from sensor and opening data file cause DST record adjustment. |

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