

## Effects of GPS Rollover on Weather Buoys and C-MAN Stations

There will be an upcoming “GPS rollover event” on **April 6, 2019**. The GPS Week Number (WN) Rollover may cause reliability problems for reporting correct Universal Coordinated Time (UTC). The legacy GPS navigation message has a ten (10) bit parameter that represents WN. Thus, the WN parameter in the GPS navigation message “rolls over” to zero every 1024 weeks starting from 00Z January 6, 1980. The next WN rollover will occur April 6, 2019. Some older model GPS devices in Coastal Marine Automated Network (C-MAN) and marine weather buoy stations may not handle the rollover properly. A GPS device that conforms to the latest GPS standards and provides correct UTC conversion should not be adversely affected.

Approximately 29 of the 45 C-MAN stations maintained by the National Data Buoy Center (NDBC) will be impacted by the rollover event. Of those, NDBC will be able to access nine stations prior to the rollover. But due to site access restrictions that either require air or water transportation, or have environmental sensitivities that need to be considered, the 20 remaining stations (44%) will not be corrected by April 7th and they will likely stop transmitting on **April 7th**. See **Figure 1** for the stations affected.

Older GPS equipment on 23 of 106 Weather Buoy stations (22%) will be affected by the problem in **July 2019**, and no firmware update is available from the vendor. It is anticipated that the data will continue to transmit, but with incorrect timestamps. NDBC is working on a software solution to correct the date problem. See **Figure 2** for the weather buoys affected.

Initial NDBC investigations indicate that the Tropical Atmosphere Ocean (TAO) buoy platforms will experience the issue in 2021 and Deep Ocean Assessment and Reporting of Tsunamis (DART) buoys will experience the issue in 2023. These can be corrected through normal maintenance activities.



Figure 1. C-MAN Stations with known GPS Problems. A red triangle indicates a station with a known problem and will not be corrected by April 7, 2019. A blue triangle indicates a station which is scheduled to be corrected by April 7, 2019.



Figure 2. A red triangle indicates a Weather Buoy Station with a known GPS Problem. Beginning in July 2019, data should continue to transmit from these stations but could have incorrect time stamps.