

GPS Week Number Rollover Advisory

There is a GPS week number rollover event coming up on April 6, 2019 and we want to provide some insight into how this may affect the operation of Nanometrics instrumentation that contain GPS receivers. Most Nanometrics instruments will not be affected on that date, however some older Taurus, Cygnus, EuropaT and Janus models will require action if they are still in active service. This communique provides information about the GPS week number rollover issue, how Nanometrics products are affected and when, as well as what to do about it.

Background:

The GPS Week Number Rollover Issue

The Global Positioning System (GPS) broadcasts time and date information. This includes a 10-bit week number (0 to 1023) relative to Jan 6, 1980. The maximum number of 1023 means this number resets or “rolls over” back to 0 approximately every 19 years and 35 weeks. The week number previously rolled over in August 1999, and will again on April 6, 2019. GPS receivers that do not account for this rollover will effectively jump back in time about 20 years, which can cause instruments that use these receivers to stop working unless the instrument is programmed to expect and correct for it. Many GPS receivers shift this rollover event to some other date in the future, effectively deferring the date at which its week number rolls over to a future time that is specific to that particular receiver. This complicates the situation because the date at which a particular instrument is affected is dependent on which model of GPS receiver it uses.

How this affects instruments that use GPS receivers

Most instruments that use GPS to accurately timestamp digitized data or for other precise time synchronization purposes will stop working correctly if the date provided by its internal GPS receiver is suddenly set back nearly 20 years in the past due to receiver’s week number rolling back by 1024 weeks. If you have instruments with internal GPS receivers, it is important to have the manufacturer of the instrument provide you with detailed information about if and exactly when it may be subject to a GPS week number rollover issue. The instrument manufacturer should know what GPS receiver is used and should be able to determine if and when the week number will roll over. The instrument manufacturer can then advise what action to take. A firmware update, hardware update, or retirement or replacement of the instrument may be required to avoid operational outages.

How this affects your Nanometrics instrumentation

Several Nanometrics products use commercial GPS receivers to derive accurate time and date. This includes Centaur, Taurus and EuropaT digitizer models, as well as other

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instruments that contain digitizers such as TitanSMA/EA and Meridian. Nanometrics Libra L-band transceivers including Carina and Cygnus models also use GPS for precise time synchronization in satellite networks.

Some early serial number Taurus instruments are affected by the April 2019 GPS week number rollover. Some Europa-T, Libra I Cygnus and Janus models are affected in October 2019 or November 2021. Action is required to keep these instruments operating after these dates.

No other Nanometrics instruments are affected by GPS week number rollover until the year 2025 or later. For these products, firmware updates will be provided to prevent any issues before those future events. Keeping the firmware up to date on these Nanometrics instruments will avoid the future GPS week number rollover issues identified below.

For more information...

For details on specific instruments, please see the [GPS Week Number Rollover Reference for Nanometrics Instruments](#) that follows.

Here are some references for additional information on the impending GPS week number rollover.

https://ics-cert.us-cert.gov/sites/default/files/documents/Memorandum_on_GPS_2019.pdf

<https://www.gps.gov/cgsic/meetings/2017/powers.pdf>

<https://www.navcen.uscg.gov/?pageName=gpsweek>

<https://www.spirent.com/Blogs/Positioning/2018/January/GPS-Rollover-Week>

If you wish further information, please contact your Sales Account manager or send an email to techsupport@nanometrics.ca

Sincerely,

Bruce Townsend

Chief Technology Officer

Nanometrics Inc.



GPS Week Number Rollover Reference for Nanometrics Instruments

April 6, 2019: Taurus digitizer models with serial numbers less than 800

Taurus datalogger models with serial numbers less than 800 may require a firmware update before April 6, 2019 if they are to continue operating. The firmware update will be provided before the end of 2018. Note that all Taurus models require the firmware update prior to September 2025 (see below). To determine if your Taurus requires the update before April 2019, disconnect the GPS antenna from the Taurus. If the "Status Detail" page indicates a "No GPS antenna" error, the firmware update is not required until 2025. If the disconnected GPS antenna is not detected, the Taurus has an older GPS receiver that requires the firmware update prior to April 2019. An alternate test is to login to a Linux prompt and issue the command "curl 1.0.0.2/status/gps/version && echo" to get the version of the GPS receiver. If the response is 1.4 or 1.6 the firmware update must be applied before April 2019, but if it is 1.12 or 1.16, it can wait until 2025.

Action: Please contact Nanometrics if you have any Taurus digitizers with serial numbers less than 800, and obtain and apply the firmware update before April 2019.

October 28, 2019: Libra I Cygnus, EuropaT (without central timing), Janus

A hardware update is required for these older models to continue to operate after October 28, 2019 or November 15, 2021, depending on the version of your instrument's GPS receiver module. This involves replacing a circuit board which can be done without returning the unit to the factory. Note this does not apply to Libra I Carina, or Libra II (Carina105/110 or Cygnus 205/210) models.

Action: Please contact Nanometrics if you have any of these products in operation. The hardware update, or replacement of this older generation equipment with current generation equipment must be done before October 2019 or November 2021, depending on the version of your instrument's built-in GPS receiver module.

September 13, 2025: Libra II Carina 105, Cygnus 205, and newer Taurus

Libra II Carina 105 and Cygnus 205 models with serial numbers below 832 and all Taurus models require a firmware update before September 2025 (except for those Taurus units that were already updated in 2018, see above). Libra II Carina and Cygnus firmware version 2.5.5 will be released later in 2018 that avoids the 2025 rollover issue. A Taurus firmware update will also be available before the end of 2018 that addresses this issue.

Action: None required at present. Update firmware prior to September 2025.



December 30, 2029: Libra II Carina 105/110, Cygnus 205/210

Libra II Carina 105 and Cygnus 205 models with serials number 832 and higher and all Carina 110 and Cygnus 210 models require a firmware update before December 2029. The Libra II Carina and Cygnus firmware version 2.5.5 to be released later in 2018 avoids the 2029 rollover issue.

Action: None required at present. Update firmware prior to December 2029.

May 2031 or later: all Centaur, TitanSMA/EA/XT/CWB, Meridian models

All Centaur, Titan and Meridian models have no pending GPS week number rollover issues until at least May 2031. In future years, firmware updates for supported products will be provided to avoid rollover issues in 2031 and beyond. Note that firmware release 4.3.20 and later defer the week number rollover until the year 2038.

Action: None required at present.

February 18, 2034: Libra I Carina, Lynx, Europa, EuropaT (with central timing), Central Time Server

Libra I Carina, Lynx, Europa, EuropaT (with central timing) and Central Time Server are not affected until Feb 18, 2034. No further fixes will be provided, and so these products must be decommissioned by this date. A week number rollover occurred in February 2016 which was accommodated by a firmware update at that time.

Action: None required at present. Decommission these products before February 2034.

