CGSIC
GPS Week Roll Over Issue

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GPS Week Rollover

- GPS Time as defined in the legacy GPS navigation message (ICD-200), uses 10 bits to count GPS Week Numbers. This representation can only cover a finite period of 1024 weeks (19.7 year epoch).

- GPS Time started on Jan 6, 1980

- The first GPS Time Epoch ended on Aug 21/22 1999.

- GPS Time is presently in its second Epoch which will end on April 6, 2019

- It’s up to the user receiver to resolve this week number ambiguity

- Newer receivers fully compliant with GPS ICD should handle this event OK

- In the Future the Modernized GPS Navigation (CNAV and MNAV) message has a 13-bit week number, which for all practical purposes solves this ambiguity
What could happen

• **UTC timing displayed and/or time tags of receiver data containing PNT information could jump by 19.7 years**

• **Any month/year conversion could also fail**

• **Navigation solution should be OK, but associated time tags could be incorrect thus still corrupting navigation data at the system level**

• **And the failure is not limited to April 6/7 2019**

• **A common fix for week number ambiguity was to hard code new pivot date, which shifts event to unknown date/time in future**
  – December 2014, older legacy USNO monitor receiver failed
  – Feb 14, 2016 Endrun technology receivers using a Trimble GPS engine failed
  – Aug 14, 2016 Motorola Oncore UT+ older firmware failed
  – July 22, 2017 older Novatel GPS engine failed, notice was posted in Spring 2017 to upgrade firmware, but many did not check
Does your receiver have a problem with GPS Week Roll Over

• Most newer receivers are likely going to be OK if ICD-200 was followed

• Older receiver may be problematic

• “Trust but Verify” consult your manufacture

• Conduct testing using GPS simulator