



International Civil Aviation Organization

**MIDANPIRG Communication, Navigation and Surveillance Sub-Group**

**Ninth Meeting (CNS SG/9)**  
*(Cairo, Egypt, 19 – 21 March 2019)*

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**Agenda Item 3: Global Developments related to CNS**

**GPS WEEK COUNTER ROLLOVER EVENT**

*(Presented by the Secretariat)*

**SUMMARY**

This paper aims to inform the meeting about the possible effects of the April 6, 2019 GPS Week Number Rollover on Coordinated Universal Time derived from GPS devices.

Action by the meeting is at paragraph 3.

**REFERENCES**

- ICAO Electronic Bulletin Number EB 2019/7 dated 12 February 2019

**1. INTRODUCTION**

1.1 The Global Positioning System (GPS) is an element of the Global Navigation Satellite System (GNSS) standardized by ICAO (Annex 10, Volume I, Chapter 3, 3.7). GPS navigation and timing information is used by many aviation systems, both on board aircraft and on the ground.

**2. DISCUSSION**

2.1 The GPS Provided Timing Service is Critical to the Aviation System. GPS timing services provides the global standard for access to precise time supporting Air Navigation Services.

2.2 The legacy GPS navigation message has a ten (10) bit parameter that represents Week Number. Thus, the Week Number parameter in the GPS navigation message “rolls over” to zero every 1024 weeks starting from 0000Z 6 January 1980. The next Week Number rollover will occur 6 April 2019.

2.3 Based on the above, ICAO issued an Electronic Bulletin (EB 2019/7) on GPS week counter rollover event that will occur on 6 APRIL 2019. The EB is at **Appendix A**.

**3. ACTION BY THE MEETING**

3.1 The meeting is invited to urge States to:

- a) disseminates the EB to the relevant authorities; and
- b) take necessary actions to eliminate the impact of the GPS week number rollover on Aviation system.

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## ELECTRONIC BULLETIN

For information only

EB 2019/7

12 February 2019

### GLOBAL POSITIONING SYSTEM (GPS) WEEK COUNTER ROLLOVER EVENT (6 APRIL 2019)

The global positioning system (GPS) is an element of the global navigation satellite system (GNSS) standardized by ICAO (Annex 10, Volume I, Chapter 3, 3.7). GPS navigation and timing information is used by many aviation systems, both on board aircraft and on the ground.

The GPS navigation message contains information about current date and time in the form of a sequential week counter (representing the number of weeks elapsed from the reference date 6 January 1980) and of the number of seconds elapsed within the current week. GPS user systems can convert this format in a straightforward manner into conventional day/month/year formats.

However, the GPS navigation message format has a limitation, insofar as the data field that contains the week counter is of limited length (ten bits) and thus can count only up to 1024 weeks, from week 0 to week 1023. At the end of week 1023, the counter restarts from 0 (“rollover”). The next rollover event will occur on **6 April 2019**<sup>1</sup>.

Systems using this information for obtaining date and time are therefore required to take appropriate account of the rollover to ensure that a correct progressive week count is maintained. With regard to the use of GPS for aircraft navigation, this requirement is specified in Annex 10, Volume I, Appendix B, 3.1.1.2.6.2. An equivalent requirement for all GPS user systems is provided in the official GPS interface specification issued by the United States (IS-GPS-200H), which operates GPS. The United States has also issued a Memorandum informing about the upcoming rollover and providing recommendations on related steps to be taken by GPS users<sup>2</sup>.

In light of the above requirements, it should generally be expected that the rollover event will be properly handled by aviation systems, without resulting in incorrect date/time information being conveyed to users. Nevertheless, the existence of non-compliant equipment cannot be ruled out and has in fact been confirmed in some cases. Aviation GPS users are therefore encouraged to be aware of the potential impact from the rollover in terms of incorrect date/time information; to investigate and ascertain their dependencies on GPS for obtaining time/date; and to confirm with the relevant manufacturers of GPS user equipment that the rollover event will be properly handled by the equipment.

Issued under the authority of the Secretary General

<sup>1</sup> The first rollover event occurred on 21 August 1999.

<sup>2</sup> [https://ics-cert.us-cert.gov/sites/default/files/documents/Memorandum\\_on\\_GPS\\_2019.pdf](https://ics-cert.us-cert.gov/sites/default/files/documents/Memorandum_on_GPS_2019.pdf)