

To: Owners and Operators of IGC-approved GPS Flight Recorders
From: Chairman IGC GNSS Flight Recorder Approval Committee (GFAC)
Date: 29 November 2014, updated 30 November 2018

Subject: **Date Errors in IGC files from GPS Flight Recorders**

Summary: Owners and operators of Flight Recorders (FRs) that use the US Global Positioning System (GPS), particularly of older designs, are advised to switch on the FR at regular intervals during periods when it is not in use, in order to keep the FR and GPS receiver batteries from running down. This will reduce the possibility that when the FR is used again, a wrong date may be recorded in the IGC file.

Background

Posts on Newsgroup Rec.Aviation.Soaring (r.a.s.) have shown that in some early models of IGC-approved Flight Recorders, the date recorded in the IGC file has suddenly started to be in error by several years. This has been noticed with older models of Cambridge and Garrecht Volkslogger FRs, and modifications have been offered to correct it. This error may also be present in other types of FR.

The error occurs because the small internal battery inside the GPS receiver has run down and the Real Time Clock (RTC) in the GPS engine has stopped. When the receiver is powered up again, the RTC is unable to reset to the correct date, for the reasons given below. It should be noted that this battery is not the same one that is used to back up the flight recorder's memory, but is a smaller battery inside the GPS engine itself.

The IGC GNSS Flight Recorder Approval Committee (GFAC) has contacted FR manufacturers so that they are aware of the anomaly, and have the opportunity to take remedial action such as replacing the GPS battery, changing the GPS receiver, or developing a Firmware update that corrects the date.

Technical Detail

General. GPS dates are expressed as a week number and a day-of-week number after the date when the US GPS system first came fully on-line on 6 January 1980. The date system used was designed with a maximum of 1024 weeks, after which it starts to count again from Week One. There was therefore no problem for 1024 weeks from 6 January 1980 until 19 years and 8 months later, when on 6 August 1999 the week-count rolled back to zero. It rolls back again on 6 April 2019.

GPS 1024-week Epochs. Each period of 1024 weeks is called an "Epoch" and the first Epoch started on 6 January 1980 as described above. The second GPS date Epoch was from August 1999 to April 2019 when the third date Epoch started. A GPS engine with a functioning Real Time Clock (RTC) can identify the Epoch roll-over without problem. However, if the RTC sustaining battery fails, when the FR is powered up again it has no knowledge of which Epoch it is in and reverts to dates with respect to the first Epoch. The problem was made greater when some GPS engine manufacturers decided to replace relatively large-capacity memory batteries with smaller, rechargeable versions. These had a smaller capacity and relied on being regularly recharged when the FR was powered up. They performed well for many years, but like all rechargeable batteries, their capacity reduces with time. After some 10 years or more, their capacity is reduced and some may fail after a few weeks unless they are re-charged regularly by powering up the FR.

Solutions. Some FR manufacturers solve this problem by replacing the GPS memory batteries and resetting the RTC, others replace the GPS engine itself, and it is also possible to update the FR firmware to a version that allows for GPS Epoch changes. Many modern GPS engines automatically recognise the new date Epoch and should retain the correct date for over 100 years. In general, it is always wise to run your GPS Recorder at regular intervals, not only for the above reasons but also to check that it is performing and is set-up in the way that you want, so that it is ready to record your future competition, badge or record flights.
