

To: Owners and Operators of IGC-approved GPS Flight Recorders  
From: Chairman IGC GNSS Flight Recorder Approval Committee (GFAC)  
Date: 29 November 2014  
Subject: **Date Errors in IGC files from Flight Recorders**

**Summary:** Owners and operators of GPS Flight Recorders (FRs), particularly of older designs, are advised to switch on the FR at regular intervals during periods when it is not in use for flights, in order to keep the FR and GPS receiver batteries from running down. This will minimise 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 GPS is re-powered, 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) is investigating. It is contacting FR manufacturers so that they are aware of the anomaly, can inform GFAC whether their FRs could also be affected, and have the opportunity to take remedial action such as through replacing the GPS battery, changing the GPS receiver, or developing a Firmware update that corrects the date.

### **Technical Detail.**

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

Each period of 1024 weeks is called an "Epoch" and we are currently in the second date Epoch. A GPS engine with a functioning RTC can identify the Epoch rollover 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 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 rechargeable batteries had a much 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 now fail after a few weeks unless they are re-charged by powering up the FR.

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 theoretically possible to update the FR firmware to a version that allows for this problem.

Finally, it should be noted that many modern GPS engines do not suffer from this problem and can retain the correct date for over 100 years.

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