Report from Chairman of the
GNSS Flight Recorder Approval Committee (GFAC)

for the agenda of the 2017 IGC Plenary

7 January 2017

1 **GNSS Flight Recorders**. A total of 57 types of GNSS Flight Recorders (FRs) from 20 different manufacturers are currently IGC-approved.

1.1 GFAC Approval. Activity in 2016 was as follows:

25 April 2016 – LXNAV S-10 and S-100, initial approval.

3 August 2016 – LXNAV LX9000HAFR, initial approval.
HAFR=High Altitude Flight Recorder, for altitude claims above 15,000 metres. Above this altitude, GPS altitude is used for altitude records rather than pressure altitude. Special procedures to ensure the integrity of GPS altitude are in the IGC FR Specification and the Sporting Code.

16 November 2016 – LX Navigation LX MOP IGC recorder, initial approval.
This is a small recorder without a screen, with a dual frequency audio detector, designed to be installed close to the engine or propeller. Three ENL figures in each fix in the IGC file record low frequency noise centred on 150 Hz are designed to detect noise from a piston engine or the propeller of an electric engine. In addition, three figures in each fix under the MOP code record high frequency noise centred on 6 KHz to record jet pipe noise from small jet engines.

1.2 Ongoing Work. Another small FR is being tested that also has a dual-frequency audio detector for ENL and MOP.

2 **GPS Lat/Long Accuracy**. Accuracy tests in Lat/Long position with FRs using modern multi-channel GPS receivers have shown improvement over previous figures which had an average error of about 11metres. Recent new types of FR have shown average errors at accurately surveyed ground positions of between 4 to 7 metres.

3 **IGC File Analysis**. Many IGC files have been analysed including those from FRs being tested, and those sent to GFAC for analysis and advice. Advice has been given to NACs, competition organisers, pilots, OOs and FR manufacturers. This also applies to IGC files from NAC-approved Position Recorders that have a lower level of security but use the same IGC file structure as the IGC-approved Flight Recorder.

4 **Amendments**

4.1 FR Specification. Amendment 4a to the FR Specification was published on 10 April 2016. This made small changes to line 1 of the Flight Declaration record (the C-record line in an IGC file) to remain compatible with some Analysis programmes that look for fields both for intended date of flight and actual flight date. Data for intended date of flight is no longer required because there have been cases where pilots have flown on different dates and this has compromised approval of a valid flight. The solution is that the field for intended date of flight should now be filled with zeros which means that there is no confusion with actual flight date, and Analysis programmes that require both dates will continue to work.

4.1.1. Amendment 5. As this report is written, Amendment 5 to the FR Specification is under discussion, dealing with matters that have been raised in recent IGC-approvals and allowing for recent progress in FR design. A report will be made to the Plenary. Some subjects include:

4.1.1.1 Three-Letter Codes (TLCs). These are being updated to include those relevant to latest FR designs, and some obsolete codes (such as those referring to cameras) may be removed.

4.1.1.2 Front-Engine Electric Systems (FES). Originally these were "sustainers" for use in flight. Wording is being updated because some are now powerful enough to allow self-launching.

4.1.1.3 New Glider Types. In IGC files, it must always be possible to make manual inputs of Glider Type rather than being restricted to the list of types provided by some FR manufacturers for IGC files for their FRs. This is because it is not possible for such lists to cover all glider types, particularly new ones. This was a point raised by the Sporting Code Committee after instances of claims being refused due to an inaccurate glider type in the IGC file for the claim.

4.1.1.4 Starting the IGC file. Recording should always begin when the FR is switched on and horizontal or vertical movement is detected. An IGC file should not be lost due to special switching requirements before flight.

4.1.1.5 Engine Recording. The Environmental Noise Level (ENL) system inside the FR records low frequency noise (typically centred between 100-200 Hz) and places three ENL numbers on each fix in an IGC file. It is designed to give high ENL numbers with piston engines or when the FR is placed close to other engines and/or propellers. The FR Specification also includes a separate MOP (Means of Propulsion) system that places three MOP numbers on each fix in addition to ENL. The type of MOP sensor is specified in the header record of the IGC file and can be noise, electric current, fuel flow, etc. Originally the MOP system was for a separate sensor connected to the FR by cable, but some FR manufacturers have recently designed dual-frequency acoustic systems inside the FR. These add to the low-frequency ENL system a high-frequency audio sensor centred at about 5-6 KHz, designed to record jet pipe noise and using the MOP code for the high frequency figures. The Specification needs to cover MOP systems inside the FR as well as those connected by cable.

4.2 Annex B to the Sporting Code. Amendment 10 to SC3B became effective on 1 October 2015 and there was no amendment in 2016. As this report is made, Amendment 11 for 2017 is under consideration and a report will be made to the Plenary. It is intended to add the Front-engine Electric System (FES - see above), and expand the wording on High Altitude Flight Recorders (HAFRs) as a result of experience gained by the Perlan project in 2016 and references to HAFRs in other parts of the Sporting Code.

5 **Plenary Update**. An update on the above will be given to the Plenary.

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