

AMENDMENT LIST NUMBER 11
to
THE TECHNICAL SPECIFICATION FOR
IGC-APPROVED GNSS FLIGHT RECORDERS

EFFECTIVE 20 MAY 2008

ISSUED BY FAI
ON BEHALF OF THE INTERNATIONAL GLIDING COMMISSION

Glossary

Download - to read: Where used in this document, it refers to the transfer of data from the GNSS Flight Recorder either by cable to a PC or directly to a memory device attached to the recorder. This terminology follows normal usage in avionics where "download" refers to data being transferred from an aircraft module such as a flight recorder to a separate ground storage device for later analysis. The term "upload" is the reverse process where data is transferred into the recorder from a PC or other storage media. (AL11)

Main Paragraphs

2.4.5 New para on the need for an electronic declaration system that is easy to use:

2.4.5 Pre-flight declarations. The Sporting Code for gliding (SC3) requires an electronic declaration in the IGC file for World records; a paper declaration is not valid. Many other flight claims need an electronic declaration. Therefore, for IGC-approval at the "all flights" level, an electronic declaration facility is required and is desirable at other approval levels. (AL11)

2.4.5.1 Electronic declaration requirements. Where an electronic declaration facility is included in the recorder design (at any approval level) it must include setup software that allows the user to create the declaration data that is required by the Sporting Code for gliding (SC3). The software may be combined with other setup facilities such as for fix interval etc., or be separate for the declaration data only. The software must be easy to use and must allow inputs of the data required in the C-record (Waypoints) and the H-record (Pilot, glider etc) with options to input lat/long in arcseconds and decimal minute formats. It is also recommended that the software should allow declared Points to be extracted from Waypoint lists in at least one of the common formats that are available internationally through such web sites as the Worldwide Soaring Turnpoint Exchange (<http://soaringweb.org/TP>) and others. As well as a number of waypoint list formats that were originally from particular recorder manufacturers, a more comprehensive IGC format is given at <http://www.fai.org/gliding/gnss/wpformat.asp> (AL11)

2.7.2 Title shortened to read: **Security of Data**.

2.7.2.1 Type of seal. To read: The enclosure containing the recorder module must have a tamper-proof physical seal across at least two joints or screws, so that the seal will be broken if the case is opened. The type of seal must be approved by GFAC and must have markings unique to the recorder that are difficult to replicate. Seals with holographic symbols are preferred. The seal material must be such that it breaks when it is peeled off and it must not be possible to remove intact in the presence of heat or solvents. (AL11)

2.7.2.2.3 Data cable. Re-title "Separate GPS Receiver Unit - Data Cable to Recorder", and re-order this para to the end of 2.7.2.2, becoming 2.7.2.2.6.

Existing 2.7.2.2.4 Cables for approved functions. The last words to read: "Motor Glider RPM sensor system".

Existing 2.7.2.2.5 To allow for SD cards and USB memory sticks, this para to read: Connectors and fittings for data transfer from FR to PC. The types of IGC-approved connectors or fittings on the FR case for download of flight data are specified in 2.7.3. Some fittings such as memory cards and USB memory sticks do not need a PC to be connected to the recorder for downloading flight data, other connectors on the recorder case need a PC to be connected for data download. (AL11)

New 2.7.3 as follows, re-number existing 2.7.3 as 2.7.4, and later paras 2.7.4 and 2.7.5 appropriately.

2.7.3 Connectors and Fittings for downloading Flight Data. *(This is an updated 2.7.2.2.7)* IGC-approved types of connectors or fittings on the recorder case for downloading flight data are listed below. Where a PC is used for downloading, either the RJ45 or the USB type is recommended because standard wiring to these types includes both power and data transfer facilities. The IGC standard connections for the RJ45 are given below and the USB connections are to the international standard. For panel-mounted recorders, it is recommended that an industry-standard memory fitting is on the front face (such as an SD card or USB connector); if the connector for downloading is elsewhere, an extension cable must be supplied so that there is no need to gain access to the back of the instrument for routine downloading. (AL11)

New 2.7.3.1 Stand-alone Memory Devices. Downloading of IGC files may be to industry-standard memory devices such as SD cards, USB memory sticks or others approved by GFAC. SD cards include full-size, mini- and micro- variants. It is recommended that where such a memory device is in place during and after flight, downloading of the last flight should be automatic rather than requiring pilots to make selections. Such memory devices may also be used for uploading data into the recorder such as settings and Waypoints, but the design must prevent false data or unauthorised programs affecting the security of the recorder. A manufacturer's DLL file for the IGC Shell program (see Appendix 3) is still required for electronic Validation of downloaded IGC files. (AL11)

2.7.3.2, wording as in the existing 2.7.2.2.7.2 8-pin RJ-45 connector.

2.7.3.3, wording as in the existing 2.7.2.2.7.3 USB connectors. Use existing wording and add at the end: "The USB connector may either work with the IGC Shell program (Appendix 3) or enable the Flight Recorder to be recognised and processed directly as an extra disc drive by a Windows-based PC ". In the latter case, a manufacturer's DLL file for the IGC Shell program (see Appendix 3) is still required for electronic Validation of downloaded IGC files.(AL11)

2.7.3.4, wording as in the existing 2.7.2.2.7.1 9-pin RS232 connector.

2.7.3.5, wording as in the existing 2.7.2.2.7.4 Connectors for other functions.

2.7.3.6, wording as in the existing 2.7.2.2.7.5 "Grandfather Rights" for 6-pin RJ-11 connector.

2.7.3.7, wording as in the existing 2.7.2.2.7.6 Other Plugs and Sockets.

2.9 Data Transfer - New third sentence after "addition": In the case of direct downloading of IGC files to electronic media covered in 2.7.2.3, the Validate function is still required so that downloaded IGC files can be checked.

2.9.1 Format of transferred data from the FR. Add after the first sentence: "Downloading directly in the IGC format is preferred."

2.9.3.7 Other ways of producing the short program file functions. To read: It is a requirement that the DATA, CONV (where relevant) and VALI functions are produced as above, either in the form of the manufacturer's DLL file for the IGC Shell program (Appendix 3), or as separate program files, for placing on the IGC GNSS web pages for general use. (AL11)

- 2.10.1 Calibration. 2.10.1a, add (1mb at SL = 26.9 feet(8.2m))
 2.10.1b, add (3mb at 1000ft (304.8m) = 83.2 feet (25.4m))
 (3mb at 2000ft (609.6m) = 85.5 feet (26.1m))
 (3mb at 3000ft (914.4m) = 88.2 feet (26.9m))
 (3mb at 4000ft (1219.2m) = 90.9 feet (27.7m))
 (3mb at 5000ft (1524.0m) = 93.8 feet (28.6m))
 (3mb at 6000ft (1828.8m) = 96.5 feet (29.4m))
 (3mb at 7000ft (2133.6m) = 99.7 feet (30.4m))

Appendix 1 - IGC File

2.5.6 Manufacturer Codes. In the table, add: M, IMI, IMI Gliding Equipment

3.3.1 Header Record - Required Record List. In lines for Pilot, Glider and Glider ID, change second letter in the example from P to F (because these details will be entered in the recorder before flight and therefore the data in the IGC file will come from the Flight Recorder (Code Letter F)).

3.3.1 Header Record. In the table under HFGPS, change the next to last sentence to: For the Russian GLONASS system use the code GLO instead of GPS and for the European Galileo system use GAL (GLO and GAL are listed in para 7). If another GNSS system is used, apply to GFAC for an appropriate three-letter code. For equipment that receives data from more than one GNSS system, put the receiver maker and type first and then the three-letter code for the first GNSS system followed by the number of channels and the maximum GNSS altitude in metres, then the same data for the second GNSS system, and so forth for other systems. (AL11)

3.3.1 Header Record - Crew Names.

Line for Pilot, change to Pilot-in-Charge: HFPLTPILOTINCHARGE:TEXTSTRING CRLF

To allow for Crew Member 2 (Code CM2) add the following line under the line for HFPLTPILOT: "HFCM2CREW2:TEXTSTRING CRLF" and change table entry as follows:

Lines on Glider, Pilot in Charge and Crew Member 2	At least 30 characters	Text String	After relevant TLC. PLT for name of Pilot in Charge, CM2 for name of Crew Member 2, if any (AL11)
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3.3.3 Names and identifications. Second para code SCM should be CM2, change words to read: Name of Crew Member 2 (code CM2)

3.4 IRecord. Fourth sentence, replace "SIU and ENL" with "SIU, ENL and RPM". Also, the final para to start: "I 04 3638 FXA 3940 SIU 4143 ENL 4446 RPM CR LF

This shows that on each B-record line, Fix Accuracy (FXA) is recorded between bytes 36 and 38, Satellites In Use (SIU) between bytes 39 and 40, Engine Noise Level (ENL) between bytes 41 and 43 and RPM between bytes 44 and 46 "

3.6.1 C Record. Delete the last 8 words

3.6.5 In the format example under this para, insert TEXTSTRING on each line before CR LF

In the table under Flight Date, delete: "taken from the FR".

In the table under Task Number of the Day, after "sequence", add "; if not used, the default is 0001".

In the table, change the words from ", but the latitude and longitude is definitive" to ". The exact declared point is defined by the latitude and longitude".

4.1 B Record - The end of the second sentence to read: "... (SIU), Engine Noise Level (ENL for all motor gliders), RPM (additional for motor gliders with quiet engines)". In the seventh sentence, delete: "The three characters for FXA and two for satellites in use (SIU), should be derived from parts of the fix sentence used and are described in both the NMEA GGA and GNS as 'Horizontal DOP' and 'number of satellites in use'.". In the sentence following, delete "HDOP". This sentence should now read: "In the B Record, FXA should be recorded as a three-figure group in metres and SIU as a two group number."

4.1 B Record - Table:

Latitude line, last column, add: If no latitude is obtained from satellite data, pressure altitude fixing must continue, using times from the RTC. In this case, in B record lines must repeat the last latitude that was obtained from satellite data, until GPS fixing is regained. (AL11)

Longitude line, last column, add: If no longitude is obtained from satellite data, pressure altitude fixing must continue, using times from the RTC. In this case, in B record lines must repeat the last longitude that was obtained from satellite data, until GPS fixing is regained. (AL11)

Fix Validity line, last column to read: Use A for a 3D fix and V for a 2D fix (no GPS altitude) or for no GPS data (pressure altitude data must continue to be recorded using times from the RTC). (AL11)

4.1 B-Record - after the table: To read as follows to add RPM for quiet motor gliders: "To append the Fix Accuracy (FXA, mandatory), Satellites in Use (SIU), Engine Noise Level (ENL) and RPM (RPM) or any other variable to each fix, these have to be defined earlier in the I Record (so that, for instance, they will be recognised by analysis programs). For instance:

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I 04 3638 FXA 3940 SIU 4143 ENL 4446 RPM CR LF
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This shows that on each B-record line, Fix Accuracy is recorded between bytes 36 and 38, Satellites In Use between bytes 39 and 40, Engine Noise Level between bytes 41 and 43, and engine RPM between bytes 44 and 46. The resulting B Record becomes (with spaces for clarity in this example):
BHH MM SS DD MMMMM N DDD MMMMM E V P PPPP GGGGG AAA SS NNN RRR CR LF"

4.3 F RECORD. The first sentence to read: This is a mandatory record. However, there is no requirement to update the F-record at intervals of less than 5 minutes, so that transient changes of satellites received due to changing angles of bank, flying in valleys, etc do not lead to frequent F-record lines.

6 Valid characters.

In last column of the table, delete " , = 2C ".

In the Symbols column, replace " Res = 2C " by " , = 2C "

Reason, commas are used in most IGC files.

7 Three-letter codes.

Add: "GAL - H - Galileo (European GNSS system), followed by receiver maker, type & version letter/number. See 3.3.1 above. (AL11)".

GLO, amend words to: GLONASS (Russian GNSS system), followed by receiver maker, type & version letter/number. See 3.3.1 above. (AL11)

GPS, amend words to: GPS (US GNSS system), followed by receiver maker, type & version letter/number. See 3.3.1 above. (AL11)

OA1, etc: Remove commas from first column in table because they could be taken as comma-separators (which they are not).

9 IGC Format File. Pilot line to read: HFPLT PILOTINCHARGE: Bloggs Bill D

Change second crew line to "HFCM2 CREW2: Smith-Barry John A" and re-position this line under that for Pilot.

Appendix 2 - Test Schedule

Preliminary note to start: *The following tests may be carried out by members of GFAC or by an individual GFAC member who has the test facilities or access to them.*

8.5 insert after the first sentence: The critical ENL cases are described in the Sporting Code for Gliding, Annex B, para 1.4.2.2.

8.5 In the second sentence, delete up to the comma.

Appendix 3 - IGC shell program

1.1 General. Last sentence to read: This includes, but is not exclusive to, Windows XP and Vista home and professional editions. (AL11)

3.9 add (found by a manufacturer when trying to program their DLL): *Note: The KeepAwakeFR function may be called asynchronously by the program that has loaded the DLL. There is no guarantee that KeepAwakeFR will not be called while another request is in progress, such as DownloadLogFR. It is up to the DLL implementer to ignore any KeepAwakeFR requests that will interfere with other operations in the DLL. (AL11)*
