FÉDÉRATION AÉRONAUTIQUE INTERNATIONALE

AIR SPORT GENERAL COMMISSION
COMMISSION AÉRONAUTIQUE SPORTIVE INTERNATIONALE (CASI)

AGENDA FOR THE MEETING TO BE HELD IN DUBROVNIK
STARTING AT 0930 HOURS ON 9 OCTOBER 2002

1. Roll call of members, those present, apologies, proxy votes.

2. Departed members

3. Minutes of the last meeting

    3.1 Accuracy

    3.2 Matters arising from the minutes
    (those not covered by agenda items below)

4 Timing of CASI Meetings. Can we find a better time slot than the present, immediately before the General Conference?

5. Sporting Code General Section. Details, Annex A. *So that Annex A is not too long, the existing GS wording is not repeated every time, so please have access to a current GS for this agenda item.*

6. Statutes and By-Laws, aspects relevant to CASI and Sporting matters. Details, Annex B.

7. Jury matters. Including the Jury Member's handbook, editor's report (J-C Weber) and any comments and suggestions.

8. FAI WAG policy as it may affect CASI and the GS.
Notes: J-C Weber asked for this item and is invited to speak to it.
The Secretary asks for considerations and discussion points to be emailed to him before the meeting so that they can be collated and circulated to delegates.
The Secretary General suggests that the following GS paras could be looked at: 3.1.7, 3.5.1.1 and 3.5.6.1. See the item in Annex A under GS 3.1.7.
BJ Worth, as WAGCC Chairman, may also be able to advise.

9. Use of GPS recorders for flight validation.

9.1 The Presidents of Commissions that are using or proposing to use GPS recorders for validating performances are asked to make a statement on how such recorders are being used, particularly for evidence for records up to world level.

9.2 The Secretariat are invited to make a statement about dealing with world records in the different Airsports, or any other GPS/GNSS matters that have come to their attention.

9.3 The chairmen of IGC GNSS and GFA Committees are invited to attend, and equivalents in other Airsports.

9.4 Some notes on GNSS flight data are at Annex C.

10. Actions and procedures between CASI plenary meetings. Proposals for the main body of para 3 are at Annex D. This was the para for which there was not enough time for CASI to agree in 2001

11. CASI web pages. Present and future, comments, discussion. Please view the CASI web pages on http://www.fai.org before this item is discussed. CASI is listed on page one as one of the ASCs and the web pages then follow on clicking CASI in the list.

12. CASI name and initials in the English language, discussion. Notes, Annex E.

13. Any other business (AOB). Where possible, please give items to the Secretary before the meeting. AOB items received before leaving for Dubrovnik will be circulated by the secretary by email.

14. Date and place of next meetings. There will be a brief meeting immediately after the General Conference, then the following year's Plenary before the next General Conference.
Note: The FAI General Conference will elect the 5 NACs (FAI Members) that will replace the 5 NAC Members that must retire each year from CASI. Each NAC in the election will have nominated an individual Delegate (and, if desired, an Alternate Delegate) to represent them on CASI, should that NAC be elected. Immediately after the end of the General Conference, the new CASI will meet briefly, to elect the CASI Bureau for the next year and to clear up any business not resolved at the Plenary meeting two days before.

ANNEXES

A. Suggested amendments for the Sporting Code GS 2003. Items 5 and 8 refer.

B. Statutes and By-Laws, CASI and Sporting Aspects. Item 6 refers.

C. Use of GPS recorders for flight evidence. Item 7 refers.

D. CASI business between Plenary meetings. Item 10 refers.

E. CASI name in the English language. Item 12 refers.

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ANNEX A TO THE CASI AGENDA

SPORTING CODE GENERAL SECTION - YEAR 2003 EDITION

The following proposed amendments and discussion points have been brought to the notice of the Secretary, and are listed in the order of the GS. To avoid this annex becoming too long, existing GS wording is not repeated except where it is part of an explanation. It is therefore expected that CASI Delegates will have access to a current GS for this item. In any case, other GS references may come up in the discussion.

Next Edition. Page (i). The 2003 version will be the "1996 Edition with Amendments 1-7 ". It has been suggested that CASI should decide a future year to which a new edition will apply, rather than continuing to add more amendments to the 1996 Edition. So that some time can be given to consideration of its layout and how wording might be streamlined, the year 2005 has been suggested. It has also been suggested that in any future edition, all matters concerning competition and championships be collected in one place such as a separate chapter or annex, separating them from more general rules that apply to activities outside competition. Other suggestions on layout and content of a new edition are invited.

Web Publication. Page (i) and para 10.5. Para 10.5 was to be re-worded to put emphasis on web publication rather than hard copy (Minutes, para 3). This also applies to the wording on page (i). Suggested wording follows:
"Amendments and complete amended versions of the Sporting Code General Section are published by the FAI secretariat, acting for the Commission d'Aéronautique Sportive Internationale (CASI). Where an amendment is agreed, the complete new GS to apply for the next year will be published on the appropriate FAI web page, normally in December of the previous year, and will take effect on 1 January. The FAI web reference for the latest GS version is as follows:
http://www.fai.org/sporting_code/scg-download.asp
Within Nations, the National Airsport Control (NAC) organisation is then responsible for making sure that their officials and other holders of the Sporting Code General Section are aware of the above and are using the correct version for the year concerned. Such individuals include Officials including Members of appropriate Committees, Championship Directors, Judges, Official Observers and others holding copies of the GS."

GS 1.4 **Technical Commissions - Names.** In the first sentence after the table, add the initials of the Technical Commissions so that they can be looked up in the Glossary without any further searching. Change to: "The names of the Technical Commissions of FAI are abbreviated CIACA, CIEA, CIMP and EnvC. See the Glossary under these initials for more details."

2.2.1.6. **Class F: Aeromodel.** The definition to include model aerostats. This originated from the last CIAM Plenary meeting. In 2.2.1.6, replace "aerodyne" by "aircraft" (the FAI definition of "aircraft" (para 2.2.1) includes both aerodynes and aerostats).

3.1.7 **World Air Games.** Agenda item 7 also refers. The words "all NACs" may not be correct in the future and could be replaced by "invited NACs", "NACs that are involved", or other suitable words. GS 3.5.1.1 (first category events) and 3.5.6.1 (WAG time interval) may also have to be looked at. Suggestions for more flexible wording are invited.

3.8.1.3. **Competitors admission into a country**. This currently says: "The bid must detail any conditions of admission of participants to the country or location of the event. The FAI Executive Board shall decide whether the restrictions, if any, are acceptable."
It has been suggested that the second sentence should read: "If any restrictions are proposed or found, the FAI Executive Board shall decide whether they are acceptable, having taken advice on Sporting aspects from the ASC concerned and the CASI Bureau". This would ensure consultation on Sporting aspects, and the CASI Bureau will develop a track record of monitoring such cases and reporting to the CASI Plenary in due course.

3.15.1 **Cancellation of Championships.** Item 8.4 of the last minutes, refers. Add: "Before a cancellation decision is made, the relevant ASC shall consult the Secretary General who will inform and consult as

necessary. Actions will be assessed on a case-by-case basis. In cases with political implications for FAI, the Executive Board may be involved."

3.16.3.2 **Medals**. To make it clear that the relevant ASC funds any medals, it has been suggested that the start of the third sentence of 3.16.3.2 should read: "All medals are funded from within the ASC concerned (costs may be passed on to the Organisers' budget if the ASC so decides), and, if requested by the ASC, FAI gold, silver and bronze medals ....". Also add: "The large FAI medals for winning teams are to be forwarded to the appropriate NACs by the team manager."

6.8 **Certification (of world records). Proposal from J-C Weber, President CIA:** To allow an ASC President to extend the time period within which a world record file must reach FAI (change from the CASI President).

6.8.1 To read only the first 14 words: "A record attempt must be recognised by the organising NAC as a National Record." This deletes the 90 day requirement for recognition as a National record before the claim can go forward as a world record. *(Note from Secretary: As FAI has no jurisdiction over National records, the above proposal does not appear to have any adverse effect on FAI procedures, and is simpler)*.

6.8.2 Last sentence permitting longer than 120 days for the file to be received at FAI, change "President of CASI" to "President of the Air Sport Commission concerned".

6.8.4 Extension of the 7 day notification to FAI of a preliminary claim, change "President of CASI" to "President of the Air Sport Commission concerned".

----- proposed 6.8.ends -----

Alternatives for 6.8.2 and 6.8.4, drafted by the CASI Secretary (UK Delegate) so that some alternatives are "on the table" for discussion:

1. To keep CASI in contact with such situations and ensure uniform treatment across the FAI ASCs, suggest wording such as the following. "Unless an extension is granted by the CASI President, having taken formal advice from the relevant ASC President about any factors that may have made it difficult to give notice in the normal timescale." (In 6.8.4 replace "give notice" by "submit the file").

2. To make the time period for initial notification less critical, in 6.8.4, change 7 days to 14 days. This makes more allowance for competitions and flights in remote parts of the world, where the need for 7 day notification may more easily be missed. It is suggested that there is no case for extending the existing 120 day period in 6.8.2. 120 days gives time to apply for an extension if getting the paperwork together and resolving any difficulties with evidence is likely to take longer.

7.2 **Performance Increase Requirements.** Several points have been raised:

1. Para 7.2 is in the measurement section. As it applies solely to records, a better place might be in Chapter 6 for World Records. If this is not agreed, there should be a cross-reference to it in Chapter 6.

2. It was decided at the 2001 Plenary that the values listed should be reviewed in view of modern methods of measuring time, position and altitude (Minutes, para 3). This was particularly in the light of use and potential use of systems such as GPS, GLONASS and Galileo and the use of electronic transducers rather than aneroids for pressure altitude. The Secretary was asked to prepare some notes for discussion and these follow:

   2.1 What is the principle that FAI requires? Is it a given margin (such as 1%) for its own sake? Or is it related to the accuracy of measuring the variable concerned, with a view to ensuring that all predicted errors and margins are taken into account so that there is no doubt that a new record is sufficiently in excess of the last one?

2.1.1 If it is the latter, a number of points follow:
Duration margin - should be in units of time (say, 5 or 10 minutes, particularly if measured from GNSS-time which is accurate to the nanosecond).
Distance margin - perhaps "1% or 10 km, whichever is the least " (this allows for both short and long distances).
Speed margin. If GPS waypoints are considered accurate to less than 100m (which they should be), the main variable will be task duration (start and finish times). However, 5 minutes for a short distance is a large margin in terms of speed, for a long distance it is a small speed margin. Ideas and discussion invited.
Small and large numerical achievements. General wording as suggested above for distance could apply to all. This would allow for numerical achievements that might be small in one airsport but large in another. For instance, where measured by a GNSS system approved by the ASC:
Duration margin - 1% or 10 minutes, whichever is the least.
Distance margin - 1% or 10 km, whichever is the least.
Speed margin - 1% in speed or 10 minutes in the time between start and finish, whichever is the least.

2.1.2 **Altitude margin** - why 3%? Why not 1% if a calibrated electronic sensor was used. These are more accurate and consistent than an aneroid and an analogue output such as a needle/drum system. The percentage unit is still logical due to less density with altitude.
GNSS Altitude. For the future, the use of GNSS altitude will be relevant, once a Specification for a recorder with reliable GNSS altitude output can be agreed. This may need Aviation- or Professional-Standard components, or Differential GPS (DGPS) rather than the "domestic standard components" currently used in low-cost GPS recorders and receiver boards. If present as an Observer, the Chairman of the IGC GNSS Committee (Bernald Smith) may be able to report on progress in this area.

3. **Astronautics.** Question for the Astronautics Commission.

3.1 5% is a very large margin, is it still relevant with today's measurement methods?

3.2 As this line refers only to one ASC, is it needed in the General Section at all? There is a disclaimer in line one of 7.2 which says "Unless otherwise stated in a particular section of the Sporting Code ... "

CASI President's comments:

"These requirements will by necessity vary vastly between different airsports, and even between different categories and classes within the same airsport. The best policy for the future will undoubtedly be to leave
all details to the ASCs, especially as this option already exists in § 7.2. Only the most basic principles should be retained in the GS, otherwise we probably will be faced with a never-ending stream of amendments in the GS.

This very much applies to the items in Annex C, too."

-------- Annex A ends --------

ANNEX B TO THE CASI AGENDA

STATUTES AND BY-LAWS - CASI and Sporting Aspects

If agreed by CASI, the following to be proposed to the bodies responsible for the FAI Constitution (the FAI Executive Board and the General Conference in due course).

Names, Member and Delegate.

General. In Statutes and By-Laws, for individuals having votes on CASI, the term "Member" is used rather than "Delegate". There is some confusion between the FAI Active Member (the NAC) and the individual nominated by the NAC (the delegate). It is suggested that this wording is looked at more closely by the FAI Executive Board.

STATUTES

Terms and Definitions.
Astronautics. This currently says: "For FAI purposes, activity more than 100 kilometres above the earth's surface". It is suggested that, as "the earth's surface" varies in height from sea level to some 9000m ASL, these words should be replaced by "above sea level". If this was agreed, the relevant items in the GS Glossary would also be changed in the same way.

BY-LAWS

By-Law 5.2.1.1. Sentence 2 should be clarified. Suggest: "Before the election, Active Members shall declare the name of the person who will represent them as their Delegate if the Member is elected, and, if desired by the Member, the name of an Alternate Delegate."

Blank paragraphs.

By-Law 5.5.4 was deleted in 1993 but still appears as a blank paragraph. It is suggested that the number should be closed up to avoid the blank paragraph. With web publication this is easier than it was in hard copy printing.

--------- Annex B ends --------

ANNEX C TO THE CASI AGENDA

Use of GPS recorders for flight evidence

Background notes by Ian Strachan
(as Chairman IGC GNSS Flight Recorder Approval Committee)

Competitions. These are generally highly supervised, different tasks are set on each day, and pilots look closely at the scores and performances of each other. Although there have been cases of data corruption, poor procedures by both pilots and organisers, and even cheating in some competitions, it is suggested that in terms of the integrity of electronic flight data, competitions are not the critical case.

Records and other certified performances. These can be flown anywhere in the world under lighter supervision than applies in competitions. The critical case is probably a world record claim resulting from a flight made in a remote region with minimal oversight from independent Official Observers. There is also the possibility of inadvertent corruption of electronic data between downloading from the recorder and assessment of the data by the authority validating the flight.

DATA FORMATS

NMEA formats

Most GPS receivers output a data stream in a NMEA format. NMEA is the National Marine Electronics Association and its GPS formats are accepted also by aviation authorities such as the FAA in the USA and JAA in Europe. These formats documented in publication NMEA 0183, a copy of which will be available at the CASI meeting. No security or checksum system is built in to NMEA data streams. Software can be used to add this later after downloading from a GPS receiver unit or, for specially designed recorders such as the IGC designs, within the recorder unit itself.

Pressure altitude data

Only a few Off-the-Shelf GPS units have a pressure altitude transducer. The IGC system (see below) has included pressure altitude from the start.

Calibration. IGC has requirements for good accuracy (low calibration errors) on initial sale of a recorder. Also, regular calibration of pressure altitude must be possible to the usual FAI/IGC standards for barograph calibration, and this is tested before an IGC-approval is issued.

Use of GPS simulators. The requirement for simultaneous pressure altitude data also protects against the possible use of a GPS simulator to create data for a flight that did not take place.

GPS altitude data

Each GPS fix includes an altitude figure as well as lat/long, because each fix is essentially a position in 3-D co-ordinates. This altitude figure is vertical distance above either the selected ellipsoid (for instance, WGS84), or, if selected, the related Geoid (an equi-potential gravitational surface approximately equal to local sea level). Transforming such GPS altitude figures into the pressure datum used, for instance, at airfields (QFE/QNH) is possible but not easy. Correcting to the 1013.2 mb datum used for much controlled airspace is also not easy. For accuracy in transforming GPS altitude into pressure altitude and vice-versa, the atmospheric structure at the time needs to be known (temperature and humidity against altitude). This figures are then applied in a conversion formula such as the one understood to be used by CIA to derive geometric altitude above sea level from barograph readings.

Accuracy of GPS altitude figures. Tests carried out by IGC in the latter half of year 2000 showed anomalies in GPS altitude figures in just over 27% of the 410 IGC data files examined. A report on this was published with the IGC agenda for their 2001 meeting and is available through the CASI Secretary (references at the end). One reason may be that low-cost GPS boards are used in IGC-approved recorders, compared to higher cost professional- and aviation-level boards used in other applications. The use of differential beacons (DGPS) may also reduce such errors, but this adds substantially to cost. Investigation continues. Fortunately the lat/long accuracy does not seem to be affected by anomalies in GPS altitude figures. IGC tests show that the average error in horizontal distance since the deliberate Selective Availability error was removed for civil GPS receivers on 1 May 2002 is currently running at 11.5 metres compared to 43.9 m before. Tests continue.

IGC format and procedures

During 1993 and 1994, a group of technical experts and potential GPS Recorder manufacturers developed a standard format for flight data. The ASCII character set was used so that this format would be easy to work with, and could be understood by people not experts in computing (unlike, for instance, data in binary format). The format included a security code at the end so that any corruption of data would be detected (this is a so-called "checksum" system and is common in computer data). This work was co-ordinated by Bob Fletcher in the USA and Dr Hans Trautenberg in Europe. The IGC format was first published by FAI in March 1995 as part of the new Annex B to the Sporting Code Section 3 (Gliding).

The IGC ASCII flight data format has been transferred to a document published by FAI called the Technical Specification for IGC-approved GNSS Flight Recorders, and can be viewed through the web reference (it is not a simple system for the casual reader, but a specialist document for the recorder professional):

http://www.fai.org/gliding/gnss/tech_spec_gnss.asp

General IGC procedures on the use of GPS continue to be in Annex B to Sporting Code Section 3 (Annex B is now in its third edition, showing how things have moved on since the first edition in 1995):

http://www.fai.org/sporting_code/sc3.html

One object of a standard format was to encourage the producers of software programs for flight analysis to use it. There are now 25 such programs notified to IGC and details are on the web reference:

http://www.fai.org/gliding/gnss/gnss_analysis_software.pdf

Committees. IGC has two committees specialising in GPS matters. The more general term Global Navigation Satellite System (GNSS) is used, because GPS is the US system and there are also the Russian GLONASS and the future European Galileo systems.

> **IGC GNSS Committee**. This is chaired by Bernald Smith and reports to IGC on broad GNSS matters mainly for the future.
>
> **IGC GNSS Flight Recorder Approval Committee (GFAC)**. This is chaired by Ian Strachan and is concerned with test and evaluation of GNSS recorders submitted to IGC for their approval in accordance with the IGC Technical Specification. Currently 20 models of recorders from 9 manufacturers have been IGC-approved and a further one is under test. For a complete list of IGC-approved Flight Recorders and all IGC-approval documents, see:
> http://www.fai.org/gliding/gnss/approved_gnss_flight_recorders.asp

Data integrity for FAI certified performances such as records

One question is, what features indicate that electronic data files are valid and do not contain corrupt data when being evaluated by an NAC, or, for world records, by FAI.

IGC security system. IGC-approved flight recorders have two types of security device.

Physical security. A device such as a microswitch operates if the case of the recorder is opened. On operation, the security algorithms are eliminated and future data from that recorder can be identified as potentially insecure. In the worst case someone may have tampered with the modules inside with the intention of producing false output data.

Electronic security. This centres round the built-in security record in the IGC ASCII-format data file. The electronic security of an IGC-approved recorder was "cracked" during 1997 by Prof Wedekind in Germany. This was an academic exercise designed to show vulnerability to "hacking", not an attempt to put forward altered data files for certification. As a result, the Specification was changed to require the well-known RSA system that uses public and private keys and is extensively used in email communications. Since 2000, the IGC standard has been RSA or equivalent with a private key length of at least 512 bits. For the experts, the US DSA system is accepted as of equal strength as RSA and has the advantage that security calculations can be made in flight between fixes ("on the fly"), thus reducing time to download at the end of the flight, important in a big competition.

Checking integrity of flight data. Integrity of flight data is checked by use of an easy-to-use VALIDATE program produced by the recorder manufacturer and matching particular types of his recorders. These VALI program files are available free from the IGC web pages. These programs check not only that the data has originated correctly from the appropriate and properly sealed recorder, but also that the data has not been altered since initial downloading. These programs will detect one false or corrupt character in a large data file. Their use gives confidence that data being assessed for records and other achievements is genuine flight data that has not become corrupted or altered in transmission to the validating authority.

Other references. These are available by email from the CASI Secretary:

Paper:
GPS Altitude - Results from the analysis of a sample of over 400 IGC Flight Data Files

MS Excel spreadsheets:
Acc-GPS-alt-long.xls (the detailed altitude results referred to above)
Acc-Av-SAoff.xls (lat/long accuracy results since 1 May 2000)
Acc-Av-withSA.xls (lat/long accuracy results before 1 May 2000)
Geoid-WGS84-Excel4.xls (table of WGS84 Geoid heights with respect to the WGS84 ellipsoid)

--------- Annex C ends --------

ANNEX D TO THE CASI AGENDA

Management of CASI business between Plenary meetings

The short paper above was agreed by CASI in 2001 except for the main body of para 3 (para 3.1 about the CASI President reporting to the Plenary was accepted). For the 2002 meeting, here are some alternative drafts for the main body of para 3:

C-1. **Proposal from J-C Weber:**
3. Matters within its defined powers and not specifically reserved to the CASI Plenary meeting may be dealt with by the CASI Bureau between two CASI Plenary meetings. Sporting Code issues may only be dealt with for urgent safety reasons. The Bureau shall make sure that all decisions are clearly documented and duly registered with the FAI Secretary General.

C-2. **Year 2001 CASI agenda:**
3. Powers of the Bureau. Powers are delegated by CASI to the Bureau to act on behalf of the Commission between Plenaries, except on matters concerning the constitution or operation of CASI, which require decisions by the annual Plenary meeting or by those responsible for the FAI Constitution. However, the Bureau should use discretion in exercising these powers and should normally make sure that issues are clearly documented and circulated, normally by email, to Commission members before decisions of any significance are made.

C-3. **19 October 2001 draft, discussed briefly by CASI but not agreed:**
3. Matters concerning the constitution or operation of CASI require decisions by the CASI Plenary meeting and/or by those responsible for the FAI Constitution (Statutes and By-Laws). The Bureau shall make sure that other issues are clearly documented and circulated, normally by email, to CASI members before any decisions are made. With these qualifications, powers are delegated by CASI to the Bureau to act on behalf of the Commission between Plenaries.

C-4 **Draft by CASI Secretary dated 8 August 2002**
The following is suggested, intended to ensure that there is full email consultation with CASI delegates with adequate time to reply before a Bureau position is circulated.
"3. Matters concerning the constitution or operation of CASI require decisions by the CASI Plenary meeting and/or by those responsible for the FAI Constitution (Statutes and By-Laws). The Bureau shall ensure that other issues requiring advice or decision are documented and circulated, normally by email, to CASI Delegates (and to the Secretariat and technical experts where relevant) who will be given a minimum of one calendar month to reply. The Bureau will then consider the position and circulate their proposed solution before any action is taken. If safety issues are concerned, a shorter timescale is allowed."

------ Annex D ends ------

ANNEX E TO THE CASI AGENDA

Name of CASI in the English language

Note by the Secretary

Para 8.1 of the Minutes of the CASI Plenary on 17 October, refer.
This requested proposals with a view to discussion at the 2002 Plenary.

In FAI Statutes and By-Laws, the term CASI is not used. It only occurs in the GS. The official title for what we refer to as CASI, in Statutes and By-Laws is "Air Sport General Commission".

E.1 Should the term CASI be added to Statutes and By-Laws, or should we revert to the English title in the GS? In which case, what abbreviation should be used? The letters ASGC are not very charismatic! Claude Gillard suggested an alternative title last year, using the word "co-ordination".

E.2 In order to retain the well-known CASI abbreviation, one suggestion has been "Commission for the Co-ordination of Air Sport International matters". Short versions "CASI", or "Co-ordination Commission". In French, perhaps "Commission pour la Co-ordination d'Aéronautique Sportive Internationale" ?

------- CASI Annexes end -------