TO: IGC Delegates 1Jan06
SUBJ: Mar06 IGC Meeting GNSS/RTCA report
FROM: Bernald S. Smith, IGC ANDS Committee Chairman
FAI & SSA RTCA representative
OSTIV/SSA Technical Soaring Coordinator

Sorry, lots of detail for which see Appendicies I-V; this is updated from a report that went to FAI and SSA.

Acronym List in Appendix I

ACTION ITEMS- We will present nominations at the meeting for your consideration for election to fill the expiring terms of GFAC members and to replace a member retiring midterm. Current members are Ian Strachan (UK), Hans Trautenberg (Germany), Angel Casado (Spain), Rolf Buelter (Australia) and Marc Ramsey (USA). In addition, we seek your support of a small change in the sporting code, to take effect immediately if you agree, which will more definitively descirbe GFAC term length, successor continuity, staggered endings, and specific expiry date. What we actually have been doing, this proposed change will codify in Section 3, Annex B of the Code, as follows:

1.2.1 Appointment of GFAC Members. GFAC members will be appointed by IGC to serve a 3 year term, or until their successor is appointed. Terms will be staggered such that not more than two terms end in one year. Each 3-year term shall end on the date of the first meeting of the year of the IGC plenary. Members will be eligible for re-appointment. Members will select the GFAC chairman from amongst their number.

A - GALILEO See Appendix II

B - GLONASS See Appendix III

C - RTCA See Appendix IV

D - TRANSPONDERS From what we hear, the Mode S transponder required installation date deadlines continue to slip in Europe, as the whole EASA business moves into the picture. FAA continues to assure us that no Mode S requirement is being considered for USA.

E - MISCELLANEOUS Japan is pressing forward with QZSS (Quasi-Zenith Satellite System) which will be comprised of 3 satellites flying a figure-8 N-S pattern overhead from the extreme north of Japan to Australia. It will provide, utilizing other GNSS systems, more exacting positioning information for ground use in Japan by automobiles, etc. since there will always be a satellite directly overhead Japan, due to the QZSS ground path track design. They will broadcast on L1, L2 and L5.

Re augmentation, GBAS was to come to Australia in Oct05 in Sydney and GRAS (for which there is an RTCA WG as part of SC159) nationwide in 2007. Concern is rightly expressed by Australia about WAAS reception outside WAAS areas since the WAAS corrections don't apply in outlying areas. Their use in outlying areas can result in wrong positioning. The same concern applies to MSAS and EGNOS. The latter is being actively tested in Europe, with good results so far.

Still no decision on LORAN as a backup to GPS but one is expected this year since the technical study is completed. A single chip, capable of handling both GPS and Loran signals, is coming into availability which should make a combined GPS/Loran receiver much more affordable. But of course LORAN is not world-wide.

GPS CONSTELLATION See Appendix V
We continue to be amazed by all they're doing with GPS re atmospheric water content, the latest being rainfall forecasting. A recent example, which you may or may not be aware of, is the evaluation of hurricane Katrina. Too bad enough people weren't listening to what GPS was telling them!

WOW items:
- ANN, a nice ladies name, also stands for Autonomous Neural Navigation, teaching electrons in complex systems using GPS to think. Does it portend the end of human flight?
- Radar-like GPS signal interpretation, utilizing the extremely weak ground-reflected signal. Gliders equipped with 'radar'?
- Radio-measured futball (soccer) movement of the ball during the game. Faster than a speeding bullet?
- Head movement measurement in response to aural traffic indications. A way to know whether your student is really looking outside?
- Maybe WEEE and RoHS belong in my EnvCom report, but they also belong in this paragraph. China, California and Canada are considering legislation addressing the meaning of these acronyms, which you are challenged to read the appendix to determine their meanings/importance.
- Finally, just like IGC's GFAC FR rules, some non-soaring users are coming to see the value of having pressure altitude input to GPS-derived positions.

Sorry, no receiver census again.

We (nearly 2000 attendees) completed a week of CGSIC and ION Meetings in Long Beach, CA in September. Good, knowledgeable GNSS people from around the world to learn from and talk to were there. It works both ways; we're educating them on gliders/sport aviation.

Catching Technical Soaring (TS) up to date is still badly delayed, mainly

because so many papers need to be reviewed in a short period of time that those volunteers are overwhelmed. SSA has decided to discontinue producing TS, so plans have been made for OSTIV to take it over commencing 1Jan06. That process will be overseen by Mark Maughmer and Bernald Smith, utilizing commercial entities for layout, printing and mailing services.

F - FLIGHT RECORDERS (FR) We are addressing matters to be considered at your meeting regarding changes in the FAI Code re FRs. That will include a proposal* for use of COTS units. As you may recall, at the 2005 IGC meeting, invited COTS-concept supporters made a presentation, which was not a proposal but an explanation. IGC's GFAC has more new FR applications undergoing the evaluation process. Reiterating: Please help us by using the term Flight Recorder or its acronym, FR. The word 'logger' is not in the FAI/IGC lexicon. *ACTION ITEM by Ross MacIntyre, with a lengthy Annex II from ANDS - all a separately submitted item.

G - EGU We plan to attend the EGU meeting in Copenhagen on 25/26Feb06. The US's Soaring Safety Foundation pays the dues so that SSA can be an Affiliate Member of EGU. We recognize that EASA is playing a big role on the European scene, and appreciate the work of EGU and EAS, with no little success we're pleased to note, in easing of the original onerous-appearing rules. The multitude of new/changed matters they are having to deal with are of interest to the USA because we live and fly in a single world. What happens in one place can easily impact the rest of us. We note that NZ is also an Associate Member of EGU. We still urge IGC/EGU to press EAS for membership in EUROCAE.

-end of report-
Appendix I
ACRONYMS & DEFINITIONS
(a relatively short list, compared to the long one we use)

ADS-B - Automatic Dependent Surveillance - Broadcast
AIS - Aeronautical Information Services
ANDS - Air Traffic, Navigation and Display Systems
ANN - Autonomous Neural Navigation
ATCRBS - Air Traffic Control Radar Beacon System
ATS - Air Traffic Service
C/A - Coarse/Acquisition
CGSIC - Civil GPS Service Interface Committee
COTS - Commercial Off The Shelf
EAS - Europe Air Sports
EASA - European Aviation Safety Agency
EGNOS - European Geostationary Navigation Overlay System
EGU - European Gliding Union
ELT - Emergency Locator Transmitter
ERP - Effective Radiated Power

EUROCAE - European Organization for Civil Aviation Equipment
FAI - Federation Aeronautique Internationale
FCC - Federal Communications Commission
FLARM - no acronym could be determined
FOC - Full Operational Capability
FR - Flight Recorder
GALILEO - not an acronym meaning could be found anywhere
GBAS - Ground Based Augmentation System
GFAC - GNSS Flight Recorder Approval Committee
GLONASS - Global Orbiting Navigation Satellite System (Russian)
GNSS - Global Navigation Satellite System (generic)
GPS - Global Positioning System (USA)
GRAS - Ground Regional Augmentation System
IGC - International Gliding Commission
IGS - International GNSS Service (originally International GPS Service)
ION - Institute of Navigation
ITRF - International Terrain Reference Frame
L1 - 1575.42MHz (basic GPS signal providing SPS and PPS)
L1c - Proposed L1 overlay
L2 - 1227.60MHz (military GPS but also used by civil)
L5 - 1176.45MHz (future signal)
L-AII - Legacy - Accuracy Improvement Initiative
LORAN - Long Range Navigation
M - modernized
MHz - Megahertz
Mode S - Mode Select Transponder, includes ATCRBS but selectively addressable with data link capability
MSAS - Asian WAAS equivalent
N-S - North - South
OC - Operational Capability
OSTIV - Organization Scientifique et Technique Internationale du Vol a Voile
PPS - Precise Positioning Service, using P(Y) code on both L1 and L2
P(Y) - encrypted military code
PZ-90 - Russian Reference Frame
QZSS - Quasi-Zenith Satellite System
RFG - Requirements Focus Group
RoHS - Restriction of the use of certain Hazardous Substances
RTCA - no separate meaning, a private non-profit corporation addressing aviation requirements and technical concepts to advance the art and science of aviation and aviation electronic systems for the benefit of the public, with nearly 300 volunteer organizations, more than 25% of which are non-US, from the entire worldwide aviation community, functioning as a Federal Advisory Committee, to develop consensus-based recommendations on contemporary aviation issues, whose

documents are most often used as the basis of government-issued TSOs
SA - Selective Availability
SBAS - Space Based Augmentation System
SC - Special Committee
SPS - Standard Positioning Service, using C/A code on L1
SSA - Soaring Society of America
SSF - Soaring Safety Foundation
SSR - Secondarry Surveillance Radar
TAI - International Atomic Time
TS - Technical Soaring
TSO - Technical Standard Order
TSP - OSTIV's Training and Safety Panel
UTC - International Coordinated Time
WAAS - Wide Area Augmentation System
WEEE - Waste Electrical and Electronic Equipment
WG - Working Group
WGS84 - World Geodetic System 1984 Reference Frame

Appendix II
RTCA
Here's the usual listing of RTCA Special Committees and Task Forces and other activities, on which I serve for FAI and SSA, all of which are deemed of some potential import to the sport aviation community. You who have been around for awhile will recall that there are a number of other SCs not listed below whose work was completed some time ago. That statement is not always correct; witness SC147 which completed its work years ago but has just been reconstituted to see how it's going to fit with ADS-B:

- SC-147, Traffic Alert and Collision Avoidance System*
- SC-159, Minimum Standards for Airborne Navigation Equipment Using GPS
- SC-172, Future VHF Air-Ground Communications*
- SC-186, Automatic Dependent Surveillance-Broadcast (ADS-B)
- SC-189, ATS Safety & Interoperability Requirements* (Joint w/EUROCAE WG-53)
- SC-193, Terrain and Airport Databases (Joint w/EUROCAE WG-44)^
- SC-200, Modular Avionics* (Joint w/EUROCAE WG-60)
- SC-201, Aeronautical Operational Control Message Hazard Mitigation*
- SC-202, Portable Electronic Devices*
- SC-203, Unmanned Aircraft Systems*
- SC-204, 406 MHz Emergency Locator Transmitters (ELTs)*
- SC-205, Software Considerations*
- SC-206, Aeronautical Information Services (AIS) Data Link*
- SC-207, Airport Security Access Control Systems
- SC-208, Aeronautical Mobile Satellite Services (AMSS) Avionics*
- SC-209, ATCRBS/Mode S Airborne Equipment *

- SOIT, Satellite Operations Implementation Team
- WG-49, Transponders (EUROCAE) re LAST (Light Aviation SSR Transponder)*
- CGSIC, Civil GPS Service Interface Committee
- ION, Institute of Navigation
- RFG, Requirements Focus Group, a special arrangement of interested folks, set up to bring harmony to the ADS-B work of RTCA/EUROCAE

Note: there are several additions to the above list since my last report.
* on the committee, so I get meeting reports, but attend very few or no meetings.
In addition to the joint listings above, others of the SCs above work with EUROCAE WGs, which are counterparts of RTCA, the purpose of course being to coordinate European and USA airspace changes.

^As mentioned last time about a planned SC193 meeting in Palma, Mallorca, we suffered thru it, making enough progress to actually finish the work of that SC, so you can see we didn't go to play.

The new SC207 is a regenerated previous committee which I want to keep an eye on as before to be sure we retain the ability for airport access at places we might fly into with our glider. Not that it's going to be JFK or LAX, but these security ideas impact any airport with airline service and drift down eventually to small airports.

SC186 struggles to make progress (I really thought it would be in operation in 2000) while a low-cost (?550) alternative for gliders, FLARM, is up and running, developed by a small group in Switzerland, originally non-profit but now for-profit, utilizing 868.0 - 868.6 MHz, but also able to operate in the 900-928 MHz band (FCC Part 15 Ch 247), with an ERP of 10 mW, and a duty cycle of less than 1%. It has a range of less than 4km; I'm told about 3500 have been purchased, mostly for use in Switzerland, Austria and Germany, but some in other countries as we've seen in some internet discussions, including Australia where development is taking place under license, I guess. Helicopter search and rescue in Switzerland is also a customer. The system includes an obstruction data base. We had it demonstrated at the Aug05 TSP meeting in Germany. It provides traffic information on other similarly-equipped aircraft, but may not receive much adoption outside the sport aviation community. It is interesting to note that the FLARM documents state that it is not allowed to use FLARM in aircraft that are registered in the USA, or on aircraft that have persons on board who have any affiliation with the USA. We knew folks were mad at USA for going into Iraq, but isn't that carrying it a bit too far!

Appendix III
GALILEO
Still much talk, altho two experimental, demonstrator satellites expected to be launched. The first one, scheduled for 16Dec05, to test message systems, integrity concepts, etc., was launched on 28Dec05 from Baikonur, Kazakhstan,

atop a Soyuz-Fregat vehicle operated by Starsem. The satellite is now in a circular orbit at an altitude of 23,258 km, inclined at 56 degrees to the Equator. I still hear about this system at the many sessions given by Galileo reps at RTCA, ION, CGSIC and other meetings in the US which I attend. For instance, more than 30 papers re Galileo were presented at the September ION GNSS 2005 conference in Long Beach, CA. Everybody is using the words compatible/interoperable re Galileo/GPS (see RFG). One ION presenter, an extremely well-respected US GPS consultant who I know quite well, says that there are more problems in this arena than are really being addressed, with Galileo's integrity plans being part of the unresolved problems. Something to do with an integrity information signature, I think. As I understand it, Galileo plans 'built-in' integrity monitoring. But all that's Hans Trautenberg's domain of expertise.

Appendix IV
GLONASS

As opined last time ("...when they set them operational, but I fully expect that when they list those 3 operational, they will list less than 14 operational."), of the 14 GLONASS satellites in orbit, only 13 are operational. Russia's planned next 3-satellite launch (3 satellites on one launch vehicle) of Dec05 was actually launched Christmas day, a year after the last GLONASS launch. They have not been set operational at the time of this writing, so they are not included in the listing of numbers in orbit. We'll know more definitively about that probably within a few weeks from this writing. Two are supposed to be a newer modernized version. That M category will include an L2 signal and will also provide GLONASS accuracy equal to current GPS accuracy. They are talking with India about cooperation, including the possibility of utilizing an Indian launch vehicle. Some ambitious goals have been set to get back into international good graces: minimum (18 satellites) OC (operational capability) in 2008 when they expect to achieve system GPS accuracy and FOC (full OC - 24 satellites) in 2010-11. So, GLONASS is still a long ways from being acceptable for IGC-approved FRs, altho I read in Pravda recently that President Putin is saying Russia should work to get there even sooner. Another* highly respected acquaintance publicly derided GLONASS's likely world-wide user acceptance, not the least because of its time and reference frame differences compared to GALILEO and GPS. However, they are working on it. To get worldwide system monitoring, they probably will seek cooperation from IGS (of which I've been a member with Fellow status) and its worldwide GNSS monitoring system. One very interesting possibility is for adoption of ITRF vice their current PZ-90 datum. That would be a huge improvement for interoperability, not only with GPS since its WGS-84 reference frame is very, very close to ITRF, but with Galileo which will use ITRF. And, they will broadcast time differences, since GLONASS uses Moscow time, which is differently-based than TAI/UTC. Altho the multiple frequency band that GLONASS uses poses complexity problems, it's also more jam resistant, because rather than having to jam a single frequency, 12 frequencies would have to be jammed

on GLONASS.

*He also said that GALILEO, QZSS, GPS, SBAS are easily compatible which means they will be cheaper to build as integrated receivers.

Appendix V
GPS CONSTELLATION
There are 29 operational GPS satellites, giving a worldwide 5m horizontal position error 95% of the time, and a 2m error 50% of the time. The first Block IIR-M satellite was launched 26Sep05, containing the 2nd signal frequency planned for GPS. The first Block IIF is planned for 2007 with the 3rd signal frequency. L-AII (Legacy - Accuracy Improvement Initiative), more monitor stations, will provide worldwide monitoring, which will get us faster notice of 'bird' problems. To the interest of some who continue to wonder, discontinuance of SA is guaranteed. Political efforts continue w/all countries to assure compatibility/interoperability with new GNSS's coming along (GALILEO, QZSS). GPS III will be reprogrammable in orbit, and contain the new GPS frequency proposal, L1c at 1575.42MHz, but not until 2013! That's a long time to wait for someone my age, but may be well worth it for the rest of you since it'll be backwards compatible and likely improve FR circling flight recording which sometimes results in short fades due to rapid constellation dropouts/changes. Jam testing will continue into the foreseeable future. We need to submit reports of our scheduled activities (contests) so they can try to plan around them. For those who care about such things, a new leap second will be applied on 1Jan06 at 0000hrs, making TAI-UTC=33 seconds.
-end of appendices-