INTERNATIONAL CIVIL AVIATION ORGANIZATION

RLA/00/009 PROJECT SECOND COORDINATION MEETING ON GNSS AUGMENTATION TRIALS

(Río de Janeiro, Brazil, 28 to 30 August 2002)

Agenda Item 4 Review of activities foreseen in the project document and reformulation of same

SCHEDULE OF ACTIVITIES

(Presented by the Secretariat)

Summary

This working paper presents information related with the schedule of activities to carry out until the end of the project, foreseen for mid-2004. Likewise, it indicates the assigment of responsibility for each project activity.

Reference:

RLA/00/009 Project Document.

1 Background

1.1 During the trials carried out to date in the execution of RLA/00/009 project, it has been verified that the current structure of the SBAS GNSS augmentation system would not be guaranteeing the air navigation operations requiring certain vertical precision and, therefore, would be oriented towards air navigation en route and non precision approach trials.

1.2 The trials carried out in Brazil in February 2002 verified that the ionosphere near the Geomagnetic Equator (**15-20° North, South)** presents physics processes (bubbles, scintillation) that rarely occur in other latitudes, such as the geographical area covered by the WAAS (CONUS). The ionosphere corrections made to the master stations (TMS) in the SAM Region are based on a CONUS ionosphere model, therefore, are not in agreement with the behaviour of the ionosphere in this area, specifically in the areas near the Equator line.

1.3 To support vertical air operations, the elaboration of a ionosphere model in the CAR/SAM Regions is necessary, with the aim of making the variations corresponding to the GIVE algorithm and the WAAS corrections of the grids.

1.4 This task had not been taken into consideration by the project, since it had been foreseen that the current CSTB system would cover the ionospheric corrections in the Region for en route, NPA and vertical air operations. The trials carried out to date demonstrated that this would not be possible.

1.5 Using the current infrastructure would guarantee en route and NPA air operations, but further trials would be necessary to determine the degree of availability of the signals in the airspace for these operations.

1.6 For SBAS NPA augmentation operations, air and ground data collection should continue to analyze the scintillation effects in the GPS signals and in the geostationary satellites in charge of disseminating the augmentation of the GPS signals.

1.7 **Appendix A** shows a schedule of activities for the holding of regional and State trials oriented towards en route and NPA air operations as of today and ending by the date of the project finalization, foreseen for mid-2004.

2 Activities foreseen

2.1 In accordance with the schedule of activities, a first item would be to complete the (CAR/SAM Test Bed) that will support the augmentation trials. These trials would be SBAS.

2.2 To complete the CSTB platform, the establishment of communications links between some reference stations and the respective master station are pending, as well as the communications between the two master stations and the link between the master station and the satellite ground station.

2.3 The final implementation of the remaining circuits will be made once the installation of the south american digital network (REDDIG) is finished, foreseen by end of February 2002. The circuits currently implemented through communications providers would be deactivated and implemented through the REDDIG. Likewise, it is expected that by the end of September 2002 the Colombian network VSAT station is installed in Rio de Janeiro, permitting the obtainment of information from the Colombia and COCESNA TRS. This connection would be out of service once the REDDIG is installed and operational.

2.4 Note should be made of the importance that the data obtained from the reference station reach a collection centre with the aim of storing and registering it to be able to make all necessary analyses. At the moment, the centres able to collect the information are those installed in the Atlantic City Technical Centre and in the Rio de Janeiro station.

2.5 The collection of data from the TRS is of utmost importance for the analysis of the project's trials results, therefore, it is important to keep the already implemented circuits in operation and apply alternate actions in the event of their failure, such as local recording of the GPS data from the reference stations. In addition, this justifies the presence of the reference stations since it should not only be taken into consideration when there are flight trial verifications to be made. Therefore, the meeting is submitted with the following Conclusion:

CONCLUSION 2/X- CONTINUOUS RECORDING OF DATA OBTAINED BY THE REFERENCE STATIONS

That, with the aim of guaranteeing the collection of the data obtained by the reference stations, consideration be given to the following:

a) That the FAA Technical Center in Atlantic City and the Aeronautical Administration of Brazil continue recording the information from the TRS, informing the respective project counterparts when information is not being received; and

b) That States having TRS installed ensure that the information obtained be duly recorded at the collection centres and that continuous local recordings be established when interruptions occur in the middle or at the collection centres.

2.6. To analyse the data obtained by the TRS, the meeting might consider the possibility that a group of States from the project, supported by the FAA and ICAO, carry out quarterly or semester reports to obtain information on the progress of the trials.

2.7 Pending verification trial flights will be carried out with Brazilian and Colombian flight trial aircraft. The aeronautical administration of Brazil has equipped a flight inspection aircraft with a trial WAAS console to carry out trials in the CSTB. With regard to Colombia, no information is available as to when the aircraft with WAAS equipment would be available for the trials. The trials with the Colombian aircraft have been scheduled for the first quarter of 2004.

2.8 The next trials, in addition to collecting data to verify the scintillation effect of the ionosphere in the GPS signal, will also verify the precision, integrity, continuity, availability and coverage parameters for en route and NPA air operations over the GPS signal through SBAS augmentation.

2.9 For SBAS augmentation, the installation of a satellite ground station is required, as well as a space reserve (band width) for the geostationary satellite to be in charge of disseminating pertinent corrections.

2.10 This task in under the responsibility of the Brazilian aeronautical administration and has been partially completed, with the reservation to use the INMARSAT III F5 satellite. The acquisition of the ground satellite station is in progress.

2.11 To complete the personnel training foreseen in the project, a course on Operational Requirements will be held in mid-February 2003. To that end, it would be necessary that the FAA provide the course contents.

2.12 It is expected that once all the trials have been carried out, the necessary information can be obtained to evaluate the technical and operational benefits of the satellite based augmentation systems in the CAR/SAM Regions, in order that the project can provide assistance in the establishment of an satellite based augmentation system operational model to be developed by GREPECAS.

3 Actions suggested

3.1 The meeting is invited to:

a) Take note of the information provided;

b) Analyze Section 2, including the conclusion formulated; and

c) Analyze the schedule of activities in Appendix A to this working paper.

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RLA/00/009 - GNSS Augmentation Regional Trials
ACTIVITITIES TO BE CARRIED OUT FOR EXECUTION OF SBAS AUGMENTATION TRIALS

ID	Task Name	Duration	Start
1	**RLA/00/009 Implementation**	**477 days**	**Wed 28/08/02**
2	**WAAS Platform Installation**	**234 days**	**Wed 28/08/02**
3	**Communications Links**	**127 days**	**Wed 28/08/02**
4	Bogota Río	24 days	Wed 28/08/02
5	La Paz Santiago	127 days	Wed 28/08/02
6	Honduras Rio	24 days	Wed 28/08/02
7	Rio Santiago	127 days	Wed 28/08/02
8	**Satellite ground station**	**180 days**	**Mon 04/11/02**
9	Purchase	5 days	Mon 04/11/02
10	Manufacturing	153 days	Mon 11/11/02
11	Activation and operation	9 days	Tue 01/07/03
12	**WAAS Platform Activation**	**107 days**	**Fri 21/02/03**
13	TRS TMS trials	3 days	Fri 21/02/03
14	TMS TMS Trials	3 days	Wed 26/02/03
15	TMS Uplink Trials	3 days	Mon 14/07/03
16	Uplink Trials	3 days	Thu 17/07/03
17	**Trial operational plan**	**87 days**	**Mon 02/12/02**
18	Regional plan	87 days	Mon 02/12/02
19	State plan	87 days	Mon 02/12/02
20	**Level of service to verify**	**55 days**	**Mon 16/09/02**
21	Enroute service level study	55 days	Mon 16/09/02
22	NPA service level study	55 days	Mon 16/09/02
23	**Regional trial**	**100 days**	**Mon 15/09/03**
24	Brazil aircraft trial	10 days	Mon 15/09/03
25	Colombia aircraft trial	10 days	Mon 19/01/04
26	**Regional trial report**	**23 days**	**Wed 31/03/04**
27	Report preparation	23 days	Wed 31/03/04
28	**States trials**	**100 days**	**Mon 15/09/03**
29	Trials State 1	10 days	Mon 15/09/03
30	Trials State 2	10 days	Mon 19/01/04
31	**States trials report**	**113 days**	**Mon 29/09/03**
32	Report State 1	23 days	Mon 29/09/03
33	Report State 2	23 days	Mon 02/02/04
34	**Final report**	**25 days**	**Fri 21/05/04**
35	Final report preparation	25 days	Fri 21/05/04
36	**Training**	**5 days**	**Mon 10/02/03**
37	Procedures Course	5 days	Mon 10/02/03
38	**Costo-benefit analysis**	**15 days**	**Fri 30/04/04**
39	Cost-benefit study	15 days	Fri 30/04/04