



International Civil Aviation Organization

CAR/SAM REGIONAL PLANNING IMPLEMENTATION GROUP (GREPECAS)

**Fifth Meeting of the CNS Committee of the GREPECAS ATM/CNS Subgroup
(CNS/COMM/5)**

Lima, Peru, 13 to 17 November 2006

CNS/COMM/5-IP/03

27/10/06

Agenda Item 2: Navigation systems developments

**FEDERAL AVIATION ADMINISTRATION (FAA)
GROUND BASED AUGMENTATION SYSTEM (GBAS) PROGRAM STATUS**

(Presented by the United States)

SUMMARY

The FAA is continuing to pursue research and development of GBAS technology. In 2006, the FAA will continue to support modification of an existing GBAS system in Memphis, Tennessee USA. Flight and ground tests are currently underway at this site to demonstrate integrity, and the general performance of this GBAS system under Visual Flight Rule (VFR) landing conditions. The FAA is supporting applicant requests for GBAS system design approval within the National Airspace (NAS). International cooperation on GBAS development, system, and operational approval are also key objectives of the GBAS program.

1. Introduction

1.1 This paper describes the activities and priorities of interest to ICAO and the international community as a whole on U.S. Federal Aviation Administration (FAA) Ground Based Augmentation System (GBAS) program.

1.2 Note that internally the FAA has referred to its GBAS program as the Local Area Augmentation System (LAAS).

2. “Provably Safe Prototype” Progress

2.1 Development of integrity monitors and detailed design are the goals for the FAA CAT-I GBAS program. A developmental system installed at Memphis, Tennessee in the USA is being updated using new integrity designs developed jointly between the FAA and Honeywell. The LAAS Integrity Panel (LIP), a joint group of Honeywell engineers, FAA key technical advisors, and FAA personnel, have agreed to a number of software and hardware changes within Honeywell’s “baseline” design that will improve its ability to meet CAT-I integrity and performance requirements. Among these, a number of algorithm description documents are being finalized and implemented within the Memphis system. These documents contain the details on specific monitors and outline most of the integrity case for the system.

2.2 In September 2006, Honeywell and the FAA program office completed the development of the algorithm description documents. Honeywell will implement these in several software updates in the prototype at Memphis International Airport. The FAA successfully conducted flight tests at Memphis in September 2006 to validate technical and operational performance of the prototype CAT-I GBAS facility at Memphis. The FAA will continue to use the prototype facility in Memphis to validate operational implementation criteria and procedures for GBAS to reduce delays for an operational approval.

2.3 The Honeywell Corporation has submitted an application for system design approval to the FAA. The FAA supports these requests as part of its obligation to regulate non-federal navigation aids within the U.S. National Airspace System, or NAS.

2.4 Flight testing of the prototype is scheduled for late 2006 to validate the technical and operational performance of the Memphis prototype. Eight (8) LAAS instrument approaches have been developed for the Memphis flight test program.

3. International Cooperation for GBAS Development

3.1 The FAA is continuing to support international development of Global Navigation Satellite System (GNSS) augmentations including GBAS. In February 2006, the FAA signed a Memorandum of Cooperation (MOC) with Airservices Australia (AsA) to support regulatory approval of an Australian GBAS implementing the LIP approved algorithms. The system developed under the AsA contract will be SARPS-compliant and will be implemented in Sydney. Honeywell and FedEx plan to implement CAT-I GBAS in Memphis under FAA Non-Fed Approval process (FAR Part 171) for privately installed, owned and operated navigation systems.

3.2 The FAA continues to participate in the International GBAS Working Group meetings coordinated by several national navigation service providers and EUROCONTROL. Additional MOCs between the FAA and Spain, and FAA and Germany are in progress to further the cooperation between service providers interested in implementing GBAS technology.

4. Terminal Area Procedure (TAP)

4.1 The FAA has conducted research flight tests for complex approaches to a precision approach in VFR conditions. These tests, conducted in the Spring/Summer of 2006 on-board the FAA Boeing 727-100, demonstrated that the FAA GBAS ground station can successfully broadcast the necessary information for performing an area navigation (RNAV) procedure, and that the Rockwell-Collins GNLU 930 Multi-mode Receiver (MMR) is capable of receiving the corrections and terminal area path (TAP) data, and then providing guidance to a basic course deviation indicator (CDI).

4.2 This test was the first GBAS demonstration using highly accurate global positioning system (GPS) correction data that providing TAP points that allowed for a series of RNAV legs of different types, including curved path, leading to a straight-in final for a precision approach and landing.

4.3 An earlier test was performed at the FAA William J. Hughes Technical Center (WJHTC) where the TAP points were hard-coded directly into the MMR, but was done as a preliminary assessment of the receiver capability. These tests represent the first to incorporate the standards found in RTCA DO-246C LAAS Interface Control Document, and DO-245A, LAAS Minimum Aviation System Performance Standard. The test results from this test flight will soon be available in an FAA report

5. GSL-D Research and Development

5.1 GSL-D continues to be the FAA's leading option for supporting near-term CAT II/III operations. Current efforts focus on developing practical requirements for GNSS based technology and assessing the feasibility of today's GBAS technologies' ability to meet those requirements. The ICAO Navigation Systems Panel's (NSP) advice and support in these near-term efforts is an integral part of assuring equivalent levels of safety and performance to current systems. GSL-D provides a transitional stage and mitigation measure for end-state multi-frequency GNSS navigation capability. This initial stage in the "life cycle" of GNSS CAT II/III operations could also provide a platform for mitigating unforeseen integrity and/or operational issues in future stages of multi-frequency development.

6. Conclusion

6.1 The meeting is requested to note the material presented in this information paper, and consider its contribution to the implementation of a global satellite-based navigation system.

6.2 Attendees are invited to visit the FAA's GPS Product Team's website at <http://gps.faa.gov> for up-to-date LAAS/GBAS program information.

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