



International Civil Aviation Organization

CAR/SAM REGIONAL PLANNING AND IMPLEMENTATION GROUP (GREPECAS)

**Eleventh Meeting of the GREPECAS Aeronautical Information Management Subgroup (AIM/SG/11)**

Bogotá, Colombia, 16-20 June 2008

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#### **Agenda Item 4: Review of the Implementation Process**

- 4.4 **Follow-up on e-TOD implementation (electronic terrain and obstacle data), actions taken by CAR/SAM States regarding Annex 15, Chap. 10, Appendix 8 SARPS and guidance from Doc. 9881 (Conclusions 9/7 and 9/9 of the AIS/MAP/SG/9 Meeting)**

#### **FLIGHT PROCEDURES DESIGN**

(Presented by Colombia)

##### **SUMMARY**

This Working paper look for present the importance of automated tools, like which it uses by the Colombian Civil Aviation Authority, to design conventional flight procedures or RNAV and RNP (FPDAM) with the purpose to support its development, as well as, to evaluate, to predict and to analyze satellite navigation (SAPET) and, to analyze and to evaluate the Radar data (RADAR DATA VIEWER)

##### **References:**

- PANS-OPS ICAO (Doc. 8168): Construction of Visual and Instrument Flight Procedures;
- ICAO Annex 14
- US FAA TERPS

#### **INTRODUCTION**

The Colombian Special Administrative Unit of Civil Aeronautics (UAEAC) has enhanced its system of managing aeronautical information in 2006, acquiring new components that made part of the system and updating one of the tools, which it has had the organization for the airspace management and the flight procedure design (conventional, RNAV and RNP) - FPDAM.

## DESCRIPTION

### FPDAM

FPDAM System is connected to the aeronautical centralized data base, from which it obtains all their up-to-date data, like runways coordinates, ARP, thresholds, obstacles, routes, airspace and navaids, besides ground information. The system allows to design, to control and to maintain departure flight procedures, arrival and instrument approach procedures. In addition, it allows to design and to manage airspace, routes, aeronautical and topographical data.

### SA.P.E.T. (Tool for Satellite Navigation evaluation, prediction and analysis)

- Analysis of coverage, precision, trustworthiness and integrity of the satellite signal.
- GNSS flight procedures planning and inspection (Global System of Satellite Navigation)
- GNSS designed procedures Pre-validation.
- Predictive NOTAM RAIM GNSS generation and automatic broadcast via e-mail to the users.
- The up-to-date satellite information Automatic download by Internet.
- It fulfills PANS-OPS ICAO requirements, RTCA/DO-208, RTCA/DO 229C
- It evaluates the satellite visibility
- It allows analysis of volume (extensive coverage areas of the country), local analysis (on the aerodrome) and in route (on a procedure).

### RADAR DATA VIEWER (Tool for radar information analysis and evaluation)

- It allows to consult and to simulate routes of aircraft previously recorded.
- Automatic calculation of separation minimum ranges between aircrafts.
- It allows to optimize the airspace and the flight procedure design
- Show routes on geo-referenced graphs
- It imports data filtered from other customized formats.
- It allows to load radar coverage information and to superpose it on the planned procedures.

## CONSIDERATIONS

In the evaluation of the level of implementation of requirements AIM and on the solution of deficiencies existing in the design of flight procedures, the following aspects are due to consider:

En la evaluación del nivel de implementación de los requisitos AIM y sobre la solución de deficiencias existentes en el diseño de procedimientos de vuelo, se deben considerar los siguientes aspectos:

- ❖ Design automation of flight procedures.
- ❖ Time efficiency in the elaboration of flight procedures.
- ❖ Accomplish with IACO PANS-OPS OACI (Doc. 8168) standard about visual and instruments flights procedures.
- ❖ Management and design of airspace and routes.
- ❖ Aeronautical and ground data management.
- ❖ Perform the norms of U.S. FAA TERPS (Instruments Terminal Procedures)
- ❖ Automatic calculation of flight minimum allowed altitudes for an aircraft on an Obstacle.
- ❖ Calculation of interference of an Obstacle in a route.
- ❖ Automatic design charts update with the information of the centralized data base (AeroDB)
- ❖ Surfaces building and evaluation (protection areas, obstacles limit surfaces); satisfying ICAO annex 14 and considering natural obstacles and Obstacles that has been done by the man.
- ❖ Routes Design regarding lateral separations and obstruction verification in order to calculate of the minimum route level.

- ❖ Nav aids different alternatives installation evaluation.
- ❖ Airspace Optimization

### **RECOMMENDED ACTION**

Considering former information, It is evident the advantage to implement a system that allows to design conventional flight procedures, but especially RNAV and RNP; moreover evaluating precision approach segments and nonprecision, such as: route segment, initial segment, intermediate segment, final segment, missed approach segment, Holding and exit segments; these elements make more efficient the implementation of procedures today known like PBN

These systems contribution to evaluate ANNEX 14 ICAO obstacles limit surfaces, combined with the evaluation, prediction and analysis of Satellite Navigation at local level, area, en-route and at procedures level; extending the civil aviation authority capabilities to implant the aforementioned procedures.

Therefore, those authorities, like the Colombian, that requires a surveillance radar environment for terminal areas PBN applying shall count with a Radar evaluation and analysis information tool, that when it is using altogether with the previous ones facilitates the development of PBN flight procedures.

Thus, we gently ask to the meeting to take note of this information and to formulate the following conclusion

“Conclusion XX – the Meeting finds that the implementation of automated tools for the development of RNAV and RNP (Today PBN) that are interconnected with related obstacles information, radar coverage and satellite navigation subsystems contributes in improving the capacity of ATM new environment implementation”

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