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**International Civil Aviation Organization
South American Regional Office**

**FOURTH WORKSHOP/MEETING OF THE SAM IMPLEMENTATION GROUP
(SAM/IG/4)
REGIONAL PROJECT RLA/06/901**

Lima, Peru, 19-23 October 2009

Agenda Item 7: Operational implementation of new ATM automated systems and integration of the existing ones

**STRATEGY FOR THE IMPLEMENTATION OF AMENDMENT 1 TO THE 15th EDITION OF
THE ICAO PANS-ATM (DOCUMENT 4444) IN THE SAM REGION**

(Presented by the Secretariat)

Summary
This working paper presents the document containing the strategy for the implementation of Amendment 1 to the 15th Edition of the ICAO PANS ATM (Document 4444) in the SAM Region, as a follow-up to the activities for the implementation of automated systems in the SAM Region.
References: Reports of the SAMIG/2 and SAMIG/3 meetings; Amendment 1 to the 15th Edition of the PANS-ATM (Document 4444); and Report of the GREPECAS 15 meeting (Rio, Brazil, 13-17 October 2008).
ICAO Strategic Objectives: D: <i>Efficiency</i>

1. Introduction

1.1 Through communication AN13/2.1-08/50 of 25 June 2008, ICAO informed the States about the publication of Amendment 1 to Doc. 4444 (PANS-ATM), aimed at updating the ICAO flight plan (FPL) form to meet the needs of aircraft with advanced capabilities and the evolving requirements of automated air traffic management (ATM) systems, while taking into account compatibility with existing systems, human factors, training, cost, and aspects concerning transition.

1.2 GREPECAS/15, when assessing the establishment of the new CNS/ATM Subgroup and its terms of reference and work programme, reviewed the new flight plan model. In this regard, considering that a CAR/SAM regional strategy will need to be established for its implementation, it formulated Conclusion 15/35 - *Implementation of the new ICAO flight plan model*, requesting States to adopt the necessary measures to prepare for the transition, and also requesting the CNS/ATM//SG to establish a contributory body to develop this transition strategy.

1.3 The SAM/IG/2 meeting assessed the impact that this amendment could have on automated systems and, in this regard, felt it was necessary to develop a strategy for the implementation of the new flight plan, taking into account the impact on ATC automated systems.

1.4 In view of the above, the meeting agreed to include a task involving the development of a strategy for the implementation of the new flight plan in the 2009 work programme, with the support of Regional Project RLA/06/901.

1.5 The SAM/IG/3 meeting formulated Conclusion SAM/IG/3-8, according to which project RLA/06/901 would prepare an initial plan, describing a strategy for the implementation of said amendment, to be presented at the SAM/IG/4 meeting.

2. Analysis

2.1 The Administration of project RLA/06/901, taking into account that the impact of the implementation of the new flight plan format would basically affect ATM automation systems, organised a mission by an expert on ATM automation systems to draft a document containing the strategy for the implementation of Amendment 1 to the 15th Edition of ICAO PANS-ATM (Document 4444) in the SAM Region.

2.2 The strategy developed appears in the **Appendix** to this working paper. The strategy document analyses the real situation in the SAM Region *vis-à-vis* the changes formulated in Amendment 1 to the 15th Edition of Document 4444 and proposes an initial strategy for the implementation of the amendment.

2.3 The strategy analyses the critical criteria, the preparation, the transition, post-transition, and the administrative, technical, and operational aspects for the implementation of the aforementioned amendment.

2.4 The Meeting should review the strategy document and formulate an initial model action plan for the implementation of the amendment, which should be completed by each SAM State and submitted to the SAM/IG/4 meeting.

3. Suggested action

3.1 The Meeting is invited to:

- a) take note of the information presented;
- b) examine the strategy document contained in the Appendix to this working paper;
- c) based on the strategy document, formulate a model action plan for the implementation of the amendment, to be completed by the States of the Region and submitted at the SAMIG4 meeting; and
- d) analyse any other considerations in this respect that it may deem necessary.

APPENDIX

STRATEGY FOR THE IMPLEMENTATION OF AMENDMENT 1 TO THE 15TH EDITION OF THE ICAO PANS-ATM (DOCUMENT 4444) IN THE SAM REGION

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1. Objective

The purpose of this document is to establish the SAM strategy for the implementation of Amendment 1 to the 15th Edition of the ICAO PANS-ATM (Doc 4444), pursuant to conclusions 15/35 of GREPECAS and SAM/IG/3-8.

2. General considerations

ICAO, taking into consideration that:

- Dynamic management of information will provide the most appropriate and integrated vision of ATM status in historical terms--past, present, and planned or future---and will serve as a basis for decision-making by the whole ATM community;
- The *Global Air Traffic Management Operational Concept* (Doc 9854) requires information management actions to support ATM operations with accurate, quality, and timely information; and
- ATM requirement N° 87 of the *Manual on Air Traffic Management System Requirements* (Doc 9882) defines that 4-D paths will be used in traffic synchronisation applications, with a view to attaining the performance objectives of the ATM system. It also clarifies that automation in both “ground” and “air” applications will be fully used to create an efficient and safe air traffic flow in all flight phases.

Informed the States, through letter AN13/2.1-08/50 of 25 June 2008, about the publication of Amendment 1 to Doc. 4444 (PANS-ATM), aimed at updating the ICAO flight plan (FPL) form to meet the needs of aircraft with advanced capabilities and the evolving requirements of automated air traffic management (ATM) systems, while taking into account compatibility with existing systems, human factors, training, cost, and transition aspects.

GREPECAS/15, when assessing the establishment of the new CNS/ATM Subgroup and its terms of reference and work programme, reviewed the new flight plan model. In this regard, considering that a CAR/SAM regional strategy will need to be established for its implementation, it formulated Conclusion 15/35 “*Implementation of the new ICAO flight plan model*” requesting States to adopt the necessary measures to prepare for the transition, and also requesting the CNS/ATM//SG to establish a contributory body to develop such transition strategy.

The SAM/IG/2 meeting analysed the impact that this amendment could have on automated systems, taking into account PBN implementation. It was noted that the amendment in question was complex and involved other aspects besides PBN. Consequently, the meeting deemed it necessary to adopt a strategy for the modification of automated ATC systems.

In view of the above, the meeting agreed to include a task in the work programme of the SAM PBN Implementation Group, related to the assessment of PBN implementation in light of Amendment 1 to the PANS-ATM. This activity would serve as support and reference to the work entrusted to the aforementioned specific task force of the GREPECAS CNS/ATM/SG. Accordingly, a task was included in the work to be carried out in 2009 under the auspices of Regional Project RLA/06/901 in the SAM Region.

At the SAM/IG/3 meeting, States were presented with the ICAO directives for the incorporation of flight plan information, in accordance with Amendment 1 to the Procedures for air navigation services — Air traffic management, 15th edition (PANS-ATM, Doc. 4444).

Conclusion SAM/IG/3-8 considered that project RLA/06/901 should develop an initial plan, together with a description of the strategy for the implementation of said amendment, to be presented at the SAM/IG/4 meeting.

3. Principles

In preparing this document, the following aspects have been considered:

1. The sovereign will of the States;
2. It is a guide for SAM States to develop their action plans for the implementation of the contents of Amendment 1 to Doc. 4444.

4. Scope

This document applies to all SAM States, specifically to all air navigation service providers and airspace users.

5. Reference documents

This strategy follows ICAO recommendations, as contained in the following documents:

- a) ICAO PANS-ATM, 15th Edition (Doc 4444)
- b) Amendment 1 to the 15th Edition of Doc 4444;
- c) Directives for the incorporation of flight plan information, pursuant to Amendment 1 to the Procedures for air navigation services - Air traffic management, 15th edition (PANS-ATM, Doc 4444);

- d) GREPECAS 15 final report; and
- e) Final reports of the SAM/IG meetings.

6. Analysis

6.1. Amendment 1 to the 15th edition of Doc 4444;

ICAO considered that, in order to meet the needs of aircraft with advanced capabilities and the evolving requirements of automated air traffic management (ATM) systems, the flight plan forms need to be updated.

In this regard, it published Amendment 1 to PANS-ATM, Doc 4444 - 15th Edition, which contains, basically, the following changes:

1. Flight plan
 - a. Flight plan form: operators and air traffic service units should comply with the restrictions established in aeronautical information publications (AIPs);
 - b. Filing of flight plan: changes in the deadlines for filing flight plans;
 - c. Box 7: Aircraft identification: use of alphanumeric characters;
 - d. Box 8: Flight rules: specification of one or more items of change in flight rules;
 - e. Box 10: Equipment: changes in the designation of equipment and capabilities
 - f. Box 13: Aerodrome of departure and time
 - g. Box 15: Route
 - h. Box 16: Aerodrome of destination and total estimated duration, alternate destination aerodromes
 - i. Box 18: Other data
2. Messages from air traffic services
 - a. Composition of CHG, CNL, DLA, DEP, RQP and RQS messages

6.2. Implementation directives

In Letter AN 13/2.1-09/9, dated 6 February 2009, ICAO defines the directives for the incorporation of flight plan information pursuant to Amendment 1 to the Procedures for air traffic services.

In general, ICAO highlights that the changes have significant repercussions for ANSP flight data processing systems that check and accept flight plans and related messages, use flight plan data from displays as a reference for controllers, use data for ANSP automation, and facilitate communications among ANSPs during flight, and also have consequences for airspace users.

Although a date has not been established for the implementation of flight planning changes, the transition is expected to begin on 25 June 2008 and finish on 15 November 2012.

It also recognises that the changes will be applied according to timetables specific to each ANSP and airspace user, based on their own needs, but there shall be some coordination.

Finally, it stresses that all those involved should be in a position to submit and process flight information in keeping with Amendment 1 to the PANS-ATM by 15 November 2012.

Some considerations regarding the planning environment follow:

1. EXISTING means the existing flight planning formats and ATS messages defined in the current version of the PANS-ATM;
2. NEW means the flight planning formats and ATS messages specified in Amendment 1 to the PANS-ATM;
3. The ATM system shall support simultaneously the EXISTING and NEW information for some period of time, in order to have time to deal with individual performance cases;
4. Amendment 1 does not change the filing of flight plans through different means (individual filing of flight plans before each ANSP, filing of flight plans at one location and then the ATM system distributes them), but the transition to the implementation of Amendment 1 might entail some requirements during the transition period;
5. The Amendment makes changes to the content of flight plan messages exchanged between ANSPs.

A summary of the contents of ICAO directives follows:

Directriz 1. Recommends that ANSPs be capable of operating with the two types of flight plan information, EXISTING and NEW, during the transition period. ANSPs are not required to accept and process EXISTING data after 15 November 2012. It applies to cases in which some ANSPs and/or airspace users do not implement flight plan changes until the end of the transition period.

Directriz 2. Regional planning and implementation groups are encouraged to plan and publish the changes sufficiently in advance to the date of application. It considers that transition plans should take into account the fact that it is possible that airspace users will not be able to use the new opportunities offered by the NEW information until such time that the ANSPs have made the transition and, even then, the use of the NEW information could be limited in its application if flights continue to involve ANSPs that have not made the transition yet.

Directriz 3. Clarifies that airspace users will determine whether they will submit NEW or EXISTING information to the ANSP during the transition period and after the ANSP has notified that it can accept the NEW information.

Directriz 4. In the event that not all ANSPs have made the transition to the NEW information, airspace users must make sure that the EXISTING information is submitted to the ANSPs that have not made the transition yet. It stresses the concern that ANSPs that use EXISTING information might misinterpret and reject the information submitted by airspace users more than 24 hours before the flight, as well as the case in which ANSPs that use the NEW information will not be in a position to transmit essential coordination to the ANSPs that use the EXISTING information.

Directriz 5. Informs that ICAO will maintain a website containing the list of capabilities of each ANSP to accept EXISTING or NEW information. Each ANSP will communicate to the respective ICAO Regional Offices, as soon as possible, its capability of accepting the NEW information.

Directriz 6. To supplement Directive 4, it is noted that the ANSPs that accept the NEW information could translate flight information into EXISTING information for purposes of coordination with adjacent ANSPs that have not made the transition.

6.3. Current scenario in the SAM Region

Currently, the SAM Region shows different levels of technological evolution in terms of ATM automation, which can be classified into the following groups:

- SAM States that have automated systems (radar data and flight plan processing) in the following ACCs: Argentina, Brazil, Chile, Colombia, Ecuador, French Guiana, Panama, Peru, Uruguay and Venezuela. Many of the automated systems installed in the Region are based on the AIRCON (INDRA) solution, but in different versions;

- States that have ATM automated systems and are in the process of updating them, like Brazil and Peru;
- States that do not have ATM automated systems, but are in the phase of implementing them in the short term, like Guyana, Suriname and Paraguay.
- States that do not have ATM automated systems and no short- or medium-term plans to purchase them, like Bolivia.

The implementation strategy must take into account the different degrees of evolution in the Region.

The main means used for the transmission of flight plans in the Region is the AFTN, which is in the process of transition to the AMHS system. It is expected that, by 2012, all SAM States will have the AMHS system installed. The means of communication used for the transmission of AFTN information in the Region is the REDDIG.

6.4. Impact

Based on the changes defined by ICAO, on the directives for the implementation of these changes, and on the current scenario of the SAM Region, a macro analysis is made of the impact on ATM systems, whether automated or not, as well as on data communication systems, both at the technical and operational level.

6.4.1. Technical impact

For States that do not have ATM automated systems, the changes in the new flight plan format would only affect data communication systems based on the AFTN or the AMHS, basically associated to the human-machine interface at the system terminals available at AIS offices and other specific locations for the entry of flight plans.

It must be noted that changes in the flight plan format involve the introduction of more options for filling the boxes in the form, and this could imply more errors in the generation of messages from terminals, which do not have the capability of checking data consistency, only message syntax.

It must be noted that these changes in the flight plan form introduce many options that can increase the likelihood of errors when completing it.

In States that have ATM automated systems, changes have a significant technical impact, and it will be necessary, at least, to make adjustments in the sub-systems dealing with flight plan processing, communication interface with other systems, recording and re-display, and in the HMI of control displays.

Such adjustments must take into account, at least, the following aspects:

- The incorporation of all the changes contained in Amendment 1 and described in item 6.1 of this document;
- The provision to the air traffic controller of all the information required for air traffic planning and management, including the alerts of aircraft capability changes;
- Enabling the correct transmission of flight plan information, EXISTING or NEW, to all the control centres involved;
- A clear definition of box sizes and their respective sub-divisions, as well as data sequencing (for example, the sequence for the inclusion of data in Box 10);
- Including the updating of all the technical documentation of the system; and
- Early testing to validate the changes.

Consequently, the effort of modifying these systems must be considered, also taking into account the difficulties inherent to technological obsolescence and insufficient technical training of maintenance personnel, which may cause additional financial expenditures due to the need to hire third parties, and a higher risk of failure.

For States that are in the process of purchasing new automated systems, whether or not for changing the existing systems, the impact will be on the specification of such systems, which must be suitable to process the changes defined in the amendment.

Another important aspect is that ICAO considers a period of transition, in which ANSPs must be capable of processing EXISTING and NEW information, which implies making adjustments to the software so that it can recognise what format is being used.

6.4.2. Operational impact

The changes have a direct impact on operational personnel, especially air traffic controllers and flight plan operators.

However, many variables need to be considered, as well as the relationships between the data in the different boxes of the FPL (for example, boxes 10 and 18), which may change depending on aircraft status.

This impact is reduced if the ATM automated system can provide the air traffic controller with the information required for air traffic planning, and send alerts whenever there is a change in the scenario with respect to the data declared in the flight plan.

Consideration should also be given to the operational difficulty that will exist during the transition period, when it must be possible to operate with the two types of information: EXISTING and NEW

It is also necessary to clearly and formally define those aspects that are not totally defined in Amendment 1 and in the directives; for example, the use of item COM/NAV, in Box 10, where the letter S represents VHF RTF, VOR or ILS standard equipment, without making reference to NDB.

In order to mitigate the impact, a significant amount of training must be provided to the personnel on both the use of the new resources of the automated system and the manual processing of flight plan data, as well as on the adjustment of operational models and the clear definition of controversial issues.

7. Implementation strategy

7.1. Critical criteria

The following aspects must be taken into account for the implementation of Amendment 1 in the SAM Region:

- Make sure that, by 15 November 2012, all States and airspace users implement all the changes contained in Amendment 1, and not just some selected aspects;
- States that do not fully implement the amendment will be obliged to publish the non-conformities in their AIPs as “SIGNIFICANT DIFFERENCE” before 15 November 2012. Likewise, failure to implement the changes will be considered as a deficiency and will be included in the List of Deficiencies of the SAM Region; and
- Make sure that, as of 15 November 2012, all States and airspace users will accept and disseminate only information of the NEW flight plan format and of associated ATS messages, and that the capability of processing the EXISTING format is deactivated.

7.2. Preparation

In order to succeed in the implementation of the changes, SAM States need first to develop an action plan that takes into account the impact of the change on their systems, taking into consideration the aspects included in this strategy.

In order to succeed, the States, under the coordination of the ICAO Regional Office and GREPECAS, need to develop their action plans based on the impact on their systems, taking into account the changes, directives and critical criteria defined above.

Such plans must contain, as a minimum, the following topics:

- Classification of the level of evolution of their systems;
- A detailed assessment of the technical and operational impact;
- The solution to mitigate the impact, with the respective implementation timetable and those responsible for its execution;
- Deadline for the implementation of the solutions;
- Solution validation tests;
- Technical and operational training programmes; and
- Contingency measures.

Such plans must be submitted to the SAM/IG/5 meeting.

The ICAO SAM Regional Office will monitor the following tasks:

TASK	START	END	RESPONSIBLE PARTY
Ensure that automated system requirements contain all the changes of the FPL form	2009	2012	Each State will indicate who is the responsible party
Ensure the proper modification of ATM automated systems for a correct analysis of the information, and the identification of the order in which messages are received, to make sure that there are no data interpretation errors.	2009	2012	Each State will indicate who is the responsible party
A comparative analysis between flight plan data processed in the NEW format and the same data treated in the EXISTING format.	2010	2011	Each State will indicate who is the responsible party

States must also agree on a joint definition of any items that are not clearly specified in the amendment before making adjustments to their systems.

7.3. Transition

The action taken in this transition phase must:

- Follow GREPECAS guidance;
- Follow the ICAO directives described in paragraph 6.2;
- Act together with the implementation coordinator;
- Carry out the activities foreseen in the action plan to mitigate technical and operational impact;
- Recognise that airspace users will only obtain benefits if the changes are implemented jointly.

In the SAM Region, the transition period during which the ANSPs must be capable of processing both flight plan formats--EXISTING and NEW--starts on 18 July 2011 and ends on 15 November 2012.

However, States are urged to complete the implementation of the NEW format between 18 July 2011 and 20 July 2012, and not to use this NEW format before the transition period.

Therefore, States must maintain coordination with respect to the evolution of action plans, and report any changes in dates, deadlines, etc.

Likewise, airspace users must take steps to adjust their systems in a precise and correct manner, in accordance to the NEW and EXISTING flight plan formats.

Implementation coordination meetings will be held periodically in order to assess the plans, ending with the meeting to be held on 15 June 2011 to decide on the start-up of the transition.

Each State shall designate a contact person to coordinate with ICAO and other States during the transition to the new flight plan format.

7.4. Post-transition

States must discontinue the processing of the EXISTING flight plan format on 15 November 2012.

They must also ensure that ATM systems, whether or not automated, process all the information contained in the NEW flight plan format correctly, and provide support for their operation.

Any difficulties observed must be assessed and resolved by the parties involved, ANSPs and/or airspace users.

8. Administrative aspects

States must assess all the documents involved, including Letters of Operational Agreement, Contingency Plans, and Operational Models.

For all purposes, this document establishes the following process:

1. Periodic meetings and discussions to identify requirements and preferred technical solution(s), alternatives, and options for the implementation of the new flight plan format;
2. The exchange of reports, technical documentation, plans and programming required for ensuring a successful and timely implementation.
3. Planning, technical coordination and implementation of activities by the States, under the coordination of the ICAO Lima Office.

9. Financial aspects

The participating States, as individual administrations, will be responsible for any financial obligation to cover direct and indirect expenditures related to the implementation of this strategy, including those related to the acquisition of the equipment, spare parts, training of technical and operational personnel, lines of communication, and others.

Expenditures related to a possible updating of the REDDIG to support any traffic increase will be equally distributed among the States involved.

States may establish mechanisms for the implementation of this strategy; for instance, through ICAO technical Cooperation projects, under the coordination of the ICAO SAM Office.