Twenty Second Meeting of the
Informal South Pacific ATS Co-ordinating Group (ISPACG/22)

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Agenda Item 4 - Review Open Action Items
AI 21-2

Report on the FAA's Development For ADS-C In-Trail Procedures

Presented by the Federal Aviation Administration

SUMMARY

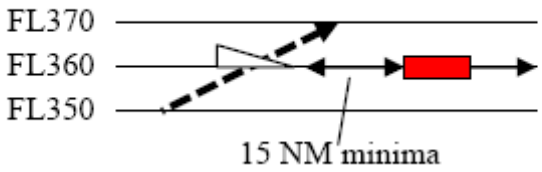
Automatic Dependent Surveillance – Contract, (ADS-C), In-Trail Procedures (ITP)are currently being studied for use in climbs and descents. This paper presents an update on the FAA progress regarding this initiative including the business case and plans for collision risk analysis.

1 Introduction

1.1 The FAA is continuing the background work associated with the development of an in-trail climb through and descent through procedure (ITP) using Automatic Dependent Surveillance – Contract (ADS-C) capabilities. In 2007, the FAA concluded a business case analysis for development of this procedure.

1.2 The proposed procedure for Automatic Dependent Surveillance – Contract (ADS-C) ITP takes advantage of existing equipage in Future Air Navigation System (FANS)-ADS equipped aircraft to provide reduced longitudinal separation between aircraft pairs when one aircraft is in level flight, and the second is climbing or descending through the altitude of the first, to a vertically separated level (Figure 1).

Figure 1. In-Trail Climb Example



1.3 This procedure is based on in-trail Distance Measuring Equipment (DME) rules in ICAO Doc. 4444, paragraph 5.4.2.3.2. Aircraft pair distance verification is performed by ground flight tracking systems, such as the FAA's Ocean21 system, using near simultaneous ADS-C demand contract reports. As with the existing DME procedure, responsibility for separation assurance remains with air traffic control.

1.4 In August 2007, the FAA completed the business case development for ADS-C ITP in the Oakland and New York Flight Information Regions (FIRs). In 2008, the FAA will conduct a collision risk analysis and develop documentation for a supporting safety case for ADS-C ITP, in anticipation of possible operational trials in 2009.

2. Discussions

2.1 The ADS-C ITP business case includes the following elements:

- Cost estimate - Plan developed for high-level estimate.
- Concept Review – Outline of procedural and automation elements.
- Benefit Estimate – Calculation of benefits in the Oakland FIR (ZOA) and the New York FIR (ZNY) based on current, projected and 100% FANS equipage rates.

2.2 ADS-C Cost Estimating Process

2.2.1 Rough Order of Magnitude (ROM) cost estimate

2.2.2 Cost estimate categories:

- Business case
- Safety case per Safety Management System (ICAO, FAA approval)
- Automation changes (minimal to full capabilities)
- Procedure development (and documentation)
- Service provider (controller) training
- User (airline) training

2.3 Approach

- Cost/benefit studies from comparable FAA programs.
- Engineering judgment for ADS-C ITP resources (staff level).

2.4 Benefit Metrics Categories

2.4.1 Geographic domain

- ADS-C ITP event within ZOA and ZNY.

- From ZOA and ZNY FIR boundary to 200 NM from arrival airport.

2.4.2 Percentage of aircraft equipped with FANS1/A

- 2006 FANS 1/A aircraft (approx. 30 to 35 percent in ZOA, approx. 15 percent in ZNY).
- Calculate benefits based on near 100 percent FANS 1/A aircraft.

2.4.3 Required standard separation distances (for FANS1/A aircraft)

- In ZOA, 50 NM longitudinal (RNP10) and 30 NM longitudinal (RNP4).
- In ZNY, 80 NM longitudinal, 50 NM longitudinal (RNP10) and 30 NM longitudinal (RNP4).
- If standard separation is conflict-free, ADS-C ITP does not apply, and no benefits are assumed.

2.5 ***Benefits Summary***

2.5.1 Based on ***Oakland Center*** traffic, with a 35% FANS equipage rate, the analysis projected total combined fuel savings up to 20,000 pounds per day in the Oakland Pacific FIR.

2.5.2 A FANS equipage rate nearing 100% increased the potential benefits to nearly 40,000 pounds per day in the Oakland Pacific FIR.

2.5.3 Based on ***New York Center*** traffic, with a 15 % FANS equipage rate, the analysis found the fuel savings to be negligible. (Note: the ZNY benefits analysis did not include significant traffic in the North Atlantic Oceanic Track System (NAT-OTS). Benefits on the NAT-OTS are projected to be substantially higher based on aircraft density within a single direction track network).

2.5.4 A FANS equipage rate nearing 100% increased the potential benefits to 2900 pounds per day in the New York FIR.

2.5.5 Although not calculated in the study, benefits are potentially much higher when factors like contingency fuel and 2nd aircraft climb opportunities to vacated altitudes are considered.

2.6 ***Business Case Recommendation and Next Steps***

2.6.1 The FAA has determined that there is a conclusive business case for the continued development of an ADS-C based ITP in the Oakland FIR. Although not a principal focus of the study, the business case results indicate that the calculated ADS-C ITP benefits extend into adjacent Pacific FIRs.

2.6.2 In Fiscal Year 2008, the FAA will continue development of an ADS-C ITP standard, with the conduct of collision risk analysis and safety case development.

2.7 ***Collision Risk Analysis and Safety Case***

2.7.1 In 2008, the FAA's ADS-C ITP development will focus on the collision risk analysis necessary to identify potential hazards associated with the implementation of reduced longitudinal separation minima (e.g. 10-15 nm) with aircraft at intermediate flight levels to determine collision risk model parameter values.

2.7.2 This analysis will consider and include elements such as:

- Collection of performance data
- Identification of performance criteria
- Definition of simultaneous demand reports
- Determination of guidelines for maximum converging speed
- Identification of the maximum time from granting clearance to aircraft after re-establishing separation

2.7.3 The results of the 2008 collision risk analysis will be compiled into a safety assessment and supporting documentation for consideration of Pacific operational trials in 2009.

3. Action by the meeting

3.1 The meeting is invited to note the information provided in this paper, and consider participation with the FAA in the development of the ADS-C ITP.