Twenty Third Meeting of the
Informal South Pacific ATS Co-ordinating Group (ISPACG/23)

Santiago, Chile, 26-27 March 2009

Agenda Item 4: Review Open Action Items

STATUS OF THE DEVELOPMENT AND IMPLEMENTATION ADS-C
IN-TRAIL PROCEDURES

(Presented by Federal Aviation Administration)

SUMMARY

This paper presents an update on the progress of Automatic Dependent Surveillance–Contract, (ADS-C), In-Trail Procedures (ITP) being studied for use in climbs and descents.

1. **BACKGROUND**

1.1   The U.S. Federal Aviation Administration (FAA) is continuing the work associated with the development of an in-trail climb through and descent through procedure using ADS-C capabilities.

1.2   ADS-C analysis has determined that this oceanic in-trail procedure supports the FAA's goals for fuel efficiency, emission reductions and air traffic capacity.

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.

2. **DISCUSSION**

2.1   In fiscal year (FY) 2008, ADS-C ITP activities focused on procedure refinement and analysis in preparation for operational trials to prove the ADS-C ITP concept. Business case development, collision risk modeling, hazards analysis and procedure development have all been completed with regard to the ADS-C ITP.

2.2   The objective of ADS-C ITP activities in FY 2009 will be to begin conducting operational trials over Pacific airspace. These activities will include the finalizing of procedures developed in FY 2008, the development of necessary safety case documents and obtaining ICAO endorsement.

2.3   Pending FAA approval and ICAO endorsement, a demonstration plan and procedure will be developed. The operational trial will be a manual execution of the procedure using Ocean21 displays but without changes to the Ocean21 software. During the operational trial, Safety Management System monitoring will be performed and benefits metrics will be collected. Although not determined, it is expected that the operational trial will be limited to specific sectors such as Oakland Sectors 1 and 2.

2.4   The proposed requirements for an operational trial of ADS-C ITP are listed in the Appendix to this paper.

3.   **ACTION BY THE MEETING**

3.1   The meeting is requested to note the information in this paper.

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APPENDIX

Proposed rrequirements for an operational trial of ADS-C ITP are as follows:

- The maneuvering aircraft is flying level prior to executing ADS-C ITP
- The maneuvering aircraft is approved for Reduced Vertical Separation Minimum (RVSM)
- The maneuvering aircraft has active FANS-1/A ADS-C and Controller-Pilot Data Link Communication (CPDLC) connections
- The blocking aircraft is flying level
- The blocking aircraft is approved for RVSM
- The blocking aircraft has active ADS-C and CPDLC connections
- The blocking aircraft has an assigned altitude that is 1,000 feet above or below maneuvering aircraft assigned flight level
- Blocking and maneuvering aircraft are on same track, same direction
- Blocking and maneuvering aircraft are eligible for distance-based separation
- Neither the maneuvering nor blocking aircraft are on a deviation from course or are requesting a deviation from course
- Neither the maneuvering nor blocking aircraft are out of conformance
- The maneuvering aircraft will execute an altitude change of 2000 feet
- For a manual operational trial, maneuvering and blocking aircraft must be qualified for RNP-4

For a manual operational trial, the following separation criteria shall be used:

- The controller must set RNP-4 distance-based separation flags for the maneuvering and blocking aircraft.
- ADS-C ITP can be used if the Conflict Probe results for the requested altitude change show a conflict, and either of the following two distance and speed checks is passed.

  - When the maneuvering aircraft is probed for an altitude change, the blocking and maneuvering aircraft display an ACTUAL conflict (NOW indicated in red, to the right of "LOS" in the Conflict Report Window), and all of the following checks are satisfied:
    - The longitudinal separation distance at the conflict start time is greater than or equal to parameter (16) nm
    - The leading aircraft groundspeed is greater than or equal to the trailing aircraft groundspeed, based on the displayed groundspeeds after ADS DEMAND reports are received

- The leading aircraft reported Mach number is greater than or equal to the trailing aircraft reported Mach number

- When the maneuvering aircraft is probed for an altitude change, the blocking and maneuvering aircraft have an ACTUAL or IMMINENT conflict (Red box will be displayed to the right of "LOS" in the Conflict Report Window), and all of the following checks are satisfied:
  - The longitudinal separation distance at the conflict start time is greater than or equal to parameter (26) NM
  - The trailing aircraft groundspeed is greater than the leading aircraft groundspeed by at most parameter (10) knots, based on the displayed groundspeeds after ADS DEMAND reports are received
  - The trailing aircraft reported Mach number is greater than the leading aircraft reported Mach number by at most parameter (.02)

- The uplink clearance shall be a CPDLC message (Appendix A of *ATOP Ops Manual* [5]–UL Messages 26 and 28)
  - CLIMB TO REACH (*alt*) by (*time*)
  - DESCEND TO REACH (alt) by (*time*)
    - *(time) i*s a parameter (15) number of minutes after the uplink time of the ADS Demand message for the maneuvering aircraft