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

Papeete, Tahiti, 12-14 March 2008

Agenda Item 4: Review Open Action Items
AI 17-12

Optimum Arrival Trial Auckland NZ April-June 2007

Presented by Airways NZ

SUMMARY

From April through June 2007, Airways NZ together with Air New Zealand and Qantas Airways carried out Optimum Arrival Trials (OAT) with B744 and B777 aircraft flying Constant Descent Approach (CDA) procedures into Auckland International Airport.

1. INTRODUCTION

1.1 From April through June 2007, Airways NZ together with Air New Zealand and Qantas Airways carried out Optimum Arrival Trials (OAT) with B744 and B777 aircraft flying Constant Descent Approach (CDA) procedures into Auckland International Airport.

The objective of a CDA is to reduce aircraft fuel burn, emissions and noise by means of a continuous descent, so as to intercept the approach glide path at an appropriate height for the distance to touchdown.

A CDA is an aircraft operating technique in which an arriving aircraft descends from an optimal position with minimum thrust and avoids level flight to the extent permitted by the safe operation of the aircraft and compliance with published procedures and ATC instructions.

CDA can be optimised within energy, speed and safety constraints by avoiding, as far as possible, unnecessary flap, air brake and engine thrust and avoiding early lowering of landing gear. Aircraft energy and speed management is therefore a critical factor in successful CDA implementation.

Optimum Arrival (OA) was a generic name derived for these procedures to differentiate them from other similar trials, namely the Boeing Tailored Arrival procedure which has been under trial for some years in Australia, the United States and Europe.

1.2 The objectives of the Optimum Approach Trial OAT were:

1. Determine what fuel and emission savings could be achieved by allowing aircraft to fly their best energy profile from top of descent to the runway, and

2. Determine aircraft ability to meet an allocated Required Time of Arrival, (RTA) at defined points during the arrival segment, and Optimum Arrival Trials for participating B747 and B777 flights arriving at Auckland International Airport-April, May and June 2007

3. Assess the impact on other traffic and the sustainability of having Optimum Arrival profiles being flown at Auckland on a full time basis by some arriving aircraft, and 4. Identify any requirements for Auckland Air Traffic Management to allow Optimum Approach (OA) procedures to be flown on a full time basis should these trials prove successful.

2. DISCUSSION

2.1 Methodology

The Optimum Approach Trial (OAT) was carried out in three phases:

Phase 1:
Establish base line fuel burn data for existing ‘normal’ arrival procedures and descent profiles.

Phase 2:
Establish fuel burn data when aircraft were allowed to fly Constant Descent Approach (CDA) profiles without ATC interference.

Phase 3:
Establish fuel burn data when aircraft flew a Constant Descent Approach (CDA) profile whilst meeting an allocated Required Time of Arrival (RTA) at the Final Approach Fix (FAF) near the airport, the RTA being the estimated time of arrival (ETA) at the FAF, obtained from the aircrafts Flight Management System (FMS).

2.2 Results

- Air New Zealand reported savings of 100 kg per flight, in phase 2, while fuel burn increased markedly, for phase 3 flights, where the required time of arrival over the final approach fix (FAF) was mandatory.

- Qantas Airways reported savings of as much as 250 kg of fuel per arrival, which equates to $182,000 per annum, or 575 tonnes of CO2.

- Airways NZ reported that an analysis of the "qualitative" issues of traffic management separately, in the months of May (phase 2) and June (phase 3) indicated there may have been a "settling in" period, during which the controllers became familiar with the operating changes necessary to allow the trial aircraft uninterrupted descent and approach.

  Certainly the incidence of controllers reporting traffic and workload effect declined by almost 50 % in June, with occasions other traffic affected declining to 25% of OAT flights, and occasions ATC workload increased significantly reducing to 7% of OAT flights.

- Both Air New Zealand and Airways NZ reported the phenomenon of a marked decline in accuracy of flight management computer (FMC) derived time estimates (RTAs) over the final approach fix (FAF). Air NZ comments that "The RTA function is not consistent enough to be reliable in strong winds: it may be better to use flight plan times."

  Airways NZ noted that estimates for the Star Start Point were matched by the actual performance inside a three minute envelope in 88% of flights, while estimates for the RTA were similarly matched for only 56 % of flights.

2.3 The Immediate Next Step

With the establishment of the new "Collaborative Arrival Manager" (CAM) airline ops, internet accessible, arrivals scheduling program on 27th September this year, for Wellington arrivals, there exists the opportunity to assess the accuracy of international flight planned arrival times as well as the accuracy of Airways Skyline profiled arrival times.

As the arriving flight's flight management computer (FMC) derived ETAs for the Auckland final approach fix (FAF) have been proven to lack significant accuracy, it is necessary to find another and more accurate time reference point so that domestic traffic can be sequenced around the international arrivals carrying out fuel efficient Constant Descent Approaches.

Airways NZ will record and analyse estimated times of arrival and the subsequent actual times of arrival for both airline flight plan predictions and CAM predictions for international arrivals at Wellington International Airport over the three months of October, November and December 2007.

Airways NZ will also gather and analyse ETA and ATA data for international arrivals occurring in approximately the same time zone, on a daily basis, to see if there are consistent inaccuracies in ETAs which might facilitate the application of a "corrective factor".

A report of the accuracy of Collaborative Arrival Manager time estimates, for international arrivals, will be available by the end of January 2008.

3. ACTION BY THE MEETING

3.1 The meeting is invited to:

a) Note the information contained in this paper
b) Comment on any aspects of the paper that may be of further interest to this meeting.