Twenty Ninth Meeting of the
Informal South Pacific ATS Co-ordinating Group
(ISPACG/29)

Santiago, Chile
4-6 March 2015

Agenda Item [6.1**]**

[Boeing 787 Ice Crystal Icing Avoidance]

Presented by [IATA-United Airlines]

SUMMARY

The Boeing 787 aircraft with GEnx-1B engines are susceptible to High Altitude Ice Crystals (HAIC). In order to present loss of thrust the FAA had issued an Emergency AD in November 2013 with several restrictions. These restrictions included the possible descent from normal cruising altitude to below FL300, or a lateral deviation to avoid possible significant weather by at least 50nm. These restrictions could have a significant effect on the United Airlines Boeing 787 operations between Los Angeles and Melbourne Australia, in addition to adding some complexity to the air traffic management within the FIRs that the 787 was flying. Recently, (February 2015), the FAA granted some relief from these restrictions based on some software changes to the Electronic Engine Control of 787s.

1. INTRODUCTION

1.1 United Airlines inaugurated Boeing 787 service between Los Angeles and Melbourne Australia in October of 2014. The Boeing 787 with GEnx-1B engines are deemed susceptible to High Altitude Ice Crystal Icing. The ANSPs within the operational routing of these flights were made aware of the potential need to support significant changes in flight levels and possible extensive lateral weather deviations during the course of the flight.

2. DISCUSSION

2.1 The FAA had issued an Emergency AD in November 2013 advising operators of the Boeing 787 with GEnx-1B engines of special restrictions to avoid High Altitude Ice Crystal Icing.

2.2 For operations **at or above 30,000 feet** pressure altitude, when approaching, or in IMC, or visible moisture, the flight crew must comply with the following Avoidance of ICI procedures:

1. Operate the weather radar in Auto Tilt (Radar Automatic mode) and zero gain adjustment

2. If the Auto Tilt (Radar Automatic mode) is inoperative, adjust the gain to maximum (+ 3) and adjust manual tilt to within -1 and -3 degrees.

If areas of green, amber or red weather radar returns are observed along the flight path:

1. Use manual weather radar tilt control mode

2. Vary the tilt between -3 and -5 degrees

3. Select zero manual gain adjustment to determine if amber or red weather returns are present below the airplane's flight path

4. ***Flight is <u>prohibited</u> within 50 NM of amber or red radar weather returns that are displayed below the airplane's flight path***

2.3 United Airlines did not require any descents to avoid HAIC from normal cruising levels to below FL300 since beginning these operations, (KLAX-YMML sectors). Pilots have requested and executed several lateral weather deviations to avoid significant weather. We also planned additional fuel to support an unplanned descent to below FL300.

2.4 Recently (beginning of February) Boeing Service Bulletin B787-81205-SB730026-00, Issue 002, gives instructions to install new EEC Software Version B178 on GEnx-1B engines.

2.5 New Electronic Engine Control (EEC) software logic has been installed on the 787 fleet. This software logic detects and accommodates operation in Ice Crystal Icing (ICI) conditions from FL300 to FL375 (inclusive). When EEC ICI Variable Bleed Valve (VBV) logic is activated, the VBV doors open and then pulse to avoid ICI accretion.

2.6 With this updated software logic, a table was provided that will allow operations in IMC between FL300 and FL 375, dependent on aircraft gross weight and speed. Note on the following table, when operating at lighter weights, a higher Mach/thrust must be maintained to ensure sufficient airflow and energy is maintained within the engine for VBV logic activation.

2.7 Dispatch will continue to plan to avoid large areas of ICI risk (convective systems greater than 60 NM wide) by 50 NM laterally and/or include discretionary EXTRA fuel for possible tactical deviations based on High Ice Water Content (HIWC) forecasts depicted on the iPad WSI weather application. Generally, a 50 NM deviation around hazardous weather requires an additional 5 minutes of fuel burn.

3. ACTION BY THE MEETING

3.1 The meeting is invited to:

a) Note the information provided is to provided controller awareness to possible weather deviation actions by United Boeing 787 aircraft
b) No specific actions are required by ANSPs
c) United Airlines Boeing 787 Pilot Bulletin is attached