



**THE FORTY-THIRD MEETING OF THE
INFORMAL PACIFIC ATC CO-ORDINATING GROUP
(IPACG/43)**

(Tokyo, Japan 27 – 28 September 2017)

Agenda Item 6: ATM Issues

VARIATIONS IN AIRSPEED IN CONTROLLED AIRSPACE

Presented by Federal Aviation Administration

SUMMARY

This paper provides an update on implementation of operator procedures for unannounced speed changes within the Pacific Oceanic Flight Information Regions.

1. Introduction

1.1. Aircraft speed changes that are not requested or announced to ATC can place an unacceptable risk on separation minima. FANS 1/A equipped aircraft may be separated by as little as 30nm longitudinally. When aircraft make a speed change and don't advise ATC, longitudinal separation can erode quickly. Data shows that aircraft are frequently making Mach speed changes of Mach .04 or greater and not advising ATC.

1.2. In order to manage speed changes in the North Atlantic, all turbojet aircraft in the NAT are assigned a fixed Mach speed in the oceanic clearance that is issued to aircraft before entry into the NAT area. This practice is governed by the following provision in the NAT section of the Regional Supplementary Procedures (SUPPs, Doc 7030):

6.1.1.7 The ATC-approved true Mach number shall be included in each clearance given to subsonic turbo-jet aircraft operating within Bodo Oceanic, Gander Oceanic, New York Oceanic, Reykjavik, Santa Maria Oceanic and Shanwick Oceanic control areas.

1.2.2 ICAO Annex 2 Rules of the Air states the following in Chapter 3:

3.6.2.2 *Deviations from the current flight plan.* In the event that a controlled flight deviates from its current flight plan, the following action shall be taken:

- a) *Deviation from track:* if the aircraft is off track, action shall be taken forthwith to adjust the heading of the aircraft to regain track as soon as practicable.
- b) *Deviation from ATC assigned Mach number/indicated airspeed:* the appropriate air traffic services unit shall be informed immediately.
- c) ***Deviation from Mach number/true airspeed: if the sustained Mach number/true airspeed at cruising level varies by plus or minus Mach 0.02 or more, or plus or minus 19 km/h (10 kt) true airspeed or more from the current flight plan, the appropriate air traffic services unit shall be so informed.***
- d) *Change in time estimate:* except where ADS-C is activated and serviceable in airspace where ADS-C services are provided, if the time estimate for the next applicable reporting point, flight information region boundary or destination aerodrome, whichever comes first, changes in excess of 2 minutes from that previously notified to air traffic services, or such other period of time as is prescribed by the appropriate ATS authority or on the basis of

regional air navigation agreements, the flight crew shall notify the appropriate air traffic services unit as soon as possible.

1.3. Iceland presented a paper at the NAT ATMG meeting on the Speed Distribution of Aircraft that have an Assigned Mach Speed.

1.3.1. The paper analysed the speed information in ADS-C periodic reports and compared them to aircraft assigned fixed Mach Speeds. The paper indicated “Aircraft manufacturers have stated that the reported Mach speed in ADS-C reports is instantaneous speed and not the target speed of the aircraft. It has been stated that because the reported Mach speed is instantaneous it could not be relied on for separation and fix-time calculations since it will show fluctuations from the target speed and may show significant fluctuations in some cases such as when the aircraft encounters turbulence (target speed = the speed that the aircraft is striving to maintain).”

1.3.2. The data set in the Iceland paper was from 12,234 flights and 92,284 periodic ADS-C reports. The data showed that 95% of the ADS-C reports were within plus or minus .01 Mach from the ATC cleared static Mach Speed. Additionally, 99.99% of the ADS-C reports were within plus or minus .02 Mach from the ATC cleared static Mach Speed.

1.3.3. The data from the Iceland Paper shows that Mach Speed assignments can be very effective in managing aircraft speeds. It also shows that 95% of ADS-C reports fall within .01 Mach of their cleared Mach Speed assignment which means that Mach speed fluctuation in ADS-C reports falls within .01 Mach most of the time.

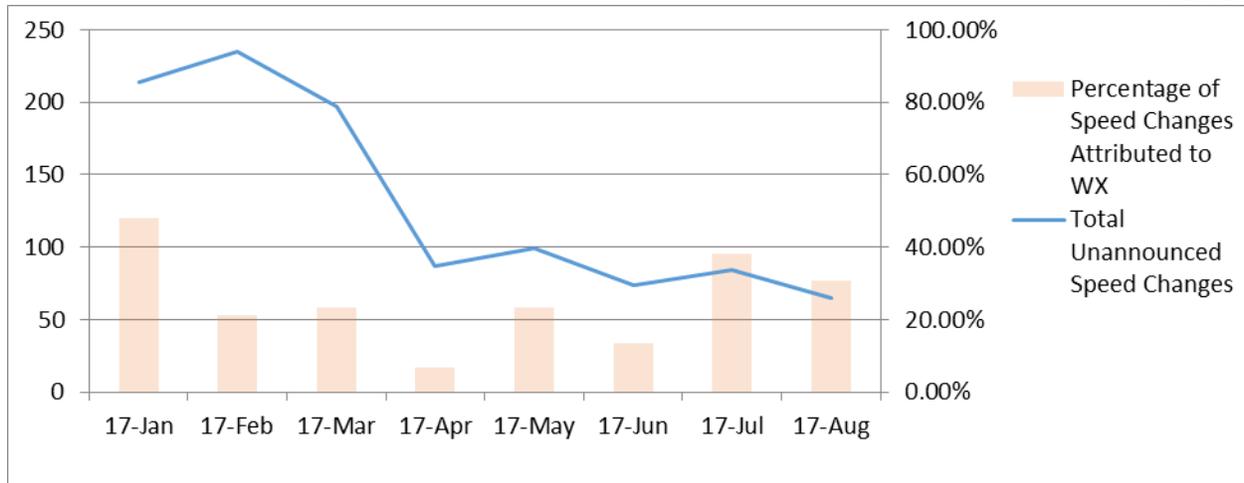
1.4. While fixed Mach Speed assignments can be effective in managing aircraft speeds, they are not as efficient because they cause extra fuel burn. Most aircraft in the Pacific utilize Cost Index or Econ mode to manage their speed. Cost index or Econ modes leads to a very gradual slowing of the aircraft speed as the weight of the aircraft is reduced. These gradual speed changes do not place a risk to safety. It is the abrupt large speed changes that occur when and aircraft encounters turbulence, slows to meet a curfew or other pilot commanded large speed change events that pose a risk to safety.

1.5.

2 Discussion

To quantify the number of unannounced speed changes from the filed flight plan Oakland ARTCC analyzed ADS-C position reports the first 10 days of every month for every flight in our FIR. In the data flights that were not at cruise flight levels were eliminated. The ADS-C reports were filtered to show only aircraft where the Mach Speed in the ADS-C reports changed by M.04 or more between two subsequent ADS-C reports.

2.1 The data presented below represents ADS-C reports that had speed changes of +-M.04 between subsequent ADS-C reports. The first 10 days of each month were analysed January 2017 through August 2017.



2.2 The graph above also depicts the number of un-announced speed changes that are associated with weather. Analyzing the data has shown a correlation to aircrews asking for deviations or altitude changes due to weather but aircrews are not informing ATC of the speed changes that often go along with weather phenomenon. For example, in August 2017, of the 65 un-announced speed changes, it is believed that roughly 30% were related to weather.

2.3 To continue to support the effort of cost index flight planning or econ speeds and managing un-announced speed changes in the Oakland FIR, we will continue to educate users to the effects and leave in place the following KZAK NOTAM.

- **A1445/15 - ATTN ALL AIRCREWS-NEW PROCEDURAL REQUIREMENT FOR FLIGHTS OPERATING IN OAKLAND OCEANIC CONTROL AREA (KZAK). IN ORDER TO SUPPORT COST INDEX OR ECON SPEEDS AND MAINTAIN ATC SEPARATION SPACING AIRCREWS ARE REQUIRED TO USE THE FOLLOWING PROCEDURES IN THE KZAK FIR. A PILOT MUST INFORM ATC VIA VOICE OR CPDLC EACH TIME THE CRUISING MACH NUMBER VARIES OR IS EXPECTED TO VARY BY A VALUE EQUAL TO OR GREATER THAN 0.02 MACH FROM:**
 - **(1) THE MACH NUMBER AT FIR ENTRY; OR**
 - **(2) ANY SUBSEQUENT SPEED CHANGE NOTIFIED TO ATC IN FLIGHT**
 - **IF YOU HAVE ANY QUESTIONS CONTACT DUSTIN BYERLY (510)745-3543**

2.4 The data shows that there has been a reduction in the number of un-cleared/announced speed changes since beginning the trial, but the numbers are still high. The FAA will continue to work with the operators to reduce the number of un-cleared speed changes and gain more compliance with the procedure.

3. Conclusion

3.1 The meeting is invited to note the information provided and work together with the users and other ANSPs to eliminate unannounced speed changes.