Safety Information Bulletin

Operations

SIB No.: 2015-17R1

Issued: 16 October 2015

Subject: **Unreliable Airspeed Indication at High Altitude/ Manual Handling at High Altitude**

Ref. Publications:
Commission Regulation (EU) No 1178/2011 of 3 November 2011.
Commission Regulation (EU) No 965/2012 of 5 October 2012.
Commission Regulation (EU) No 748/2012 of 3 August 2012.
Relevant aircraft type Operational Suitability Data – Flight Crew.
EASA SIB 2013-05: Manual Flight Training and Operations.
EASA SIB 2015-07: Prevention of Hazardous Low Speed at High Altitude Cruise.
EASA SIB 2015-13: Safety Management of Flight Operations in Adverse Convective Weather and the Inter-Tropical Convergence Zone.

Applicability:
NAAs, operators and ATOs of aeroplanes with max cruising altitude above FL300, pilots.

Description:
Loss of, or unreliable airspeed indications can result from a variety of factors. Certification requirements for airspeed indication systems impose a high level of redundancy and resilience to failure conditions, making a total loss of airspeed indication a rare event. There have been however a few events worldwide in recent years, typically caused by pitot blockage due to high altitude (glaciated and mixed phase) icing conditions. These have involved aeroplanes flying at high altitude in adverse convective weather. Pilots should be aware that strategic (planning) and tactical (in-flight) weather avoidance is the best practice to prevent these events (ref. EASA SIB 2015-13).

The autopilot (AP) and autothrottle/autothrust (ATHR) often disconnect as a consequence of this type of failure. In some cases, inappropriate pilot input on the flight controls has resulted in a temporary or permanent loss of control of the flight path, particularly when operating near maximum operating altitude of the aircraft.

Fly-by-wire (FBW) aircraft are susceptible to additional effects in these situations caused by the reversion of the flight control system to laws/modes that provide reduced or no flight envelope protection.

It is therefore necessary that pilots have an adequate understanding of the interactions between the air data systems, the autopilot, flight director (FD), autothrust/autothrottle, primary flight control and flight deck indication systems, in order to maintain a safe aircraft state at all times.

Also, to deal appropriately with such failures, pilots need to be familiar with the handling characteristics of their aeroplane at high altitude in both normal and non-normal flight control laws/modes.

Failure of the pilots to recognise and respond to an unreliable airspeed indication correctly can result in loss of control, in case of inappropriate crew reaction.

It should be understood by pilots that in case of sudden loss of airspeed indications, including a complete loss of airspeed indications, normally only minor (or even no) inputs to the flight controls are required under most circumstances to keep the aircraft within a safe flight envelope, making sure that the thrust/power setting are appropriate for the flight phase.

Therefore, maintaining the appropriate pitch attitude and thrust setting, until basic or alternate indications are recovered through the appropriate procedure, is normally an adequate response. In deciding an appropriate pitch attitude and thrust, it is useful if pilots develop the habit of familiarising themselves with typical cruise pitch and thrust settings during their normal operations.

When appropriate, the “memory items” provided by the manufacturer in the relevant abnormal/emergency procedure must be applied without delay.

Pilots should also be aware that erratic and large pitch inputs, which could be triggered by the startle/surprise effect, can very rapidly bring the aircraft into an upset. It has been observed that occasionally, during events of this kind, stall indications (e.g. stall warning) have been triggered and pilots have not taken either correct or prompt recovery action. A prompt and accurate application of the stall recovery procedure, as provided by the aircraft manufacturer, at the first indication of an impending stall, is essential, taking into account that stall recovery at high altitude may result in a significant loss of altitude.

In some cases, conflicting warning indications, such as simultaneous overspeed warning from the failed airspeed system and legitimate stall warnings from the AOA system, may be experienced.

The purpose of this SIB, in conjunction with procedures and guidance provided by the aircraft manufacturer, is to:

- raise awareness of this specific risk to pilots, operators and NAAs, providing specific knowledge elements; and
- provide recommendations on the implementation of dedicated flight crew training to cope with the specific failure and its consequences, to be implemented in a short time frame.

This SIB revises and replaces SIB 2015-17, dated 29 September 2015, to improve its Description section.

Recommendation(s):
EASA strongly recommends that operators and training organisations of aeroplanes with max cruising altitude above FL300 provide pilots with briefing material, theoretical knowledge and practical training on the following elements, at the earliest possible opportunity and regularly thereafter, during their recurrent training (ORO.FC.130, ORO.FC.230).

EASA strongly recommends that the same elements are included, by ATOs, in initial type rating training for the same category of aeroplanes.

- Basic flight physics principles concerning flight at high altitude, with a particular emphasis on the relative proximity of the critical Mach number and the stall, pitch behaviour, and an understanding of the reduced stall angle of attack when compared with low altitude flight (see EASA SIB 2015-07).
- Interaction of the automation (AP, FD, ATHR) and the consequences of failures inducing disconnection of the automation.
- Consequences of an unreliable airspeed indication at high altitudes and the need for the flight crew to promptly identify the failure and react with appropriate (minimal) control inputs to keep the aircraft in a safe envelope.
- Degradation of FBW flight control laws/modes and its consequence on aircraft stability and flight envelope protections, including stall warnings.

- Practical training, using appropriate simulators, on manual handling at high altitude for all pilots in normal and in non-normal flight control laws/modes, with particular emphasis on pre-stall buffet, the reduced stall angle of attack when compared with low altitude flight and the effect of pitch inputs on the aircraft trajectory and energy state.
- The requirement to promptly and accurately apply the stall recovery procedure, as provided by the aircraft manufacturer, at the first indication of an impending stall.
- Procedures for taking over and transfer manual control of the aircraft, especially for FBW aeroplanes with independent side-sticks.
- Task sharing and crew coordination in high workload/stress conditions with appropriate call-out and acknowledgement to confirm changes to the aircraft flight control law/mode.

Training programmes should be developed using appropriate simulators and, as much as possible, a realistic scenario, presenting the flight crew with an unexpected failure. The objective should be to create a 'startle effect', to the greatest extent possible in a simulator environment.

Training contents should include, when available, the appropriate elements of the applicable OEB report or OSD flight crew developed in accordance with Regulation (EU) 748/2012 (Part-21), as amended by Regulation (EU) 69/2014.

Additional/alternate guidance provided by the aircraft manufacturer should be taken into account when developing training contents.

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