Civil Aviation Authority of Singapore

Safety Information Bulletin

CAAS SIB No. 2015-15

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Subject Management of unreliable airspeed indication at high altitude

Ref. Publications
EASA SIB No.: 2015-07
EASA SIB No.: 2015-13
EASA SIB No.: 2015-17R1

Applicability All Singapore Air Operator Certificate (AOC) Holders with flight operations at cruising altitude above 30,000ft

Description

CAAS draws AOC holders' attention to the possible failure of airspeed indication during flight operations at altitude above 30,000ft.

Aviation events in recent years have seen reported incidents of erroneous airspeed indications. The loss of, or unreliability of, airspeed indication can result from a variety of factors. Typically, these are caused by pitot blockage due to icing when flying at high altitudes in adverse convective weather.

EASA issued SIB 2015-13 on 29 July 2015 on Safety Management of Flight Operations in adverse convective weather and inter-Tropical Convergence Zone (ITCZ). It provided a brief description of the occurrence, associated hazards and the need for effective safety management adapted to the specific risks related to flight operations in the ITCZ. In this regard, SIB 2015-13 suggests that strategic (planning) and tactical (in-flight) weather avoidance are best practices to prevent such events.

In addition to SIB 2015-13, SIB 2015-17R1 explains further that autopilot (AP) and autothrottle/autothrust (ATHR) often disconnect as a consequence of this airspeed failure. Inappropriate pilot input on the flight controls, in some cases, has resulted in 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.

EASA SIB 2015-17R1 in conjunction with the procedures and guidance provided by the aircraft manufacturer, was issued to:

a) raise awareness of this specific risk to pilots and operators providing specific knowledge elements; and

b) provide recommendations on the implementation of dedicated flight crew training to cope with the specific failure and its consequences.

Recommendation(s) CAAS strongly recommends that operators and training organisations of aeroplanes with max cruising altitude above FL300 (30, 000ft) 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.

CAAS also strongly recommends that the same elements are included in initial type rating training for the same category of aeroplanes.

a) 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).

b) Interaction of the automation (AP, FD, ATHR) and the consequences of failures inducing disconnection of the automation.

c) 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.

d) Degradation of FBW flight control laws/modes and its consequence on aircraft stability and flight envelope protections, including stall warnings.

e) 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.

f) 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.

g) Procedures for taking over and transfer manual control of the aircraft, especially for FBW aeroplanes with independent side-sticks.

h) 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.

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

Contact(s)

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