Civil Aviation Authority

SAFETY NOTICE

Number: SN–2019/005

Avoidance of Loss of Control In-Flight – Flight Crew Training

Pilot awareness of aircraft trim state, intervention strategies and techniques, during both automated and manual flight

This Safety Notice contains recommendations regarding operational safety.

Recipients must ensure that this Notice is copied to all members of their staff who need to take appropriate action or who may have an interest in the information (including any ‘in-house’ or contracted maintenance organisations and relevant outside contractors).

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<th>Applicability:</th>
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<tr>
<td>Aerodromes:</td>
<td>Not primarily affected</td>
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<td>Air Traffic:</td>
<td>No primarily affected</td>
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<td>Airspace:</td>
<td>Not primarily affected</td>
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<td>Airworthiness:</td>
<td>Not primarily affected</td>
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<tr>
<td>Flight Operations:</td>
<td>All Pilots, training departments and operational management</td>
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<td>Licensed/Unlicensed Personnel:</td>
<td>All ATOs</td>
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1   Introduction

1.1 Loss of Control In-Flight is a significant safety concern and major contributor to worldwide aircraft accidents.

1.2 Over the last five years, there have been number of large commercial air transport aircraft accidents and incidents which were attributed to lack of awareness of the aircraft’s trim condition. Factors which contributed to loss of control in-flight were inappropriate trim inputs or mishandled automatic trim malfunctions, especially during a high energy state or at low altitude, which resulted in excessive elevator or stabiliser load forces.

1.3 The purpose of this Safety Notice is to draw attention to the causes of loss of control in-flight and poor aircraft energy management; and promote the avoidance of undesirable aircraft trim conditions. This is with particular reference to aircraft equipped with conventional trimming systems (i.e. non-fly-by-wire) and aircraft which use manual trim back-up systems in the event of an electronic trim system malfunction.

2   Recommended action to be taken

2.1 Utilising their Safety Management System (SMS), training organisations, operators and flight crew training departments should identify potential gaps in manual flying skills and intervention
methods amongst crews. Particular consideration should be given to type-specific control issues and flight-control downgrade scenarios where manual intervention may not have been comprehensively practised. The effects of startle factor and the crew’s ability to manually control the aircraft in an undesired state when the malfunction/s cannot be accurately diagnosed should be thoroughly evaluated and assessed with training interventions, when required.

2.2 Training organisations and flight crew training departments should comprehensively review training syllabuses with a view to identifying skills and knowledge deficiencies related to the operation of aircraft trim systems, related aircraft systems and associated malfunctions. Training should focus on a flight crew’s ability to prevent an undesirable aircraft state by identifying and recovering from any out-of-trim state, particularly during high workload and dynamic situations in all phases of flight. This should include pilot awareness of aircraft trim condition, intervention strategies and techniques when the automated system is not performing correctly and the effect of startle.

2.3 Examples of flight crew training syllabus items which may assist in the avoidance of aircraft loss of control are given in the following list. These items support the enhancement of fundamental manual flying skills and awareness of aircraft trim changes, along with associated human factors considerations and automation intervention strategies.

Manual Flight with and without Flight Directors including manual and automatic trimming scenarios, where applicable:

- No autopilot, no auto thrust/auto throttle and at different control laws, where applicable, and at different speeds (including slow flight) and altitudes
- Steep turns using 45 degrees bank, 180 degrees to 360 degrees left and right
- Turns with and without spoilers
- Procedural instrument flying and manoeuvring including instrument departures and arrivals and visual approaches
- Prevention of and recovery from stall events
- Thrust and pitch mode awareness in automatic, partial automatic and manual flight including pilot monitoring and crew coordination
- Automatic trim malfunctions, associated crew actions and implications of manual intervention and lack of awareness of the aircraft’s trim state. This should include strategies to recover from an out-of-trim condition after an automated system failure and various energy states at different altitudes
- The difficulty of manual trim intervention at high aerodynamic loads with applicable commercial air transport aircraft, particularly at lower altitudes and with consideration of crew coordination difficulties/techniques
- Pitch and power couple, in automatic and manual flight, with and without auto thrust. Particular focus should be given to fly-by-wire aircraft, especially in the event of a control law downgrade
- Flight control law downgrades, if applicable
- Unreliable airspeed events and crew co-ordination
- Reduction in automation levels and subsequent reinstatement of automatic systems;
- Instrumentation failures and basic scan
Management and recovery from high energy and high workload manoeuvres may additionally be of benefit. For example:

- Go-arounds and rejected landings
- Visual manoeuvring exercises
- Recovery from abnormal manoeuvres; (e.g. TCAS or windshear events, etc.)

Related human factors issues pertaining to all aspects should be thoroughly considered, reviewed and embedded into flight crew training programmes. For example:

- Situational awareness, particularly related to an aircraft’s dynamic situation and altitude, anticipation of a trimmed state and knowledge of systems and limitations
- Management of distractions during high workload situations
- Crew coordination, cooperation and communication
- Workload management
- Pilot Monitoring duties
- Awareness and management of startle factor

3 Queries

3.1 Any queries or requests for further guidance as a result of this communication should be addressed to commsflightops@caa.co.uk

4 Cancellation

4.1 This Safety Notice will remain in force until further notice.