



EASA Safety Information Bulletin

SIB No.: 2014-07R1

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- Subject:** **Unexpected Autopilot Behaviour on Instrument Landing System (ILS) Approach**
- Ref. Publication:** Bureau d'Enquêtes et d'Analyses pour la sécurité de l'aviation civile (BEA) [Serious Incident Report](#), dated March 2013.
Dutch Safety Board Safety Alert, dated 18 November 2013.
Dutch Safety Board Report "Pitch-up upset due to ILS false glide slope", dated June 2014.
- Revision 1:** This SIB revises and replaces EASA SIB 2014-07 dated 25 March 2014, in order to include new specific safety recommendations to increase its effectiveness.
- Applicability:** Owners and operators of aeroplanes equipped with an automatic flight control system (AFCS, autopilot) and ILS capability; Air Navigation Service Providers (ANSPs); Approved Training Organisations (ATOs).
- Description:** Following reports of number of occurrences involving unexpected autopilot behaviour while intercepting the ILS glide slope (G/S) signal from above, the Agency considers it appropriate to raise Operators' and ANSPs' awareness on the subject.
- The main issue related to these occurrences is that, while intercepting the ILS G/S signal from above the 3 degree nominal flight path with the AFCS engaged, the aeroplane can capture a false G/S resulting in a sudden and rapid pitch-up without any crew warning, which may lead to, or approach, stall conditions.
- Analysis showed that between the 3 and 9 degree glide paths, signal strength changes. For the pilot this can result in observable movement of the ILS glide slope marker on the primary flight display. Depending on the glide slope field, signal reversal occurs occasionally at the 6 degree glide path, and always at the 9 degree glide path. This reversal activates the G/S capture mode, after which the autopilot follows the G/S signal without restrictions.

This is information only. Recommendations are not mandatory.

The Dutch Safety Board (DSB) has investigated, among others, a severe and sudden pitch-up upset during an ILS approach to Eindhoven Airport in 2013, involving a Boeing 737-800. The airspeed dropped rapidly to a near stall situation and the crew carried out a go-around. The preliminary findings from the occurrence investigation made the DSB decide to measure the M-array antenna signal and determine the 'glide slope field' characteristics above the 3 degree glide path while established on the localizer.

Analysis of these measurements showed that between the 3 and 9 degree glide paths, signal strength changes. For the pilot this can result in observable movement of the ILS glide slope marker on the primary flight display. Depending on the G/S field, signal reversal occurs occasionally at the 6 degree glide path and always at the 9 degree glide path. This reversal activates the G/S capture mode, after which the autopilot follows the G/S signal without restrictions.

During subsequent flight tests, the reversal resulted in the AFCS commanding a severe pitch-up. Immediate flight crew intervention was required to regain aircraft control. This investigative information prompted the DSB to issue the referenced Safety Alert.

The Italian National Agency for the Safety of Flight (Agenzia Nazionale per la Sicurezza del Volo – ANSV) is currently investigating an incident involving another Boeing 737-800, on approach to Treviso-San Angelo Airport that occurred in 2013. During final approach at high altitude, in bad weather conditions, the crew tried to capture the G/S from above in autopilot and experienced an aggressive pitch-up. The crew immediately disconnected the autopilot and executed a go-around.

In 2012, the French BEA investigated a pitch upset of an Airbus A340 on approach to Charles de Gaulle airport. During this incident the crew followed ATC guidance. They had been cleared for ILS when they were well above the ILS G/S (non-compliant approach). The crew performed G/S capture in autopilot in spite of their altitude and their distance to the runway. The G/S mode was engaged on an ILS signal of a side lobe defining a descent slope of about 10 degrees. The autopilot interpretation of the ILS signal led to an increase in pitch. This pitch-up increase continued until it reached 26°, the airspeed dropped rapidly and the crew disconnected the autopilot and performed a go-around.

Other cases have also been investigated by Operators resulting in similar findings.

Recommendation(s): EASA recommends operators to take the following actions:

- Develop procedures that define explicit operational limits in their documentation, providing pilots with guidance to make a decision before intercepting the G/S from above;

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- Report any similar occurrences to their State of Registry National Aviation Authority (NAA), and to the State Investigation Authority of the country where the occurrence took place, and provide any relevant information of the event;
- Make their flight crews aware of the ILS G/S signal characteristics and the risks involved when flying with the autopilot engaged in the area above the 3° glide path during ILS approach;
- Design and deliver to flight crews dedicated training to:
 - o Explain the false glideslope inversion phenomenon, and the related threats;
 - o Emphasize the importance of maintaining situation awareness throughout the entire approach phase, taking into account the absence of system warnings when flying with the autopilot engaged above the nominal glide slope;
 - o Enable the recognition and resolution of undesired aircraft states (UAS) including the positioning of the aircraft above the glide path and/or autopilot misbehaviour.

EASA also recommends that ANSPs ensure that their air traffic controllers use prescribed navigation procedures that would reduce the flight crew workload and allow positioning the aeroplane in intercepting the G/S from below.

Contact(s):

For further information contact the Safety Information Section, Certification Directorate, EASA. E-mail: ADs@easa.europa.eu.

For further technical information or advice:

- Dutch Safety Board at www.safetyboard.nl.

- BEA at: www.bea.aero.

- More information at: [Unstabilised Approach: Vectoring Resulting in Intercepting the Glidepath from Above](#).

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