

Recommended Distribution

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Aircraft Type : BAe 146 and Avro RJ

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Comment:

SUBJECT: False ILS localizer capture and hazardous ILS glideslope indications ATA: 34

Reason

This safety bulletin gives information regarding premature ILS localizer course capture and serious incidents where approaches have been made on a false ILS glideslope due to a ground station on-test condition. Operators are reminded of the need to cross check all navigation aids when flying instrument approaches and adhering to standard operating procedures for altitude checks at the outer marker or against range from touchdown.

1. Premature Localiser Capture

Background

Civil aviation authorities have been monitoring and studying false or incorrect ILS localizer course captures by a range of aircraft types. There have been a few reported instances with BAE SYSTEMS product aircraft.

The localizer capture conditions are designed to minimize localizer overshoot for autopilot/flight director equipped aircraft. However some systems (autopilot/flight director, navigation receiver or ground station) may initiate false captures in areas located well off the selected course where ILS receivers cannot properly process the localizer signal.

False course captures may occur when the pilot selects the approach mode at large angular deviations or at a large cross track distance from the ILS centerline. Some ILS receivers produce lower than expected course deviation outputs in the presence of localizer signal noise or beam side-lobe. The reduced course deviation signal can cause the autopilot/flight director to change to a capture mode.

False course captures are most likely to occur in between 8 degrees to 12 degrees from the published localizer course, but can occur at angles up to 35 degrees of a published course. This is approximately 1.3nm before the ILS course centerline when intercepting the localizer at 10nm from the threshold.

Recommendation

In order to minimize the possibility of a false course capture during an ILS approach, pilots should use raw data navigation sources to ensure that the aircraft is on the correct localizer course prior to initiating a coupled approach.

The following cockpit procedures are recommended:

The approach mode should not be selected until the aircraft is within the ILS service area (approximately 18nm from the threshold); less than 8 degrees angular deviation from the runway course and with a small cross track offset distance from the ILS centerline.

Pilots should ensure that:

- where available, the ADF bearing (associated with the appropriate NDB locator site) is monitored for correct runway orientation;
- all available navigation aids are used to establish the aircraft position before localizer capture;
- the raw ILS localizer data indicates that the aircraft is approaching and will establish the correct course; and
- should a false course capture occur, it will be necessary to deselect and re-arm the approach mode in order to achieve a successful coupled approach on the correct localizer course.

The use of Final Approach Course Fixes (FACF) may aid aircraft with Flight Management Systems (FMS) in reducing the probability of ILS localizer false course captures. These fixes are generally established from 2 to 8nm prior to the glide slope intercept point on the localizer centerline.

2. False Glide slope

Background

There have been several world-wide incidents where aircraft have made an ILS approach where the ground transmitter was in a specific test mode (phasing). There has been no report of an incident involving a BAE SYSTEMS product aircraft.

During incidents flight crews had no warning of the ILS being on test thus extremely hazardous situations occurred due to:

- no test identification transmitted (Morse code identification may be valid).
- no navigation warning flags displayed.
- all ILS indications show an ON COURSE indication.
- the aircraft GS indicators are always centred. The aircraft instruments display an ON COURSE indication at all times, irrespective of the aircraft deviation from the centre of the ILS GS.

In one of several incidents, a modern wide body transport aircraft avoided a potential CFIT accident due to an Enhanced Ground Proximity Warning alert during final approach. The aircraft was dangerously below the glide path and could have flown into a mountain top. The standard GPWS does not normally give terrain protection during the final approach with the landing gear down. The aircraft pulled up and flew a go around. Another wide body transport aircraft following the first aircraft crossed the outer marker at a lower than expected altitude; the crew requested confirmation of the altimeter setting and when this was verified as correct the crew flew a go around from below the intended glideslope. The ILS was in maintenance phasing test mode. No NOTAM or ATC notification had been issued, no flight-instrument warning annunciation was given. All GS signals in the flight deck showed the aircraft as being on course.

During another incident a wide body transport aircraft flying an ILS approach made visual contact with the sea when at low altitude in a position well below the expected glide path. No warnings were given to the crew, all GS signals showed on course. The ILS was in a specific maintenance test mode.

Recommendation

All flight crews are reminded of the standard procedures that should be used before making an instrument approach.

Before flight:

- Navigation serviceability should be checked for any NOTAM indicating maintenance activity.
- Briefings should be given that any NOTAM'ed approach navigation aid will not be used even if the signals appear to be valid.

Before commencing the approach:

- Set and crosscheck the altimeter settings.
- Check and confirm the ILS identification.
- Brief and follow all published procedures.
- Note and set crossing altitudes and approach minima.
- Note the minimum safe altitude and any significant terrain.
- Estimate the expected descent rate for the approach ground speed.
- Where there is alternative navigation aids, the position of LOC and GS interception point should be verified by cross checking before the ILS approach is commenced.

During the approach:

- Where DME is available monitor altitude against range.
- Check the marker / final approach fix crossing altitude. Verify the final approach fix against distance or use a cross bearing as required by the approach procedure.
- If the aircraft is equipped with radio altimeter note the expected altitude profile during an approach.
- The radio altitude should never indicate less than 1000ft before the initial approach fix and not less than 500ft between the initial fix to the final approach fix.
- Be particularly alert to any unusual instrument indications or aircraft performance when approaching unfamiliar airports.
- If any crossing or check altitude is incorrect then fly a go around. Check vertical and lateral position with all navigation aids and recheck all altimeter settings.
- Pull up immediately if a GPWS or EGPWS warning is given. If the approach is not progressing as expected then always fly a go around.

Remedial action

ICAO, the FAA and other world-wide aviation authorities are aware of these events. Urgent action is being considered in order to maintain the integrity of instrument approaches during the specific phasing test mode of an ILS. The safe normal operation on an instrument approach is assured; however flight crews must remain alert to the possibility of unannounced test activity when flying ILS approaches and therefore conduct all approaches using basic procedures which includes a cross checks all navigation aids and altimeters.

BAE SYSTEMS will advise operators of any significant developments in the above areas.

Operators are encouraged to report any incident involving an ILS approach to their national authority in the interests of flight safety. If an autopilot, flight director, navigation receiver, or associated aircraft system malfunction is suspected then the incident should also be reported to BAE SYSTEMS.

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