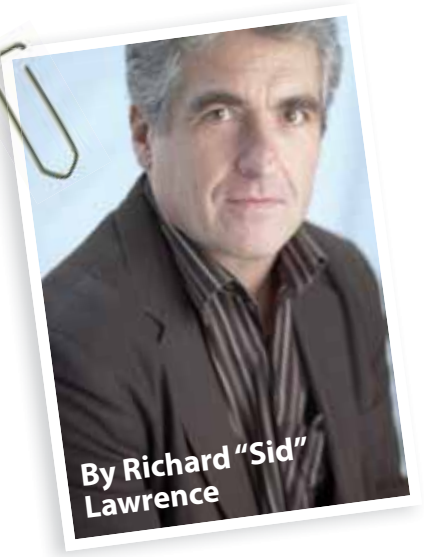

REQUEST FOR SUPPORT MESSAGE

Operator errors relating to hazard analyses in support

During the past few months the EUROCONTROL Safety Alert service has been approached by a number of stakeholders requesting the promulgation of a safety alert covering a variety of topics. In the pages that follow, I aim to take you through a selection of the alerts that I hope will spark your interest.

As in the previous edition, my intention is to try and bring new information to the table. So, instead of a faithful reproduction of each alert, this section will also feature more in the way of feedback, responses, comment and analysis.

If you would like to know more about the EUROCONTROL Safety Alert service, register as a subscriber, submit a suggestion or have a subject that you wish to consider for a safety alert then please contact me at ***richard.lawrence@eurocontrol.int.***

The first safety alert to be reviewed is a Request for Support Message, Operator Errors relating to P-RNAV operations - informing Hazard Analyses in support of Safety Case development...

Alternatively, register your interest through the EUROCONTROL Website - Safety Alerts Board ***http://www.eurocontrol.int/safety/public/standard_page/safety_alert_board.html*** *or go to SKYbrary:* ***http://www.skybrary.aero/index.php/Portal:EUROCONTROL_Safety_Alerts*** *to access the Alerts featured here and all previous Alerts.*

Published 18 November 2010

Purpose

The message was requested by NATS to help them gather instances of operator errors relating to precision area navigation (P-RNAV) STARs, transitions and SIDs that could inform the hazard analyses needed to support the development of local safety cases for the introduction of P-RNAV operations. The data collected should help to ensure that appropriate mitigations are put in place.

Synopsis

Evidence considered so far has shown that operator errors (such as aircraft flying the wrong P-RNAV SID) dominate the occurrence reports within national and European (e.g. EVAIR) databases. This RFS sought further experiences (e.g. identified hazards, reported/recorded deviations, corrective actions, mitigations, best practices, etc.) from ANSPs and aircraft operators.

Regulatory requirements & guidance

Overall, it is expected that P-RNAV operations will be acceptably safe, subject to the implementation being undertaken with due reference to the regulatory requirements and/or guidance provided by:

JAA TGL 10, Rev1, Airworthiness and Operational Approval for Precision RNAV Operations in Designated European Airspace, dated Feb 05.

ICAO:

- Doc 8168-PANS-OPS/611;
- Doc 7030/4 - Regional Supplementary Procedures, EUR Region;
- Doc 9613 Performance Based Navigation (PBN) manual (3rd edition 2008) Vol 2 part B.

EUROCONTROL:

- NAV.ET1.ST10, Guidance Material for the Design of Procedures for Area Navigation, Edition 3.0, March 2003.
- EUROCONTROL Safety Argument for Precision RNAV (P-RNAV) in Terminal Airspace (Version 3.2, May 2008), Appendix A.

P-RNAV operations - informing of safety case development

Support requested

Air navigation service providers and aircraft operators were requested to provide instances of:

- Operator errors relating to the use of P-RNAV operations in both TMA and en-route airspace.
- Equivalent experiences from other applications of performance-based navigation, such as: RNP0.3; RNAV (GNSS) Baro VNAV Approach; and General RNAV NPAs (i.e. LNAV only).

Feedback and responses

A total of 10 responses with comments were received: three ANSPs, one aircraft operator association, 5 aircraft operators (AO) and one aircraft manufacturer. In addition, 8 ANSPs (including one military) provided a 'nil return', indicating that they had not yet begun implementation of P-RNAV operations.

Although the returns show that P-RNAV is not yet widespread, it provided a limited amount of information that may be useful for later implementation. For instance, some of the errors identified were:

- **FMS use policy differences**
  It is the policy for one company which responded for their pilots to always use the FMS. Unfortunately due to the FMS/aircraft performance aircraft could not accurately maintain a published SID profile and the aircraft were turning in early. The mitigation chosen to resolve the issue was to change the design of the SID. On the other hand, another aircraft operator recognising that the SID design was not compatible with FMS operation, allows the use of manual flying techniques (which are inherently less accurate than FMS).
- **Noise abatement** has a strong influence on SID design and subsequent AO operations. This does not necessarily raise any safety concerns but it is worth noting that environmental constraints are an increasingly important factor in procedure design.
- **Mixed conventional/P-RNAV ops**
  Another aircraft operator reported that it was sometimes necessary to use a mix of 'conventional' and PBN techniques in the same flight profile, often switching between them. The general advice is that such 'mixed' operations should be avoided.
- **Aeronautical Information**
  The importance of the procedures being properly and accurately described in relevant aeronautical information was highlighted by one ANSP.

One ANSP also kindly provided a copy of a report on the implementation of P-RNAV continuous descent approach (CDA) STARs and some of the difficulties experienced by ATC and the aircrew. Some of the more salient findings involved:

- The sometimes incompatible use of 'short-cuts' by ATC during CDA ops.
- Working with parallel altitude restrictions, i.e. the cleared altitudes assigned by ATC and the published procedural altitudes.
- The changing role of the controller, from proactive control to 'passive observer'.
- The additional training needs of controllers in order to fully understand how to handle flights involving CDA.
- Altitude restrictions for airspace reasons are not always viewed by some pilots with the same degree of seriousness as those in place because of physical obstacles.
- The mixed standard of R/T phraseology used in conjunction with rejoining CDA STAR (after a short-cut).

It is intended to analyse the information received and, if appropriate, to include it in the SKYbrary Hazard Log which is currently being developed. Moreover, as is normal with Request For Support messages, a shortened, de-identified synopsis of the feedback has been posted at the end of the RFS message on the Safety Alert section of SKYbrary.

Further reading

- **SKYbrary:** Area Navigation - http://www.skybrary.aero/index.php/Area_Navigation_Systems
- EUROCONTROL Navigation Domain: http://www.ecacnav.com/

SAFETY WARNING MESSAGE

Aircraft altimeter failure

Published January 2011

Synopsis

The SWM concerned a case of credible corruption of flight data and was based around an incident involving an altimeter failure on a PC12 aircraft. This caused a 2000ft discrepancy between the displayed altitudes on the aircraft's two altimeters. Subsequently, the Mode C transmitted by the aircraft and displayed to ATC showed the aircraft to be 2000ft lower than its actual level, which brought the aircraft into conflict with another aircraft flying at that level.

The sharp-eyed among you will recognise that this event has previously featured in HindSight 12 (pages 58 & 59) under the title, "Altimeter System Error, What's My Level?". Since publication of the article, the BEA report on the incident referred to in this alert has been made public:

http://www.bea.aero/docspa/2010/ec-h100602.en/pdf/ec-h100602.en.pdf
The BEA asked us to refer to the BEA report in the safety alert, and include in the body of the alert some evidence of the severity of this incident using extracts from the report such as:

"There was no triggering of the Short Term Conflict Alert (STCA) system at the control position or a TCAS alert on either of the 2 airplanes."

"Intrigued by fresh oscillations that made him think of wake turbulence, the co-pilot looked outside. He was then in visual contact with an airplane that was very close, slightly above and to the right."

"The minimum separation between the 2 airplanes could not be measured on the recording, the 2 radar plots being mixed together. The crews estimated that the separation was between 15 and 30 metres horizontally and about 100 feet vertically."

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EUROCONTROL

SAFETY REMINDER MESSAGE

Runway incursion prevention – runway-holding position, stop bars and ATC clearance

This message was conceived following a request from the newly created European Working Group for Runway Safety. This group brings together, under the chairmanship of EUROCONTROL, the previous runway safety working groups established by EUROCONTROL and ECAST.

Published 4 February 2011

Synopsis

EUROCONTROL had been notified of incidents of aircraft crossing runway-holding positions and associated stop bars, which had been switched off, and then entering the runway without a valid ATC clearance.

In some instances pilots had reported inconsistent local policies on the use of stop bars (e.g. low visibility ops only, H24 operation on some runways, at some airports, in some States), which, in their opinion, contributed to confusion or to an assumed ATC clearance to proceed.

ICAO Provisions

The operation of stop bars is covered by a number of ICAO provisions, inter alia:

- ICAO Annex 2, Rules of the Air.
- ICAO Annex 14, Aerodromes.
- ICAO Doc 4444, PANS ATM.
- ICAO Doc 9870, Manual on the Prevention of Runway Incursions.

Analysis

It is important that the ICAO provisions relating to runway-holding positions, the operation of stop bars and associated ATC clearance are read and understood in conjunction with one another and in the appropriate context. ICAO Annex 2, 3.2.2.7.3 must be understood in the context of the preceding 3.2.2.7.2, which clearly explains that pilots can proceed beyond the holding position only when "…authorised by the aerodrome control tower", i.e. an ATC clearance has been issued.

Moreover, Annex 14 5.3.19.13 (Note1) and PANS ATM 7.15.6 and 7.15.7 are concerned only with the physical operation of the stop bars by ATC controllers. The observation that a previously lit stop bar has been turned off, or that a stop bar is not lit, should not be interpreted as a visual confirmation of an ATC clearance to proceed. **Note:** Subsequent to publication, the EUROCONTROL Runway Safety Project Manager also advises that *"The receipt of a valid ATC clearance can be confirmed by checking with the Tower and / or use of a cockpit (or driver cab) procedure e.g. to switch on forward facing lights if cleared for Take Off".*

To make things absolutely clear, in October 2010 the ICAO Aerodrome Panel proposed a revision of Annex 14, 5.3.19.13 (Note1) to the effect that the phrase "in conjunction with an explicit ATC clearance" be added at the end. This proposal was subsequently endorsed by the ICAO Air Navigation Commission and will be subject to ICAO State Letter consultation.

Safety reminders

Runway-holding position markings are the primary means used to protect the integrity of the runway. Where switchable stop bars are provided, either at a runway holding position or elsewhere in the taxiway system, they are there to support and reinforce designated positions and are not a replacement for them.

- Notwithstanding this general statement, stop bars are an important safety net at some aerodromes and ICAO Doc 9870 also provides other recommendations and best practices for both pilots and ATC controllers, namely:

  - **Rec 4.4 (Pilots):** "Pilots should never cross illuminated stop bars when lining up on, or crossing, a runway…"
  - **Appendix B - Best Practice for Flight Deck:** "Red stop bars should never be crossed when lining up on or crossing a runway unless, in exceptional circumstances, the stop bars, lights or controls are reported to be unserviceable, and contingency measures, such as using follow-me vehicles, are in force..."
  - **Rec 4.5.5 (ATCOs):** "Aircraft or vehicles should never be instructed to cross illuminated red stop bars when entering or crossing a runway."

- Therefore, it follows that before crossing stop bars pilots should:

  a. challenge ATC if they are cleared to cross an illuminated stop bar - **RED means STOP;**
  b. confirm that the stop bars are switched OFF except in the exceptional circumstances described in ICAO Doc 9870, Appendix B above;
     and
  c. have an ATC clearance to proceed beyond any holding position/stop bar, in particular those protecting runways.

- State authorities, aerodrome operators and ANSPs were invited to ensure the consistent operation of stop bars that protect the runway(s), e.g. low visibility ops only, H24 operation.

Feedback and responses

The alert generated a number of comments concerning the operation of stop bars. It is clear from some of these that there is inconsistent use of stop bars at many aerodromes which reflects the lack of a standard policy. That is why the European Action Plan for the Prevention of Runway Incursions, Version 2, contains a new Recommendation 1.7.6 "Ensure that Aerodrome Operators and Air Navigation Service Providers regularly review the operational use of aeronautical ground lighting e.g. stop bars, to ensure a robust policy to protect the runway from the incorrect presence of traffic."

Yvonne Page, the EUROCONTROL Runway Safety Project Manager and Chair of the European Working Group for Runway Safety, added that the responses to this alert have demonstrated the importance of placing the use of stop bars protecting the runway in the framework of a global network. Pilots need an airport to apply a stop bar policy consistently, with operational issues such as adequate time required to cross the holding position factored in. Air traffic controllers need the operating panel co-located with the working position. Aerodrome operators need to know about the operational needs to get the implementation right. Subject to appropriate local adjustments, an average re-lighting time of stop bars protecting the runway in Europe is in the range of 30 – 40 seconds.

Further reading

- ICAO Doc 9870, Manual on the Prevention of Runway Incursions.

- **EUROCONTROL Runway Safety Website**
  http://www.eurocontrol.int/runwaysafety
  - European Action Plan Prevention of Runway Incursions (EAPPRI) - 2003
    http://www.eurocontrol.int/runwaysafety/public/standard_page/ Awareness.html
  - Use of Stop Bars H24 Study Report
    http://www.eurocontrol.int/runwaysafety/public/standard_page/Awareness.html

- **SKYbrary:**
  - IFATCA Stop Bar Survey Report - December 2008
    http://www.skybrary.aero/bookshelf/books/602.pdf
  - Runway Guard and Status Lights article
    http://www.skybrary.aero/index.php/Runway_Guard_and_Status_Lights

SAFETY REMINDER MESSAGE

ANSP preparation for emergency, degraded modes of operation and unusual situations

Published 4 February 2011

Synopsis

A number of short-term, catastrophic failures of ATC system components e.g. voice communication systems (VCS) and flight data processing (FDP) at various European area control centres had occurred during recent months. In each case the ATC staff had responded promptly and efficiently to ensure that safety was not jeopardised.

These successes serve as a useful reminder to other ANSPs of the importance of being properly prepared to deal with emergencies, degraded modes of operation and other unusual situations that might threaten the provision of safe air navigation services.

Provisions

Provisions for dealing with emergencies, degraded modes and unusual situations are covered by, inter alia, the following:

- **ICAO**
  - Training Manual for Air Traffic Safety Electronics Personnel (ATSEP), Doc 7192. Advanced Edition 2009), Part E-2, Chapter 12.
- **EU**
  - EC Regulation 1108/2009, Annex Vb, 4 (c).
- **EUROCONTROL**
  - ESARR 5, Chapter 5.2.2.6
  - Guidelines for the Competence Assessment of Air Traffic Safety Electronics Personnel says in para 8.2,
  - Guidelines for Contingency Planning of Air Navigation Service, Edition 2.0.

Analysis

Catastrophic failures of complete ATC systems (or parts thereof) are rare. Nevertheless, to maintain tolerable levels of safety during periods of abnormal operations (i.e. the ability to "fail to safe"), it is essential that personnel connected with the provision of ATS are properly prepared to cope with a full range of situations. Recent experience has identified a number of common success factors:

- Strategies, plans and procedures to deal with emergencies, degraded mode and contingency operations should be in place. These need to be regularly reviewed and tested/exercised against relevant operational scenarios, e.g. equipment failures, airspace closures.
- Formal refresher/continuation training regimes to help prepare controllers, technical staff, supervisors and managers.
- Controllers must have a basic awareness and understanding of the main ATC system components, their functionalities and limitations. Equally, engineering and technical staff must have an appreciation of the operational impact of system disturbances - intentional and unintentional. Teamwork across all disciplines is essential.

- Swift communication (internal and external) is critical.
  - Inform neighbouring sectors (possibly in another country) so that they can help relieve the situation if needed.
  - If necessary, inform the CFMU as early as practicable so that appropriate ATCFM regulations can be applied quickly and efficiently.
- Letters of agreement, MoUs etc., checklists, emergency telephone numbers and standby facilities must be kept up-to-date if they are to be useful in potentially safety-critical situations.
- In-built fallback capabilities improve overall ATM system resilience.
- NSA oversight of contingency plans helps provide a focus on the investigation (severity and repeatability) and reporting of ATM specific occurrences as required by ESARR 2, Appendix A - 1.3.

Feedback and responses

ESSIP Objective GEN 01 - Implement European ANS Contingency Measures for Safety Critical Modes of Operation - requires ANSPs to be adequately prepared in order that they can continue to ensure the safety of ANS operations during a range of events including catastrophic ATC system outages. Latest monitoring of the ESSIP objective shows that over 75% of ANSPs comply with this requirement, but that still leaves a number of ANSPs who may need to do more to bolster their resilience.

Further information

EUROCONTROL

- Guidelines for Controller Training in the Handling of Unusual Incidents. http://www.eurocontrol.int/humanfactors/gallery/content/public/docs/DELIVERABLES/T11%20(Edition%202.0)%20HRS-TSP-004-GUI-05withsig.pdf
- Guidelines for Contingency Planning of Air Navigation Service, Edition 2.0. http://www.eurocontrol.int/ses/public/standard_page/sk_sesis_guidelines.html
- Managing System Disturbances in ATM, Edition 1.0. http://www.eurocontrol.int/humanfactors/gallery/content/public/docs/DELIVERABLES/HF47%20(HRS-HSP-005-REP-06)%20Released-withsig.pdf
- Guidelines for the Competence Assessment of Air Traffic Safety Electronics Personnel. http://www.eurocontrol.int/safety/public/site_preferences/display_library_list_public.html

SKYbrary

- Emergency and Contingency Category. http://www.skybrary.aero/index.php/Category:Emergency_%26_Contingency
- Guidance on Degraded Modes Safety for Operational Engineering.