



ICAO

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### **Agenda Item 3: Reports from Asia/Pacific RMAs and EMAs**

#### **SUMMARY REPORT OF IDENTIFIED AIRSPACE RISK AND MITIGATIONS**

(Presented by SEASMA)

##### **SUMMARY**

This paper presents the analysis and mitigations to reduce Large Height Deviation (LHD), Large Longitudinal Error (LLE) and Large Lateral Deviation (LLD) occurrences in the Singapore Flight Information Region (FIR).

## **1. INTRODUCTION**

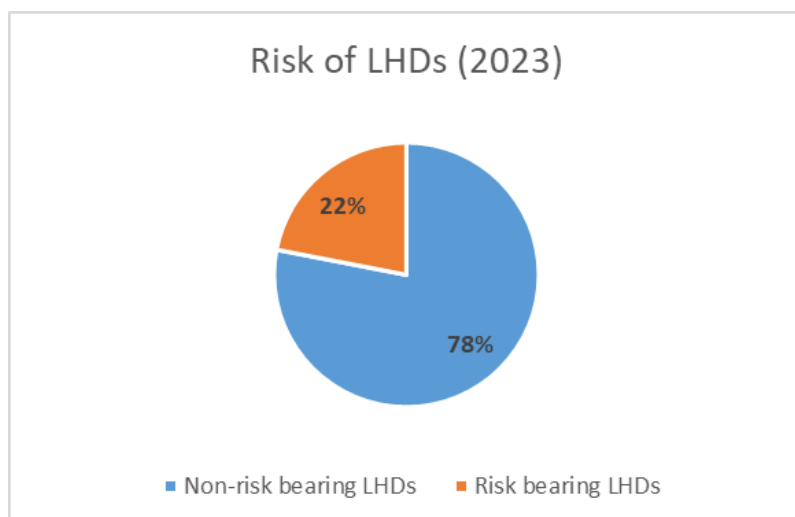
1.1. This information paper provides the analysis of the contributory factors to airspace deviation errors, namely LHDs, LLEs and LLDs, in the Singapore FIR and its associated mitigations for the period of 1 January to 31 December 2023.

## **2. DISCUSSION**

### *Airspace Deviation Errors*

2.1 The total number of reported LHD occurrences decreased from 45 in 2022 to 41 in 2023. Conversely, the number of reported LLE occurrence increased from zero in 2022 to one in 2023 and the number of reported LLD occurrences increased from one in 2022 to five in 2023.

2.2 From analysis, the top LHD error category identified was Category ‘E’ error, attributed to coordination errors in the ATC-to-ATC transfer of control responsibility as a result of human factors issues. The decrease in reported LHD occurrences could be due to a combination of human factors mitigation strategies, Human-machine Interface (HMI) enhancements, and procedural improvements. Furthermore, effective utilization of surveillance data enabled early detection of aircraft abnormalities. This allowed the Air Traffic Control Officers (ATCOs) to seek verification from adjacent FIRs and to address any potential issues promptly. Of the 41 reported LHD occurrences in 2023, 78% were non-risk bearing (See **Figure 1**).



**Figure 1:** Risk of LHDs

2.3 The reported LLE occurrence in 2023 was categorized as Category ‘B’ error, attributed to incorrect estimate or route provided due to incorrect operations or interpretation of airborne equipment. All reported LLD occurrences in 2023 were categorized as Category ‘A’ error, attributed to flight crew deviation without ATC clearance in the horizontal dimension.

#### Mitigations

2.4 Man. Proactive measures were implemented to strengthen safety awareness and to address errors related to human factors issues. Entrusted Safety Officers conducted regular sharing sessions for the ATCOs on LHD, LLE and LLD. The sharing sessions presented opportunities for the ATCOs to gain valuable insights into the analysis, lessons learnt and best practices from past occurrences. Active participation from the ATCOs during the sharing sessions generated a wealth of productive discussions. In addition, workshops and refresher trainings on traffic management and the Air Traffic Management System (ATMS) were conducted to enhance ATCOs’ skills and knowledge.

2.5 Machine. Regular engagements with ATCOs were conducted to identify opportunities for enhancements to the HMI of the ATMS. Such enhancements allowed ATCOs to perform their tasks safely and effectively, by utilizing all available tools and alerts. In addition to the visual arcs that were incorporated into the ATC air situation display to prompt ATCOs to ensure all necessary coordination has been completed before the aircraft approach the Transfer of Control Points, messages regarding incomplete or failed Air Traffic Services Inter-facility Data Communication (AIDC) coordination in the Operational Message Window within the ATMS have allowed ATCOs to conduct timely verification on the coordination status with adjacent FIRs.

2.6 Method. Operating procedures were regularly reviewed to ensure compliance with regulations and best practices. All safety data related to airspace deviation errors were comprehensively tracked and analyzed. The information from the safety data served as a valuable source for the review of procedures and implementation of additional mitigations, if needed. To mitigate flight crew deviation without ATC clearance, the ANSP would engage the involved airlines to understand the causal factors and measures implemented in response to the occurrence. This information would in turn be shared with the ATCOs for their awareness.

### **3. CONCLUSION**

3.1 The number of reported LHD occurrences within the Singapore FIR has seen a moderate decrease and this could be due to a combination of man, machine, and method mitigation strategies.

While there was an increase in the number of reported LLE and LLD occurrences, primarily attributed to the actions of the flight crew, Singapore would continue to actively monitor and collaborate with involved airlines to address any adverse trends and emerging issues with timely and appropriate mitigations.

**4. ACTION BY THE MEETING**

4.1 The meeting is invited to note the information contained in this paper.

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