INTERNATIONAL CIVIL AVIATION ORGANIZATION
ASIA AND PACIFIC OFFICE

GUIDELINE ON

ADDRESSING INCONSISTENCIES OF ICAO AIRCRAFT ADDRESS AND TARGET IDENTIFICATION BETWEEN SURVEILLANCE DATA AND FLIGHT PLAN

Edition 1.0 – May 2024

Guideline on Addressing Inconsistencies of ICAO Aircraft Address and Target Identification between Surveillance Data and Flight Plan

1. INTRODUCTION

1.1 PURPOSE

1.1.1 ADS-B is an aircraft surveillance technology that relies on aircraft broadcasting their own position, velocity and other information to ground stations. It is a collaborative surveillance that requires coordination from stakeholders such as ANSPs, airline operators and ground handling agents. Proper ICAO Aircraft Address (AD) and Target Identification (ID) in surveillance data and flight plans are essential for the application of ADS-B and mode S surveillance. This guideline is developed to mitigate the discrepancies observed in AD and ID between surveillance data and flight plans to enhance the application of mode S or ADS-B surveillance in air traffic control, which plays a key role in safe and efficient ATM systems.

1.2 BACKGROUND

1.2.1 ADS-B and mode S radar are surveillance technologies that rely on onboard mode S transponders. The successful implementation of these technologies requires close coordination among aspects including ground equipment, flight operations, air traffic control, dispatch and aircraft maintenance.

1.2.2 The Flight ID is usually set in the aircraft by the flight crew via a cockpit interface. It enables air traffic controllers to identify an aircraft on the ATC disapply and to correlate a mode S or ADS-B track with the filed flight plan aircraft identification (ACID). Flight ID is critical to ATC planning and situational awareness, so it must be entered carefully and accurately.

1.2.3 Similarly, the flight dispatch should ensure the unique 24-bit aircraft address is correctly filed in Item 18 of the ICAO flight plan. The 24-bit aircraft address transmitted by the aircraft should exactly match with the one filed in the flight plan.

1.2.4 Correlating the flight plan with the mode S or ADS-B transmitted AD and ID allows for accurate association of the mode S or ADS-B data with the intended flight, ensuring that the position, velocity and other relevant information align with the planned flight trajectory.

1.2.5 In the event of any discrepancy in AD or ID between surveillance data and flight plan, it is important to promptly identify and address the issue. The main

solution to identify the discrepancy is to use software to create new alerts displaying in ATM system(s) to identify the issue to ATC, which has been deployed in ATM system(s) in some countries. Such alerts, while legitimate, may be considered as nuisance, which may induce distraction to and increase the workload of air traffic controllers thus not conducive to safe and efficient ATC operation.

1.2.6 With the extensive usage of mode S or ADS-B surveillance, the discrepancy issues could result in serious implications and pose challenges when the ATM system is solely reliant on mode S or ADS-B surveillance data for correlation/coupling.

1.3 REFERENCE

- ICAO Annex 10 - Aeronautical Telecommunications
- ICAO Annex 11- Air Traffic Services

2. KEY FINDINGS OF INCORRECT ID AND AD

2.1 GENERAL

2.1.1 It is important to assess each specific case and identify its contributing factors, in order to shed light on critical aspects that demand attention. The practice also aids to determine the most effective mitigation measures to address the root causes and minimize the potential for recurrence.

2.2 INCORRECT ID

2.2.1 In cases of discrepancies observed in ID between surveillance data and flight plan, the majority of attribution can be traced back to human error, while the remaining instances are associated with hardware and software defects.

2.2.2 The **human errors** involved can be summarized and categorized as follows:

(a) Typographical errors of cockpit crews, flight dispatch and/or ground handling agents, for example:

- Incorrectly set Flight ID (e.g., ABC123 instead of ABC321);
- Spaces in Flight ID (e.g., AB C12 3 instead of ABC123) which produce a corrupted Flight ID;

- Additional leading zeros in Flight ID (e.g. ABC0123 instead of ABC123);

- Omission in ICAO airline designators (e.g. 123 instead of ABC123);

- Using aircraft registration instead of approved ACID (e.g., ZKABC instead of ABC123);

- No Flight ID set;

(b) Co-pilots and/or supervisory staff's failure to cross-check the flight data input;

(c) Failure to update the flight data in cases of delayed or cancelled flights;

(d) Failure to update the flight identification of the corresponding inbound flight after completing the outbound leg; and

(e) Misuse of IATA airline designator in ICAO flight plan.

2.2.3 **Database errors** and **aircraft defects** include:

(a) Programming or database defects in the flight planning systems of airline operators and/or ground handling agents; and

(b) Defects in mode S transponder system.

2.3 INCORRECT AD

2.3.1 In contrast to cases of incorrect aircraft identification which are predominantly attributed to human factor issues, the contributing factor to the broadcast of incorrect 24-bit aircraft address varies.

2.3.2 **Database defects** caused by the following activities contribute to more than 50% of mismatched 24-bit aircraft address cases:

(a) Failure to update the aircraft database upon registration of new aircraft or revised aircraft registration of the existing aircraft;

(b) Late notice airframe changes with the change message (CHG) not being generated, or arriving after the flight becomes airborne;

(c) Data loss during upgrade to a new flight planning system; and

(d) Software-based defects in the flight planning system.

2.3.3 Other contributing reasons could be:

(a) **Human errors**, e.g. flight dispatch staff and/or ground handling agents' input of wrong 24-bit aircraft addresses in Item 18 of ICAO flight plans; and

(b) **Hardware defects** in mode S transponder system.

3. MITIGATION MEASURES

3.1 GENERAL

3.1.1 In light of the issues identified and summarized in Section 2, it is recommended to collaborate with the regulators and/or operators concerned to take the relevant mitigation measures as given in this Section to prevent recurrence of the discrepancy cases.

3.1.2 Mitigation measures should be implemented based on the nature and underlying causes of the issue. Air operators are recommended closely monitor the common issues and ensure equipment airworthiness, data quality and reliability. Regular maintenance and monitoring can help identify and address the problems promptly.

3.2 ID DISCREPANCY

3.2.1 When an alert is triggered due to an incorrect ID, it is essential for the flight crew to promptly address the issue by immediate correction of the ID. The controller acknowledges the alert, informs the pilot and requests a reset of the Flight ID - Phraseology **"RE ENTER IDENTIFICATION"**. Once the correction is made, the system can accurately associate the aircraft with its intended flight. The alert associated with the incorrect ID will thus be removed from the data black display.

3.2.2 A comprehensive overview of the measures to mitigate **human errors**, which contribute to most ID discrepancy cases, is provided below.

(a) Debriefing and Additional Training

Conducting debriefings with crew directly involved in ID discrepancy occurrence allows for an open discussion to identify the root causes and factors contributing to the error. The debriefing process helps in understanding the specific circumstances and provides an opportunity for additional training tailored to address the identified issues.

(b) Internal Safety Bulletins and Notices

Issuance of internal safety bulletins, circulars or notices to all staff members is an effective method to disseminate educational materials and enhance safety awareness throughout the organization. The communications provide guidance, highlight best practices and share lessons learned from ID discrepancy incidents. By increasing awareness and knowledge, employees at all levels can actively contribute to preventing and mitigating ID discrepancies.

(c) Review of the standard operating procedures (SOPs)

It is a crucial step to ensure that SOPs are comprehensive, up-to-date and effective in preventing ID discrepancies. Emphasizing cross-check procedures by flight operations supervisors and/or the captain-in-flight adds an additional layer of verification and validation to the identification process. This helps catch potential errors and ensures accuracy before the information is entered into the system.

(d) Automation and System Upgrades

Automating the flight data handling process through software or system upgrades can significantly reduce the likelihood of ID discrepancies. By automating data entry and verification processes, the potential for human error is minimized as reliance on manual input is reduced.

3.2.3 To address **database errors** and **aircraft defects**, timely maintenance of the defective part(s) and software upgrades could be prioritized. Proactive and continuous monitoring could be followed to promptly address identified issues.

(a) Timely Maintenance

By conducting timely maintenance, organizations can identify and rectify issues that may contribute to ID discrepancies. This involves inspecting, repairing, or replacing faulty parts to ensure their proper functioning. Timely maintenance helps prevent further errors or malfunctions that could impact the accuracy of aircraft identification.

(b) Software Upgrades

Regular software upgrades help address known issues, bugs, or vulnerabilities that may exist in the system. Upgrades can include improvements in data validation processes, error handling mechanisms, and enhanced compatibility with other systems.

(c) Proactive Monitoring

Continuous monitoring and analysis of data can detect any anomalies or inconsistencies, allowing for timely intervention. By promptly addressing identified issues, organizations can prevent the occurrence of ID discrepancies and ensure the integrity of the database and aircraft systems.

3.3 AD DISCREPANCY

3.3.1 To mitigate the discrepancy, the following measures are recommended in collaboration with regulars and/or operators concerned to address **database-related deficiency** and **software defects** as identified in Section 2.3

(a) Comprehensive Database Overhaul and Update for Operator's Fleet

It is recommended to conduct a comprehensive overhaul of the entire database and updating the operator's fleet ensures that all data is properly maintained and up to date, reducing the potential of AD discrepancies caused by outdated information.

(b) Procedures for Timely Removal of Obsolete Aircraft Data

It is recommended to develop implementation procedures for the removal of obsolete aircraft data could ensure regular review and timely removal of outdated information from the database, maintaining a clean and reliable database.

(c) Communication Protocol for Sharing Aircraft Information between Engineering and Flight Operations

It is recommended to devise communication protocol for sharing aircraft information between the engineering team and flight operations for establishing effective communication channels to ensure that all relevant parties have access to current accurate aircraft data, particularly in case of revised aircraft registration and acquisition of new aircraft.

(d) Development of an Automated System for Aircraft Database Updates

It is recommended to automate the update process, so that organizations can ensure that the database remains current and accurate without relying solely on manual efforts. This helps reduce the likelihood of human errors and enhances the efficiency of maintaining the aircraft database.

3.3.2 To mitigate the recurring trend of **human errors** and erroneous data input, operators could issue reminders and safety notices to maintain a high level of vigilance of their employees to the importance of the accuracy of AD filed in the flight plans. Alongside regular reminders and safety notices, operators could implement comprehensive training programs to address human errors and improve data input accuracy.

3.3.3 **Aircraft defects** could be tackled by timely maintenance of the defective part(s) in the mode S transponder system to prevent problematic data from being transmitted.

4. COORDINATION BETWEEN REGULATOR AND AIR OPERATOR

4.1 COORDINATION ISSUE

4.1.1 It is of great importance to work with the regulators and air operators to rectify the ID/AD discrepancy issues. There are a number of issues with the coordination:

- The time delay between an event and the regulator not being able to contact the operator, especially those domiciled overseas;
- Inadequate details on the operator, particularly for non-scheduled international traffic;
- The ability of the overseas operator’s regulator to action requests from another country;
- Lack of feedback from the regulator and/or operator.

4.1.2 To rectify the coordination issue, it is essential to strengthen international cooperation between regulatory authorities and operators to promote a coordinated approach, ensuring the root cause is identified and the issue is addressed in a timely and comprehensive manner.

4.2 REPORTING AND FEEDBACK

4.2.1 A reporting-and-feedback mechanism should be in place to allow ATC to alert flight crews, and ANSP to advise the air operators and/or regulatory authority of an issue, allowing them to remedy the issue.

*****