



Committee on Aviation Safety

Topic 2

Director – Vincent Correia¹

¹ This paper reflects the author's personal views and cannot be considered as the views of ICAO.

AIRCRAFT ACCIDENT AND INCIDENT INVESTIGATIONS AND TRACKING OF AIRCRAFT IN DISTRESS

The disappearance, on 8 March 2014, of Malaysia Airlines Flight 370 (MH370) revealed to the world that notwithstanding the high-level of technology carried onboard modern aircraft, the latter can simply vanish from radars and vanish. In front of this unexpected and disastrous event, the international community reacted in a spirit of cooperation, to support the State of Registry in its search for the missing aircraft. These actions were undertaken in accordance with both the 1944 Chicago Convention and its Annex 13, but revealed some challenges regarding aircraft in distress and conducted to the development of rules governing Autonomous Distress Tracking (ADT).

Overview of the rules governing investigations

Article 26 of said Chicago Convention only imposes obligations to the so-called “State of Occurrence,” which could raise some issues since there was no State of Occurrence, due to the fact that the whereabouts of the aircraft remained uncertain:

“In the event of an accident to an aircraft of a contracting State occurring in the territory of another contracting State, and involving death or serious injury, or indicating serious technical defect in the aircraft or air navigation facilities, the State in which the accident occurs will institute an inquiry into the circumstances of the accident, in accordance, so far as its laws permit, with the procedure which may be recommended by the International Civil Aviation Organization. The State in which the aircraft is registered shall be given the opportunity to appoint observers to be present at the inquiry and the State holding the inquiry shall communicate the report and findings in the matter to that State.”

Conscious of this lacuna, ICAO developed more precise obligations in its Annex 13.² Through mandatory allocation of certain obligations to States, this annex mandate the Contracting States to work in close cooperation when it comes to accident and incident investigations, The State of occurrence is normally in charge of the investigation, but Annex 13 encourages the involvement of the State of Registry, the State of the Operator, the State of Design and the State of Manufacture to said investigation. The objective of said investigation is solely to prevent future accidents and incidents for the same causes. In other words, as coined under the term “just culture,”³ the aim is not to apportion blame or liability. The investigation must be furthermore carried out by an independent investigation authority,⁴ which shall not receive any instruction whatsoever from the State’s civil aviation authority or other entities.

Main Provisions of Annex 13

The main provisions of Annex 13 to the 1944 Chicago Convention are the following:

- **Annex 13 – Aircraft Accident and Incident Investigation, Chapter III, Standard 3.3 – Responsibility of the State of Occurrence**
“3.3 The State of Occurrence shall take all reasonable measures to protect the evidence and to maintain safe custody of the aircraft and its contents for such a period as may be necessary for the purposes of an investigation. Protection of evidence shall include the preservation, by photographic or other means, of any evidence which might be removed, effaced, lost or destroyed. Safe custody shall include protection against further damage, access by unauthorized persons, pilfering and deterioration.”

- **Annex 13 – Aircraft Accident and Incident Investigation, Chapter V, Standard 5.3 – Accidents or Incidents Outside the Territory of Any State**
“5.3 When the location of the accident or the serious incident cannot definitely be established as being in the territory of any State, the State of Registry shall institute and conduct any necessary investigation of the accident or serious incident. However, it may delegate the whole or any part of the investigation to another State or a regional accident and incident investigation organization by mutual arrangement and consent.

² *Aircraft Accident and Incident Investigation*, ICAO, Annex 13 to the Convention on International Civil Aviation, 12th ed, July 2020.

³ Francesca Pellegrino “Just Culture: The Only Way to Proceed: Towards Enhancing Safety” (2020) 69:4 ZLW 594; Philippine Dumoulin, “Just Culture and Unjust Results: The Changing Paradigm” (2015) 40 Ann Air & Sp L 395 ; Christoph Kaupat, “Just Culture and the Obligation on States to Prosecute under the Chicago Convention” (2013) 38 Ann Air & Sp L 461; Ronnie R. Gipson Jr., “The Chicago Convention Should Not Be Used to Create Criminals” (2017) 42 Ann Air & Sp L 83; Kenneth P. Quinn & Jennifer E Trock & Timothy C. Gerheim, “Improving Global Aviation Safety by Protecting Information Sources” (2009-2010) 9:2 Issues Aviation L. & Pol’y 243.

⁴ Accident and Incident Investigation (Doc 9756), Part I — Organization and Planning and the Manual on Accident and Incident Investigation Policies and Procedures (Doc 9962).

5.3.1 States nearest the scene of an accident in international waters shall provide such assistance as they are able and shall, likewise, respond to requests by the State of Registry.”

- **Annex 13 – Aircraft Accident and Incident Investigation, Chapter V, Standard 5.4 – Responsibility of the State Conducting the Investigation**

“5.4 The accident investigation authority shall have independence in the conduct of the investigation and have unrestricted authority over its conduct, consistent with the provisions of this Annex. The investigation shall normally include:

- a) the gathering, recording and analysis of all relevant information on that accident or incident;
- b) the protection of certain accident and incident investigation records in accordance with 5.12;
- c) if appropriate, the issuance of safety recommendations;
- d) if possible, the determination of the causes and/or contributing factors; and
- e) the completion of the Final Report.

- Where feasible, the scene of the accident shall be visited, the wreckage examined and statements taken from witnesses. The extent of the investigation and the procedure to be followed in carrying out such an investigation shall be determined by the accident investigation authority, depending on the lessons it expects to draw from the investigation for the improvement of safety.

5.4.1 Any investigation conducted in accordance with the provisions of this Annex shall be separate from any judicial or administrative proceedings to apportion blame or liability.”

Overview of the Modern Challenges

In cases of aircraft in distress, Article 25 of the 1944 Chicago Convention only provides that:

“Each contracting State undertakes to provide such measures of assistance to aircraft in distress in its territory as it may find practicable, and to permit, subject to control by its own authorities, the owners of the aircraft or authorities of the State in which the aircraft is registered to provide such measures of assistance as may be necessitated by the circumstances. Each contracting State, when undertaking search for missing aircraft, will collaborate in coordinated measures which may be recommended from time to time pursuant to this Convention.”

ICAO nevertheless developed the Global Aeronautical Distress and Safety System (GADSS) concept of operation, which first edition was released in June 2017 with the objective of allowing aircraft tracking, Autonomous Distress Tracking (ADT) and post flight localization and recovery.

According to ICAO:

“Several significant functional requirements are necessary to permit the effective implementation of autonomous distress tracking of aircraft in flight, including:

- a. detection of a distress condition;
- b. autonomous transmission of information from which a position can be determined, including a time stamp. This could take the form of, inter alia, transmitted GNSS coordinates, or a radio signal which can be triangulated. The system used for this

transmission shall be capable of transmitting the information in the event of aircraft electrical power loss, at least for the expected duration of the entire flight;

- c. a means for the aircraft operator to receive such transmitted position information;
- d. validation by the aircraft operator of the distress condition (i.e. it is valid and not the result of a faulty ADT device or some other reason) to avoid unnecessary burdens to SAR services; and
- e. a means for the aircraft operator to make the position information of a flight in distress available to the appropriate organizations, as established by the State of the Operator.”⁵

As per Annex 6, Chapter 6, standard 6.18.1:

“As of 1 January 2025, all aeroplanes of a maximum certificated take-off mass of over 27 000 kg for which the individual certificate of airworthiness is first issued on or after 1 January 2024, shall autonomously transmit information from which a position can be determined by the operator at least once every minute, when in distress, in accordance with Appendix 9.”

Said Appendix 9, while not imposing any specific technology, requires that:

“An aeroplane in distress shall automatically activate the transmission of information from which its position can be determined by the operator and the position information shall contain a time stamp. It shall also be possible for this transmission to be activated manually. The system used for the autonomous transmission of position information shall be capable of transmitting that information in the event of aircraft electrical power loss, at least for the expected duration of the entire flight.”

The ADT function is to be approved by the State of the Operator, considering high level performance criteria detailed in ICAO’s Manual on Location of Aircraft in Distress and Flight Recorder Data Recovery (Doc. 10054) published in 2019. Hence, ICAO does not impose the use of one identified technology but set guidelines and objectives to be complied with. As the deadline of the 1st of January 2025 approaches, some issues remain.

Non-exhaustive list of potential questions to be addressed by the delegates:

- 1) Is GADSS ready for global use in its current state?
- 2) How to ensure the interoperability of ADT systems?
- 3) What actions can be undertaken to make sure that the ADT systems will not be vulnerable to cyber-attacks?
- 4) Given the fact that the validation of the ADT systems is the responsibility of the State of the Operator, how to ensure a proper coordination with other interested States (such as

⁵ ICAO, “Autonomous Distress Tracking Of Aircraft In Flight”, at: <https://www.icao.int/WACAF/Documents/Meetings/2020/SAR%20Workshop/Autonomous%20distress%20tracking%20of%20aircraft%20in%20flight%20guidance%20material%20for%20IAMSAR.pdf>

the State of Design or the State of Registry)?

- 5) Having in mind that the lack of a valid ADT should have an effect on the Certificate of Airworthiness (CofA) of the aircraft (suspension or revocation), how can we prevent that the coexistence of different national standards would lead either:
 - a. To the obligation of having a functioning ADT onboard being disregarded, or
 - b. To States refusing to recognize the certificates issued by other Parties if they do not comply with their own national requirements, in contravention of Article 33 of the Chicago Convention?
- 6) As many countries still haven't adopted their national regulations to implement GADSS, what can be done to ensure compliance?