

AUTONOMOUS DISTRESS TRACKING (ADT)

Mr. David Edwards & LTJG Catherine Taylor Pravia
United States Coast Guard



TIMELINE - TRAGIC EVENTS & OPPORTUNITIES FOR IMPROVEMENTS

● 19 May 2016:

MS 804 Crash



● 08 March 2014 :

MH 370 Disappearance



● 01 June 2009 :

AF 447 Crash



Impact:

Raised a number of **concerns** with respect to the **public's trust** in international **civil aviation** and led to a series of rapid actions

May 2014:

ICAO Special Multidisciplinary meeting

June 2015:

GADSS concept made by Adhoc working group

March 2016:

ICAO Council adoption of GADSS-related global aircraft tracking initiatives

GLOBAL AERONAUTICAL DISTRESS AND SAFETY SYSTEM (GADSS)

- ICAO developed GADSS Concept of Operations, released June 2017.
- Evolved into SAR gaining the most benefit.
- The most important function for us is the Autonomous Distress Tracking (ADT).
- Basic information is in the 2019 edition of the IAMSAR Manual (Volume I, Appendix G and Volume II, Chapter 1) **AND** you can help decide what should go into the next edition for 2022.



AUTONOMOUS DISTRESS TRACKING (ADT)

- **01 January 2023** (ICAO granted 2 year delay from earlier date of 2021)
- **Brand new** aircraft to be outfitted with **ADT device**
- Applies to large passenger & cargo aircraft (long-haul flights).
- All aircraft with take-off weight greater than 27,000KG/30TON maximum certificated take-off mass or seating capability over 19.
- Mandated to autonomously **transmit information from which a position can be determined by the operator (airline, not the pilot)** at least once per minute when the aircraft is in a distress condition.



AUTONOMOUS DISTRESS TRACKING (ADT)

The ADT accuracy of position information shall, as a minimum, meet the position accuracy requirements established for Emergency Locator Transmitters (ELTs).

There are two high-level functional objectives for an ADT system:

1. receive timely notice of an airplane in a **"distress condition"** to facilitate timely SAR operations; and
2. locate an accident site within a 6 NM radius after a crash, based on last known position of the aircraft.



AUTONOMOUS DISTRESS TRACKING (ADT)

- As an incentive for ADT installation and to encourage retrofit by older aircraft, ICAO allows an ADT device to replace the automatic fixed ELT.
- An unintended consequence is that some aircraft may no longer be equipped with a 121.5-MHz homing transmitter since an ADT device is not required to have a homing transmitter.
- Global SAR community is fighting to retain 121.5 homing OR its equivalent
- Remember: All USCG aircraft can DF on 406-MHz signal.



AUTONOMOUS DISTRESS TRACKING (ADT)

- ICAO considers the ADT as a **notification** that an aircraft is in a **"distress condition"**
- Upon the triggering of an ADT transmission, the Aircraft Operator is responsible for validation of the transmission and initial checks, if possible, including attempted contact with the aircraft to confirm the situation.
- The Aircraft Operator would then notify the relevant Air Traffic Service Unit (ATSU) of the results, including if it was a false activation.
- The ATSU will **declare an emergency phase**, as appropriate, and notify the relevant RCC responsible for the aeronautical SAR region, providing the position of the aircraft and other relevant information – this is the long establish ICAO alerting procedure



AUTONOMOUS DISTRESS TRACKING (ADT)

- ICAO's intent was for the Aircraft Operator to receive the ADT notification AND to not specify the technology used. This enabled ICAO to retain its current aeronautical alerting procedures and not have to amend other ICAO standards.
- Aircraft Operators, ATSU's and RCCs need to ensure that their staff understand each other's roles, responsibilities and processes to ensure clear communication and coordination, and avoid, conflicting effort and unnecessary increased workload.
- To assist aircraft operators, ICAO established the "Location of an Aircraft in Distress Repository (LADR)".

LOCATION OF AN AIRCRAFT IN DISTRESS REPOSITORY (LADR)

- The repository is a secure web-based storage facility to store position/location information of aircraft in distress or potentially in distress and will be the means to make the last known position of that aircraft available to stakeholders in a timely manner and in a standard format.
- Appropriate stakeholders: Aircraft Operators, ATSU's and RCCs, will be notified of an ADT activation within their SAR region, and will be allowed access to the ADT data.
- The LADR enables consistency of coordination procedures between Aircraft Operators and ATSU's, and between ATSU's and RCCs when an emergency phase is declared.

LOCATION OF AN AIRCRAFT IN DISTRESS REPOSITORY (LADR)

- The LADR stakeholders will include the LADR Administrator (i.e. ICAO), and Contributors and Users as Subscribers. Users will have read-only access. RCCs, as LADR Users, will need to subscribe as an authorized user to access ADT data in the LADR.
- Subscribing to the LADR is voluntary. States should determine who in their government could have access to the LADR and for which categories of data. For example, an ATSU will have access only to ADT data within its FIR (plus a buffer zone around it).
- LADR contributor and functional specifications document(s) to be complete by June 2020.



- COSPAS-SARSAT has developed specifications for an ELT Distress tracking (ELT(DT)) device, which is a unique type of ADT device.
- COSPAS-SARSAT will distribute the ADT notifications from the ELT(DT) to the LADR, and also directly to the relevant RCCs under its existing procedures for ELT alerts transmitted at 406 MHz.



ELT (DT)

- ELT(DT) expected duration of operation is 370minutes (6.2hrs)
- ADT device not required to have 121.5 MHz homing capability
- ADT device de-activated only by the same mechanism that activated it
- ELT(DT) via Cospas-Sarsat distribution system - sent to RCCs and the repository.
This is different from the current ICAO alerting procedures.
- Cospas-Sarsat messages will contain additional information to assist the RCC decision-making process. Details are in the IMO Circular.
- Cospas-Sarsat has the capability to provide RCCs with the specific automatic trigger of the ELT (DT) with future system upgrades, they only **need a unified request from RCCs**. Should US RCCs seek this capability/change in the ELT(DT)?



ELT (DT)

ADT devices activated when the plane is still flying either **manually** by the crew OR via **4 automatic** triggers

(1) **Unusual attitude.**

The conditions may include, but are not limited to, excessive values of roll, pitch and yaw and their corresponding rates of change

(2) **Unusual speed.**

The conditions may include, but are not limited to, excessive vertical speed, stall condition, low airspeed, overspeed or other speed conditions.

(3) **Collision with terrain.**

The conditions may include, but are not limited to, high rate of closure to terrain or inappropriate altitude for the current position.

(4) **Total loss of thrust/propulsion on all engines.**

The parametric data used to define this condition may be engine performance parameters or other parameters that result from loss of thrust.

**IMO SUB-COMMITTEE ON
NAVIGATION, COMMUNICATIONS AND SAR
15-24 JANUARY 2020**

+

- IMO Circular **Interim Guidance for SAR Services Regarding Implementation of Autonomous Distress Tracking of Aircraft in Flight**
- IMO circular to be revoked as it is incorporated into the 2022 edition of the IAMSAR Manual.
- What is your advice on what parts of the Circular should go into the IAMSAR Manual?

Flight from London to Miami.
Outfitted with an ELT (DT).

