



AUTONOMOUS DISTRESS TRACKING (ADT)

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TIMELINE - TRAGIC EVENTS & OPPORTUNITIES FOR IMPROVEMENTS







Disappearance of Air France flight 447

Plane on route from Brazil to France with 228 people on board drops off radar screens at 0600 GMT



01:55:57am

Capt. Dubois goes on scheduled break, leaving two co-pilots in charge in the cockpit.

02:10:05am

Pitot tubes freeze. Air speed indicator goes haywire. Auto-pilot disconnects. Co-pilot Bonin now flying the plane.

02:10:07am

Co-pilot Bonin makes disastrous decision to pull the nose of the plane up. Plane starts to climb rapidly, which soon leads to aerodynamic stall.

02:10:11am

First stall warning. Nose is still up, vertical speed increasing.

02:11:22am

Top of the rollercoaster. The plane stalls, starts to fall out of the sky—dropping at 10,000 feet per minute.

02:11:43am

Capt. Dubois re-enters the cockpit. Says to Bonin, "What are you [expletive deleted] doing?" No one acknowledges the plane is in a stall.

02:12:30am

Co-pilot Bonin says: "Am I going down now?" Apparently so discombobulated he has no idea whether the plane is going up or down.

02:13:23am

Computer's synthetic voice announces "dual input" in the cockpit—the two copilots are putting contradictory inputs into their respective control sticks.

02:14:14am

Synthetic Voice: "Pull up!" But it is too late. Co-pilot Robert's last words: "We're going to crash. I can't believe it."

02:14:28 am

Air France 447 hits the water.



GLOBAL AERONAUTICAL DISTRESS AND SAFETY SYSTEM (GADSS)

- ICAO developed GADSS Concept of Operations, released June 2017.
- Will enhance aviation safety for crew and passengers of commercial aircraft and SAR responders.
- Idea is to not lose anymore aircraft out at sea and able to locate the aircraft.
- The 2019 edition of the IAMSAR Manual contains general guidance regarding GADSS that applies to certain aircraft.

GLOBAL AERONAUTICAL DISTRESS AND SAFETY SYSTEM (GADSS)

- The first phase commenced 1 January 2018 with Underwater Locating Device (ULD) on frequency 37.5 kHz attached to the aircraft flight recorder; and a ULD on frequency 8.8 kHz attached to the aircraft frame.
- The second phase commenced 8 November 2018 for the aircraft tracking function of automated reporting of position at least every 15 minutes.
- The next phase commences 1 January 2021 for the Autonomous Distress Tracking (ADT) function of reporting position updates at least once every minute.

GLOBAL AERONAUTICAL DISTRESS AND SAFETY SYSTEM (GADSS)

- OBJECTIVES

- (1) Ensure timely detection of aircraft in distress (timely initiation of SAR actions).
- (2) Ensure tracking of aircraft in distress and timely accurate location of end of flight (accurate direction of SAR actions).
- (3) Enable efficient and effective SAR operations.
- (4) Ensure timely retrieval of flight recorder data.

GLOBAL AERONAUTICAL DISTRESS AND SAFETY SYSTEM (GADSS)

- FUNCTIONS

(1) Aircraft Tracking

(2) Autonomous Distress Tracking (ADT)

(3) Post flight localization and recovery

AUTONOMOUS DISTRESS TRACKING (ADT)

- The ADT function would be used to identify the location of an aircraft in distress with the aim of establishing, to a reasonable extent, the location of an accident site within a 6 NM radius. The 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. These are to:
 - a) receive timely notice of an airplane in a distress condition to facilitate timely SAR operations; and
 - b) locate an accident site with high probability after a crash based on last known position of the aircraft.

AUTONOMOUS DISTRESS TRACKING (ADT)

- 01 January 2021
- **Brand new** aircraft to be outfitted with ADT device after 2021
- Applies to certain passenger & cargo aircraft.
- 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 at least once per minute when the aircraft is in distress.
- A specific technology is not mandated. One type is Cospas-Sarsat ELT Distress Tracking (ELT(DT))
- ELT(DT) expected duration of operation is 370minutes (6.2hrs)
 - **Note: Not 24 hours like an ELT**
- Distress can only be de-activated using the same mechanism that it was activated originally in case of recovery from distress
- Aircraft will be allowed to replace installed Automatic Fixed ELTs with ADT devices.
 - **Consequence – loss of homing and exact location**

Global Aeronautical Distress Safety System

ADT

• Autonomous Distress Tracking

Only protected aeronautical safety spectrum, or protected distress spectrum (e.g., 406.1 MHz), can be used

- Provides automatic A/C position at least once every minute
- Must be active prior to accident event
- Location of an accident site within 6 NM
- Operates autonomously of aircraft power
- Results in Distress signal to appropriate aircraft operator
- May be manually activated
- Cannot be isolated



ALERT

SAR

Accident Investigation
Authority



ELT (DT)

- COSPAS-SARSAT will start approving specialized ELTs for Distress Tracking (DT) in 2019
- Does not have the 121.5 MHz homing capability
 - May optionally equip 121.5 MHz homing
- Linked to new COSPAS-SARSAT system, alerts will be sent to RCCs
- Transmits position, aircraft ID and country of origin
- There will be a notification on the alert which will indicate whether if the ELT(DT) is in flight or has crashed
- For only 370minutes (6.2hrs)
- Every 5 seconds the first 2 minutes
- Every 10 seconds 2-5 minutes
- Every 30 seconds after 5 minutes
- There will be a part in the SIT report which states the age of the latest alert received. I.E "position 23-34.44N 070-33-.55W is less than 1 minute old"
- The only way to cancel the distress alert is by having the same reason it was activated solved

ELT (DT)

- Activated when the plane is still flying via 4 main **automatic** triggers (manual activation available)
 - (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.

AUTONOMOUS DISTRESS TRACKER



- Get aircraft position BEFORE the accident/crash.
- Help with past ELT issues of being destroyed after crash or not activating at all due to crash.

AUTONOMOUS DISTRESS TRACKER

QUESTIONS?

