GADSS AND ELT(DT)s

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The GADSS Concept

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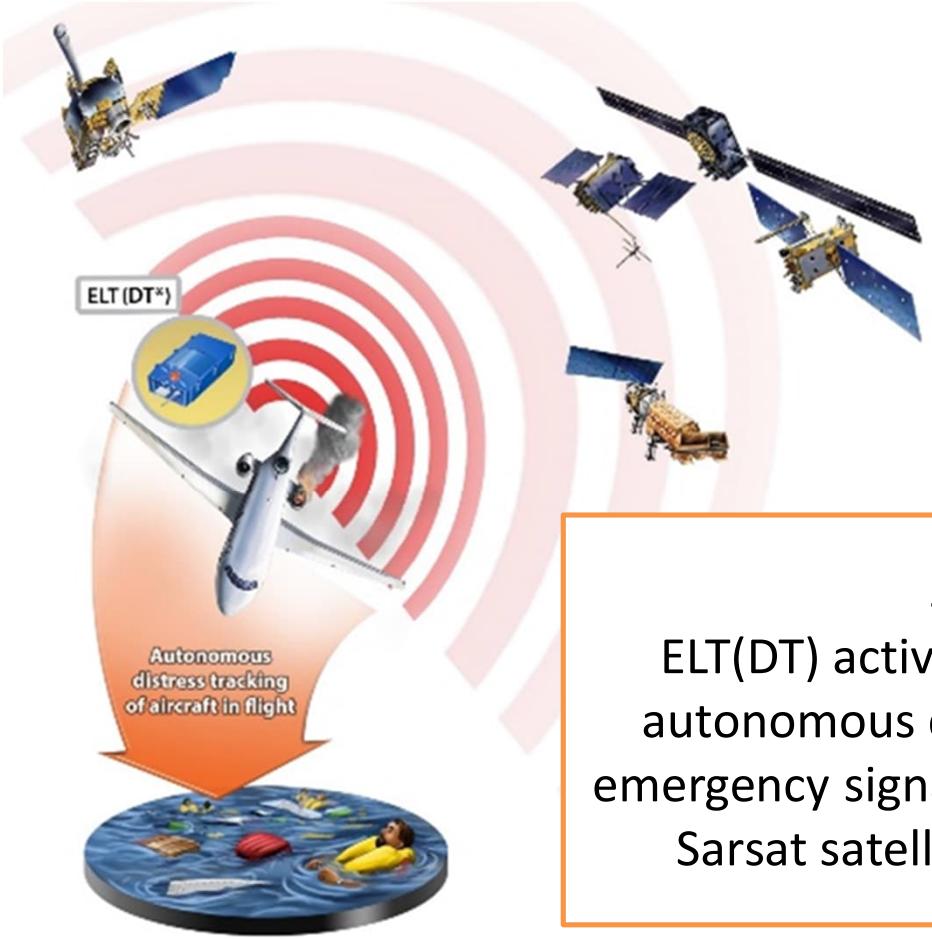
ELT(DT) for Distress Tracking



Scenario #1:
ELT(DT) activates independently upon autonomous detection in-flight aircraft emergency signaling the distress to Cospas-Sarsat satellites (MEOSAR* system).

COSPAS SARSAT

ELT(DT) Design

- ICAO: "*ADT is performance based and non-technology specific*"

Airbus, Boeing, Bombardier, Embraer,… (OEMs) have selected the ELT(DT) to satisfy:

- ICAO Annex 6 - GADSS recommendations
- European operational requirements (see ED-237).

ELT(DT) Design

- Linked to aircraft avionics for autonomous activation
- Start transmitting after 5 sec max after activation (FGB ELT = ~ 50 sec)
- Higher transmission rate than regular ELT:
  - Every 5 sec between T= 0 to T=2 min
  - Every 10 sec between T = 2 min to T = 5 min
  - Every 28.5 sec after T = 5 min

- Initially powered by aircraft; if disconnected, battery for > 370 minutes,
- Cancellation function (when activation criteria are no longer valid)
- Coded with ICAO 24-bit address (mode S) and Operator 3LD
- Provides GNSS position and altitude (range)
- Does not provide 121.5 MHz in flight
- Not supposed to survive a crash

ELT(DT) Design

Enhanced ELT(DT)s:

1. ELT(DT) designed to withstand a crash impact
   - ELT(DT) regular mode before a crash (>370 min)
   - ELT(DT) specific mode after “crash” detection
     - Every 5 sec between T = Crash and T = 30 min
     - Every 120 sec after T= 30 min
   - Total operating time (in-flight + after crash) >24h
   - Keep same Hex ID

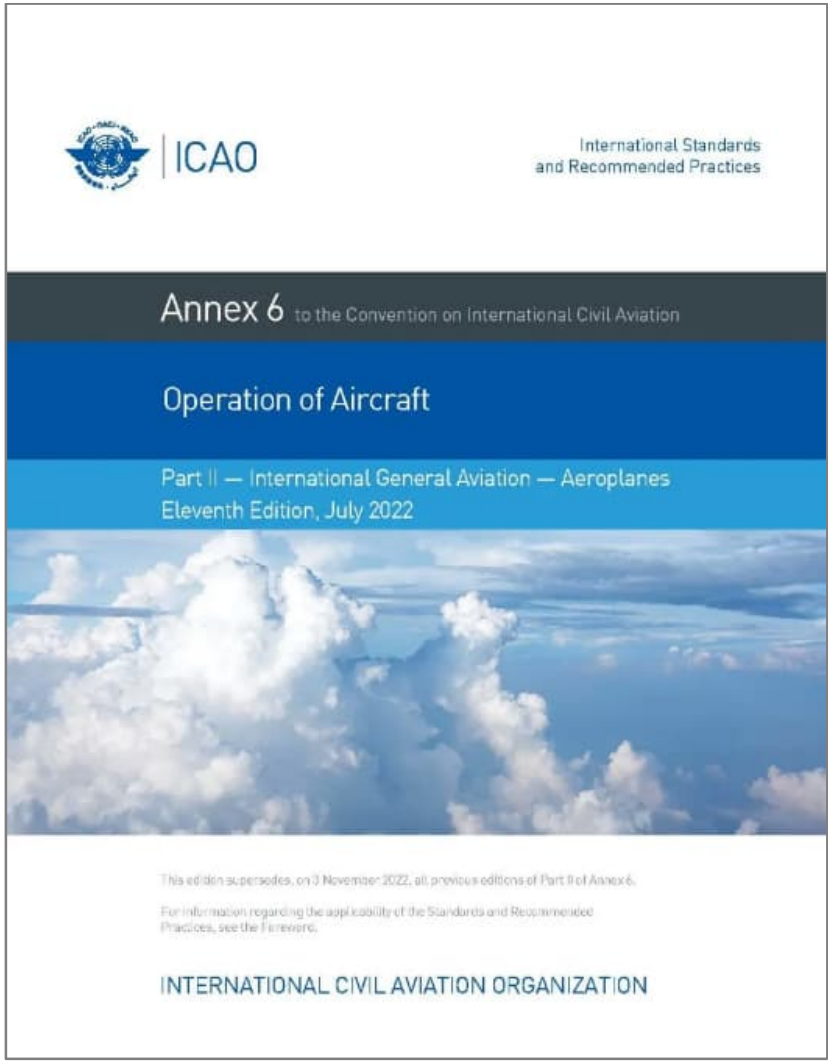
2. ELT(DT) combined with automatic ELT
   - ELT(DT) mode before a crash (>370 min)
   - ELT(Auto)* mode after a crash (>24h) with
     - 3LD once every 2 bursts for 5 minutes
     - Cancellation message capability
   - Keep same ELT(DT) Hex ID

ELT(DT) Readiness

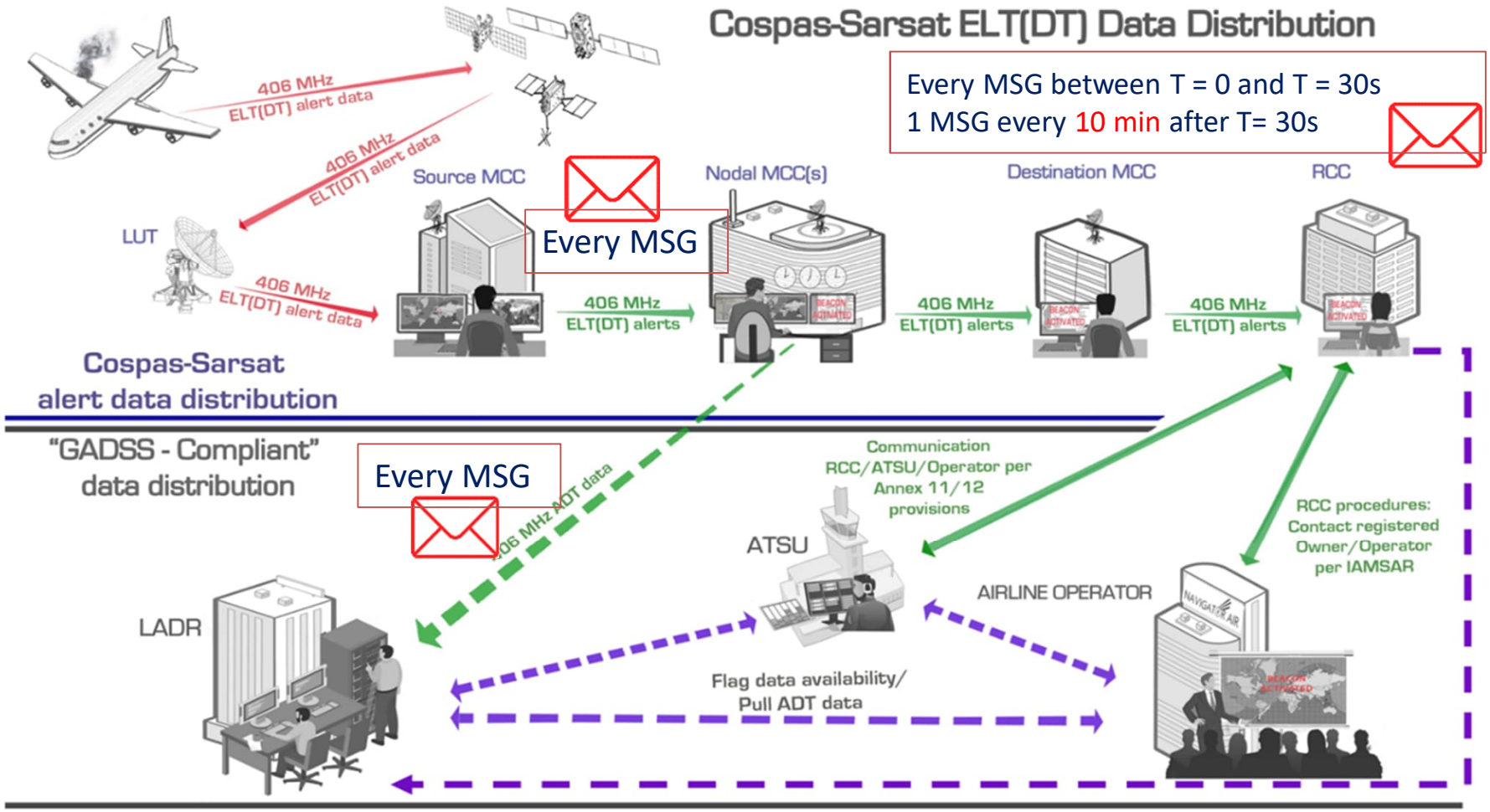
- Required ADT equipage date postponed to 1 Jan 2025
  - applicable to all aircraft over 27,000 kg first issued with a Certificate of Airworthiness from **1 January 2024**.
  - Several major airframers indicated ELT(DT) onboard as early as **March 2023**

=> FGB ELT(DT) was declared at FOC by C/S on 1 January 2023

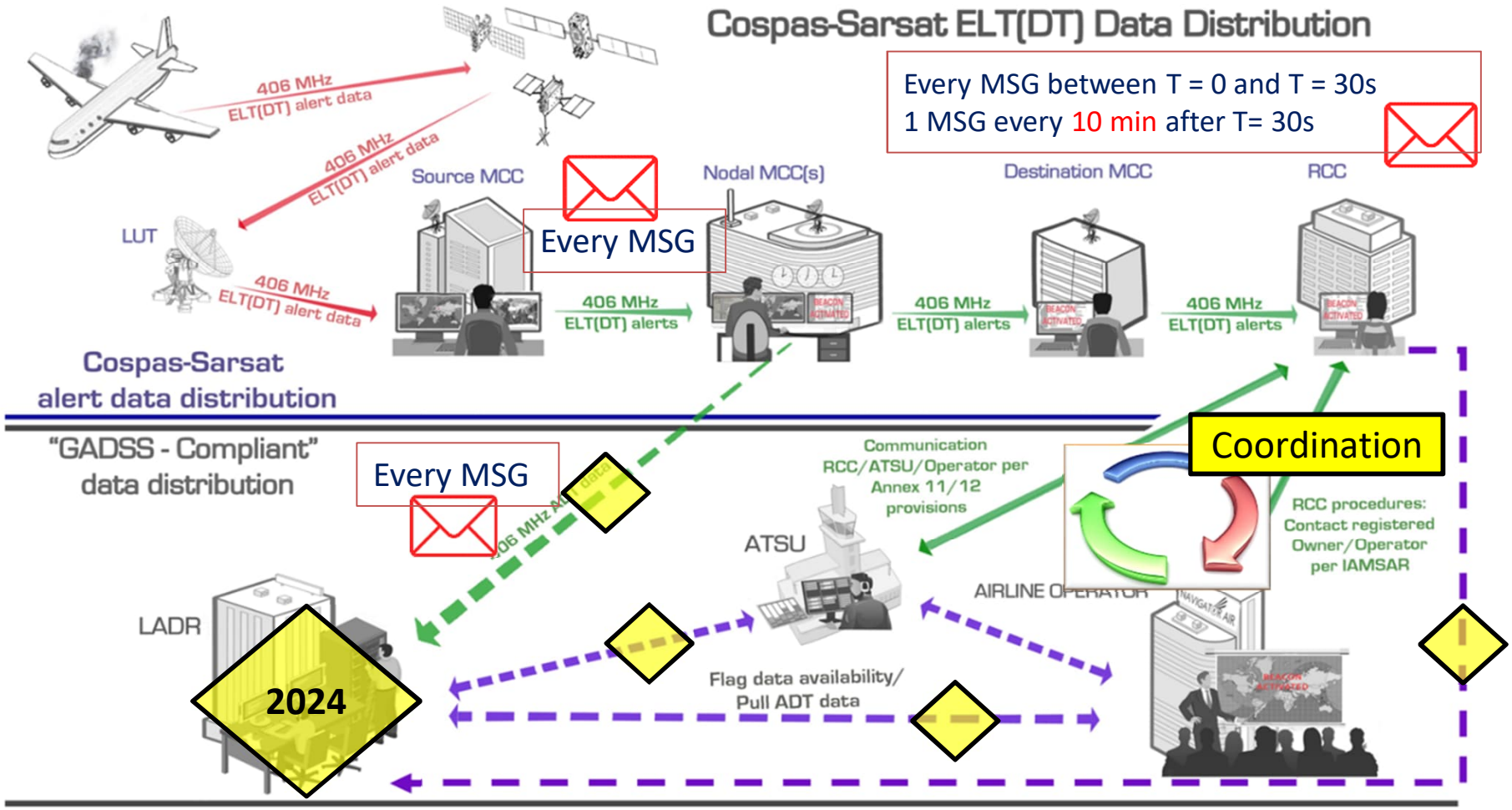
=> SGB ELT(DT) was declared at FOC by C/S on 1 January 2024.



ELT(DT) Data Distribution



ELT(DT) Data Distribution



Guidance to ATS and RCC

1. SIT 185 message also reports the detection of a signal from ELT(DT); Paragraph 1 will contain "**DISTRESS TRACKING**", and Paragraph 3 will clearly identify the source of the message as an "**ELT DISTRESS TRACKING**"

2. Study the basic event information provided in the ELT (DT) SIT 185:
   - Paragraph 3 provides "**flag" State of the aircraft** decoded from the **ICAO 24-bit address,** and the **aircraft operator 3LD** from the rotating field.
   - Paragraph 4 provides the **aircraft position (GNSS)**.

[~~*3. **Login to ICAO's LADR** to access all available information for this distress event, including the aircraft's **last known position** (LKP).*~~ *[LADR not ready]*

4. contact the appropriate **ATSU(s)** (and possibly the airline operator) per ICAO Annexes 11 and 12 to determine more information about the possible distress event, *contact information for both ATS unit and operator should be available within the new Ops Control Directory **[**when ready]* and/or listed in the RCC national/regional documentation and plans.

Guidance to ATS and RCC

~~*5. Monitor the LKP available in the LADR to assist in determining whether the aircraft is a* **fixed or moving target**~~*, in coordination with the appropriate ATSU and neighboring RCCs, as appropriate.* ~~*[LADR not ready]*~~

6. If necessary, request that the sending MCC **send more** of the data stored at the MCC level for the beacon event, to allow tracking of the flight using all (or more) of the information transmitted by the ELT(DT).

7. **Contact your supporting MCC** for any necessary clarifications about the content or the distribution of a SIT 185 message.

8. **Prepare for a SAR operation**, while monitoring incoming alerts for a possible cancellation message (SIT 185 **cancellation message**, Paragraph 1 will contain "**DISTRESS TRACKING COSPAS-SARSAT USER CANCELLATION ALERT**").

9. Launch SAR activities per national procedures (and IAMSAR manual guidance)…

Independent Post-Crash Position

Because the Cospas-Sarsat System has been designed to provide an “independent” location (i.e., a location from the C/S System itself using Doppler & TOA/DOA processing - and not from internal GNSS-receiver from the beacon itself), these “independent” locations will also be provided for any ELT(DT) transmitting in post-crash-activation mode.

(Ground Segment equipment software upgrade is in progress).

• FGB ELT(DT) SIT Message

1. **DISTRESS TRACKING** COSPAS-SARSAT INITIAL ALERT
2. MSG NO 21013 CMCC REF 1D1220F03BBFDFF
3. BEACON MESSAGE INFORMATION
   BEACON TYPE **ELT DISTRESS TRACKING**
   AIRCRAFT 24 BIT ADDRESS 41E077 ASSIGNED TO G BRITAIN
   AIRCRAFT OPERATOR DESIGNATOR MMB
   HEX ID 1D1220F03BB**FDFF**
   COUNTRY OF BEACON REGISTRATION 232/G BRITAIN
   ACTIVATION TYPE **AUTOMATIC BY EXTERNAL MEANS (AVIONICS)**
   GNSS POSITION PROVIDED BY EXTERNAL DEVICE
4. ALERT POSITION INFORMATION
   DETECTED AT 04 AUG 23 101501 UTC BY MEOSAR
   ALERT LAST DETECTED AT 04 AUG 23 101501 UTC
   GNSS - 61 54.40 N 045 37.53 W
   UPDATE TIME WITHIN 2 – 60 SECONDS OF DETECTION TIME
   ALTITUDE OF GNSS LOCATION BETWEEN 1600 AND 2200 METRES
   (BETWEEN 5200 AND 7200 FEET)
5. OTHER INFORMATION
   GNSS POSITION UNCERTAINTY PLUS-MINUS 2 SECONDS OF LATITUDE AND LONGITUDE
   DETECTION FREQUENCY 406.0400 MHZ
6. REMARKS
   THIS DISTRESS TRACKING MESSAGE IS BEING SENT TO APPROPRIATE SAR AUTHORITIES. PROCESS THIS ALERT ACCORDING TO RELEVANT REQUIREMENTS

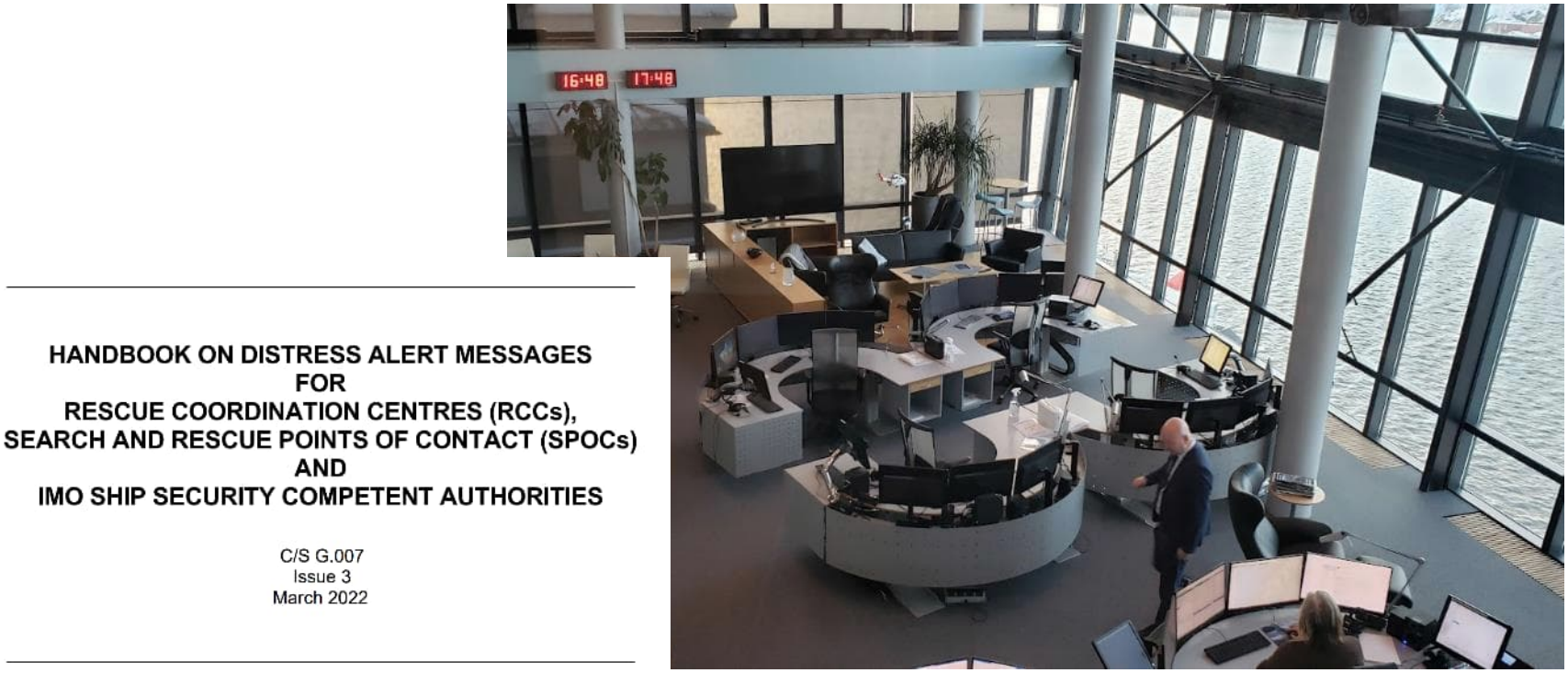
END OF MESSAGE

• SGB ELT(DT) SIT Message

1. **DISTRESS TRACKING** COSPAS-SARSAT DOA POSITION MATCH ALERT
2. MSG NO 00192 AUMCC REF B274FA041FD4710
3. BEACON MESSAGE INFORMATION
   BEACON TYPE **SGB – ELT DISTRESS TRACKING**
   AIRCRAFT 24 BIT ADDRESS 7100CE ASSIGNED TO SAUDI ARABIA
   AIRCRAFT OPERATOR DESIGNATOR SVA
   TAC 16001 SERIAL NO 509
   HEX ID **B274FA041FD4 7100CEA3F00**
   COUNTRY OF BEACON REGISTRATION 403/SAUDI
   ACTIVATION TYPE AUTOMATIC BY BEACON (G-SWITCH/PROBABLE CRASH)
4. ALERT POSITION INFORMATION
   DETECTED AT 03 MAY 23 085310 UTC BY MEOSAR
   ALERT LAST DETECTED AT 03 MAY 23 085310 UTC
   GNSS - 02 24.40 N 046 04.11 E
   TIME OF GNSS POSITION UPDATE: 03 MAY 23 085308 UTC
   TIME SINCE GNSS LOCATION GENERATED: 0 MINUTES
   ALTITUDE OF GNSS LOCATION: 125 METRES (410 FEET)
   DOA - 02 25.1 N 046 06.2 E ESTIMATED ERROR 001NMS
5. OTHER INFORMATION
   BEACON CHARACTERISTICS PER TAC DATABASE PROVIDED IN A SEPARATE MESSAGE
   GNSS POSITION UNCERTAINTY PLUS-MINUS 10 METRES
   ELAPSED TIME SINCE ACTIVATION: 0 HOURS
   REMAINING BATTERY CAPACITY BETWEEN 75 AND 100 PERCENT
   DETECTION FREQUENCY **406.05 MHZ**
   ELT(DT) POSITION DOES NOT REFERENCE ANY PREVIOUS POSITION
6. REMARKS
   THIS DISTRESS TRACKING MESSAGE IS BEING SENT TO APPROPRIATE
   SAR AUTHORITIES. ROCESS THIS ALERT ACCORDING TO RELEVANT REQUIREMENTS.

END OF MESSAGE

Cospas-Sarsat RCC Handbook



Further guidance for RCCs are available in the Cospas-Sarsat RCC Handbook available on the Cospas-Sarsat/Pro website <here> (See also document C/S A.002 for SIT185 messages)

ELT(DT) Inappropriate Activations

By design, an ELT(DT) should transmit less than 1 false activation per 50.000 hrs of flight (i.e., once in a 12-year beacon lifetime operated 12hrs a day).

However, many inappropriate manual activations (on ground / even manually in flight) have been detected since 2023.

Appropriate discussions are in progress with aircraft manufacturers and airline operators to remedy this important concern for the C/S System and SPOCs/RCCs.

Annex

Rationale for ADT early alerting to RCCs: Triggered Transmission of Flight Data Report, March 2011

- For all accidents studied, after triggering criteria* are met:
  - 50% of aircraft impact the ground within 30 seconds,
  - 85% of aircraft impact the ground within 3 minutes, and
  - 95% within 6 minutes

- Draft letter to SPOCs to provide guidance on actions to take after receipt of an ELT(DT) alert will be discussed at JC-36

* based on ED-237, i.e., a/c very likely to be in distress