Aeroplane distress signals go high-tech

Next-generation satellite technology is proving instrumental in advancing search and rescue operations in the sky and at sea. New equipment to speed up adoption of the technology has successfully been developed and is now in operation.

Rapid search and recovery in plane and ship disasters is crucial for saving lives. From the ill-fated Air France Flight 447 to Malaysia Airlines Flight 370, air disasters over the ocean have been hard to locate accurately. This prompted the International Civil Aviation Organization (ICAO) and related stakeholders to revamp how aircraft are tracked by conceiving the integrated Global Aeronautical Distress and Safety System (GADSS).

To support this mission, the EU-funded GRICAS project worked on developing the Autonomous Distress Tracking (ADT) system for commercial aircraft. "Today's aeroplane satellite beacons are based on manual activation and shock detection but do not work well when the aircraft is in motion or when the aircraft crashes in the ocean," says project partner Thibaud Calmettes. "Europe's new Galileo global navigation
The new approach promises to improve accuracy from 5 km to 200 m and to locate aircraft in just 2 minutes rather than the current 2 hours. This could ultimately help save lives where every minute counts and provide critical insight into accidents.

New technology takes beacon alerts to a new level

Galileo enables real-time positioning of aircraft in distress and high-accuracy positioning in general, supported by improvements in the current International Cospas-Sarsat Programme, the satellite-aided search and rescue initiative. Cospas-Sarsat initiated improvements based on next-generation medium-Earth orbit search and rescue (MEOSAR) technology, which combines the strengths of previous low-Earth orbit, LEOSAR, and geostationary, GEOSAR, technologies. “GRICAS contributed to validating the feasibility of the GADSS/ADT concept based on the MEOSAR breakthrough,” highlights Calmettes. “It helped define operational concepts of ADT, advance automatic activation of in-flight–triggered distress beacons and enhanced how ground stations can get the system to meet the needs of civil aviation,” he explains.

With the new technology based on Cospas-Sarsat MEOSAR, any aircraft in distress can be located and tracked all over the globe. “This is also the case when no other system is available anymore aboard the aircraft,” reveals Calmettes. “In line with ADT recommendations backed by the ICAO, the beacon is fully autonomous and powered by its own power supply, without having to depend on any other onboard system to initiate location capability,” he clarifies. One of the most important features in the new technology is that Galileo allows two-way communication with the beacon and can send back pivotal messages as dangerous situations unfold.

Project advances already being adopted

The ICAO Autonomous Distress Tracking Recommendation requires that all commercial aircraft be equipped with the ADT system from 2021 on. In this light, the MEOSAR technology is ready for the market, with GRICAS having validated its successful performance.

Furthermore, project coordinator Thales Alenia Space has released a resulting product on the market, known as MEOLUT-Next, which conforms to the new technology. “MEOLUT-Next represents the ground station equipment that can collect and process the relevant search-and-rescuesignals relayed by Galileo and other GNSS satellites,” states Calmettes.

The new beacon technology was also recently tested in seaborne vessels, proving its worth where traditional radio contact was ineffective due to weather conditions, leading to the rescue of several people. Overall, Thales Alenia Space’s breakthrough technology has proven to be more effective and quicker than all previous technologies by exploiting the powerful MEOSAR system. This has already led to saving lives, time and money.

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