HAWKEYE ADT

AUTONOMOUS

DISTRESS TRACKING

(ADT) FOR ICAO-GADSS

COMPLIANCE

/////////////////////////////

The HawkEye ADT provides ICAO-GADSS compliant tracking and adds voice communication via Iridium satellite for reliable global reach, with dual modem redundancy for increased safety. Product includes global navigation satellite system (GNSS) receivers and a powerful attitude heading reference system (AHRS) processor for evaluating aircraft state.

COMPLETE ICAO-GADSS COMPLIANCE

The standards were developed by the ARINC Airlines Electronic Engineering Committee (AEEC) based on tracking requirements and objectives for airline operators developed by the International Civil Aviation Organization (ICAO) in the Doc 10054 on locating aircraft in distress.

This ICAO Global Aeronautical Distress and Safety System (GADSS) requirement is already enforced in some regions and is required everywhere by January 1, 2021.

The HawkEye ADT is the first aircraft device developed to provide airline operations centers (AOCs) full autonomous distress tracking (ADT) compliance with ICAO-GADSS.

FUNCTIONALITY //

OVERVIEW

The HawkEye ADT is an ICAO GADSS specification compliant satellite-based system that works on aircraft operating anywhere in the world. The product automatically reports aircraft position information for normal operations and defined distress anomalies. Position reports identify the aircraft and include critical 4D+3 parameters: time (UTC), latitude, longitude, altitude, heading, airspeed, and status; normal, abnormal (and why), distress (and why).

Additional events can be reported (e.g., take-off and landing, variable reporting rates, etc.) These individual position reports can be remotely configured at the discretion of the aircraft operator.

The HawkEye ADT is a Federal Aviation Administration (FAA) certified product designed to be easy to install, operate, and maintain. The product derives power from the aircraft electrical bus and has an additional internal battery for resilience in the event of aircraft power failure. The HawkEye ADT also includes two-way global voice communications capabilities, as well as a redundant tracking capability for increased resilience.

The system includes a cockpit panel switch that the crew can activate to notify the aircraft operator in the event of a perceived emergency during flight. The HawkEye ADT hosts an independent 4D+3 GNSS capability as well as an AHRS module that can autonomously (independent of crew activation) determine possible distress. It also includes ARINC 429 read only data inputs to calculate "out of bounds" criteria defined by the operator.

Position report messages are routed via the Iridium satellite network directly to the AOC using SkyRouter, Blue Sky Network's aircraft tracking software platform. When the ADT is activated (autonomously or by the crew) position reports accelerate to one-minute intervals to the AOC where further action can be initiated.

REPORTS

Time / Distance Changes
Report aircraft position periodically based on lapsed time or distance changes.

Aircraft Event
Report aircraft position based on data from internal GNSS capability.

Flight Event
Report aircraft position during normal tracking based on programmable movement events (e.g., OOOI).

Autonomous Distress Event
Report aircraft position automatically based on AHRS behavior determined to be abnormal and begin one-minute interval reporting.

Geofencing Event
Report aircraft position based on behavior related to geographically-defined boundaries.

Manual Distress Event
Report aircraft position manually triggered by the crew during actual or perceived distress.

Remote Configuration
All reporting parameters can be configured and updated remotely to support AOC objectives.

Custom Event
Report aircraft position based on compound rules using multiple data sources to fit your custom scenarios.

FEATURES

- AHRS for increased aircraft state determination
- Wide-range power supply voltage for installation flexibility
- Dual Iridium satellite data modems for reliable 100% global transmission
- Additional satellite voice capability for global two-way communications
- Powerful data processor for advanced evaluation required by ADT
- Redundant GNSS receivers for reliable and resilient tracking data
- Read-only ARINC 429 data inputs for specific critical aircraft status details
- Standard Ethernet port for easy maintenance
- Backup battery for autonomous ADT operation in the event of aircraft power loss
- Complete installation kit included for fast and efficient deployment
- Remote cockpit panel push toggle switch for quick manual distress trigger
- Compact and lightweight

100% GLOBAL
Transmission & 2-way communications

AHRS
For increased aircraft safety

AUTONOMOUS
ADT operation in event of power loss

BLUE SKY NETWORK ADT SYSTEM ///////////////

1. **GNSS satellite** provides positioning information to the aircraft antenna.

2. **HawkEye ADT** system detects distress condition and within five seconds transmits minute-by-minute position reports. System has battery backup power, allows manual activation and can be deactivated only by the process that activated it.

3. **Iridium satellite** relays position reports through protected aeronautical safety/distress spectrum provided by the Iridium satellite constellation.

4. **Ground system** receives position reports from satellite and sends them to the AOC via Blue Sky Network's SkyRouter tracking platform.

5. **SkyRouter** tracking platform provides secure web access to position reports displayed graphically on a map and other flight data.

6. **Airline Operations Center (AOC)** monitors position reports and other flight data received for higher operational efficiency and situational awareness.

7. **Location of Aircraft in Distress Repository (LADR)** receives data after AOC validates distress and initiates the data feed.

HawkEye ADT:
- ADT box
- GNSS antenna
- Iridium antenna
- Remote cockpit trigger
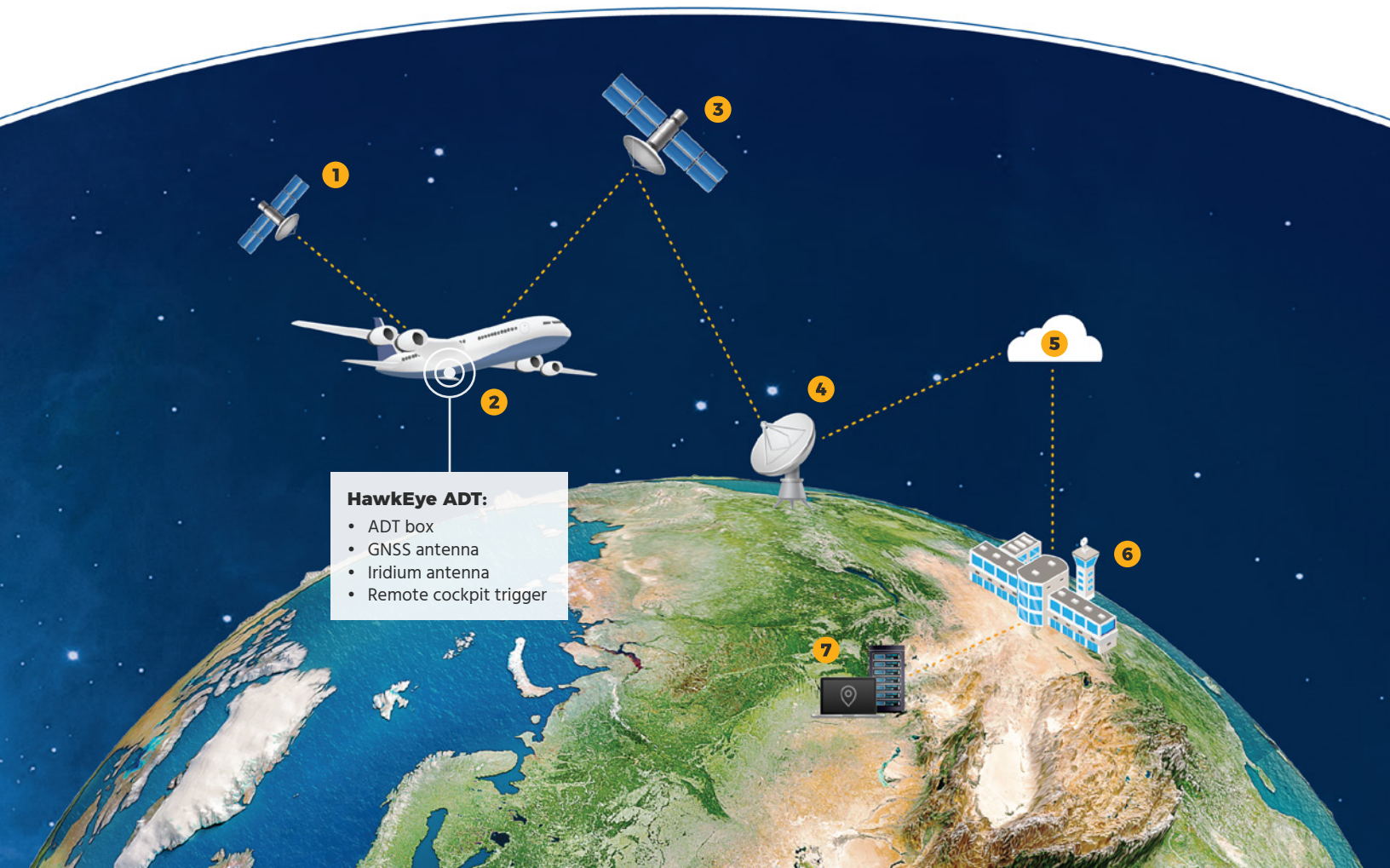
SKYROUTER COMMAND CENTER

SkyRouter is a cloud-based fleet management solution that can track, monitor, and provide communications for all your assets, anywhere in the world, from one online portal. SkyRouter communicates with tracking hardware to provide a secure web interface that displays positions on various overlay maps. It also handles two-way message traffic, events, alerts, and telematic data. SkyRouter lets you monitor, control, interact, and communicate with your assets in real-time, from anywhere.

IRIDIUM SATELLITE NETWORK

Iridium operates the world's largest commercial constellation, with a mesh architecture of 66 cross-linked low-earth orbit (LEO) satellites providing inherent performance and dependability advantages. At only 476 miles (780 km) from the Earth, the proximity of Iridium's LEO network means pole-to-pole coverage, a shorter transmission path, stronger signals, lower latency and shorter registration times.

Iridium's global constellation is supported by a recently upgraded, extensive ground infrastructure that ensures high reliability and capacity of the communications network through multiple layers of redundancy, security, and back-up systems for all critical functions.

OVERVIEW

What is GADSS?

Following several recent high profile accidents where downed aircraft could not be efficiently located, or at all, the Global Aeronautical Distress and Safety System (GADSS) recommendations were adopted by the International Civil Aviation Organization (ICAO) in March 2016.

What are the main goals of GADSS?

The GADSS concept of operations is to provide autonomous global, end-to-end tracking of commercial flights so that an aircraft is never "lost." It focuses on the detection of aircraft in distress anywhere in the world. It supports accurate tracking throughout the flight so the search and rescue (SAR) procedure can be initiated, if required, and rescuers directed to the correct location. This process enables more efficient SAR operations as well as timely retrieval of the flight data recorder (FDR).

What are the three standards of GADSS?

To make aircraft flight safer, ICAO has identified tracking components and technologies for three operation phases:

› **Aircraft tracking (AT) during normal operations** – The aircraft position information needs to be updated and available to the airline operations center (AOC) and air traffic services (ATS) and provide:

- 100% global coverage

- Automated 4D 15-minute tracking

- Two-way link between GADSS system and the AOC

› **Autonomous distress tracking (ADT) during abnormal operations** - The aircraft position information needs to be updated and additionally provide:

- Independent detection of aircraft in distress

- Autonomous activation of one-minute reporting when an aircraft is in a distress condition, without the need for flight crew action

- Automated 3D one-minute tracking

- Resilience to loss of aircraft power, communication and navigation systems

› **Post-flight localization and recovery** - Accurate aircraft position information to locate aircraft within 6 NM of termination.

When will the regulation be applicable?

The aircraft tracking function under normal operations was applicable on November 8, 2018.

Who is covered and which airplanes are impacted?

As of January 1, 2021, all three standards of GADSS will apply to all new-built aircraft with take-off weight greater than 27,000 kg. Other new aircraft with take-off weight greater than 5,700 kg are also recommended to comply with the GADSS requirement from the same date.

COMPLIANCE

The HawkEye ADT is the key component of the Blue Sky Network ADT system and it is set to provide full alignment with ICAO-GADSS defined concept of operations.

ICAO GADSS Required Capabilities	FANS/ADS-C	ACARS	HawkEye ADT	ADS-B[1]	ELT(DT)[2]
100% global coverage	✔ [3]	✔ [3]	✔	✔ [4]	
Automated minimum 4D 15-minute tracking [5]	✔	✔ [6]	✔	✔ [4]	✔ [6]
Two-way link between Aircraft GADSS system and AOC		✔	✔		
Independent detection of aircraft in distress and autonomous activation of one-minute reporting			✔		✔ [2,6]
Resilient to failures of aircraft systems (power, communications and navigation systems)			✔		[7]
Additional Device Capabilities					
Distress definition is definable and configurable on device firmware by AOC			✔		
Satellite voice communication capability			✔		
Real-time notifications of normal phases of flight [8]			✔		
Flight operations software included for AOC implementation			✔		

[1] Ground-based and space-based ADS-B have significantly different capabilities

[2] Architecture requires additional component(s) to process input from aircraft systems and to detect and trigger ADT logic

[3] Only if Iridium-based

[4] Space-based ADS-B only

[5] Not required if reliable ATS surveillance is always available at 15-minute or better intervals

[6] Assumed, but unclear at this point

[7] Power only; not resilient to communication/navigation systems failures

[8] Examples include automated take-off / landing, 3D geofencing, variable reporting rates, OOOI times, ETA, ETE, route deviations, etc.

FAA CERTIFICATION

The HawkEye ADT is certified by the FAA and has an approved model list supplemental type certificate (AML-STC) for Boeing 737 type series.

SPECIFICATIONS ///

Physical Properties

› Aluminum enclosure: 5.25" x 10.75" x 2.24"
› Weight: 3.2 lb (max)

Operating Environment

› Operating temperature: -30°C to +70°C
› Operating humidity: ≤ 75% RH
› Storage temperature: -40°C to + 85°C
› Storage humidity: ≤ 93 % RH

Dual Iridium Modems

› ADT channel: Single purpose ICAO-compliant ADT
› Voice channel: Iridium voice and redundant aircraft tracking

Power Requirements

› ADT channel: 30 W (max)
› Voice channel: 15 W (max)
› Input voltage range: 10 VDC to 32 VDC
› Internal battery capacity: ~2 hours of one-minute reporting (only applicable to ADT channel)

Interface Connectors

› ADT and voice channels each have:
  • MIL-DTL-38999: for power & data inputs
  • TNC: for Iridium antenna
  • SMA: for GNSS antenna

Data Inputs

› ARINC 429 label input (read-only) with discrete recognition for key flight system monitoring and trigger for potential distress event

GNSS Receivers

› Each channel hosts its own GPS receiver
› Location acquisition within one second at up to 2.5 meter accuracy

Flight Deck Control Panel

› ADT distress notification annunciator with dimmer control
› RJ-11 port for POTS telephone operations
› ADT distress notification annunciator with dimmer control

Environmental Qualifications

› Hardware tested to RTCA/DO-160G qualifications applicable to part 25 and part 121 aircraft

FAA approved AML-STC for B737 models

INSTALL KIT

› Comprehensive parts and instructions included (Iridium/GPS TSO'd antennas, coax cables, custom sheet metal, full length fuselage wire harness, cockpit switches, circuit breakers, etc.)

› Weight: < 20 lb

ANY OPERATION
ANY ASSET
ANYWHERE

CERTIFIED QUALITY
ISO
9001:2015
MANAGEMENT SYSTEM

Blue Sky Network

ATS AIRCRAFT TRACKING SOLUTIONS

iridium   GSA   Bluetooth   WiFi   Download on the App Store   GET IT ON Google Play   FC   ANATEL