



ICAO

Doc 10150

Manual on the Functional Specifications for the Location of an Aircraft in Distress Repository (LADR)

First Edition, 2021



Approved by and published under the authority of the Secretary General

INTERNATIONAL CIVIL AVIATION ORGANIZATION



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AMENDMENTS

Amendments are announced in the supplements to the *Products and Services Catalogue*; the Catalogue and its supplements are available on the ICAO website at www.icao.int. The space below is provided to keep a record of such amendments.

RECORD OF AMENDMENTS AND CORRIGENDA

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FOREWORD

The purpose of the functional specifications for the Location of an Aircraft in Distress Repository (LADR) is to define the requirements for a centralized repository of location information resulting from activations of aircraft distress tracking systems. The Repository enables operators to meet the requirements of Annex 6 — *Operation of Aircraft, Part I — International Commercial Air Transport — Aeroplanes*, Chapter 6, 6.18.3 to make position information of a flight in distress available to appropriate organizations, as established by the State of the Operator, while also meeting the expectation from the search and rescue (SAR) community that such information will be held in a single place such that information from different autonomous distress tracking (ADT) systems would be collected together, thereby facilitating quick access to the last known position of the aircraft.

All previous draft versions of this document were made available in the Global Flight Tracking Section of the ICAO public website at: <https://www.icao.int/safety/globaltracking/Pages/Homepage.aspx>.

Version 1.0 was developed from the Distress Tracking Repository (DTR) White Paper and published after review by the Autonomous Distress Tracking Repository Task Force (ADTR-TF) in August 2018.

Version 2.0 incorporated the outcomes of the DTR Functional Workshop held at ICAO from 9 to 11 April 2019. As part of the workshop's discussion, a proposed change to the name of the repository was discussed, resulting in the renaming of the document.

Version 3.0 was updated as a result of the DTR Technical Workshop held at Cospas-Sarsat, from 1 to 3 July 2019 in Montréal. Following this workshop, the format of the functional specification was completely revised to facilitate the tendering process for development of the LADR. Changes in performance measurements and other minor amendments resulted in Version 3.1, which incorporated requirements for a basic web viewer to be included as part of the functionality and subsequently revised (Version 3.2) with additional editorial changes.

Version 4.0 was developed following the LADR prototype virtual workshop in August 2020, which provided additional information regarding the use and functionality of the LADR, based on discussions around scenarios simulating activations of distress tracking systems and subsequent submission of data to the repository. Version 4.0 was again amended to allow for the publication as an ICAO document.

On 2 March 2016, the ICAO Council adopted Amendment 40-A to Annex 6 — *Operation of Aircraft, Part I — International Commercial Air Transport — Aeroplanes*, which included, among other elements, Standards and Recommended Practices (SARPs) related to the location of an aeroplane in distress (Chapter 6, 6.1.8, refers). These SARPs address the Global Aeronautical Distress Safety System (GADSS) autonomous distress tracking (ADT) concept and became effective on 11 July 2016, with an applicability date of 1 January 2021. Amendment 40-A was issued in July 2016.

The SARPs are applicable to aeroplanes with a take-off mass greater than 27 000 kg for which the certificate of airworthiness is first issued as of 1 January 2021, and establish the requirement to autonomously transmit information from which a position can be determined by the operator at least once every minute when in a distress condition. The same is recommended for new aeroplanes for which the certificate of airworthiness is first issued as of 1 January 2021 with a take-off mass greater than 5 700 kg. An aircraft is considered in distress when it is in a state that can, if the behaviour event is left uncorrected, result in an accident.

The SARPs state that the autonomous transmission of position information needs to be active when an aircraft is in a distress condition. This will provide a high probability of locating an accident site to within a 6 NM radius. Annex 6, Part I, Appendix 9, also specifies that this transmission can be activated manually. Annex 6 is not technology-specific and will allow for various solutions, including triggered transmission systems. The autonomous transmission of position information needs to be capable of occurring in the event of aircraft electrical power loss, at least for the expected duration of the

entire flight. For further details regarding the requirements for an ADT system, refer to the *Manual on Location of Aircraft in Distress and Flight Recorder Data Recovery* (Doc 10054).

The SARPs also establish the requirement for making this information available to authorities such as: rescue coordination centres (RCCs); air traffic services units (ATSUs); and others as determined by the State of the Operator.

Performance-based standards for ADT systems allow the industry develop different degrees of innovation. The challenge, however, is to make the ADT position information available in a standard format for the primary intended audience, the RCCs and ATSUs. To accomplish this, the Global Aeronautical Distress and Safety System (GADSS) concept of operations (CONOPS) identified the need to store and provide access to ADT position information by means of a centrally managed repository, originally referred to as the Distress Tracking Data Repository and now referred to as the LADR, and implemented in accordance with the guidelines provided in the *Manual on System Wide Information Management (SWIM) Concept* (Doc 10039).

Additional provisions have been drafted for the *Procedures for Air Navigation Services — Aircraft Operations*, Volume III — *Aircraft Operating Procedures* (PANS-OPS, Doc 8168) which will require that the information related to the position of an aircraft in distress be provided to the centrally managed repository.

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GLOSSARY

LIST OF ACRONYMS

ADT	Autonomous distress tracking
AFTN	Aeronautical fixed telecommunication network
AIRAC	Aeronautical information regulation and control
ANSP	Air navigation services provider
AMQP	Advanced message queuing protocol
ATC	Air traffic control
ATS	Air traffic service
ATSU	Air traffic services unit
DNA	Data Network for Aviation
ELT	Emergency locator transmitter
FIR	Flight information region
FIXM	Flight Information Exchange Model
GADSS	Global Aeronautical Distress Safety System
GIS	Geographic information system
LADR	Location of an Aircraft in Distress Repository
RCC	Rescue coordination centre
SAR	Search and rescue
SARPs	Standards and Recommended Practices
SELCAL	Selective calling system
SMS	Short message service
SSR	SAR region
SWIM	System-wide information management
TI	Technical infrastructure
TLS	Transport layer security

DEFINITIONS

Aircraft tracking. A process, established by the operator, that maintains and updates, at standardised intervals, a ground-based record of the four dimensional position of individual aircraft in flight.

Air navigation system. A generic term for all systems as detailed in the ICAO Annexes and any related systems required to interface with these aviation systems.

Air traffic service (ATS). A generic term meaning variously, flight information service, alerting service, air traffic advisory service, air traffic control service (area control service, approach control service or aerodrome control service).

Alerting service. A service provided to notify appropriate organizations regarding aircraft in need of search and rescue aid, and assist such organizations as required.

Alerting post. Any facility intended to serve as an intermediary between a person reporting an emergency and a rescue coordination centre or rescue sub centre.

Automatic deployable flight recorder (ADFR). A combination flight recorder installed on the aircraft which is capable of automatically deploying from the aircraft.

Autonomous distress tracking (ADT). The capability using transmission of information from which a position of an aircraft in distress can be determined at least once every minute and which is resilient to failures of the aircraft's electrical power, navigation and communication systems.

Note. — This capability is described under 'Location of an Aeroplane in Distress' in Annex 6, Part 1.

Cospas-Sarsat System. A satellite-based system designed to detect and locate activated distress beacons transmitting in the frequency band of 406.0-406.1 MHz and to distribute these alerts to RCCs.

Emergency locator transmitter (ELT). A generic term describing equipment which broadcast distinctive signals on designated frequencies and, depending on application, may be automatically activated by impact or be manually activated. An ELT may be any of the following:

Automatic fixed ELT (ELT(AF)). An automatically activated ELT which is permanently attached to an aircraft.

Automatic portable ELT (ELT(AP)). An automatically activated ELT which is rigidly attached to an aircraft but readily removable from the aircraft.

Automatic deployable ELT (ELT(AD)). An ELT which is rigidly attached to an aircraft and which is automatically deployed and activated by impact and, in some cases, also by hydrostatic sensors. Manual deployment is also provided.

Survival ELT (ELT(S)). An ELT which is removable from an aircraft, stowed so as to facilitate its ready use in an emergency, and manually activated by survivors.

Emergency locator transmitter (distress tracking). Emergency locator transmitter for ICAO-specified in-flight distress tracking.

Emergency phase. A generic term meaning, as the case may be, uncertainty phase, alert phase or distress phase.

Uncertainty phase. A situation wherein uncertainty exists as to the safety of an aircraft and its occupants.

Alert phase. A situation wherein apprehension exists as to the safety of an aircraft and its occupants.

Distress phase. A situation wherein there is reasonable certainty that an aircraft and its occupants are threatened by grave and imminent danger or require immediate assistance.

False alert. An alert received from any source, including communications equipment intended for alerting, when no distress situation actually exists, and a notification of the alert should not have resulted.

GADSS information management. The infrastructure and services used for the exchange and timely dissemination of information in support of the GADSS.

Mission control centre (MCC). A component of the Cospas-Sarsat ground segment that follows a prescribed set of data processing and distribution rules to process distress alert data from 406 MHz beacons, exchange it with other MCCs, and send it to RCCs.